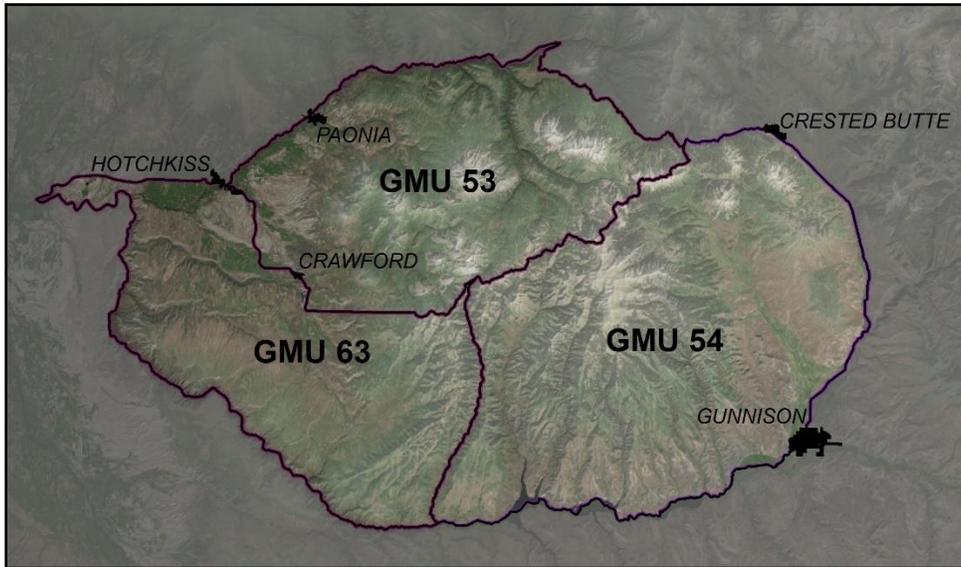


# E-05 Herd Management Plan - West Elk Mountains-

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## Game Management Units 53, 54, & 63



Colorado Parks and Wildlife

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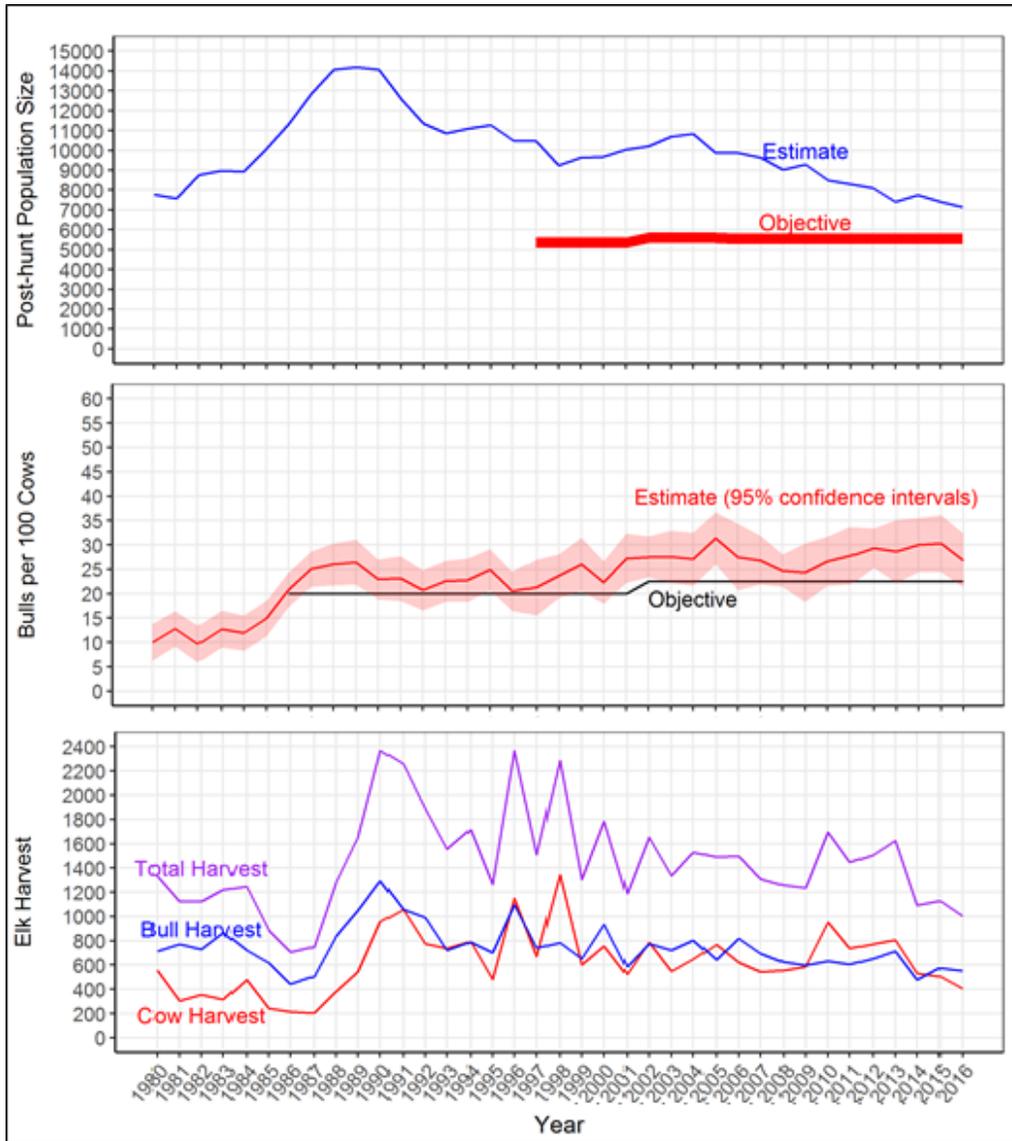


June 7, 2018

# Executive Summary

## DAU E-05: West Elk Mountains Elk Herd (formerly E-41 and E-52)

<b>Game Management Units:</b> 53, 54 & 63	<b>Landownership:</b> 27% private & 73% Public
<b>Post-hunt population size (2016):</b> 7150 elk	<b>Post-hunt sex ratio (bulls:100 cow):</b> 29 (modeled 3 yr avg.)
<b>Previous herd plan objectives:</b> 5200 – 5900 elk, 18-23 bulls:100 cows	
<b>2017 herd plan objectives (Current/Approved/New):</b> 7800-8800 elk, 23-28 bulls:100 cows (modeled 3 yr avg.)	



This E-05 plan reflects the merging of E-41 (GMU 54) and E-52 (GMU 53 & 63). Combining these into a single “West Elk Mountains Elk Herd” will allow the elk population to be managed at a biologically appropriate scale given CPW’s management by objective approach. The E-05 GMUs are managed with a partially limited licensing strategy to provide ample elk hunting opportunity.

The management alternatives selected in this plan will ultimately be used on an annual basis for setting license number allocations. Formation of the primary objective (population size) is made considering the partially limited licensing strategy, stakeholder input, and carrying capacity history. Formation of secondary objectives (bull ratio and license allocation strategy) should consider the population size alternatives. The bull ratio objective cannot be modified considering the over-arching strategy to manage for ample hunting opportunity in this herd. The spatial distribution objective was formed based on desires of stakeholders and the need to actively manage the inter-GMU spatial distribution of elk. The following set of objectives and corresponding alternatives were examined:

Objective	Alternatives
Population Size	#1: 6600 - 7600 elk (status quo)
	<b>#2: 7800 - 8800 elk (Approved)</b>
	#3: 8500 – 9500 elk
Expected Bull Ratio	#1: 18-23 bulls:100 cows (E-52 former status quo objective)
	<b>#2: 23-28 bulls: 100 cows (E-41 former status quo objective - Approved)</b>
Spatial Distribution	<b>#1: Cow licenses are allocated disproportionately among GMUs to manipulate elk distribution (Approved)</b>
	#2: Cow licenses are allocated spatially among the GMUs according to the 2006-2017 inter-GMU proportions.

Desires of stakeholders were characterized through an extensive public input gathering process that included: a public scoping meeting, a survey of a randomized set of elk hunters and landowners, a survey open to the public, and a 30-day public comment period. The CPW staff preferred alternatives identified in the table above best reflect the desires measured in the public input process.

Stakeholder desires must be balanced with the carrying capacity of the landscape in E-05. In the past (i.e., prior to 2007), E-05 rangelands have experienced over-grazing by wild and domestic ungulates. Wild ungulate numbers (mule deer and elk) have been decreased by CPW in response to the overgrazing issue. Current (>2010) surveys indicate that vegetation has likely recovered. E-05’s historic population size and habitat condition history were considered in range of population size alternatives. However, the distribution of elk within E-05, rather than the overall population size, underlies most of E-05’s current elk management issues. As indicated by CPW data on elk movements and public opinion surveys, elk distribution is currently skewed toward lands where elk hunting pressures are low. This distribution issue will be ever-evolving (and possibly increasing) as other pressures (highway traffic, recreation, land management practices, spruce beetle) further redistribute elk. Monitoring of elk movements via GPS collar studies are helping managers better understand the relative importance of each elk distribution driver.

### **CPW Recommendation to the Parks and Wildlife Commission**

Population, Sex Ratio Objectives, and Spatial Distribution Objectives: The CPW staff preferred population size alternative is #2; an approximate 17% increase (from 7150 to 7800-8800 elk). The Bull ratio alternative preferred by CPW staff is #2 (23-28 bulls:100 cows), which most closely represents the bull ratio objective in the former E-41 (GMU 54) plan. The preferred spatial distribution alternative is to allocate cow licenses disproportionately among the three GMUs to spatially distribute elk relative to stakeholder desired population size change in each GMU.

### **Strategies for Achieving Objectives**

**Population-** The selected population will be achieved and maintained by manipulating cow and bull license numbers as described in CPW's adaptive management by objective approach.

**Herd Composition (expected bull ratio)** - It is recognized that the major changes in the bull ratio can't be made considering the partial over-the-counter licensing strategy. Bull ratios are expected to be maintained at status quo given this licensing strategy.

**Spatial Distribution-**The spatial distribution objective will be achieved by manipulating cow licenses more dramatically in early seasons of GMU 54 (relative to GMU 53 & 63) to encourage elk's utilization of GMU 54 public lands during the summer and fall season. Focus may be placed on manipulating early season hunting licenses(reducing the number of licenses) that may best be suited for encouraging summer range re-colonization of certain GMU 54 localities.

#### **Strategies to Address Management Concerns**

**Private Land Conflicts-**Future management actions may consider manipulating elk distribution through hunt code manipulations (i.e., sub-unit and special seasons) to increase hunter encounters with elk and discourage elk utilization of lands where rangeland conflicts are most pronounced. Staff will continue to encourage relatively more hunting pressure on private lands.

*This E43 herd management plan was approved by the Colorado Parks and Wildlife Commission on June 7, 2018.*

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## **Introduction and Purpose**

Colorado Parks and Wildlife (CPW) manages wildlife for the use, benefit and enjoyment of Colorado's people and visitors. Management of big game wildlife populations is conducted with a "Management by Objective" approach, in which each big game population is managed to achieve objectives for its defined herd. Defined herds are bound geographically as Data Analysis Units (DAU) which delineates a grouping of animals that has little spatio-temporal overlap with neighboring herds. Ideally, it delineates where most animals in the herd birth, live, and die. A herd is often divided into several game management units (GMUs) to distribute hunters and harvest within the herd. The term "Data Analysis Unit Plan" was abandoned in January 2018 for "Herd Management Plan" in order to improve the line of communication between biologist, the public, and other CPW staff.

The primary purpose of a herd management plan is to establish management objectives pertaining to a DAU. For herd E-05, the plan establishes management objectives in terms of a desired elk population size range (primary) and sex ratio range (secondary). Management objectives established in this plan must abide by statutes and policies set forth by the CPW's Big Game Season Structure, CPW's Strategic Plan, Parks and Wildlife Commission, and the Colorado State Legislature. E-05 is currently designated by the Colorado Parks and Wildlife Commission as a partially unlimited license unit for providing hunter opportunity. Thus, a mixture of limited licenses, over-the-counter bull licenses, and antler point restrictions, are used to provide ample opportunity for bull hunters, while allowing some control over bull ratios. Herd management plans also identify and carefully consider issues and topics important to big game management, which are broadly categorized as those pertaining to herd population dynamics and hunting history (pp. 6-12) or herd distribution and carrying capacity (pp. 12-18). Herd management plan objectives are established by considering the best available scientific data along with the desires of stakeholders through a public input gathering process (pp. 19-21 and Appendix 5).

The alternatives selected in this plan will drive annual elk license setting decisions, which are designed to maintain or modulate the elk population and meet the objectives established in this plan. The plan also describes additional strategies and techniques that will be used to achieve the herd objectives.

### ***Description of Herd***

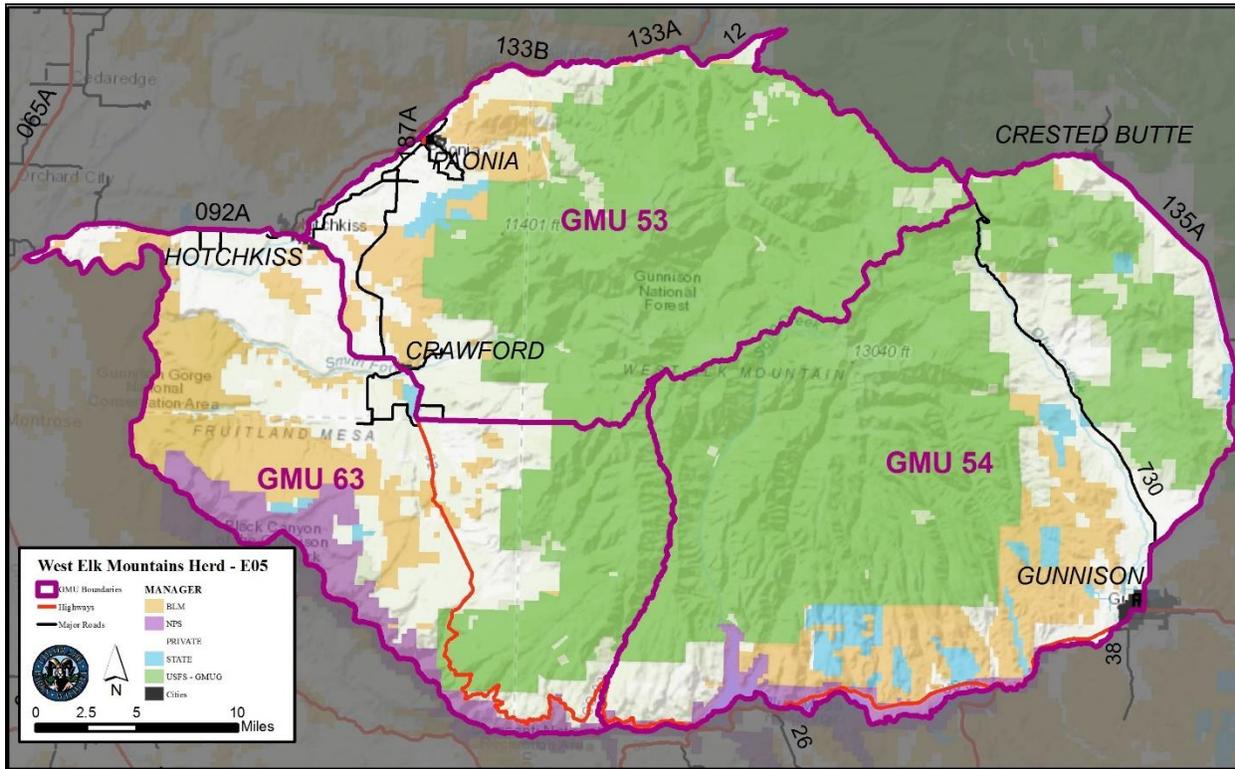
E-05 is located in southwest Colorado and spans northwestern Gunnison county, eastern Delta county, and northeastern Montrose county. It consists of Game Management Units 53, 63, and 54 (Fig. 1), covering 1351 square miles. The West Elk Mountains, the predominant land feature, is in the center of E-05. A description of the current vegetation can be found in the herd distribution and carrying capacity section below.

Landownership is dominated (72.6%) by public lands managed by the United States Forest Service (USFS), Bureau of Land Management (BLM), National park Service (NPS), and the state of Colorado (Colorado Parks and Wildlife and State Land Board) (Fig. 1). 6.7% of the land is private land protected with conservation easements. The remaining (20.6%) are privately owned and managed lands.

### ***Combining E-41 and E-52 to a single West Elks herd (E-05)***

Prior to the creation of this plan, E-05 was composed of two DAUs, E-52 and E-41. E-52, (which was denoted as the Coal Creek/ Fruitland Mesa Herd), was comprised of GMU 53 and 63. E-41, (denoted as the Sapinero Herd), was comprised solely of GMU 54. A complete discussion of the process and

justifications taken into consideration for merging the E-41 and E-52 DAUs as DAU E-05 (West Elk Mountains Herd) is discussed in Appendix 1.



**Figure 1.** Location of DAU E-05, GMU 53, 54, and 63 boundaries, public land ownership (shaded), private land (un-shaded), cities, and major roads.

## Herd Population Dynamics and Hunting History

### *Population Estimation Methods*

Estimating numbers of wild animals over large geographic areas is a difficult and approximate science. Colorado Parks and Wildlife recognizes the difficulties of estimating the size of big game populations as a challenge in managing populations. The agency utilizes flexible population estimates that incorporate the latest technologies available and complimenting data sources. As additional years of data are added, the accuracy of prior year estimates are improved, thus ultimately improving current estimates.

The population objective range depends on the population estimate derived at the time the herd management plan was being created. However, population modeling is an evolving process whereby modeled estimates can change over time based on additional data or improved modeling methodology. CPW managers have conducted two major revisions in the E-41 population model since the 2001 herd management plan and one major revision in the E-52 population model since the 2005 plan. These changes ultimately improved the model, but also resulted in a large increase of the estimated population size at two points in time (post-hunt 2004 and 2010) (Fig 2). No actions were taken concerning elk license allocations when these changes in population estimation methods occurred; an actual population change on the ground did not occur. An adjustment, or index, to the population size

objective can be calculated by examining the difference observed in the published population estimate at the time of the herd management plans creation and the retrospective population size estimates derived with the most recent population model (June 2017). To account for uncertainty in this disparity, we computed the average difference in annual population size estimates originating from the two models during 1999-2003 for E-41, and 2000 – 2005 for E-52. The retrospective estimates of population size were on average a factor of 1.26 and 1.72 (1.39 combined) times higher than what was generated and published on an annual basis for E-41 and E-52 respectively. Thus, the revised population size trend (Fig. 2) is the best information CPW has available; past published population estimates for a particular year are less accurate. If the population objective of 5550 elk (midpoint determined by the 2001 E-41 and 2005 E-52 plan) was adjusted retrospectively in accordance with the two herd's adjustment factors, an adjusted objective of 7812 elk would be realized (Fig. 2). As a result, the 2016 E-05 population estimate is actually just under the relative population objective desired in the prior herd management plans.

Population objective adjusting with an amendment is a concept that has been extensively discussed and vetted to the CPW Commission in January 2018. In situations where population models are updated with new data (as done annually in E-41 and E-52) or with new parameters that result in more accurate population estimates, an existing herd plan could be modified with a simple amendment. As demonstrated in the 2001 – 2016 example expressed above, population objective adjusting with a factor could be conducted by comparing the change in population size of a new population model to the existing model. If functional changes to the model in the future result in changes in the population estimate, but not changes in management, the population objective can be modified with a short herd management plan amendment. Failing to adjust population size objectives when model changes occur, or after several years of data has been collected, can mislead annual harvest management decisions, bringing the population out of line with stakeholder desires or the capacity of the habitat. Simply stated, an amendment would not change the number of animals on the ground, but intended to synchronize the most up-to-date population estimate with the current herd management plan objectives. This in turn, will help substantiate annual license prescriptions.

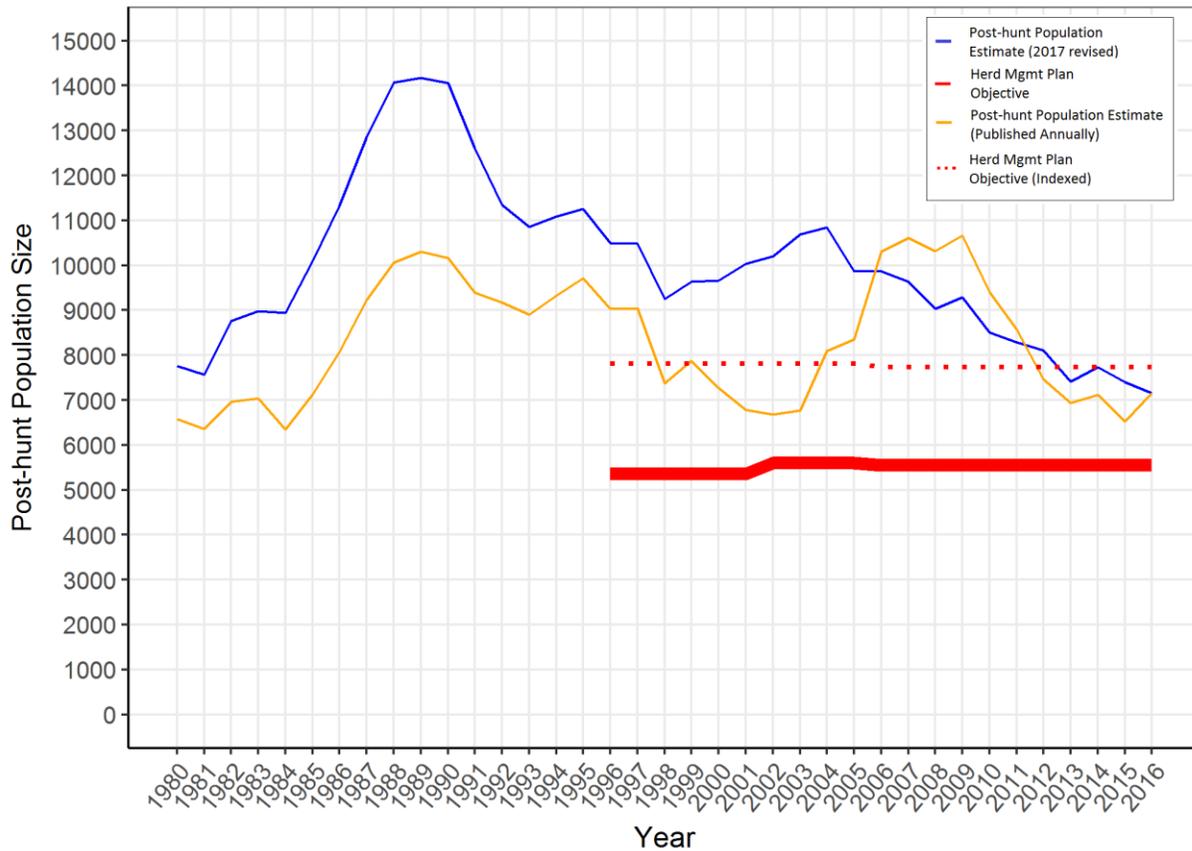
### ***Population History***

Examining the E-05 herd retrospectively with the most current population model indicates that E-05 experienced three major population size trajectories (changes) since 1980 (Fig. 2):

- 1) 1980-1989. During this period, the population grew rapidly. Elk harvest ranged from 200-500 cows annually, representing a 6% harvest of the pre-hunt cow elk population segment.
- 2) 1990 – 1998. The population was decreased intentionally in response to high elk numbers the prior decade. Elk harvest averaged 830 cows annually, representing a 14% harvest of the pre-hunt cow elk population segment.
- 3) 1999 – 2016. The population was decreased again (primarily in E-41), but at a slower rate with approximately 650 cows harvested annually. This represents a 13% harvest of the pre-hunt cow elk population segment.

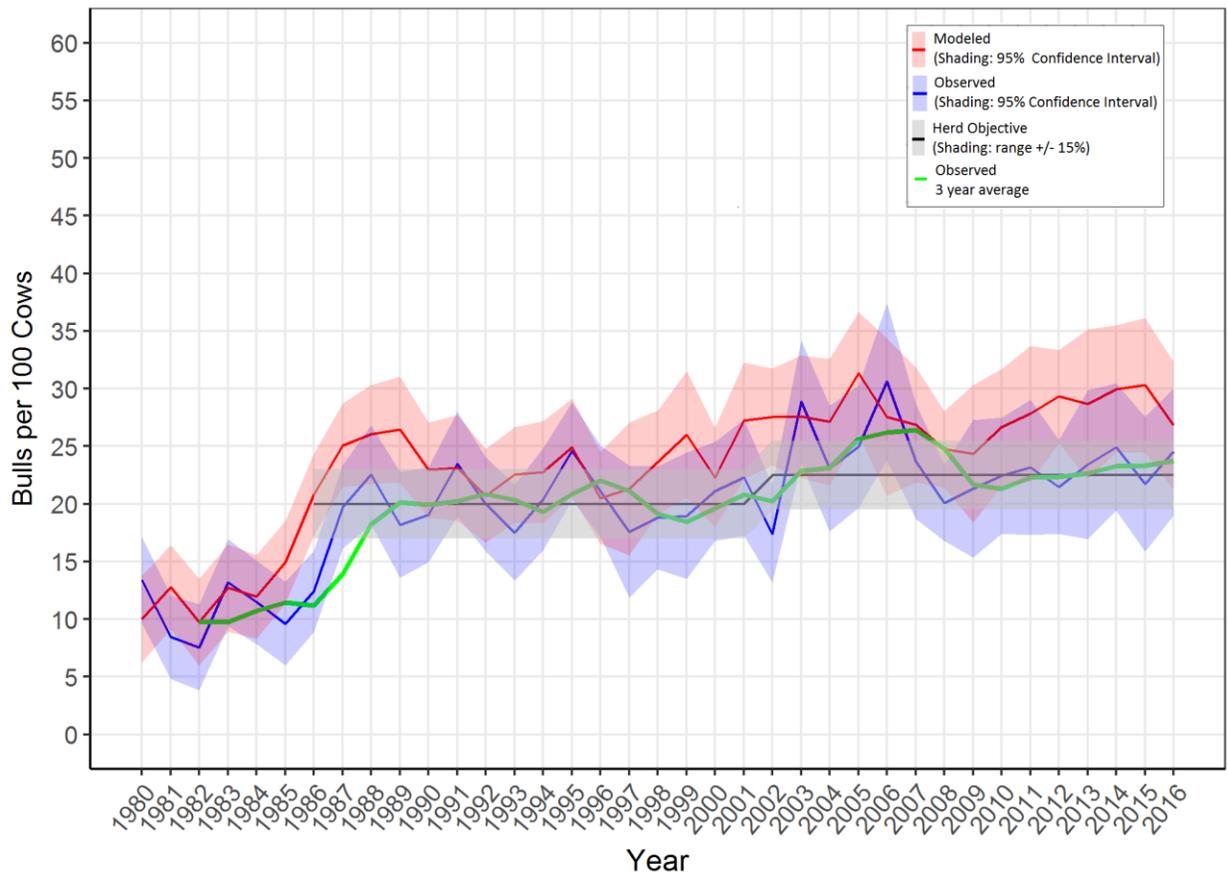
Bull ratios (bulls per 100 cows) experienced an overall increase since 1980 (Fig. 3). Contributions to this increase include changes in bull ratio objectives, a 4-point antler restriction implemented in 1986, and

an overall high cow harvest. Given the partial over-the-counter licensing strategy used in E-05, the actual bull harvest in a given year cannot be fully controlled by license allocations in these units.



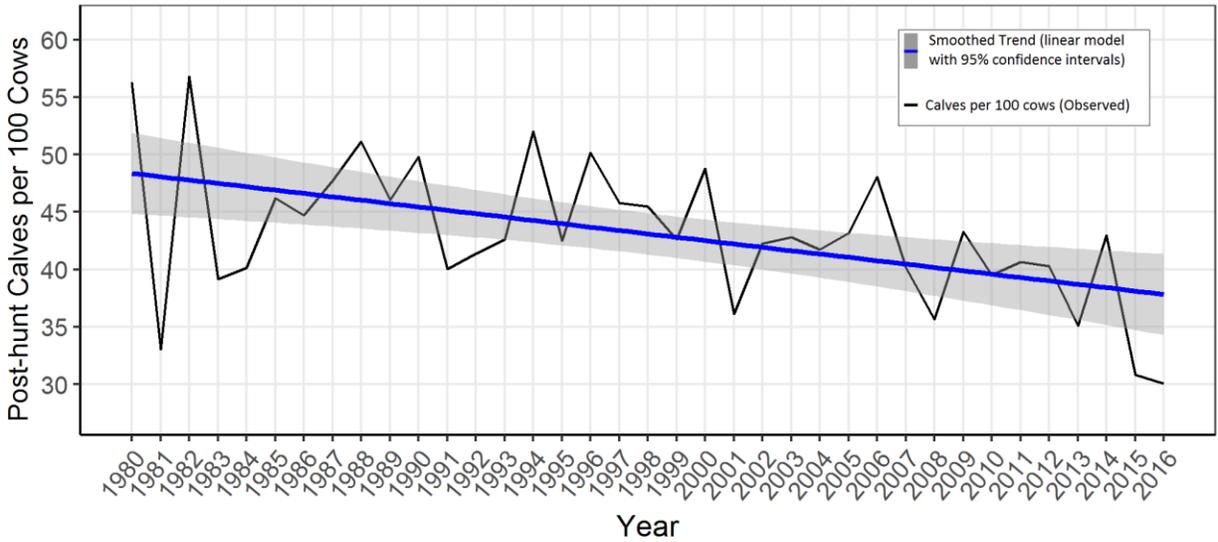
**Figure 2.** Population size trend estimates and corresponding herd management objectives. Current (2017) best estimates (blue) are more realistic and have smoother estimates over estimates published annually (yellow). The indexed objective (dotted red line) is the old combined population objectives (solid red line) of the prior E-41 and E-52 plans, scaled by an average factor of 1.39 to reflect the revised retrospective population estimate.

Since the 1980s, the E-05 herd has experienced a decline in calf ratios (calves per 100 cows; Fig. 4). Calf ratios measured post-hunting season are a partial measure of reproductive performance. Calf ratios have declined gradually from 47 to 38 calves:100 cows since 1980 (Fig. 4). This decline in calf ratios is likely contributing to a declining percentage in the pre-hunt cow harvest segment needed to maintain this herd. This decline is also observed in many other Colorado Elk herds, with the steepest declines in the more southerly latitudes. E-05’s calf ratio currently approximates Colorado’s statewide five-year average calf ratio of 39:100.



**Figure 3:** Modeled (red) and observed (blue) bull ratio estimates (bulls:100 cows) and corresponding 95% confidence intervals (blue and red shading). Previous herd plan objectives (gray) were not published as ranges, but as a single fixed point objective. Objective range is shown corresponding to +/- 15% of this fixed objective. Annual management decisions consider the modeled bull ratio and running three-year average observed (green) bull ratio.

The predominant driver of elk population size in this unit appears to be adult female harvest and natural calf survival. A variety of non-harvest related mortality factors can influence population growth rates, depending on whether they are compensatory or additive. Cow and calf natural mortality rates (deaths unrelated to hunter harvest) measured with VHF telemetry in 2000 – 2001, across the Gunnison Basin, found that annual and over-winter survival rates were high, but comparable to other studied populations (Freddy 2002). Given the 98% annual survival rate and 84% calf survival rate measured, only a small number of mortalities were found and investigated. They found that the proximate cause of death for 21 collared calves included predation (53%), malnutrition (24%), and other sources (23%). Given the high elk population size at that time (Gunnison Basin wide), predation and malnutrition were likely compensatory mortality factors with each other. Habitat quantity and quality are recognized by wildlife managers as being the predominant driver of non-hunting mortality and reproduction in elk populations. Stakeholders also appear aware; public input surveys indicate that habitat quantity/quality are of a high to moderate level of concern (Appendix 5, Section 2, Question 11).



**Figure 4.** E-05 observed calf ratios (post-hunt calves per 100 cows) 1980 – 2016 (black line). Smoothed trend and 95% confidence interval of calf ratio (blue line and gray shading).

The effects of wild predators are not always clear. Whether predators are severely limiting elk depends on how close the elk population is to carrying capacity. At relatively high elk population sizes (closer to carrying capacity), predation likely has little additive effect. Predation could be more concerning if the elk population size is low (well below carrying capacity). Carrying capacity can change depending on rapidly changing ecological conditions (i.e., extreme winter or drought). Prior to concluding that high predation rates have an impact on elk population growth, it should be determined whether predation is the ultimate or proximate cause of death. Ultimate causes of death, such as from the contraction of a fatal disease or poor body condition, must be considered when the cause of mortality appeared to be predation. Public input surveys indicate that predator impacts to populations of deer and elk are of a moderate to low level of concern (Appendix 5, Section 2, Question 11).

Diseases can ultimately decrease population growth rates if ever established at a sufficient high prevalence. Currently, the influence of disease presence (CWD, adenovirus, EHD or blue-tongue) on the E-05 population size is unknown given the lack of standardized disease surveillance. It is noted that EHD has been detected opportunistically in wild ungulates inhabiting E-05. While very little rigorous CWD prevalence monitoring has occurred in the West Elk Mountains, CWD has been detected in wild ungulates of neighboring vicinities (GMU 64, 65, and 521). Given that aggregations of ungulates on the landscape can increase transmission rates of diseases like CWD (Farnsworth et al. 2005), areas where elk seek refuge from hunters are of special concern. Public input surveys indicate that disease impacts to deer and elk populations are of a high level of concern (Appendix 5, Section 2, Question 11).

CPW is currently monitoring the survival rates of adult female elk with GPS collars throughout the Gunnison Basin GMUs and North Fork GMUs 53 and 63. Results of this study can help discern sources of mortality and provide additional information for the estimation of elk population sizes.

### ***Harvest Management History***

Carefully regulated harvest of the elk population’s cow segment is the primary tool to maintain or drive an elk herd’s size to the management plan’s established objectives. Elk harvest regulations have

changed over time. The following chronology of regulations have occurred for most over-the-counter elk units across Colorado.

- 1986: 4-point antler restrictions put into place for 1<sup>st</sup> and 2<sup>nd</sup> rifle seasons.
- 1996: 4-point antler restrictions put into place for all elk seasons
- 2000: 1<sup>st</sup> rifle seasons became limited
- 2005: 4<sup>th</sup> rifle season became limited
- 2010: Muzzleloader season became limited

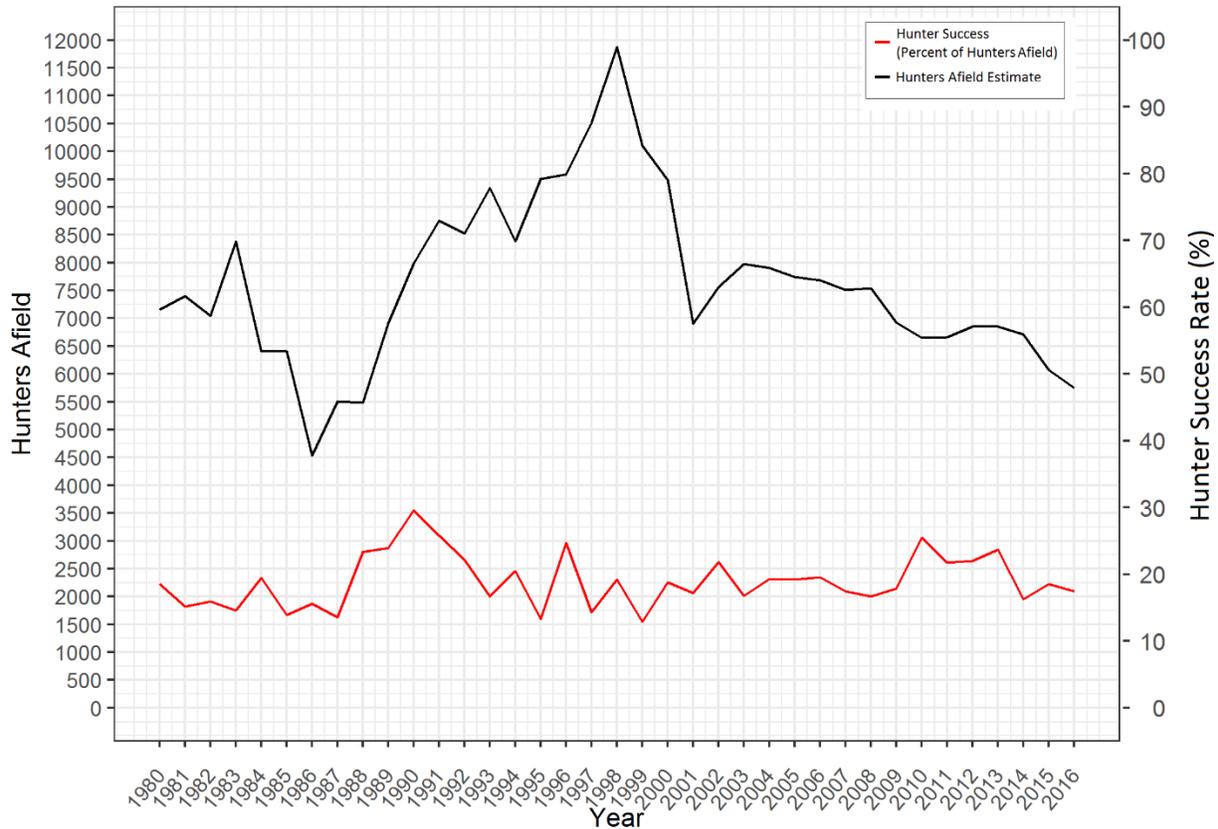
Manipulating population sizes is done by providing a certain number of hunters with the opportunity to harvest cows via licenses. The number of licenses allocated in a particular season is based on the prior year's data of 1) licenses allocated by CPW, 2) number of hunters that went afield, 3) number of elk harvested. Hunter success rates can be measured as either elk harvested per licenses allocated or by the number of hunters afield. The number of harvests per the total hunters afield is the metric published annually by CPW (Fig. 5), and is most important to a hunter's experience in terms of hunter crowding levels. However, harvest success rates per licenses allocated are most important metric for the annual license allocation process. Given that success measures vary annually with response to weather and survey error, a three-year average harvest success rate is actually used. Overall (1980-2016) harvest success for seasons with limited licenses averaged 19% ranging between 12.9 and 29.6% (Fig. 5).

While a majority of the harvest management strategy focus in E-05 the past two decades has been placed on lowering the overall elk population size, a few harvest strategies have been implemented to manipulate elk distribution in order to 1) help address agricultural conflicts, and 2) hold elk on public lands to provide hunter opportunity.

In 2010, a limited licenses regulation was placed on GMU 54's archery season to reduce hunting pressure on elk summer range that could be causing elk to seek refuge on lower elevation private lands. Other strategies implemented over the past decade to help manipulate elk distribution and reduce overall numbers included:

- Either sex licenses in place of bull only licenses
- Either sex, Over-the-counter licenses with caps for 2<sup>nd</sup> season.
- Expanded late rifle seasons
- List B cow licenses
- List C Private-land-only cow licenses
- Sub-unit hunts targeting conflict areas like Ohio Creek (GMU 54) and areas west of Hwy 92 (GMU 63)

Manipulating bull ratios in E-05 toward a target objective is not straightforward given the partially OTC licensing strategy. Overall, regulations regarding limited licensing and 4-point restrictions have contributed the most to manipulating bull ratios. Given the partial over-the-counter licensing strategy used in E-05, the actual number of bull-hunters in the field in a given year cannot be controlled. Manipulating bull ratios based solely on the current limited licenses (1<sup>st</sup> and 4<sup>th</sup> rifle seasons) may have some influence on bull ratios in certain years. However, any modulation in the bull ratio composition perceived by hunters on the ground will likely result in short term changes in OTC bull harvest success, by attracting more or less OTC bull hunters in future years.



**Figure 5.** E-05 estimated number of hunters (black) and hunter success rates by the percentage of hunters afield (red) 1980-2016.

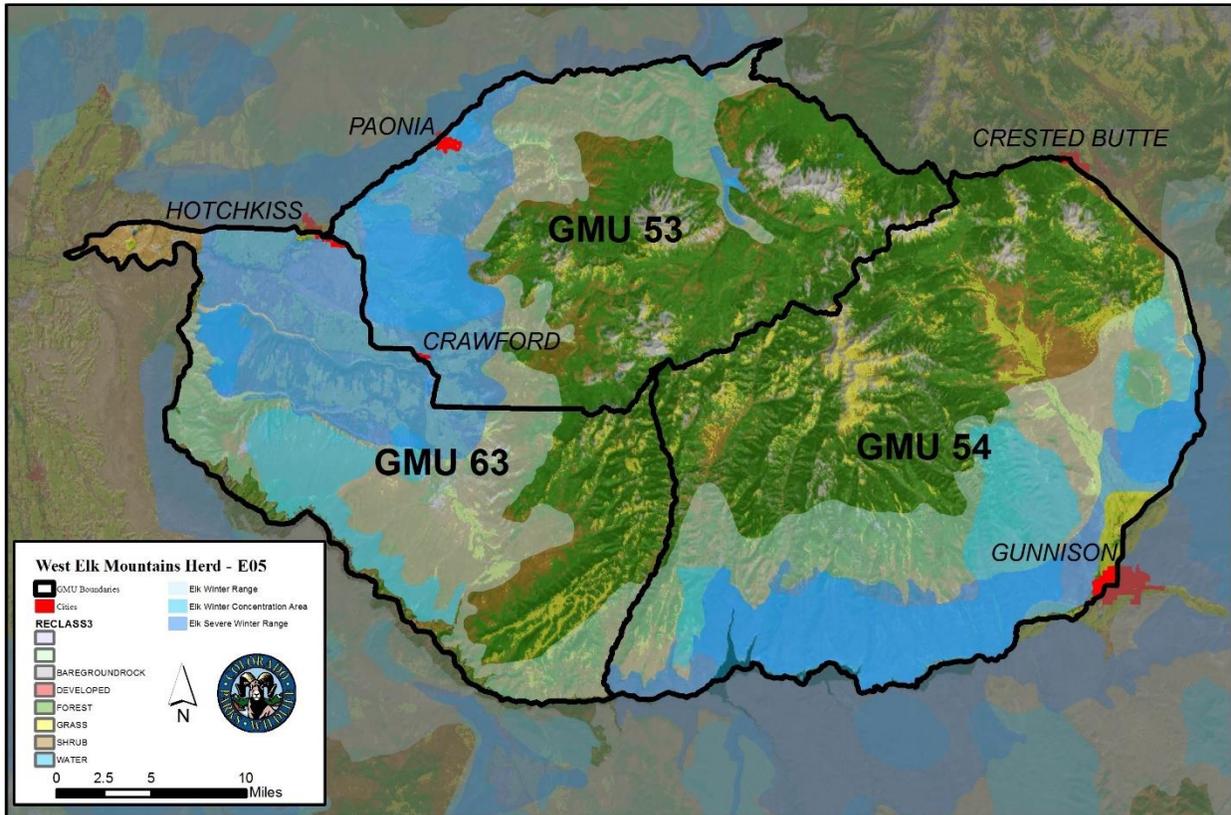
The number of hunters afield is important to consider for hunter crowding issues, when hunter numbers are considered in relation to GMU size, elk distribution, and accessibility. Hunter numbers, and the distribution of hunters, influences elk distribution on the landscape. Various studies indicate that elk movement rates increase with response to hunting pressure (Johnson et al. 2002, Rumble et al. 2005, Cleveland et al. 2012). Speculations are also made that elk may decrease home range sizes during hunting seasons, thus requiring hunters to traverse more area before encountering an elk. Decreases in home range size during the hunting season may contradict the effect of increased elk movement rates on hunter-elk encounterability. Elk hunter density must also be considered in conjunction with human pressures outside of the control of this plan. Hunters seeking other game (mule deer, bear, bighorn, dusky grouse) and non-hunting recreation pressures in E-05 should be considered when developing management plans for those species. Public input surveys indicate that human pressures on elk distribution, whether they are from hunters or non-hunters, are of a moderate level of concern (Appendix 5, Section 2, Question 11).

## **Herd Distribution and Carrying Capacity**

### ***Elk Distribution***

Throughout the year, elk can potentially occupy any locality within E-05. However, the spatial distribution changes throughout the annual cycle. No quantifiable data has been collected on the

spatial-temporal heterogeneity in E-05 elk density. Elk generally follow a typical seasonal migration pattern in E-05, with the utilization of higher elevations in the summer, and lower elevations in the winter. However, in some cases, elk wintering in GMU 54 move to a nearly equal elevation for summer range; migration appears to be driven partially by moisture availability in the northern West Elk Mountains. In GMU 53, the knowledge of elk distribution is limited to data collected on elk collared on winter ranges of neighboring GMUs and a small telemetry study in the early 1990s (Appendix 3), in addition to expert opinion maps of elk winter range, critical winter range, and severe winter range (Fig. 6).



**Figure 6.** Polygon range maps derived by CPW staff depicting elk winter range (light blue shading), elk winter concentration areas (medium blue shading), and elk severe winter range (dark blue shading).

Elk utilize a range of habitats, depending on the season and conditions. Elk movement and subsequent distribution patterns are influenced by many factors, such as weather, vegetation (Lyon and Jenson 1980, Hurley and Sargeant 1991, Sawyer et al. 2007), and wild predators (Hebblewhite et al. 2005). A growing body of information also supports that elk habitat utilization is influenced by several anthropogenic factors, including: non-hunting recreation (Phillips and Alldredge 2000, Kloppers et al. 2005), hunting recreation (Walsh et al. 1991, Conner et al. 2001, Johnson et al. 2002, Viera et al. 2003, Sunde et al. 2009, Cleveland et al. 2011, Rumble et al. 2005), off-highway vehicle traffic (Preisler et al. 2006, Wisdom et al. 2005), road traffic (Perry and Overly 1977, Lyon 1979, Rost and Bailey 1979, Witmer and deCalesta 1985, Preisler et al. 2006, Sawyer et al. 2007, Montgomery et al. 2013), resort/residential development (Picton et al. 1980, Morrison et al. 1995, Wait and McNally 2004, Shively et al. 2005), and mineral extraction (Kuck et al. 1985, Webb et al. 2011). It appears that combinations of these

anthropogenic and or natural factors produce a nonlinear habitat utilization response in elk (Frair et al. 2008). Support for some of these elk-habitat selection relationships (i.e., road impacts on elk movement) are currently being demonstrated in preliminary analysis of elk movements in the Gunnison Basin and West Elk Mountains (Appendix 3, section 6).

It is important to reiterate that elk are not evenly distributed across E-05 or any particular polygon delineation of the herd (i.e., Fig. 6). When elk distribution exhibits extreme spatio-temporal variations within the herd, methods for estimating elk population size (White and Lubow 2002) must be conducted for a specific geographic unit boundary that delineates a closed population. This variation in distribution within the herd can complicate carrying capacity estimates and estimates of pressure exhibited by elk on the vegetation. Elk have the capability to continually move across the landscape to seek out the most available and nutritious forage. This dynamic distribution will often limit attempts to evaluate carrying capacity at smaller geographic scales.

The Gunnison Basin and North Fork HPP committees have recognized elk distribution as a prevailing issue and have worked to facilitate and improve landowner communication and cooperation. A number of projects have been done on private and public lands over the past decades to address fence, forage, and distribution conflicts.

Wildlife managers are becoming increasingly aware of how important elk distribution is when making elk management decisions. Furthermore, when examining public opinions in a recent E-05 survey of landowners and hunters, 67.3% showed a level of agreement (strongly or somewhat agree) with a statement referencing that elk distribution is more important than elk abundance in E-05. Only 20.3% showed a level of disagreement (strongly or somewhat disagree) and 12.5% were equivocal with the statement that distribution was more important than abundance.

### ***Vegetation Characteristics***

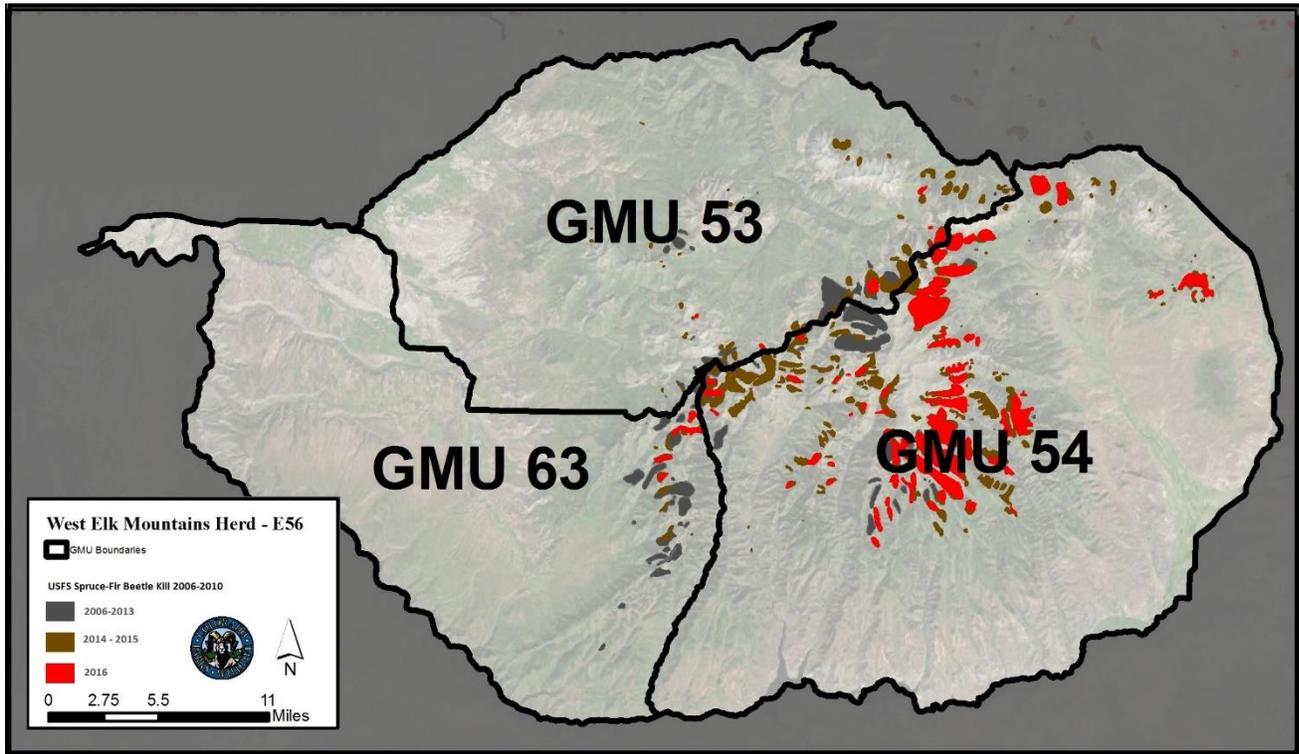
E-05 is composed of three major vegetation cover types (grassland and barren: 12.7%, shrub-land: 29.8%, forest: 57.4%) and a variety of communities within each type (LANDFIRE 2013).

Grasslands are found either in high elevation alpine, dispersed throughout the herd boundary in forest and shrub-land types, or found existing as agricultural conversions. Alpine grasslands, along with adjacent barren ground, cover ~4.2% of E-05. Approximately 4.9% of E-05 is considered non-native grasslands maintained via irrigation and crop production.

Shrubland communities, comprising almost one third of E-05, exist as: Gambel oak shrubland alliance (42%), Inter-mountain basin big sagebrush shrubland (24.3%), Rocky Mountain lower montane foothill shrubland (20.4%), and inter-mountain basins mixed saltbrush shrubland (4.1%) other types include various sagebrush alliances, greasewood flat, and gambel oak alliances.

Conifer forest make up 60.7% of the all forest types in E-05. Forests are comprised of aspen or aspen-conifer mixed woodlands (37.9%), spruce-fir forest and woodlands (32.5%), pinyon-juniper woodland (14.1%). The remaining woodland types are Douglas-fir associations (9%), lodgepole pine (3.78%), riparian woodland/shrubland mixes (1%), and agricultural-orchards (0.02%). Aerial survey data indicates that approximately 60.2 square miles of forest in E-05 have been affected by an ongoing spruce beetle epidemic in E-05 between 2006 and 2016 (Fig. 7). This impacted area is approximately 13% of all conifer

forest types mapped and 24% of all spruce-fir forest and woodlands in E-05. Most of the impacted areas are in GMU 54, but it appears that beetle impacted areas continue to grow.



**Figure 7:** E-05 spruce beetle affected areas by year: 2006 – 2013 (gray shading), 20013-2015 (brown shading), 2016 (red shading).

### ***Habitat Capability and Condition***

Several factors influence how many animals can be supported on a landscape. Habitat or biological carrying capacity is a landscape’s ability to provide food and shelter for a particular species. Biological carrying capacity is an important variable when recognizing density dependent population responses. Given a finite level of food and cover resources, an ungulate population can become self-limiting under certain conditions; rates of survival and reproduction will decline as population density reaches habitat carrying capacity. Definitive estimates of carrying capacity are not available in E-05; capacity can vary spatially and temporally in response to weather, site history, and inter-specific competition. For a long-lived species, such as elk, fluctuations in weather patterns from year to year make it difficult to manage toward the higher carrying capacities afforded in years of good forage availability and fair weather.

Social carrying capacity is also important, as it is the number of animals that human society may accept or desire on the landscape. Social carrying capacity does not have any intrinsic effects on elk population size, such as the way biological carrying capacity would. Social carrying capacity is determined by the public input process discussed in this plan.

A particular focus of current vegetation monitoring by land managers has been placed on monitoring sagebrush habitats for Gunnison Sage-grouse (GUSG), a threatened species protected under the federal Endangered Species Act. GUSG habitats are also important areas for elk winter range (Fig. 6). Thus far, no research has been conducted to examine direct impacts of elk populations on the GUSG. Speculation

has existed that impacts to vegetation in and around grouse nests can occur in areas heavily used by wild and domestic ungulates. Recent GUSG studies conducted specifically in the Gunnison Basin, during a period when vegetation characteristics were within the optimal range, found that changes within that optimal range were not strongly indicative of GUSG nest success (Stanley et al. 2015, Davis et al. 2015). However, any extreme deviations in vegetation height outside the optimal range should be cautioned against (Davis et al. 2015). Managers should be cognizant of any ungulate mediated decreases in sagebrush cover below 10% (at the 1-2 acre scale), as this appears to influence GUSG nest site selection (Oyler McCance et al. 2001, Aldridge et al. 2012) and is the minimum of the GUSG Rangewide Conservation Plan guidelines (GSRSC 2005).

While large spatial and temporal scale quantitative information on carrying capacity is unavailable, various vegetation assessments and surveys have been conducted on smaller spatio-temporal scales (relative to E-05's extent) that offer land managers clues on the overall wild and domestic animal carrying capacity in E-05. Information from 17 projects are summarized in Appendix 4 to help provide discussion and justification for the elk population objective alternatives considered in this plan. Based on this information, relative to the mid-1990's to mid-2000's, E-05 has shown an overall improving trend in range condition over the past 10 years. While sagebrush habitat characteristics of GMU 54 are within guidelines for GUSG habitat (GSRSC 2005), certain localities within GMU 63 are well below. It is undocumented whether a full recovery in all shrub species (serviceberry, mountain mahogany, and antelope bitterbrush) has occurred E-05 wide. Recent vegetation measures collected on elk winter range by the BLM AIM monitoring program indicate that BLM lands within the Gunnison Basin are currently meeting GSRSC (2005) guidelines for sage-grouse (Appendix 4). Other similar vegetation measurement projects collecting data for GUSG monitoring purposes (Summarized in Appendix 4 - Williams and Hild 2012: 2011, Davis et al. 2015: 2005-2010) indicated that Gunnison Basin vegetation from 2005 through 2011 was within the GSRSC (2005) guidelines. During this 2005-2011 period, approximately 30-40% more elk were present on GMU 54 winter-range (Figure A1.1: E-41 population trend) than are present at the time of this elk plan's development, thus elk are not currently considered a limiting factor for GUSG within GMU 54.

It is recognized that managing a wild population to a size that is well below carrying capacity of the habitat results in the highest reproductive rates. Managing a population toward high elk population size objectives can occur in fair weather years with good forage. However, years of extreme winter weather or extended drought may result in an abnormally low biological carrying capacity for all ungulates (wild and domestic). These temporary, but extreme, weather events can negate managers' efforts to maintain high wild animal populations. For instance, even during years of above average range quality, a winter with abnormally high snow depths can physically limit ungulate's ability to access the available vegetation.

The E-05 public appears to be at least partially aware of issues involving carrying capacity for ungulates. When asked in a recent survey of hunters and landowners opinions, habitat quality and quantity ranked as one of the top issues concerning deer and elk management (Appendix 5, Section 2, question 11).

The degree of range overlap among other wild ungulate species (i.e. mule deer) must also be considered for understanding carrying capacity. A detailed discussion of ungulate habitat carrying capacity in reference to mule deer can be found in Diamond (2013).

### ***Conflicts with Agriculture***

Agricultural activities consist of rangeland grazing by cattle and sheep, hay production (grass and alfalfa), and hobby livestock interests. It is estimated that ~5% areal coverage of E-05 is croplands consisting of irrigated hay meadows and terraces planted with annually harvested non-native forage, with smaller concentrations of row crops and orchards in GMU 53 and 63. Most agricultural interests in E-05 are based on private cow-calf operations that utilize federal (BLM and USFS) grazing allotments during the spring and summer. However, domestic sheep grazing occurs within GMU 53 and 63 on public lands in both the winter and summer.

Efforts to resolve conflicts between elk and agricultural producers have been an ongoing issue in E-05. Since 1997, 30 elk damage claims, totaling \$42,184 have been paid by CPW to ag-producers for conflicts with elk on private lands in E-05. CPW has implemented various management actions in order to alleviate forage competition on public lands, along with actions meant to reduce ag/elk conflicts on private lands. These efforts include: overall elk population size reductions, manipulating animal distribution through road closures (County Road 77 – GMU 63) and habitat treatments, improving forage quality through fertilizer purchases (HPP), hay stack-yard construction, and providing fencing materials (HPP). Agricultural economic losses from wild ungulates are one of the least concerning issues to respondents of a recent survey of E-05 stakeholders (Appendix 5, section 2, question 11). Despite the low level of public concern, CPW must remain cognizant of conflicts between elk and ag producers. Besides CPW being financially responsible for game damage claims, private lands provide habitat for elk at certain times of the year, especially for transitory and winter elk range.

### ***Anthropogenic Development***

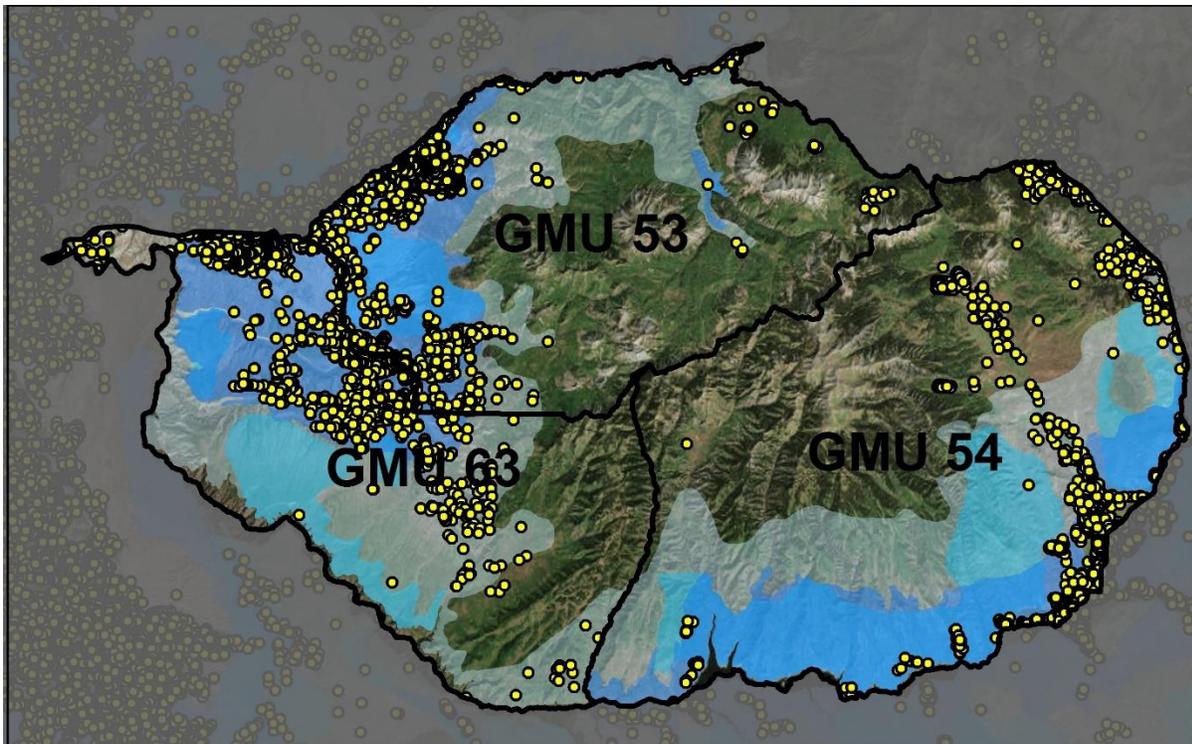
Elk have been shown to be negatively influenced by residential development (Wait and McNally 2004). Exurban (1.7 – 40 acres per housing unit) and suburban housing densities (<1.7 acres per housing unit) have a combined 2.1% areal proportion of the E-05 land area (Bierwagen et al. 2010). Rural developed private lands (>40 acres per housing unit) cover approximately 16.3% of E-05. Census data of E-05 indicate a 2010 human population size of 14,143 and a housing unit count of 7,587 (US Census Bureau). 80.8% of these housing units have full-time occupancy. Between 1980 and 2010, the amount of E-05 land area characterized as exurban and suburban has increased by 91.6% (Bierwagen et al. 2010). This has been accompanied by a 55.6% increase in total population size across the counties of Gunnison, Montrose, and Delta from 1980 (56,266 people) to 2010 (87,552 people) (US Census Bureau).

The tourist based economy of E-05 ultimately results in an effectively higher degree of human presence. In E-05, 81% of the housing units in 2010 were occupied, with 11% indicated as being used for seasonal living (US Census Bureau). Thus, there are periods of the year (i.e., likely summer) when the actual human population size inhabiting E-05 is much higher than the 14,143 counted in the 2010 census.

E-05 housing developments are clustered. The historic human settlement patterns and public land configuration (Fig. 1) result in this spatial clustering of residential areas in long linear patterns along roadways and drainage bottoms (Fig. 8). Most housing developments have occurred on elk winter range (Fig. 8). It is possible that areas of rural density will be eventually converted to exurban, and exurban converted to suburban densities. If housing densities increase in the areas already characterized as rural development, winter range will likely become more fragmented, inhibiting the ability of elk to move across larger expanses of traditional winter range.

A variety of elk studies have indicated that elk distribution, movements, and behavior are influenced by vehicle traffic. Various studies indicate elk respond to vehicle traffic (OHV and highway vehicles) at distances up to 1000 m away (Rost and Baily 1979, Preisler et al. 2006). However, the influence of roads on elk is conditional upon several factors, such as vegetation composition (Lyon 1979, Rost and Bailey 1979) and road type (Montgomery et al. 2013). Highway vehicle traffic volumes have likely increased since 1980 because of the human population growth. Off-highway vehicle utilization has likely increased given that CPW's statewide off-highway registration sales have increased by ~115% from 2001 to 2015. Recently implemented travel management plans by the USFS and BLM will likely redistribute human recreation activities away from certain areas, but possibly concentrate human activity in others. It is uncertain exactly how this redistribution of roads and traffic influences elk movements and hunter access. Other human development activities that can be potentially negative to elk carrying capacity in E-05 are row-crop agricultural fields and mineral extraction. While these types of developments cover a relatively low amount of land area of E-05, they exist in a clustered pattern along the North Fork of the Gunnison River in GMUs 53 and 63.

There are several notable examples in E-05 where private lands serve as refuges to elk during the hunting seasons. Like many places in Western Colorado, these situations tend to occur when landowners or land managers do not impose significant hunting pressure, essentially protecting elk. Related to this issue, is the increasing housing density in rural and exurban areas, in which hunting activities with firearms are often unable to be conducted safely. While a full analysis has not been conducted of the ongoing Gunnison Basin elk movement study, cursory inspection (Appendix 3, section 5) indicates that private land refugia are present, or are becoming more prevalent. As human residential development activities continue to expand, management techniques, policies, and regulations must adapt to take account of this refuge behavior in elk. A recent public input survey indicated that the highest concern for GMU 54 hunters and the third highest concern for GMUs 53 and 63 hunters was having land accessible for hunting (Appendix 5, section 2, question 11). The same public input survey indicated that 29% of E-05 landowners do not allow any hunting on their property (Appendix 5, section 2, question 5).



**Figure 8.** Address points (yellow dots) of Gunnison, Montrose, and Delta Counties overlaid on E-05 elk winter range (blue shading).

## Public Involvement

CPW staff conducted an extensive public outreach effort in the development of this plan. This included a set of public scoping meetings, a suite of three public input surveys, and an open public comment period on a draft of the plan. The specific surveys included:

**Survey 1:** Public scoping meetings were held in Gunnison (to cover GMU 54) and Paonia (to cover GMU 53 & 63) in early July 2017. An audience of 19 and 25 people signed in at the Gunnison and Paonia meetings respectively. Following an information presentation on elk population history and elk distribution, attendees of the meeting were questioned via live audience polling. This small sample size (43) of participants precluded a detailed quantitative analysis by stakeholder type. Given the small sample size from the live audience polling, results from the two public meetings were combined. Detailed results of the live audience polling can be found in Appendix 5 (section 1). A majority (58%) of the participants represented the interest of elk hunters (Appendix 5, section 1, question 1). Overall, a majority (66%) of the participants were in favor of some increase in elk population size from the current level (Appendix 5, section 1, question 4). 32% of the participants were satisfied with the number of bulls encountered while hunting, while 51% were unsatisfied with the number of bulls encountered while hunting (Appendix 5, section 1, question 5).

**Survey 2:** The second survey effort reached out to landowners and hunters. This involved a pool of elk license applicants that had applied in either GMUs 54, 53, or 63 and a pool of randomly selected landowners holding at least 20 acres of land within 54, 53, and 63, overlapping elk range. The randomly selected hunters or landowners received post cards directing them to a web-link hosting an online

survey (Survey Monkey, Inc, Palo Alto, CA, USA). A total of 609 people responded with interest in elk management. A wide variety of questions were asked in order to help categorize respondents by stakeholder groupings (i.e., hunters, landowners, GMU, residency, method of take) to allow results to be analyzed by stakeholder group. Detailed results of this survey can be found in Appendix 5 (Section 2).

Most hunters (47.1%) indicated that they were satisfied, while 40.6% indicated they were not satisfied with their elk hunting experiences for elk in these units, and 12.2% were neither unsatisfied nor satisfied. This satisfaction trend held true for all stakeholder groups.

Respondents were given a choice between having a future elk population size change of +35%, +17%, 0%, -17%, -35% with respect to the most current 2016 post-hunt elk population estimate. These percent changes would correspond to a population size of 9650, 8360, 7150, 5930, and 4650 respectively assuming the current modeled E-05 population size of 7150. Respondents were provided with a detailed discussion (Appendix 5, Section 2, Question 9) providing anticipated outcomes and the various tradeoffs associated with decreasing or increasing the elk population size. Given that relative differences were equal among the incremental population size choices in the provided scenarios, a desired population size change was calculated, based on a weighted average, for each of the stakeholder groups.

Given the various stakeholder groups examined, no majority of any group wanted to decrease or maintain the current population size; the majority in each group wanted some type of increase in elk population size. Landowners with ag interests (n = 61) desired an average increase of 9.1% while landowners without ag interests (n = 110) desired a 14.4% increase. Hunters (not owning land in the West Elks; n = 438) desired a 16.2% increase from the current population size. No major differences were found between non-resident hunters and resident hunters. Major differences did exist among the various GMUs. The smallest change in population size desired (a 1.9% increase) was voiced by landowners with ag interests identifying themselves as having specific interests in GMU 63. The largest desired change in elk population size was voiced by GMU 54 hunters (a 19.2% increase). This contrasted with GMU 63 hunters, who desired only an 8.1% increase. GMU 53 respondents desired a moderate percent increase in population size that fell between that of GMU 54 and GMU 63 desires. A full breakdown of the weighted percent change in population size desired by stakeholder group can be found in the table of Appendix 5, Section 2, Question 9.

Respondents were also asked about their desired bull ratio. A tradeoff was presented, with a note that higher bull ratios would equate to having more and potentially older aged bulls, along with fewer hunters on the landscape. However, having a higher bull ratio also means that hunting opportunity must be decreased. Overall, with all stakeholder groups combined, 38% of respondents favored a bull ratio increase, while 47.9% desired to stay the same, and 6.1% desired a decrease in bull ratio. Stakeholder groups varied with respect to increases in bull ratios; 51.1% of the landowners with ag-interests desired an increase in bull ratio, while 30.1% of the respondents interested in GMU 63 desired an increase in bull ratio.

**Survey 3:** The third survey consisted of an online survey (Survey Monkey, Inc, Palo Alto, CA, USA) that was made available to the general public in August 2017. The survey was advertised in local media outlets, and advertised on CPW insider and the CPW web page. Anyone with access to the internet was allowed to participate. A total of 103 people responded to the survey. Results from this survey were not considered as rigorous as Survey 2, as respondents were not chosen in a randomized or representative strategy. Although not as rigorous, this survey was especially important for gathering written comments

from members of the public that may not have been randomly selected in Survey 2. Detailed results can be found in Appendix 5 (section 3).

### ***Open Comment Period on Draft Plan***

In October and November 2017, a draft of the plan was presented to the public for a 30-day commenting period. An announcement of the 30-day comment period was placed in the local newspapers, the CPW insider email list, followed by a notification sent to all scoping meeting attendees and online survey respondents that provided their email address. Organizations and agencies receiving notification of the comment period include: The Gunnison and North Fork Habitat Partnership Program Committees, Montrose board of county commissioners, Delta County commissioners, Gunnison County commissioners, Gunnison BLM field office, Montrose BLM field office, Paonia USFS ranger district, Gunnison USFS ranger district, and the Gunnison County Stock Grower's Association. Comment letters were accepted until December 21, 2017. Comment letters were submitted by 18 entities that reflected a wide variety of stakeholder interests.

- 9 letters contained content that expressed the distribution issue of disproportionately more elk on private land than public land during the hunting season
- 6 letters contained content supportive of an increase in elk population size
- 5 letters contained content expressing concerns of predator impacts on elk
- 4 letter contained content expressing concerns of an elk population increase causing more elk-ag conflicts on private lands
- 4 letters contained content expressing concerns of elk refuging on Black Canyon National Park lands.
- 3 letters contained content supportive of a decrease in elk population size
- 2 letters contained content desiring an increase in bull ratios or the numbers of trophy bull elk
- 2 letters contained content expressing concerns of too many elk in the western portions of GMU 63 and the potential impacts on competition with other wild/domestic ungulates and sage grouse.
- 2 letter contained content expressing concerns that increasing the elk population will increase the hunter crowding (through more cow harvest required to maintain population).
- 2 letters contained content expressing concerns of the lack of access to huntable lands due to roads not being traversable or available
- 1 letter contained content expressing concerns of the declining calf:cow ratio
- 1 letter contained content expressing the concern of an increase of 17% in elk population increasing the risk of disease spread

### ***Stakeholder Meetings***

In addition to the two public scoping meetings, five additional meetings were held with various stakeholder groups. This included the: Gunnison County Stock-growers Association, Gunnison Basin Habitat Partnership Committee, North Fork Habitat Partnership Committee, U.S. Forest Service Gunnison Ranger District, and the Gunnison Basin Sage-grouse Strategic Committee. Less formal one-on-

one meetings were conducted when requested (Crawford Area Gunnison Sage Grouse Working, landowners, and hunters).

## **Proposed Management Objective Alternatives**

The primary focus of this plan is to develop management alternatives for population size. Historically, controlling bull:cow ratios in E-05 is difficult given partially unlimited licensing strategy (bull licenses are over-the-counter in 2<sup>nd</sup> and 3<sup>rd</sup> seasons). In addition, the techniques used to estimate bull:cow ratios are imprecise and biased to some degree, based on behavioral differences between bulls and cow/calf groups, seasonal sexual segregation, winter conditions, and survey detectability. The long-term population and sex ratio objectives for this herd is managed as ranges, rather than point values. Objective ranges better reflect the uncertainty inherent in wildlife population estimates. Also, having the flexibility to manage this elk herd within a range is more fitting to annual variability in ecological conditions.

## **Proposed Population Objective Alternatives**

Reference to status quo in these alternatives are based on the 2016 post-hunt population size estimates (Fig. 2). CPW only suggests alternatives for a practical population size objective. Practical population sizes are those that are well below carrying capacity (i.e., E-05's late 1980's estimate of 14,000 elk). Other alternatives considered, but not listed here, included decreasing the elk population size. However, decreasing elk population size received minor to no public support during public scoping meetings or during the public surveys.

### ***Population Objective Alternative 1: 0% change 6600 – 7600 elk (Status Quo)***

Assuming status quo bull ratios, population vitality measures, hunter success, maintaining the status quo population size will likely result in no changes to hunter experience or opportunity and the potential for conflicts with other wildlife and domestic animals would likely not change.

### ***Population Objective Alternative 2: 17% increase; 7800 – 8800 elk***

This alternative represents the objective population size derived from extensive hunter and landowner input, but also aligns the best with current estimates of the landscapes carrying capacity. Assuming status quo bull ratios, and constant population vitality measures, hunter success, and license demand measures, increasing the population size by 17% (from status quo) to the mid-point of this objective range will likely:

- Immediately decrease hunting opportunity for cow elk, and increase cow elk license demand rates.
- In the long-term, increase hunting opportunity and crowding, and decrease license demand rates.
- Compared to the status quo, the potential for competition with other wildlife and domestic animals must be considered for certain areas.

### ***Population Objective Alternative 3: 35% increase; 8500 – 9500 elk***

Assuming status quo bull ratios, and constant population vitality measures, hunter success, and license demand measures, increasing the population size by 35% (from status quo) to the mid-point of this objective range will likely:

- Immediately decrease hunting opportunity for cow elk, and increase cow elk license demand rates.
- In the long-term, increase hunting opportunity and crowding, and decrease license demand rates.
- This alternative has the highest potential for elk degradation of certain vegetation communities during extreme winters and drought years.

### **Proposed Expected Bull Ratio Objective Alternatives**

Bull ratio alternatives considered the tradeoffs between hunting opportunity (the ability to draw a license) and hunter crowding (the density of hunters in the field). Bull ratio alternatives must be considered in context of a population size because it is a proportion of an absolute number; the same bull ratio of a smaller population results in a smaller number of bulls, whereas the same ratio of a large population results in a higher number of bulls that must be managed. The combination of former E-41 and E-52 allows bull ratios to be estimated more accurately than before. A status quo objective is not as readily defined, given that the E-41 and E-52 had differing sex ratio objectives (20:100 and 25:100 respectively). Furthermore, no range on the bull ratio objective was provided in the former E-41 plan (Masden 2001).

As aforementioned in this plan, manipulating bull ratios will likely not be possible given the partially limited licensing strategy. The following expected bull ratio alternatives serve primarily to synchronize objectives across this newly combined E-05 DAU. If licensing strategy changes in the future, annual bull license allocations will be adjusted to maintain the population's composition at this objective.

#### ***Expected Bull Ratio Objective Alternative 1: Range of 18-23 (midpoint = 20) bulls:100 cows (E-52 former objective)***

This bull ratio is more similar to that selected in the former E-52 (GMU 53 & 63) plan (Diamond 2005). Assuming the population size is status quo (population size alternative 1), this bull ratio objective range will likely result in greater hunting opportunity for bulls, but add some additional hunter crowding.

Assuming an overall elk population increase (population size alternatives 2 or 3), maintaining the proportion of bulls E-05 wide will potentially:

- Immediately result in a slight decline in the bull ratio as overall population is increasing, assuming bull license allocations are held at status quo during the period of population building. If bull license allocations are decreased, the ratio will be maintained.
- Long term result in no to little change in the opportunity to hunt bulls, as the influence of an increased population size will ultimately influence the opportunity to draw bull licenses and encounter bulls when hunting.

#### ***Expected Bull Ratio Objective Alternative 2: Range of 23-28 (midpoint = 25) bulls:100 cows (Status quo)***

This bull ratio is more similar to that selected in the former E-41 (GMU 54) plan (Masden 2001). Assuming the population size is status quo (population size alternative 1), this bull ratio will likely not change bull hunting opportunity or hunter crowding.

Assuming a population size increase (population size alternatives 2 or 3), increasing the proportion of bulls E-05 wide will potentially:

- Immediately result in no change to bull ratio as overall population is increasing
- Long term result in the same opportunity (as status quo) to hunt bulls, as the influence of increased population size will ultimately increase the opportunity to draw bull licenses and encounter bulls when hunting.

## **Proposed Spatial Distribution Alternatives**

The spatio-temporal distribution of elk is just as important to elk managers as the population size, thus the following alternatives are considered for how the distribution of elk is to be managed across the three GMUs.

***Spatial Distribution Objective Alternative 1: Cow licenses are allocated disproportionately among the three GMUs to redistribute elk to GMUs desiring higher elk population sizes (CPW staff preferred)***

Across the three GMUs, a proportionally higher number of limited cow elk licenses will be allocated in GMU 63, in which stakeholders wanted the smallest increase, while proportionally fewer cow licenses will be allocated in GMU 54 (stakeholders wanted the highest increase). This will attempt to redistribute elk into these areas where stakeholders desired the highest increases (per 2017 stakeholder survey).

***Spatial Distribution Objective Alternative 2: Cow licenses are allocated spatially among the GMUs according to 2006-2017 inter-GMU proportions (Status quo).***

Across the three GMUs, the proportional change in limited cow licenses will be equal to that allocated in 2006 – 2017. Any changes in elk population distribution within the E-05 population will likely be equal.

## **New Objectives**

Population Size Objective Alternative:

Population Size Objective **Alternative 2** was preliminarily recommended by CPW staff and approved by the CPW Commission. This calls for a 17% increase given the 2016-post-hunt estimates (7800 – 8800 elk). Alternative 2 is preferred over other alternatives as it best reflects the desired population size increase of the E-05 stakeholders (hunters and landowners), while maintaining the elk population size well below ecological and social carrying capacity, thus reducing the probability of rangeland conflicts and competition with other wildlife and domestic animals.

Expected Bull Ratio Objective Alternative:

Bull Ratio Objective **Alternative 2** was preliminarily recommended by CPW staff and approved by the CPW Commission. This calls for maintaining status quo post-hunt bull ratio estimate (modeled estimate)

of 23-28 bulls:100 cows for E-41. Given the combination of the former E-41 and E-52 herds into a new E-05 herd designation, and given the current elk migratory patterns between these two former herds, managers will need to recognize that post-hunt measures of bull ratios are most reflective of the latest hunting seasons (4<sup>th</sup> season rifle) and less reflective of earlier seasons (1<sup>st</sup> season rifle). It is recognized that a reliable distinction in bull ratio estimates between the three GMUs cannot be accomplished.

#### Spatial Distribution Objective Alternative:

Spatial Distribution Objective **Alternative 1** was preliminarily recommended by CPW staff and approved by the CPW Commission. **Alternative 1** calls for limited cow licenses to be allocated in a manner congruent with GMU specific stakeholder desires for population size. Assuming a total elk population size increase is selected, proportionate GMU specific elk license allocations will be reconfigured from the prior 2006-2017 license allocations. GMU 63 will receive the highest cow hunting pressure in order to not exert additional elk grazing pressures on rangelands in the west side of GMU 63. GMU 54 will receive the least cow hunting pressure in order to redistribute elk back to the unit during the fall hunting season. Changes in GMU 53 cow tag allocations will be held mid-proportional to GMU 54 and 63.

## **Strategies for Achieving Objectives and Addressing Management Concerns**

Staff will take measures in the near future to reach or maintain the objectives selected. In order to achieve the 17% increase in elk population size, it is currently unknown if and how cow license numbers from the prior years will need to be modified. Compared to the prior decade, the 2016 and 2017 cow license numbers were decreased in order to transition to a management strategy that stabilizes the elk population size, rather than one that has been continually decreasing the elk population size. Other factors (calf mortality rates, adult mortality rates, and hunter success rates) also have an influence in changing elk population sizes, and must be considered in addition to cow license numbers. The relative distribution of elk across the three GMUs (Spatial Distribution Alternative 1) would be manipulated by modifying cow license allocations to ensure the largest increase of elk occurred in GMU 54, while a small increase would occur in GMU 53, and no to little increase in GMU 63.

An outpouring of comments were received in all stages of the public input process that indicated CPW needs to do more about managing the localized distribution of elk; a concern expressed by hunter and agricultural producing stakeholders. Manipulating elk distribution for the benefit of elk hunters throughout E-05 is best achieved by increasing the segment of the elk population utilizing GMU 54 public lands in the summer and fall. However, it is recognized by CPW that shifting elk to be proportionally distributed across private and public lands is not currently possible without an overall increase in elk population size. If the population is held at status quo (Population Size Alternative 1), shifting the distribution of elk from private to public lands will not occur without a substantial increase in hunting pressure on lands where elk seek refuge (i.e., private lands, National Park lands). However, CPW cannot manipulate the hunting pressure on the private or National Park lands that are currently receiving little to no elk hunting pressure due to private land owner desires. Concerns do exist that an overall elk increase will only add to the number of elk utilizing private lands. Recent attempts to increase the number of available private land only tags have not always resulted in more elk hunting pressure on private lands; the current demand for private land only tags appear to be already satisfied given the

current grazing pressures elk exhibit on private lands. If elk start to exert additional pressures on private lands in E-05, additional private land only licenses (through special seasons or damage hunts) will be made available.

Manipulating the elk distribution should be done in a manner that encourages recruitment and recolonization of major drainages of the southern side of GMU 54 which holds a large core of highly accessible public land. Research data from GPS collared elk in the Gunnison Basin is indicating that elk hunting activities during Archery, Muzzleloader, First Rifle, and Second Rifle seasons are occurring while a majority of GMU 54 wintering elk are still on their summer ranges in neighboring units (i.e., GMU 53 and 63) (Appendix 1, Section 6). GMU 54 license allocations during these four hunting seasons should be reduced to discourage late summer and early fall mortalities of elk on public lands within GMU 54. Additional hunting pressure in GMU 53 and 63 should be limited in the high elevations of the early seasons to ensure elk are not pushed on to private lands to the west and north sides of E-05. Ample early season opportunities for hunting should be placed on lower elevations of GMU 53 and 63. Future issue papers will likely need to be produced and presented to the CPW commission to address these elk distribution issues.

## **Appendix 1: Evaluation of merging E-41 with E-52 as a single herd (E-05).**

The elk herd in GMUs 53 and 63 were historically managed as separate herds consisting of E42 (GMU 53) and E44 (GMU 63). These two herds were merged in the 1995 E-52 DAU plan based on inter-herd movements documented between GMU 53 and 63 (Appendix 3, section 1). Managing GMU 54 (E-41), and GMU 53/63 (E-52) as a single herd (E-05) has been considered for some time by managers given anecdotal information derived by six studies of radio-collared elk in the West Elk Mountains indicating a large amount of seasonal migratory movement across these units (Appendix 3). However, it was only determined recently (Fall 2014-2016) that many of these fall migrations are occurring after the hunting season period; GMU 54 wintering elk are not completely available to GMU 54 hunters in the fall (Appendix 3, Section 6). Former E-41 and E-52 have exhibited similar population characteristics (population size, bull ratios, calf ratios) and harvest history (harvest rates and hunters afield) (see below). Furthermore, the public stakeholders of these two herds have similar opinions when it comes to desires and concerns for elk management (see below). Combining E-41 and E-52 as a single DAU (E-05) has several benefits enumerated below:

Benefit 1: Population size and bull ratio estimates will improve over the long run, especially in the event that winter habitat capabilities change between the North Fork and Gunnison Basin side of the herd. CPW staff confidence level in population estimates will be greater for this larger herd, than the smaller former herd boundaries.

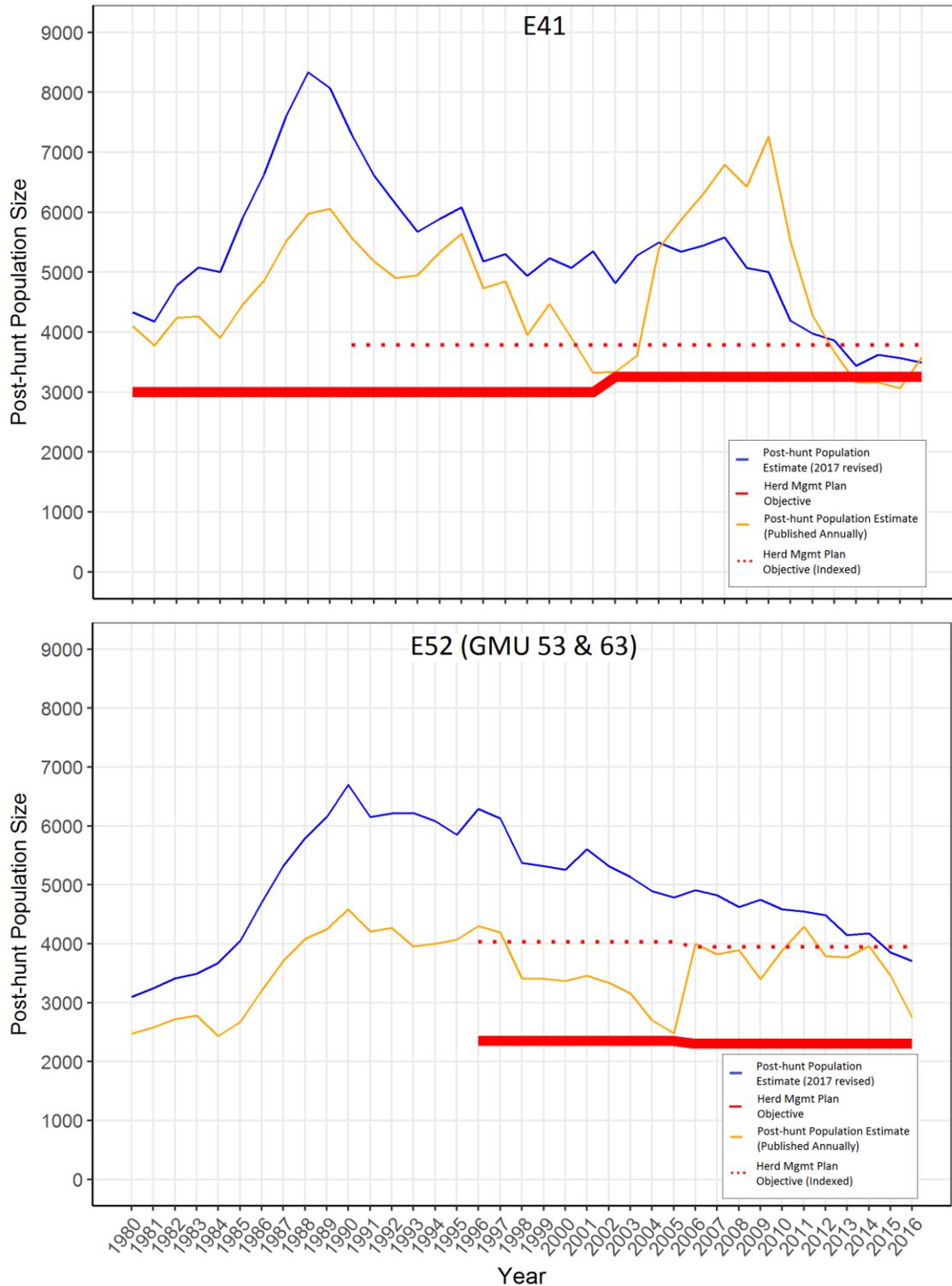
Benefit 2: Unfortunately, elk management objectives in terms of population size and bull ratios for the former E-41 and E-52 herds are not mutually exclusive, given the elk spatio-temporal distribution and hunting season structure. Previously, population characteristics surveyed in the annual post-hunt survey were potentially not reflective of what was experienced by hunters in earlier hunting seasons. For instance, the bull ratios experienced by hunters in the fall, while elk were still on summer ranges, were potentially different than the bull ratios surveyed on winter ranges in the post-hunt period (late December through January). Also, wintering elk herd bull ratios observed in the west end of GMU 63 can be influenced by hunter activities in GMU 54.

Benefit 3: GMU boundaries are designed to distribute hunters within a broader herd boundary (the DAU). Allowing multiple GMUs (GMU 53, 54, & 63) to occur within the larger herd, allows managers to distribute hunters more strategically in order to potentially change the elk distribution within the larger West Elks DAU when needed. CPW managers will be more readily able to adjust the recommended tag allocations to better manipulate the elk distribution.

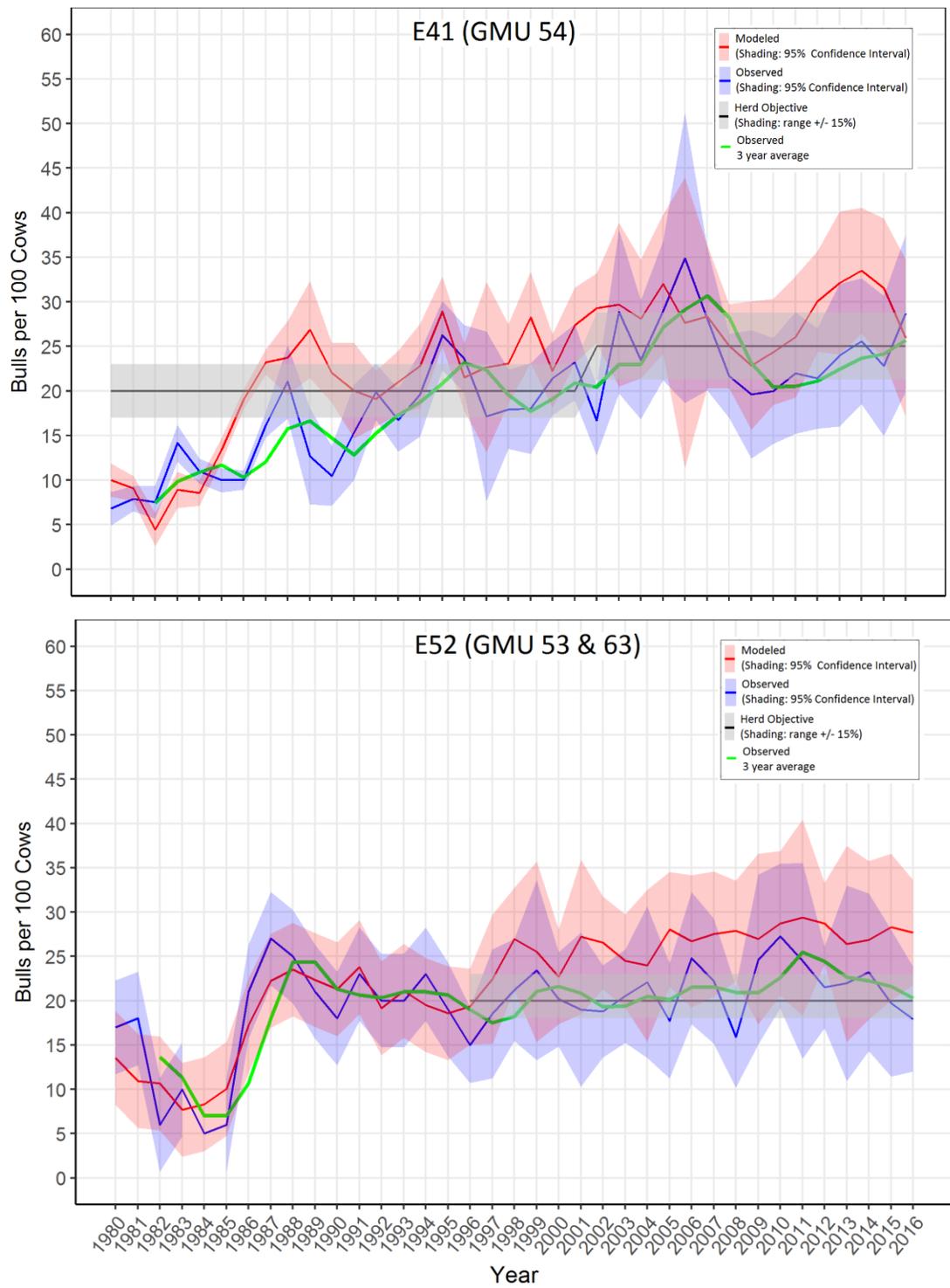
Benefit 4: Allowing the DAU to be spatially centered on summer range allows inter-year changes in winter range usage to be more readily accounted for. Preliminary examination of recent GPS collar information (Appendix 3, section 6) is indicating that an individual elk's choice of winter range is more flexible than its choice of summer range; an individual elk appears to consistently utilize the same summer range, but not always the same winter range.

### ***Population history comparison between E-41 and E-52***

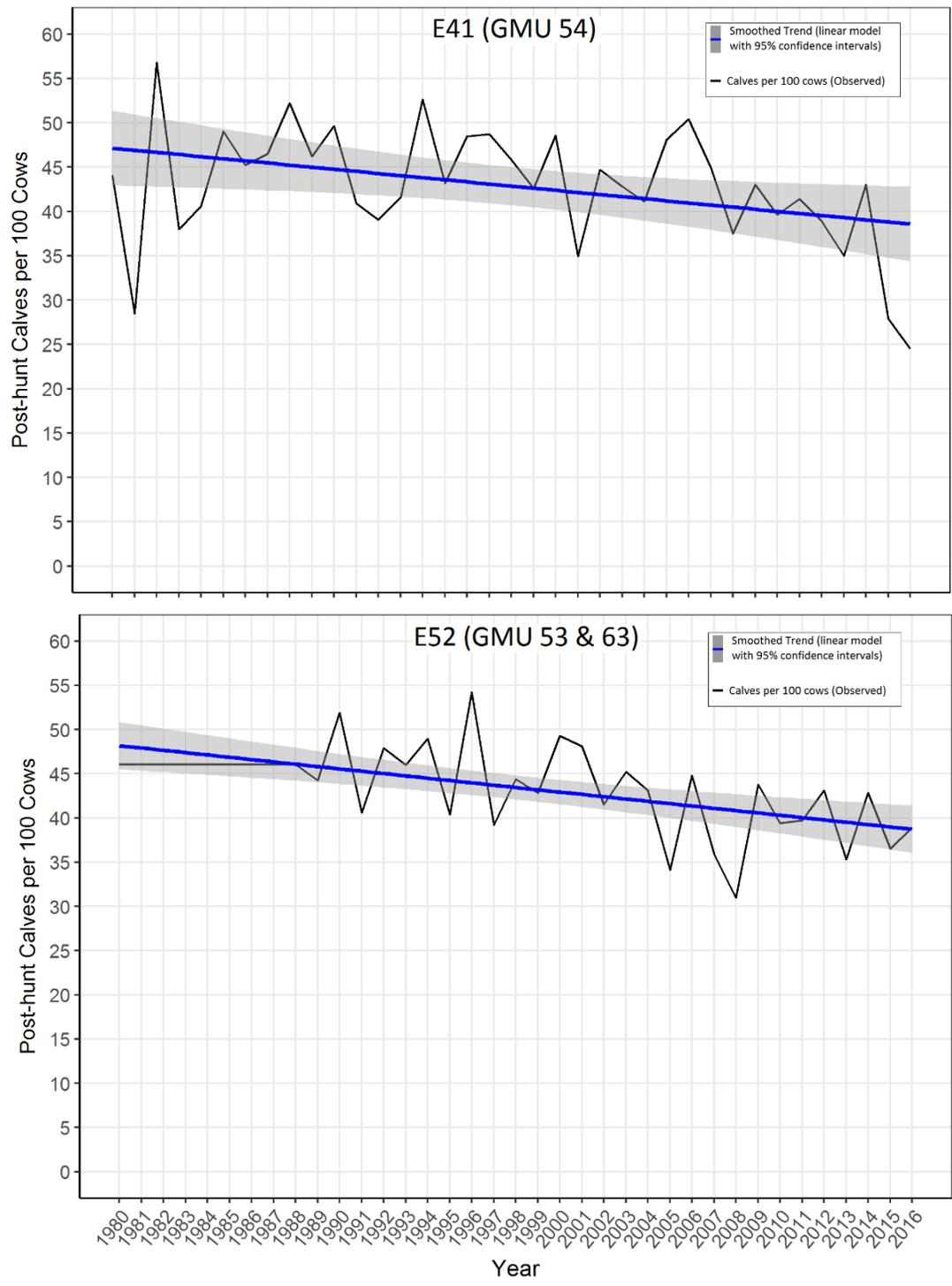
Elk in the former E-41 and E-52 have remarkably similar population characteristics, that may be partially due to the high summer range overlap of these herds. The population history section of this management plan highlights various population parameters of interest for the new E-05 herd as a whole after combining the historic data for these two herds. Population size estimates from these two herds are currently similar with approximately 3500 elk estimated in E-41 and 3700 elk in E-52. Both E-41 and E-52 have exhibited a declining trend since the late 1980s (Fig. A1.1). Both herds are at or above the 2001 (E-41) or 2005 (E-52) management plan established objective, but both slightly below the adjusted (indexed) objective. Bull ratios have exhibited an increasing trend from 1980 to 2016 in both E-41 and E-52, with the most notable increases following the 4-point antler restriction put in place in the 1980's (Fig. A1.2). However, the former bull ratio objective for E-41 (25:100) was higher than the former E-52 objective (20:100). Post-hunt calf ratios (calves per 100 cows), a measure of calf elk survival the first six months of life, are exhibiting similar trends in E-41 and E-52. From 1980 to 2016, a decline from 47 to 37 calves per 100 cows is apparent in both E-41 and E-52 (Fig. A1.3). Hunter success rate (percent of hunters afield successfully harvesting elk) is similar between E-41 and E-52 with a 36-year average of 18.4% and 19.1% respectively (Figure A1.4). The estimated number of hunters-afield vary greatly across the 36-year time period, but show a similar trend between E-41 and E-52 (Fig. A1.4).



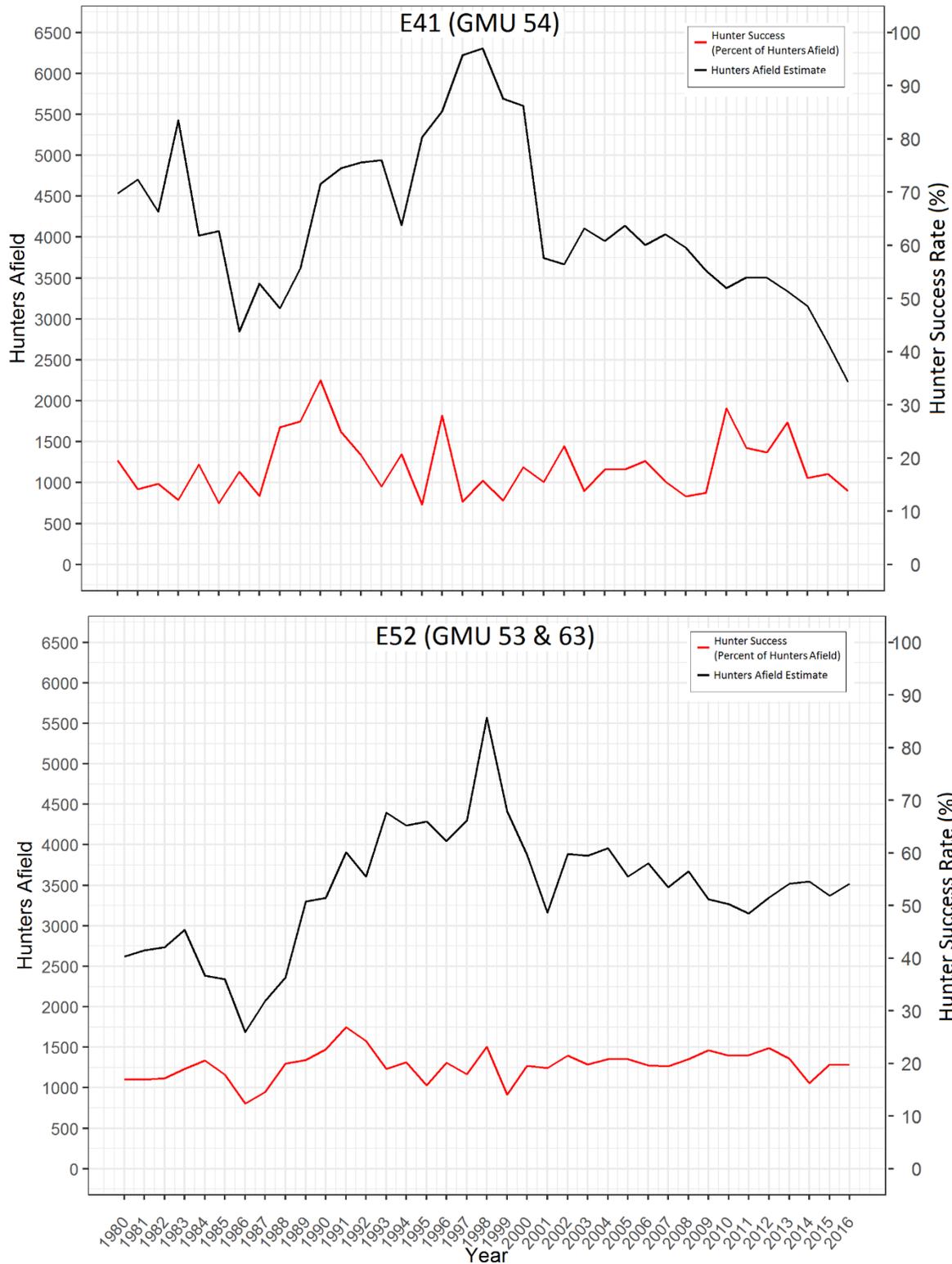
**Figure A1.1.** Post-hunt population size history (1980-2016) for E-41 (top pane) and E-52 (bottom pane). The revised retrospective post-hunt estimate is depicted in blue, while the annually published estimate is in orange. The previous herd management plan objective post-hunt size is the red solid line, with the indexed objective in the dotted line.



**Figure A1.2.** Post-hunt bull ratio history (1980-2016) for E-41 (top pane) and E-52 (bottom pane). Modeled bull ratio (red line) and observed bull ratio (blue line) is depicted with the 95% confidence interval (red and blue shading respectively). Observed 3-year average bull ratio is also overlaid (green line).



**Figure A1.3.** Post-hunt calf ratio history (1980-2016) for E-41 (top pane) and E-52 (bottom pane). Observed calf ratio (black line) is overlaid by the smoothed trend line based on a linear regression model (blue line) and 95% confidence interval (gray shading).



**Figure A1.4.** Hunters afield (black line) and hunter success (red line) estimates (1980-2016) for E-41 (top pane) and E-52 (bottom pane). Hunters afield only account for limited licenses (i.e., 1<sup>st</sup> rifle season) and not for the over-the-counter seasons (i.e., 2<sup>nd</sup> rifle).

### ***Social comparison between E-41 and E-52***

The former E-41 and E-52 herds can be characterized similarly in terms of human-wildlife relationships, given shared physiography. E-41 is approximately 585 square miles and E-52 is slightly larger at 765 square miles. Both units share a central mass of mountains (the West Elk Mountains) that serve as a common summer range for the two sub-herds, and is dominated by the same public land management entity (USFS). On the periphery of the West Elk Mountains are private lands, which have greater overlap with elk winter and transitory ranges. The percentage of private land is 21.5% and 32.7% in E-41 and E-52 respectively. GMU 54 (E-41) and GMU 63 (of E-52) are similar in terms of private lands occurring in many of the elk transitory ranges (GMU 54: Ohio Creek, GMU 63: Crystal Creek & Hwy 92), which are accompanied by larger tracts of public lands in the lower elevation winter ranges (GMU 54: North side of Blue Mesa Reservoir. GMU 63: Fruitland Mesa, Gunnison Gorge & National Park Service Lands). Based on radio collar information and various comments received in the public input surveys, GMU 54 and 63 elk appear to be utilizing large tracts of lands, characterized by little or no human hunting pressures, as refuge during the fall seasons. All GMUs experience conflicts between elk and agriculture operations in the form of elk utilizing hay fields, unprotected hay stacks, or cattle feed-lines.

CPW reached out to a sample of hunters and private landowners/land managers in a public input survey (Appendix 5, section 2). Results are described for each question asked, separated by results for E-41 (GMU 54) and E-52 (GMU 53 and 63 combined):

- Respectively, 24.2% and 23.3% of E-41 and E-52 landowners/land-managers responded they had experienced significant loss from deer and elk in the past 10 years (Appendix 5, section 2, question 3). However, the landowners differ by the level of hunting pressure allowed; 43.9% of E-41 landowner/land-managers do not allow hunting, while only 16.8% of E-52 landowners do not allow hunting (Appendix 5, section 2, question 5).
- When asking hunters the reason for hunting elk, the answers were very similar. The answer of “spending time in nature and/or enjoy the time with family and friends” received a ranked score of 76.9% in E-41 and 80.5% in E-52. “Obtaining wild game meat” received a ranked score of 63.5% and 63.4% in E-41 and E-52 respectively. “Obtaining a trophy” received scores of 43.4% and 40.0% in E-41 and E-52 respectively (Appendix 5, section 2, question 6).
- When asking hunters their satisfaction level with their experience while hunting elk in these units, 45.6% of E-41 hunters and 46.9% of E-52 hunters showed some level of overall satisfaction (Appendix 5, section 2, question 7).
- When asking respondents “how do you want the elk population size to be managed?”, a majority of survey respondents in both E-41 and E-52 want some type of increase. However, E-41 and 52 respondents differed in the weighted average wanted in elk population size, corresponding to a 19% and 11% increase respectively (Appendix 5, section 2, question 9). This was accompanied by 41.9% and 33% of E-41 and E-52 (respectively) respondents wanting an increase in bull ratios (Appendix 5, section 2, question 10).
- When asking respondents how they feel about the statement of “the problem isn’t with too many or too few elk in GMU 53 or 63, it is the distribution (where elk occur) that is a problem” (Appendix 5, section 2, question 12), 28.4% and 35.5% of E-41 and E-52 (respectively) responded they strongly agree with the statement. 33.2% and 44.7% somewhat agree. 10.5% and 10.5% indicated they somewhat disagree. Finally, 10.9% and 8.6% of E-41 and E-52 (respectively) indicated they strongly disagree; the number of elk needs to be changed.

## **Appendix 2: Population Estimation Methods**

Estimating numbers of wild animals over large geographic areas is a difficult and approximate science. CPW recognizes the difficulties of estimating the size of big game populations as a challenge in managing populations and that estimating populations of wild animals provides inexact measures of abundance. The agency utilizes flexible population estimates that incorporate the latest technologies available and complimenting data sources. As additional years of data are added, the accuracy of prior year estimates are improved, thus ultimately improving current estimates.

Population estimates are derived from computer assisted population models that integrate multiple biological factors, such as initial population size, mortality rates, reproductive rates, hunter harvest numbers (Steinert et al. 1994), post-harvest sex ratios, and wounding loss. Annually, a suite of biologically plausible models is constructed and ranked based on a score that minimizes the difference between observed and predicted sex ratios. Initial models of the early 1970s were constructed with ONE POP software. In the early 1980s, POP II software was implemented (Bartholow 2000). Post-1999, spreadsheet models replaced POP II. In 2009, the spreadsheet model was standardized based on newer mathematical models (White and Lubow 2002). This continual process of updating the model: 1) allows past and current estimates of population size to be more accurate, 2) dampens annual variation that reflects sampling variability, 3) provides a better representation of population trend (long term relative changes in population size). Model realism is further diagnosed by examining the various biological parameters derived by the model. In addition to annual updates to the model, a revision to the model is made when a DAU plan is updated; an expanded suite of models is constructed and the best model is selected.

Actual counts or extrapolation-based sampling of elk population size are not conducted in E-05. Instead multiple sources of information are gathered during: 1) aerial elk age/sex classification surveys and 2) elk harvest mortality surveys. The elk age/sex classification surveys provide an estimate of the number of males and number of young of the year per 100 females. Bulls:100 cow ratios include bulls  $\geq 1$  year of age. Current aerial survey methodologies underestimate the bulls:100 cow ratio, as larger groups of animals, primarily represented by females and calves, are easier to detect than bull groups. Habitat utilization differences between bulls and cows further complicates the technique. Given that bulls have a lower probability of detection than cows, a sightability factor is incorporated into the model to provide a more realistic representation of the bulls:100 cows. This modeled bull ratio estimate is utilized when making management decisions concerning allocation of licenses.

Finally, anecdotal information gathered from hunter and landowner contacts made by CPW field staff is considered for model evaluation and final license allocations. While field observations are used to help ground-truth the model, it is recognized that using population estimates based entirely on sportsmen's observations has produced biased results. For instance, a study (Freddy et al. 2004) was conducted in D-6 (GMU 10) to assess whether estimates of population size derived from CPWs mathematical models, was in line with those made by a local sportsmen group, and that of a more rigorous (and more expensive) helicopter quadrat survey method commonly used by Idaho Fish and Game. The rigorous helicopter quadrat survey method revealed 6782 – 11042 deer. Sportsmen's opinions of deer population size (1750 deer) underestimated that given by the more rigorous method by >74%. Population size estimates derived with the CPW mathematical population model approximated the more rigorous count method with 7000 – 7300 deer, and thus underestimated deer population size by only 3 – 37%.

## Appendix 3: Elk movement studies

The distribution and movement patterns of elk in the West Elk Mountains has been studied in six projects utilizing radio collars. Although these six studies have only focused on certain GMUs at certain 2-5 year study periods since 1980, they provide important snapshots and insight into the E-05 elk distribution. A new comprehensive study of elk movements across all three GMUs (GMU 53, 54, 63) is being planned for 2018 – ~2028 to better understand elk movements, the drivers of these movements, and long-term changes in elk movement behaviors.

### Section 1 (Young 1982)

From 1979 to 1980, a project was conducted to evaluate elk movements in the upper Gunnison River valley as part of an environmental assessment of a proposed molybdenum mine. A total of 133 elk were captured and either neck-banded or VHF radio collared throughout GMU 54 and GMU 55. In GMU 54, 79 neckbands were deployed along with 54 VHF radio collars. Winter relocation data in the second year of the study differed from the first year of study in half of the individuals followed. Given the coarse level of location data collected, an individual based examination of movement data was not possible. Further details of the study can be found in Young (1982).

### Section 2 (Homan 1996)

From 1990 to 1995, a project was conducted to determine movement patterns, survival rates, and cause-specific mortality factors for elk in the North Fork area (Homan 1996). Information gathered during that project prompted wildlife managers to recommend E42 and E44 to be managed as one herd, which became E-52. 627 elk were marked through the course of the study which included 49 VHF collared elk. The herd movement patterns are described in the table A3.1. Unfortunately, it was difficult to ascertain whether inter-herd movements between the fall and winter periods occurred precisely before, during, or after hunting seasons. A report from this study is available upon request.

HERD	WINTER	SPRING	SUMMER	FALL
<i>Black Mesa</i>	Fruitland Mesa; North Rim Black Canyon	Poison Springs; Spring Gulch	Black Mesa; Crystal Creek	Crystal Creek; Pine Ridge; Green Mountain
<i>West Elk</i>	West of Landsend Peak; Fruitland Mesa	Landsend Peak; Little Coal Creek	Minnesota Creek; Little Elk Basin	Minnesota Creek; Mt. Lamborn & Landsend Pk.

**Table A3.1.** General description of herd movements described in the 1990-1995 study of elk in E-52 (Homan 1996).

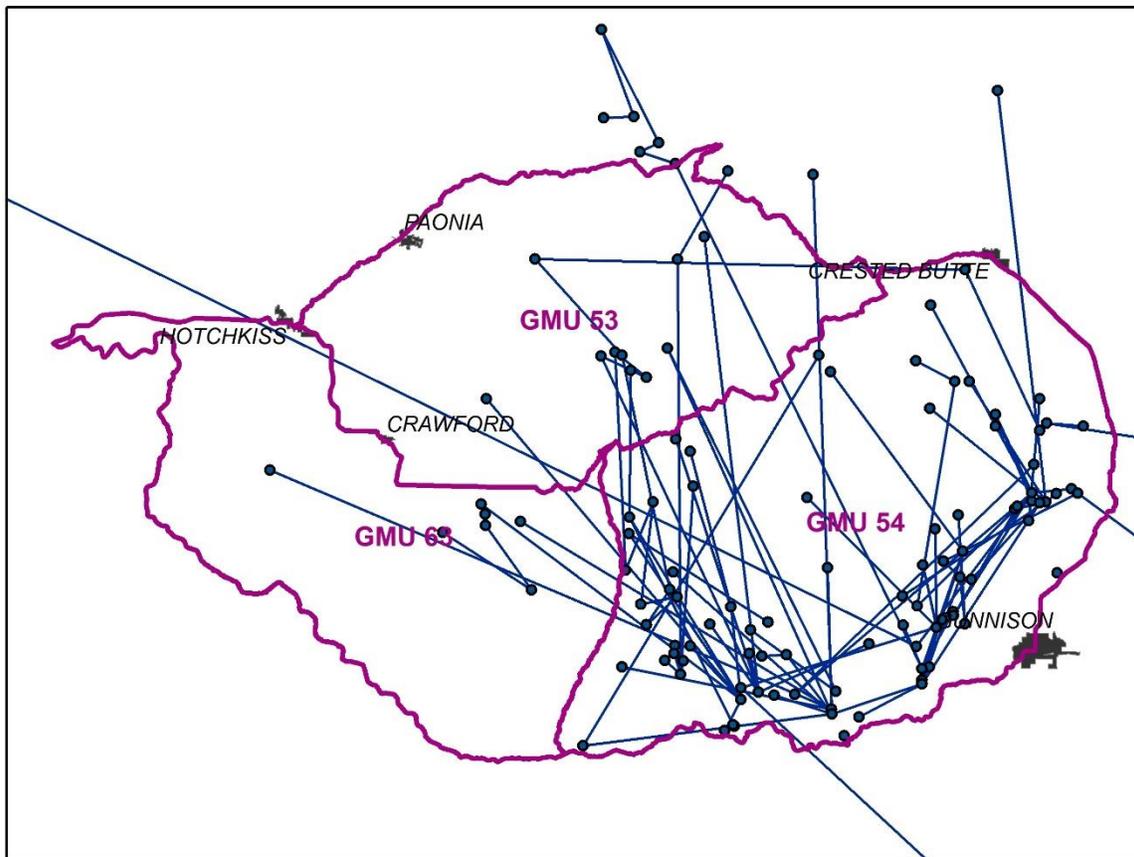
### Section 3 (Masden and Spicer 2003)

From 1998 to 2001, a study was conducted to assess the effectiveness of trapping and translocating elk, for mitigating wildlife conflicts with private lands in GMU 54 (Masden and Spicer 2003). Of the 172 elk trapped near Flat Top Mountain, 62 were released with VHF radio collars. The project report (Masden and Spicer 2003) states a known return rate of 17.2% to Flat Top Mountain. However, this percentage is likely biased low based on: 1) VHF tracking data relying upon collecting only one location data point, 2) elk VHF collars were only tracked for 2-3 years post translocation, 3) dispersing elk (i.e., calves) do not appear to be censored from the return rate calculations despite calves and yearlings comprising 42% of

the translocated elk, 4) no elk were captured, collared, and released at the conflict site as a control group. Therefore, translocation as a management strategy has not been advised as a viable strategy since this study. Fall location data collected on these radio collared animals indicated that elk relocated from Flat Top Mountain readily utilized GMUs 53 and 63. However, this anecdotal movement information must consider that these elk were translocated distances of 18 – 28 miles from the Flat Top Mountain conflict site to vicinities near GMU 63.

#### Section 4 (Freddy 2002)

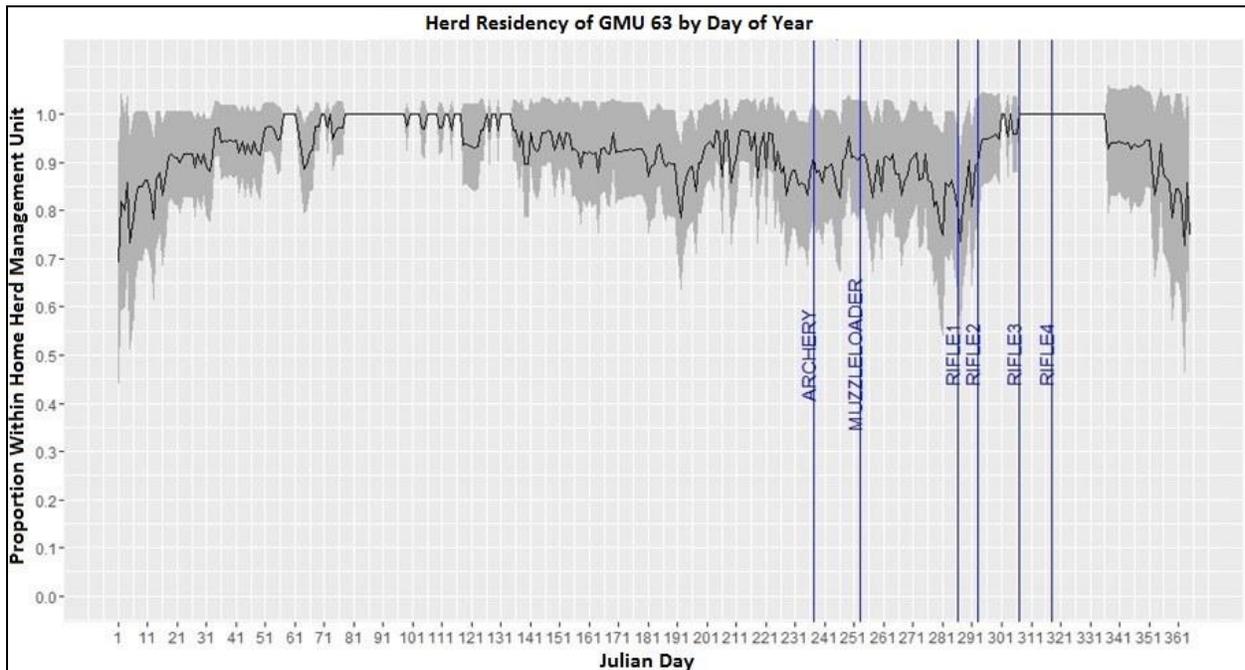
From 2000 to 2002, location data from a sample of adult female and calf elk outfitted with VHF collars were collected opportunistically in conjunction with an ongoing survival monitoring study (Freddy 2002). While focus was on the Gunnison Basin winter range as a whole, a sample of 61 elk represented the herd wintering in GMU54 (formerly E-41). Examination of the coarse spatio-temporal data indicates that 11 of 23 elk tracked over at least one annual cycle, conducted seasonal migrations to summer range outside of GMU 54. Unfortunately, it is difficult to ascertain whether these collared elk migrated back to GMU 54 winter range before, during, or after hunting seasons. These migrations out of the former E-41 boundary can be difficult to account for when estimating population size if the migrant individuals are not available for hunter harvest in E-41. This coarse location data is depicted in the Fig. A3.1. No detailed information on movements and habitat utilization patterns were documented in this study.



**Figure A3.1.** Coarse location information for GMU 54 gathered from the study of elk movements in the Gunnison Basin depicting seasonal movements outside of GMU 54 (Freddy 2002).

## Section 5 (Ouren 2007)

From 2005 to 2007, a study of elk habitat usage patterns in GMU 63 were conducted by a cooperation of USGS and Colorado Parks and Wildlife. The focus of this study was placed on understanding how elk are influenced by road traffic volumes, and whether management strategies could be implemented to reduce landowner conflicts in the Montrose County portion of that unit. A sample of 31 adult female elk were captured in GMU 63 winter range and fitted with GPS collars. Preliminary results of this study are indicating that elk are indeed responding to roadway traffic (*Doug Ouren: Personal Communication*). Aside from the roadway utilization analysis, another examination of this GPS collar information indicates that ~15-20% of elk wintering in GMU 63 migrate into neighboring GMU 54 (herd E-41) for the summer season (Fig. A3.2). This dataset also revealed a portion (~15-20%) of GMU 63 wintering elk occasionally utilize GMU 64 (west of GMU 63) at certain times of the winter (Fig. A3.2). This sample of elk did not show any significant utilization of the neighboring GMU 53 to the north, despite earlier information (Homan 2006) indicating interchange had been occurring. This lack of interchange being detected in this latter study may be due to elk monitoring efforts being focused solely on GMU 63 wintering elk, rather than both GMU 53 & 63.

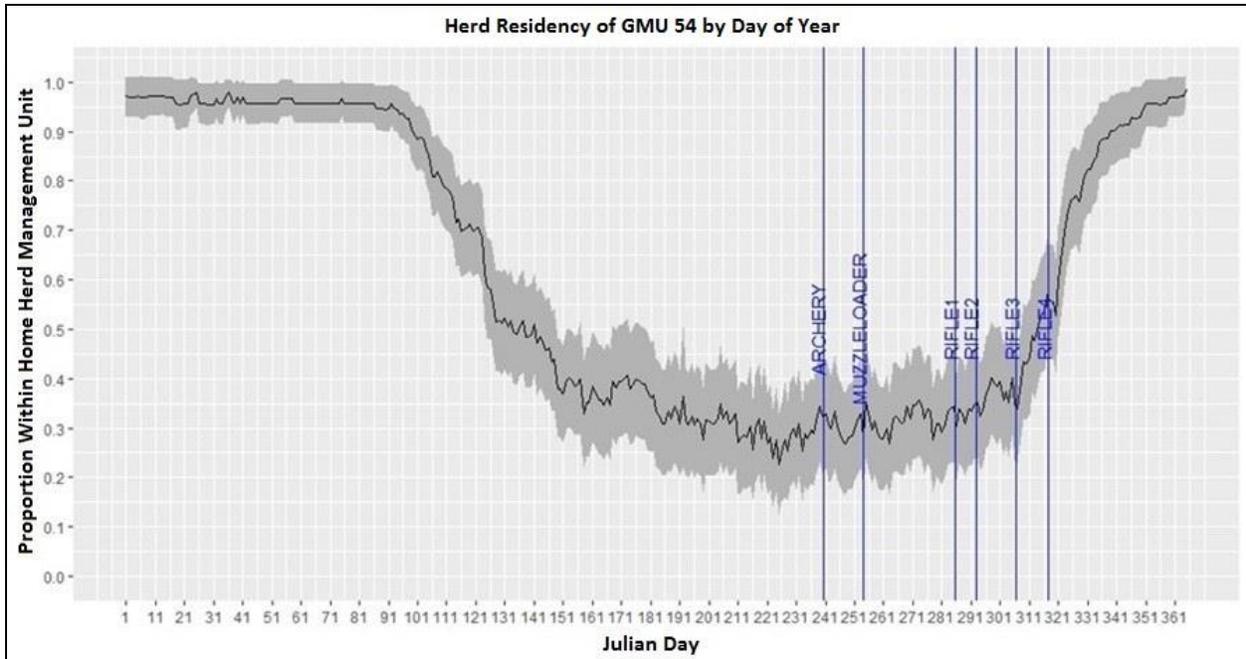


**Figure A3.2.** Proportion of collared elk residing on GMU 63 winter range that are actually present in GMU 63 for each day of the year (x axis: Julian day 1 = Jan 1, Julian day 365 = Dec 31) for 2005-2007. Gray shading indicates 95% confidence intervals.

## Section 6 (CPW 2017)

In January 2014, a sample of elk (25 adult females) were collared on GMU 54 winter range to initiate a larger Gunnison Basin wide study utilizing GPS satellite collar technology. This long-term study focuses on the spatio-temporal dynamics of elk movements with a component of the project examining movements across GMU and DAU boundaries. GPS collars are currently being used to collect real-time elk locations at a 13-hour temporal interval. This study is focusing not only on large scale movements

(i.e., migrations) but on the drivers of smaller scale (i.e., <1 day) movements and the resulting habitat selection patterns. Preliminary analysis is indicating that a large proportion of elk, that utilize the former E-41 winter range, migrate to summer ranges in the former E-52 (GMU 53 & 63) and beyond (i.e., GMU 521). A majority of these migrators are currently not available to hunters in GMU 54 until the third and fourth rifle seasons (Fig. A3.3). Data collected from this sample in GMU 54 and in neighboring GMU 55, is indicating that individual elk show site fidelity to their respective summer range (summer range usage is consistent from year to year), but winter range usage is inconsistent from year to year; elk may change what winter range is utilized from one winter to the next. Furthermore, spring and fall migration paths do not always appear to be followed consistently for an individual elk.



**Figure A3.3.** Proportion of collared elk residing on GMU 54 winter range that are actually present in GMU 54 for each day of the year (x axis: Julian day 1 = Jan 1, Julian day 365 = Dec 31) for 2014-2017. Gray shading indicates 95% confidence intervals.

## Appendix 4: Discussion on E-05 Carrying Capacity

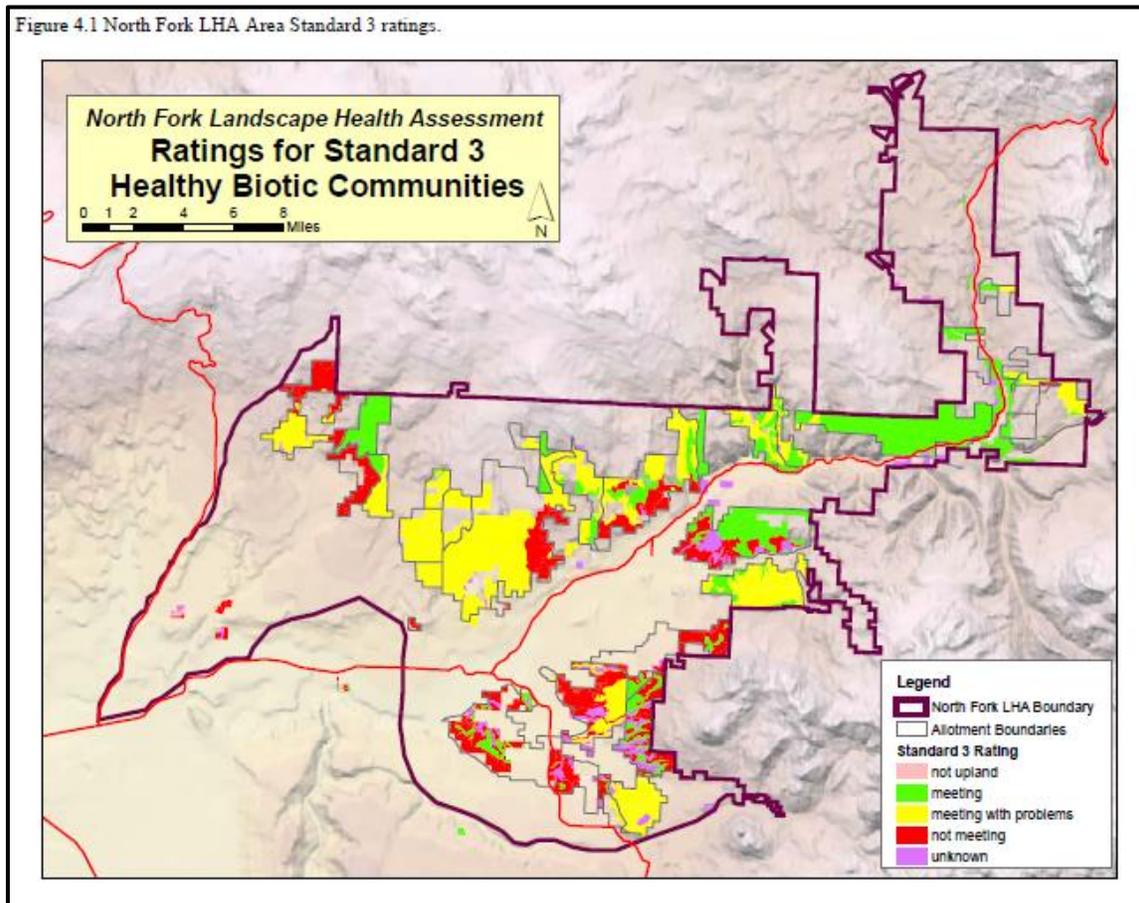
The following 13 bullets provide a summary of various pieces of information that can be used as justification and discussion for where E-05 stands in relation to biological carrying capacity of the land and vegetation resource.

- 1) 1985-2017 -All of E-05: Examining elk population history provided in a prior section, revised elk population models are revealing that elk numbers peaked in 1980 at approximately 14,000 elk. In the subsequent 26 years, the population was intentionally reduced in half to the current 2016 post-hunt elk population of ~7000.
- 2) 1999 – Gunnison Basin wide: Winter range condition assessments in the Gunnison Basin determined that winter range forage resources were not in good condition, suggesting that the wild/domestic ungulate populations had been exceeding winter range carrying capacity (Roath

et al. 1999). These assessments indicated that the health and productivity of sagebrush species was low, in which little annual growth and new leaders occurred. Additionally, bitterbrush and mountain mahogany showed excessive usage by ungulates.

- 3) 2001 – GMU 54: A Land Health Assessments (LHA) conducted by the BLM for the McIntosh Mountain Allotment showed excessive deer and elk browsing. Line transects in this LHA found that sagebrush and bitterbrush types were lacking forb cover, forb diversity, and grass diversity; dead and decadent sagebrush and bitterbrush was little to moderate. Hedging on shrubs and aspen shoots was rated as little-to-severe. Grazing in the allotment was rested from 1999-2003.
- 4) 2001 – GMU 63: An LHA was conducted by the BLM for the Gunnison Gorge area (~110,000 acres), which overlapped much of the elk winter range of GMU 63. It was found that just under half was meeting rangeland health standards for “Standard 3” (healthy native vegetative communities), and half were meeting “Standard 3 but had isolated problem areas”, approximately 5% were not meeting Standard 3. Problem areas were noted as having extensive exotic and noxious plant invasions and low shrub vigor.
- 5) 2003 – GMU 54: An LHA conducted by the BLM for the Steuben Creek Allotment showed that much of the allotment was not meeting range standards. Past usage by livestock and big game, in combination with an ongoing drought, resulted in hedged and decadent shrubs (serviceberry, bitterbrush, and sagebrush), grass mortality, and low forb/grass cover.
- 6) 2005 – 2010 - Gunnison Basin Wide: Vegetative structure habitat measures were collected at 177 Gunnison sage-grouse nests by Davis et al. 2015. Measures of shrub cover, shrub height, grass cover, and grass height indicated that measures collected at most of the nest sites met the guidelines of the GSRCP (2005). While this data is not representative of all sagebrush habitat, it does indicate that suitable nesting sites were available. In addition, vegetation structure had no influence on the success of GUSG nests in this study.
- 7) 2006 – Gunnison Basin Wide: BLM conducted repeat visits to survey plots established in 2001, in shrub communities, to measure average degree of hedging, plant volume, and percent dead. Focus was placed on serviceberry, mountain mahogany, and antelope bitterbrush. Over the five-year period, the degree of hedging increased, plant volume decreased, and the percent dead increased in shrubs (United State Department of Interior 2006). Shrub health in this study was likely influenced by a combination of ungulate usage and a drought spanning 2000 – 2004.
- 8) 2006 – GMU 53 & 63: CPW’s Habitat Partnership Program (HPP: North Fork Committee) and Colorado State University developed a habitat assessment model for the North Fork HPP jurisdiction, which overlapped GMU 53 & 63. The model suggested that this area was being grazed by domestic/wild ungulates at or near carrying capacity.
- 9) 2007 – GMU 53 & 63: BLM conducted a LHA for the North Fork of approximately 65,000 acres of BLM lands, of which some overlapped GMs 53 and a small portion of GMU 63. It was determined that a minority (29%) of the areas examined met “Standard 3” (healthy native

vegetation communities), while 41% were “meeting Standard 3 but had problem areas”, and 24% were not meeting range standards (Fig. A4.1). Most notable was the 1) prevalence of exotic and noxious weeds, 2) problems with shrub hedging occurring across the unit, with particularly severe hedging south east of Paonia, 3) habitat changes due to an increasing wildland-urban interface.



**Figure A4.1.** Reprinted image from BLM-UFO (2007) indicating areas meeting, meeting with problems, or not meeting range health for Standard 3.

10) 2008 – GMU 54: USFS conducted an Environmental Assessment (USFS 2008) for grazing allotments that overlapped much of GMU 54. The analysis indicated that aspen stands, especially in the Carbon allotment were generally in poor condition, with younger stands being highly browsed by wildlife in winter/spring. Sagebrush communities were determined to be at a lower seral successional stage due to heavy big game utilization. Soap Mesa and Cow Creek allotments showed high wildlife impacts to many shrub species such as mountain big sagebrush and service berry. It was noted that heavy elk utilization on Carbon and Soap Mesa allotments was preventing willow reestablishment.

11) 2010-2011 - Gunnison Basin wide: CPW and the University of Wyoming used a series of 392 line transects, randomly placed across ecological types most utilized by GUSG (Dry Mountain Loam

and Mountain Loam), to measure vegetation characteristics (sagebrush, grass, and forb height and cover percentages) of the sagebrush community. This effort found that the GUSG Rangeland Conservation Plan guidelines were being met in terms of vegetation cover and heights (breeding, summer/fall) for sites overlapping GMU 54 (Williams and Hild 2012).

- 12) 2011 – GMU 63: An LHA was conducted by the BLM for the Gunnison Gorge area (~110,000 acres), which overlapped much of the elk winter range of GMU 63. It was found that over half of grazing allotment areas (60%) met rangeland health standards for “Standard 3” (healthy native vegetative communities), and a moderate amount (21%) were meeting “Standard 3 but had isolated problem areas”, approximately 9% of the area was not meeting Standard 3. Standard 4 (Special Status Species, including GUSG) found that 50% of the area met, approximately 33% met standards but had problem areas (low forb cover, poor shrub vigor and old aged vegetation), and 12% of the area did not meet standards.
- 13) 2011-2013 – GMU 54 & 63: National Park Service transect data was collected in sagebrush habitats on the north rim of the Black Canyon of the Gunnison National Park and in Currecanti National Recreation Area. Overall, this monitoring indicated that the sagebrush habitats met the minimum habitat guidelines for the GUSG Rangeland Conservation Plan.
- 14) 2013-2017 – GMU 63: BLM has been conducting vegetation monitoring of suitable habitat within occupied GUSG range. Overall, the average sagebrush cover and height is just below the minimum guidelines for breeding habitat, while forb cover is within the guidelines, and grass cover is above the guidelines (*BLM 2015*)
- 15) 2015-2017 – Gunnison Basin wide: The Gunnison BLM office initiated a new monitoring effort focused on vegetation monitoring of rangelands under the BLM’s nationwide Assessment, Inventory, and Monitoring (AIM) program (BLM 2011). From 2015 to 2016, rigorous methods were used to measure vegetative structural characteristics of shrubs, forbs, and grasses at 78 sites. A summary of the data indicates that the average metrics from these sites are meeting the GRCP (2005) structural guidelines (Table A4.1)

BLM AIM Vegetation Variable	BLM AIM Measure	GSRCP Habitat Guideline Range	
		Breeding Habitat - Arid	Summer/Fall Habitat - Arid
Average of sagebrush Cover	25.0%	Sagebrush Canopy: 15-25%	Sagebrush Canopy: 5-15%
Average Non-sagebrush Canopy Cover	24.7%	Non-sagebrush Canopy: 5-15%	Non-sagebrush Canopy: 5-15%
Average of Non-Invasive Shrub Cover	32.2%	Total Shrub Canopy: 20-40%	Total Shrub Canopy: 10-30%
Sagebrush Height	35.9 cm	Sagebrush Height: 25-50 cm	Sagebrush Height: 20-40 cm
Non-Invasive Perennial Grass Cover	37.2%	Grass Cover: 10-30%	Grass Cover: 10-15%
Non-Invasive Annual and Perennial Forb Cover	10.6%	Forb Cover: 5-15%	Forb Cover: 5-15%
Non-Invasive Perennial Grass Height	29.7 cm	Grass Height: 10-15 cm	Grass Height: 10-15 cm
NA	NA	Forb Height: 3-10 cm	Forb Height: 3-10 cm
All Herbaceous Height	26.45 cm	NA	NA

**Table A4.1.** Summary of BLM AIM terrestrial vegetation measurements for the Gunnison Basin plots overlaying elk winter range collected in summer of 2015 and 2016. BLM AIM measurements of vegetation structure met the guideline ranges identified in the GSRCP (2005).

16) 2016 – E-05 USFS rangelands: In GMU 54, range conditions appear to be most favorable, followed by GMU 53, and 63. On suitable livestock range in GMU 54, range trend is relatively stable, with condition being good to excellent (*personal communication*: USFS Gunnison Range District), which is likely due to improved grazing management practices (USFS 2008) and long-term decreases in wild ungulates. A majority of USFS rangelands in GMU 53 and 63 appear to be in fair condition but are improving overall.

17) 2016 – E-05 beetle kill: USFS aerial detection surveys is revealing that 60 square miles of spruce-fir forest types (LANDFIRE 2013) has been touched by the ongoing spruce beetle die off (Fig. 7). As ecological succession unfolds, it is expected that elk will ultimately benefit in terms of increased availability of summer habitat quantity and quality.

## Appendix 5: Public Input Results

### Section 1: Scoping meeting live audience polling

Results of the live audience polling conducted at the two public meetings (Gunnison and Paonia: July 2017) are shown in the following tables. Given the small sample size (43 total respondents) at the two separate meetings, results were pooled.

Question 1: Choose the option that best represent your interests in this elk herd:	Count responding (% of respondents)
Ag operator/landowner or land manager	7 (16%)
Business owner	1 (2%)
Elk Hunter	25 (58%)
Hunting Guide/Outfitting service industry	4 (9%)
Other	1 (2%)
Wildlife Watcher/non-hunting recreationist	4 (9%)
BLANK	1 (2%)

Question 2: Which season do you prefer to hunt elk?	Count responding (% of respondents)
Archery	16 (37%)
Muzzleloader	5 (12%)
Rifle	21 (49%)
BLANK	1 (2%)

Question 3: Rank the top 3 items most concerning to you in GMU 53 & 63, with 1 being the most important.	Score (#1 = 3 points, #2 = 2 points, #3 = 1 point)	% of potential score
Habitat quantity and/or quality	44	18%
Impacts of hunting recreation pressure on elk distribution	43	17%
Land being inaccessible to hunting (i.e. places where hunting is not allowed)	41	17%
Impact of non-hunting recreation on elk distribution	39	16%

Predators	36	15%
Conflicts between elk/ agriculture production	25	10%
Disease (i.e. CWD)	10	4%
Other	8	3%

Question 4: How would you like the elk population size to be managed over the next 10-15 years?	Count responding (% of respondents)
A: Increase back to 2000-2009 level	11 (26%)
B: Increase, but not as much as Option A	17 (40%)
C: Maintain current size	4 (9%)
D: Continue Decreasing	7 (16%)
BLANK	4 (9%)

Question 5: How satisfied are you with the number of bulls encountered when hunting (pick one)	Count responding (% of respondents)
Very Satisfied	1 (2%)
Satisfied	13 (30%)
Somewhat unsatisfied	16 (37%)
Very unsatisfied	6 (14%)
I don't hunt	3 (7%)
BLANK	4 (9%)

## ***Section 2: Randomized hunter and landowner online survey***

For the second survey, a randomly drawn set of hunters who recently applied for deer or elk hunting licenses (2013, 2014, 2015, and 2016 hunting seasons) were invited to partake in an internet based survey in August 2017. In addition to the sample of license applicants, a sample of landowners were drawn from county parcel data. Post-cards were sent out to a total sample of 4935 potential survey respondents for solicitation to take an online survey (Survey Monkey, Inc, Palo Alto, CA, USA). Of the pool of land-owners available, only those holding a cumulative land area greater than 20 acres were sent post-cards. 2.5% of the post-cards sent were returned as having undeliverable recipient addresses. Because the survey specific to GMUs 53 & 63 was also directed to those interested in deer management issues for a similar DAU planning process, respondents indicating they were solely interested in deer were filtered from the survey when applicable. Methods were established during survey development to ensure that unique responses were obtained (i.e., a respondent could only complete the survey once).

Removing respondents specific to the ongoing deer management plan survey for GMU 53 and 63, the overall response rate to the survey was 17.1% with surveys being completed by 609 individuals interested in elk management. Response rates varied slightly (9.8% - 24.8% depending on the respondent type and GMU:

<b>Response Rate (and Count) by Respondent Type/Pool and GMU(s)</b>			
	GMU 54	GMU 53 & 63	COMBINED
NON-RESIDENT	21.4% (125)	16.6% (84)	19.2% (209)
RESIDENT	16.2% (149)	11.3% (133)	13.5% (282)
ELK LICENSE APPLICANT	18.0% (263)	24.8% (175)	20.2% (438)
ELK LICENSE APPLICANT/LANDOWNER	25.6% (11)	14.4% (42)	15.9% (53)
LANDOWNER	13.4% (51)	9.8% (67)	11.1% (119)
COMBINED	16.8% (325)	16.9% (284)	17.1% (609)

The survey asked the following list of questions (1-16). Results and/or summary for each of the questions are also provided following each question:

**Survey 2, Question 1. Which of the following best describes you:**

**(a)** Have hunted elk GMU 53, 54, or 63\*, **(b)** Have applied for elk/deer licenses, but not yet had the opportunity to hunt in GMU 53, 54, or 63\*, **(c)** Involved in the hunting service industry (hunting guide/outfitter) in GMU 53, 54, or 63, **(d)** Own or Manage private land in GMU 53, 54, or 63\*, **(e)** Agricultural producer, **(f)** Wildlife watcher, **(g)** Other business owner, **(h)** Non-hunting outdoor recreationist (e.g., ATV/OHV rider, hiker, skier, mountain biker, antler collector)

*\*Answer choices stating the GMU only contained the GMU(s) that the pool (GMU 53 & 63 pool and the GMU 54 pool) belonged to.*

*The respondents' answers were summarized in the following table based on raw number and percentage of respondents. However, this information was primarily used for characterizing the various stakeholders answer choices and summaries in subsequent questions.*

	A) Have Hunted	B) Have applied for licenses, but not hunted	C) Hunting service industry (guide/outfitter)	D) Private Land Owner or Manager	E) Agriculture Producer	F) Wildlife Watcher	G) Other Business Owner	H) Non-Hunting Outdoor Recreationist
No	12.8% (94)	94.5% (692)	98% (717)	76.5% (560)	91% (666)	84.6% (619)	97.5% (714)	88.5% (648)
Yes	87.2% (638)	5.5% (40)	2% (15)	23.5% (172)	9% (66)	15.4% (113)	2.5% (18)	11.5% (84)

**Survey 2, Question 2. Which unit are you most interested in:**

**(a)** GMU 53\*, **(b)** GMU 63\*, **(c)** GMU 54\*\*

*\*respondents from GMU 53 & 63 pool had opportunity to select both 53 and 63. The GMU 54 answer choice did not appear to those respondents in the GMU 53 & 63 pool of hunters and landowners.*

*\*\*This question did not appear to the GMU 54 pool of respondents, as a separate survey instrument was available to those hunters and landowners.*

*The respondents' answers were summarized in the following table based on percentage and raw number (in parenthesis) of respondents. However, this information was primarily used for characterizing the various stakeholders answer choices and summaries in subsequent questions.*

	Respondent Percentage (count)
Game Management Unit 53	21.6% (158)
Game Management Unit 63	17.8% (130)
Both Game Management Units 53 & 63	16.3% (119)
Game Management Unit 54	44.4% (325)
Grand Total	(732)

**Survey 2, Question 3. Have you experienced any significant loss (i.e., fence damage, forage loss, hay loss, orchard loss, etc) from deer or elk in the past 10 years?\***

- (a)** YES, from deer\*\*, **(b)** YES, from elk, **(c)** YES, from both deer and elk\*\*, **(d)** NO

*\*Only respondents who chose answer choice D (own or manage private land) from question 1 were allowed to answer.*

*\*\*respondents from GMU 54 pool were not presented with answer choices pertaining to deer*

*Summary by percentage (and count) of landowner respondents*

	All Combined	GMU 53	GMU 63	GMU 53 and 63 combined	GMU 54
NO	76.4% (126)	87.5% (79)	70% (47)	76.7% (28)	75.8% (28)
YES	23.6% (39)	12.5% (24)	30% (15)	23.3% (4)	24.2% (12)

**Survey 2, Question 4. If you answered YES to previous question, what has been the solution for solving these agricultural damage issues?**

- (a)** I generally tolerate the damage, **(b)** Submitted claims to the CPW Game Damage Program, **(c)** Applied for special hunts, **(d)** Sought help from the CPW Habitat Partnership Program, **(e)** Developed my own agricultural protection measures, **(f)** Increased hunting pressure during hunting seasons, **(g)** Other (please specify)

*\*Only respondents who chose answer choice D (own or manage private land) from question 1 were allowed to answer:*

Solution	Percent (raw count)
I generally tolerate the damage	57.6% (49)
Developed my own agricultural protection measures	12.9% (11)
Applied for special hunts	10.6% (9)
Increased hunting pressure during hunting seasons	5.9% (5)
Other	5.9% (5)
Submitted claims to CPW Game Damage Program	3.5% (3)
Sought help from the CPW Habitat Partnership Program	3.5% (3)

**Survey 2, Question 5. Which of the following best describes hunting activities on your owned or managed property in GMU 53, 54, or 63? (Choose all that apply)**

- (a)** No hunting is allowed, **(b)** Only myself, family and or friends are allowed to hunt, **(c)** Land is leased to outfitter/guide or we outfit guide on property, **(d)** Public is allowed to hunt with permission, trespass fee required, **(e)** Public is allowed to hunt with permission, no trespass fee is required, **(f)** Other (please specify)

*\*Only respondents who chose answer choice D (own or manage private land) from question 1 were allowed to answer:*

	All Combined	GMU 53	GMU 63	GMU 53 & 63 Combined	GMU 54
No Hunting Allowed	25.9% (51)	30% (12)	6% (3)	16.8% (22)	43.9% (29)
Me, Friends & Family Only Allowed	50.3% (99)	50% (20)	62% (31)	56.5% (74)	37.9% (25)
Leased for Hunting	4.6% (9)	0% (0)	8% (4)	6.1% (8)	1.5% (1)
Trespass Fee Required	1.5% (3)	5% (2)	2% (1)	2.3% (3)	0% (0)
Open to the Public With Permission	8.6% (17)	7.5% (3)	14% (7)	9.2% (12)	7.6% (5)
Other	9.1% (18)	7.5% (3)	8% (4)	9.2% (12)	9.1% (6)

**Survey 2, Question 6. How important to you is each of the following reasons to hunt deer/elk in GMU 53, 54, or 63?\***

**(a)** To spend time in nature and/or enjoy the time with family and friends, **(b)** To obtain wild game meat, **(c)** To contribute to wildlife management and conservation, **(d)** To contribute to the local community (e.g., financial benefits from hunters), **(e)** To obtain a trophy

*\*Answer choices could pertain to both deer and/or elk in the GMU 53 & 63 pool of respondents. Deer was not described in the GMU 54 survey answer choices, and thus GMU 54 respondents answers only applied to elk.*

*Answer choices were ranked by calculating a weighted percent (Not important = 0 points, Slightly important = 1 point, Moderately important = 2 points, Very important = 3 points) for each reason independently. A weighted score was calculated by multiplying the number of respondents times the degree (points 0 – 3) they answered for. A total count was created by multiplying 3 times the total number of respondents answering. Dividing the weighted score by the total possible count produced the percentages presented below. 0% would indicate all respondents in the survey indicated that a particular reason was “Not Important”, while a 100% would indicate the particular reason was “Very Important”.*

	GMU 54	GMU 53 & 63	All GMUs Combined
A) Nature, Family, & Friends	83.8%	80.6%	88.8%
B) Obtain Wild Game Meat	74.6%	63.4%	82.0%
C) Contribute To Wildlife Mgmt	70.0%	52.7%	75.9%
D) Local Economy	59.5%	46.6%	56.3%
E) Obtain Trophy	35.2%	40.0%	30.7%

**Survey 2, Question 7. Overall, how satisfied were you with your experience while hunting elk in GMU 53, 54, or 63?**

**(a)** Very unsatisfied, **(b)** Somewhat unsatisfied, **(c)** Neither unsatisfied nor satisfied, **(d)** Somewhat satisfied, **(e)** Very satisfied

Satisfaction Level	All combined	Land owner	Non-Land owner	Non-Resident	Resident	GMU 53	GMU 63	GMU 53 & 63	GMU 54	Archery	Muzzle loader	Rifle
Very unsatisfied	19.5%	21.2%	18.9%	18.1%	20.1%	14.5%	17.0%	16.0%	22.4%	16.0%	22.8%	20.5%
Somewhat unsatisfied	21.2%	19.2%	22.5%	17.0%	25.5%	19.1%	23.6%	22.1%	21.4%	20.2%	21.1%	22.0%
Neither unsatisfied nor satisfied	12.2%	15.4%	11.9%	12.4%	13.1%	13.6%	17.0%	15.0%	10.5%	9.6%	8.8%	12.8%
Somewhat satisfied	33.4%	29.8%	33.9%	34.0%	32.2%	36.4%	31.1%	34.7%	31.3%	37.2%	36.8%	32.0%
Very satisfied	13.7%	14.4%	12.9%	18.5%	9.1%	16.4%	11.3%	12.2%	14.3%	17.0%	10.5%	12.8%

Satisfaction values collapsed:

Satisfaction Level	All combined	Land owner	Non-Land owner	Non-Resident	Resident	GMU 53	GMU 63	GMU 53 & 63	GMU 54	Archery	Muzzle loader	Rifle
Unsatisfied	40.6%	40.4%	41.4%	35.1%	45.6%	33.6%	40.6%	38.1%	43.9%	36.2%	43.9%	42.5%
Neither unsatisfied nor satisfied	12.2%	15.4%	11.9%	12.4%	13.1%	13.6%	17.0%	15.0%	10.5%	9.6%	8.8%	12.8%
Satisfied	47.1%	44.2%	46.8%	52.5%	41.3%	52.7%	42.5%	46.9%	45.6%	54.3%	47.4%	44.8%

**Survey 2, Question 8. Which method of take have you preferred when hunting elk in GMU 53, 54, or 63?**

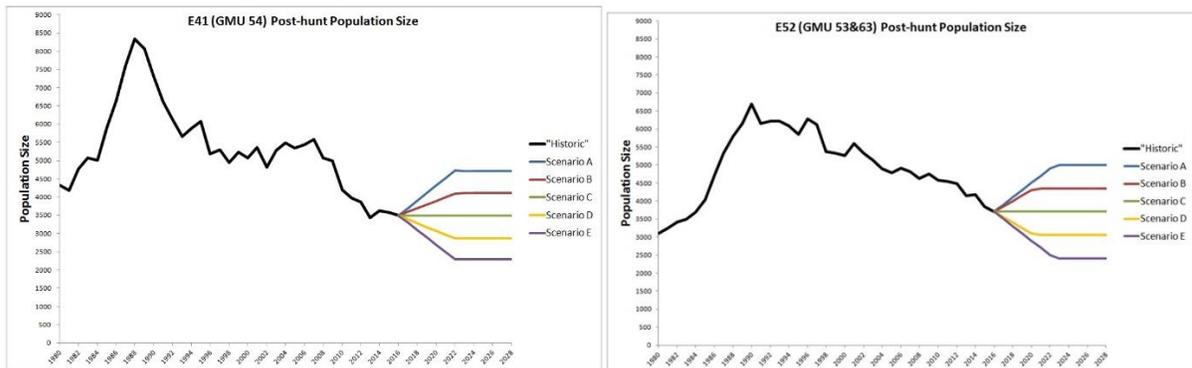
**(a) Archery, (b) Muzzleloader, (c) Rifle, (d) No preference**

	Non-Resident	Resident	GMU 53	GMU 63	Both GMU 53 & 63	GMU 54	All Combined
Archery	19.5%	12.8%	12.1%	16.8%	14.1%	17.3%	15.8%
Muzzleloader	13.1%	6.9%	12.9%	10.3%	8.2%	8.5%	9.6%
Rifle	62.9%	72.8%	69.8%	66.4%	68.2%	68.7%	68.4%
No preference	4.5%	7.5%	5.2%	6.5%	9.4%	5.4%	6.1%

**Survey 2, Question 9. The historic trend of the elk population size in GMU 53 & 63 follows the black line in the chart below.** Manipulating the elk population size can have short and long term effects, several of which are provided below:

Please read the scenario descriptions before answer the following question.

\*\*\*Disclaimer: Several of the "anticipated outcomes" listed below assume that elk biological variables, bull ratios, hunting success rates, and license demands do not change.\*\*\*



INCREASING elk population size can have these anticipated outcomes:

Short-term:

- Cow elk licenses decrease dramatically for the next ~5 years
- Reduces hunter crowding

Long-term:

- Cow licenses increase after objective is reached.
- More cow hunters will be required to maintain the elk population, thus more hunter crowding may occur.
- A greater opportunity to harvest bulls and cows may occur.
- Competition between other range-land animals may likely occur (domestic livestock, mule deer, sage grouse).
- Conflicts with landowners and agricultural operators may be more likely to occur.

Maintaining the elk population size (NO CHANGE) can have the following anticipated outcomes:

Short-term:

- Cow licenses may decrease slightly in order to make the current elk population trend stable.

Long-term:

- Competition between other range-land animals (domestic livestock, mule deer, sage grouse) may still occur and vulnerability of range-lands to drought and severe winter may still occur.

DECREASING elk population size will have these anticipated outcomes:

Short-term:

- Cow licenses increased for the next ~5 years
- Increases hunter crowding

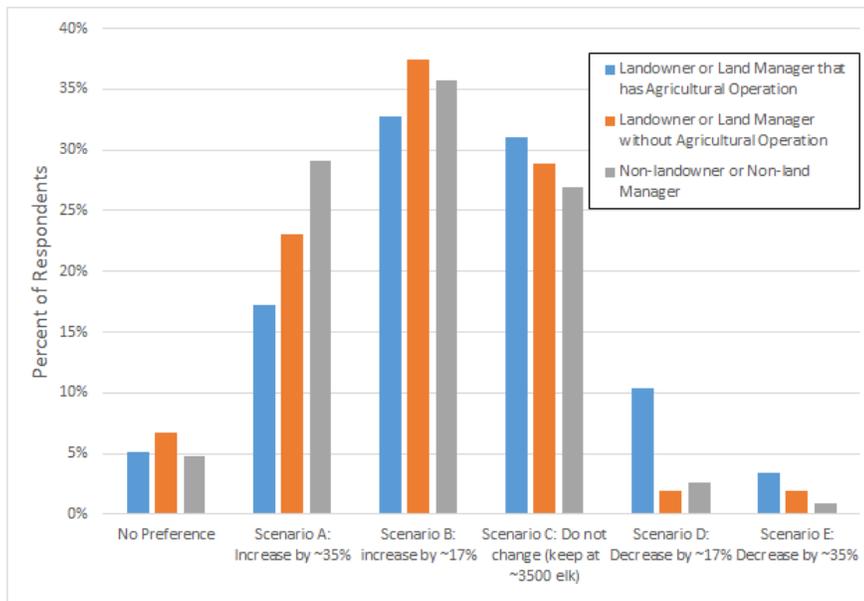
Long-term:

- Cow licenses increase after objective is reached; fewer cow hunters may be required to maintain the elk population
- Very little hunter crowding may occur.
- Opportunity to harvest bulls and cows may be the least.
- Competition between other range-land animals may be less likely occur (domestic livestock, mule deer, sage grouse).
- Conflicts with landowners and agricultural operators will be less likely to occur

**Given the above scenarios and descriptions of anticipated outcomes: during the next 10 years (2018 – 2029), how do you want the GMU 53, 54, & 63 elk population size to be managed?**

**(a)** increase by ~ 35%, **(b)** increase by ~17%, **(c)** Do not change, **(d)** Decrease by ~17%, **(e)** Decrease by ~35%

*Answer choices by percent of respondents and respondent type:*



The following table shows *n* weighted average percent change in elk population size desired for each respondent type and GMU of interest. Overall, the public desired a positive percent change (increase in elk population) regardless of respondent type; a majority of the respondents wanted some increase in elk.

The weighted average percent change was calculated by multiplying the number of respondents for each of the five letter options above, by the desired percent change they desired (+35%, +17%, 0%, -17%, -35%). Those indicating no-preference were removed from the analysis.

Respondent Type	Weighted Percent Increase Desired in Population Size (respondent count)					
	Landowner with Ag Interests	Landowner without Ag Interests	Non Landowner	Non Resident Hunter	Resident Hunter	All Combined
GMU 54	15.1% (16)	17.7% (46)	19.2% (263)	19% (150)	18.5% (175)	18.7% (325)
GMU 53 Only	11.6% (11)	14.5% (23)	10.1% (75)	9.2% (44)	12.5 (65)	11.1% (109)
GMU 63 Only	1.9% (20)	5.8% (22)	8.1% (82)	5.9% (31)	6.3% (67)	6.2% (98)
GMU 53 & 63	6.6% (45)	11.9% (64)	11.5% (175)	9.1% (103)	10.5% (181)	11.0% (284)
All Combined	9.1% (61)	14.4% (110)	16.2% (438)	15.1% (209)	15.2% (282)	15.2% (609)

**Survey 2, Question 10. High bull ratios often equate to having more older aged bulls and fewer other hunters on the landscape. However, having a higher bull ratio also means that hunting opportunity is decreased. During the next 10 years how would you like the bull ratio to be managed in GMU 53 & 63?**

- (a) Increased (want less hunting opportunity, but potentially more/larger bulls, less crowding),
- (b) Stay the same, (c) Decreased (I want more hunting opportunity, but potentially fewer/smaller bulls, more crowding), (d) No preference

Answer choices by percent of respondents and respondent type:

Respondent Type	A) Increase Bull Ratio	B) Stay the same	C) Decrease Bull Ratio	D) No preference
Landowner with Ag interests	51.1%	35.6%	4.4%	8.9%
Landowner without Ag interests	42.6%	44.3%	4.9%	8.2%
Non Landowner	35.9%	49.8%	6.5%	7.9%
Non-Resident Hunter	36.0%	53.3%	6.5%	4.2%
Resident Hunter	39.4%	44.2%	5.8%	10.6%
GMU 54 only	41.9%	42.6%	7.9%	7.6%
GMU 53 only	34.4%	58.9%	1.1%	5.6%
GMU 63 only	30.1%	51.8%	4.8%	13.3%
GMU 53 & 63 combined	33.0%	54.5%	3.9%	8.6%
All Combined	38.0%	47.9%	6.1%	8.0%

**Survey 2, Question 11. How concerned are you about the following items:**

- (a) Habitat quantity or quality (not having enough habitat for deer and/or elk, other wild species, and/or domestic livestock), (b) Potential for deer and/or elk to starve during the winter,
- (c) Economic losses due to deer and/or elk (i.e., ag-production, gardens, fences), (d) Land not being accessible for hunting (i.e., places where elk hunting is not allowed), (e) Impacts of hunting recreation pressure on the distribution of deer and/or elk, (f) Impacts of non-hunting

recreation (i.e., ATVs hikers, camping, antler collecting) on the distribution of deer and/or elk, **(g)** Disease (i.e., Chronic Wasting Disease) negatively effecting deer and/or elk populations, **(h)** Disease (i.e., Chronic Wasting Disease) transmission potential from wildlife to humans, pets, or livestock, **(i)** Predators effecting deer and/or elk populations, **(j)** Vehicle collisions with deer and/or elk

*\*Answer choices could pertain to both deer and/or elk in the GMU 53 & 63 pool of respondents. Deer was not described in the GMU 54 survey answer choices, and thus GMU 54 respondents answers only applied to elk.*

*Answer choices were ranked by calculating a weighted percent (Not at all concerned = 0 points, Slightly concerned = 1 point, Moderately important = 2 points, Very concerned = 3 points) for each issue independently. A weighted score was calculated by multiplying the number of respondents times the degree of concern (points 0 – 3) they answered for. A total count was created by multiplying 3 times the total number of respondents answering. Dividing the weighted score by the total possible count produced the percentages presented below. 0% would indicate all respondents in the survey indicated that a particular issue was “Not at all concerning”, while a 100% would indicate the particular issue was “Very concerning”. Issues were ranked from 1 – 10 (second column) for each of the respondent types, with the most concerning issue highlighted in yellow.*

Issue	Weighted Percentage (out of 100%) and Ranking by Respondent Type											
	All respondents combined		Landowners with Ag Interest		Landowners without Ag Interest		Non Landowners		GMU 53 & 63 combined		GMU 54 only	
A) Habitat Quantity Quality	67.1%	2	67.8%	1	76.9%	1	68.5%	2	65.2%	4	51.0%	5
B) Elk/Deer Starvation Potential	66.5%	4	62.2%	2	74.1%	2	67.4%	3	66.3%	2	54.4%	3
C) Ag-economic Losses	31.8%	10	42.2%	10	45.4%	10	31.9%	10	35.3%	10	44.7%	8
D) Hunting Land Inaccessible	68.5%	1	45.0%	9	61.1%	4	77.7%	1	65.3%	3	70.1%	1
E) Hunting Pressure Impacts on Elk Distribution	58.3%	5	56.7%	5	51.9%	7	60.0%	5	57.5%	6	44.5%	9
F) Non-Hunting Recreation Pressure Impacts on Elk Distribution	56.8%	6	61.1%	3	61.1%	5	57.6%	6	54.1%	7	53.1%	4
G) Disease Impacting Wild Ungulate Pops	66.6%	3	61.1%	4	71.8%	3	67.4%	4	68.9%	1	56.3%	2
H) Disease Transmission from Ungulates to Humans, Livestock, & Pets	51.3%	7	45.8%	8	51.9%	8	52.7%	7	53.0%	8	49.9%	6
I) Predator Impacts on Deer/Elk Populations	51.0%	8	54.4%	6	53.7%	6	52.1%	8	57.7%	5	48.5%	7
J) Wildlife-Vehicle Collisions	39.7%	9	46.1%	7	47.7%	9	38.4%	9	40.5%	9	43.8%	10

**Survey 2, Question 12. Tell us how you feel about the following statement: “the problem isn’t with too many or too few elk in GMU 53 or 63, it is the distribution (where elk occur) that is a problem”**

**(a)** I do not agree or disagree, **(b)** Strongly agree, **(c)** Somewhat agree, **(d)** Somewhat disagree, we should probably change the number of elk, **(e)** Strongly disagree, the number of elk needs to be changed!, **(f)** No opinion or none of the above

*Answer choices by percent of respondents and respondent type:*

	Landowner with Ag interest	Landowner without Ag Interest	Non Landowner	GMU 53 only	GMU 63 only	GMU 53 & 63 combined	GMU 54 only	All Combined
I do not agree nor disagree	12.5%	15.1%	12.0%	19.8%	12.9%	15.2%	9.8%	12.5%
Strongly agree	20.8%	17.8%	31.2%	19.8%	24.7%	21.0%	35.5%	28.4%
Somewhat agree	47.9%	42.5%	37.2%	38.3%	49.5%	44.7%	33.2%	38.9%
Somewhat disagree; we should probably change the number of	10.4%	11.0%	10.5%	12.3%	5.4%	10.5%	10.6%	10.5%
Strongly disagree; the number of elk needs to be changed!	8.3%	13.7%	9.2%	9.9%	7.5%	8.6%	10.9%	9.8%

**Survey 2, Question 13. What is your zip-code (please enter 5-digit zip)?**

*Respondents represented a variety of geographies, that were also captured a-prior in the list of post-card addresses solicited. Future analysis may utilize these addresses to extract geographic attributes of respondents.*

**Survey 2, Question 14. In what year were you born? (please enter 4-digit year)**

Respondent Type	Average Age
Landowner with Ag Interests	58.2
Landowner without Ag Interests	60.8
Non-Landowner	51.4
All Combined	53.4

**Survey 2, Question 15. Would you like to receive updates on this plan? (i.e., when a draft is released for public comment, notice of the plan’s final approval) If so, please enter your email address here:**

*A total of 477 respondents (71% of those interested in elk) provided email addresses for notifying them on the updates of the plan.*

**Survey 2, Question 16. Please use the space below to provide any additional comments you may have about deer or elk management in GMUs 53, 54, and 63.**

*A total of 366 respondents (55% of those interested in elk) took the opportunity to provide written comments. These comments were all read and reviewed to glean any additional ideas for elk management strategies potentially implemented in this plan and for outside of this plan.*

**Section 3: General public online survey**

Results of the third survey, “general public online survey” (Survey Monkey, Inc, Palo Alto, CA, USA) are summarized below in the following tables. Because the survey specific to GMUs 53 & 63 was also directed to those interested in deer management issues for a similar DAU planning process, respondents indicating they were solely interested in deer were filtered from the survey when applicable. Results of this survey are considered less rigorous, as it may not be representative of all interests or proportionally representative of any particular stakeholder group.

**Survey 3, Question 1: Answer choices by percent of respondents and respondent type:**

Question 1: How did you hear about this survey?	GMU 54	GMU 53 & 63	All GMUs Combined
CPW insider	50.0% (21)	50.8% (31)	50.5% (52)
From a friend	14.3% (6)	16.4% (10)	15.5% (16)
Newspaper	11.9% (5)	8.2% (5)	9.7% (10)
Other	23.8% (10)	24.6% (61)	24.3% (25)

**Survey 3, Question 2: Answer choices by percent of respondents and respondent type:**

Question 2: Which of the following best describes your interest in GMU 53, 54, or 63?	GMU 54	GMU 53 & 63	All GMUs Combined
Have hunted elk there	69% (29)	27.9% (17)	44.7% (46)
Have applied deer/elk licenses, but not yet had the opportunity to hunt there	16.7%(7)	29.5% (18)	24.3% (25)
Involved in the hunting service industry (hunting guide/outfitter)	9.5% (4)	3.3% (2)	5.8% (6)
Own or manage private land there	4.8% (2)	9.8% (6)	7.8% (8)
Agricultural producer (farm or ranch operator) there	0% (0)	3.3% (2)	1.9% (2)
Wildlife watcher	26.2% (11)	36.1% (22)	32.0% (33)
Other business owner	9.5% (4)	8.2% (5)	8.7% (9)
Non-hunting recreationist	21.4% (9)	23.0% (14)	22.3% (23)

**Survey 3, Question 3\*:**

*\*respondents from GMU 53 & 63 pool had opportunity to select both 53 and 63. The GMU 54 answer choice did not appear to those respondents in the GMU 53 & 63 pool of hunters and landowners.*

*\*\*This question did not appear to the GMU 54 pool of respondents, as a separate survey instrument was available to those hunters and landowners.*

*The respondents' answers were summarized in the following table based on percentage and raw number (in parenthesis) of respondents. However, this information was primarily used for characterizing the various stakeholders answer choices and summaries in subsequent questions.*

*Answer choices by percent of respondents and respondent type:*

Question 3: Which unit(s) are you most interested in?	Percent (raw count)
GMU 53	11.7% (12)
GMU 63	3.9% (4)
Both GMU 53 & 63	35.0% (36)
GMU 54	38.8% (40)
BLANK	10.7% (11)

**Survey 3, Question 4:**

*\*Only respondents who chose answer choice D (own or manage private land) from question 2 were allowed to answer.*

*\*\*respondents from GMU 54 pool were not presented with answer choices pertaining to deer*

*Summary by percentage (and count) of landowner respondents*

Question 4: Have you experienced any significant loss (i.e., fence damage, forage loss, hay loss, orchard loss, etc) from deer or elk in the past 10 years?	GMU 54 (raw count)	GMU 53 & 63 (raw count)
NO	2	5
YES		2

**Survey 3, Question 5:**

Question 5: If you answered YES to previous question, what has been the solution for solving these agricultural damage issues?	Raw Count
Submitted claims to CPW Game Damage Program	1
Applied for special hunts	1
Sought help from the CPW Habitat Partnership Program	1

**Survey 3, Question 6:**

*\*Only respondents who chose answer choice D (own or manage private land) from question 2 were allowed to answer.*

*\*\*respondents from GMU 54 pool were not presented with answer choices pertaining to deer*

*Summary by percentage (and count) of landowner respondents*

Question 6: Which of the following best describes hunting activities on your owned or managed property in GMU 53, 54, or 63? (Choose all that apply)	GMU 54 (raw count)	GMU 53 & 63 (raw count)
No hunting is allowed	1	0
Only myself, family, and/or friends are allowed to hunt	0	5
Land is leased to an outfitter/guide or we outfit/guide on property	0	0
Public is allowed to hunt with permission, trespass fee is required	0	0
Public is allowed to hunt with permission, no trespass fee is required	1	0
Other	0	1

**Survey 3, Question 7:**

*\*Answer choices could pertain to both deer and/or elk in the GMU 53 & 63 pool of respondents. Deer was not described in the GMU 54 survey answer choices, and thus GMU 54 respondents answers only applied to elk.*

*Answer choices were ranked by calculating a weighted percent (Not important = 0 points, Slightly important = 1 point, Moderately important = 2 points, Very important = 3 points) for each reason independently. A weighted score was calculated by multiplying the number of respondents times the degree (points 0 – 3) they answered for. A total count was created by multiplying 3 times the total number of respondents answering. Dividing the weighted score by the total possible count produced the percentages presented below. 0% would indicate all respondents in the survey indicated that a particular reason was “Not Important”, while a 100% would indicate the particular reason was “Very Important”.*

Question 7: Rank the following from not important to most important	GMU 54	GMU 53 & 63	All GMUs Combined
A) Nature, Family, & Friends	78.1%	87.3%	82.6%
B) Obtain Wild Game Meat	83.8%	87.3%	85.5%
C) Contribute To Wildlife Mgmt	81.0%	84.8%	82.8%
D) Local Economy	53.3%	61.5%	57.2%
E) Obtain Trophy	41.7%	25.3%	33.8%

**Survey 3, Question 8: Answer choices by percent of respondents and respondent type:**

Question 8: Overall, how satisfied were you with your experience while hunting elk in GMU 53 or 63 or 54?	GMU 54	GMU 53 & 63	All GMUs Combined
Very unsatisfied	14.3% (5)	18.8% (3)	15.7% (8)
Somewhat unsatisfied	31.4% (11)	31.3% (5)	31.4% (16)
Neither unsatisfied nor satisfied	17.1% (6)	12.5% (2)	15.7% (8)
Somewhat satisfied	28.6% (10)	25% (4)	27.5% (14)
Very satisfied	8.6% (3)	12.5% (2)	9.8% (5)

**Survey 3, Question 9:**

The below graph categorized question 8 into three broad categories.

*Answer choices by percent of respondents and respondent type:*

Question 9: Overall, how satisfied were you with your experience while hunting elk in GMU 53 or 63 or 54?	GMU 54	GMU 53 & 63	All GMUs Combined
unsatisfied	45.7% (16)	50% (8)	47.1% (24)
Neither unsatisfied nor satisfied	17.1% (6)	12.5% (2)	15.7% (8)
satisfied	37.1% (13)	37.5% (6)	37.3% (19)

**Survey 3, Question 10:** *Answer choices by percent of respondents and respondent type:*

Question 10: Which method of take have you preferred when hunting elk in GMU 53, 54, or 63?	GMU 54	GMU 53 & 63	All GMUs Combined
Archery	8.8% (3)	26.7% (8)	17.2% (11)
Muzzleloader	0% (0)	10.0% (3)	4.7% (3)
Rifle	82.4% (28)	50% (15)	67.2% (43)
No preference	8.8% (3)	13.3% (4)	10.9% (7)

**Survey 3, Question 11:** Respondents were presented with the discussion and the different tradeoffs when managing the elk population size certain ways. See question 9 of section 2 in this appendix for the graphs and discussion provided.

*Answer choices by percent of respondents and respondent type:*

Question 11: Given the above scenarios and descriptions of anticipated outcomes: during the next 10 years (2018 - 2028), how do you want the GMU 53 & 63 or 54 elk population size to be managed?	GMU 54	GMU 53 & 63	All GMUs Combined
Scenario A: Increase by ~35%	40.5% (17)	24.6% (15)	31.1% (32)
Scenario B: increase by ~17%	23.8% (10)	32.8% (20)	29.1% (30)
Scenario C: Do not change (keep at ~3500 elk)	16.7% (7)	9.8% (6)	12.6% (13)
Scenario D: Decrease by ~17%	4.8% (2)	1.6% (1)	2.9% (3)
Scenario E: Decrease by ~35%	0% (0)	3.3% (2)	1.9% (2)
No Preference	14.3% (6)	27.9% (17)	22.3% (23)

**Survey 3, Question 12:** *The question read as: “High bull ratios often equate to having more older aged bulls and fewer other hunters on the landscape. However, having a higher bull ratio also means that hunting opportunity is decreased. During the next 10 years how would you like the bull ratio to be managed in GMU 53 & 63?”*

Question 12: During the next 10 years, how would you like the bull ratio to be managed in GMU 53 & 63 or 54?	GMU 54	GMU 53 & 63	All GMUs Combined
Increased (want less hunting opportunity, but potentially more/larger bulls, less	42.4% (14)	42.9% (12)	42.6% (26)
Stay the same	39.4% (13)	39.3% (11)	39.3% (24)
Decreased (I want more hunting opportunity, but potentially fewer/smaller	12.1% (4)	3.6% (1)	8.2% (5)
No preference	6.1% (2)	14.3% (4)	9.8% (6)

**Survey 3, Question 13:** \*Answer choices could pertain to both deer and/or elk in the GMU 53 & 63 pool of respondents. Deer was not described in the GMU 54 survey answer choices, and thus GMU 54 respondents answers only applied to elk.

Answer choices were ranked by calculating a weighted percent (Not at all concerned = 0 points, Slightly concerned = 1 point, Moderately important = 2 points, Very concerned = 3 points) for each issue independently. A weighted score was calculated by multiplying the number of respondents times the degree of concern (points 0 – 3) they answered for. A total count was created by multiplying 3 times the total number of respondents answering. Dividing the weighted score by the total possible count produced the percentages presented below. 0% would indicate all respondents in the survey indicated that a particular issue was “Not at all concerning”, while a 100% would indicate the particular issue was “Very concerning”. Issues were ranked from 1 – 10 (second column) for each of the respondent types, with the most concerning issue highlighted in yellow.

Question 13: How concerned are you about the following items:	Weighted Percentage (out of 100%) and ranking by respondent type					
	GMU 54		GMU 53 & 63		All GMUs Combined	
Habitat quantity or quality (not having enough habitat for elk/deer, other wild species, and/or domestic livestock)	67.6%	4	82.2%	1	57.0%	2
Potential for deer and/or elk to starve during the winter	64.8%	5	78.0%	2	52.5%	3
Economic losses due to deer and/or elk (i.e., ag-production, gardens, fences)	27.8%	10	37.9%	10	6.3%	9
Land not being accessible for hunting (i.e. places where deer and/or elk hunting is not allowed)	73.1%	2	71.1%	3	58.0%	1
Impacts of hunting recreation pressure on the distribution of deer and/or elk	74.3%	1	65.9%	4	36.3%	5
Impacts of non-hunting recreation (i.e., ATVs, hikers, camping, antler collecting) on the distribution of deer and/or elk)	71.3%	3	51.9%	7	33.3%	7
Disease (i.e., Chronic Wasting Disease) negatively affecting deer and/or elk populations	64.8%	6	65.2%	5	37.5%	4
Disease (i.e., Chronic Wasting Disease) transmission potential from wildlife to humans, pets, or livestock	52.4%	8	47.4%	9	26.3%	8
Predators affecting deer and/or elk populations	55.2%	7	54.8%	6	33.8%	6
Vehicle collisions with deer and/or elk	34.3%	9	51.1%	8	6.2%	10

**Survey 3, Question 14: Answer choices by percent of respondents and respondent type:**

Question 14: Tell us how you feel about the following statement: “the problem isn’t with too many or too few elk in GMU 53 or 63, it is the distribution (where elk occur) that is a problem”	GMU 54	GMU 53 & 63	All GMUs Combined
I do not agree nor disagree	8.6% (3)	16.1% (5)	12.1% (8)
Strongly agree	17.1% (6)	6.5% (2)	12.1% (8)
Somewhat agree	34.3% (12)	41.9% (13)	37.9% (25)
Somewhat disagree; we should probably change the number	8.6% (3)	9.7% (3)	9.1% (6)
Strongly disagree; the number of elk needs to be changed!	17.1% (6)	16.1% (5)	16.7% (11)
No opinion or none of the above	14.3% (5)	9.7% (3)	12.1% (8)

**Question 15: What is your zip-code (please enter 5-digit zip)?**

*Respondents represented a variety of geographies, that were also captured a-prior in the list of post-card addresses solicited. Future analysis may utilize these addresses to extract geographic attributes of respondents.*

Question 16: In what year were you born?	GMU 54	GMU 53 & 63	All GMUs Combined
Average of Age	51.6	53.3	52.5

**Question 17: Would you like to receive updates on this plan? (i.e., when a draft is released for public comment, notice of the plan’s final approval) If so, please enter your email address here:**

*A total of 55 respondents (54%% of those interested in elk) provided email addresses for notifying them on the updates of the plan.*

**Question 18: Please use the space below to provide any additional comments you may have about deer or elk management in GMUs 53, 54, and 63.**

*A total of 40 respondents (39%% of those interested in elk) took the opportunity to provide written comments. These comments were all read and reviewed to glean any additional ideas for elk management strategies potentially implemented in this plan and for outside of this plan.*

**Section 4: Attached Comment Letters**

*Letters received from the Gunnison County Stock Growers Association (8/2/2017), Montrose BLM Field Office (11/17/2017), Habitat Partnership Program (combined letter from North Fork and Gunnison Committees: 12/18/2017), Gunnison County Stock Growers Association (1/8/2018), and USFS Gunnison Ranger District (2/20/2018) are attached below.*



Established 1894

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GUNNISON COUNTY STOCKGROWERS ASSOCIATION, INC.

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P.O. Box 1711 ♦ Gunnison, Colorado 81230

8/25/2017

AUG 29 2017

Colorado Parks & Wildlife/State Wildlife Commission  
300 West New York  
Gunnison, CO 81230

Dear Colorado Parks and Wildlife:

My name is Alphonse Taramaraz, current President of the Gunnison County Stockgrowers Association. We are the oldest stockgrowers organization in Colorado and we continue to be one of the most active. Thank you for accepting our comments concerning your upcoming decision on elk numbers in Unit 54 (DAU E41). We do have concerns regarding the process for determining elk numbers for herd objective.

Following are our concerns:

- 1: Distribution has changed due to weather, recreation, and land use changes which has resulted in more use on private lands all year round.
- 2: Big game numbers must be adjusted due to distribution changes. We have seen extreme changes in big game distribution in the summer resulting in higher use on private lands.
- 3: Consideration must be given to past wildlife winter use areas such as Tomichi Dome with a renewed emphasis on protecting those areas in the winter as they play a key role in Big Game Distribution.

It is essential the elk populations be based first and foremost on the available land resources and distributions. We insist the Commission work closely with the USFS and BLM and affected landowners to determine the appropriate carrying capacity.

I have yet to meet a hunter who wanted less "Hunter Opportunity". Elk populations should not be based on hunters wanting more elk.

Thanks again,

Alphonse Taramaraz

Email: goldeneagletrash@pcrs.net

Phone: 970-641-3230



## United States Department of the Interior

BUREAU OF LAND MANAGEMENT  
Uncompahgre Field Office  
2465 South Townsend Avenue  
Montrose, Colorado 81401  
[www.co.blm.gov](http://www.co.blm.gov)



Date: 11/17/2017

Re: Draft Elk Management Plan for Game Management Units 54, 53 and 63

Colorado Parks and Wildlife  
Attn: Kevin Blecha,  
300 W. New York Ave.  
Gunnison, CO, 81230

Dear Mr. Blecha,

The Bureau of Land Management, Uncompahgre Field Office submits the following comments on the Draft Elk Management Plan for Herd E05 (Game Management Units 54, 53 and 63) (Draft Plan).

### ***Comments on the Draft:***

As with previous conversations with CPW biologists, the Uncompahgre Field Office has concerns about the winter and early spring distribution of elk behind the C-77 gate closure (western portion of GMU 63). The C-77 closure was implemented in 2004 to provide big game refuge during the winter months and decrease impacts to private lands from wintering big game, as well as provide protection for lekking Gunnison sage grouse in the early spring.

The closure has been highly successful in providing refuge for wintering elk. With public motorized access restricted from December to May annually, substantial wild ungulate populations will spend the majority of the winter on public lands on Green Mountain and Black Ridge. Studies have shown that elk remain on these winter ranges through the lek season and early nesting season until the motorized access restriction is lifted on 15 May annually<sup>1,2</sup>. Elk winter concentration habitat directly overlaps with core Gunnison sage grouse habitat for the Crawford population. During mild winters with low snow depth, the number of elk using the core of Gunnison sage grouse habitat is concerning, and could be having impacts to this grouse population. BLM staff have regularly observed multiple very large herds (300-500 elk) per day behind the C-77 gate in late-winter to early-spring since about 2010.

Given that CPW has both elk and grouse population estimates, we recommend an analysis to see if there is an inverse relationship between elk and grouse population fluctuations. It appears that during the time period described in the Draft Plan that the elk populations were increasing (1984-1989, Draft Plan Fig 2) and the Crawford grouse population was declining (from 133 to 119 (See attached Figure 1), with the low point in 1993 of 97 birds. During the time period that the elk population was decreased intentionally in response to high elk numbers (1990 – 1998; Draft Plan pg 7), grouse populations in the Crawford area increased dramatically to their high of 239 birds in 2000. During the time period that the elk populations again increased (2003-2008), grouse populations were again on the decline (from 202 to 147 birds), with a continued decline to a low of 69 birds in 2012. From 2011 through 2013, CPW augmented this grouse population with 72 birds from Gunnison Basin, bringing the population back up to an estimate of 134 birds in 2017.

The Uncompahgre Field Office completed a vegetation assessment of the Crawford Gunnison sage grouse area to determine the suitability of habitat for grouse<sup>3</sup>. Generally, the area met habitat guidelines<sup>4</sup> for sagebrush height and shape, overall forb cover and height, and perennial grass cover and height (3.9"). Additionally, overall forb cover and composition are well within ecological site potential. Concerns for sage grouse habitat included low sagebrush

cover and that mean perennial grass height met **minimum** height guidelines. We observed a low composition of residual tall bunch grasses during early temporal periods (nesting/early brood rearing) of this study. Additionally, grass species composition was heavily favored by grass species that may not meet minimum heights in dry or drought years. Issues with vegetation condition in this area are affected by many factors: drought, domestic cattle and sheep grazing, and wild ungulate (mule deer and elk) grazing. Elk utilization of vegetation in late-winter to early-spring may be having impacts to grass cover and composition in the area. Especially during those mild winters where elk appear to congregate, remove residual cover in the late winter, and then graze early green grasses as they come out of dormancy in the early spring. Studies have shown that repeated heavy spring grazing contributes to both changes in plant species abundance and biodiversity in sagebrush steppe.<sup>5,6</sup>

Additionally, in contrast to the habitat guidelines for grass height (3.9"), there is growing consensus among the scientific community that 18cm (~7") grass heights correlate to increased habitat preference and nest success by sage-grouse<sup>7, 8,9, 10, 11</sup>. Recent studies of Gunnison sage-grouse have found that increases in grass heights are positively associated with increased nest survival rates<sup>12</sup>. These findings are consistent with previous studies which have correlated increased (residual) grass heights with increased nest survival rates for greater sage-grouse<sup>13,14, 15</sup>. Lateral cover provided by tall residual bunch grasses from the previous growing season, help to conceal nests from non-avian predators<sup>6, 16, 17</sup>. Conversely, the removal of residual grass has been found to negatively impact the quality of sage-grouse habitat<sup>18</sup>, as residual grass is the predominant grass cover during nesting season<sup>6,19</sup>. Therefore, reducing residual grass cover can negatively affect the quality of sage-grouse habitat and nest fate<sup>20</sup>.

Given our concerns for the Crawford Gunnison sage grouse population in GMU 63,

- We can support *License Allocation Objective Alternative 1* (Cow licenses are allocated disproportionately among the three GMUs, with proportionally higher number of limited cow elk licenses will be allocated in GMU 63).
- We would prefer to see *Population Objective Alternative 1* (0% change). However, we understand that the larger Herd E05 may be able to support the CPW preferred Alternative 2 (17% increase), while addressing distribution issues within GMU 63 through License Allocation Objective Alternative 1. We strongly encourage a full range of management options be employed to allow for the greatest proportion of the 17% increase in population occur in GMUs 54 and 53. BLM believes these areas offer either greater extents of winter range or less sensitive winter ranges where increased numbers of animals would have less impacts to sensitive resources.

We also recommend a joint effort between CPW and BLM to monitor and address issues of elk concentrations overlapping with sage grouse core habitats in the Crawford population. Given that the C-77 seasonal closure (Dec 1-May 15) appears to encourage elk to concentrate behind the gate during late-winter to early spring, when BLM begins travel management in this area, we may consider modifying the gate closure in favor of Gunnison sage grouse (generally, lekking/nesting season) to attempt to address this issue.

Thank you for the opportunity to submit these comments. BLM looks forward to finding solutions to these matters and to continue working with CPW as this planning process moves forward.

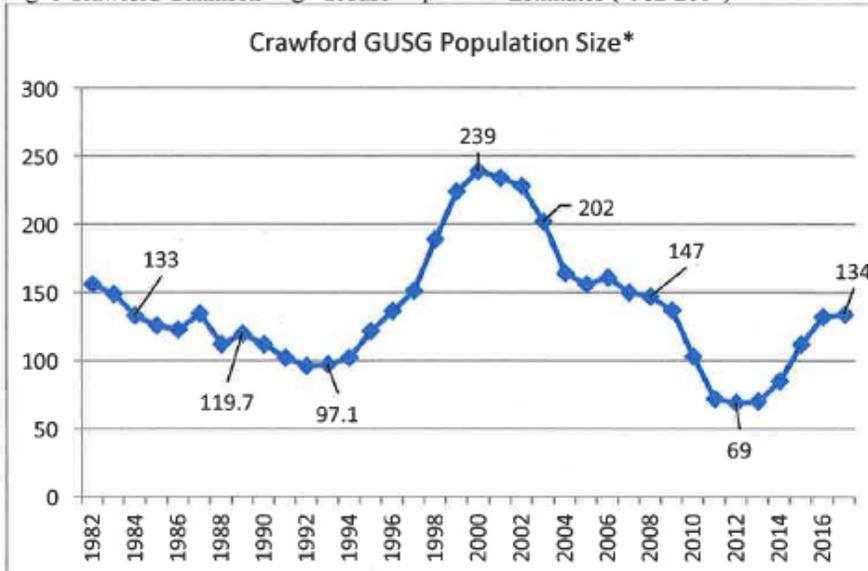
Sincerely,



Gregory Larson,  
Field Office Manager

Enclosure  
1 – Chart

Fig. 1 Crawford Gunnison Sage Grouse Population Estimates (1982-2017)



\* Based on 5-year average

<sup>1</sup> Ouren, D.S, J. Keim. *In review*. Outsmarting Management; Elk Responses to Land Management and Vehicle Use. *Wildlife Biology*, BioOne.

<sup>2</sup> Ouren, D.S., pers. comm. April 8 2016

<sup>3</sup> BLM 2016. Gunnison Sage-grouse Habitat Assessment Crawford Population 2013-2015, Uncompahgre Field Office, Montrose, Colorado.

<sup>4</sup> PCE 2: Table 2 in 79 FR 69333 Designation of Critical Habitat for Gunnison Sage-Grouse.

<sup>5</sup> Anderson J.E., and R.S. Inouye. (2001). Landscape scale Changes in Plant Species Abundance and Biodiversity of a Sagebrush Steppe over 45 Years. *Ecological Monographs* 71(4):531-556.

<sup>6</sup> Adler, Peter B., Daniel G. Milchunas, William K. Lauenroth, Osvaldo E. Sala, Ingrid C. Burke (2004). Functional traits of graminoids in semiarid steppes: a test of grazing histories *Journal of Applied Ecology* 41(4):653-663.

<sup>7</sup> Gregg, M.A., J.A. Crawford, M.S. Drut, and A.K. DeLong. 1994. Vegetational cover and predation of sage grouse nests in Oregon. *Journal of Wildlife Management* 58:162-166.

<sup>8</sup> Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage-grouse populations and their habitats. *Wildlife Society Bulletin* 28(4): 967-985.

<sup>9</sup> Hagen, C.A., J.W. Connelly, and M.A. Schroeder. 2007. A meta-analysis of Greater sage-grouse (*Centrocercus urophasianus*) nesting and brood-rearing habitats. *Wildlife Biology* 13: 42-50.

<sup>10</sup> Herman-Brunson, K.M., K.C. Jensen, N.W. Kaczor, C.C. Swanson, M.A. Rumble, and R.W. Klaver. 2009. Nesting ecology of greater sage-grouse *Centrocercus urophasianus* at the eastern edge of their historic distribution. *Wildlife Biology* 15: 395-404.

<sup>11</sup> Prather, P.R. 2010. Factors affecting Gunnison sage-grouse (*Centrocercus minimus*) conservation in San Juan County, Utah. PhD Dissertation, Utah State University, 134 pp.

<sup>12</sup> Stanley, T., C. Aldridge, D.J. Saher, and T. Childers. 2015. Daily Nest Survival Rates of Gunnison Sage-Grouse (*Centrocercus minimus*): Assessing Local and Landscape-Scale Drivers. *Wilson Journal of Ornithology* 127(1): 59-71.

<sup>13</sup> Connelly, J, S. Knick, M Schroeder, S. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife

<sup>14</sup> Hagen, C.A., J.W. Connelly, and M.A. Schroeder. 2007. A meta-analysis of Greater sage-grouse (*Centrocercus urophasianus*) nesting and brood-rearing habitats. *Wildlife Biology* 13: 42-50.

<sup>15</sup> Prather, P.R. 2010. Factors affecting Gunnison sage-grouse (*Centrocercus minimus*) conservation in San Juan County, Utah. PhD Dissertation, Utah State University, 134 pp.

<sup>16</sup> Connelly, J, S. Knick, M Schroeder, S. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife.

<sup>17</sup> Ouren, D.S., pers. comm. April 8 2016

<sup>18</sup> Prather, P.R. 2010. Factors affecting Gunnison sage-grouse (*Centrocercus minimus*) conservation in San Juan County, Utah. PhD Dissertation, Utah State University, 134 pp.

<sup>19</sup> BLM. 2015. Sage-grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. Stiver, S.J., E.T. Rinkes, D.E. Naugle, P.D. Makela, D.A. Nance, and J.W. Karl, eds., Bureau of Land Management and Western Association of Fish and Wildlife Agencies, Denver, Colorado

<sup>20</sup> Ouren, D.S, J. Keim. *In review*. Outsmarting Management; Elk Responses to Land Management and Vehicle Use. *Wildlife Biology*, BioOne.



December 18, 2017

Kevin Blecha, Terrestrial Biologist  
Colorado Parks & Wildlife  
300 W. New York Ave.  
Gunnison, CO 81230

**RE: North Fork of the Gunnison & Gunnison Basin HPP Committee comments on the West Elk Mountains Elk Herd (E05) Management Plan**

Dear Mr. Blecha:

This letter is in response to your request for formal comment regarding the Colorado Parks & Wildlife E05 Herd Management draft plan. The Habitat Partnership Program (HPP) was created to help resolve wildlife conflicts, particularly those associated with fence and forage issues and to assist CPW in achieving game management objectives. The diverse makeup of local HPP committees (3 livestock growers, Forest Service, BLM, CPW and sportsmen representatives) provides a good cross-section of local interests to review DAU proposals and respond accordingly for CPW consideration.

The North Fork of the Gunnison and Gunnison Basin HPP Committees held special meetings on November 13<sup>th</sup> and December 11<sup>th</sup> to discuss elk population objectives for E05, and review the herd management plan alternatives. After careful consideration, the committees offer the following recommendations:

- The committees agree that the current elk population objective should be increased according to the collaborative objective (Alternative #2). This represents a 17% increase, resulting in a post-season population objective between 7800-8800 elk. The committees feel that this increase is modest enough that the proposed population objective will be sustainable, and well-received by the public. Additionally, the committees support a gradual population increase to achieve this objective over a period of years, such that near-current levels of hunting opportunity, hunter crowding, and license demand will be maintained.
- The North Fork Committee particularly feels that while population increases are desirable within the DAU, the majority of the increase should occur within GMU 54 only and would not support significant increases within GMUs 53 and 63. However, the Gunnison Basin HPP Committee, while supportive of the increase, is concerned that the proposed population increase within GMU 54 could exacerbate existing agricultural and access issues.
- To address these concerns, the committees strongly support a disproportional license allocation according to the CPW staff preferred alternative (Alternative #1), and would not support the proposed 17% population increase if the spatial allocation (Alternative #2) is selected. Uniform allocation of licenses across the

DAU will result in increased numbers of elk and associated conflicts within GMUs 53 and 63, where significant refuge issues and agricultural conflicts exist. However, using disproportional license allocation in addition to the current levels of DWM involvement, Game Damage resources, and HPP involvement, the committees feel that the elk can be appropriately distributed within lower conflict areas, and that landowner tolerance would be maintained as a result.

- The committee believes CPW's management strategies, including existing season structures, hunt codes, and game damage/distribution hunt license allocations, will be critical to the adaptive management of increased numbers of elk within known conflict areas in the Gunnison Basin and North Fork. Both HPP committees encourage CPW staff and offer their assistance to develop the changes in advance of the anticipated population increases and associated conflicts.
- The committees support managing the E05 bull ratio according to the status quo objective (Alternative #2). This represents an objective of 23-28 bulls per 100 cows, and a relative average between the two DAUs that were previously managed separately. The committees feel that this ratio is acceptable to the public as it should not result in decreased hunter opportunity or increased hunter crowding, and will be sustainable throughout the population increase.

Finally, there are currently ongoing elk research and monitoring efforts which both HPP committees have helped to fund. The study is anticipated to yield data which will help inform HPP decision-making processes and may also affect CPW's management strategies within the area.

The committees feel that these alternatives are reasonable and sustainable based on current range conditions, high landowner tolerance for big game, and the extensive public input gathered during this planning process.

Thank you for the opportunity to provide these comments.

Sincerely,

 (KR)

Cody Purcell, Chair

North Fork Gunnison HPP Committee

 (KR)

Nick Gallowich, Chair

Gunnison HPP Committee

Cc J. Wenum

01/08/2018

County Stockgrowers Association

Comments on Elk Management Plan for Elk Herd E05

Dear Wildlife Commission,

Please accept our comments and thoughts regarding your upcoming decision for managing the E05 Elk Herd. We appreciate Colorado Parks and Wildlife outreach to our organization.

The Gunnison County Stockgrowers Association (GCSA) has a good working relationship with Colorado Parks and Wildlife on the State level as we continue legal efforts for the Gunnison Sage Grouse. GCSA has a good working relationship with the CPW local Gunnison office.

GCSA values these relationships and remains dedicated to working in this spirit.

We would like to see the following resolved before the Wildlife Commission makes a final decision on E05:

1. The federal agencies that are primarily responsible for providing habitat and forage for elk, BLM and USFS, need to have and share written documentation of their positions on elk numbers. If they support increased numbers they must show/document where there is excess grazing available and how they intend to work with CPW to get elk to graze those areas.
2. If the USFS and BLM support elk increases we need to have their written positions on how many additional hunters they anticipate in the field and justify support of this additional recreational use.
3. GCSA wants to know what percentage elk increase CPW is proposing for Unit 54. Herd E05 is proposing a 17% average elk increase, with more of the increase coming from Unit 54. How much more?
4. For discussion purposes assume approximately a proposed 20%-25% increase in elk numbers for Unit 54. GCSA needs to understand how CPW envisions keeping elk off private property during hunting seasons to accomplish the goal of increased hunter opportunity. Our concern is that this increase may only accomplish 20%-25% more elk congregating on private property.
5. We would like to see a plan from CPW that shows what additional measures will be implemented as preparedness measures to manage/feed elk in the winter months. A significant amount of private ranch land is used by elk during the winters. The majority of ranchers are not offering to feed 20% - 25% more elk in the winter. CPW needs to

make its own accommodations for winter feed. Additionally, very few folks support starvation as acceptable.

6. GCSA needs to see conclusive and legally defensible documentation that additional elk competing for winter range will not have an adverse impact on the Gunnison Sage Grouse. The State of Colorado, Gunnison County, and Stockgrowers have spent too much time, energy, and money to take chances on this. We all need to be able to legally defend decisions when the US Fish & Wildlife Service or Environmental groups make the accusation “the USFS and BLM, along with State and Local entities, value increased hunter opportunity over Sage Grouse viability”.
7. Stockgrowers also want to see a written statement from Gunnison County Commissioners addressing E05 elk management.

If other recreational interests (Biking, Motorized, Fishing, Hiking, Boating, etc.) circulated a poll, with the majority of the respondents being active participants in that specific recreational activity, predictably there would be desire for additional opportunity. That elk hunters want more hunting opportunity is no surprise. GCSA feels that because a specific recreation group desires additional opportunity, this community and all affected parties, including USFS, BLM, and Gunnison County, must fully vet proposals, with no obligation to providing increased opportunity.

GCSA recognizes the Wildlife Commission isn't required to address any of our mentioned items. Yet, we remain convinced and dedicated that our Gunnison Community (Stockgrowers included) is best served when we look at our basin as a whole and resist the temptation to pit competing interests or agencies. Collaborative is a word thrown around too often these days, but it applies here.

Gunnison County Stockgrowers respectfully ask the Wildlife Commission to give our concerns the weight they deserve. Ranching controls a large amount of private land that provides wildlife habitat well beyond elk and grouse. Ranching utilizes large areas of public lands in conjunction with wildlife. We are not here for the weekend, we are here for lifetimes. Stockgrowers are your partners.

Burt Guerrieri

GCSA Board Member, Past President



United States  
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Agriculture

Forest  
Service

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**File Code:** 2600  
**Date:** February 20, 2018

J Wenum  
Area Wildlife Manager  
Colorado Parks and Wildlife  
300 W. New York Ave  
Gunnison, CO 81230

Dear J,

Thank you for the opportunity to provide input on the West Elk Mountains Elk Herd (E05) Management Plan. After consultation with our district and forest wildlife biologists and range management specialists, I have determined that Forest Service lands projected to be impacted by an increase in elk populations can withstand the proposed increase based on observed habitat conditions and forage production. While the proposed 17% increase applies to E05 and includes Game Management Units (GMU) 63, 53, and 54, we understand that this proposed increase for E05 is anticipated to result in a 24% increase on winter range in GMU 54. We agree with your management goals to improve elk distribution and encourage elk recolonization of areas in GMU 54 that currently appear void of elk, but once harbored many. This includes an area of primarily National Forest land between Red Creek and Ohio Creek.

One important landscape-scale change affecting habitat conditions within GMU 54 is a recent spruce beetle outbreak, affecting approximately 60 square miles of forest in the West Elk Mountains between 2006 and 2016. We do not yet understand how elk will respond to the spruce beetle epidemic. General observations by Forest Service staff indicate increased forage production within portions of the spruce-beetle impacted areas. If the perceived forage increase is occurring due to the landscape-scale spruce beetle disturbance, this may temporarily result in improved elk distribution and increased habitat capability during the summer-fall that could sustain an increase in population size.

As you are well aware, recreation is a significant driver for the Gunnison community. Elk hunting is a significant economic driver and contributor to recreation and wildlife conservation. We often think about the biological carrying capacity of habitat to support elk. Carrying capacity also equates to a social carrying capacity. We have not attempted to estimate how many additional hunters are anticipated once license sales go up as the elk population objective range is achieved. We anticipate fewer hunters will be on the landscape in the near-term as license sales are reduced to allow for the population increase. We cannot understate the important role the Forest Service plays in recreation management. This includes travel management work conducted each year addressing unauthorized, user-created routes. Effective travel management requires persistence to inform and educate recreationists, including hunters, on why this matters. We appreciate the support your staff have provided in travel management efforts. We look forward to coordinating future travel management work with Colorado Parks and Wildlife.



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J Wenum

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Undoubtedly, there are challenges to managing increased, diverse, and sometimes conflicting recreation uses. To manage the diverse recreation uses on the landscape in a compatible manner with elk management objectives, livestock grazing, and other Forest Service multiple use objectives, we often talk about sustainability. Sustainability equals trade-offs. Trade-offs are necessary to achieve desired objectives for all uses within the context of what the natural resources can support. We desire to see the hunting seasons and license allocation managed in such a way as to strike a sustainable balance of hunter numbers and distribution throughout the GMUs. We look forward to working with you to manage habitat in a way that is beneficial to elk distribution, providing hunting opportunities throughout E05, and particularly in GMU 54. This is important for a quality hunting experience and hunter opportunity, as well as sustainable recreation management.

In terms of livestock grazing management, the grazing allotments in GMU 54 include a combination of active cattle allotments, and closed or Forage Reserve status. Active allotments have multi pasture rotational grazing systems. Range condition on the grazing allotments within GMU 54 are rated good to excellent in riparian and uplands. This represents the vegetation composition and soil condition in mid-seral to climax ecological status. Livestock grazing utilization averages light to moderate use of current year's forage production in riparian areas and uplands. This is based on range inspections looking at stubble heights of desirable plants. Range condition would represent the quality of the habitat to sustain an elk herd. Current year's utilization and forage production would represent the amount of feed available for an elk herd to survive during the spring/summer/fall seasons. Analysis of range conditions and forage production indicate that a proposed 17% increase in elk herd size could be sustained by the habitat and feed available to them during the time of year they are on National Forest Lands.

In terms of Forest Service habitat management, we conduct riparian and wet meadow habitat restoration and prescribed burning on elk winter range and in habitat areas used by elk in transition during spring and fall. These activities have occurred within GMU 54 on Flat Top Mountain and north of Blue Mesa Reservoir in the Soap Creek, Red Creek and Rainbow Lake Road (Willow Creek drainage) areas. To be effective in having the desired influence on elk distribution patterns and elk habitat use, we coordinate with Colorado Parks and Wildlife, the Gunnison Basin Habitat Partnership Program, and other stakeholders on what areas should be prioritized for habitat treatments that support elk habitat improvement, big game and livestock forage production, and improved animal distribution.

The Forest Service plays a significant role and is an important partner in achieving desired objectives for elk management. We look forward to working with you on managing these resources.

Sincerely,



MATTHEW M. MCCOMBS  
District Ranger

J Wenum

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cc: Kevin Blecha, Brandon Diamond, Matthew McCombs, Dan Perez, Matthew Vasquez, Clay Speas

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