

2018 - JCR Evaluation Form

SPECIES: EIK

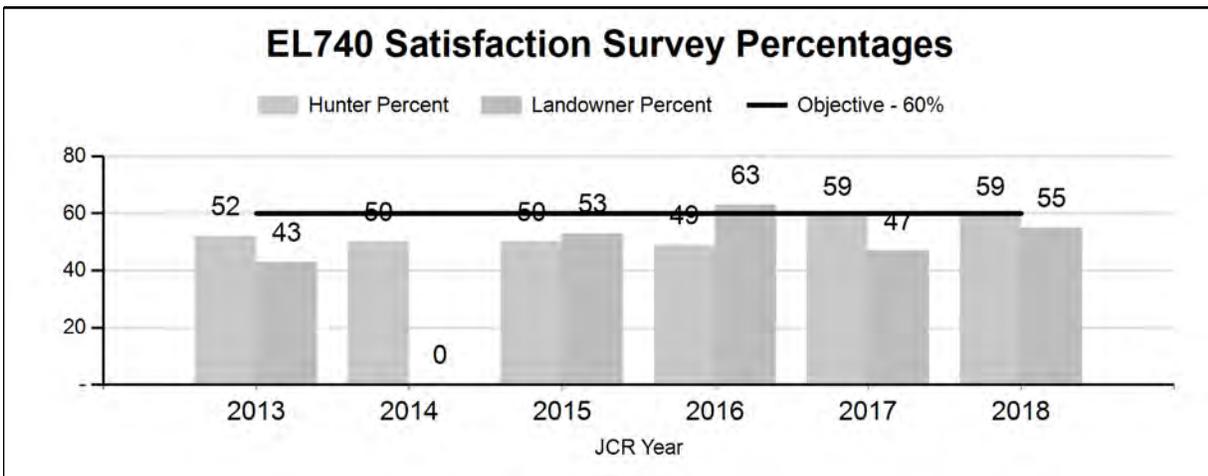
PERIOD: 6/1/2018 - 5/31/2019

HERD: EL740 - BLACK HILLS

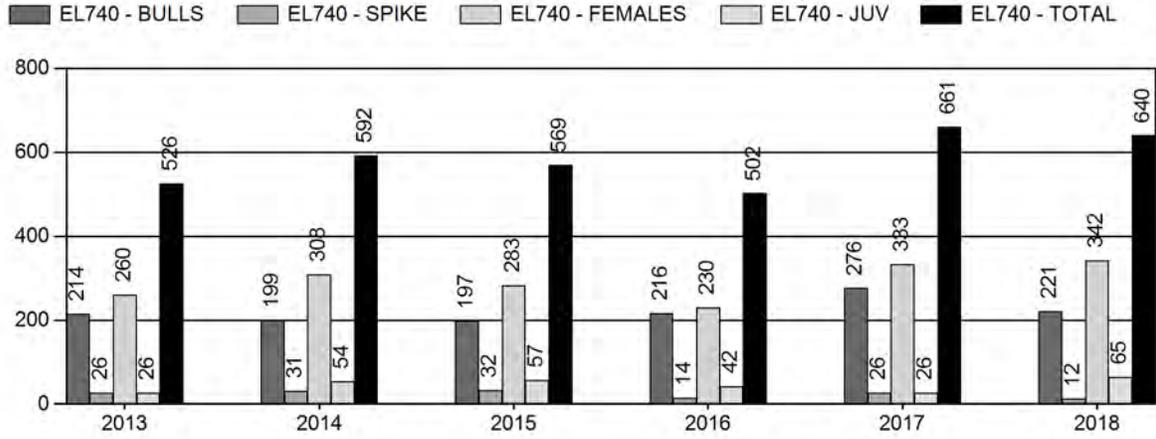
HUNT AREAS: 1, 116-117

PREPARED BY: JOE SANDRINI

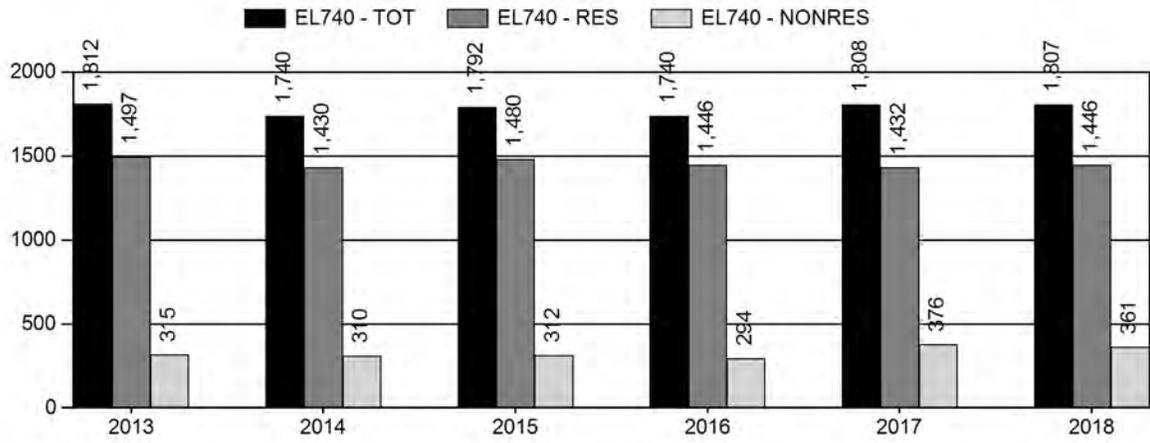
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Hunter Satisfaction Percent	52%	59%	60%
Landowner Satisfaction Percent	53%	55%	60%
Harvest:	570	640	750
Hunters:	1,778	1,807	1,875
Hunter Success:	32%	35%	40%
Active Licenses:	1,874	1,872	1,500
Active License Success:	30%	34%	50%
Recreation Days:	18,208	16,207	17,200
Days Per Animal:	31.9	25.3	22.9
Males per 100 Females:	32	47	
Juveniles per 100 Females	41	44	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			-3%
Number of years population has been + or - objective in recent trend:			5



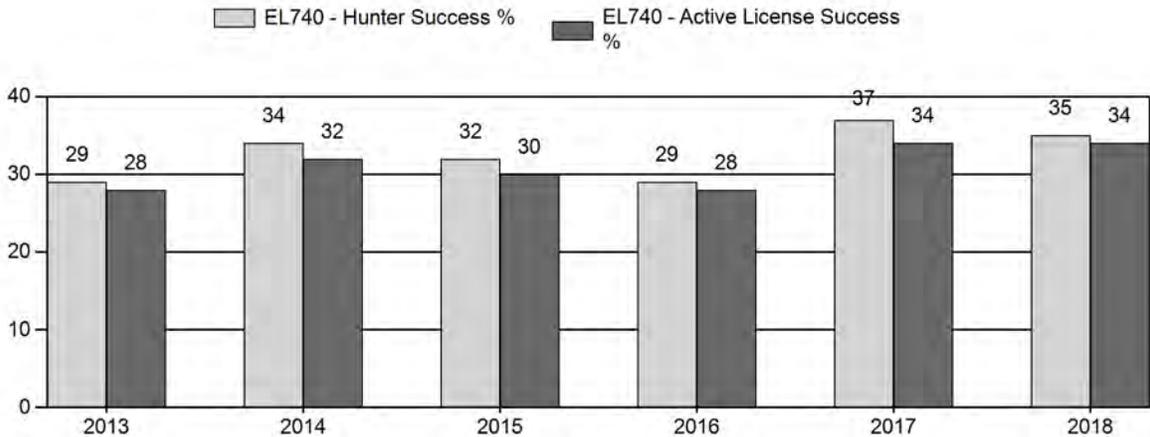
Harvest



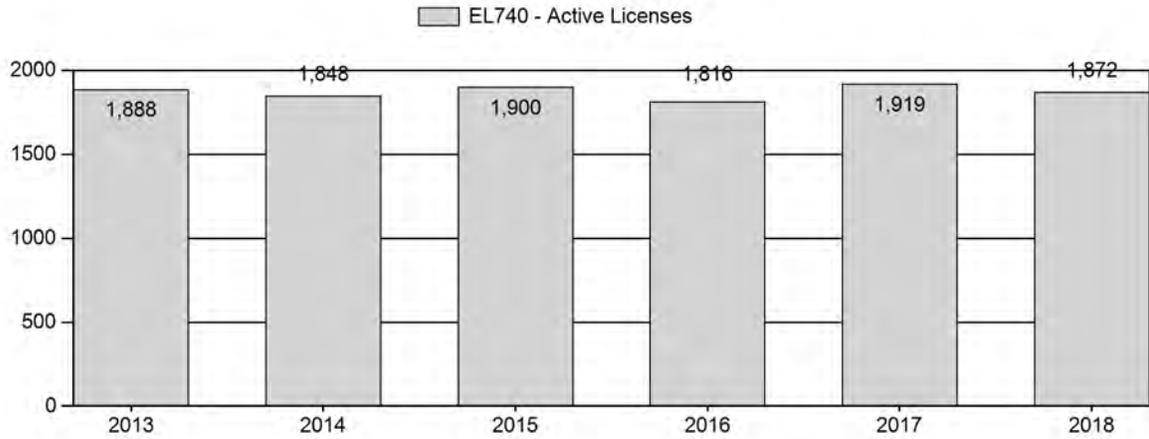
Number of Hunters



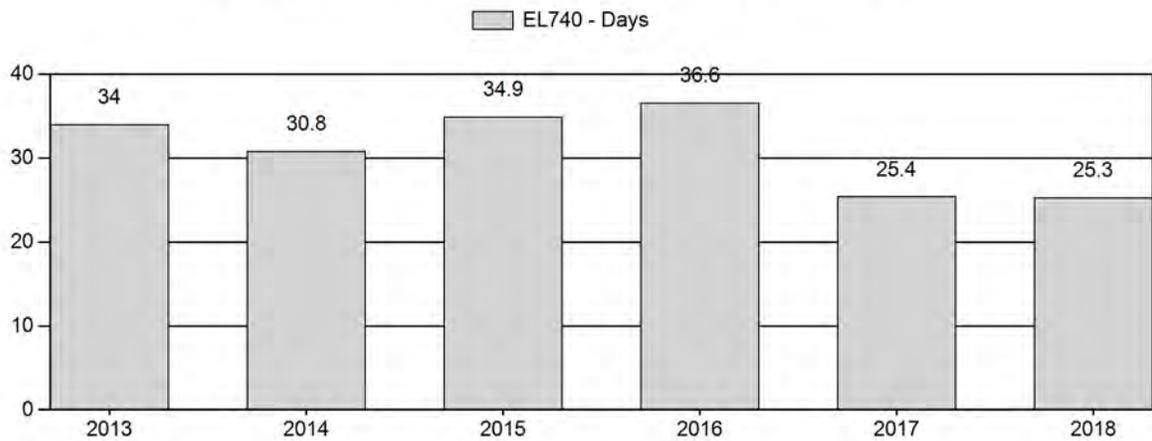
Harvest Success



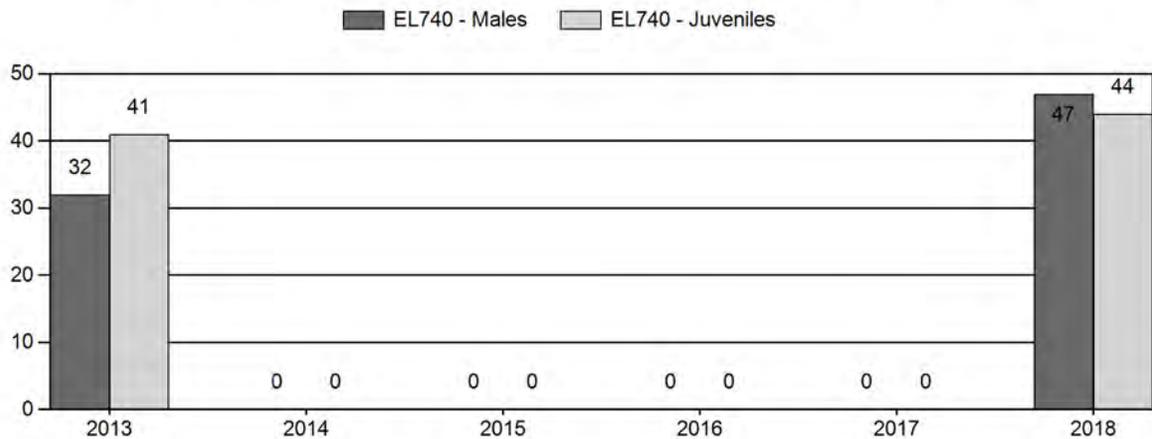
Active Licenses



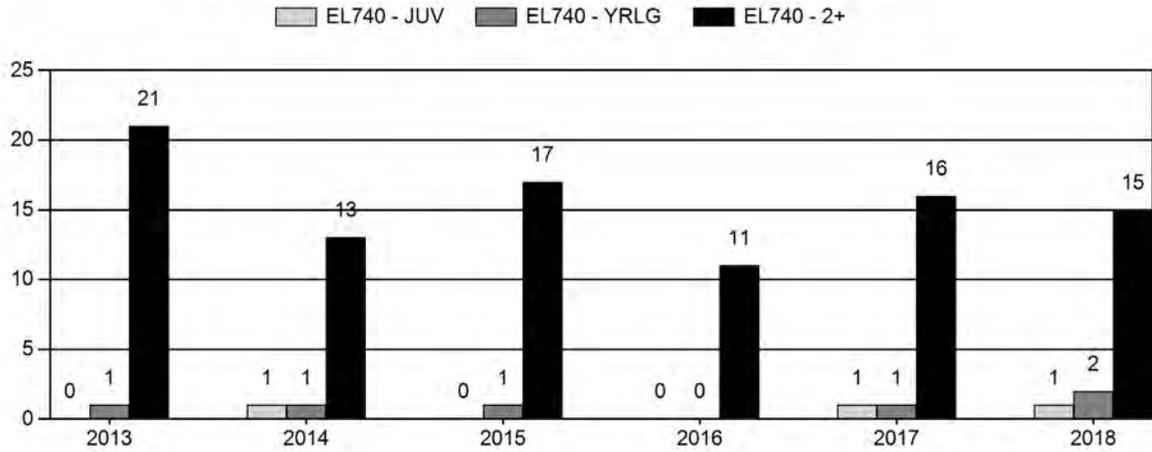
Days per Animal Harvested



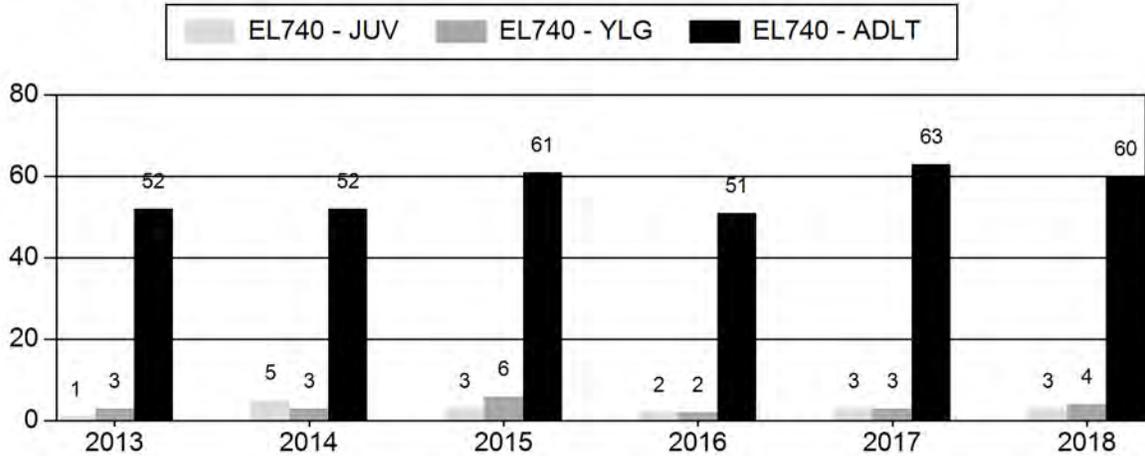
Postseason Animals per 100 Females



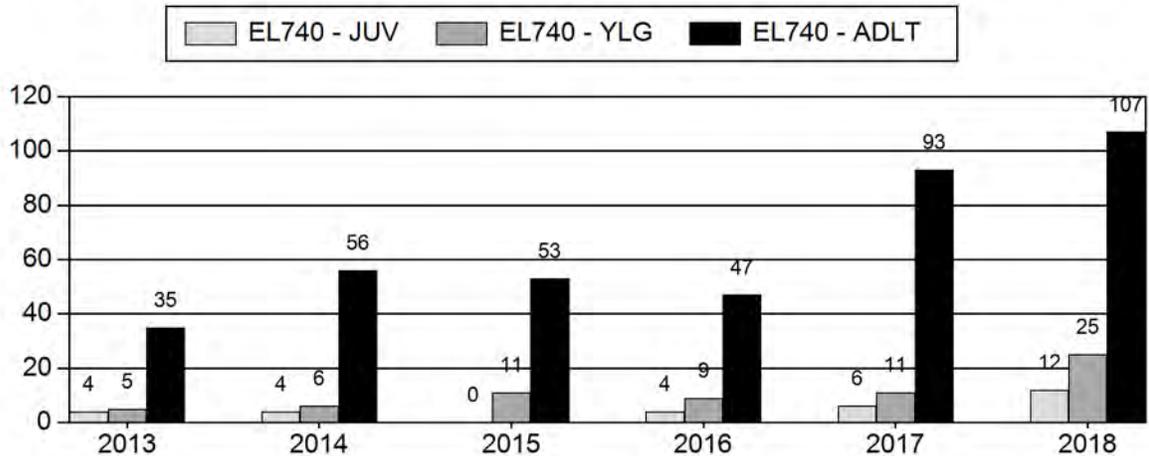
Age Structure of Field Checked Males



Age Structure Data (Field and Laboratory) - Male



Age Structure Data (Field and Laboratory) - Female



2013 - 2018 Postseason Classification Summary

for Elk Herd EL740 - BLACK HILLS

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	19	24	43	19%	133	58%	54	23%	230	0	14	18	32	± 0	41	± 0	31
2014	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2015	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2016	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2017	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2018	0	47	79	126	25%	266	52%	116	23%	508	0	18	30	47	± 0	44	± 0	30

**2019 HUNTING SEASONS
BLACK HILLS ELK HERD (EL740)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
1	1	Oct. 15	Nov. 30	100	Limited quota	Any elk
1	4	Oct. 15	Nov. 30	75	Limited quota	Antlerless elk
116		Oct. 15	Nov. 10		General	Any elk
116		Nov. 11	Nov. 30		General	Antlerless elk
116	7	Aug. 15	Jan. 31	300	Limited Quota	Cow or calf valid off national forest
117	1	Oct. 15	Nov. 30	350	Limited quota	Any elk
117	1	Dec. 1	Jan. 31			Antlerless elk
	2	Oct. 15	Jan. 31	50	Limited quota	Spike or antlerless elk
117	4	Oct. 15	Jan. 31	200	Limited quota	Antlerless elk
117	7	Aug. 15	Jan. 31	400	Limited quota	Cow or calf valid off national forest

SUMMARY OF CHANGES IN LICENSE NUMBER

Hunt Area	License Type	Quota change from 2018
116	6	- 250
	7	+ 300
	8	- 50
117	1	+ 50
	2	+ 50
	4	- 50
Herd Unit Totals	1	+ 50
	2	+ 50
	4	- 50
	6	- 250
	7	+ 300
	8	- 50

Management Evaluation

Current Hunter Satisfaction Management Objective: 60%

Current /Landowner Satisfaction Management Objective: 60%

Management Strategy: Private Land

Secondary Management Strategy: Age distribution of harvested bulls

2018 Hunter Satisfaction Estimate: 59%

2018 Landowner Satisfaction Estimate¹: 55%

Most Recent 3-year Running Average Hunter Satisfaction Estimate: 56%

Most Recent 3-year Running Average Landowner Satisfaction Estimate²: 56%

2018 Postseason Population Estimate: ~ 2,500 (*Anecdotal Field Estimate*)

2019 Proposed Postseason Population Estimate: ~ 2,500 (*Anecdotal Field Estimate*)

HERD UNIT ISSUES: The Black Hills Elk Herd is managed for 60% or greater landowner and hunter satisfaction. The management strategy is private land, with a secondary management objective seeking an annual bull harvest (based upon tooth age data) comprised of 20% aged ≤ 2 years old; 60% aged 3 to 5 years old; and 20% aged 6 years old, or older ($\pm 5\%$ in all categories). These management objectives and strategies were adopted in 2013 and renewed in 2018. Based upon anecdotal observations, field personnel estimate Wyoming's Black Hills elk population to have numbered around 2,500 at the close of the 2018 hunting season (01/31/19). This estimate of wintering elk in Wyoming does not take into account the significant (but unknown) number of elk that move into South Dakota for the winter that are normally present in Wyoming from late spring through early January.

We can neither construct a population model, nor generate a population estimate for this herd as the Department has historically not been able to collect adequate classification data. Additionally, radio collar data show substantial numbers of elk regularly cross the Wyoming / South Dakota Stateline violating the closed population assumption of models. Consequently, no attempts have been made to model this population since 1996. As a result, the aforementioned non-numerical management objectives were adopted.

The Black Hills Elk Herd Unit is comprised of Hunt Areas (HA's) 1, 116, & 117. It is located in the northeast corner of Wyoming and encompasses approximately 3,270 mi², of which 1,920 mi² are considered occupied habitat. Elk are not ubiquitous across occupied habitat. Rather, they tend to move about depending upon range conditions, snow depth and human activity, with some areas seeing regular elk use and others very infrequent use. Approximately 73% of the occupied habitat is private land, with the single largest block of public land being found on the Black Hills National Forest (BHNF), which contributes 14% of the occupied habitat. HA 1 is 97% public land, and represents the largest contiguous block of public land extensively inhabited by elk. Elk do occur

¹ Percentage of landowner respondents to survey indicating elk numbers "at or about at desired level."

² Mean percentage of landowner respondents to survey indicating elk numbers "at or about at desired level" (bio-yrs. 2016-2018).

on other portions of the Black Hills National Forest and dispersed sections of State and other federally owned lands. However, elk use and hunter harvest in those areas are irregular.

The adopted management framework states all landowners receiving landowner elk licenses and other landowners whose property see regular elk use, or have expressed an interest in elk management will receive a mail survey with prepaid response envelopes every three years; and annual, documented one on one visits will be conducted on non-survey years (annual meeting with “key” landowners).³ However, since 2015, we have been conducting the former in lieu of the latter based upon administration direction. Landowner satisfaction with elk numbers was first quantified in bio-year 2012 with the proposal to move to a non-numerical objective. At that time, slightly more than 60% noted they were satisfied, very satisfied, or neutral with respect to elk numbers.

The criteria used to gauge landowner satisfaction were formalized in bio-year 2014 by Wildlife Division Administration when it was deemed landowners reporting elk numbers to be “at, or about at” desired levels were to be considered satisfied, while those reporting numbers above or below desired levels categorized as unsatisfied. As such, survey results for bio-years 2012 and 2013 were reanalyzed using these criteria where they could be teased from the responses collected. Consequently, the recorded satisfaction values were changed to 59% and 43% for bio-years 2012 and 2013, respectively. Unfortunately, due to the timing of survey efforts and administrative direction regarding satisfaction measurement criteria, no landowner satisfaction survey data meeting the revised standards were collected during 2014.

Since 2016, each January a pre-paid return mail survey has been sent to about 160 Black Hills landowners who receive landowner elk licenses, whose property see regular elk use, or have expressed an interest in elk management. Subtracting for undelivered surveys, the response rate has declined steadily from 53% in 2016 to 49% this year. Responses are summarized in Figures 1, 2 & 3. Landowner satisfaction and the reasons for satisfaction are not strictly tied to perceptions of elk numbers. Therefore, they cannot be directly compared to hunter satisfaction measures, because quantifying criterion for each group are different. Consequently, using reports of “at,” “above,” and “below” desired levels as satisfaction measures is inappropriate. These statements are not measures of satisfaction per se, and while they may be associated to some degree with satisfaction, they are simply subjective indications of perceived elk numbers relative to personal desire. Therefore, to tease out true satisfaction and be consistent with harvest survey data, each year landowners are specifically asked to identify their satisfaction level with elk numbers as very dissatisfied, dissatisfied, neutral, satisfied, or very satisfied (Figure 2). We also ask a follow up question to quantify reasons for dissatisfaction (Figure 3). Each year the number of respondents indicating they are not specifically dissatisfied with elk numbers (satisfied + very satisfied + neutral) has been greater than those reporting elk numbers were “at or about at” desired levels.

³ See “Final Black Hills Herd Unit and Population Review” adopted by the Dept. and Commission in 2013.

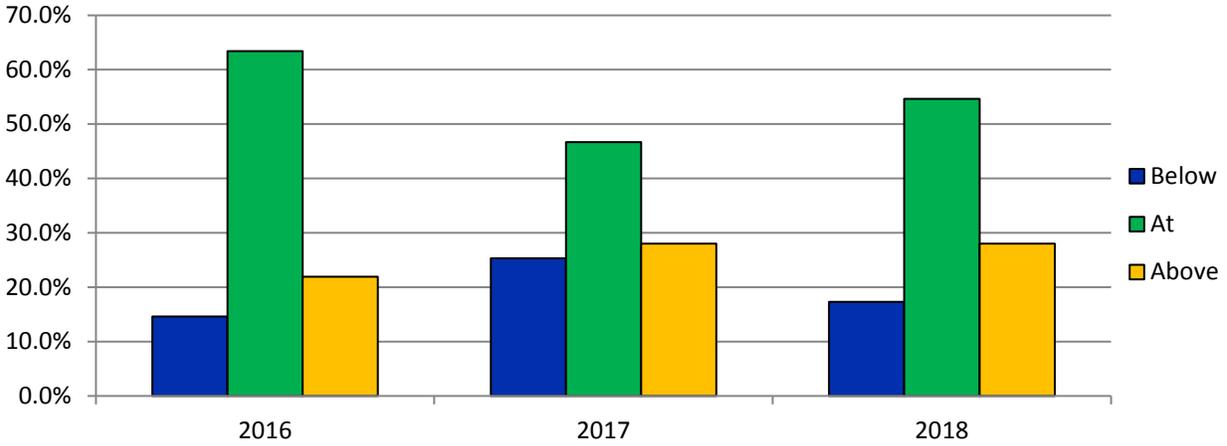


Figure 1. Proportions of Black Hills landowner reporting perceptions of elk numbers relative to “desired level.”

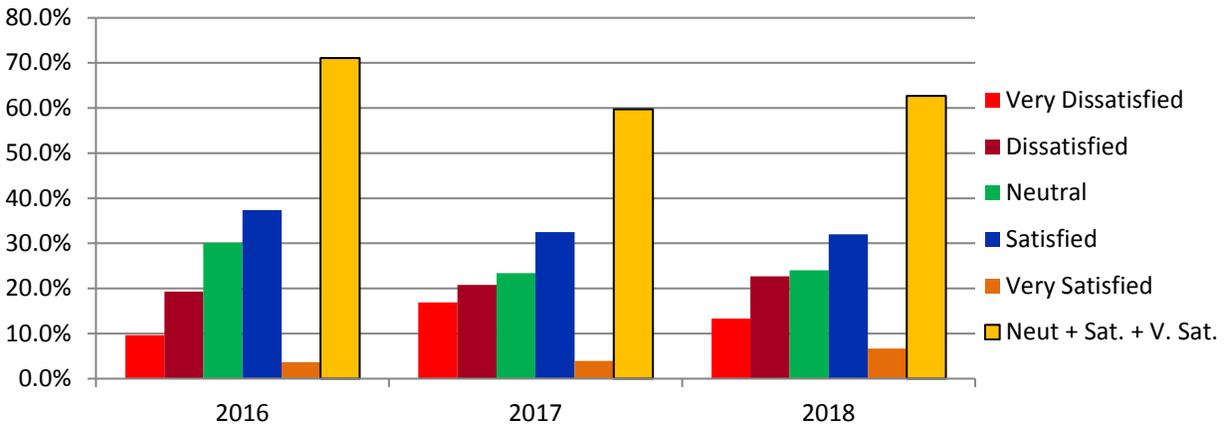


Figure 2. Percentages of landowners reporting various satisfaction levels with elk numbers in the Black Hills.

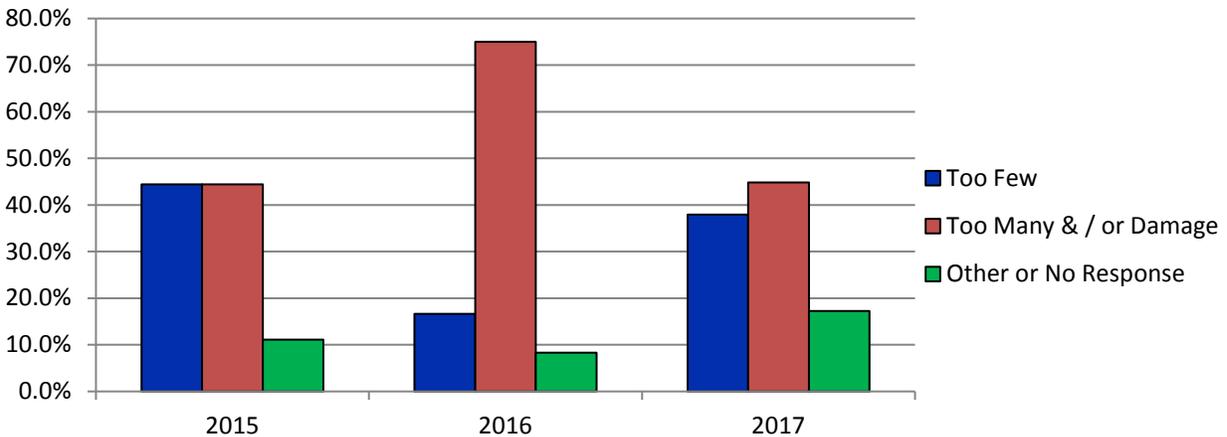


Figure 3. Reason(s) for dissatisfaction with elk numbers in the Black Hills.

These survey data demonstrate how difficult it is to broadly quantify landowner satisfaction. Most private land holdings in the Black Hills are relatively small by typical Wyoming ranch standards, and many are not dependent on agriculture for profit. A significant portion of these landowners enjoy having elk around and would like to see more, as would other non-traditional landowners who have purchased property for hunting. On the other hand, there are traditional ranching landowners negatively impacted by elk and frustrated with the damage they cause along with the lack of hunting on adjoining or nearby properties. As such, these two contingents are diametrically opposed in what they desire in the way of elk numbers. The result is conflict between the disparate positions, with both contributing to dissatisfaction with elk numbers. Overall, field personnel report wide-ranging ambivalence among landowners regarding elk management, with some noting conflicts and dissatisfaction and others expressing real satisfaction, or a desire for more elk.

In the normal course of duties, Department field personnel contact landowners on an almost daily basis. Complaints about elk numbers are recurrently received from the same cadre of landowners who endure regular pasture use by elk, damage to fences, and crop depredation. In FY18, there was a single elk damage claim from the Sundance game warden district and eight claims (stemming primarily from two landowners) in the Newcastle game warden district. The claims totaled \$61,489.38 of which \$38,011.37 was paid. Paid claims were for damage to growing cultivated crops, improvements, and extraordinary damage to grass. Given landowner attitudes, landownership patterns, and disparate access for public hunting, damage claims will persist no matter what hunting season structures are put in place.

WEATHER: For the most part, winter weather and growing season conditions over most of the past decade in the Black Hills have been neither specifically detrimental, nor abundantly beneficial for elk. However, fluctuations in weather patterns such as transient drought periods, a few significant snow events, and persistent deep snow at times have intermittently impacted herd demographics and exacerbated damage. Severe drought plagued the Black Hills in 2012, and drought again beset the majority of the herd unit during the primary growing seasons of 2016 and 2017. These ephemeral droughts resulted in poor to very poor forage production and led to several large wildfires. Consequently, over the past decade, elk have entered winter in good condition, except in 2012, and possibly again in 2016, and 2017.

During the 2013 to 2015 inter-drought period, above average temperatures and rainfall characterized growing seasons. This resulted in good to excellent forage production each year. Fall and winter weather over this same timeframe was dominated by normal to above average temperatures and average to below normal precipitation. Consequently, productivity and survival of elk was excellent. However, on the heels of drought ridden summers in 2016 and 2017, more normal to severe winter weather was experienced as temperatures were close to average or below, and total precipitation received was normal or above normal most months. These conditions may have lowered yearling recruitment in 2017, but did not appear to affect it in 2018 (Figure 4). In fact, forage growth in 2018 was very good with above average moisture and close to normal temperatures during the growing season. However, the 2018-19 winter presented below normal temperatures and above average snowfall. Given the drought in 2016 & 2017, more severe winter weather since, and increased antlerless harvest, transient improvements in this herd's performance may be beginning to reverse themselves. See <http://www.ncdc.noaa.gov/cag/> for weather information.

HABITAT: The Black Hills is the western most extension of many eastern plant species. These species are often found mixed with more typical western plants providing a large variety of habitats used by elk. Ponderosa pine (*Pinus ponderosa*) is the predominant overstory species. There are scattered patches of quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), bur oak (*Quercus macrocarpa*), and true mountain mahogany (*Cercocarpus montanus*). Many of these stands are in late successional stages. Important shrubs include Saskatoon serviceberry (*Amelanchier alnifolia*), Oregon grape (*Berberis repens*), common chokecherry (*Prunus virginiana*), and wild spiraea (*Spiraea betulifolia*). Since 2000, wildfires in both Wyoming and South Dakota have burned well over 10% of the BHNF and significant amounts of private land in this ecosystem. These fires have been beneficial for elk by creating early succession plant communities and increasing available forage. However, there are no habitat evaluation or vegetation surveys located within this herd unit related to elk forage or cover.

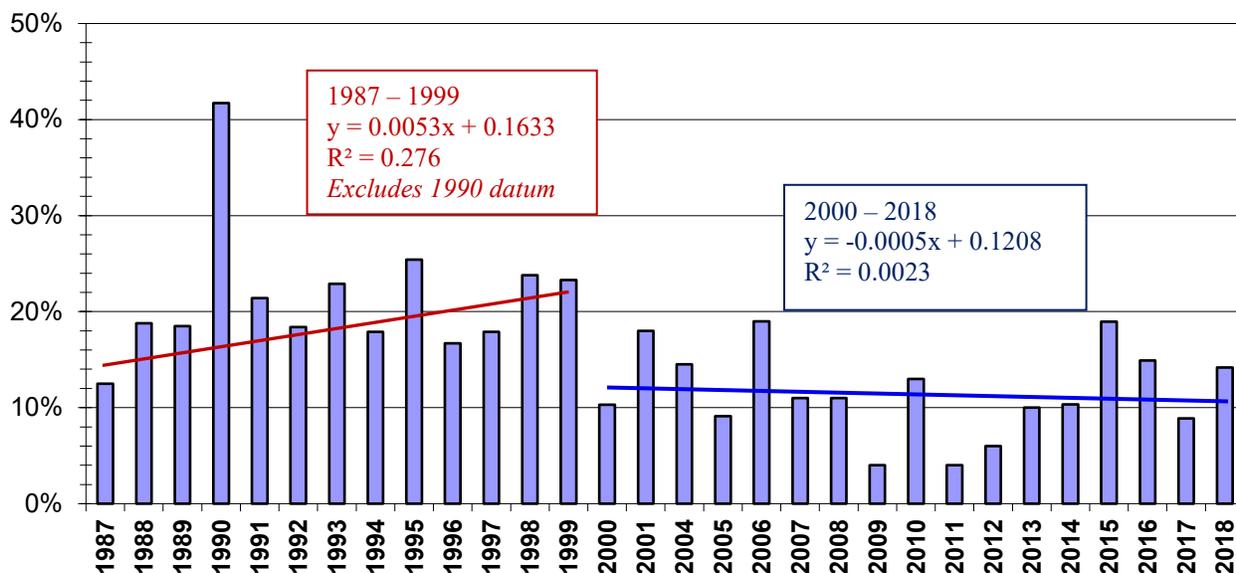
Elk habitat quantity and quality are thought to be good, but security areas may be impacted or lacking in areas due to high road densities. These road densities, along with vast tracts of commercially thinned ponderosa pine stands, do not provide what is usually considered classic, good elk habitat. Despite the lack of escape cover in areas, the elk population significantly expanded through the 1990's and into the early years of the next decade. Several factors benefited this population. First, herbaceous forage is abundant, and wildfires have increased annual forage production. Second, despite high road densities, much of the land inhabited by elk is privately owned. This private land has lower road densities and experiences limited human activity. Many of these same private land areas provide elk refuge from hunting pressure during the fall. Also benefiting the situation, the number of road closures increased on the Black Hills National Forest in 2010 when USFS adopted a new travel management plan.

FIELD DATA: Collection of regular classification data was suspended in 1996, and only occasionally are limited classification data garnered during other field activities. These limited data collected over the years have generally reflected larger samples collected in the Black Hills of South Dakota by SDGF&P. SDGF&P collects preseason classification data most years, and since 2003 these data have consistently yielded calf:cow ratios near 50:100, but more variable bull:cow ratios, which have averaged near 30:100. It is believed SDGF&P's observed bull:cow ratio is low due to classifications be conducted outside the rut and from the ground.

In 2015, WGFD partially funded SDGF&P's helicopter-based late winter elk survey. This funding was used to pay for SDGF&P's survey efforts in much of the occupied habitat south of Interstate Highway 90 (I-90) within HA 117. That effort detected a total of 923 wintering elk. Of the elk observed, SDGF&P personnel were able to classify 516 (262 cows, 52 calves, and 202 bulls). The 407 unclassified elk were primarily large groups of cows and calves. Assuming these unclassified elk were cow:calf groups and had a similar calf:cow ratio as those classified, the post-season bull:cow ratio would have been about 35:100 (which is a decent estimate, but probably low). Managers are considering standardizing this type of data collection in future years, at least in that portion of Wyoming south of I-90 harboring wintering elk. Should budgetary constraints allow, periodic winter trend / sightability surveys may possibly become the basis for a mid-winter trend count objective with good classification data.

In early March of 2019, the opportunity presented itself to aerially classify elk in a large portion of HA 117 north of Highway 16. That effort resulted in 508 elk being classified, and yielded an observed calf:cow ratio of 44:100. A total bull:cow ratio of 47:100 was found, with 37% of the bulls observed being spike elk. This resulted in a spike:cow ratio of 18:100 and a mature bull:cow ratio of 30:100. Of the mature bulls categorized by antler class, 83% were class II bulls and 17% class I. Snow cover and weather conditions during this survey were excellent, and the personnel conducting the survey felt as if detectability of elk was about 50%. In addition to this classification effort, during mule deer and bighorn sheep classification flights on Elk Mtn. about 300 unclassified elk were observed in HA 117 south of Highway 16 near the Wyoming Stateline south of Clifton Canyon.

Tooth age data have been collected from harvested elk most years since 1987.⁴ Tooth age data can estimate annual recruitment via the percentage of yearlings in the female segment of the harvest (Figure 4). Since 1987, this figure has averaged 15% (std. dev. 5.9%)⁵ suggesting on average 30 yearling elk (cows and bulls combined) are added per 100 adult cows into this population. However, as noted in previous reports (2015 EL740 JCR), recruitment of yearling elk has been significantly lower since 2000, but appears to be increasing. Because of this and enhanced license issuance with extended hunting seasons, there had been a general decline in the harvest of female elk over age five and a slight increase in the relative number of younger (0 - 2 year old) elk taken, while the relative percentage of mid-aged cows has remained fairly stable (Figure 5). However, it is notable that in 2015 & 2016 the percentage of very young cows in the female harvest increased following a couple excellent production and recruitment years. Similarly, the yearling buck:doe ratios in sympatric deer herds increased noticeably in 2015 & 2016 as well, suggesting strong production and recruitment in 2014 & 2015 amongst Black Hills ungulates. Then, in 2017 and 2018, as the calves from 2014 and 2015 aged, a larger percentage of 3-5 year old females were harvested.



⁴ Budgetary constraints prevented tooth age data collection in 2002 & 2003.

⁵ Omits 1990 data – the inclusion of which raises the average to 15.9% with a std. dev. 7.5%.

Figure 4. Percentage of yearlings in the female segment of the elk harvest (1987 – 2017).

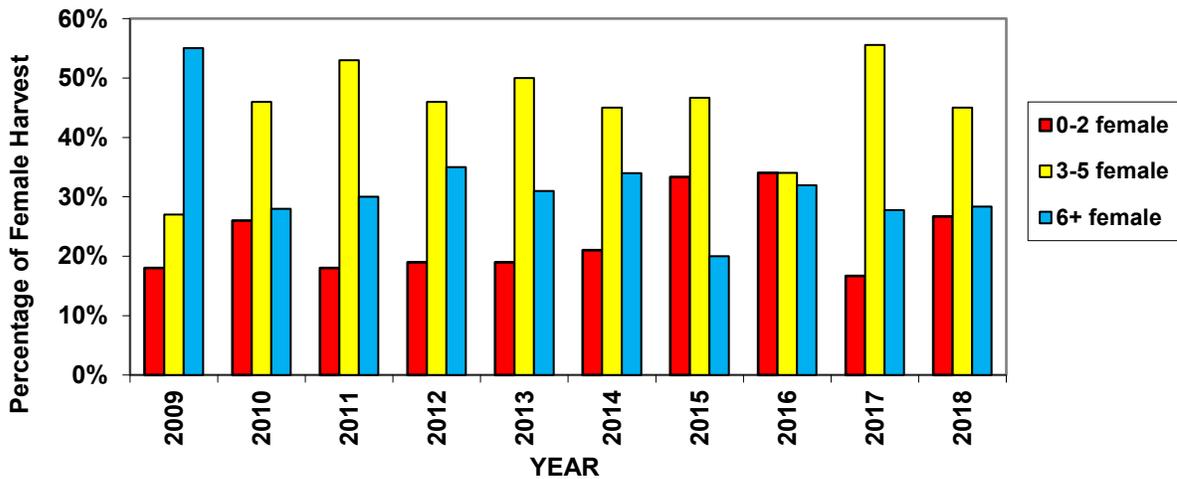


Figure 5. Relative percentages of various age classes of female elk harvested (2009 – 2018).

Of course there is hunter selectivity when it comes to take of bulls. Between 2000 and 2009, tooth age data suggested a slight decline in the relative percentages of both middle-aged (3-5 year old) and young (≤ 2 years old) bulls in the harvest, and an increase in the percentage of older bulls (6^+ years old) taken. However, since 2010 this trend seems to have reversed itself, as it now appears the trend is towards harvesting fewer young and old bulls, but more middle aged (3-5 year old) bulls (Figure 6). Considering the relatively larger increases in antlerless versus bull harvest in recent years, we have more significantly affected the antlerless segment of the herd. This is apparent in the increasing percentage of female elk in the harvest, which has outpaced take of bulls. Elevated female harvest must be contributing to increasing bull:cow ratios, and perhaps changes in the age distribution of harvested bulls. If this population was rapidly expanding or in decline, given the relatively stable bull harvest, one would expect to see a greater percentage of younger aged bulls harvested. This is because if the population was rapidly increasing, the vast majority of bulls would be young, while in a significantly declining population, the availability of older bulls would drop with decreased recruitment. Thus, it is possible (at least south of I-90) that herd growth has stabilized through antlerless harvest, and bulls are now being under-harvested, leading to an increase in the number of middle-aged bulls taken (Table 1) and the high, observed bull:cow ratio found in HA117. Further, local managers report seeing what appears to be an increase in the total number of bulls along with many harvested bulls with broken antlers. Total bull harvest has also increased the past couple of years without significant changes in license issuance. Finally, our ability to meet the secondary objective of age distribution of harvested bulls cannot be met without increasing harvest of younger bulls over the course of the next few years. Consequently, we are creating a Type 2 license valid for spike or antlerless to help manage bull numbers through increased take of younger bulls.

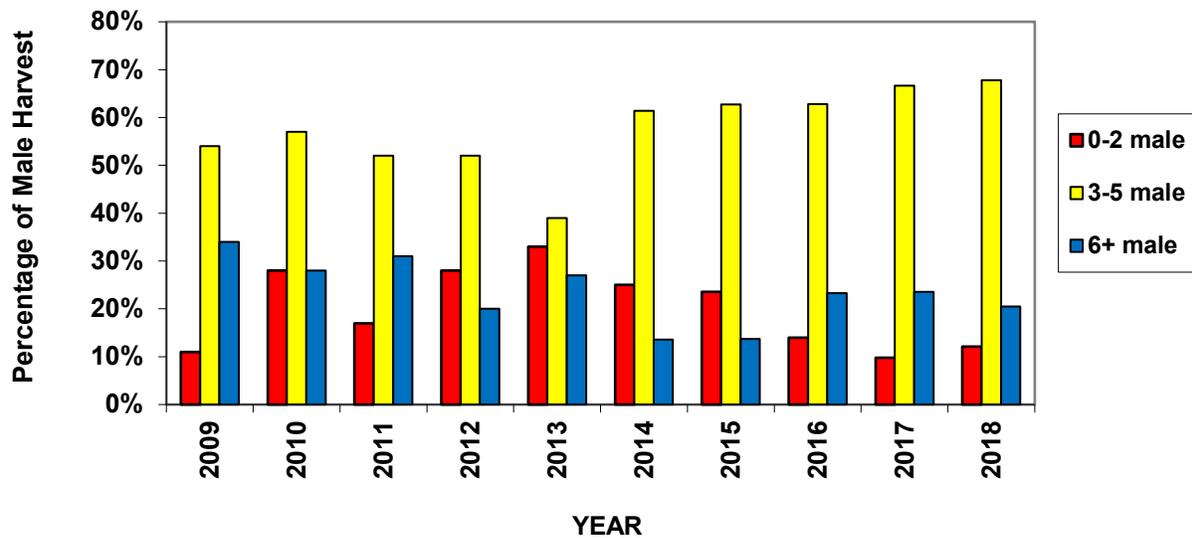


Figure 6. Relative percentages of various age classes of male elk harvested (2009 – 2018).

Segment of Bull Harvest	Objective	2016	2017	2018
Bulls 0-2 yrs. old	20%	14%	10%	12%
		3 yr. mean		12%
Bulls 3-5 yrs. old	60%	63%	67%	73%
		3 yr. mean		68%
Bulls 6+ yrs. old	20%	23%	24%	14%
		3 yr. mean		21%

Table 1. Secondary management objective, relative distribution of ages of harvested bulls

HARVEST: The percentage of yearling females in the harvest since 2000 suggests reduced recruitment, as does the fact elk have not been pioneering into unoccupied habitats as they once had. However, the bulk of tooth age data have been returned from elk harvested south of I-90 (HA’s 1 & 117), with the vast majority coming from HA 117. Therefore, any changes in recruitment should only be ascribed to that segment of the herd. It does seem harvest rates adequate to manage elk numbers may be achieved some years south of I-90, but poor success by hunters pursuing female elk in HA 116 is likely allowing that portion of the herd to grow. Fluctuating elk management in South Dakota and interstate elk movement further confound our ability to make herd-wide judgments relative to our harvest’s capacity to manage elk numbers.

Elk harvest bounced back to “average” levels in 2014, as weather conditions allowed hunters easier access to elk compared to 2013 when travel was severely hindered by winter storm “Atlas.” In

2015, with the same hunting season structure in place as the previous two years, total harvest fell midway between that experienced in 2013 and 2014. Field personnel also reported that hunters seemed to struggle a bit more to find and harvest elk in 2015. The same scenario played out in 2016 with fewer total elk being harvested compared to 2015, again with the same season structure in place. In 2017, harvest improved as weather for elk hunting was favorable and creation of a Hunter Management Assistance Program (HMAP) in HA 117 resulted in 58 antlerless elk taken that otherwise likely would not have been killed. Overall, the 2017 harvest was 20% above the average witnessed the preceding seven years (Figure 7). Increased harvest was again experienced 2018 as access to elk hunting improved with more properties enrolled in the HMAP program (resulting in 68 elk harvested), and excellent weather for elk hunting most of the season.

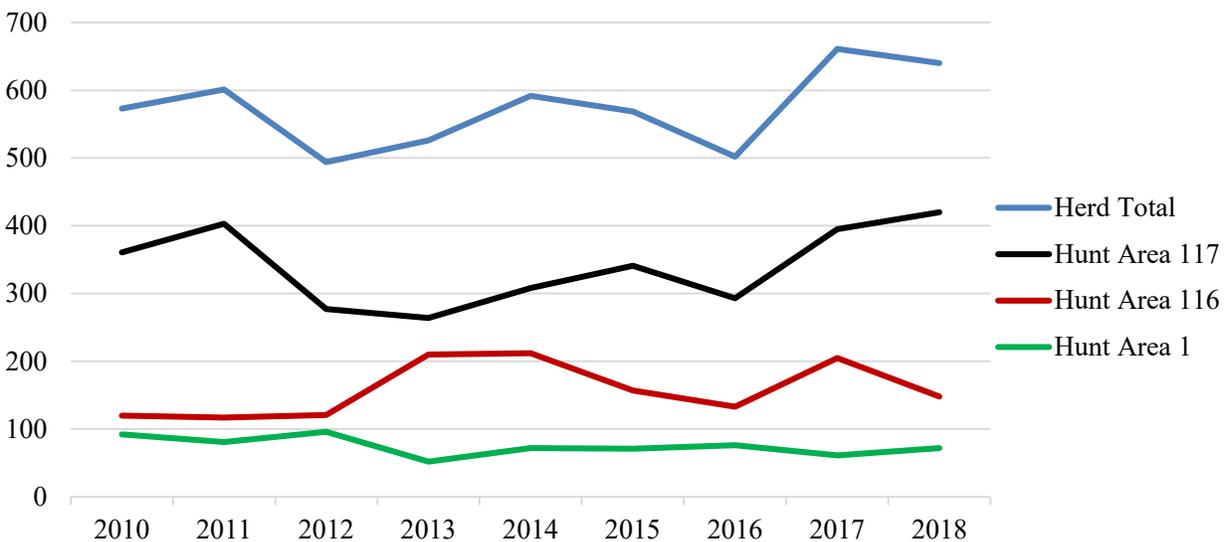


Figure 7. Total Elk Harvest by Hunt Area and Herd Unit (2010 -2018)

In 2017, with the advent of the HMAP and use of the smartphone mediated check station application, the number of field-checked elk increased substantially. This trend continued in 2018, when the number of field-checked elk was further enhanced due to increased Chronic Wasting Disease (CWD) testing. Of the 42 hunter-killed elk tested for CWD, one was positive - yielding a prevalence of 2.4%. The infected elk being a cow taken from HA 117 within the HMAP. Prior to this detection, no other hunter-killed elk had tested positive in this herd unit. Instead, of the 78 elk tested prior to 2018, only a single targeted surveillance elk was positive yielding a total prevalence of 1.2%.

Across Wyoming, elk hunter success is highly correlated with reported hunter satisfaction on a herd unit basis (close to 90% in many years). Beginning in 2013, HA 116 moved from limited quota license hunting to a liberal general license season combined with a significant number of cow/calf licenses. Due to very limited access to elk hunting on private land, this resulted in a large number of license holders hunting the BBNF north of Sundance where few elk reside. Consequently, since 2013 hunter success on general licenses has been very low, averaging 16%. Success on Type 6 cow/calf licenses has averaged only 22% and total active license success

averaged about 19%. These poor success rates are reflected in low hunter satisfaction in HA 116, which has averaged 45% during this same timeframe. That figure biases the herd unit hunter satisfaction numbers low, since well over 50% of the hunters at the herd unit level are sampled each year from HA 116. In contrast, since 2013, hunter satisfaction in HA 1 and HA 117 have consistently been above 60%, and in 2018 it was 74% and 67% in those HA's, respectively.

Given an annual recruitment of 30 yearling elk per 100 cows and assuming a pre-season herd composition of 45 bulls per 100 cows and 50 calves per 100 cows, the 2018 harvest of 575 adult elk (640 total) would have removed the annual recruitment of yearlings from a total population of about 3,750 elk.⁶ Thus, based upon anecdotal observations of elk, the 2018 harvest should have reduced this herd some. However, because substantial numbers of elk regularly cross the Stateline and winter in South Dakota, it is difficult to determine the real effect harvest is having on our resident post-season population.

POPULATION: Despite the lack of a population estimate, indications are elk numbers increased substantially between 1990 and 2010 as elk greatly expanded their distribution. Silvicultural practices and wildfires throughout the region have created habitat favorable for elk; and, although habitat changes have favored elk in recent years, elk have not continued to pioneer into previously unoccupied areas. Harvest statistics and tooth age data suggest population growth may have been curbed recently, at least south of I-90. However, it is likely reproduction and survival between 2014 and 2016 allowed this sub-population grow. In contrast, harvest in 2017 and 2018 (45% above that experienced the previous four years) should have helped stabilize elk numbers somewhat, at least in the Newcastle area. Overall, elk numbers seem to be at levels generally supported by landowners who are not experiencing significant damage. Given the high quality habitat in the region, limited access to hunt elk on private land, and sustained high harvest rates of mountain lions, this herd will likely continue to exhibit growth potential in many areas due to limited private land access for hunting.

MANAGEMENT SUMMARY: In 2016, the aforementioned landowner survey contained the following question: "If you think elk numbers are too high, how can we work together to substantially reduce the herd size through public hunting?" Unfortunately, no viable or positive answers were returned. Similarly, in 2017, survey respondents who did not support the current management objectives failed to provide a single constructive alternative when asked. These facts bear out that while some traditional landowners complain about elk numbers, few are willing to allow hunting at the levels needed to significantly reduce this population or work towards feasible solutions. However, beginning in 2017, two landowners in the Skull Creek drainage of HA 117 participated in a Hunter Management Assistance Program (HMAP) to address a sub-herd of about 300 head. To accommodate and facilitate this request, a Type 7 license valid in this portion of the area was added in 2017 with 50 tags available, and HA 117 Type 8 license issuance increased by 25. Then, in 2018, all Area 117 Type 6 and Type 8 licenses were converted to a Type 7 and were valid off National Forest from August 15 – January 31, and two more landowners added to the HMAP. As a result, 58 antlerless elk were harvested through the HMAP in 2017 and 68 in 2018 (accounting for about 20% of the elk harvested in HA 117 both years). Overall, management tactics the past few years seem to be reducing or holding elk numbers in check where there is

⁶ calf:cow:bull = 50:100:45 = 51.2% cows. $575 / (0.15 \times 2) = \text{yrlg. recruitment harvest rate of } 1,916 \text{ cows. } 1,916 / 0.0512 = 3,742 \text{ hd. pre-season.}$

adequate access for hunting, but allowing sub-herds to grow in areas where landowners continue to prohibit adequate hunter access.

Changes to the 2019 hunting season structure are intended to increase bull harvest where we believe this can have a positive effect (HA 117), and more precisely target antlerless harvest where it is most needed (HA 116 off National Forest). The HA 117 Type 1 increase should augment public hunting opportunity and bull harvest to some degree in this high demand area with strong bull numbers. Given the current age distribution of bulls, more older bulls (6⁺ yrs. old) will be available for harvest the next two to three years, and we expect the harvest percentage in this age class to increase with increased Type 1 license issuance. The new Type 2 license will provide an added incentive for folks to purchase a full price license designed to limit herd growth and encourage harvest of younger bulls. This latter condition being necessary to meet our secondary management objectives, as the percentage of younger aged bulls (less than 2 yrs. old) has been declining. Local managers believe private land access for spike hunting will be generally better than for mature bull hunting. Something that should foster success on the new type 2 license. Increases in bull harvest in the older and younger age classes will help begin to bring bull:cow ratios down and reduce the occurrence of broken antlers, along with dropping the percentage of middle aged (3-5 yrs. old) bulls taken.

Consolidating Type 6 and Type 8 licenses in HA 116 into a single Type 7 tag valid off National Forest follows a similar change in HA 117 last year, one that bolstered targeted harvest of elk on private land. This consolidation also simplifies regulations related to cow/calf licenses. Finally, by restricting all Type 7 licenses in the herd unit to lands off National Forest, we can reduce crowding on publically accessible National Forest harboring elk, segregate archery and firearm hunters on these public lands, and provide some incentive for purchasing a full price antlerless or spike/antlerless license.

Given recent hunter participation and success rates and increased license issuance, the 2019 harvest should result in about 685 total elk taken (300 bulls, 320 cows, & 65 calves). This estimate is predicated on another successful HMAP. If these projected harvest levels are reached, elk numbers could decline slightly south of I-90, while elk numbers north of the Interstate will likely continue to increase. Based upon an estimated preseason herd composition of 45:100:45 (calf:cow:bull) and a recruitment rate of 30 yearling elk per 100 cows, a harvest of 680 adult elk would remove the annual yearling recruitment from a herd of around 4,400 elk (all age classes).

2018 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2018 - 5/31/2019

HERD: EL741 - LARAMIE PEAK/MUDDY MOUNTAIN

HUNT AREAS: 7, 19

PREPARED BY: HEATHER O'BRIEN

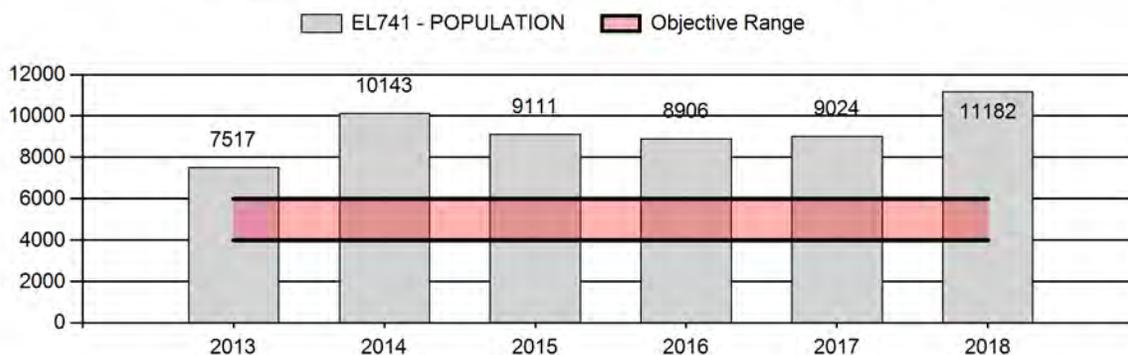
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	8,940	11,182	11,000
Harvest:	2,474	2,132	2,360
Hunters:	4,885	4,824	4,850
Hunter Success:	51%	44%	49%
Active Licenses:	4,979	4,955	4,980
Active License Success:	50%	43%	47%
Recreation Days:	36,775	34,713	36,200
Days Per Animal:	14.9	16.3	15.3
Males per 100 Females	30	51	
Juveniles per 100 Females	35	42	

Population Objective (\pm 20%) :	5000 (4000 - 6000)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	124%
Number of years population has been + or - objective in recent trend:	18
Model Date:	03/04/2019

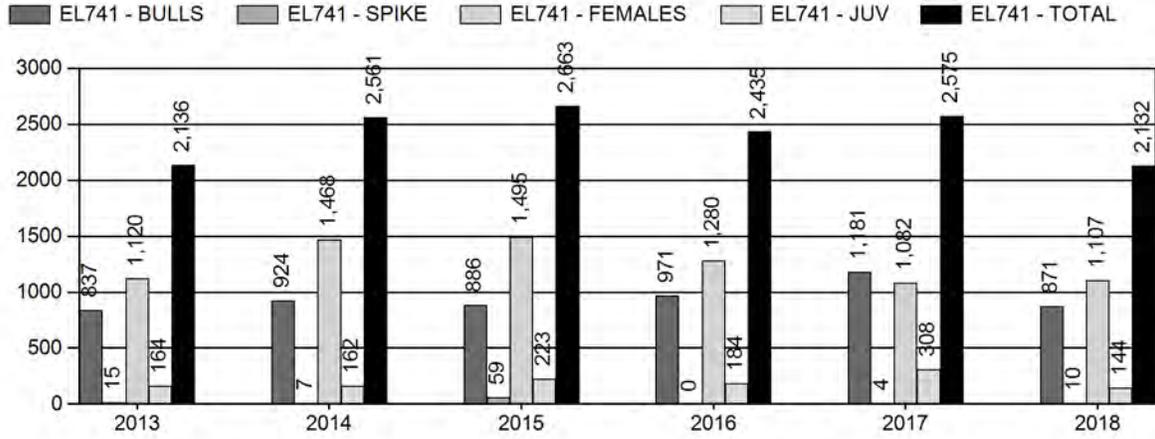
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females \geq 1 year old:	0.0%	0%
Males \geq 1 year old:	0%	0%
Total:	0%	0%
Proposed change in post-season population:	0%	0%

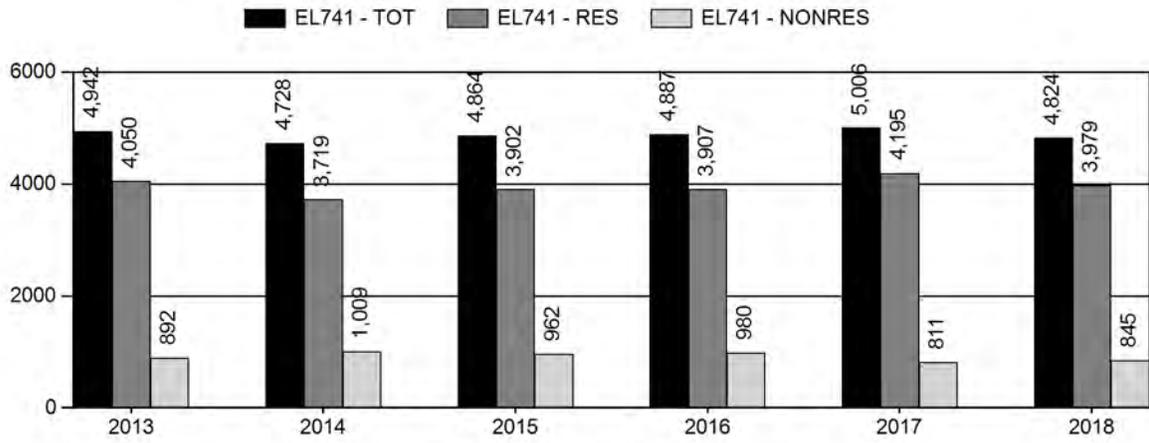
Population Size - Postseason



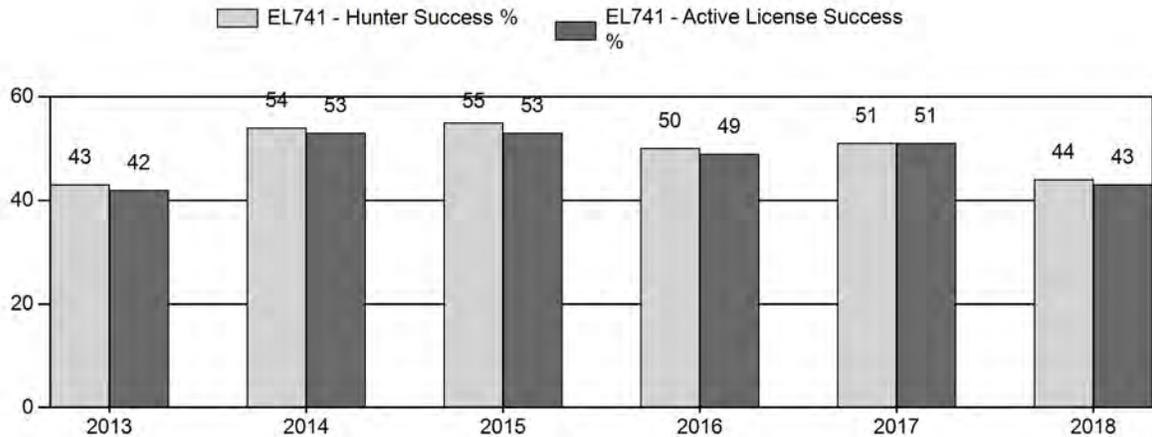
Harvest



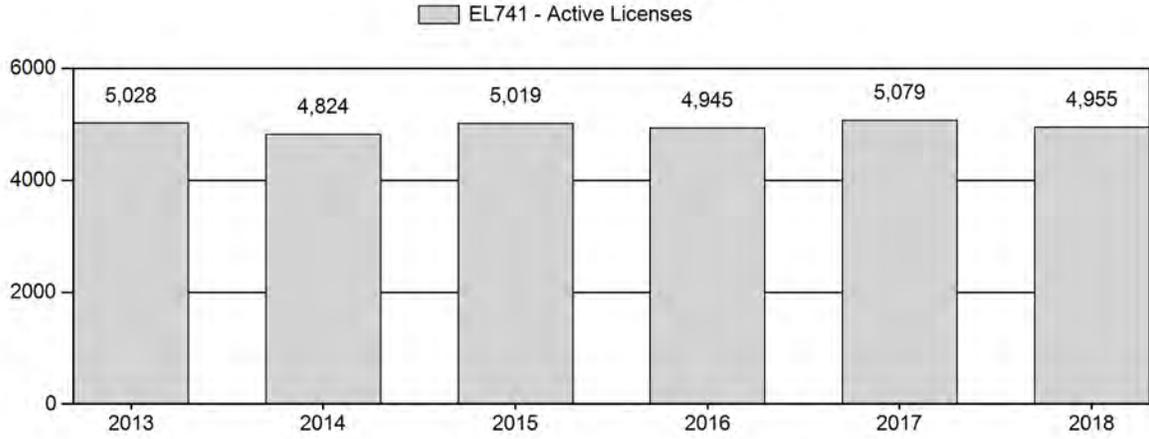
Number of Hunters



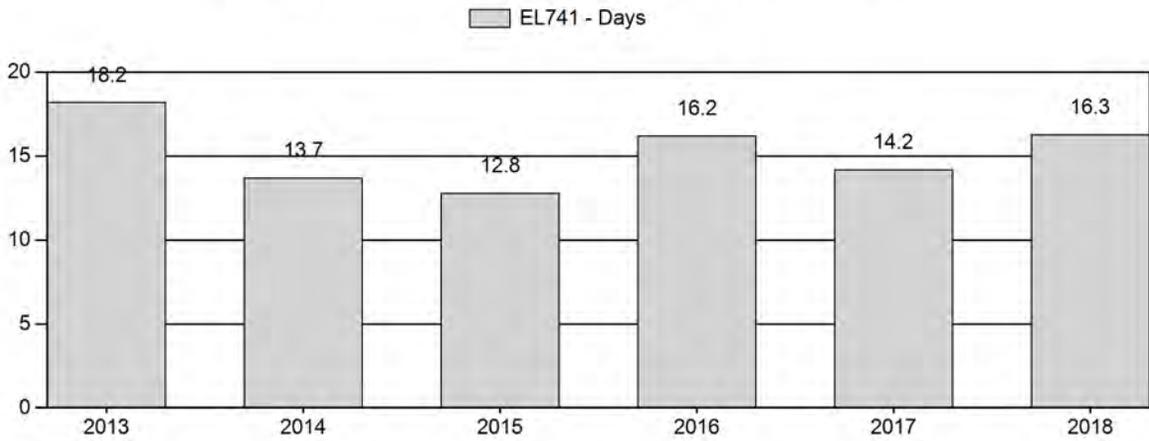
Harvest Success



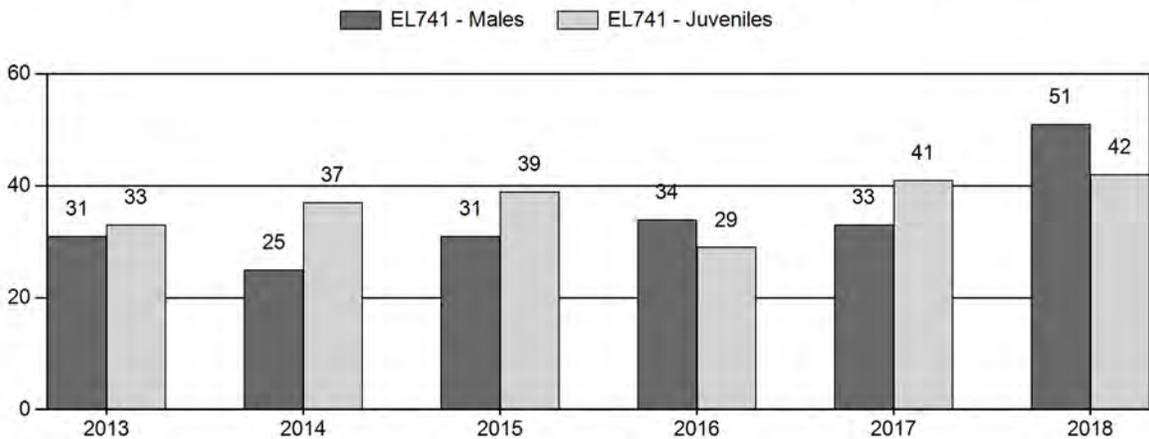
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL741 - LARAMIE PEAK/MUDDY MOUNTAIN

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	7,517	328	487	815	19%	2,605	61%	869	20%	4,289	535	13	19	31	± 1	33	± 1	25
2014	10,143	383	468	851	15%	3,454	62%	1,270	23%	5,575	592	11	14	25	± 1	37	± 1	30
2015	9,111	404	485	889	18%	2,882	59%	1,116	23%	4,887	504	14	17	31	± 1	39	± 1	30
2016	8,906	383	581	964	21%	2,803	61%	806	18%	4,573	495	14	21	34	± 1	29	± 1	21
2017	9,024	211	339	550	19%	1,645	57%	674	23%	2,869	499	13	21	33	± 2	41	± 2	31
2018	13,319	853	1,630	2,483	27%	4,855	52%	2,021	22%	9,359	602	18	34	51	± 1	42	± 1	28

2019 HUNTING SEASONS
LARAMIE PEAK MUDDY MOUNTAIN ELK (EL741)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
7	1	Oct. 15	Nov. 20	1,500	Limited quota	Any elk
		Nov. 21	Dec. 31			Antlerless elk
7	4	Oct. 15	Dec. 31	1,200	Limited quota	Antlerless elk
7	6	Aug. 15	Oct. 14	2,250	Limited quota	Cow or calf valid in Platte County and on private land in Albany and Converse Counties
		Oct. 15	Dec. 31			Cow or calf valid in the entire area
7	7	Jan. 1	Jan. 31	50	Limited quota	Cow or calf
19	1	Oct. 1	Oct. 14	150	Limited quota	Any elk
		Nov. 21	Jan. 31			Antlerless elk
19	2	Nov. 1	Nov. 20	150	Limited quota	Any elk
		Nov. 21	Jan. 31			Antlerless elk
19	4	Oct. 1	Oct. 14	125	Limited quota	Antlerless elk
		Nov. 21	Jan. 31			Antlerless elk
19	5	Nov. 1	Jan. 31	125	Limited quota	Antlerless elk
19	6	Oct. 1	Oct. 14	225	Limited quota	Cow or calf
		Nov. 1	Jan. 31			Cow or calf
Archery		Sep. 1	Sep. 30			Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2018
7	6	+200
7	7	-200
19	All	No changes

Management Evaluation

Current Postseason Population Management Objective: 5,000

Management Strategy: Special

2018 Postseason Population Estimate: 11,200

2019 Proposed Postseason Population Estimate: 11,000

2018 Hunter Satisfaction: 66% Satisfied, 18% Neutral, 16% Dissatisfied

The Laramie Peak / Muddy Mountain Elk Herd Unit has a postseason population management objective of 5,000 elk. The herd is managed using the special management strategy, with a goal of maintaining postseason bull ratios between 30-40 bulls per 100 cows and a high percentage of branch-antlered bulls in the male harvest segment. The objective and management strategy were reviewed in 2018 (Appendix B). Following an extensive review of surveys from landowners and hunters, no change in the population objective and special management strategy was made based on landowner input. Although this population far exceeds the management objective, there was strong landowner opposition to increasing the population objective. There are considerable challenges to managing this herd, with varying levels of hunter access to private lands and landowner tolerances for elk. Given the large amount of private land within this herd unit and persistent elk damage in some areas, managers give considerable deference to landowner input regarding the management of this herd. While many traditional livestock producers want elk numbers reduced, much of the occupied habitat is owned by non-traditional recreational landowners with much higher tolerances for elk. Thus, the objective of 5,000 elk postseason was maintained, although managers recognize it is likely unrealistic given the current elk population size coupled with restricted hunter access in many locations.

Herd Unit Issues

Hunting access within the herd unit is variable, with a mix of national forest, state lands, and private lands. The addition of Walk-In Areas and Hunter Management Areas greatly expands hunting opportunity within the herd unit as well. Landowners offer varying levels of access to hunting. While most landowners offer some form of access – whether it be free or fee hunting – there are a few ranches that offer little access. These areas tend to harbor high numbers of elk that are inaccessible during hunting seasons, and are problematic when trying to manage a population that is over objective. The main land use within the herd unit is traditional ranching and grazing of livestock; however several properties in the herd unit have become “non-traditional” in that they are owned by individuals who do not make a living by ranching their lands. Industrial-scale developments are minimal within this herd unit, though there is potential for the expansion of wind energy development. Chronic Wasting Disease is present in this herd with a prevalence typically averaging about 6% in hunter-harvested elk.

Weather & Habitat

The 2013-2014 winter brought temperature and precipitation conditions near the recent 30-year average, and the growing season of 2014 was one of the best the region had seen in years. Winter 2014-2015 was generally mild, and the 2015 growing season was just above average for the region. Fall of 2015 was relatively dry, and much of the herd unit remained accessible for hunting for the majority of the hunting season. The spring of 2016 was mild with above average precipitation, but became quite dry for the majority of the summer and fall. Fall temperatures were above average and elk activity was more limited to early morning and late evening, making hunting difficult. Late fall precipitation provided green forage and a nutritional boost for elk prior winter. The early winter of 2016-2017 was snowy, making access to hunt elk difficult in many parts of the herd unit. The growing season of 2017 was similar to the previous year, with a wet spring followed by a dry summer with little precipitation. There was little snow to speak of over the winter of 2017-2018, and access for January hunters was good. The 2018 growing season was average to dry, and water became scarce at higher elevation by fall. Winter conditions set into much of the region by mid-November, and snow accumulation at high elevation became significant over the winter of 2018-2019. Elk deserted most of their high-elevation ranges, and hunters were limited to a few access points at lower elevation during the winter cow season. Persistent snow and drifting hampered access for much of November through January, which was largely responsible for the reduced antlerless elk harvest in 2018. Calf survival for the winter of 2018-2019 may ultimately be below average if spring storms are severe enough to cause additional stress. For detailed weather data see <http://www.ncdc.noaa.gov/gac/time-series/us>.

Field Data

Calf ratios are typically in the 40s per 100 cows for the Laramie Peak / Muddy Mountain Elk Herd. Managers have high confidence in observed calf ratios from year to year, due to consistent large annual sample sizes of cow/calf groups during classification surveys. While calf survival can vary from year to year, adult elk in this herd are thought to have rather high rates of survival. Predation pressure is relatively low in the herd, and there is little mortality from disease and winter weather. Calf ratios averaged 37 per 100 cows from 2012-2016, which is lower than the long-term average of 43 (1991-2016). This may be due to a number of factors including stress on pregnant cows from extended hunting pressure, changes in habitat quality, or increased competition due to higher elk densities. Ratios were closer to the long-term average in 2017 and 2018 (41 and 42, respectively) despite continued harvest pressure on cows. Improved calf ratios may be more a reflection of mild winters and/or favorable habitat conditions in these years. While lower calf

production/survival from 2013-2016 may have slowed population growth slightly, continued high license issuance and harvest of cows is still necessary to reduce this herd toward objective.

Observed bull ratios for the Laramie Peak / Muddy Mountain Herd historically average in the mid-30s per 100 cows, though there have been years where the ratio has dropped below special management limits into the 20s. Prior to 2016, the accuracy of bull ratios was questionable from year to year in this herd, as sample sizes were highly variable. While post-season classification sampling effort is well distributed within this herd unit, changes in distribution of elk, ability to locate large cow/calf groups, and concealment of bulls in timber during January can influence results from year to year.

In 2016 a new survey method was developed, using stratified random selection of sample units delineated from previous elk location data. The intent of this change was to eliminate surveyor bias and provide a more accurate estimate of bull ratios within the herd. Consistent use of the new survey method should also improve the accuracy of the population model, as it relies strongly on observed male ratios for alignment and predicting population size. The new survey method yielded similar bull ratios in its first two years, with 34 and 33 bulls per 100 cows observed in 2016 and 2017 respectively. In 2018, a more extensive survey was conducted with better coverage than at any other time for the herd unit, and included a sightability survey to develop an abundance estimate (Figure 1)(Appendix C). As a result, the observed bull ratio was 51 per 100 cows, which is above management parameters for elk. Additionally, the distribution of mature elk was confirmed to be disparate within the herd. At the time of the survey in late January and early February, a higher proportion of mature bulls were observed within the northern portions of the herd unit compared to south. A higher proportion of Class-II bulls were observed during 2018 surveys compared to the past several years as well. With such a high level of effort and coverage, these results are considered the most accurate data collected for the herd to date and will help direct management for several seasons to come.

Having conducted such an extensive and inclusive sightability survey, managers can compare observed totals with harvest data to gauge management impacts on population growth within the herd. During 2019 surveys, 853 yearling males were observed. The observed ratio of 18 per 100 cows was slightly higher than the 5-year average of 13 per 100 cows, and annual harvest on males has averaged 1,168 animals over the past five years. Assuming a fraction of yearling males were missed during the sightability survey, this indicates bull harvest in the herd is likely keeping pace or slightly exceeding the 2019 rate of bull recruitment. Similarly, if observed yearling males are doubled, the minimum rate for recruitment of all calves to yearlings in 2019 would be approximately 1,700 animals. Again provided some animals were missed during surveys, the total harvest of 2,206 in 2019 is likely similar to or slightly exceeds recruitment in the herd overall.

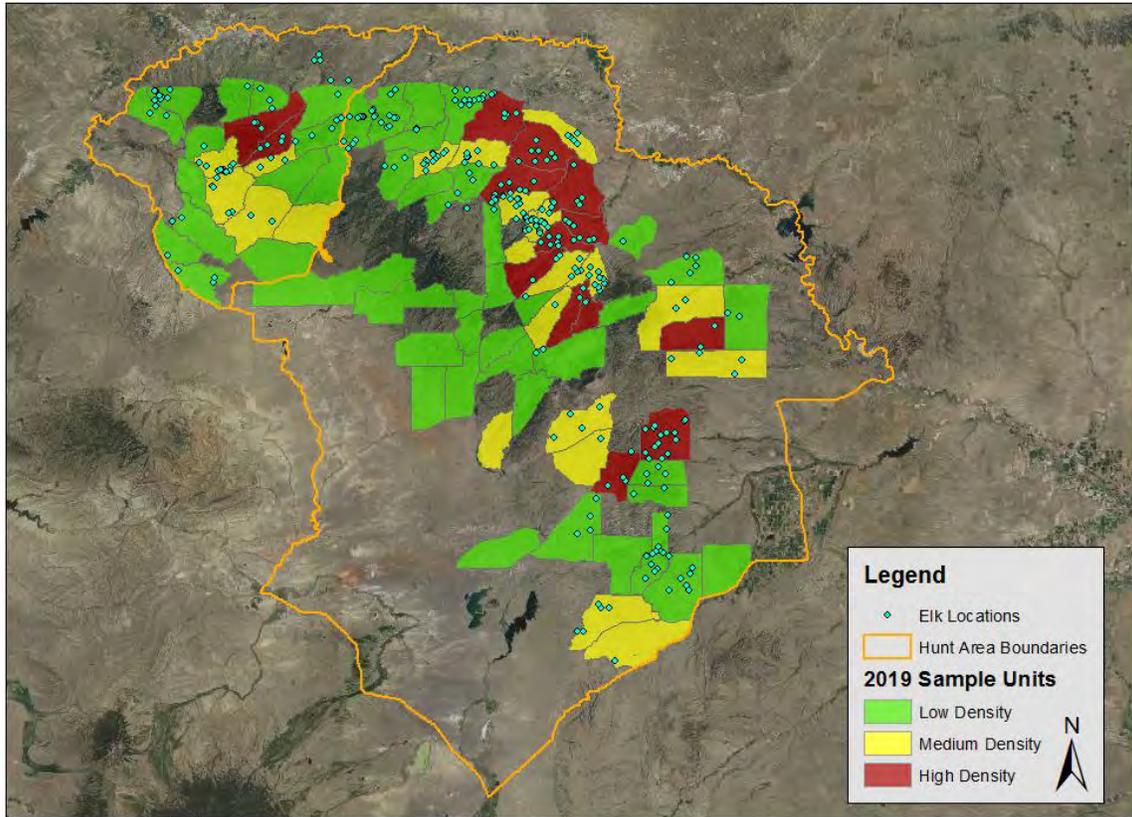


Figure 1. Stratified random sample units selected for classification surveys in the Laramie Peak Muddy Mountain Elk Herd Unit, February 2019.

From 2010-present, any-elk license issuance has fluctuated between 1,500 and 1,750 licenses in Area 7, depending upon hunter, landowner, and manager perceptions of bull quality. Since 2014, any-elk license issuance has been held steady at 1,500 licenses. Annual tooth-age data illustrate hunters are consistently harvesting prime age-class bulls in recent years (Appendix A). This information paired with high bull ratios would normally warrant an increase in any-elk licenses. However, managers feel accessible public lands are saturated with hunters, and extending the bull season to improve harvest success would likely lower cow harvest. Without improved hunting access on private lands, an increase in licenses would likely yield both decreased harvest success and hunter satisfaction.

Contrary to tooth-age and classification data, hunters and managers have also expressed concern about declines in trophy quality within the herd in recent years as well. While consistent harvest pressure on mature bulls may be one contributing factor, other variables including competition for resources may also affect antler quality. It should also be noted that expectations of hunters for large bulls in a prized hunt area may also be influencing perceptions of bull quality. Regardless, 2018 survey results illustrate opportunity is still readily available for a quality hunt, though the distribution of larger bulls may be irregular.

During the 2018 objective review, hunters were asked their satisfaction regarding bull quality in the herd. Sixty percent of respondents were either satisfied or very satisfied, while 13% were either dissatisfied or very dissatisfied. Only 8% of Area 7 hunters felt there were too few any-elk licenses; the remaining respondents were evenly split between wanting 1,500 licenses or wanting more. Considering hunter survey responses in combination with biological data, management goals, and access constraints, any-elk license issuance will be maintained in Areas 7 and 19 at 1,800 licenses, which is typical for this herd unit.

Harvest Data

License success in this herd unit is typically in the 50th percentile. It should also be noted that days per animal can be high in this herd unit compared to others, as hunters have high expectations regarding bull quality and will exert more effort in finding a mature bull. Archery hunting is also very popular in the herd unit, as hunters want to maximize their time in the field to harvest a mature bull. Days per animal was 16 in 2018, which is higher than the 10-year average of 14.7 days per animal. Weather and access conditions were average during much of the 2018 hunting season. Early in the season, open habitats allowed elk to spread widely across the herd unit. Winter conditions set in across higher elevations by mid-November, making access difficult in portions of the herd unit. Overall harvest success in 2018 (46%) was lower than the ten-year average (52%), and success on both any-elk and antlerless licenses was down compared to previous years. Total harvest (2,206) was below the ten year average of 2,380, and lower than harvest totals for the previous four years. Bull harvest (863) was lower than the previous four years, while cow harvest (1,200) was slightly higher than the 10-year average (1,187). In Area 19, an estimated 201 cows and calves were harvested, while in Area 7 the harvest was 1,142. The total cow/calf harvest in Area 19 was above average, and may be attributed to changes in elk distribution in areas with good hunter access in 2018. The total cow/calf harvest in Area 7 was below average, which may be attributed to late-season snows and poor access conditions.

Population

Historically, it has been difficult to model this and other elk herds in the state using age ratios obtained from directed surveys combined with harvest data. Current model designs rely heavily on male ratios, assume even distribution of harvest across available age classes and genders, and cannot rectify sustained high levels of harvest without predicting a sharply declining or crashing population. Field and harvest data frequently contradict model predictions, as managers regularly observe high numbers of elk during surveys and hunters consistently harvest 2,000-2,700 elk annually with stable rates of success. Tooth age data have shown that prime-age bulls and cows

have consistently been harvested from the herd in recent years. All these data suggest the herd is more likely stable than declining. Thus, managers have had low confidence in the validity of the population model.

While the transition to conducting stratified random classification surveys in 2016 and 2017 improved confidence in observed sex and age ratios, survey coverage was not adequate to calculate an abundance estimate. In 2018, managers significantly increased survey coverage and were able to conduct a sightability analysis. A record 9,359 elk were observed, and analysis yielded an abundance estimate of 11,182 elk. This estimate, along with more accurate classification ratios, will be integrated into a new population model in the future. However, due to timing of the survey and the need for additional post-survey stratification and analysis, a new population model will not be constructed until later in the spring of 2019. Regardless, the abundance estimate produced by the sightability model is by far the best estimator of this population ever produced. The 2018 postseason population estimate is approximately 11,200 elk, and managers believe the herd is likely stable.

Managers will hopefully have improved confidence in future modeling efforts for the Laramie Peak / Muddy Mountain Herd Unit, having integrated an abundance estimate and better classification data. Continued use of a stratified random classification survey method should help enhance model quality.

Management Summary

Season dates have been liberalized over time to maximize cow harvest and reduce damage on agricultural fields. Meetings with landowners and surveys of both landowners and hunters were conducted in 2017-2018 in conjunction with the herd unit objective review. The general consensus with the public and managers alike is to continue efforts to maximize female harvest and maintain mature bull quality. The majority of survey respondents expressed approval for the season structure in both Area 7 and Area 19, with the exception of January antlerless seasons. In response, January seasons will be discontinued in Area 19 and a small number of licenses will be maintained in Area 7 to address localized agricultural damage. The remaining Area 7 licenses will be added to the earlier antlerless season to maintain harvest pressure on females. Area 7 Type 6 licenses will remain valid early from August 15th through October 14th to address damage on hay fields. Currently, access is predicted to be similar in 2019 compared to previous years. Managers feel an increase of licenses is unwarranted unless hunting access in the herd unit improves. Goals for 2019 are to continue reduction of the herd toward objective, maintain bull quality while working toward special management limits, maintain or improve harvest success, and reduce elk damage to agricultural fields.

If we attain the projected harvest of 2,360 elk with average calf ratios, this herd will remain stable. The predicted 2019 postseason population size of the Laramie Peak / Muddy Mountain Elk Herd is approximately 11,000 animals, which is 120% above objective.

APPENDIX A:

Tooth-Age and Antler Class Data for Laramie Peak / Muddy Mountain Elk

The Laramie Peak / Muddy Mountain Elk Herd Unit (Wyoming Hunt Areas 7 & 19) has historically built a reputation for superior hunting in terms of high bull ratios, bull quality, and good hunter success. Bull ratios are managed under the special management criteria, with the goal of maintaining 30-40 per 100 cows. Bull quality is monitored annually using cementum annuli tooth aging from a sample of hunter-harvested elk and categorical postseason classifications based on antler size.

Tooth age data from the Laramie Peak / Muddy Mountain herd have been collected in nearly all years from 1997-2018. Tooth samples are solicited from both bull and cow elk hunters, as female age data is more representative of a random sample across age classes, while bull age data is potentially biased towards hunter preferences for more mature age classes. Samples received from calf elk are removed from resulting totals so as not to skew statistics on adult age classes.

Sample size has varied from year to year depending upon hunter response rates. In most years, tooth boxes have been mailed to a large random sample of licensed hunters. However, the percent of participating hunters is frequently low compared to sampling effort. In 2018, tooth boxes were distributed to hunters by mail. Tooth samples were also collected by field and office personnel in conjunction with tissue sampling to test for chronic wasting disease (CWD). Of those solicited, 154 returned teeth from bulls and 108 from cows, which was an improvement compared to the previous year when samples were collected in the field and no tooth boxes were sent to hunters by mail.

Average tooth age of harvested adult males slowly increased from 1999-2015 and was relatively stable from 2016-2018 (Table 1). Average tooth age of harvested female elk has been more variable over time, but has steadily increased since 2011 and was the highest on record in 2018 (Table 2). Median age of males held constant at 6.5 years old in 2018, as did the median age of females at 5.5 years old. This slight divergence between harvested bull and cow ages suggests that hunter selectivity is for larger, older age class bulls; while the younger age class of harvested cows is likely to represent a more abundant age class in this herd. Hunters who harvest a 1.5 year old bull are also less likely to submit teeth for aging, as they are usually aware of the age of their “spike” elk in the field. Tooth data from cow elk has less potential bias from hunters and is considered more representative of true age class distribution.

The percentage of harvested bulls aged 6-10 has remained near the 45-50th percentile since 2013, indicating older age-class bulls have been consistently available for harvest. This contradicts

some years of observed antler class data during the same time period that shows a decline of Class II (6 points on a side or better) bulls in the herd during aerial classification surveys (Table 3 & Figure 1). This disparity may be due to increased selectivity of hunters for older age-class bulls, compared to the more random sample of bulls surveyed during postseason classification flights. In addition, hunters submitting teeth may be biased towards older age class bulls, as hunters who are pleased with the quality of their animals may be more likely to submit samples.

The consistent availability of older age-class bulls seems to indicate this population is not decreasing in size. License issuance has remained high, and one would expect it to become increasingly difficult to find and harvest older age-class bulls if the population were in decline. At the same time, average tooth age of harvested cows has slowly increased, while license issuance and season length have been liberalized. These data are somewhat confounding as they suggest that females are increasingly reaching older age classes in the herd before they are harvested and/or there are relatively fewer younger age class cows available for harvest. However, calf ratios have also declined in recent years, meaning lower calf recruitment may have suppressed the distribution of elk in younger age classes. While managers have prescribed years of liberal hunting seasons in an attempt to decrease population size, tooth data indicate this herd may be stable.

Trends in antler class of classified bull elk are more difficult to interpret on their own. Class I bulls are mature bulls that have < 6 points on both antlers, while Class II bulls have ≥ 6 points on either antler. The percentage of Class II bulls has generally declined since the first year of antler class data collection in 2008. During the same time period from 2008-2017, average tooth-age of harvested bulls increased from 5.01 to 6.43. Tooth age of bulls declined slightly in 2018, but the proportion of Class II bulls observed during classification surveys increased slightly. The lack of symmetry between the two data sets suggests antler quality is not always correlated positively with bull age for this herd. Factors such as nutrition and genetics may also be contributing to antler quality. Studies of the tooth-age dataset certainly temper any assumptions made regarding changes in the antler class dataset and aid in making sound management decisions for this herd. Collectively, these data indicate this herd can continue to support the current number of any-elk licenses for the 2019 season without compromising bull ratios or bull quality. Managers must continue to scrutinize harvest data and hunter feedback, and perhaps begin to reduce issuance of any-elk licenses if the percentage of Class II bulls observed during classification surveys declines to a level deemed unacceptable by the hunting public.

Table 1. Tooth-age data analysis for adult bull elk harvested within the Laramie Peak/Muddy Mountain Herd Unit, 1997 - 2018.

Year	Number of Adult Males per Age Class (Tooth Sampling)																					
	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+	14+	15+	16+	17+	18+	19+	20+	21+	22+
1997	7	13	5	5	6	2	2	3	0	2	1	0	0	0	0	0	0	0	0	0	0	0
1998	1	16	19	10	10	4	3	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0
1999	20	26	39	24	16	9	8	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0
2000	22	36	41	28	24	13	6	1	3	1	1	0	0	0	0	1	0	0	0	0	0	0
2001	15	22	27	29	14	10	3	3	1	0	2	2	0	0	0	0	0	0	0	0	0	0
2004	7	8	16	19	6	10	5	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0
2005	6	3	27	16	10	11	6	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
2007	1	11	24	18	12	12	8	3	0	0	1	1	0	0	0	1	0	0	0	0	0	0
2008	4	2	19	24	22	17	12	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0
2010	4	3	16	27	32	27	13	2	1	2	5	1	0	0	0	0	0	0	0	0	0	0
2011	7	9	11	19	25	24	7	4	6	3	3	0	0	0	0	0	0	0	0	0	0	0
2012	2	9	9	22	22	20	9	3	4	0	1	0	0	0	0	0	0	0	0	0	0	0
2013	3	3	11	33	22	40	11	9	7	4	1	0	2	0	0	0	0	0	0	0	0	0
2014	3	4	19	27	35	31	17	13	7	5	2	0	0	1	0	0	0	0	0	0	0	0
2015	4	6	10	17	18	29	27	11	9	5	2	0	1	0	0	0	0	0	0	0	0	0
2016	1	4	13	20	31	21	18	12	5	2	3	2	0	0	0	0	0	0	0	0	0	0
2017	0	3	10	12	17	17	14	5	4	4	2	0	1	1	0	0	0	0	0	0	0	0
2018	2	6	17	25	25	23	14	20	11	7	0	1	2	0	0	0	0	0	0	0	0	0

Year	1	2-5	6-10	11-12	13+	N	Avg Age
1997	7	29	9	1	0	46	4.41
1998	1	55	12	1	0	69	4.12
1999	20	105	20	1	0	146	3.91
2000	22	129	24	1	1	177	3.99
2001	15	92	17	4	0	128	4.17
2004	7	49	19	1	0	76	4.48
2005	6	56	20	1	0	83	4.51
2007	1	65	23	2	1	92	4.58
2008	4	67	35	1	0	107	5.01
2010	4	78	45	6	0	133	5.33
2011	7	64	44	3	0	118	5.35
2012	2	62	36	1	0	101	5.44
2013	3	69	71	1	2	146	6.07
2014	3	85	73	2	1	164	6.02
2015	4	51	81	2	1	139	6.40
2016	1	63	63	5	0	132	6.20
2017	0	42	44	2	2	90	6.43
2018	2	73	75	1	2	154	6.30

Year	Percentages				
	1	2-5	6-10	11-12	13+
1997	15%	63%	20%	2%	0%
1998	1%	80%	17%	1%	0%
1999	14%	72%	14%	1%	0%
2000	12%	73%	14%	1%	1%
2001	12%	72%	13%	3%	0%
2004	9%	64%	25%	1%	0%
2005	7%	67%	24%	1%	0%
2007	1%	71%	25%	2%	1%
2008	4%	63%	33%	1%	0%
2010	3%	59%	34%	5%	0%
2011	6%	54%	37%	3%	0%
2012	2%	61%	36%	1%	0%
2013	2%	47%	49%	0%	1%
2014	2%	52%	45%	1%	1%
2015	3%	37%	58%	1%	1%
2016	<1%	48%	48%	4%	0%
2017	0%	47%	48%	2%	2%
2018	1%	47%	49%	1%	1%

Table 2. Tooth-age data analysis for adult female elk harvested within the Laramie Peak/Muddy Mountain Herd Unit, 1997 – 2018.

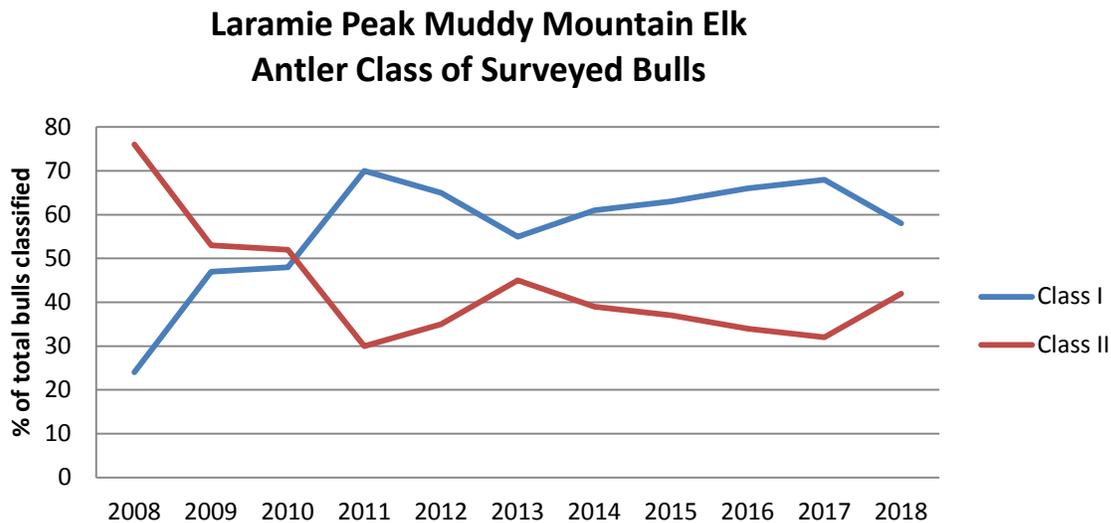
Year	Number of Adult Females per Age Class (Tooth Sampling)																						Avg Age
	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+	14+	15+	16+	17+	18+	19+	20+	21+	22+	
1997	8	3	5	9	5	1	1	2	1	1	3	0	0	0	0	0	0	0	0	0	0	0	
1998	3	14	6	10	6	7	5	2	1	2	1	1	1	0	0	0	1	0	0	0	0	0	
1999	14	22	16	20	8	8	6	7	3	1	8	3	3	1	0	0	0	0	0	0	0	1	
2000	19	26	21	17	13	11	6	4	6	0	4	3	0	1	2	1	0	0	0	0	1	0	
2001	11	15	24	11	15	9	10	5	4	4	3	0	0	0	0	0	0	0	0	0	0	0	
2004	8	4	13	8	8	6	3	2	3	0	0	1	0	0	0	0	0	0	0	0	0	0	
2005	26	14	39	34	21	14	16	15	4	6	5	0	0	4	4	0	0	1	0	0	0	0	
2007	4	7	19	24	7	6	8	5	11	4	5	2	2	1	0	2	1	0	0	0	0	0	
2008	8	11	14	14	14	8	11	5	3	2	1	2	3	1	0	2	1	1	0	1	0	0	
2010	5	7	14	9	13	9	3	5	3	5	1	1	2	0	1	1	0	0	0	0	0	0	
2011	4	4	11	10	14	6	7	6	2	1	0	0	0	0	1	2	0	0	0	0	0	0	
2012	10	9	15	8	7	5	4	6	2	1	4	1	1	0	0	0	0	0	0	0	0	0	
2013	5	1	11	20	14	8	4	3	3	2	1	4	0	0	0	0	0	0	0	0	0	0	
2014	9	11	19	25	18	11	13	11	6	4	2	3	0	3	1	1	0	0	0	0	0	0	
2015	16	9	12	16	10	3	9	7	3	1	5	4	3	1	2	0	1	0	0	0	0	0	
2016	7	12	15	13	7	6	7	5	6	1	2	3	2	1	0	0	0	0	0	0	0	0	
2017	3	3	8	10	5	6	4	4	2	0	0	1	3	0	0	0	0	0	0	0	0	0	
2018	6	5	17	14	17	14	7	1	4	2	4	3	0	4	4	1	2	1	0	0	0	0	

Year	Percentages					
	1	2-5	6-10	11-12	13+	
1997	21%	56%	15%	8%	0%	
1998	5%	60%	28%	3%	3%	
1999	12%	55%	21%	9%	4%	
2000	14%	57%	20%	5%	4%	
2001	10%	57%	28%	5%	1%	
2004	14%	59%	25%	2%	0%	
2005	13%	52%	26%	5%	4%	
2007	4%	53%	31%	6%	6%	
2008	8%	53%	28%	3%	9%	
2010	6%	54%	32%	3%	5%	
2011	6%	57%	32%	0%	4%	
2012	14%	53%	25%	7%	1%	
2013	7%	61%	26%	7%	0%	
2014	7%	53%	33%	4%	4%	
2015	16%	46%	23%	9%	7%	
2016	8%	52%	28%	5%	7%	
2017	8%	46%	35%	3%	8%	
2018	6%	49%	28%	6%	11%	

Table 3. Antler classification of bull elk from the Laramie Peak/Muddy Mountain Herd Unit, 2008-2017.

Mature Bull Antler Classification									
Bio-Year	Area 7 (N / %)			Area 19 (N / %)			EL 741 (N / %)		
	Class I	Class II	Total	Class I	Class II	Total	Class I	Class II	Total
2008	82 (23%)	270 (77%)	352	41 (26%)	119 (74%)	160	123 (24%)	389 (76%)	512
2009	211 (49%)	219 (51%)	430	58 (41%)	84 (59%)	142	269 (47%)	303 (53%)	572
2010	246 (47%)	280 (53%)	526	61 (54%)	52 (46%)	113	307 (48%)	332 (52%)	639
2011	278 (69%)	128 (31%)	406	104 (73%)	38 (27%)	142	382 (70%)	166 (30%)	548
2012	76 (56%)	60 (44%)	136	160 (71%)	66 (29%)	226	236 (65%)	126 (35%)	362
2013	213 (56%)	169 (44%)	382	57 (54%)	48 (46%)	105	270 (55%)	217 (45%)	487
2014	165 (64%)	93 (36%)	258	106 (57%)	79 (43%)	185	271 (61%)	172 (39%)	443
2015	212 (74%)	74 (26%)	286	93 (47%)	106 (53%)	199	305 (63%)	180 (37%)	485
2016	318 (70%)	137 (30%)	455	111 (57%)	85 (43%)	196	429 (66%)	222 (34%)	651
2017	258 (71%)	104 (29%)	362	55 (57%)	41 (43%)	96	313 (68%)	145 (32%)	458
2018	820 (59%)	573 (41%)	1393	125 (53%)	112 (47%)	237	945 (58%)	685 (42%)	1630

Figure 1. Percent of Class I & Class II bull elk from the Laramie Peak/Muddy Mountain Herd Unit, 2008-2018.



APPENDIX B

Laramie Peak / Muddy Mountain Elk Population Objective

2018 Review Summary

Prepared by: Willow Bish

5/1/2018

The population objective for the Laramie Peak/ Muddy Mountain Elk Herd (Hunt Area 7 & 19) was reviewed in 2018. As a component of these efforts, landowner and hunter surveys were conducted. This report summarizes the review process and outcomes.

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OVERVIEW

The Laramie Peak / Muddy Mountain Elk Herd includes limited quota Hunt Areas 7 and 19 and is located in eastern central Wyoming. The herd unit encompasses approximately 4,600 square miles from the city of Casper, east to the town of Douglas, southeast along the North Platte River to Guernsey Reservoir and the town of Wheatland, southwest to Bosler Junction, and northwest to the town of Medicine Bow (Figure 1). Management within these hunt areas is heavily influenced by private landowners who control a substantial proportion of access. Landownership includes traditional agricultural producers with lower tolerances for elk due to damage concerns coupled with non-traditional landowners who bought properties for recreational purposes, and therefore have higher tolerances for elk. However, there are also large tracts of public land as well, making it an important herd to many Wyoming residents and non-resident hunters. Outfitting is also taking place throughout this herd unit. These factors contribute to a strong desire by the public to manage this herd for trophy bull quality. The mixed landownership patterns (United States Forest Service, Bureau of Land Management, and State of Wyoming lands with about 60% private ownership), hunting access issues, large elk population, and desire for quality elk hunting experiences pose many management challenges in this herd unit. Managers therefore used the objective review process to complete a rather extensive public outreach effort to gauge public opinion regarding the population objective and hunting season structures for this herd.

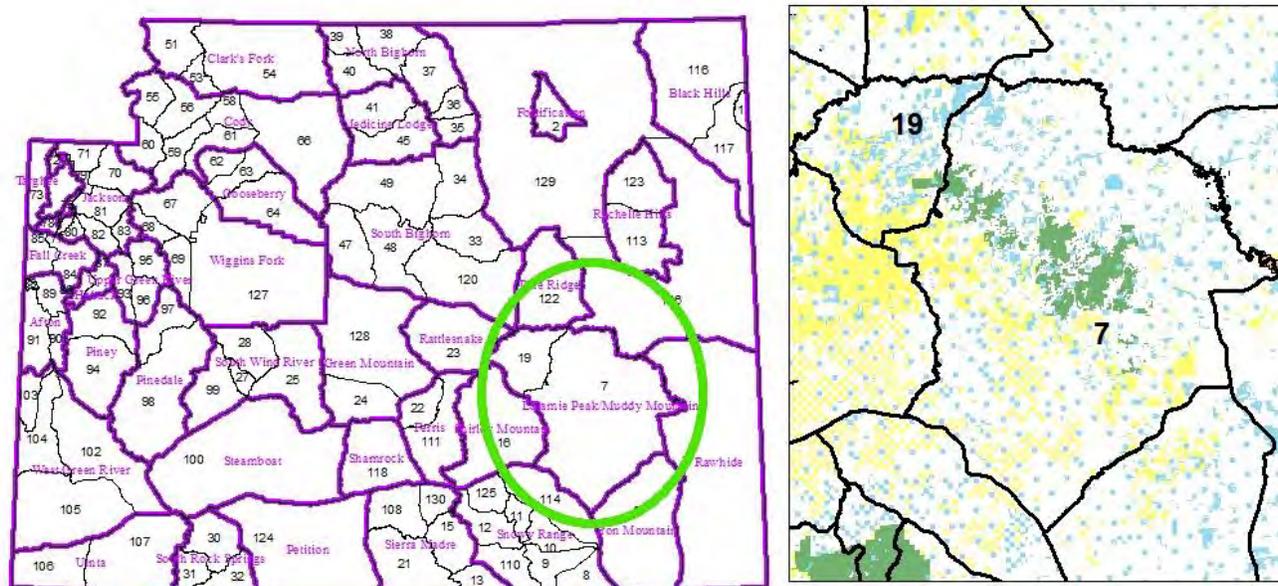


Figure 1. Location maps for Laramie Peak/ Muddy Mountain Elk herd.

Population & Hunting Seasons

The Laramie Peak / Muddy Mountain Elk Herd currently has a management objective of 5,000 elk postseason. In 2001, the objective was changed from 2,550 elk to 5,000 based on landowner and public input. The Department estimates this herd has had 8,000 – 10,000 elk postseason for the past several years. Liberal hunting seasons resulting in very high hunter harvest have prevented population growth in recent years. Rifle seasons begin in August for cow/calves in Platte County and on private land in Albany and Converse counties. Hunting season dates have run through Jan. 31 in Area 7 since 2007 and in Area 19 since 2015. For Areas 7 and 19 combined, total license issuance increased from 2,200 in 2002 to

5,800 in 2013. License issuance has remained at 5,775 since 2014. Since 2010, total elk harvest has averaged 2,412 elk per year in this herd unit (Figure 2).

Managers believe license issuance is near the saturation level, at least on public land, and that issuing more licenses could result in lower hunt quality and possibly lower success rates. Given the extremely liberal hunting season frameworks in these hunt areas, the objective of 5,000 elk postseason is likely unrealistic and unattainable considering extremely high harvest in recent years has not driven this population down to objective levels. The Department was aware that raising the objective would be a contentious issue with traditional agriculture producers given elk damage issues on private land. However, there has been a growing amount of non-traditional land use in this herd unit, where landowner tolerances for elk are much higher. Given these issues and constraints, managers proposed to raise the objective to 8,000 elk, since it is the low end of the current population estimate. The objective change was proposed to the public through landowner outreach and opinion surveys as well as hunter opinion surveys.

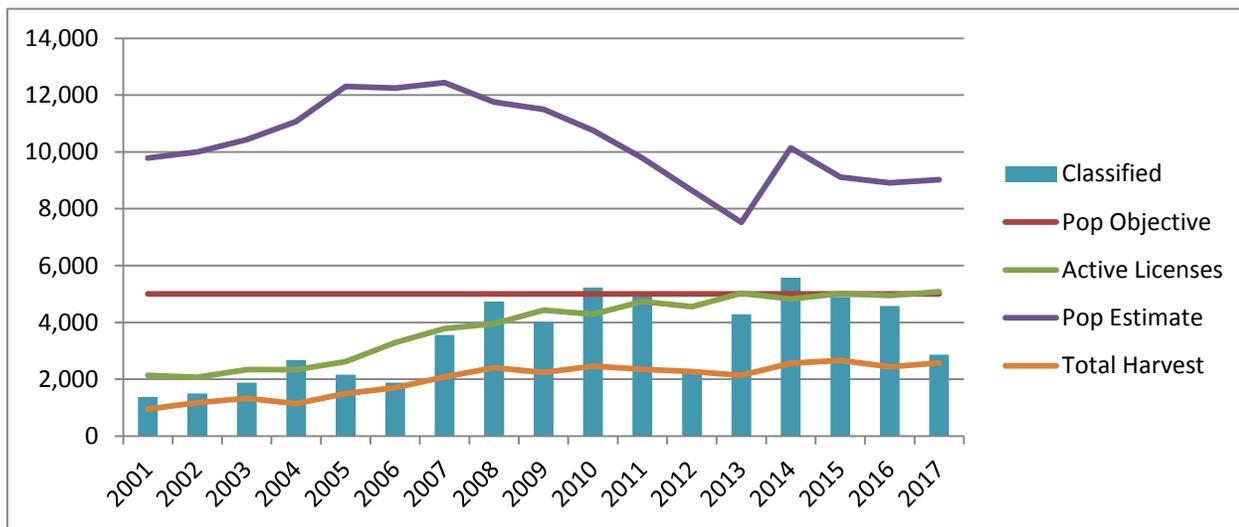


Figure 2. Postseason elk classification survey totals, population objective, active licenses, annual population estimate, and total harvest for Laramie Peak / Muddy Mountain Herd Unit, 2001-2017.

Bull Management

Bull management was also included in this review process. This herd unit is managed using the special management strategy, with a goal of maintaining bull ratios between 30-40 bulls per 100 cows and a high percentage of branch-antlered bulls in the in the male harvest segment. This herd is classified in January, when bulls typically winter away from cow/ calf herds, which leads managers to believe that bulls may be underrepresented in the classification data. To address this, a stratified, random sampling strategy has been in place since 2016. This sampling scheme has yielded bull ratios within management criteria (34 bulls / 100 cows in 2016 and 33 bulls / 100 cows in 2017). Managers also collect antler classification data (Figure 3) and tooth age data (Figure 4). While the tooth age data shows that hunters continue to harvest prime-aged bulls, antler-class data shows a consistent decrease in the percentage of Class II antlered bulls (Class I bulls are mature bulls that have < 6 points on both antlers, while Class II bulls have ≥ 6 points on either antler). This decrease, coupled with some hunters' concerns with declining trophy quality resulted in a further look into hunter opinions regarding bull quality and license issuance during the objective review process.

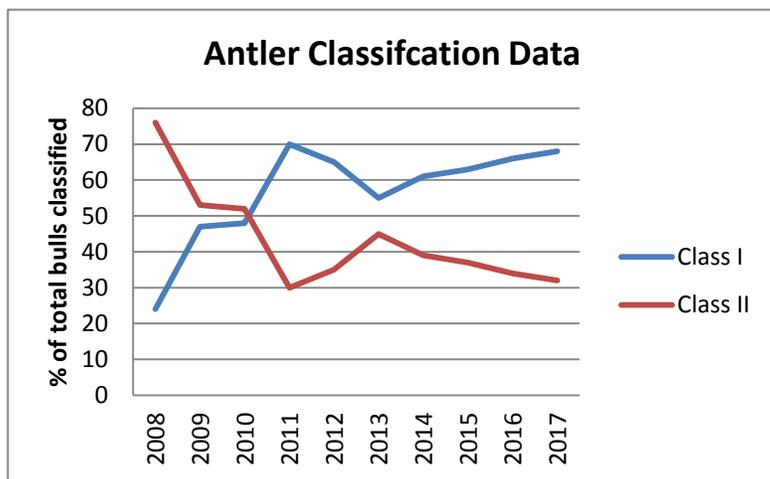


Figure 3. Percent of Class I & Class II bull elk from the Laramie Peak/Muddy Mountain Herd Unit, 2008-2017.

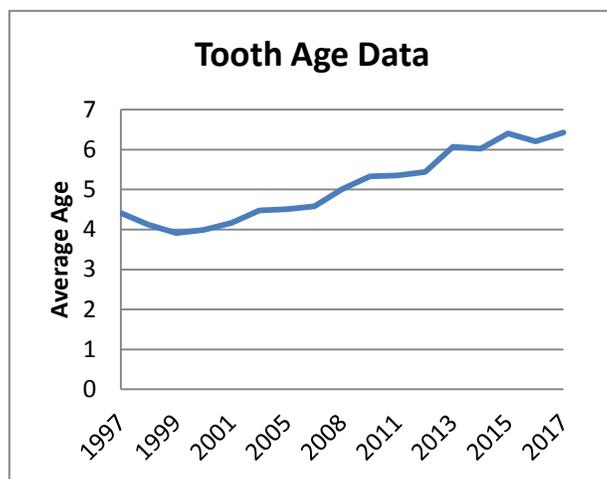


Figure 4. Average age of adult bull elk harvested within the Laramie Peak/Muddy Mountain Herd Unit, 1997 – 2017 based on tooth data.

Habitat

Elk habitat throughout this herd unit is highly variable and ranges from mid elevation sagebrush grassland, mountain mahogany/ mixed mountain shrub slopes, mountain meadows, ponderosa savanna, lodgepole, limberpine, and mixed conifer forest, aspen, and riparian areas. No formal habitat production or utilization information is available for this herd unit. However, habitat conditions throughout the Laramie Range are fairly high-quality with the exception of aspen stands. Aspen stand recruitment is limited by conifer encroachment and herbivory. There are also several locations where elk concentration results in over-use of riparian areas. While managers would like to reduce elk use on these key areas by reducing the population, there is no evidence that this elk herd is near the carrying capacity. Rather, the perception of elk over-population as it relates to habitat is linked to private landowner tolerances for elk use given elk tend to concentrate in private land hay meadows resulting in high payment damage claims throughout the herd unit.

Environmental Factors

Environmental factors are not strongly influencing the ability of the Department to manage this herd towards objective. Energy development within the herd unit primarily consists of wind energy. There are several gravel quarries within this herd unit and there are more expected given oil and gas development in areas adjacent to this herd unit. The quarries are often within or directly adjacent to winter range and have high volumes of large vehicle traffic. Also, a large gas powerplant plant was constructed within this herd unit as well. However, in general there has not been substantial enough development to significantly impact elk in this herd unit although these developments may influence hunting opportunity given concerns with firearm damage to equipment.

Several large-scale wildfires have also occurred in this herd unit in recent years. These fires primarily occurred in forested areas which contained heavy stands of conifer trees. These areas have recovered well and are provided better quality elk habitat than pre-burn conditions.

Land Managers

The United States Forest Service (USFS) and Office of State Lands and Investments (OSLI) are the two major public land owners in this herd unit. The Bureau of Land Management (BLM) has small portions of land within this herd unit, but many are not publicly accessible. These agencies have not expressed many concerns over the elk population; however, the USFS has noted the over-use of some riparian and aspen habitats by wildlife and livestock. Private landowners have raised the highest level of concern regarding the elk population. Therefore, the Department engaged with private landowners first regarding the proposed objective change, but did not initiate discussions with federal or state management agencies since no changes were made to the objective based on responses from private landowners and the public.

REVIEW PROCESS

Landowner Outreach

This herd unit encompasses two Game & Fish Regions, Casper and Laramie. The regions agreed to meet with each of their traditional agriculture producers and landowners enrolled in access programs prior to them receiving a mailed survey. The purpose of this was to avoid leading landowners to the perception that the Department wanted to manage for more elk than there are currently. Field personnel visited most major landowners in-person. The regions also followed up with their annual landowner meetings for Hunt Area 7 in Glenrock (12 individuals attended), Glendo (2 individuals attended), and Sybille (7 individuals attended). Notes from individual and group landowner meetings are included in Appendix A: Landowner Meeting Notes.

In general, the individual meetings went well with only moderate levels of alarm expressed at raising the objective. Many landowners were not supportive of raising the objective, but they also did not feel the Department could do a lot more to decrease the herd and that access was the main reason. However, strong opposition to raising the objective was expressed during the group meetings. Landowners were concerned about what raising the objective might mean for the future, and how long it would be before we would attempt to raise the objective again if we were unsuccessful in managing for the elk population at the new objective. In addition to these concerns, many landowners requested to end the January season, as they felt it is ineffective in harvesting elk or that seasons are just simply too long. This request was also strongly echoed during the group meeting as well. Additionally, many landowners in the northern part of Area 7 requested a hunting season mechanism to harvest more bulls, particularly small bulls, due to high bull densities. Many landowners also felt that elk distribution has changed in recent years due to high hunting pressure, making it more challenging to harvest cow elk.

Surveys were mailed to both Area 7 and 19 landowners (Appendix B: Landowner Surveys and Responses). In Area 7, 154 landowners received a survey and 99 responded. In Area 19, 20 landowners received a survey and 10 responded. This resulted in an overall response rate of 63%. All support/oppose questions were also provided a neutral options which may not be reported below if the results are not meaningful to the discussion.

Area 7 Landowner Survey Results

Landowners were asked about the principle interest in their properties during these surveys. Agriculture was the primary interest of 66% of the respondents, with 24% identifying themselves as being interested in both agriculture and hunting/recreation, 9% solely in hunting/recreation, and 1% listed conservation as

their primary interest. As a whole, the respondents were fairly evenly divided amongst supporting, opposing, and being neutral to raising the objective to 8,000 elk; although when broken out by interest, 49% of the agriculture interest group was opposed to the objective change, with 70% of hunting and recreation landowners supporting raising the objective (Figure 5). In total, 56% of respondents felt the objective should remain at 5,000 elk (Figure 6), and 55% of respondents that the elk population was above desired levels (Figure 7). When broken out by interest, 58% of hunting/recreation landowners felt the population was about right and 71% of agriculture producers felt the population was too high (Figure 8).

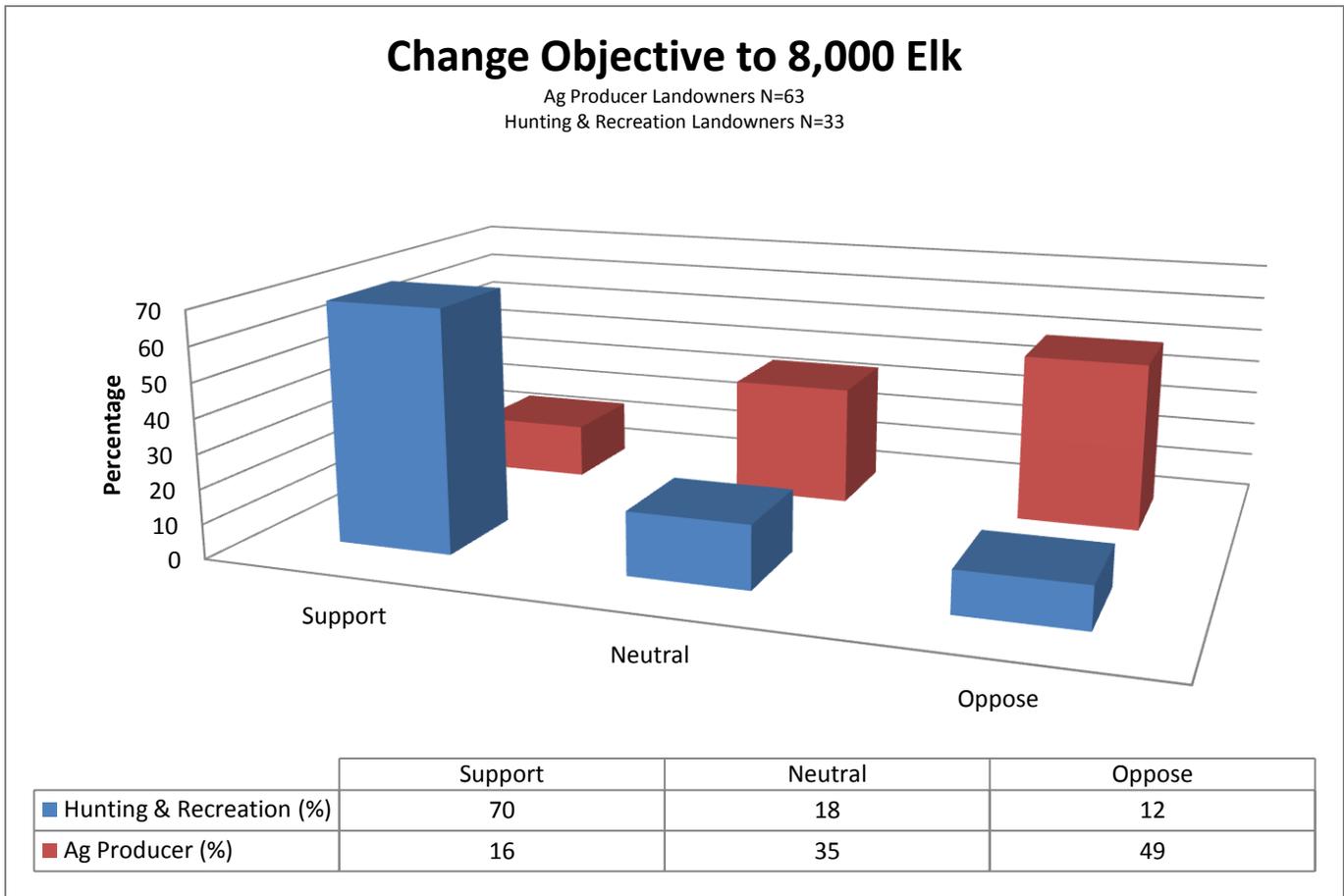


Figure 5. Elk Area 7 landowner response to raising the elk objective from 5,000 to 8,000 elk broken out by hunting/recreation landowners and agricultural producers.

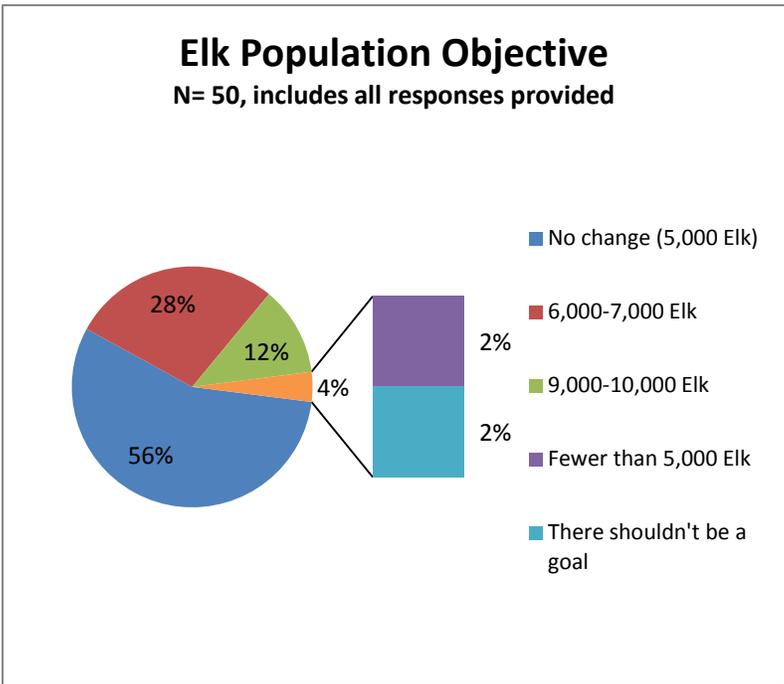


Figure 6. All Elk Area 7 landowner responses regarding what they think the population objective should be.

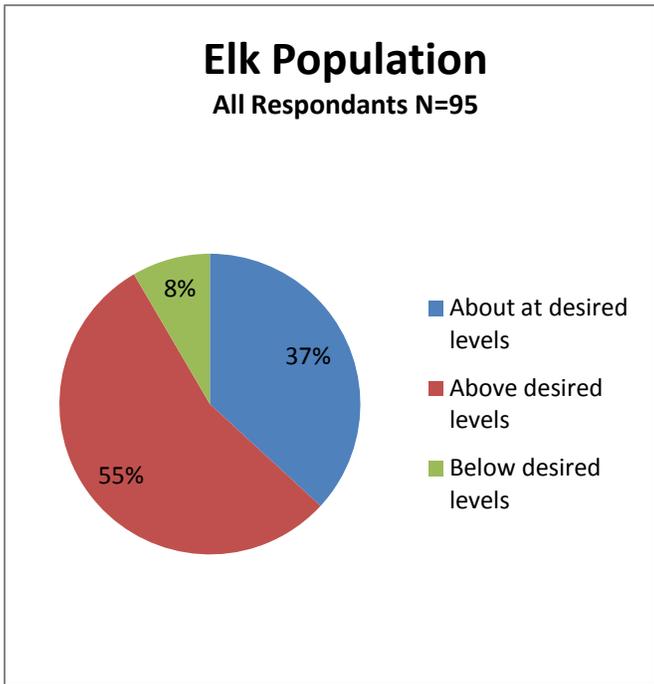


Figure 7. Elk Area 7 landowners' opinions regarding the current population size of the Laramie Peak/Muddy Mountain elk herd.

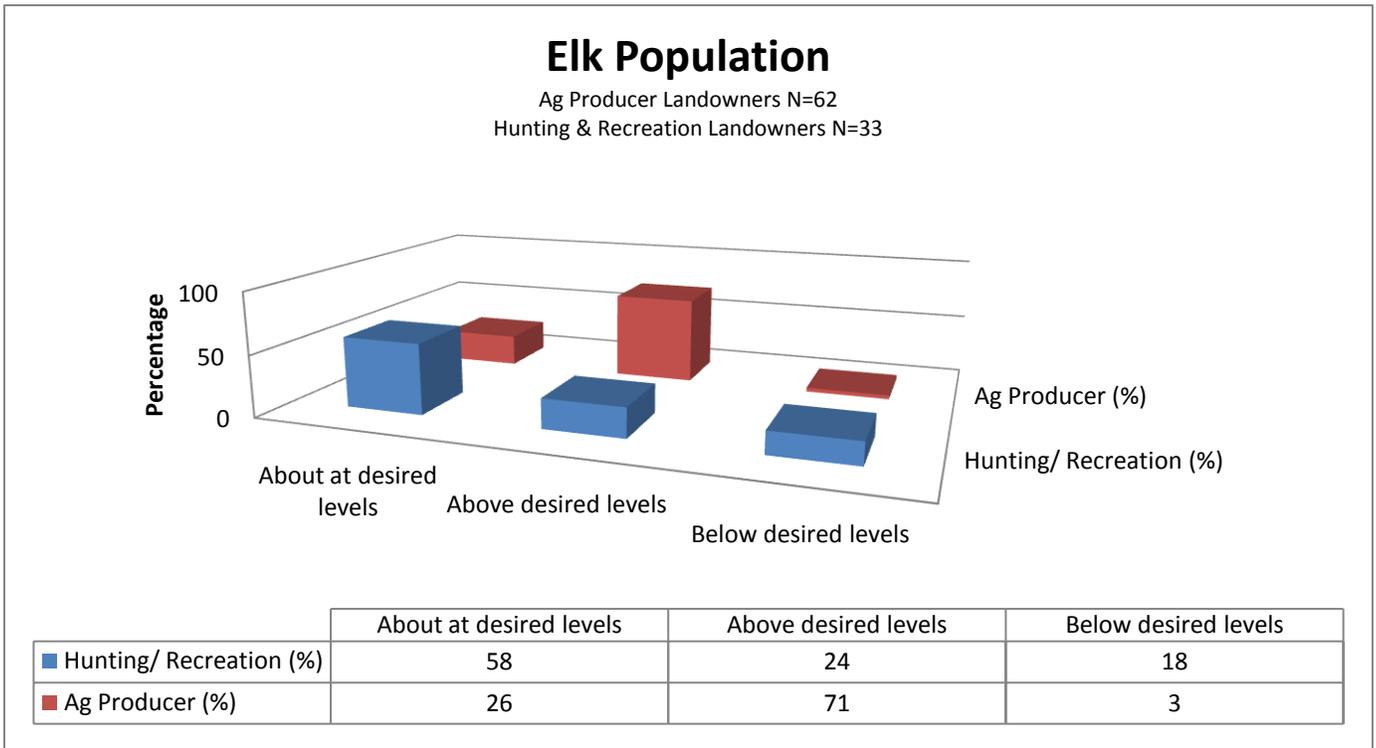


Figure 8. Elk Area 7 landowners' opinions regarding the current population size of the Laramie Peak/Muddy Mountain elk herd broken out by hunting/recreation landowners and agricultural producers.

Landowners were also asked about hunting season structure. The majority of the support was for current management practices, with the exception of the January season. Fifty-six percent of landowners wanted to maintain antlerless license issuance as is, whereas only 30% and 14% wanted to increase or decrease, respectively. Fifty-seven percent of landowners were either “satisfied” or “very satisfied” with bull quality. Forty-seven percent of landowners supported current bull license issuance and 37% would like to see an increase whereas only 16% felt that too many bull licenses are being issued. The majority of landowners (57%) were either “satisfied” or “very satisfied” with bull quality, however 31% were “dissatisfied” or “very dissatisfied”. Sixty-seven percent of landowners support the current October 15th opening date for rifle season (opening area-wide). Lastly, 55% of landowners oppose the January hunting season and only 30% support it (Appendix C: Landowner Survey Figures).

Area 19 Landowner Survey Results

Agriculture was the primary interest of Area 19 landowner respondents (70%). Landowners were evenly split between supporting (40%) and opposing (40%) the proposed objective change, with 20% of landowners reporting they were neutral. Unlike the Area 7 responses, hunting and recreation landowners were only slightly less in opposition (40%) to raising the objective than agricultural producers (57%), although only 3 landowners in Area 19 reported themselves as hunting/recreation landowners, which is a small sample size (Figure 9). Twenty-nine percent of agriculture production landowners and 40% of hunting/ recreation landowners were in support of the objective change (Figure 9). Those who did not support the objective change were asked their opinion on what the objective should be. Four landowners (57%) reported they would like to see no change (remain at 5,000 elk) and 3 landowners (43%) thought the objective should be 9,000-10,000 elk (Figure 10). In total, 50% of landowners felt that the population size was above desired levels, with 40% reporting that they felt that the population size was about right (Figure 11). All of the hunting/recreation landowners (N=3) felt the current elk population size was about right, whereas 72% of the agriculture producers felt the population was too high (Figure 12).

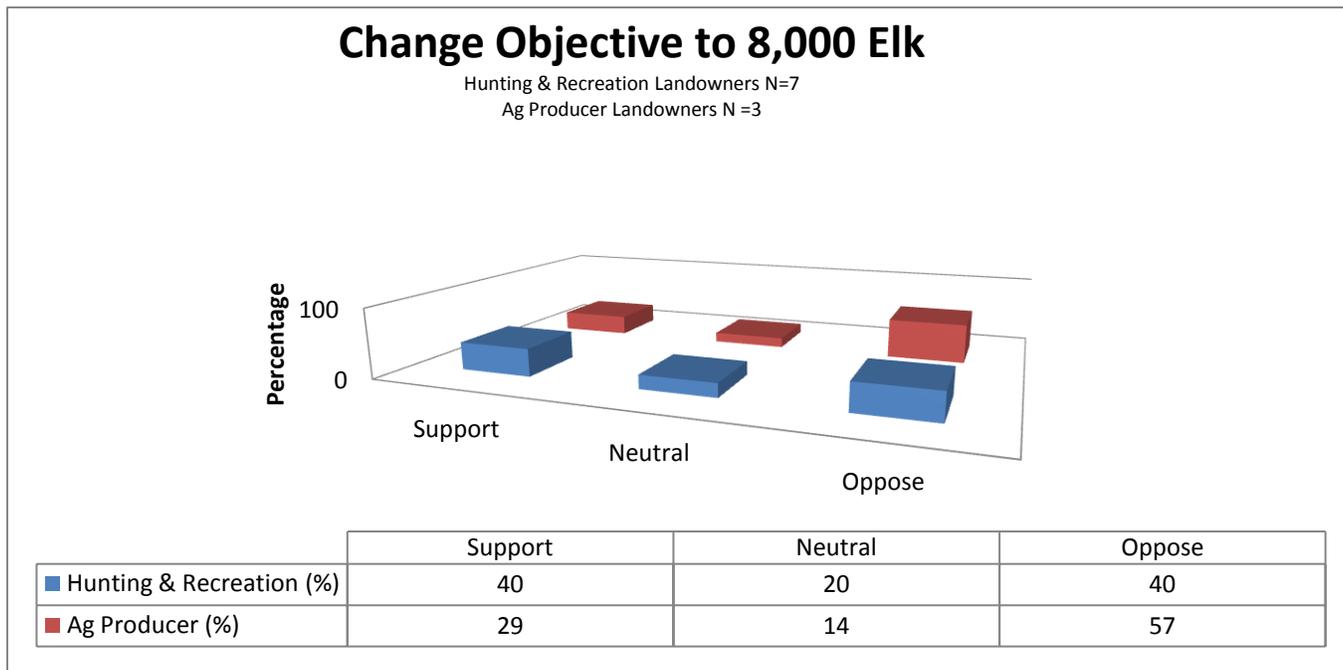


Figure 9. Elk Area 19 landowners’ opinions regarding increasing the elk objective from 5,000 to 8,000 elk in the Laramie Peak/Muddy Mountain herd broken out by hunting/recreation landowners and agricultural producers.

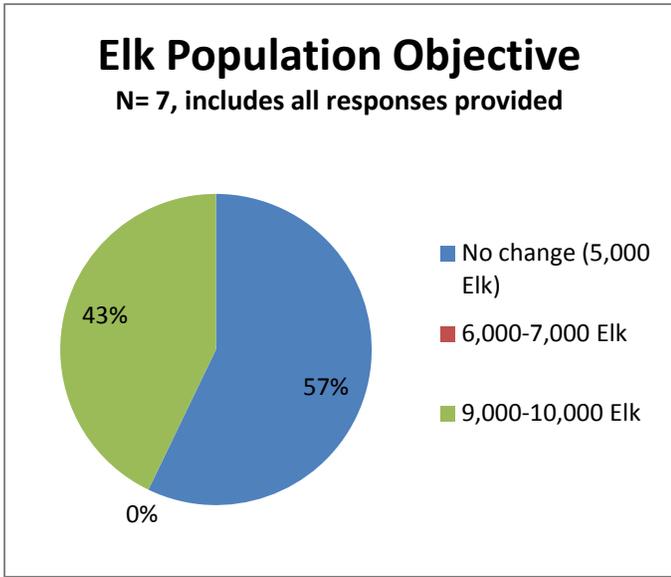


Figure 10. All Elk Area 19 landowner responses regarding what they think the population objective should be.

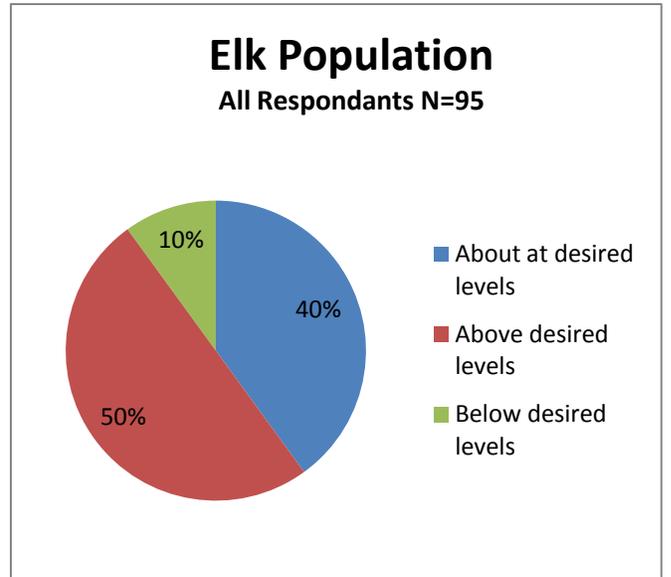


Figure 11. Elk Area 19 landowners' opinions regarding the current population size of the Laramie Peak/Muddy Mountain elk herd.

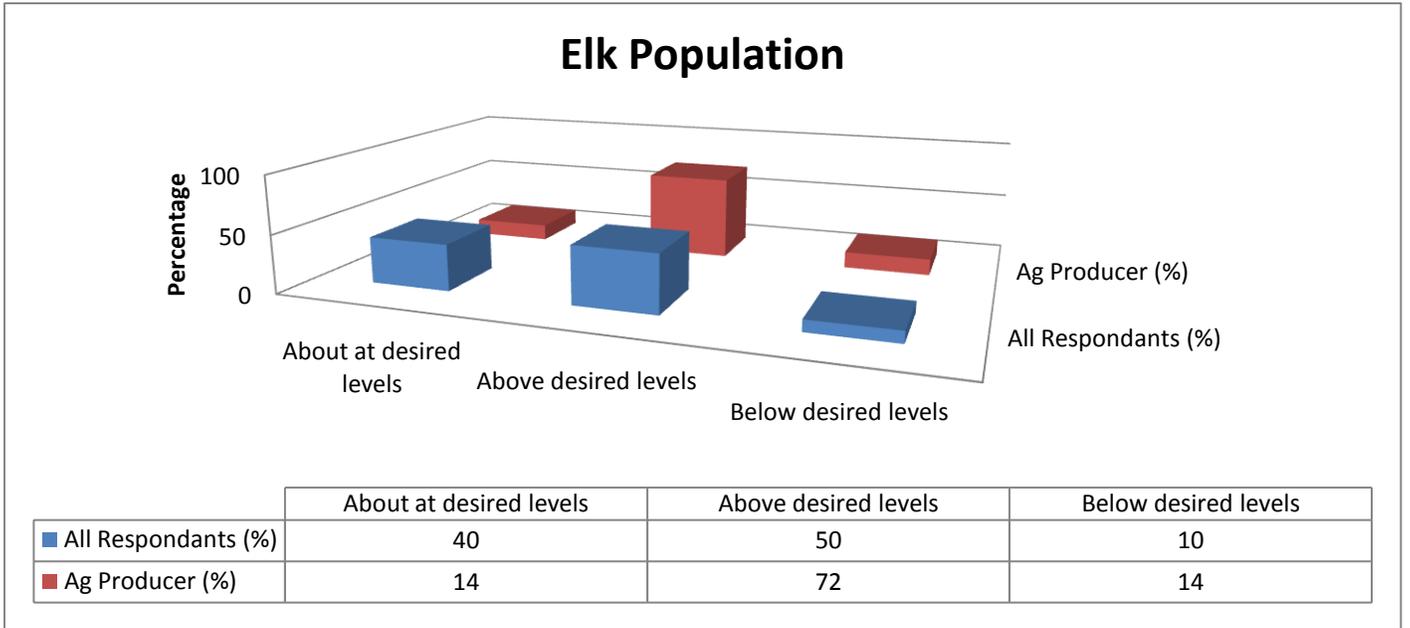


Figure 12. Elk Area 19 landowners' opinions regarding increasing the elk objective from 5,000 to 8,000 elk in the Laramie Peak / Muddy Mountain herd broken out by hunting/recreation landowners and agricultural producers.

Questions regarding hunting season structure yielded majority support for current management practices. Seventy percent of landowners supported current antlerless license issuance and 60% supported current bull license issuance. However, bull quality satisfaction was fairly evenly divided amongst selection categories, with 30% “dissatisfied” or “very dissatisfied”, 30% “neutral” and 40% “satisfied” or “very satisfied”. Questions were asked regarding the season length for Type 1 and Type 2 licenses, and each resulted in 50% support for current season length, although 30% and 37% of landowners thought the season was too short for Type 1s and 2s, respectively. Area 19 has a split season where Type 1 and 4 licenses are valid from October 1 – October 14 and Type 2 and 5 licenses are valid November 1 – November 20. There was majority support (50%) for the current season structure, whereas only 10% of landowners opposed it. Lastly, 70% of landowners support the January hunting season and only 10% oppose it (Appendix C: Landowner Survey Figures).

Hunter Outreach

Hunter outreach consisted of an online survey. The list of potential survey respondents was developed from compiling license holders across all license types from the past 3 years in order to gain feedback from individuals who had recent hunting experience in Areas 7 and 19. Survey invitations were sent to 30% of hunters within each of the license types. There were 4,389 survey invitations and 867 respondents for Area 7 and 730 survey invitations and 168 respondents for Area 19. This resulted in an overall response rate of 20%. Hunters were asked questions regarding their satisfaction with overall elk numbers, their opinion regarding the population objective, hunter densities, elk availability, hunting access, license issuance, bull quality, season length, opening date, choose your weapon/archery hunting, January seasons, as well as hunt area-specific management questions (Appendix D: Hunter Surveys). All responses in graph form are reported in Appendix E: Hunter Survey Figures. Overall, there was majority support for raising the objective (Figure 13), but this support was not overwhelming as 45% of hunters supported maintaining the objective at 5,000 elk. Hunters reported a fairly high level of satisfaction with overall elk numbers (Figure 14). Hunters made 453 and 83 additional comments for Areas 7 and 19, respectively. The majority of these comments are focused on the private land access issue and ability to access elk.

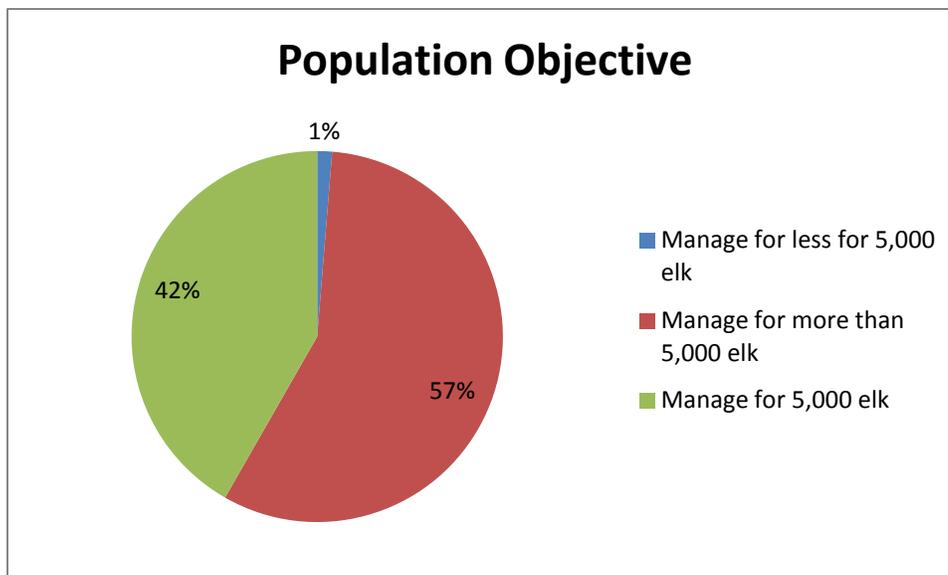


Figure 13. Hunter responses from Elk Hunt Areas 7 & 9 combined regarding the Laramie Peak/Muddy Mountain Elk population objective.

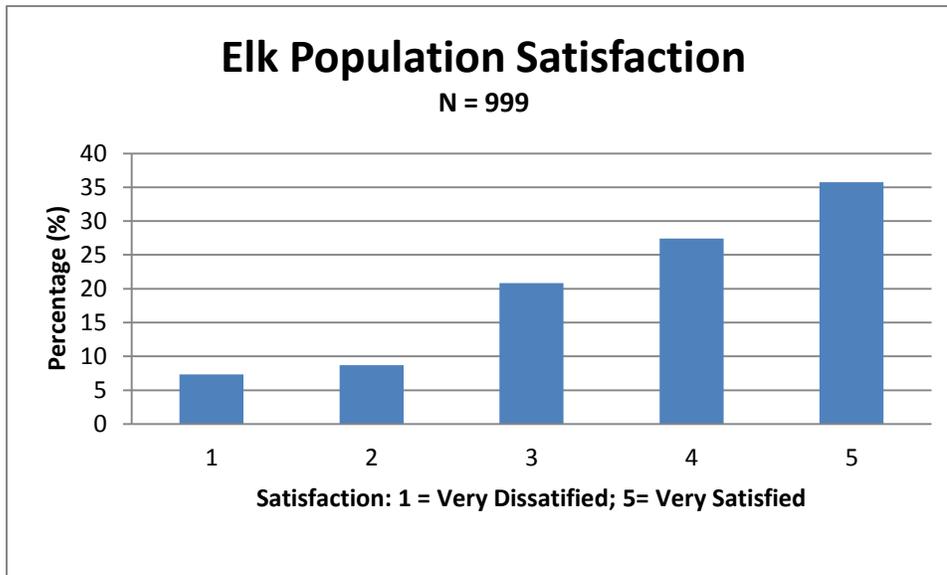


Figure 14. Hunter responses from Elk Hunt Areas 7 & 9 combined regarding their satisfaction with the current population of the Laramie Peak/Muddy Mountain Elk Herd.

Area 7 Hunter Survey Results

Over 62% of hunters were satisfied or very satisfied with elk numbers. Hunters supported managing for more than 5,000 elk, but about 42% felt we should continue to try to manage for 5,000 elk. Public land/Access Yes land hunters were the bulk of the respondents (65%); and about half of these hunters felt that hunter densities were about right on public lands, with the other half feeling that hunter densities were too high. A little over half (53%) of the public land hunters were dissatisfied with elk numbers and availability on public land, and the majority of hunters felt that increasing access to public land and/or with Access Yes programs was the solution to this issue. Only 8% of hunters felt that we issue too many bull licenses, with the remaining hunters being fairly evenly split between wanting more licenses and supporting current bull license issuance. The majority of hunters (55%) reported being either satisfied or very satisfied with trophy bull quality, while 13% reported being either very dissatisfied or somewhat dissatisfied. On a scale of 1 to 5 with 1 being very dissatisfied and 5 being very satisfied, trophy bull quality averaged a score of 3.6. About 60% of people felt bull hunting season length was about right. There was strong support (75%) for continuing to be able to hunt with both archery and rifle equipment in the same year. The majority of hunters (61%) supported the current rifle season opening date. Forty-one percent of people were satisfied or very satisfied with access to hunt antlerless elk, although a large percentage of hunters (28%) were either very dissatisfied or somewhat dissatisfied. There was considerable support for January seasons to hunt cow/calves (61%) with only 16% of people opposing the season. Hunters also supported mid-August rifle seasons on private land (50%), although 25% of people opposed August seasons.

Area 19 Hunter Survey Results

Area 19 hunters reported high (68%) satisfaction with elk numbers. Hunters supported managing for more than 5,000 elk (60%), but about 40% felt we should continue to try to manage for 5,000 elk. Public land/Access Yes land hunters were the bulk of the respondents (81%), and about 62% of these hunters felt hunter densities were about right on public lands, with only 24% feeling that hunter densities were too

high. Public land hunters reported dissatisfaction (41%) with elk numbers and availability on public land, and the majority of hunters felt that increasing access to public land and/or with Access Yes programs was the solution to this issue. Only 6% of hunters indicated we issue too many bull licenses, with the majority of hunters wanting more or the same number of bull licenses. The majority of hunters (65%) reported being either satisfied or very satisfied with trophy bull quality, while 13% reported being either very dissatisfied or somewhat dissatisfied. On a scale of 1 to 5 with 1 being very dissatisfied and 5 being very satisfied, trophy bull quality averaged a score of 3.6. The majority of hunters (47% for Type 1 and 59% for Type 2) supported current bull season length but 36% and 25% of hunters felt it was too short for Type 1 and Type 2 licenses, respectively. As with Area 7, there was strong support (73%) for continuing to be able to hunt with both archery and rifle equipment in the same year. Area 19 has a split season where Type 1 and 4 licenses are valid from October 1 – October 14 and Type 2 and 5 licenses are valid November 1 –November 20. There was majority support (59%) for the current season structure, whereas only 10% of people opposed it. Hunters were asked about their satisfaction regarding access to hunt cow/calves/ antlerless elk on a scale from 1-5. About one third of the hunters chose a “3”, with the remaining hunters split between 1 & 2 (dissatisfied) and 4 & 5 (satisfied). There was considerable support for January seasons to hunt cow/calves (70%), with only 11% of people opposing the season. The majority of hunters were neutral (49%) regarding managing for fewer elk in the Lone Tree Creek area to benefit mule deer, with 36% of hunters supporting the management, and 15% opposing it.

OBJECTIVE AND MANAGEMENT RECOMMENDATIONS

Considering the substantial public and landowner input obtained during this objective review, the Department recommends the population objective be maintained at 5,000 elk postseason. This is due to lack of majority support from landowners and hunters, and strong objections from some landowners to raising the objective. Also, raising the objective would not result in any significant changes in current management direction since managers would still issue the same number of licenses that has been issued in recent years. Regardless, the extensive public outreach proved to be a useful and meaningful exercise in engaging with the public and gathering feedback on perceptions and opinions regarding this herd. In reviewing responses and comments, field managers discovered there is widespread support for the current management direction and season structures from both the landowner community and the general public.

Hunters and landowners generally support current license issuance for bulls and cow/calves/ antlerless elk, as well as season dates and lengths. However, in hindsight, managers should have asked an additional question regarding reasoning behind why they wanted the same or more bull licenses. Judging from overall responses and comments, hunters are primarily concerned with access and opportunity. Therefore, hunters may have responded to the bull license question as they did out of desire to continue to be able to draw the license. However, the majority of landowners and hunters in both hunt areas indicated satisfaction with bull quality, although there was less satisfaction amongst landowners than there was with hunters. This may be due to landowners’ relatively longer history with the herd unit and potential loss in trophy quality over time relative to years’ past. In general, the consensus is that trophy bull quality has diminished somewhat due to overall high elk densities, or may be a function of increased harvest pressure on the mature bull segment (although bull densities remain very high throughout much of the herd unit). Decreasing overall elk densities and total bull numbers may actually improve trophy quality, although this is purely speculative. Through this process, managers have also identified that there may be a difference in bull density between the northern and southern portions of the herd unit, with higher densities of bulls in the northern portion. This has also been borne out during recent classification surveys. This will be further explored in future years through the classification sampling efforts. The current structure of allowing both archery and rifle equipment for a hunter for the same year was strongly supported as well.

These data will prove very helpful for field managers given consistent requests to issue archery-only licenses.

Access issues were the most common comment and concern brought forth by hunters. The intermingled and non-traditional landownership results in private land havens for elk, which is a strong point of contention and frustration amongst hunters and landowners interested in reducing elk numbers. Given high outfitting fees throughout the herd unit, substantial levels of additional public access is unlikely, although there are currently 224,089 acres of private land enrolled in the Department's Access Yes program for elk hunting within the herd unit. Field managers will continue to build relationships with private landowners in an effort to provide access whenever possible.

January seasons (Type 7 licenses) were supported by hunters, but strongly opposed by the majority of landowners in Area 7. Area 19 landowners still support January seasons, but this could be due to the fact that they have only been in place for 3 hunting seasons. Area 7 landowners are growing weary of the long hunting season. Landowners in the northern portion of Area 7 are unsupportive of January seasons because the season is ineffective on their ranches. Elk tend to congregate on only a few larger ranches during January which have taken fewer public hunters in recent years. The bulk of the access available to hunters in Area 7 is provided by the Hunter Management Areas administered by the Laramie Region. In 2017, 151 elk were harvested in Area 7 in January, meaning the Type 7 season is still somewhat successful in harvesting elk. However, given private landowners provide the bulk of the access for this season (as well as other elk hunting opportunities in addition to the Type 7), deference is given to landowners regarding this season. Current management actions are to reduce January licenses by 250 (from 500) and add them on the Type 6 cow/calf quota. Based on input from this review process, managers will evaluate eliminating the Type 7 license for the 2019 season. The total license issuance of around 5,000 licenses in Area 7 will remain and managers will evaluate season structure options to allow the same number of tags without a January season and without placing additional hunting pressure near the October 15th rifle opening day.

Landowners who were mailed a survey were sent a follow-up letter to discuss some of the major findings from the objective review process and to inform them of the Department's decision to maintain the population objective of 5,000 elk (Appendix F: Landowner Follow-up Letter).

APPENDIX A.1: Landowner Meeting Notes – In-Person Meetings with Area 7 Landowners

- Craig Hiser:
 - Not in favor of January season
 - Need to be flexible with seasons if we want cow harvest, cows are responding to pressure of long seasons which is limiting harvest potential
 - Ok with raising objective, but not with harvest
 - Has seen cow elk shift in his neck of the woods in the past 10 years, not the amount of cow elk there used to be during hunting season
 - Plenty of elk during growing season and substantial damage to growing crops
 - Elk nocturnal during aug-sep cow rifle season
 - Supports Dec. ragoon season

- Mark Grant
 - Not excited about raising objective but understands, suggests 7,500 for objective
 - Do Not decrease harvest
 - January season makes no difference to them
 - Hunter mentality has changed
 - Supports Dec. ragoon season

- Frank Prado
 - Strongly supports Dec. ragoon season
 - Indifferent on raising objective, understands why the need

- Will Grant
 - Wants data to show why we can raise the objective, are we at carrying capacity? What is the carrying capacity for this herd.
 - Supports Dec. ragoon season
 - Wants to make sure that it will not affect the way they get reimbursed for elk damage
 - No decrease in harvest

- Rick Grant
 - Killing elk is difficult with season length, cows respond rapidly to pressure
 - Indifferent on objective number, understands the need to raise it
 - Supports Dec ragoon season
 - Wants a type 9 archery for HA 7

- John Ralph Sullivan
 - Ok with objective raise, but not by much
 - Fewer elk available for hunters due to long season and pressure on cows

- Elsie Deininger
 - No January season
 - Hunt elk too long has made harvest more difficult

- Greg Whittenburg (nephew) from South Dakota manages hunting on ranch
- Larry Chamberlin
 - Understands need to raise objective
 - Supports Dec. ragoon season
- Connie Bowen
 - Understands need to raise objective
 - No January season, long season has changed cow elk behavior, elk on meadows until season then cannot get harvest
- Wayne Smith
 - Fairly neutral on objective change
 - Does not think G&F can do much more to increase harvest- although flexible seasons may help given elk response to continual pressure
 - Would like to see a mechanism to increase small bull harvest; suggests making Type 1s valid for bulls only and cut the season off in November and not roll the season over to cow elk
 - Not a fan of high archery season opportunity given the skill level of archery hunters
 - Ending January season wouldn't hurt his feelings
- Tim Pexton
 - Understands the need to change the objective, but thinks we should just keep it where it is since we do not intend to change harvest (although mostly neutral on the matter)
 - Does not think G&F can do much more to increase harvest
 - Would like to see a ragoon season; esp. as a way to change hunting pressure dynamics and provide youth opportunity
 - August hunting season helpful; elk have been pressured enough that he no longer has as many issues although they are no longer killing many because the elk move on right before shooting hours
 - January season growing tiresome – doesn't have cows in January
 - Need flexible season to continue to obtain harvest – elk are responding to pressure and long seasons making it difficult to continue to harvest them
- Bob Hageman
 - Understands need for objective change – neutral
 - Does not have much elk damage issues beyond some fencing damage
 - Does not think G&F can do much more to increase harvest
 - January season not really effective in our country
- Aaron Clausen
 - Doesn't have elk damage issues

- Understands the need to change the objective although mostly neutral – doesn't think it's really worth it to go through the work of changing it because it's just a number.
- Appreciated the heads-up
- Shane Cross
 - Understands the objective issue – fairly neutral – thinks it's just a number and doesn't really impact them much
 - Mostly interested in education about how our seasons, populations, management, etc.
work
- Dax McCarty
 - Raise the objective!
 - Supports late season raghorn hunting- feels that there are far too many small bulls. Wagonhound would allow for opportunity to shoot small bulls
 - Doesn't like January season – although that's when ranch employees get the opportunity to hunt.
 - Wants Type 9, archery only licenses
- Garrett Falkenburg
 - Wary of the objective change – we said the same thing back in 2001- but understands
 - Doesn't like January season
 - Wants the population to stay about where it's at now or a bit less

APPENDIX A.2: Landowner Meeting Notes- Group Meeting in Glenrock

February 2018

Attendance: Stuart McCrary, Kevin Christopherson, Dax McCarty, Dustin Ewing, Mark Grant, John Sullivan, Jim Bowen, Rick Grant, Will & Rachel Grant, Jim Huxtable, Howard Huxtable

- The majority of these landowners were contacted in-person prior to this meeting. While many of them were not extremely alarmed at the proposal to increase the objective during in-person meetings, the traditional ag producers were very vocal about not raising the objective during the group meeting.
 - The primary concern for raising the objective seems to be based primarily on fear of the unknown- landowners are unsure as to what it will mean in the future.
 - Landowners are concerned about what the next people in our positions will do regarding elk if the objective is raised.
 - Landowners feel that grass competition between elk and wildlife is considerable and that “every blade of grass up there is either spoken for via ownership or lease payments” which is not understood by the public.
- Landowners strongly agreed that they would like to end the January season.
- August season is becoming less effective but still has support.
- There was support for maintaining the current level of harvest and pressure, however landowners would like to see “out-of-the-box” solutions for continuing harvest. Simply adjusting quotas doesn’t seem adequate.
 - It was pointed out that record harvest was achieved this year. However, elk behavior and adaptations to long hunting seasons are causing concern.
- A season to increase small bull harvest was discussed at length and strongly supported.
 - Landowners would like to see the licenses from January seasons turned into a raghorn or spike tag valid after the Type 1 season.
 - Regardless of whether we can do a small bull season, landowners supported cutting off Type 1 licenses in November to force hunters to shoot an elk.
 - It was pointed out that some level of cow harvest is achieved on a Type 1 licenses but landowners still strongly felt that hunters could still get a cow tag if cow harvest was a priority – shortening season lengths puts pressure on people to harvest an elk and then get out of the field.
 - Landowners supported maintaining 1,500 Type 1 licenses regardless of whether there is a raghorn season or not.
- There was moderate support for archery only Type 9 licenses.



APPENDIX B.1: Area 7 Landowner Letter and Survey
WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006

Phone: (307) 777-4600 Fax: (307) 777-4699

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PATRICK CRANK
PETER J. DUBE
DAVID RAELE
MIKE SCHMID

February 5, 2018

Dear Landowner:

The Wyoming Game and Fish Department (Department) is currently reviewing the population objective for the Laramie Peak/ Muddy Mountain Elk Herd, which includes Hunt Areas 7 and 19. As a landowner who provides valuable wildlife habitat in the Laramie Range, your opinion is very important to us. Please review the following information and respond to the corresponding survey.

The Laramie Peak / Muddy Mountain Elk Herd currently has a management objective of 5,000 elk after the hunting season. The objective was last revised in 2001 when it was changed from 2,550 elk to 5,000 based on landowner and public input. The Department estimates this herd has had 8,000 – 10,000 elk postseason for the past several years. Hunt Area 19 typically holds about 2,000 of these elk, with the remaining population residing in Hunt Area 7. This herd has been fairly stable over the past 5-7 years due to extremely liberal hunting seasons resulting in very high hunter harvest preventing population growth. In an attempt to manage this herd toward the objective of 5,000 elk, the Department has issued 5,775 licenses in these two hunt areas annually for the past several years with season dates running from mid-August (in Area 7) to the end of January (in both hunt areas). These liberal seasons have resulted in an average of 2,412 elk being harvested per year in this herd since 2010.

Increasing license issuance beyond current levels will likely result in lower harvest success given the level of saturation in hunting access. Obviously, private landowners continue to provide a tremendous amount of access for elk hunting considering hunters have been harvesting over 2,400 elk per year over the past several years. We sincerely thank all private landowners that provide hunting access, as we are fully aware of the challenges this can create. However, it appears both public lands and private landowners that provide access have reached somewhat of a saturation point with hunter numbers given the high number of licenses issued. Additionally, much of the private land in the Laramie Range is owned by non-traditional landowners that bought their properties in large part for the purposes of hunting (although many also raise livestock), and often have a much higher tolerance for elk or do not allow enough hunting access to increase elk harvest beyond current levels. While many of these “non-traditional” landowners do provide substantial hunting access, many do not. In cases where large parcels of private land provide little or no hunting access, elk often seek refuge there as long as hunting seasons are going on. Liberal seasons have also compromised hunting quality and elk harvest on public land as elk increasingly shift to private lands before the rifle season starts (or quickly thereafter). Finally, the Department continues to strive to manage this herd toward objective while also managing for trophy quality bulls given widespread public and landowner interest.

Despite 5½ month-long hunting seasons (in Area 7) and extremely high license issuance for the past decade, this herd has still not decreased to 5,000 elk. This begs the question: How realistic and desirable is the objective of 5,000 elk postseason? Regardless, **the Department has no intention of managing this herd for more elk than we currently have (8,000-10,000).** We also have no intention of decreasing harvest pressure as long as this elk population remains at or near current levels (although we do recognize that January seasons are opposed by numerous landowners). The Department also fully recognizes that high concentrations of elk can cause substantial localized damage situations to growing

and stored hay, other cultivated crops, fences, and generally compete with livestock. Along this vein, we will continue to address any and all damage situations to the best of our ability.

Considering all of the issues mentioned above, the Department is proposing to increase the postseason population objective to 8,000 elk to better reflect reality. Again, this comes with the caveat that we will not manage for any more elk than we currently have and will maintain high harvest pressure. Considering where large concentrations of elk typically occur, if this herd was actually reduced to 5,000 elk it is likely the vast majority of elk would be relegated to a handful of private properties for much of the year. This could lead to dissatisfaction amongst many in the landowner community. The intention of increasing the objective is to establish a realistic and honest goal for population management that takes into account the broad diversity of interests in this elk herd. If accepted, this proposal will not alter the Department's current management strategy of achieving continued high female harvest for this elk herd.

Because private landowners provide much of the habitat for wildlife in the Laramie Range, the Department needs your opinion on the proposal to manage for 8,000 elk after the hunting season. To ensure the Department completely captures your thoughts regarding this objective review, please take a few minutes to respond to the enclosed questionnaire. Please return your survey in the envelope provided by **February 20th, 2018**, or bring your survey to one of our annual landowner meetings (locations and times below).

Annual WGFD landowner meetings will be held at the following locations and times:

February 21, 2018 – 6 p.m.	February 20, 2018 – 6 p.m.	February 21, 2018 – 6 p.m.
Glenrock Town Hall	Glendo Town Hall	Sybillie Research Center
219 S. 3rd Street	204 S. Yellowstone Hwy	2362 Hwy WY-34, Wheatland

Thank you for your time and participation. Please contact your local biologist or warden if you have any questions or concerns.

Sincerely,

Justin Binfet
Casper Region Wildlife Coordinator
Wyoming Game and Fish Department

Willow Bish Douglas Biologist 307-436-9617	Martin Hicks Wheatland Biologist 307-322-3821	Lee Knox Laramie Biologist 307-745-5180 x231	Kelly Todd N. Laramie Warden 307-745-4402
Cody Bish Glenrock Warden 307-436-9617	Rod Lebert Douglas Warden 307-358-3249	David Ellsworth Wheatland Warden 307-322-2067	Dylan Bergman Med Bow Warden 307-379-2337

Laramie Peak/Muddy Mountain Elk Herd Unit Landowner Survey – Area 7

- 1) As a landowner in this herd unit, what is your principle interest?
 - a) Agriculture _____
 - b) Hunting/Recreation _____
 - c) Other _____

- 2) Do you support or oppose the proposal to change the postseason population objective to 8,000 elk?
 - a) Support _____
 - b) Neutral _____
 - c) Oppose _____

- 3) If you disagree, what do you think would be an acceptable, realistic, and attainable population objective for this elk herd?
 - a) No change (5,000) _____
 - b) 6,000-7,000 _____
 - c) 9,000-10,000 _____
 - d) Other (please indicate) _____

- 4) Based on your experience with the Laramie Peak/Muddy Mountain Elk Herd, do you think the current size of the elk population is (pick one):
 - a) About at desired levels _____
 - b) Above desired levels _____
 - c) Below desired levels _____

- 5) Do you feel current number of antlerless (cow) elk licenses:
 - a) Should be maintained as is _____
 - b) Should be increased _____
 - c) Should be decreased _____

- 6) WGFD has been issuing between 1,500 – 1,750 Type 1 (*any elk*) licenses in Elk Hunt Area 7 in recent years. In your opinion,
 - a) Too many any elk (bull) licenses are issued _____
 - b) About the right number of any elk (bull) licenses are issued _____
 - c) Could issue more any elk (bull) licenses _____

- 7) How satisfied are you with bull trophy quality in Elk Hunt Area 7?
 - a) Very satisfied _____
 - b) Somewhat satisfied _____
 - c) Neutral _____
 - d) Somewhat dissatisfied _____
 - e) Very dissatisfied _____

(OVER)

I do not support the harvest of cow elk in January due to fetus size in pregnant cows, not only that but there seems to be a lot of hunters running around getting stuck etc and then needing help which is a burden on the local landowners. Usually this time of year the elk have moved and migrated out of the area anyways. I have problems as it is every year with trespassers and fence damage anyway so it is a problem when they are in the mts. in January during inclement weather. I would like to see plenty of elk and not a decrease in size. TKS. I would propose that bulls be spike or 4 points or better to help the young bulls mature to trophy quality and help bring back the desire for area 7 for economic reasons.

Seasons are way too long. August season is ridiculous!! The damage is already done by them and letting people in to shoot and run around only tears up fences and hurts landowners chances of getting money from bow hunters. Cow season could start October 1st and run to December 20th. A December 20th close date is more than long enough to reach goals of herd size and give people plenty of chances to harvest an elk. If people have a close date they will go out and try. Most people don't try anyways just drive up and down the roads and all over the place doing damage to land driving everywhere. I was denied damages because didn't turn in on time and in report it was made out like its my fault elk did damage. If I have to have so many hunters to get damages the have to wait till December to see if get hunters before can turn in damage report. Game warden saw how many elk were eating meadows. I also provided pictures sufficient evidence of damages. So 60 day limit was stupid. Showed proof should have got damage.

I would propose that unused type 1 licenses be allowed to kill a cow elk after December 31st, January 1st to January 31st.

As a participant in this exercise some years back where other suggestions by landowners were made the license growth and season length. Clearly 6 months has been a dismal failure. The elk have conditioned themselves to migrate "out of area" or onto big inaccessible large tracts of land. It will now take generations to get this herd comfortable and huntable again for many road hunters. Too little access to Muddy Mountain, Upper Deer Creek and Wagon Hound. Fix that.

In the past 20+ years the elk population has really increased. The quality of area 7 gene pool seems to be good but I feel that quality of the bulls I see overall are some what lacking. I support hunter mgt. and has worked great for us. Kelly Todd and company have been tremendous to work with. In the past 2 years in the program and the harvesting of cows seems again to improve our bull population, so this might be on right track. From a non-resident landowner I would like to see an increase of any elk tag for landowners. We get 2 for 6,000 leaved + 4,000 lease would like to see it increase to 3 or 4 per year.

I would like to see the type 1 season open a week earlier Oct 7 go to Nov 20 after the first week of rifle season the elk start getting into "big herds" more fun hunting them when in small herd spread out. Rest of seasons and types ok. January is too late end in Dec.

Landowner type 1 tags should be valid for any season open on our property. We have to pay the same price - so WGFD gets their money whether or not we get an elk. We lose a lot of feed for our livestock to these big herds of elk - hay damage that cost us fuel & equipment to put up! Our labor and fence materials have increased! We put up with idiots that tear up our roads and tear down fences while trying to find an elk. Seems like a small favor from WGFD to help us. Also landowners should NOT have to buy a conservation stamp. You say you want to help us - then prove it.

Still too many elk. We are over run with elk and can't afford to keep feeding so many!

Forget the stupidity of cow licenses and make the permit for any elk. ANY ELK you've got to many bulls. You have miss managed this herd to disgusting levels; if you were in the beef business you'd have gone broke years ago. Who ever heard of running a herd successfully with half of it bulls. You're getting much inbreeding it's detestable. Get up to speed and start managing for quality. Stop harassing your cows you bunch of nitwits - how long do you think you will have a herd? The Game & Fish Dept. has become greedy only wanting to raise revenue by selling as many licenses as possible you are not managing this resource entrusted to you by the people of NY. Either start managing your elk i.e., get the bull numbers in proper percentage or you'll have destroyed your future reputation. Already the bulls show the effects of inbreeding, your type system needs to cease and when people get an elk license they have the ability to shoot any elk. This one change will eliminate the excess bull population possibly the first year.

Like to have control of a percentage of the licenses. The Game and Fish have too much control. Damages paid for tearing

<p>down fences isn't adequate and generally nonexistent. During the season large herds stay on lands that don't allow any hunting.</p>
<p>Hunting elk in August & Sept. with guns, De? The bow hunting experience. I also think a lot of area 7 elk have moved to area 19 due to pressure. There are way more than 3000 elk in 19. One video from a few years back shows about that many in one herd. See YouTube "Trike flying with massive elk heard." We have far fewer elk on Boxelder Creek now than we had in the past all the pressure pushed them west and they don't come back.</p>
<p>I think the number of elk in our country is about right but worried about cwd. Don't like the idea that we are shooting a bunch of cows and the trashing the carcass because of cwd. We tested 2 of 5 elk killed on ranch last year and both were positive. I don't like elk and deer season opening on the same day. It is too early for elk (way too hot to process the carcass correctly.) and it's getting crowded for the deer hunters. I think it would be best to get deer season over and then start elk season. I don't allow elk hunters on the ranch until after the deer hunters have moved out. The January elk cow season is a pain we end up with a lot of folks trying to fill their tag when the weather is pretty poor. We usually let folks hunt then unless the roads are wet and susceptible to damage or if I think it will be tough getting a carcass to a road where it can be loaded. Bottom line: I'd like to see elk seasons pushed back . P.S. are you guys going to pick up the number of cwd tests in area 7 next year? seems appropriate.</p>
<p>#2Reluctantly support as long as tag #2 for type 1 decreases to maintain trophy herd and cow tags and cow/calf stay he same or increase. #3 We are concerned about reports of wolves moving into our area? Answers to those ?'s will effect our answer. #4 Based on our conversations w/people who run cattle in wolf country, we are seeing the same behaviors in our cattle. #6 Decrease to 1500 to manage for quality 1500 tags is good but we'd like to see more be made available to non residents. #7 (B) Archery season only + we've seen better in previous years. (D) Rifle season only. Last season 2017, we felt quality was a little better and attribute that to lowering type 1 tags back down to 1500. #10 We'd like to suggest a type 1 season starting Oct.1 - Oct 15th (rifle) on private land only. #11 You're going to get someone killed. No cell service on our ranch. No one there to pull them out. Plus on our ranch the late season is pointless. Additional comments: We have done an HMA for many years and want to commend Jason Sherwood and his helpers for doing a top notch job? But the bottom line is, the HMA hunters are poor hunters. They run the elk around and harvest is poor. Our HMA hunters caused our neighbors (Christensen Ranch) to the south to get angry w/us. Fact is we killed 60% more cow elk on our ranch last (2017) year w/our outfitter, than we have on our best year w/ HMA. The neighbors stayed happy, fences weren't torn up as bad and revenue was way up.! If the G&F wants more elk killed, they need to make it so more non-residents can get tags - changes to state statute to allocate higher % age to non-residents or give private landowners tags to sell. Let's not forget about deer in all these equations. What is the deer population objective? What are the current deer # estimates? What are your management plans for deer?</p>
<p>General license for area 7 not manage for trophy elk. Eliminate Aug. and Jan. seasons. Divide area 7 into smaller management area.</p>
<p>I would like the bull season to start Nov. 1 and end Nov. 20. This would save a lot of the bulls and keep better quality of larger bulls in the heard. The cows would continue to be taken Aug 15 - Dec 31. I think the objective numbers are for you the game managers to put in we know that it seems to be impossible to cut numbers back and herd range is changing to pressures from hunter access in our area.</p>
<p>Don't open the rifle season before October 15. If you do all our mature big bulls will be killed.</p>
<p>As a landowner I would like to comment on the Game & Fish's proposal to raise the postseason objective on elk areas 7 and 19. I personally object to the changing of the postseason objective number as do many other landowners. When looking back into the history of this elk herd, the Game & Fish has a terribly poor track record of managing this herd. Mismanagement has let this elk herd increase from approximately 2,500 to as high as 11-13,000 head. All the while, landowners were telling you of the increase but you continued to ignore us for some 15 years until you could no longer doubt it. I have for years, seriously questioned your numbers and your data on this herd, while you continued to defend your numbers. To this day, you continue to use the same form of data collection that has let this herd run wild over the objective. When the Game & Fish cannot get their herd data accurate, the area landowners carry the load of your inconsistencies. Your means of data collecting was inefficient then as it still is now. With your poor response time to</p>

herd changes, you are more reactive than proactive. Drought is always on the forefront and if and when we have our next drought, we still have too many elk. They will be in places that are undesirable to landowners. Ag is very tolerant of wildlife as long as there is feed enough for both, if not wildlife are the first to go. You give a lot of reasons as to why you cannot reduce this herd any further in your letter, while pointing the finger at landowners and landownership's as being the reason. Nowhere do you address sportsmen and their lazy hunting habits. Because sportsmen insist on continuously road hunting instead of getting out and ethically hunting, harvest success rate is not what it should or could be. Sportsmen are now locked out of a lot of private that they used to have access to for this very reason. This is not a good practice, as control of this herd unit depends on them. I do not see this getting any better in the future. In fact, I foresee it getting worse over time. When addressing disease in the elk, they also have CWD. Thank goodness this is not to the extent as in the mule deer. My own observation is that we have hit bottom with our deer losses and are starting to rebound. They are going to need our help, in order to have a fighting chance. Giving your lack of a starting point on this disease, we do not know if elk spread the disease to other areas, or how it interacts with in the two species. We (including the Game & Fish) know elk are in critical deer habitat and compete with overall deer numbers and their feed sources. As a landowner, I am also concerned with the migrating and comingling of our elk with elk in other areas. This is a great way for diseases to be moved from one area to another. Elk migrations are on the increase possibly due to overpopulation. No sufficient data shows where they are coming from or where they are going. In the big picture, managing the elk herd in areas 7 and 19 can still be done without changing the postseason objective number. I strongly recommend leaving the number the same and continue to harvest the same amount of elk, or more This leaves you the flexibility to manage for an overharvest. i.e.: two excellent harvest years back to back, further reducing the herd for the betterment of mule deer or drought issues. I also have thoughts on the proposal to do away with the January elk season... I'm not in favor of the January season BUT in order to keep harvest numbers the same or to decrease the overall herd numbers we must continue to have the January season. Moreover, I do not trust the Game & Fish to adjust the license numbers. In your letter you talk about saturation of land and hunters. By shortening the season, you have now compounded the problem. By doing away with the January season, you have to absorb the January license numbers into other seasons, if not, you are increasing the herd. I also think that we are losing calves because of herd harassment, either through abortion or fetus absorption. If not given careful consideration, then you are once again unintentionally increasing the herd. Never in the last thirty years has the Game & Fish ever overharvested or over-issued licenses for this herd unit and I definitely don't foresee you starting now.

G&F involvement and responsiveness to me is commendable and appreciated. My contacts are Martin Hicks and David Ellsworth. They are great professionals.

Area 7 is too big. You should break it onto smaller more manageable units. I also would prefer more and shorter seasons. Type 1 - Oct. 10-31, Type 2 Nov 1 - 20 or 30, Type 9 Sept 1 - 30. This would increase the quality of the outdoor experience and allow better opportunity. I'd also like to see 3-4 separate cow seasons. You can make more money and the hunters will have a better/higher quality experience. Good luck in the world of Biopolitics.

The type 1 hunting season should be open until Dec. 1st.

Continue to increase means to harvest antlerless elk. Easier said than done I realize, but greater access before the weather turns cold/snowy, and allow more activity on hunter management monitoring and management, but that's what it takes. The bull quality has declined due to really opening of rifle season and length of season as well. Number of licenses....I'm not sure, but that may be a factor as well. Hope this helps!....ha!

Biggest complaint is letting season run through Jan. I have 300 - 400 elk cross thru me and neighbor who only have a few acres strip and they allowed hunters in this year and of course they only have these few acres/ran all these elk back through my fences and totaled out all my gates plus 3 elk died in my fences. Its a total mess. These animals are used to crossing for water and it totally disrupts what they are used to. They now have come closer in to house wells/tanks to find water. I don't let elk hunters come until after deer season is over. Have not had only 1 elk hunter (cow) the last 3 yrs. Hunters complain they can not draw 7 - 9 yrs. There are 6 coming from Oregon that are on 9 points and hoping they will draw this yr. Grant you I don't understand a lot about this hunting but when you see that many elk crossing and still being shot at in cold Jan. it just don't seem right to me. Our fences are so tight and when you run that many through

<p>them there is going to be deaths. I see lions are getting their share as well. Lived here 50 yrs. and never been short on elk hunters until these last 4 - 5 yrs.</p>
<p>True agriculture producers are the landowners that carry the burden of supporting the elk herd in this unit. Many have crops, fences and pasture that are extraordinarily damaged every year by this elk herd. If the herd objective is increased and efforts to decrease the herd are diminished, the landowners have to bear this economical burden. If these landowners fail because of this burden and sell their property, thousands of acres of private land will become unavailable to the hunting public. Often access to public land through the private land will also be lost. I feel that it is in the best interest of the Game and Fish Department to continue to strive to decrease the elk herd to the current objective for the health of the elk herd, protecting hunter access and protecting natural resources that allow the ranching tradition to persevere in this area.</p>
<p>The elk herd can never be under control until there is more access available. And there won't be more access available until the landowners lower their fees and charge less especially since the landowners are already receiving access fees from the G&F.</p>
<p>Landowner licenses should be increased for 1000 acres or more - 4 licenses should be allowed. Many operating ranches have more than 2 owners.</p>
<p>The bull/cow ratio would support additional harvest of bulls, many would not be "quality" "trophy" animals, but a reduction of these animals has long term benefits to trophy quality.</p>
<p>I would like to see adoption of a system like New Mexico and other states that allow landowners a few bull tags that they can do whatever they want to - sell to outfitters etc. These could even be the landowners license that they can now get but have the ability to let someone else use the tag.</p>
<p>I don't feel the game and fish should pay any damage to land owners who do not allow hunting or charge a high trespass fee.</p>
<p>Should regulate taking of smaller bull elk so they might grow to better trophy size.</p>
<p>Type 1 (bull) should go from Oct 15 - Nov 15. Get rid of Jan elk season, it is a waste time and resources. Typically the elk are not up here (N. Albany Co.) or they are not accessible to hunters due to winter conditions. It seems a lot of time is put into locating lost of stuck hunters in January. Turn the type 7 tags to type 6 and get rid of Jan. hunting.</p>
<p>To reduce #, late season cow tags will help decrease total #'s as cows are generally bad at this time. If taken then will reduce future load of elk.</p>
<p>I feel the biggest issues concerning the herd management in area 7 has more to do with the lack of public land that can be accessed. This often leads to overcrowding on the limited public land and increased pressure on the private landowners to allow access/kill elk. Whatever the elk objective ends up at, the problems we face will still be there. I feel that this elk herd could be better managed if there was distinction between licenses on private and public land and allow for landowners to better manage the elk on their land. Though other idea would be to built a better incentives than the walk-in /HMA programs for landowners to provide access to allow the killing of elk. Area 7 & 19 are unique to our state b/c of the checker boarding of public/private land and the lack of public access. The landowners shouldn't have to bare the majority of the burden for the elk numbers or hunter access w/o better incentive to do so.</p>
<p>Archery only licenses, type 7 in December</p>
<p>Squaw Mtn. is predominately a bull haven during the hunting season. With late warm weather predominating it is often prudent not to hunt early in the season as there is only foot access (no roads) to get an animal out once it is harvested (meat spoils/ flies etc...) I recommend extending bull harvest to the same time as cow/calf season for those with type 1 tags. This might encourage hunters with those tags to be out longer a field in this quest and as the season nears its end, harvest a cow/calf if no bulls are found. Have you identified the ? hunt allowed landowners? What endearments can be offered to those people to change their attitude?? I suspect there are some hunters willing to do work for those people (e.g. fence repairs etc) for the chance to hunt virgin ground? P.S. Keep up your efforts on the landowners behalf.</p>
<p>Our land Nunemaker Middle Fork Ranch LLC 1,000 acre 80 acre-John Nunemaker Family joins NMFR land. 161 acre - John Nunemaker Family along Deer Creek & FS 610 All located in 40 mile area N Albany co. (Wyoming Game & Fish doing good job of mgr. these elk areas 7. 161 ac is used for Belle-Otte Ranch Grazing. 1,080 acre grazed by Rodeman Family</p>

<p>brood cows and calves (June - Oct 1) This is a high altitude 7,600' - 8,675' elevation mtn land, only good for elk - antelope - bighorn sheep - mtn. lion usage, mule deer. Yes we like the hunting also. John Nunemaker age 90 yrs. (B 11-19-27) has hunted this tract since 1956 x 2 till wife Doris died Aug 18, 2017. Yes Doris hunted with John here. I remember when elk scarce till G&F released Yellowstone elk in 1960 era, the shot 2 of these elk cows.</p>
<p>I did not see the wolves during elk season this year and heard them seldom, but never heard the coyotes, which meant the wolves were there. The bulls move onto my converse county land about the first part of December, but if you can get there is very limited. My Albany land, the forest service closes the road at elk season.</p>
<p>Could more land owner tags be issued to land owners with larger ranches? This would provide an opportunity for them to create guided hunting in areas that the elk are hiding during rifle season.</p>
<p>It looks to me as if there has been a 3 fold increase in animals in less that 15 years and the current program is barely keeping these numbers in check. Outfitters are cutthroat in bull season but hide under a rock about killing cows. There has to be a way to eliminate some cows. Work on the outfitters and "no hunting" landowners and get rid some problems or compensate those "hunting yes" landowners for putting up with the problem.</p>
<p>I don't see any signs that the herd in 7 is shrinking any, so you could set the population objective to anything less that actual and the herd numbers would not change assuming the same number of hunters. I think you need to change things up a little to keep hunter interest up. Maybe a rag (?) horn tag, or something for youth, or the ladies.</p>
<p>Since part of the issue seems to be lack of adequate harvest on private property where landowners do not allow public access perhaps a temporary solution might be an increase in landowner permits on a temporary basis from the direct family to some increment number of permits that do not have to be direct family. This increase of landowner tags would not impact the number of public draw tags. This would get more harvest on those posted lands. The increment tags would be valid only on that particular ranch including leased public land so as to have impact only on that previously closed ranch. Problem might be bigger ranches actually closing off some previously granted public hunting, but maybe some sort of requirement to allow certain amount of public hunting in exchange for those temporary incremental landowner directed tags? Don't change existing landowner tag requirement and rules.(ratio 1:1 or 2:1)</p>
<p>Bow hunters seem to put enough pressure to more cow herds into non-hunt area's earlier in season. Herd habits are changing, not staying in higher elevations year long. Would it be beneficial to have hunters declare only one hunting type? If they bow hunt then they can't rifle hunt. May cut down on number of bow hunters that are just out getting the lay of the land. Just a thought.</p>
<p>Cut type 1 by 250 this will help trophy numbers and type 6 by 250 close season about Dec 20. I think in the last 10 years the number of trophy bulls has dropped 50%</p>
<p>Late season encourages trespassing. Stresses elk. People who complain about elk numbers should allow hunting.</p>
<p>You want to kill more elk, how about offering an incentive to landowners (that feed "your" elk all year with our grass and hay) . Since you increased license fees for 20187, pay \$20.00 for landowner coupons if they submit say over 25 - 30 coupons and your \$16.00/ below that number. Money talks! You may have landowner allowing a few more hunters to hit that magic number for a bigger payout.</p>
<p>For those wanting to hunt antlerless elk. The season through end of December should be adequate time as they have over one month past type 1 season close. Many times weather can close applicants ability to get into this country. Through all of January limits the ability of local wardens to oversee hunter activity.</p>
<p>As a landowner with land in areas 6 and 7, I would like to se the type 1 season for both areas better aligned.</p>
<p>The type 1 license should be bull only. May be extend the season 10 days and maybe hunters will harvest more of the junk bulls I this area rather than kill cows later area 7 is getting to many rag and junk bulls and that is not good management for a trophy elk area.</p>
<p>If the quota increases to 8,000 do you increase # of licenses? How would increase in elk herd be obtained? What do the experts think the area could support without disease and over grazing?</p>
<p>Access has always been the issue for good harvest numbers in area 7. Many landowners in the higher portions of area 7 don't allow hunting early in the season (Oct - Nov) because cattle are still present and they are still working the land. Just wondering if many of these ranchers make the statement of "no hunting" for the entire season because they are still</p>

<p>working the land. One they have brought their cattle out maybe these hunters would allow cow hunting (etc (Dec & Jan) without even permission. I know once this time of year comes we are out of our country and it would not bother us at all if people are hunting. Depending on weather the elk still seem to pass through in the late season. Maybe a list of landowners who allow late hunting without permission would be nice.</p>
<p>The only way you will lower the elk herd is to let people hunt on the Big Ranches that let little to no public hunting. They keep it all for them self and don't really care if they make a profit or not with agriculture. The elk go right to that land and stay until season is over then they travel to the smaller Ranches that have to deal with them. The Game and Fish is doing the best job that they can, but without the public land they will have a hard time managing.</p>
<p>The 2001 objective was established before the fires destroyed large swaths of forest within hunt areas 7 & 19. Since this deforestation, there is far more grass and forage for support of a larger herd presence. I would whole-heartedly agree with the biologists and the departments intend to manage a larger elk population of 8k - 10 animals. The winter forage and habitat would indicate that a larger herd has not diminished the quality nor quantity of that most important habitat. I would even state that a larger herd is sustainable in the immediate vicinity of my lands on Crow Creek drainage. Thank you for the phenomenal job that WGFD and the wardens and biologists have performed.</p>
<p>We are just beginning to reduce numbers which is finally after 20 years of cooperation between my ranch and G&F Dept. Why would G&F Dept. even contemplate raising post seasons population objective? This essentially wastes my 20 yrs of cooperation with the G&F Dept. If you raise the post season population objective my ranch will o longer cooperate with the G&F Dept. in regard to hunter access to my land. If you raise the population objective, my policy will swing from aggressive cow elk de-population to an aggressive ranch policy of monetary compensation for all damages including fences, grazing, and hay crops. Leave the population objective at the current 5000 had post season objective or be advised that the spirit of cooperation from my ranch will be over. "William Sturgeon"</p>
<p>As a landowner the ever increasing elk numbers there is extraordinary damage to grass in many areas, which will become more evident during the next drought. $10,000 \text{ elk} / 1.7 \text{ (number of elk to = 1AUM)} = 5882.3529 \text{ AUM} \times 12 \text{ months} = 70584 \text{ AUM used /year}$. With elk leaving the area in many places and larger concentrations at more traditional area I think there is more elk than ever. If some objective can't be met, it is time to pay damages. Hunters are never going to be able to harvest enough elk to maintain a lower the numbers.</p>
<p>Hunting access</p>
<p>Cow elk numbers have definitely increased, older elk age class bull numbers have not increased along with population, cow elk numbers have increased since late cow season implementation, increased pressure on bulls since late cow season implementation. * if season structure and management stay the same the next herd unit survey will be asking should we go from 10,000 to 15,000 elk. Need to divide area 7 so Casper can manage their old bull elk and Laramie (southern area 7) can work on growing older bull numbers. (use the division boundary line Martin Hicks was working on.) These population and age class changes started about 10 years ago.</p>
<p>I think that one should be able to hunt spikes and freaks in the cow season. We are getting many of the trash bulls In our area. This would make it a better trophy area. As stands if they don't get a big bull then they just go for a cow,</p>
<p>I appreciate the work you do, and support a healthy elk population. We could take more elk on our place as we keep our cattle numbers down to help the wildlife.</p>
<p>Cutting the north part of area 7 off and making it 19 so harvest could satisfy the elk numbers.</p>
<p>If the department has no intention in managing for more elk then why increase the objective? We believe that the management objective after the hunting season should be set considering several factors including habitat and forage resources, levels of damages to private or public resources, hunter access, shared resources with other species and management objectives for those species. We believe the management objective after the hunting season should remain at 5,000 or be lowered. We believe mule deer habitat has suffered with the current elk herd and/pr crop resources have suffered far beyond acceptable levels due to the current herd size. Managing for an objective elk herd size of 8,000 basically accepts defeat and would seem to say that excessive damage to private resources is acceptable. When the going gets tough, please don't move the goal line closer to celebrate a false success. Please stay the course.</p>



APPENDIX B.3: Area 19 Landowner Letter and Survey
WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006

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PATRICK CRANK
PETER J. DUBE
DAVID RAELE
MIKE SCHMID

January 11, 2018

Dear Landowner:

The Wyoming Game and Fish Department (Department) is currently reviewing the population objective for the Laramie Peak/ Muddy Mountain Elk Herd, which includes Hunt Areas 7 and 19. As a landowner who provides valuable wildlife habitat in the Laramie Range, your opinion is very important to us. Please review the following information and respond to the corresponding survey.

The Laramie Peak / Muddy Mountain Elk Herd currently has a management objective of 5,000 elk after the hunting season. The objective was last revised in 2001 when it was changed from 2,550 elk to 5,000 based on landowner and public input. The Department estimates this herd has had 8,000 – 10,000 elk postseason for the past several years. Hunt Area 19 typically holds about 2,000 of these elk, with the remaining population residing in Hunt Area 7. This herd has been fairly stable over the past 5-7 years due to extremely liberal hunting seasons resulting in very high hunter harvest preventing population growth. In an attempt to manage this herd toward the objective of 5,000 elk, the Department has issued 5,775 licenses in these two hunt areas annually for the past several years with season dates running from mid-August (in Area 7) to the end of January (in both hunt areas). These liberal seasons have resulted in an average of 2,412 elk being harvested per year in this herd since 2010.

Increasing license issuance beyond current levels will likely result in lower harvest success given the level of saturation in hunting access. Obviously, private landowners continue to provide a tremendous amount of access for elk hunting considering hunters have been harvesting over 2,400 elk per year over the past several years. We sincerely thank all private landowners that provide hunting access, as we are fully aware of the challenges this can create. However, it appears both public lands and private landowners that provide access have reached somewhat of a saturation point with hunter numbers given the high number of licenses issued. Additionally, much of the private land in the Laramie Range is owned by non-traditional landowners that bought their properties in large part for the purposes of hunting (although many also raise livestock), and often have a much higher tolerance for elk or do not allow enough hunting access to increase elk harvest beyond current levels. While many of these “non-traditional” landowners do provide substantial hunting access, many do not. In cases where large parcels of private land provide little or no hunting access, elk often seek refuge there as long as hunting seasons are going on. Liberal seasons have also compromised hunting quality and elk harvest on public land as elk increasingly shift to private lands before the rifle season starts (or quickly thereafter). Finally, the Department continues to strive to manage this herd toward objective while also managing for trophy quality bulls given widespread public and landowner interest.

Despite 5½ month-long hunting seasons (in Area 7) and extremely high license issuance for the past decade, this herd has still not decreased to 5,000 elk. This begs the question: How realistic and desirable is the objective of 5,000 elk postseason? Regardless, **the Department has no intention of managing this herd for more elk than we currently have (8,000-10,000).** We also have no intention of decreasing harvest pressure as long as this elk population remains at or near current levels (although we do recognize that January seasons are opposed by numerous landowners). The Department also fully recognizes that high concentrations of elk can cause substantial localized damage situations to growing

and stored hay, other cultivated crops, fences, and generally compete with livestock. Along this vein, we will continue to address any and all damage situations to the best of our ability.

Considering all of the issues mentioned above, the Department is proposing to increase the postseason population objective to 8,000 elk to better reflect reality. Again, this comes with the caveat that we will not manage for any more elk than we currently have and will maintain high harvest pressure. Considering where large concentrations of elk typically occur, if this herd was actually reduced to 5,000 elk it is likely the vast majority of elk would be relegated to a handful of private properties for much of the year. This could lead to dissatisfaction amongst many in the landowner community. The intention of increasing the objective is to establish a realistic and honest goal for population management that takes into account the broad diversity of interests in this elk herd. If accepted, this proposal will not alter the Department's current management strategy of achieving continued high female harvest for this elk herd.

Because private landowners provide much of the habitat for wildlife in the Laramie Range, the Department needs your opinion on the proposal to manage for 8,000 elk after the hunting season. To ensure the Department completely captures your thoughts regarding this objective review, please take a few minutes to respond to the enclosed questionnaire. Please return your survey in the envelope provided by February 25th, 2018.

Thank you for your time and participation. Please contact myself or Jake Kettley if you have any questions or concerns.

Sincerely,

Heather O'Brien
Casper Wildlife Biologist
Wyoming Game and Fish Department
307-473-3411

Jake Kettley
East Casper Game Warden
Wyoming Game and Fish Department
307-473-3419

Laramie Peak/Muddy Mountain Elk Herd Unit Landowner Survey – Area 19

- 1) As a landowner in this herd unit, what is your principle interest?
 - a) Agriculture _____
 - b) Hunting/Recreation _____
 - c) Other _____

- 2) Do you support or oppose the proposal to change the postseason population objective to 8,000 elk?
 - a) Support _____
 - b) Neutral _____
 - c) Oppose _____

- 3) If you disagree, what do you think would be an acceptable, realistic, and attainable population objective for this elk herd?
 - a) No change (5,000) _____
 - b) 6,000-7,000 _____
 - c) 9,000-10,000 _____
 - d) Other (please indicate) _____

- 4) Based on your experience with the Laramie Peak/Muddy Mountain Elk Herd, do you think the current size of the elk population is (pick one):
 - a) About at desired levels _____
 - b) Above desired levels _____
 - c) Below desired levels _____

- 5) Do you feel current number of antlerless (cow) elk licenses:
 - a) Should be maintained as is _____
 - b) Should be increased _____
 - c) Should be decreased _____

- 6) WGFD has been issuing 300 Type 1 and 2 (*any elk*) licenses in Elk Hunt Area 19 in recent years. In your opinion,
 - a) Too many any elk (bull) licenses are issued _____
 - b) About the right number of any elk (bull) licenses are issued _____
 - c) Could issue more any elk (bull) licenses _____

- 7) How satisfied are you with bull trophy quality in Elk Hunt Area 19?
 - a) Very satisfied _____
 - b) Somewhat satisfied _____
 - c) Neutral _____
 - d) Somewhat dissatisfied _____
 - e) Very dissatisfied _____

(OVER)

- 8) In Elk Hunt Area 19, Type 1 season dates for rifle any elk (bull) hunting run from October 1 through October 14. In your opinion,
- a) The Type 1 season length is too long _____
 - b) The Type 1 season length is about right _____
 - c) The Type 1 season length is too short _____
 - d) No opinion _____
- 9) In Elk Hunt Area 19, Type 2 season dates for rifle any elk (bull) hunting run from November 1 through November 20. In your opinion,
- a) The Type 1 season length is too long _____
 - b) The Type 1 season length is about right _____
 - c) The Type 1 season length is too short _____
 - d) No opinion _____
- 10) For Elk Hunt Area 19, do you support or oppose the current split season whereby Type 1 and 4 licenses are valid from October 1 – October 14, and then Type 2 and 5 licenses are valid from November 1 – November 20?
- a) Support _____
 - b) Neutral _____
 - c) Oppose – just have one set of license types valid for the entire rifle season _____
- 11) Do you support or oppose January elk seasons to hunt antlerless elk?
- a) Support _____
 - b) Neutral _____
 - c) Oppose _____

Please provide any additional comments you may have regarding this elk herd:



APPENDIX B.4. Area 19 Landowner Comments

Laramie Peak Elk Objective Review Landowner Survey Comments | 2018

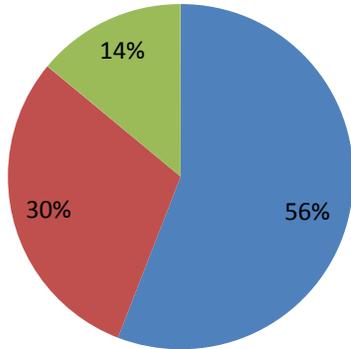
<p>Overall in support of increasing objective to current levels, would be interested in having longer bull season (especially October) but do not want to overlap with deer as it is already very crowded! Need to limit pressure in September on the forest service, please consider closing archery end of month (25th) to give a break before rifle opens. Currently supportive of January season but are concerned for the elk, 5 months of pressure is too long, potentially review if necessary in the future. Access is getting more difficult do not increase the number of tags it is already too crowded. Bull quality and numbers appear to not be as good as they were a few years ago, need to monitor this.</p>
<p>Public elk. Fly and push elk off Lone Star and Shook you would get more elk killed until then leave numbers high so people can try to get a elk. When you open type 1 quality went way down on bulls.</p>
<p>Somehow this elk herd needs to be reduced.</p>
<p>There seem to be a good number of bulls in 19, however, over the last five years or more bulls of trophy caliber have decreased. Not sure what that means, but that is my observation.</p>
<p>This elk herd has been growing for 10 years. The only way to manage it is hunting. More hunters is not the answer. Access is . Explore more access!!</p>
<p>Type 2 should be 1st Nov to 30 on account of weather and access. Bow hunter should have to pick weapon to hunt. Rifle or bow. Bow hunters run all the elk out of the hunting grounds to the reserve. Open the road on top of 2nd range so elderly hunters can get to west and east end.</p>
<p>Would like to see a Sept. 25 open for the early season. Makes both seasons the same length and doesn't give the headache of overlapping with deer. Bull herd needs thinned out. Less bulls means less fighting and maybe not as many broken horns. Since we can't kill more cows maybe by lowering the number of bulls we might be able to lower the bred up. Might also take the pressure off my winter range. The January season doesn't do me any good but I will support it as long as it is working on the other side of the mtn.</p>
<p>You are doing a great job.</p>

APPENDIX C.1: Area 7 Landowner Survey Response Graphs

N=99

Antlerless License Issuance

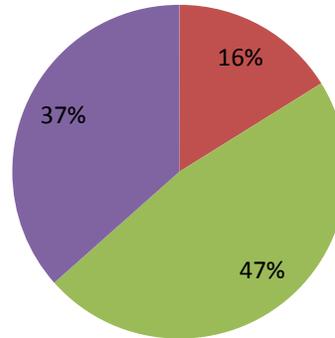
■ Maintain as is ■ Increase ■ Decrease



Bull License Issuance

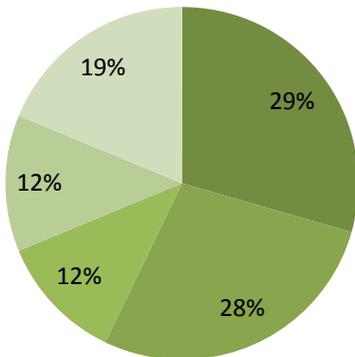
*Regarding recent license issuance at 1,500-1,750 licenses

■ Bull Tags
 ■ Too many
 ■ About the right number
 ■ Could issue more



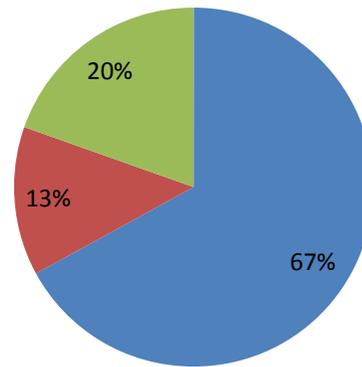
Bull Quality

■ Very satisfied
 ■ Somewhat satisfied
 ■ Neutral
 ■ Somewhat dissatisfied
 ■ Very dissatisfied



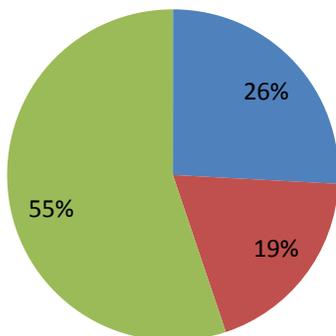
October 15th Opening Date

■ Support ■ Neutral ■ Oppose



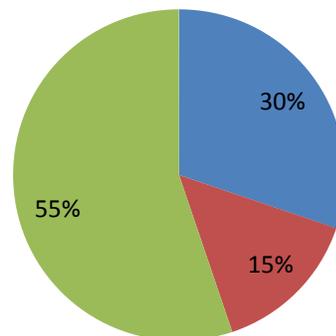
Alternative Opening Date

■ Earlier ■ Later ■ NA



January Elk Seasons

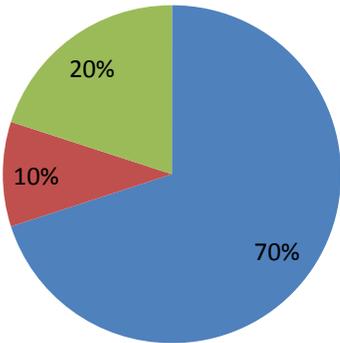
■ Support ■ Neutral ■ Oppose



APPENDIX C.1: Area 19 Landowner Survey Response Graphs
N=10

Antlerless License Issuance

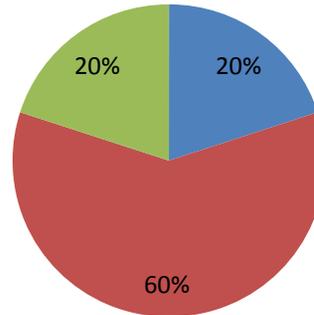
■ Maintain as is ■ Increase ■ Decrease



Bull License Issuance

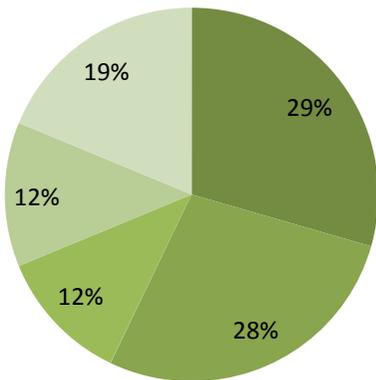
*Regarding recent license issuance at 300 licenses

■ Too many
■ About the right number
■ Could issue more



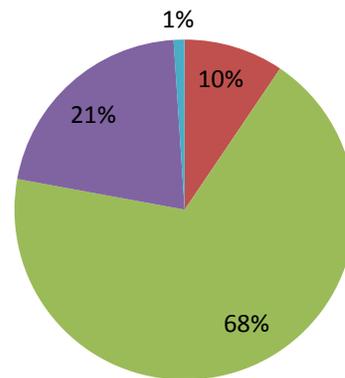
Bull Quality

■ Very satisfied
■ Somewhat satisfied
■ Neutral
■ Somewhat dissatisfied
■ Very dissatisfied



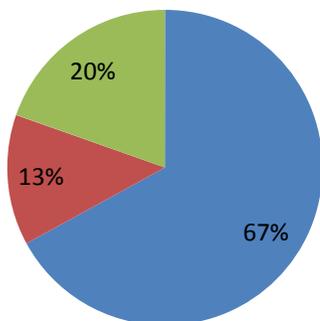
Type 1 Season Length

■ Type 1 Season length
■ Too long
■ About right
■ Too short
■ No opinion



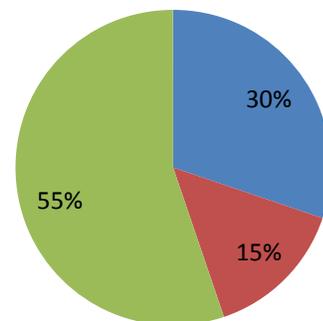
October 15th Opening Date

■ Support ■ Neutral ■ Oppose



January Elk Seasons

■ Support ■ Neutral ■ Oppose



Laramie Peak Herd Unit, Elk Hunt Area 7 2017 Hunter Attitude Survey

SECTION 1: OVERALL ELK NUMBERS IN HUNT AREA 7

1) How satisfied are you with overall elk numbers in Hunt Area 7?

- a) Very satisfied _____
- b) Somewhat satisfied _____
- c) Neutral _____
- d) Somewhat dissatisfied _____
- e) Very dissatisfied _____

2) The population objective for this elk herd is 5,000 elk postseason (for both Hunt Areas 7 and 19). The current population estimate is between 8,000 – 10,000 elk postseason. Should the Department continue to manage to reduce this herd to 5,000 elk?

- a) Yes _____
- b) No- manage for more than 5,000 elk _____
- c) No- manage for less than 5,000 elk _____

3) In Elk Hunt Area 7, do you primarily hunt public land or Access Yes lands?

- a) Yes _____
- b) No, I primarily hunt private land _____

4) If you typically hunt public land in Elk Hunt Area 7, are hunter numbers/densities on **PUBLIC** land

- a) Too high _____
- b) About right _____
- c) Could hold more hunters _____
- d) No opinion; I do not hunt public land _____

5) If you typically hunt public land in Elk Hunt Area 7, how satisfied are you with elk numbers /availability on **PUBLIC** land?

- a) Very satisfied _____
- b) Somewhat satisfied _____
- c) Neutral _____
- d) Somewhat dissatisfied _____
- e) Very dissatisfied _____
- f) No opinion; I do not hunt public land _____

6) If you are dissatisfied with elk numbers/availability on public land in Elk Hunt Area 7, then in your opinion, what are some possible solutions?

- a) Manage for a higher number of elk _____
 - b) Increase access to public land (e.g. easements, Access Yes, land trades) _____
 - c) Limit the number of licenses available on public land _____
 - d) No opinion; I do not hunt public land _____
 - d) Other _____
-

SECTION 2: BULL ELK HUNTING IN HUNT AREA 7

7) How many times, in the last ten years, have you held an Elk Hunt Area 7 Type 1 (*any elk*) license?

- a) 0 _____
- b) 1-3 _____
- c) 4-6 _____
- d) 6-10 _____

8) WGFD has been issuing between 1,500 – 1,750 Type 1 (*any elk*) licenses in Elk Hunt Area 7 in recent years. In your opinion,

- a) Too many any elk (bull) licenses are issued _____
- b) About the right number of any elk (bull) licenses are issued _____
- c) Could issue more any elk (bull) licenses _____

9) How satisfied are you with bull trophy quality in Elk Hunt Area 7?

- a) Very satisfied _____
- b) Somewhat satisfied _____
- c) Neutral _____
- d) Somewhat dissatisfied _____
- e) Very dissatisfied _____

10) In Elk Hunt Area 7, Type 1 season dates for rifle any elk (bull) hunting run from October 15 through November 20. In your opinion,

- a) The Type 1 season length is too long _____
- b) The Type 1 season length is about right _____
- c) The Type 1 season length is too short _____
- d) No opinion _____

SECTION 3: WEAPON OF CHOICE FOR ELK HUNTING IN AREA 7

11) What weapon do you typically hunt elk with in Elk Hunt Area 7?

- a) Rifle _____
- b) Archery (bow or crossbow) _____
- c) Both _____

12) Do you think hunters should be able to hunt with both archery and rifle equipment in the same year (as is currently allowed) in Elk Hunt Area 7?

- a) Support _____
- b) Neutral _____
- c) Oppose - Hunters should be able to only archery hunt or only rifle hunt, but not both in the same year _____

SECTION 4: HUNTING SEASON STRUCTURE IN ELK HUNT AREA 7

13) For Elk Hunt Area 7, do you support or oppose the current October 15 opening date for rifle season (same as general deer)?

- a) Support _____
- b) Neutral _____
- c) Oppose _____

14) If you oppose the October 15 rifle season opening date, would you prefer

- a) An earlier rifle season opening date _____
- b) A later rifle season opening date _____
- c) NA _____

15) How satisfied are you with access to hunt cow/calf/antlerless elk in Elk Hunt Area 7?

- a) Very satisfied _____
- b) Somewhat satisfied _____
- c) Neutral _____
- d) Somewhat dissatisfied _____
- e) Very dissatisfied _____

16) Do you support or oppose January elk seasons to hunt cow/calf/antlerless elk in Elk Hunt Area 7?

- a) Support _____
- b) Neutral _____
- c) Oppose _____

17) Do you support or oppose mid-August cow/calf rifle seasons on private land to address elk damage situations in Elk Hunt Area 7?

- a) Support _____
- b) Neutral _____
- c) Oppose _____

Additional Comments/Thoughts You Would Like to Provide Regarding Elk Hunt Area 7

Laramie Peak Herd Unit, Elk Hunt Area 19 2017 Hunter Attitude Survey

SECTION 1: OVERALL ELK NUMBERS IN HUNT AREA 19

- 1) How satisfied are you with overall elk numbers in Hunt Area 19?
 - a) Very satisfied _____
 - b) Somewhat satisfied _____
 - c) Neutral _____
 - d) Somewhat dissatisfied _____
 - e) Very dissatisfied _____

- 2) The population objective for this elk herd is 5,000 elk postseason (for both Hunt Areas 7 and 19). The current population estimate is between 8,000 – 10,000 elk postseason. Should the Department continue to manage to reduce this herd to 5,000 elk?
 - a) Yes _____
 - b) No- manage for more than 5,000 elk _____
 - c) No- manage for less than 5,000 elk _____

- 3) In Elk Hunt Area 19, do you primarily hunt public land or Access Yes lands?
 - a) Yes _____
 - b) No, I primarily hunt private land _____

- 4) If you typically hunt public land in Elk Hunt Area 19, are hunter numbers/densities on **PUBLIC and ACCESS YES** land
 - a) Too high _____
 - b) About right _____
 - c) Could hold more hunters _____
 - d) No opinion; I do not hunt public land _____

- 5) If you typically hunt public land in Elk Hunt Area 19, how satisfied are you with elk numbers /availability on **PUBLIC and ACCESS YES** land?
 - a) Very satisfied _____
 - b) Somewhat satisfied _____
 - c) Neutral _____
 - d) Somewhat dissatisfied _____
 - e) Very dissatisfied _____
 - f) No opinion; I do not hunt public land _____

- 6) If you are dissatisfied with elk numbers/availability on public and Access Yes land in Elk Hunt Area 19, then in your opinion, what are some possible solutions?
 - a) Manage for a higher number of elk _____
 - b) Increase access to public land (e.g. easements, Access Yes, land trades) _____
 - c) Limit the number of licenses available on public land _____
 - d) No opinion; I do not hunt public land _____
 - d) Other _____

SECTION 2: BULL ELK HUNTING IN HUNT AREA 19

7) How many times, in the last ten years, have you held an Elk Hunt Area 19 Type 1 or Type 2 (*any elk*) license?

- a) 0 _____
- b) 1-3 _____
- c) 4-6 _____
- d) 6-10 _____

8) WGFD has been issuing 300 Type 1 and 2 (*any elk*) licenses in Elk Hunt Area 19 in recent years. In your opinion,

- a) Too many any elk (bull) licenses are issued _____
- b) About the right number of any elk (bull) licenses are issued _____
- c) Could issue more any elk (bull) licenses _____

9) How satisfied are you with bull trophy quality in Elk Hunt Area 19?

- a) Very satisfied _____
- b) Somewhat satisfied _____
- c) Neutral _____
- d) Somewhat dissatisfied _____
- e) Very dissatisfied _____

10) In Elk Hunt Area 19, Type 1 season dates for rifle any elk (bull) hunting run from October 1 through October 14. In your opinion,

- a) The Type 1 season length is too long _____
- b) The Type 1 season length is about right _____
- c) The Type 1 season length is too short _____
- d) No opinion _____

11) In Elk Hunt Area 19, Type 2 season dates for rifle any elk (bull) hunting run from November 1 through November 20. In your opinion,

- a) The Type 1 season length is too long _____
- b) The Type 1 season length is about right _____
- c) The Type 1 season length is too short _____
- d) No opinion _____

SECTION 3: WEAPON OF CHOICE FOR ELK HUNTING IN AREA 19

12) What weapon do you typically hunt elk with in Elk Hunt Area 19?

- a) Rifle _____
- b) Archery (bow or crossbow) _____
- c) Both _____

13) Do you think hunters should be able to hunt with both archery and rifle equipment in the same year (as is currently allowed) in Elk Hunt Area 19?

- a) Support _____
- b) Neutral _____
- c) Oppose - Hunters should be able to only archery hunt or only rifle hunt, but not both in the same year _____

SECTION 4: HUNTING SEASON STRUCTURE IN ELK HUNT AREA 19

14) For Elk Hunt Area 19, do you support or oppose the current split season whereby Type 1 and 4 licenses are valid from October 1 – October 14, and then Type 2 and 5 licenses are valid from November 1 – November 20?

- a) Support _____
- b) Neutral _____
- c) Oppose – just have one set of license types valid for the entire rifle season _____

15) How satisfied are you with access to hunt cow/calf/antlerless elk in Elk Hunt Area 19?

- a) Very satisfied _____
- b) Somewhat satisfied _____
- c) Neutral _____
- d) Somewhat dissatisfied _____
- e) Very dissatisfied _____

16) Would you support managing for fewer elk in the Lone Tree Creek area (by Hwy 487 rest area) to benefit mule deer?

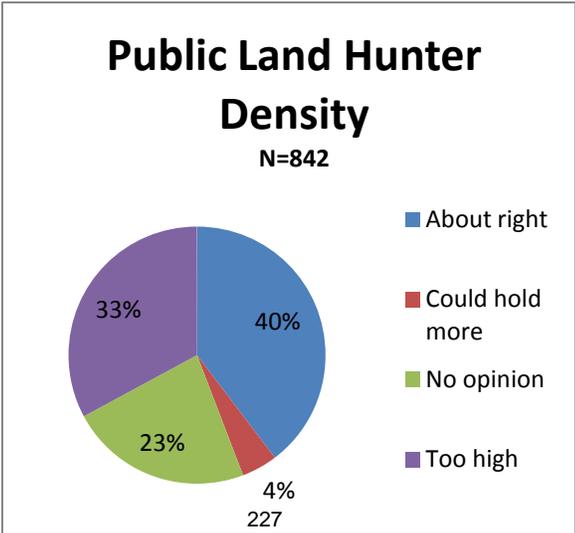
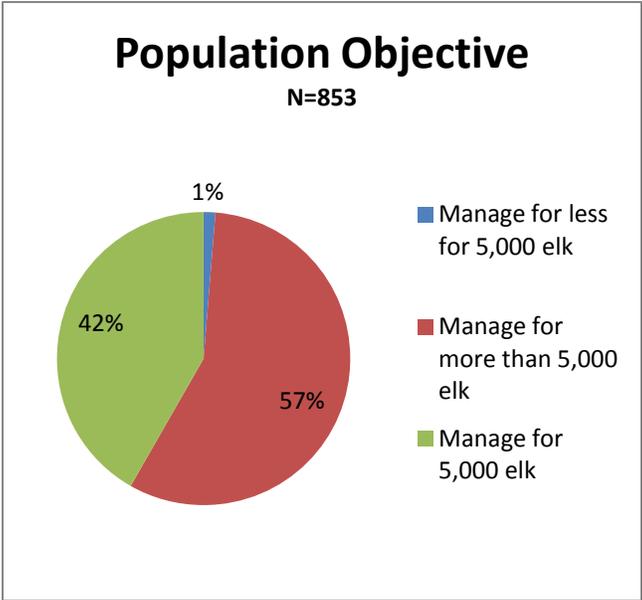
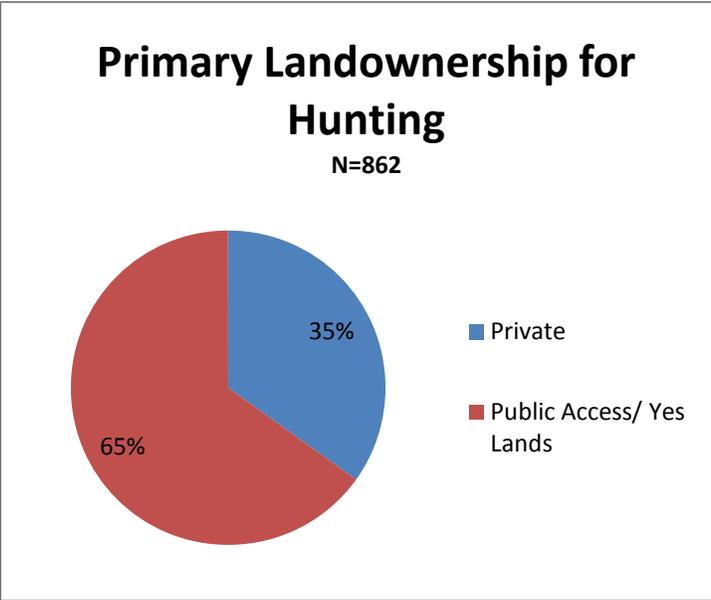
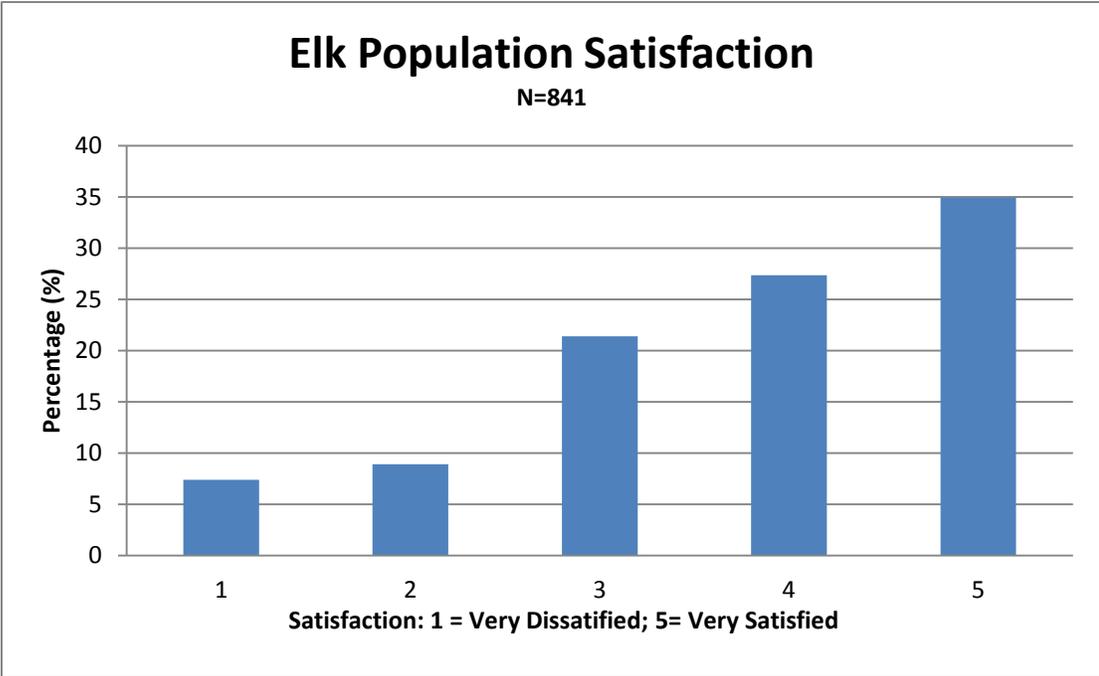
- a) Support _____
- b) Neutral _____
- c) Oppose _____

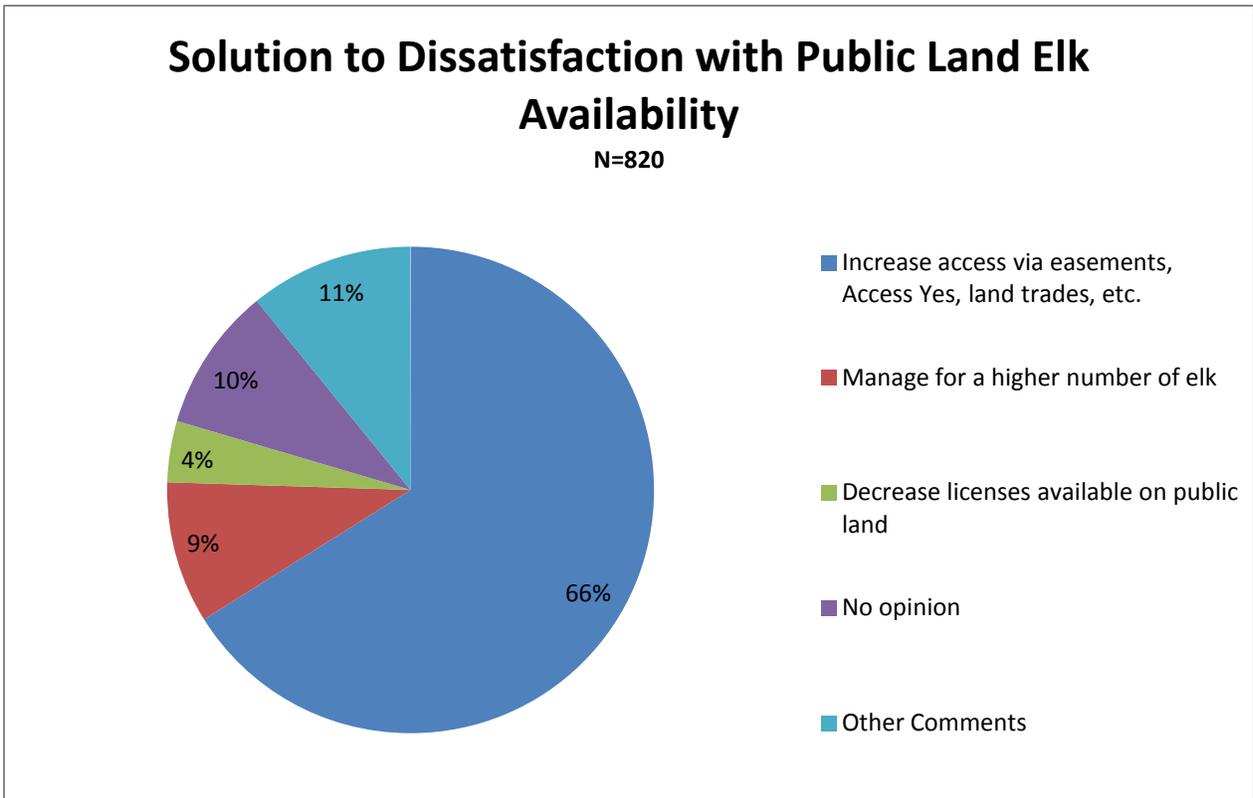
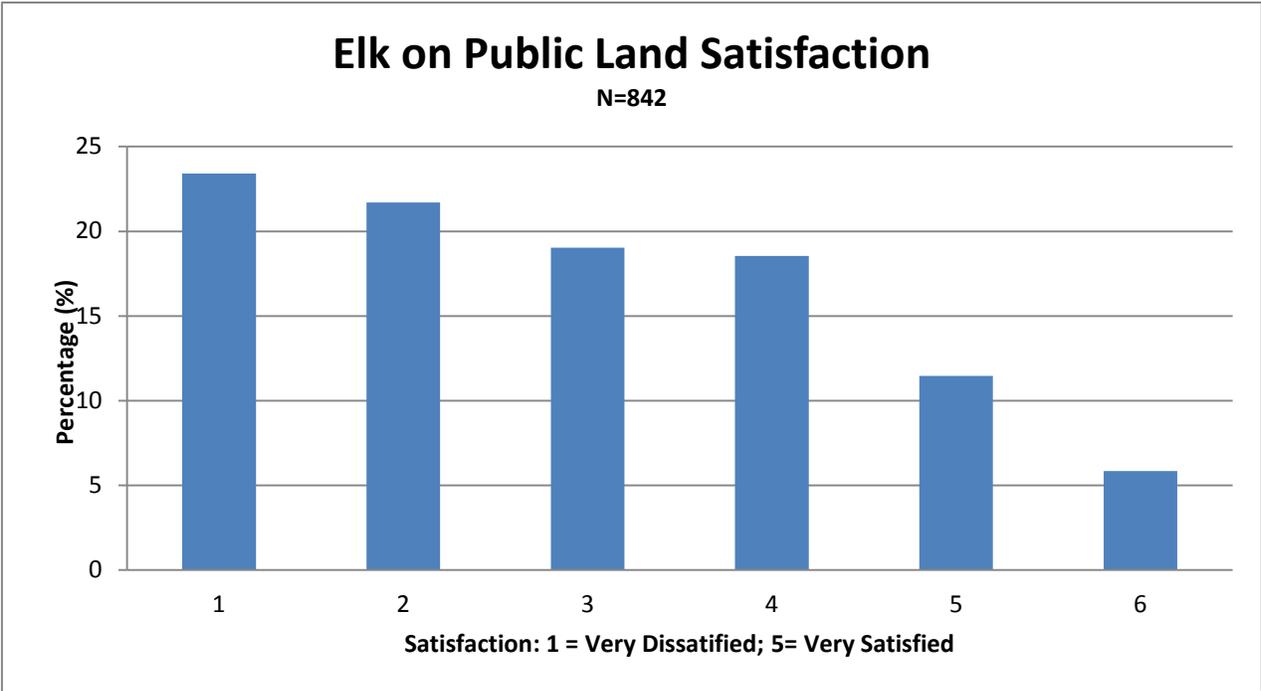
17) Do you support or oppose January elk seasons to hunt cow/calf/antlerless elk in Elk Hunt Area 19?

- a) Support _____
- b) Neutral _____
- c) Oppose _____

Additional Comments/Thoughts You Would Like to Provide Regarding Elk Hunt Area 19

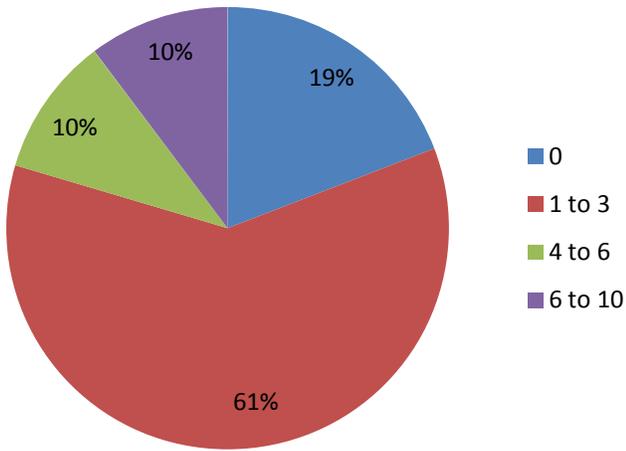
APPENDIX E.1: Area 7 Hunter Survey Response Graphs





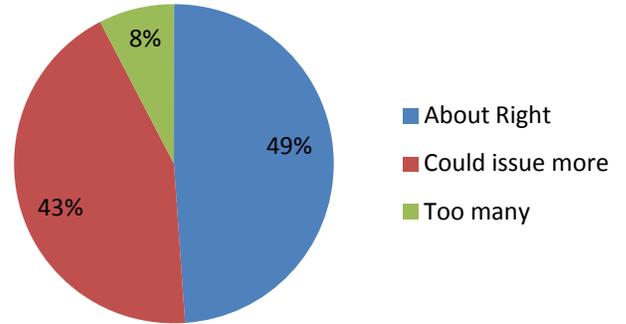
Bull Tag Draw Frequency in Last 10 Years

N=857



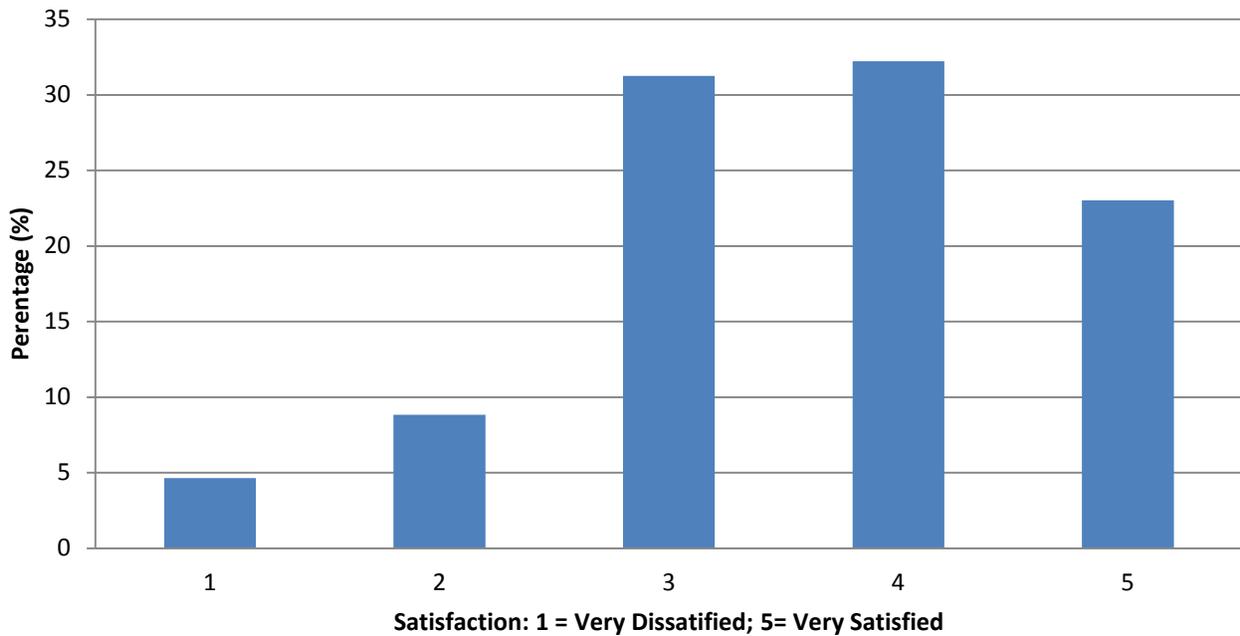
Opinion on Number of Bull Tags

N=851



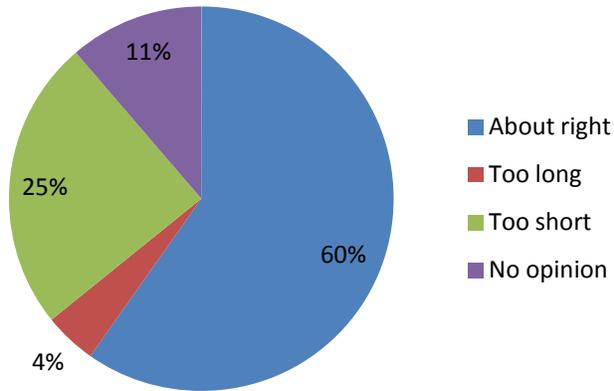
Bull Trophy Quality Satisfaction

N=838



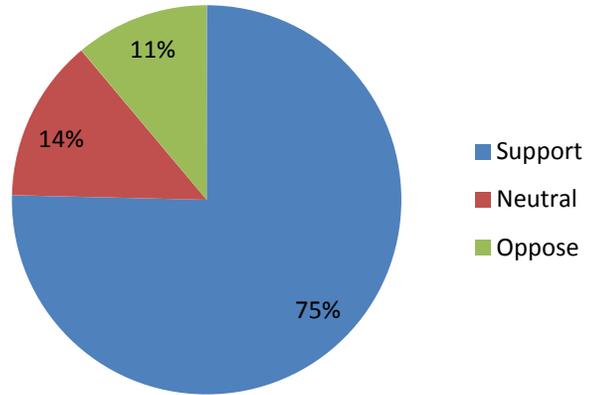
Type 1 Season Length

N=860



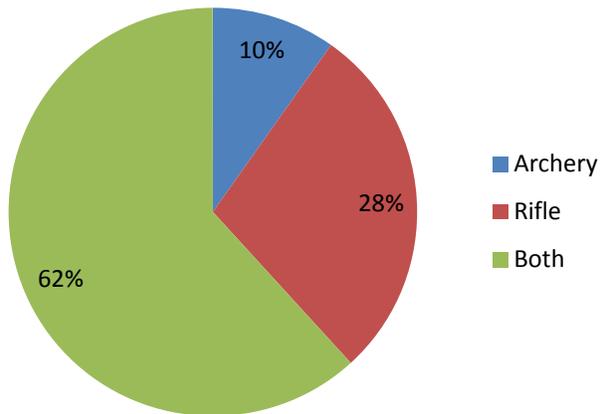
Hunting Archery and Rifle in the Same Year

N=865



Primary Weapon

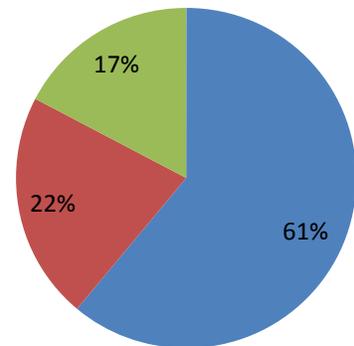
N=858



October 15th Opening Day

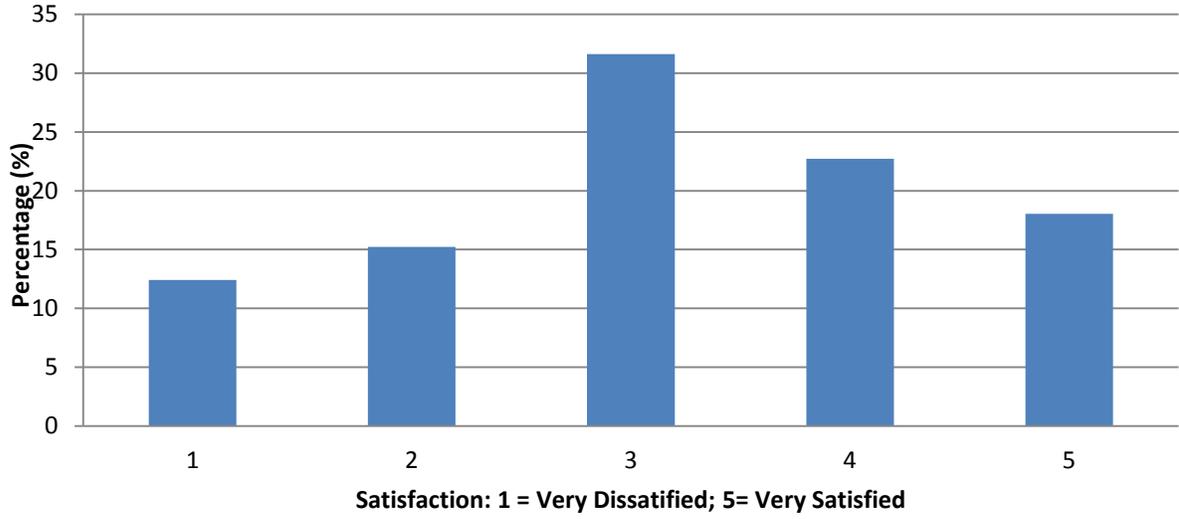
N=855

Support Neutral Oppose



Cow/Calf Hunting Access Satisfaction

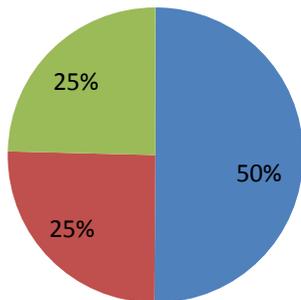
N=854



August Seasons

N=862

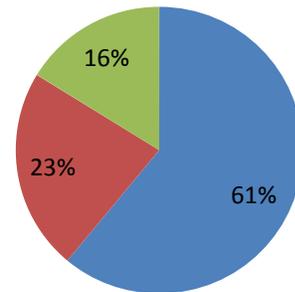
■ Support ■ Neutral ■ Oppose



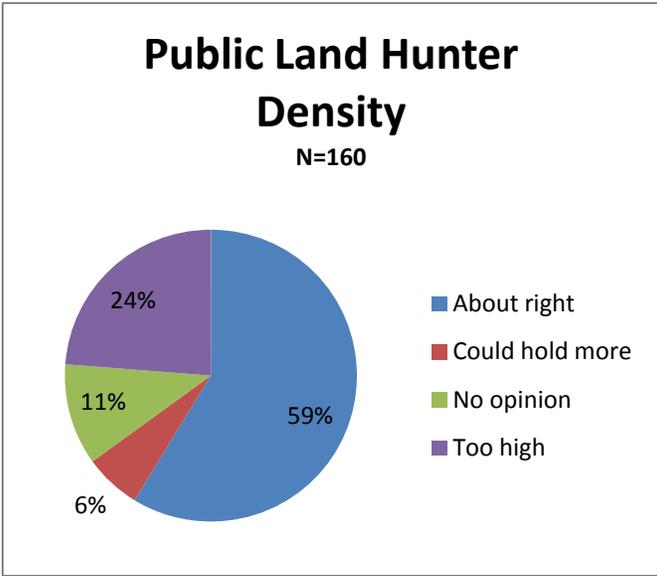
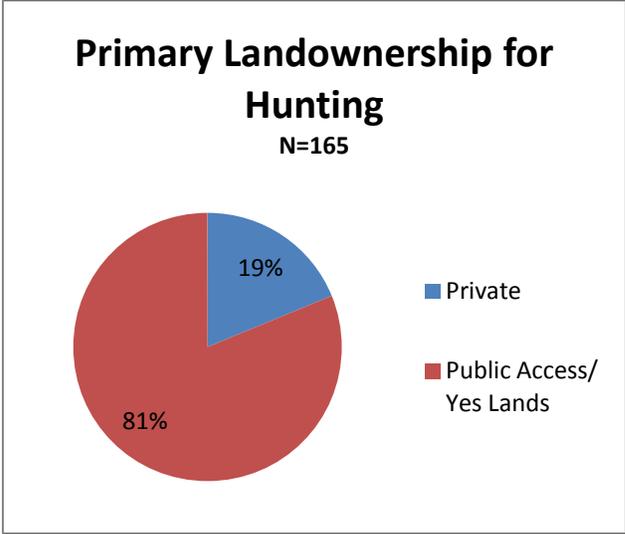
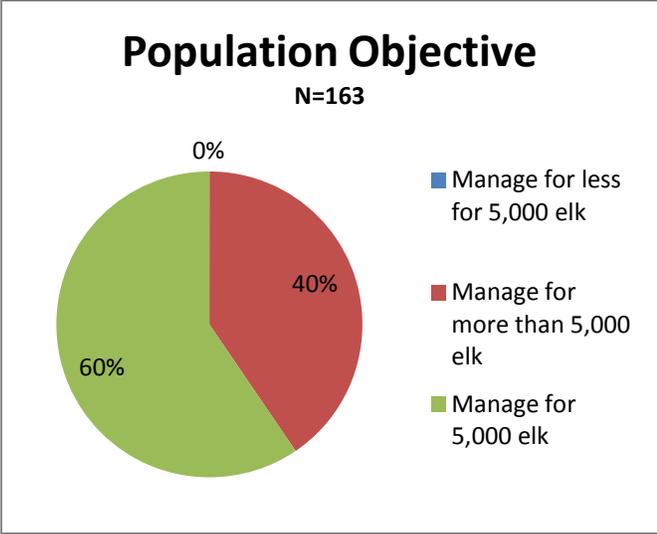
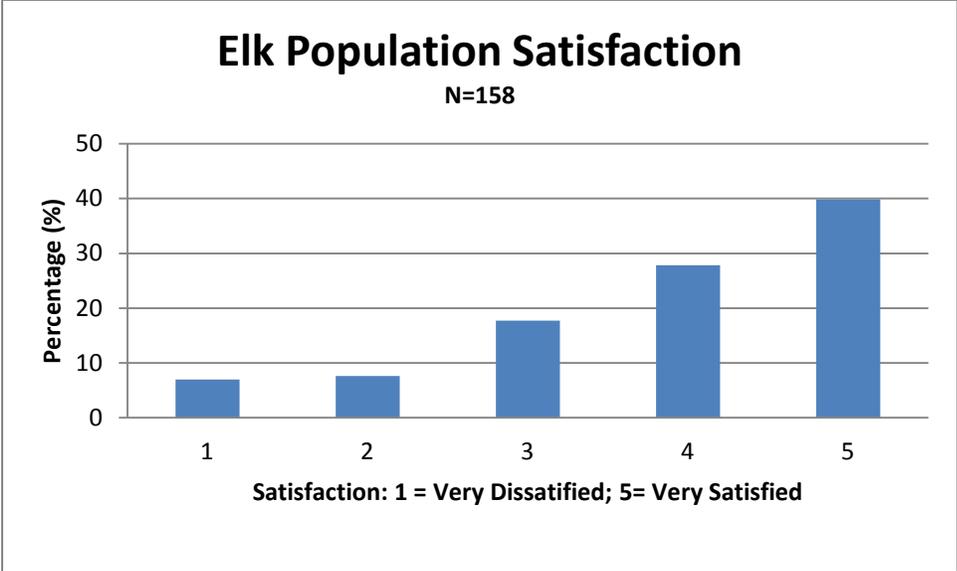
January Seasons

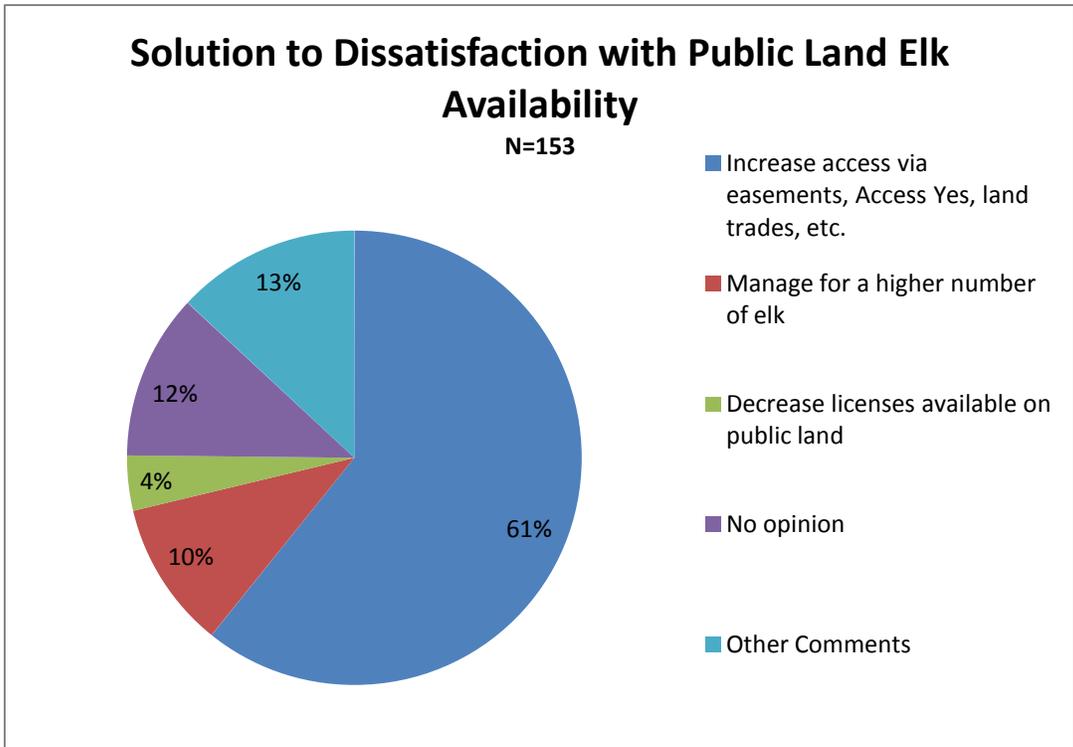
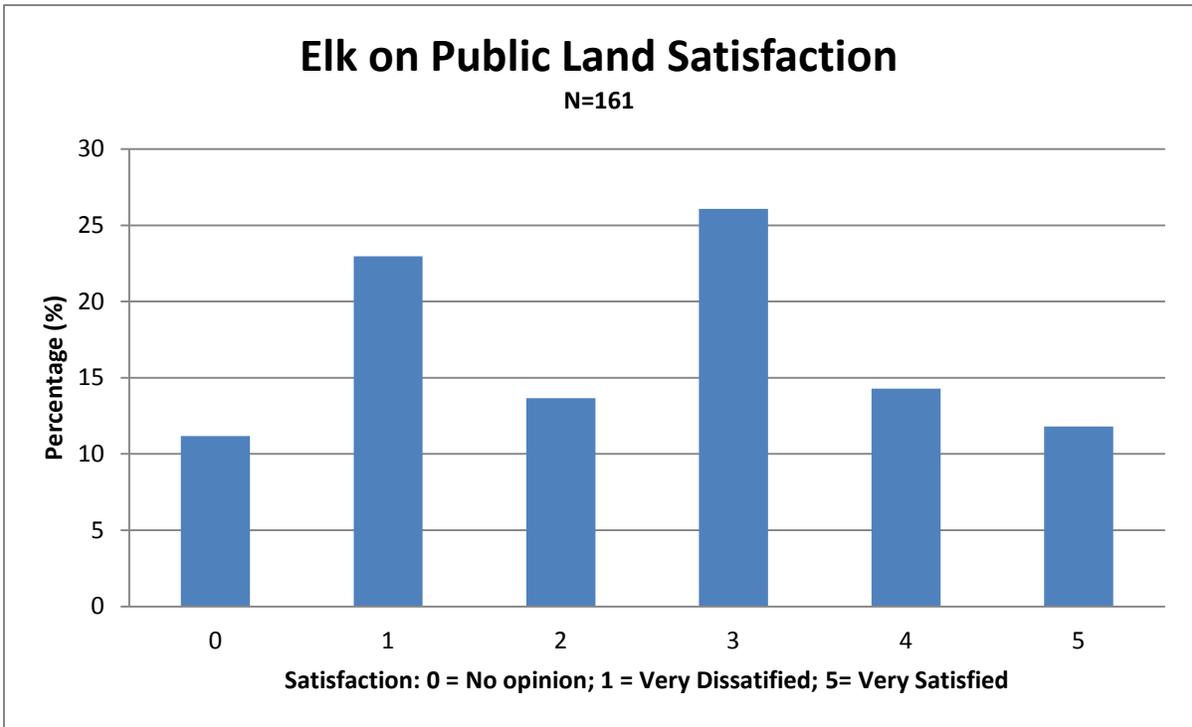
N=857

■ Support ■ Neutral ■ Oppose



APPENDIX E.2: Area 19 Hunter Survey Response Graphs

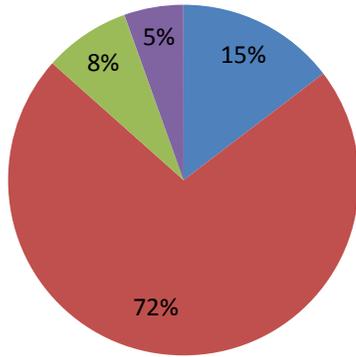




Bull Draw Frequency in Last 10 Years

N=164

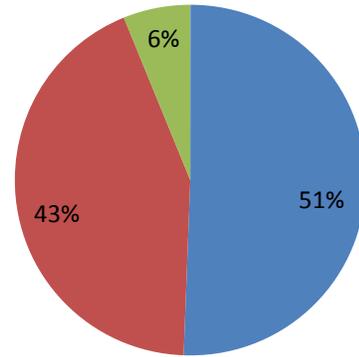
0 1 to 3 4 to 6 6 to 10



Opinion on Number of Bull Tags

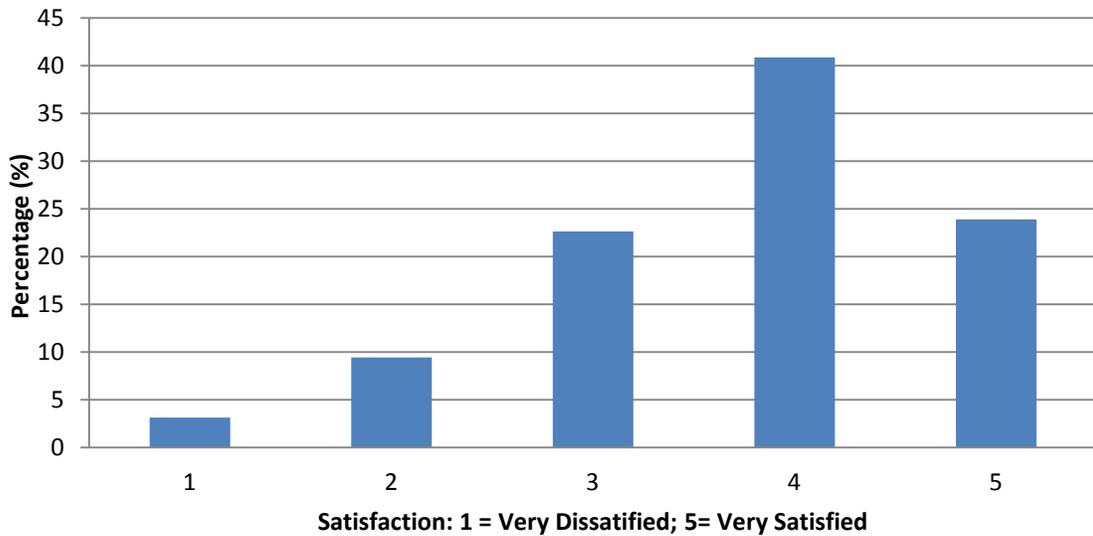
N=162

About Right Could issue more Too many



Bull Trophy Quality Satisfaction

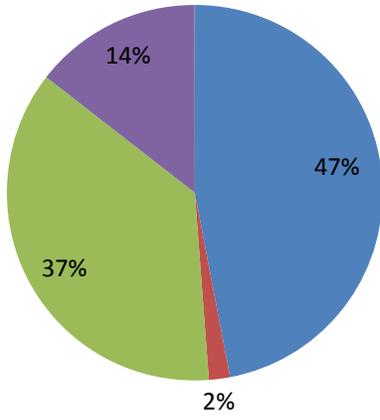
N=159



Type 1 Season Length

N=166

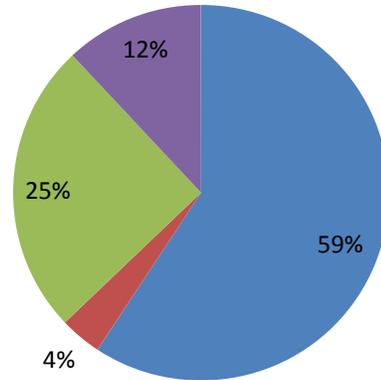
■ About right ■ Too long ■ Too short ■ No opinion



Type 2 Season Length

N=166

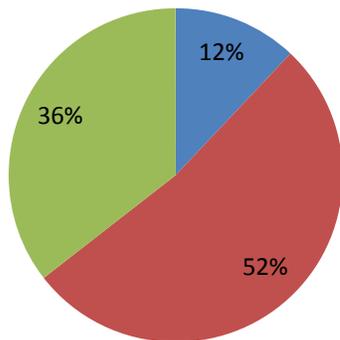
■ About right ■ Too long ■ Too short ■ No opinion



Primary Weapon

N=166

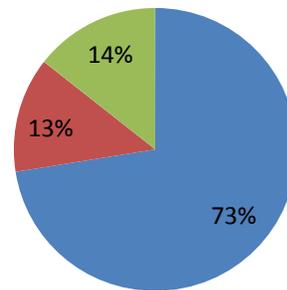
■ Archery ■ Rifle ■ Both



Hunting Archery and Rifle in the Same Year

N=167

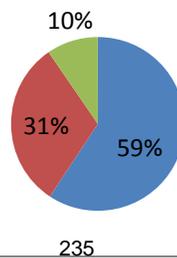
■ Support ■ Neutral ■ Oppose



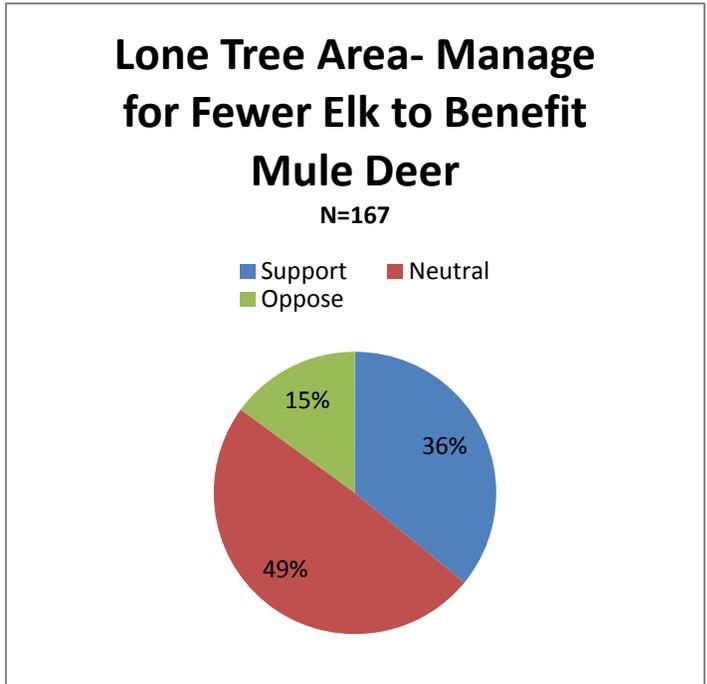
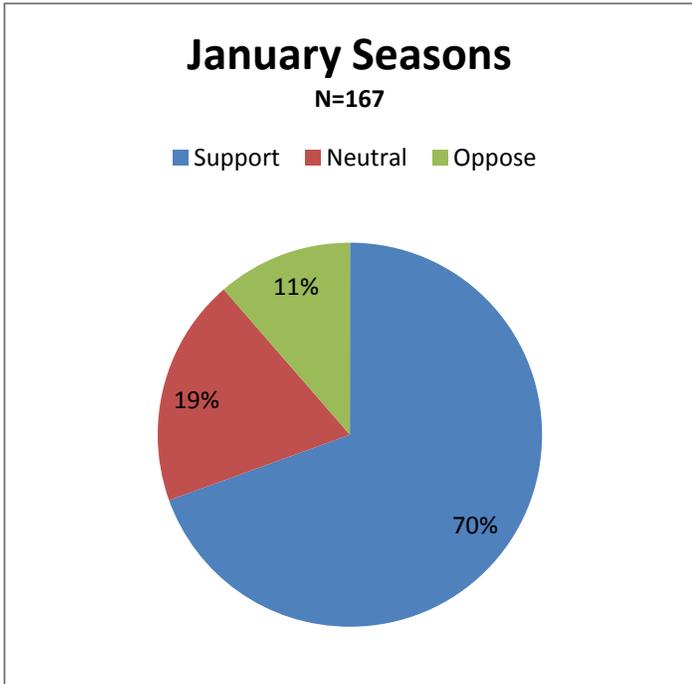
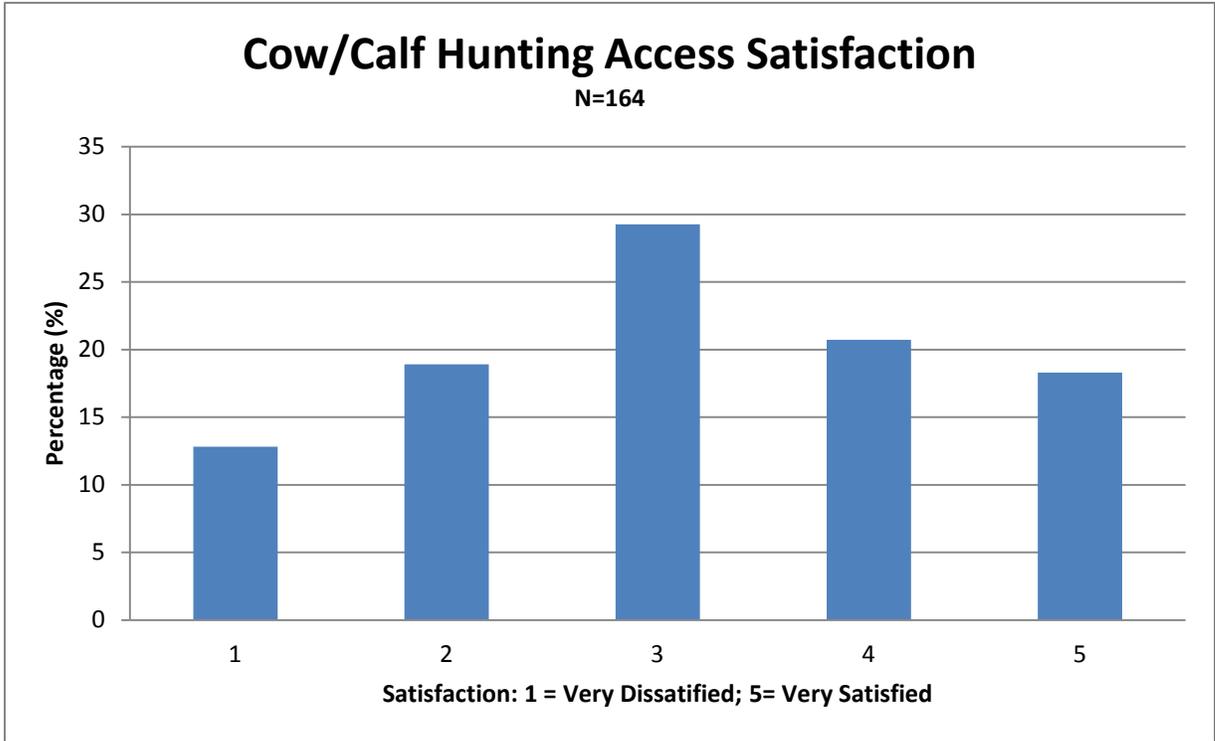
Season Split

N=167

■ Support ■ Neutral ■ Oppose



235





WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006

Phone: (307) 777-4600 Fax: (307) 777-4699

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KEITH CULVER
PETER J. DUBE
MIKE SCHMID

May 1, 2018

Dear Landowner;

This spring you were mailed a survey regarding the future management of the Laramie Peak Elk Herd Unit (Hunt Areas 7 and 19). We appreciate you taking the time to express your thoughts on the population objective and overall management of this elk herd. During this survey, our initial proposal was to increase the population objective from 5,000 to 8,000 elk for several reasons: 1) liberal seasons over the past decade have not successfully reduced this herd to 5,000 despite record harvest levels (this population is still estimated to be between 8,000-10,000 elk); 2) there continues to be large acreages with limited access for antlerless harvest providing refuge for elk; 3) hunter saturation levels have been reached, limiting our ability to increase license issuance beyond current levels given access constraints; and 4) season length cannot be extended any further, especially considering how contentious January seasons have become with many landowners in the Laramie Range.

We thank you for taking the time to respond to this important survey. It is important to gauge your perceptions of elk numbers and management considering the vital role private landowners play in providing valuable habitat for this elk herd and other wildlife. Given the dramatic changes in license issuance and season length over the past 15 years, it is beneficial to have data that quantifies landowner attitudes toward various aspects of elk management. We received responses from 65% of all surveyed landowners, meaning results from this survey should adequately represent the overall landowner community. Here are the highlights: 1) slightly more landowners (38%) opposed changing the objective to 8,000 than support it (34%), with the remaining 28% being neutral; 2) 55% of landowners oppose January seasons while 30% support them, with 15% being neutral; 3) 16% feel WGFD is issuing too many bull licenses while 36% feel we are issuing too few, with 48% indicating we are issuing about the right number of bull tags; 4) 56% agree with the number of antlerless licenses we issue, with 30% indicating we should issue more while 14% feel we should issue less; 5) 37% perceive elk numbers to be at desired levels while 55% indicated there are too many, and 8% saying there are too few; 6) there was broad support for the current bull hunting season structure, with 69% of landowners agreeing with current bull season length, and 67% supporting the October 15th opening date (Area 7 landowners only).

Generally speaking, this survey indicates most landowners prefer to stay the course with the current management framework. The Department will therefore propose to maintain the current population objective of 5,000 elk. The next herd objective review will occur in 2023. In addition, the majority of landowners would like to see the January season removed. The future of January seasons in both Hunt Areas 7 & 19 will be decided during the annual season setting process next spring, although we will remove the Area 7 Type 7 season from our application information for 2019 (although we could still have a January season in some capacity if there is demand).

Again, we appreciate your time and commitment to managing this herd. Landowners allowing significant hunting access, as well as those properties enrolled in the Department's Access Yes Program, have been instrumental in helping achieve record elk harvests in recent years. However, in order to reduce this herd to 5,000 elk, we will need additional assistance to achieve this goal, especially if we are going to consider removing the January season. Please feel free to contact Matt Withroder, Casper Access Yes Coordinator (307-473-3437) or Jason Sherwood, Laramie Access Yes Coordinator (307-745-4046) if you would like to discuss antlerless elk hunting access.

If you would like a copy of the final objective review or have any additional questions, please contact your local game warden or wildlife biologist, or feel free to contact me at 307-473-3408. Thanks for your time and all you do to help manage Wyoming's wildlife!

Sincerely,

Justin Binfet
Casper Region Wildlife Management Coordinator

Willow Bish
Douglas Biologist
307-436-9617

Martin Hicks
Wheatland Biologist
307-322-3821

Lee Knox
Laramie Biologist
307-745-5180 x231

Kelly Todd
N. Laramie Warden
307-745-4402

Cody Bish
Glenrock Warden
307-436-9617

Rod Lebert
Douglas Warden
307-358-3249

David Ellsworth
Wheatland Warden
307-322-2067

Dylan Bergman
Medicine Bow Warden
307-379-2337

JB/jb/mh

APPENDIX C

Laramie Peak Muddy Mountain Elk Herd Unit Sightability Survey 2019 Summary

Heather O'Brien – Casper Wildlife Biologist

INTRODUCTION

The Laramie Peak / Muddy Mountain Elk Herd Unit (EL 741) contains hunt areas 7 & 19 and is located in east central Wyoming (Figure 1). The herd unit encompasses an area of 4,788 square miles from the city of Casper, east to the town of Douglas, southeast along the North Platte River to Guernsey Reservoir and the town of Wheatland, southwest to Bosler Junction, and northwest to the town of Medicine Bow. Elk occupy the mountainous habitats of the Laramie Range, Muddy Mountain, and adjacent foothills. Major habitat types include sagebrush (*Artemisia tridentata*) grassland steppe, mixed mountain shrub, ponderosa pine (*Pinus ponderosa*) and lodgepole pine (*Pinus contorta*) forests intermixed with aspen (*Populus spp.*) stands. Elevations range from 5,500 to 10,500 feet (1,600-3,200 meters). The herd is very popular with hunters, as it is very large and has a reputation of producing trophy-sized bull elk.

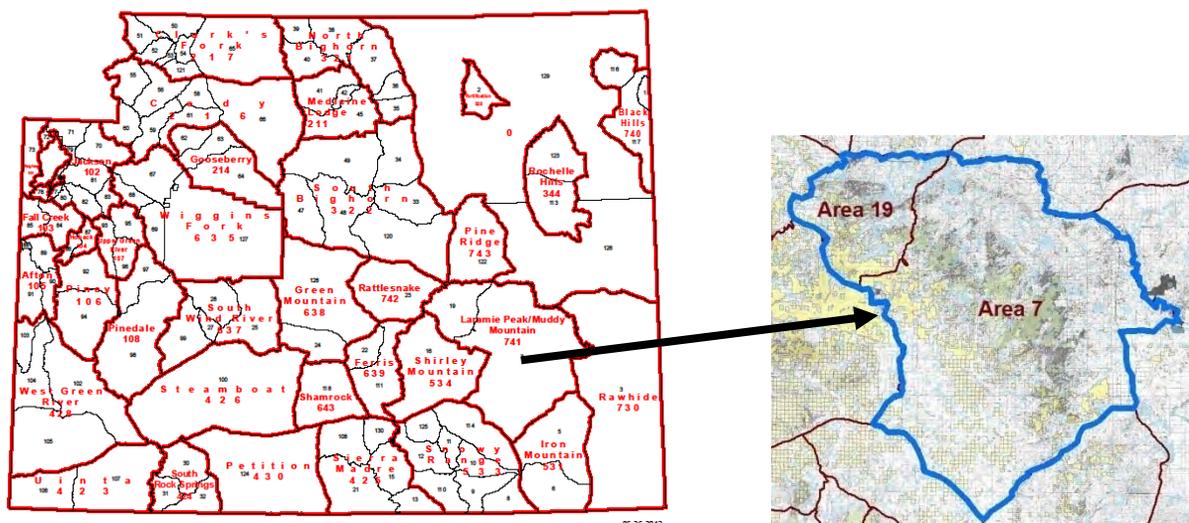


Figure 1. The Laramie Peak / Muddy Mountain Elk Herd Unit, which includes hunt areas 7 and 19 in east central Wyoming.

Due to its popularity and reputation for producing trophy-quality bulls, Casper and Laramie Region managers typically devote a considerable amount of effort to classification surveys in this herd. More recently, surveys have been altered from directed techniques to a stratified random

sampling method with the goal of improving distribution of survey effort and results (Wyoming Game and Fish Department 2017). In 2019, managers allocated additional funding to the herd unit for a more intensive abundance survey, utilizing sightability methods and incorporating classifications simultaneously. Consequently, the herd unit was surveyed more intensely and completely in 2019 than any previous assessment.

METHODS

Survey design and implementation followed standard sightability methods and guidelines summarized by Unsworth et.al (1994). Due to the large size of this herd unit, a complete sightability survey was not possible. Subunit mapping and stratification were completed previously for stratified random classification surveys using ArcMap (ESRI 2011). These subunits and strata were utilized for this survey as well, though the 2019 survey allowed a much higher sampling total of subunits compared to previous years (Figure 2).

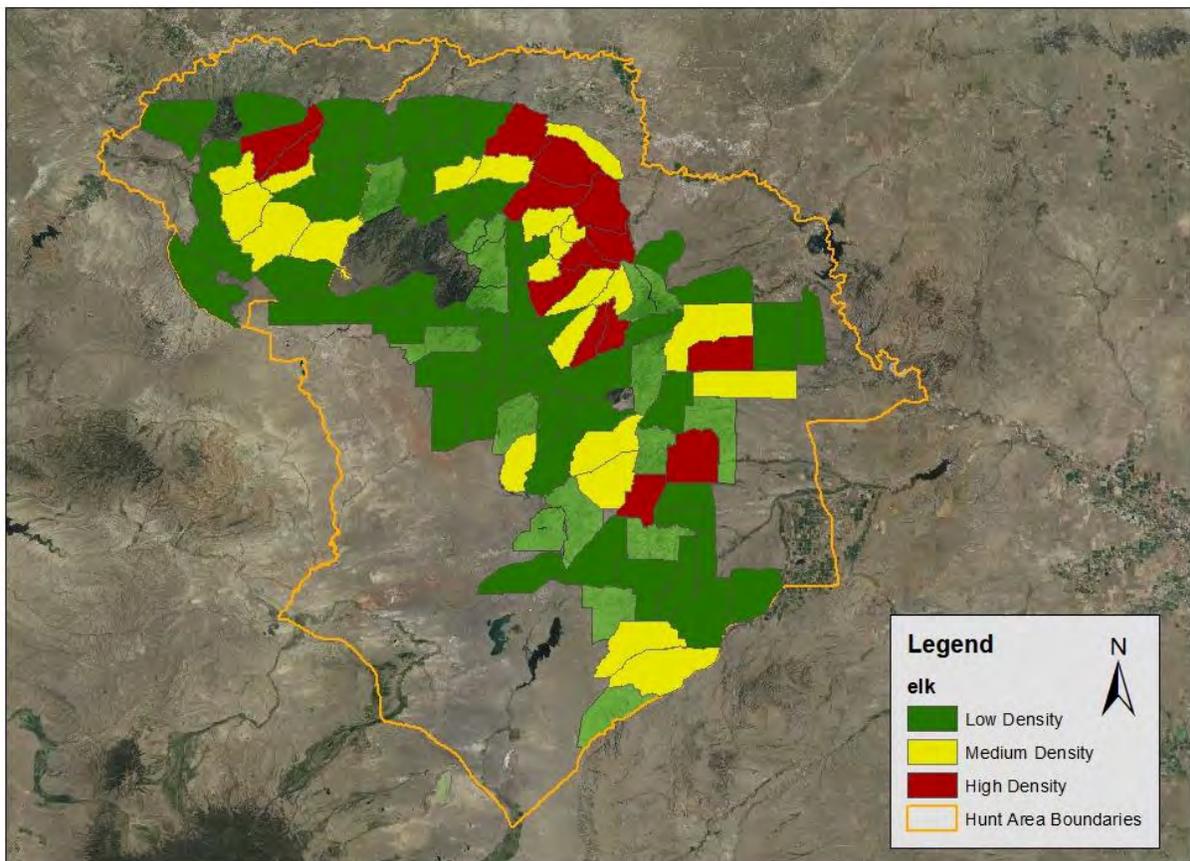


Figure 2. Total and selected subunits for sightability and classification surveys for the Laramie Peak Muddy Mountain Elk Herd Unit, 2019. Subunits that were not selected by stratified random sampling are light green.

Prior to initiating flights, all potential observers were trained in proper data collection following the protocol for WGFD sightability surveys and safety standards outlined by WGFD flight policy (Wyoming Game and Fish Department 2017; Wyoming Game and Fish Commission 2011). PowerPoint training presentations are available within the Department for both sightability surveys and approved flight policy. Flights were conducted from 29 January through 8 February 2019 on days when weather conditions were suitable for flights. Surveys were flown in Bell Jet Rangers piloted by Kent Potter of Helicopter Solutions MT, Inc. from Laurel, Montana and by David Stinson of Sky Aviation Corporation from Worland, WY. Two observers were aboard every survey flight, and pilot observations were also included during data collection. The back-seat observer was positioned to view out the opposite side of the helicopter compared to the front-seat observer to visually survey the greatest area per transect line. Observers were replaced mid-day whenever possible to avoid eye fatigue and maximize survey performance. However, this was not always feasible due to scheduling conflicts for some observers. In these instances, 30-45 minute breaks were taken approximately every three hours during helicopter refueling to provide some rest for all-day observers.

Winter severity conditions during 2019 flights were considered average to above average in terms of snow accumulation and daily temperatures. Higher elevation portions of the herd unit had deep and persistent snow cover, with little to no sagebrush or other vegetation visible. Lower elevation portions of the herd unit were more open or broken in terms of snow cover. Snows in these areas was not as deep, with exposed shrubs and ground in most areas and deeper drifted snow along drainages and hillsides. Wind conditions were severe enough on several days within the survey period to cancel flights. Conversely, there were low-wind days during the survey where fog persisted in low-lying areas. Managers either canceled flights on days when high winds or poor visibility compromised survey conditions and safety, or surveyed subunits in the herd where conditions were favorable and scheduled the remaining subunits later.

Data collection was performed by the back-seat observer in most instances using a hand-held GPS and standardized data sheet for sightability surveys (Appendix A). Location, activity of elk upon first sighting, percent snow cover, percent vegetative cover, and vegetative type were recorded for every survey observation. Observed elk were totaled and classified as cows, calves, yearling males, class I mature bulls, and class II mature bulls. Other notable species (coyotes, winter sage-grouse flocks, congregations of pronghorn, etc.) were also recorded during flights as a means to maximize survey time and collect other useful wildlife data. Flight time to complete each subunit was recorded for evaluation purposes, so managers could modify subunit sizes for future surveys as needed.

Following the completion of all survey flights, data were compiled into a Microsoft Excel spreadsheet and standardized for import into the software program Aerial Survey for Windows (Unsworth et al 1999). The pilot and all observers were debriefed and offered the opportunity to provide feedback on survey methods to consider for improvement of future surveys.

RESULTS

A total of 9,374 elk were surveyed within 305 group observations (Figure 3). Out of 107 subunits, 90 were selected for the survey and 84 were flown completely. Six high-elevation, low-density subunits were not flown due either to deep snow and lack of elk sign, or limited survey time. These units were eliminated from analysis. Several groups of elk were observed outside of a designated subunit during a concurrent mule deer survey. These elk were recorded as present in the nearest adjacent subunit, which will be enlarged to include this area for future surveys.

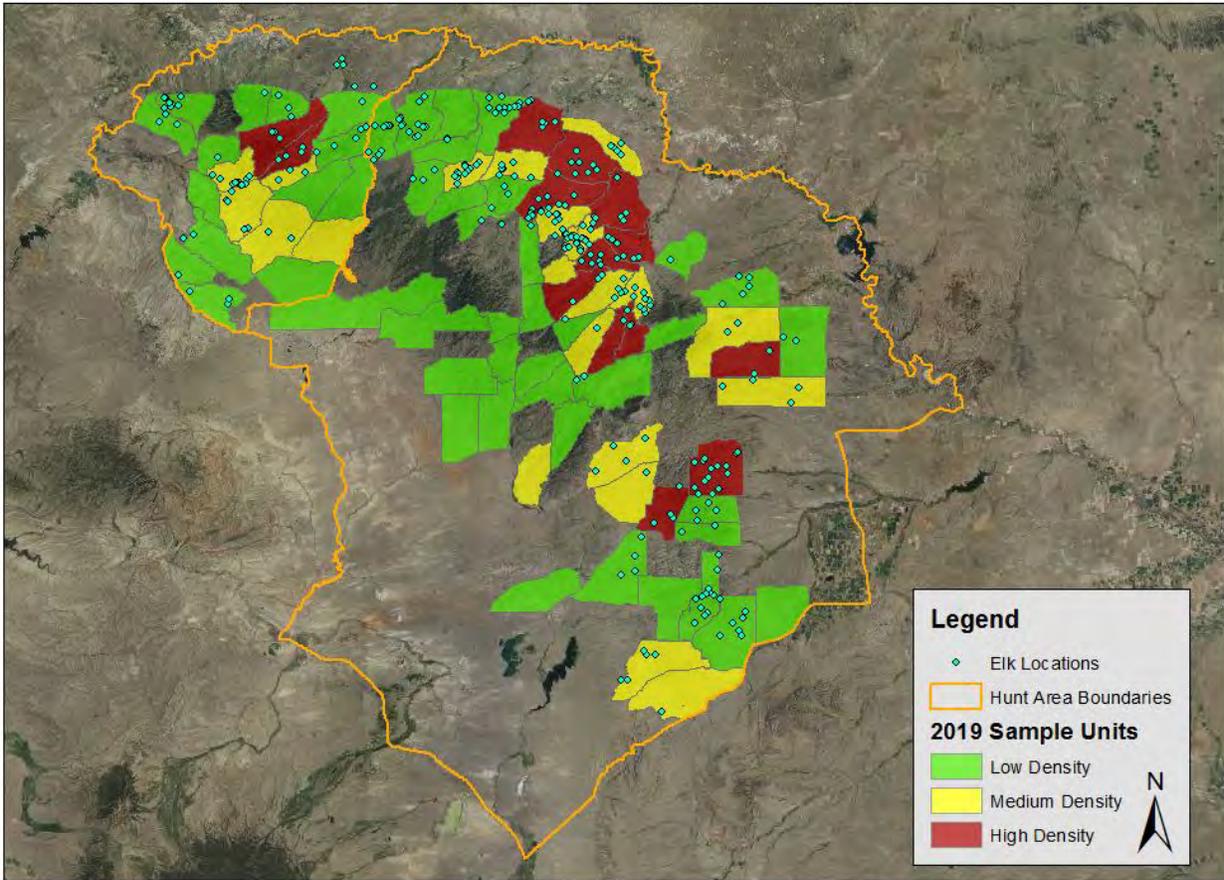


Figure 3. Elk group locations surveyed subunits for the Laramie Peak Muddy Mountain sightability and classification survey, 29 January – 8 February 2019.

Distribution of elk across the herd unit was uneven, with higher densities of elk at low to mid elevations in more open habitats containing available winter forage. Elk were sexually segregated in many instances, with very large groups consisting mainly of cows and calves typically found in more open habitats, and smaller groups of mature bulls found in more variable or timbered habitats. Many higher elevation habitats were devoid of elk due to deep snow and lack of exposed forage.

Sightability data analysis using Aerial Survey for Windows yielded a population estimate of 11,182 elk \pm 2,571 using a 95% bound, with a resulting confidence interval of 1,312 around the

correction (Appendix B). The increase of 1,808 elk compared to total elk observed accounts for those presumably missed. Analysis assumes that 178 elk were missed by observers due to variations in activity, vegetation, and snow cover in flown subunits. Observers noted that elk which remained bedded or motionless in timbered habitats were difficult to see in several instances. On colder mornings, several groups of observed elk remained bedded despite being flown over at low altitude. The remaining 1,630 elk added by the analysis are due to the assumption that a mean number of elk present in observed low-strata subunits (65.2) were also present in those low-strata subunits that were not surveyed.

The resulting abundance estimate and standard error from the sightability survey were added into the existing spreadsheet model for the Laramie Peak Muddy Mountain Elk Herd. Incorporating the abundance estimate from this sightability survey resulted in a much higher population estimate for the herd unit as a whole. Population estimates prior to the sightability survey predicted a post-season herd of 7,000-8,000 elk in 2018. The addition of abundance data to the model shifted that estimate to around 13,000 elk post-season. While classification surveys the past three years have been stratified to reduce bias, data from previous years are highly variable and likely inaccurate in their estimates for mature bull ratios. The resulting population trend represented by the model does not seem accurate to managers. For these reasons, managers discarded the current spreadsheet model for the herd unit in 2019 and are reconstructing it for 2020. Older classification data will likely be excluded in an effort improve model performance. Improved classification data from recent years, paired with harvest data and the sightability estimate should generate a more accurate population estimate.

DISCUSSION

Sightability surveys seek to estimate absolute animal abundance, and provide some of the strongest data available to wildlife managers (Steinhorst & Samuel 1989). These models may have their own limitations in terms of cost, and can be biased if groups of animals are undercounted. Despite these limitations, they are a powerful source of information for managers compared to traditional directed surveys. The 2019 sightability and classification survey for the Laramie Peak Muddy Mountain Elk Herd Unit is the most complete, comprehensive, and intensive survey ever conducted for this herd. The resulting census and distribution data alone are extremely valuable. The subsequent abundance estimate and classification ratios are conceivably the most accurate representation of population size and structure managers have ever developed for the herd.

Distribution of elk during the 2019 survey were somewhat different compared to surveys conducted during the previous milder winters. While some habitats remained open and contained high densities of elk, areas at higher elevation had deep persistent snows and contained few to no elk. During survey flights, several subunits designated as low-strata (low elk density) areas contained higher than predicted numbers of observed elk. These observations of large groups in low-strata subunits created a higher than expected mean for low-strata subunits that were not surveyed, which in turn increased the abundance estimate and standard error for the survey. This

new knowledge regarding elk distribution will be used to update and refine subunit stratification, and is even being used to post-stratify and re-analyze data from this survey to derive an improved 2019 estimate.

Overall, managers felt very good about the design and implementation of this stratified sightability survey. Minor adjustments will be made to improve the current design and results of future surveys in this herd unit. GIS map files will be cleaned up to improve data analysis, as some shape file errors created confusion during the analysis phase for 2019. Additionally, two subunits will be redrawn to incorporate elk found outside of a delineated unit in multiple years. Flying this survey has given managers more knowledge of above-average winter conditions associated elk distribution for the herd unit. This knowledge will be used to refine subunit stratification to improve future abundance estimates and standard error. The continued application of abundance surveys should help managers improve their knowledge of population dynamics and trend, and inform better management decisions in this and other big game herds.

RECOMMENDATIONS FOR FUTURE SURVEYS

- Modify subunits to encapsulate elk located outside current subunit boundaries
- Evaluate strata of each subunit using previous 3 years of survey data; change strata of subunits as needed using natural cut points
- Post-stratify 2019 survey data and re-run analysis. If the resulting estimate and standard error improve, replace current estimate in a new spreadsheet model for the herd

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- Wyoming Game and Fish Department. 2017. White Paper: Beyond directed surveys - design and evaluation of a stratified-random quadrat classification survey for elk in Wyoming. O'Brien, H. Wyoming Game and Fish Department, Cheyenne, Wyoming. 8 pp.

APPENDIX B:

Sightability Data Analysis from Aerial Survey for Windows Laramie Peak Muddy Mountain Elk Herd Unit, Winter 2019

Aerial Survey for Windows, Version 1.00 Beta 6.1.4 (12-Feb-2000)

Monday, February 25, 2019 06:22 PM

Model: Elk, Hiller 12-E, Idaho (with snow)

[Files]

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2018_EL721_1st_Strat

Section 1: Summary of Raw Counts

Stratum	Units Sampled	Total	Number of Each Class Counted						
Unclas			Cows	Bulls	BABull	Calves	Spikes	Raghrn	AdBull
1	48	3128	1557	989	688	582	301	446	242
2	22	2150	876	839	637	435	202	316	321
3	14	4096	2423	669	318	1004	351	194	124
Total	84	9374	4856	2497	1643	2021	854	956	687

Section 2: Summary of Raw Counts for Perfect Visibility Model

This table projects the number of animals that would have been counted if every unit had been flown and visibility had been perfect (no animals obscured by vegetation, etc.)

No of Units ----- Number of Each Class Counted -----

Strat Unclas	Popn	Sample	Total	Cows	Bulls	BABull	Calves	Spikes	Raghrn	AdBull
1	73	48	4757	2368	1504	1046	885	458	678	368
2	22	22	2150	876	839	637	435	202	316	321
3	14	14	4096	2423	669	318	1004	351	194	124
Total	109	84	11003	5667	3012	2001	2324	1011	1188	813

Section 3: Estimates for Total Number

Total

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	4859	1632857	682	4	2505
2	22	22	2202	0	406	6	40
3	14	14	4121	0	169	1	26
Total	109	84	11182	1632857	1257	11	2571

Cows

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	2371	666551	14	0	1600
2	22	22	880	0	20	0	9
3	14	14	2426	0	18	0	8
Total	109	84	5677	666551	52	0	1600

Bulls

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	1597	50089	567	4	441
2	22	22	885	0	345	6	37
3	14	14	690	0	130	1	22

Total	109	84	3172	50089	1042	11	443
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Branched-antlered bulls

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	1133	19496	523	3	277
2	22	22	681	0	327	5	36
3	14	14	338	0	122	1	22
Total	109	84	2152	19496	972	9	280

Calves

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	891	83516	14	0	566
2	22	22	437	0	7	0	5
3	14	14	1005	0	2	0	3
Total	109	84	2333	83516	23	0	566

Spikes

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	463	17159	16	0	257
2	22	22	204	0	5	0	4
3	14	14	352	0	4	0	4
Total	109	84	1019	17159	25	0	257

Rag horns

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	732	10547	253	2	204
2	22	22	332	0	90	1	19
3	14	14	204	0	45	0	13
Total	109	84	1268	10547	388	3	205

Adult bulls

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	401	3042	166	1	111
2	22	22	348	0	151	4	24
3	14	14	133	0	34	0	12
Total	109	84	882	3042	351	5	114

Unclassified

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	0	0	0	0	0
2	22	22	0	0	0	0	0
3	14	14	0	0	0	0	0
Total	109	84	0	0	0	0	0

Section 4: Estimates for Proportions

Cows

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	0.48805	0.00194	0.00001	0.00000	0.08648
2	22	22	0.39965	0.00000	0.00001	0.00000	0.00680
3	14	14	0.58884	0.00000	0.00000	0.00000	0.00323
Total	109	84	0.50777	0.00037	0.00000	0.00000	0.03762

Bulls

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	0.32864	0.00309	0.00001	0.00000	0.10912
2	22	22	0.40182	0.00000	0.00003	0.00000	0.01030
3	14	14	0.16736	0.00000	0.00001	0.00000	0.00450
Total	109	84	0.28361	0.00058	0.00000	0.00000	0.04749

Branched-antlered bulls

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	

Stratum	Popn.	Sample	Estimate	Variance Sampling	Variance Sightingability	Variance Model	Bound 95%
1	73	48	0.23328	0.00323	0.00001	0.00000	0.11167
2	22	22	0.30913	0.00000	0.00003	0.00000	0.01140
3	14	14	0.08198	0.00000	0.00001	0.00000	0.00483
Total	109	84	0.19245	0.00061	0.00000	0.00000	0.04860

Calves

Stratum	Popn.	Sample	Estimate	Variance Sampling	Variance Sightingability	Variance Model	Bound 95%
1	73	48	0.18331	0.00020	0.00000	0.00000	0.02744
2	22	22	0.19853	0.00000	0.00000	0.00000	0.00352
3	14	14	0.24380	0.00000	0.00000	0.00000	0.00140
Total	109	84	0.20859	0.00004	0.00000	0.00000	0.01195

Spikes

Stratum	Popn.	Sample	Estimate	Variance Sampling	Variance Sightingability	Variance Model	Bound 95%
1	73	48	0.09536	0.00002	0.00000	0.00000	0.00963
2	22	22	0.09269	0.00000	0.00000	0.00000	0.00199
3	14	14	0.08538	0.00000	0.00000	0.00000	0.00087
Total	109	84	0.09115	0.00000	0.00000	0.00000	0.00421

Rag horns

Stratum	Popn.	Sample	Estimate	Variance Sampling	Variance Sightingability	Variance Model	Bound 95%
1	73	48	0.15071	0.00126	0.00001	0.00000	0.06964
2	22	22	0.15091	0.00000	0.00001	0.00000	0.00683
3	14	14	0.04962	0.00000	0.00000	0.00000	0.00297
Total	109	84	0.11349	0.00024	0.00000	0.00000	0.03031

Adult bulls

Stratum	Popn.	Sample	Estimate	Variance Sampling	Variance Sightingability	Variance Model	Bound 95%
1	73	48	0.08257	0.00054	0.00001	0.00000	0.04570
2	22	22	0.15822	0.00000	0.00002	0.00000	0.00904
3	14	14	0.03235	0.00000	0.00000	0.00000	0.00265
Total	109	84	0.07896	0.00010	0.00000	0.00000	0.01996

Unclassified

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	0.00000	0.00000	0.00000	0.00000	0.00000
2	22	22	0.00000	0.00000	0.00000	0.00000	0.00000
3	14	14	0.00000	0.00000	0.00000	0.00000	0.00000
Total	109	84	0.00000	0.00000	0.00000	0.00000	0.00000

Section 5: Estimates for Ratios

Bulls per 100 Cows

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	67.3	227.0	0.7	0.0	29.6
2	22	22	100.5	0.0	4.7	0.1	4.3
3	14	14	28.4	0.0	0.2	0.0	0.9
Total	109	84	55.9	39.6	0.3	0.0	12.4

Calves per 100 Cows

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	37.6	0.0	0.0	0.0	0.3
2	22	22	49.7	0.0	0.2	0.0	0.8
3	14	14	41.4	0.0	0.0	0.0	0.2
Total	109	84	41.1	0.0	0.0	0.0	0.2

Spikes per 100 Cows

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	19.5	0.0	0.0	0.0	0.3
2	22	22	23.2	0.0	0.1	0.0	0.4
3	14	14	14.5	0.0	0.0	0.0	0.1
Total	109	84	18.0	0.0	0.0	0.0	0.1

Spikes per 100 Bulls

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	29.0	16.7	0.1	0.0	8.0
2	22	22	23.1	0.0	0.2	0.0	0.9
3	14	14	51.0	0.0	0.7	0.0	1.6
Total	109	84	32.1	4.2	0.1	0.0	4.1

Rag horns per 100 Bulls

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	45.9	0.0	0.2	0.0	0.9
2	22	22	37.6	0.0	0.5	0.0	1.4
3	14	14	29.7	0.0	0.4	0.0	1.2
Total	109	84	40.0	0.0	0.1	0.0	0.7

Adult bulls per 100 Bulls

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	25.1	7.9	0.0	0.0	5.5
2	22	22	39.4	0.0	0.0	0.1	0.5
3	14	14	19.3	0.0	0.0	0.0	0.2
Total	109	84	27.8	2.0	0.0	0.0	2.8

Branched-antlered bulls per 100 Bulls

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	71.0	0.0	0.1	0.0	0.7
2	22	22	76.9	0.0	0.2	0.1	1.1
3	14	14	49.0	0.0	0.7	0.0	1.6
Total	109	84	67.8	0.0	0.1	0.0	0.6

Spikes per 100 Branched-antlered bulls

Stratum	Number of Units		Estimate	Variance			Bound 95%
	Popn.	Sample		Sampling	Sightability	Model	
1	73	48	40.9	106.1	0.5	0.0	20.2

2	22	22	30.0	0.0	0.6	0.0	1.6
3	14	14	104.1	591.5	11.6	0.1	48.1
Total	109	84	47.4	44.0	0.5	0.0	13.1

Section 6: Summary Statistics

Percent correction from perfect visibility model

Stratum	Units Sampled	Total	Cows	Bulls	BABull	Calves	Spikes	Raghrn	AdBull
1	48	2.1	0.1	6.2	8.3	0.6	1.2	8.0	9.0
2	22	2.4	0.5	5.5	6.9	0.5	1.1	5.2	8.6
3	14	0.6	0.1	3.1	6.2	0.1	0.2	5.4	7.5
Total	84	1.6	0.2	5.3	7.5	0.4	0.8	6.7	8.5

[Total variances (i.e., standard error squared) are in parenthesis]

Total estimates...

11182	(1634125)	Total
5677	(666603)	Cows
3172	(51142)	Bulls
2152	(20477)	Branched-antlered bulls
2333	(83539)	Calves
1019	(17184)	Spikes
1268	(10938)	Raghrns
882	(3398)	Adult bulls
0	(0)	Unclassified

Proportions...

0.5078	(0.000368)	Cows
0.2836	(0.000587)	Bulls
0.1925	(0.000615)	Branched-antlered bulls
0.2086	(0.000037)	Calves

0.0912 (0.000005) Spikes
0.1135 (0.000239) Raghorns
0.0790 (0.000104) Adult bulls
0.0000 (0.000000) Unclassified

Ratios...

56 (40) Bulls per 100 Cows
41 (0) Calves per 100 Cows
18 (0) Spikes per 100 Cows
32 (4) Spikes per 100 Bulls
40 (0) Raghorns per 100 Bulls
28 (2) Adult bulls per 100 Bulls
68 (0) Branched-antlered bulls per 100 Bulls
47 (44) Spikes per 100 Branched-antlered bulls

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2018 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2018 - 5/31/2019

HERD: EL742 - RATTLESNAKE

HUNT AREAS: 23

PREPARED BY: HEATHER O'BRIEN

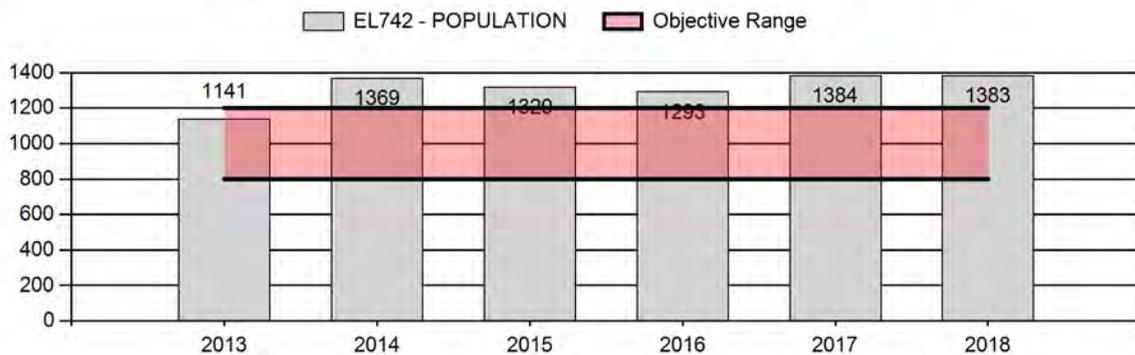
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	1,301	1,383	1,322
Harvest:	188	189	201
Hunters:	387	421	400
Hunter Success:	49%	45%	50%
Active Licenses:	409	456	440
Active License Success:	46%	41%	46%
Recreation Days:	3,316	4,262	3,600
Days Per Animal:	17.6	22.6	17.9
Males per 100 Females	46	31	
Juveniles per 100 Females	35	35	

Population Objective (± 20%) : 1000 (800 - 1200)
 Management Strategy: Recreational
 Percent population is above (+) or below (-) objective: 38%
 Number of years population has been + or - objective in recent trend: 27
 Model Date: 02/25/2019

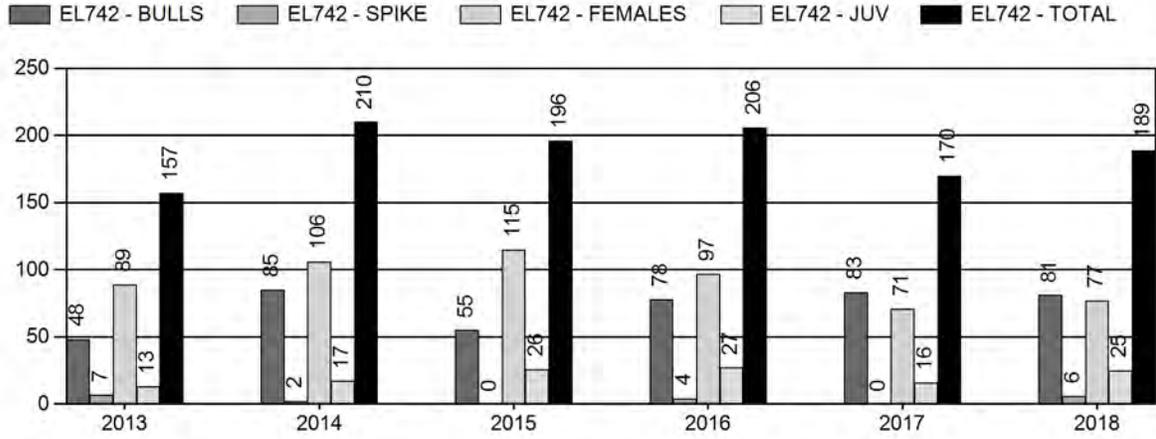
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	13.0%	12.5%
Males ≥ 1 year old:	25.2%	23.8%
Total:	13.2%	13.0%
Proposed change in post-season population:	-4.3%	-4.4%

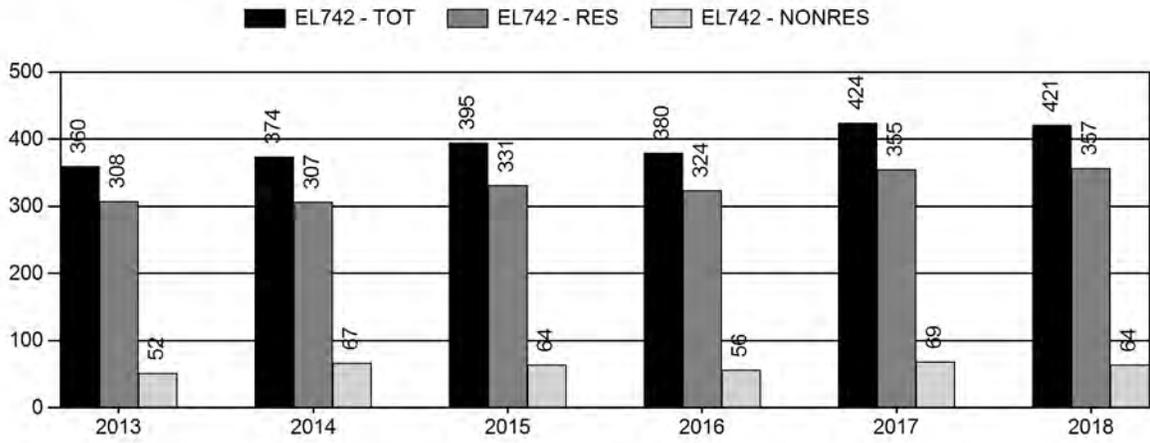
Population Size - Postseason



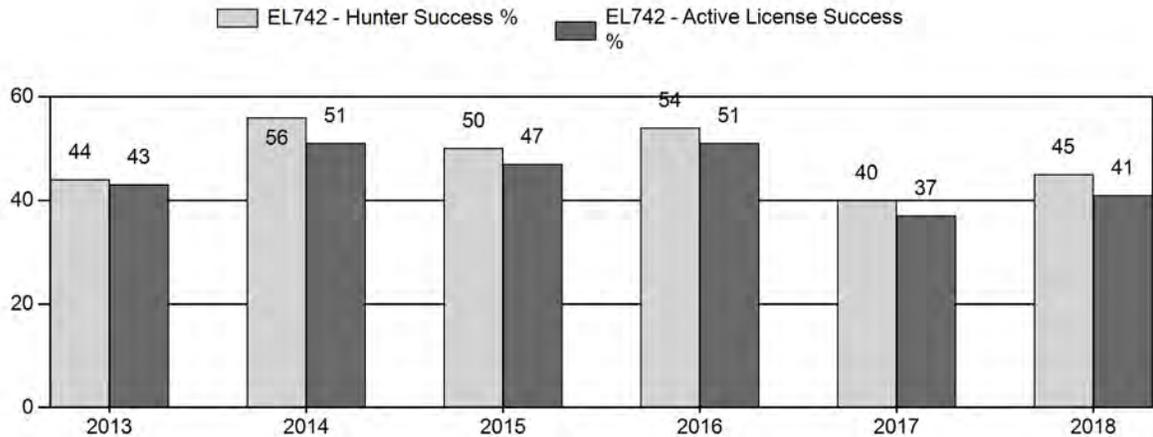
Harvest



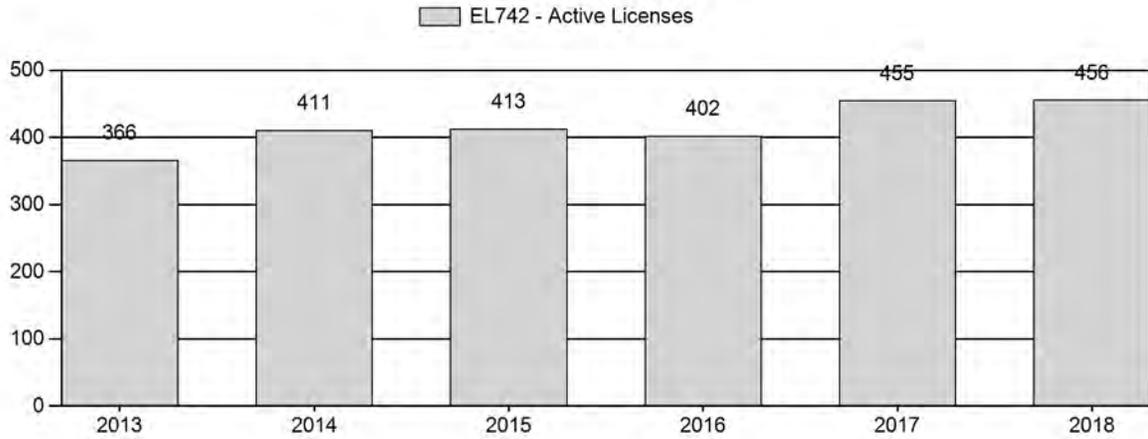
Number of Hunters



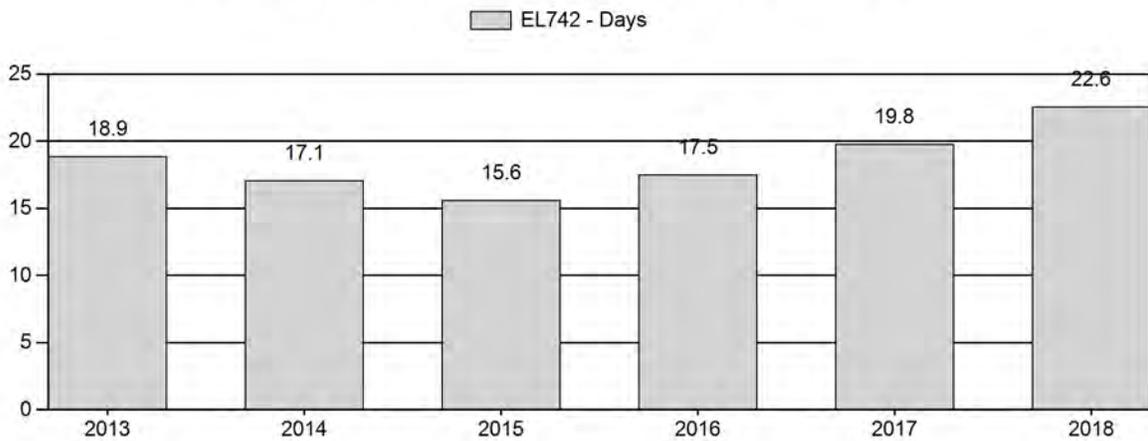
Harvest Success



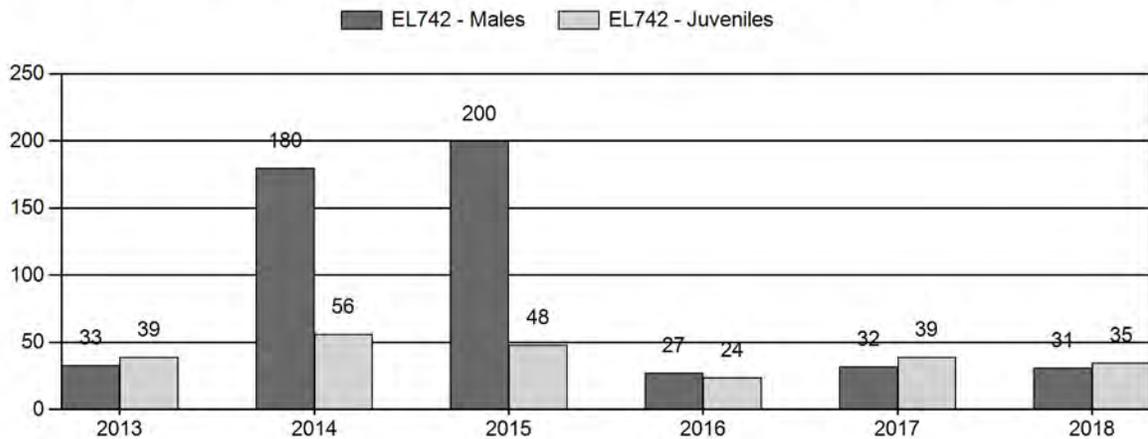
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL742 - RATTLESNAKE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	1,141	26	102	128	19%	390	58%	153	23%	671	479	7	26	33	± 3	39	± 3	30
2014	1,369	35	113	148	54%	82	30%	46	17%	276	406	43	138	180	± 28	56	± 12	20
2015	1,320	10	86	96	57%	48	29%	23	14%	167	390	21	179	200	± 42	48	± 15	16
2016	1,293	53	77	130	18%	478	66%	114	16%	722	395	11	16	27	± 2	24	± 2	19
2017	1,384	23	71	94	19%	295	58%	116	23%	505	375	8	24	32	± 4	39	± 4	30
2018	1,383	131	107	238	18%	776	60%	274	21%	1,288	441	17	14	31	± 1	35	± 1	27

**2019 HUNTING SEASONS
RATTLESNAKE ELK (EL742)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
23	1	Oct. 1	Oct. 31	150	Limited quota	Any elk
	1	Nov. 15	Dec. 15			Any elk
	4	Oct. 1	Oct. 31	125	Limited quota	Antlerless elk
	4	Nov. 15	Dec. 15			Antlerless elk
	6	Oct. 1	Oct. 31	200	Limited quota	Cow or calf
	6	Nov. 15	Dec. 15			Cow or calf
	7	Nov. 15	Dec. 15	50	Limited quota	Cow or calf
Archery						Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2018
23	1	No changes
	4	No changes
	6	No changes
	7	No changes

Management Evaluation

Current Postseason Population Management Objective: 1,000

Management Strategy: Recreational

2018 Postseason Population Estimate: 1,400

2019 Proposed Postseason Population Estimate: 1,300

2018 Hunter Satisfaction: 56% Satisfied, 20% Neutral, 23% Dissatisfied

The Rattlesnake Elk Herd Unit has a postseason population management objective of 1,000 elk. The herd is managed using the recreational management strategy, with a goal of maintaining postseason bull ratios of 15-29 bulls per 100 cows. The objective and management strategy were revised in 2012 and reviewed in 2017.

Herd Unit Issues

Hunting access within the herd unit is variable. The majority of occupied elk habitat is accessible for hunting via public land and Hunter Management Area access. However, there is one ranch within the central part of occupied habitat that does not allow any access for hunting and harbors the vast majority of elk within the herd unit. Hunters have expressed frustration when elk take refuge in this area, as they tend to remain there due to low hunter pressure and good forage conditions. The main land use within the herd unit is traditional ranching and grazing of livestock, with isolated areas of oil and gas development. There is the potential for future mining of precious metals and rare earth minerals in the hunt area, but current levels of activity are low. Disease outbreaks are not a current concern in this herd unit.

Weather

From 2013 to the present, weather trends have been generally favorable, and elk have fared well within the herd. Range conditions were particularly good from 2013 to 2015, when spring and summer moisture improved and winters were mild. The winter of 2015 was fairly average, though some areas experienced prolonged periods of persistent snow. The spring of 2016 had above average precipitation, but summer was extremely dry causing rangeland habitats to cure early. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided elk with a boost in nutrition going into the winter months. While there were several notable snow storms and cold snaps during the winter of 2016-2017, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. The 2017 growing season was very similar to the previous year, with ample spring moisture followed by a dry summer with little precipitation. Moisture improved during the fall, though there was little snow to speak of over the winter of 2017-2018. Elk dispersed widely over much of their range in the herd unit, and access for December hunters was very good. Precipitation was below average for the 2018 growing season, and many reservoirs became dry by late summer. Some sparse rain events provided some moisture during the fall months, but the 2018-2019 winter has been fairly mild in the herd unit. Thus far, the region has received average to below-average snowfall combined with many windy days to drift snow and open habitats for elk to access and forage. For detailed weather data see <http://www.ncdc.noaa.gov/gac/time-series/us>.

Habitat

This herd unit has no established habitat transects that measure production and/or utilization on vegetation preferred by elk. Anecdotal observations indicate late summer forage was in below average condition, but scattered precipitation may have improved fall forage for elk in 2018.

Harvested elk and those observed during November aerial surveys appeared to be in good body condition.

Field Data

Observed calf ratios are erratic in this herd unit due to varying classification survey conditions and levels of effort across years. Thus it is difficult to correlate changes in population size based on observed calf ratios and corresponding recruitment. In both 2017 and 2018, elk were classified from excellent video footage, and survey sample sizes exceeded the objective. The resulting calf ratios were also similar, with 39 and 35 calves per 100 cows, respectively. These results are likely more accurate than some previous years when survey conditions were not as optimal. These high calf ratios along with corresponding yearling bull ratios illustrate the capacity for this herd to grow rapidly. Managers continue to focus on maximizing cow harvest without over-saturating public lands with hunter pressure. Increases in cow license issuance are not warranted unless access improves and there are no large areas where elk can take refuge from harvest pressure.

Observed bull ratios are also highly erratic as a result of variable survey conditions and levels of effort from year to year. Since 2001, observed bull ratios have ranged from 13 to 58 per 100 cows during favorable survey years. Years with low observed bull ratios were followed by years with much higher observed ratios, indicating bulls were likely missed during classification surveys in some years and/or elk were immigrating/emigrating to and from adjacent hunt areas. In years when large cow/calf groups are missed during aerial surveys, resulting bull ratios appear to be artificially high. While real survey data in these years are reported in classification results; long-term averages are applied in the population model to represent more realistic bull ratios. Coverage during 2018 classification surveys was not as thorough as previous years due to budget constraints. Nevertheless, managers were fortunate to locate a good sample of adult bulls during surveys. The resulting bull ratio of 31 per 100 cows is similar to the previous year, and is considered a fair representation of real bull ratios within this herd. While license issuance and season structure changes in this herd are not typically based on observed classification ratios, current harvest pressure on bulls seems to be well tolerated. Future season structure should continue to maximize cow harvest while maintaining relatively good license success without overcrowding hunters.

Harvest Data

License success in this herd unit is typically in the 40th percentile and is fairly consistent, given license issuance and hunter opportunity have remained relatively similar across years. Hunter days per animal fluctuate from year to year, but this may be a function of changes in access due to weather and road conditions. The persistence of unattainable elk in the aforementioned private

land refugia most certainly contributes to increased hunter days, low harvest success, and low hunter satisfaction in most years. In 2018, large groups of cows and calves remained habitually on private lands with no hunting access. As a result, harvest success on antlerless and cow/calf licenses was relatively low (28%), but was markedly better on late-season cow/calf licenses (50%). This distinction seems to imply cow/calf distribution on public lands improved in late November and early December. Overall cow/calf harvest for 2018 was 102, which is near the 5-year average of 112. Bulls typically distribute themselves in smaller groups across favorable habitat on both public and private lands in the herd unit. Thus, harvest success on any-elk licenses is typically better compared to antlerless harvest. This was again the case in 2018, as harvest success was 63% on any-elk licenses, with 87 bulls harvested. Overall harvest success improved to 45% with 189 animals harvested, and was in line with the 5-year average of 49%.

Since 2013, late-season licenses have been valid in the adjacent Hunt Area 128, where portions of the herd sometimes migrate during the fall and winter months. Harvest success has declined for hunters with Area 23 licenses in recent years, and in 2018 only 3 cows were harvested by Area 23 hunters in Area 128. Managers feel that some hunters may be spending undue time searching in vain for elk in unsuitable habitats in Area 128. In an effort to refocus hunting pressure on antlerless elk in Area 23, late season licenses will no longer be valid in Area 128 for 2019. Late seasons will still run through December 15th to maximize opportunity for hunters to harvest an elk within the regular herd unit boundaries.

Population

The 2018 postseason population estimate was approximately 1,400 elk. No sightability or other population estimate data are currently available to further align the model in conjunction with classification and harvest data. There have been few complaints from landowners in recent years with regard to elk numbers. Harvest pressure and success have increased with longer seasons since 2013, but may also be dependent on weather and its effects on access and elk movements. It is difficult to determine how many elk may emigrate from the herd unit into adjacent areas, but managers believe this population to be relatively stable.

The “Time-Specific Juvenile – Constant Adult Survival – Male Survival Coefficient” (TSJ,CA, MSC) spreadsheet model was selected for the postseason population estimate of this herd. This population is difficult to model as it is small in size and appears to have consistent interchange with an adjacent herd, thus violating the closed population assumption of the model. High variability in observed bull and calf ratios also render this herd challenging to model. Long-term classification averages are used in years when adequate sample sizes are not reached during postseason surveys to avoid inaccuracies from high variability in the model. Trend count data are also included in the model to document higher numbers of elk that have been seen in some years

but could not be classified. The TSJ,CA and CJ,CA models were discarded, as they predict population sizes that are lower than observed survey totals. When juvenile survival was increased in years known to have mild winter conditions, the SCJ,CA model predicted a reasonable population size. However, the model applied the extreme lower survival constraint for juveniles and the upper survival constraint for adults, indicating poor model performance and quality. While the TSJ,CA,MSC model appears to be the best choice to represent the herd, it should be noted that this model frequently selected for the upper and lower juvenile survival constraints and selected the highest adult survival constraint, indicating that it is of poor quality. If the model continues to be troublesome and inaccurate in reflecting trends and known numbers of elk, managers may consider changing to trend-count based management for this herd.

Management Summary

Opening day of hunting season in this herd is traditionally October 1st, and closing dates have differed with changing harvest prescriptions from year to year. Season structure has also changed to include a split season in recent years to maximize cow harvest while extending opportunity for bull elk hunting. Longer split season dates with a closure from November 1 – 14 have been well-received the last five years by hunters, and have resulted in improved harvest success and totals. Since this has worked well, the same season structure is being implemented for 2019. The 4-week late cow season will be continued as a means to provide extended opportunity for those license holders. Goals for 2019 are to continue high harvest pressure on cows, maintain extended opportunity to hunt bulls, and maintain or improve overall harvest success.

If we attain the projected harvest of approximately 200 elk and assuming average calf production/survival, this herd should decrease slightly. The predicted 2019 postseason population estimate for the Rattlesnake Elk Herd is approximately 1,300 animals, or 30% above objective.

2018 - JCR Evaluation Form

SPECIES: Elk

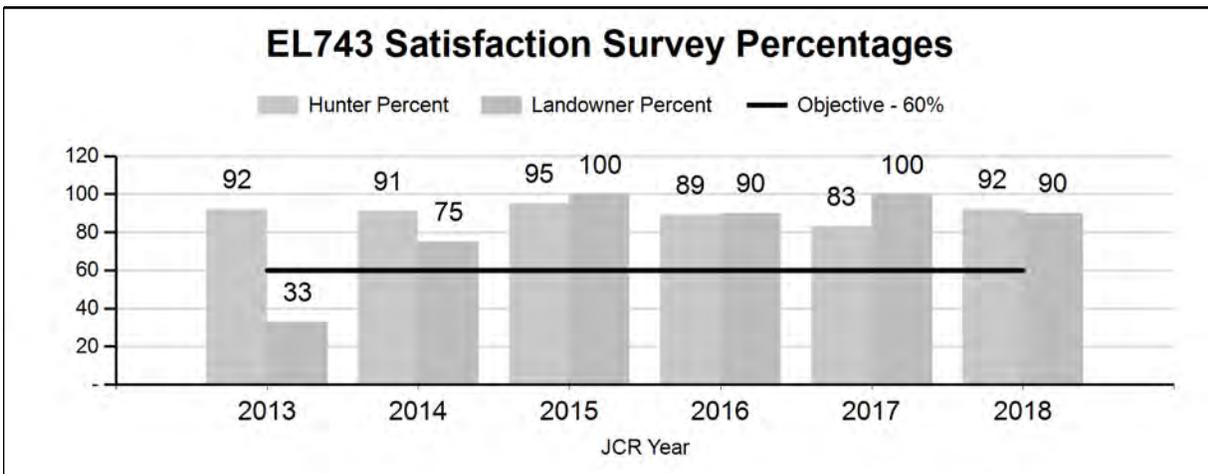
PERIOD: 6/1/2018 - 5/31/2019

HERD: EL743 - PINE RIDGE

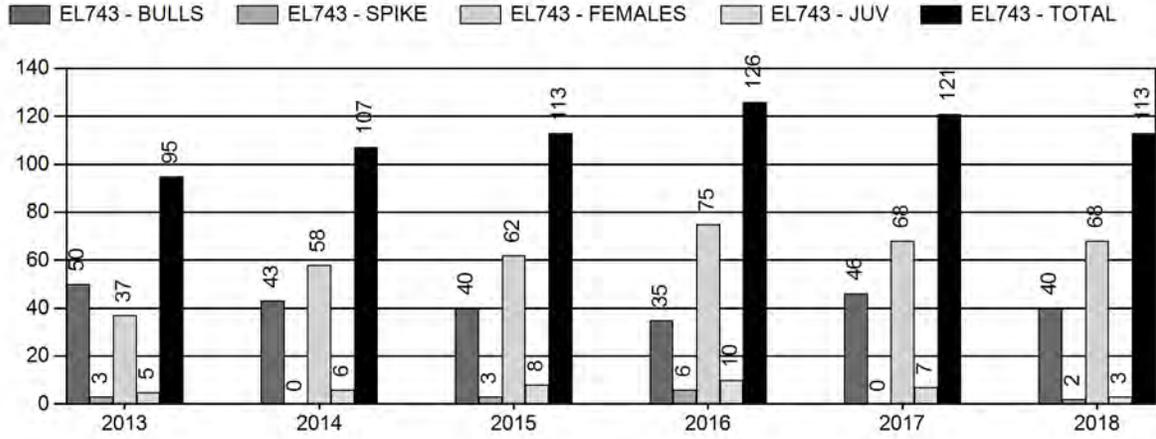
HUNT AREAS: 122

PREPARED BY: WILLOW BISH

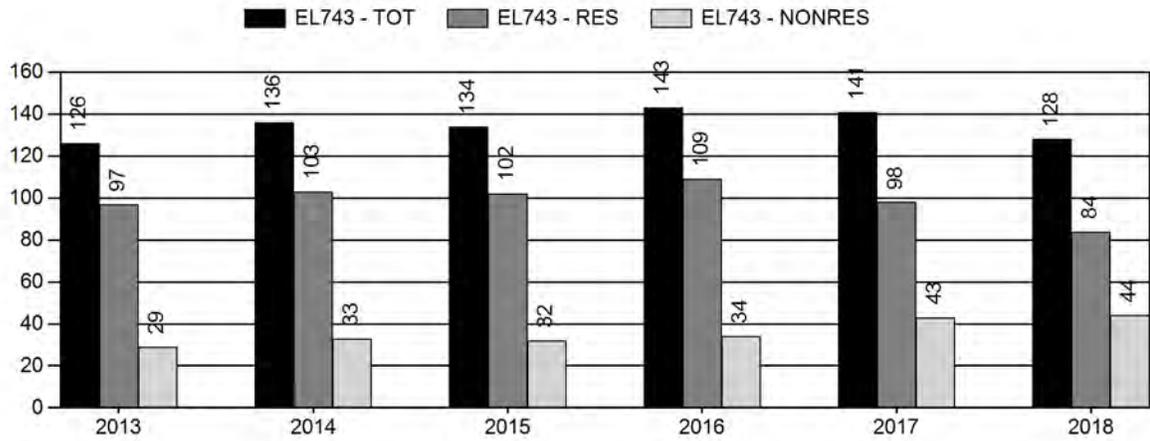
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Hunter Satisfaction Percent	90%	92%	90%
Landowner Satisfaction Percent	83%	90%	90%
Harvest:	112	113	125
Hunters:	136	128	130
Hunter Success:	82%	88%	96%
Active Licenses:	145	140	150
Active License Success:	77%	81%	83%
Recreation Days:	561	490	525
Days Per Animal:	5.0	4.3	4.2
Males per 100 Females:	0	0	
Juveniles per 100 Females	0	0	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			31%
Number of years population has been + or - objective in recent trend:			5



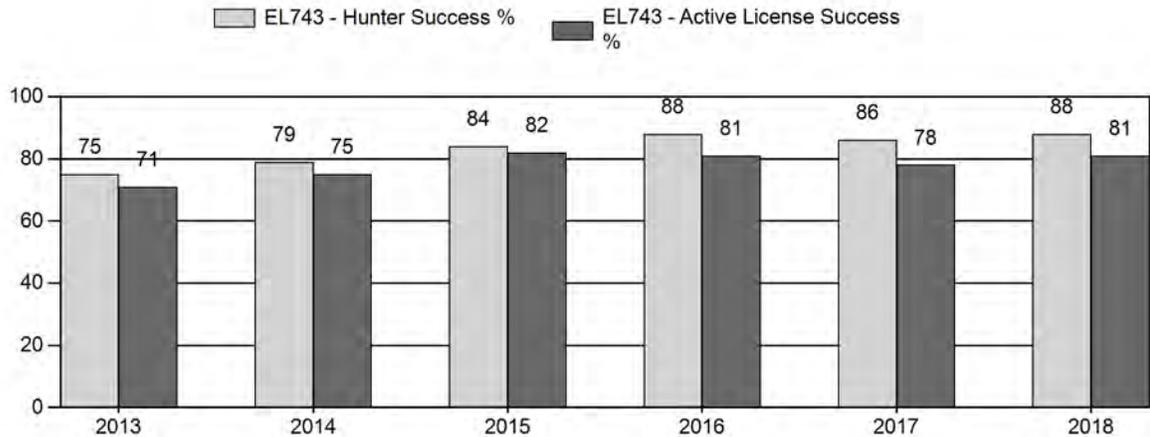
Harvest



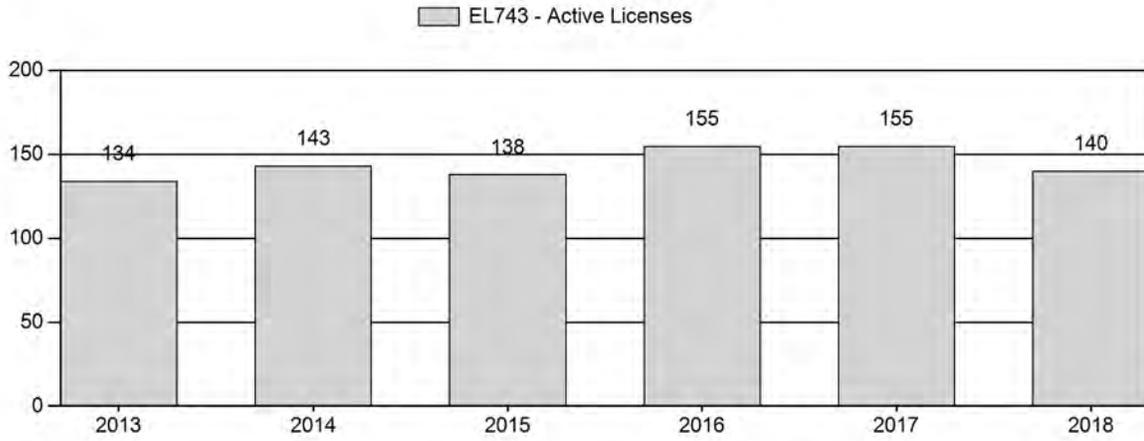
Number of Hunters



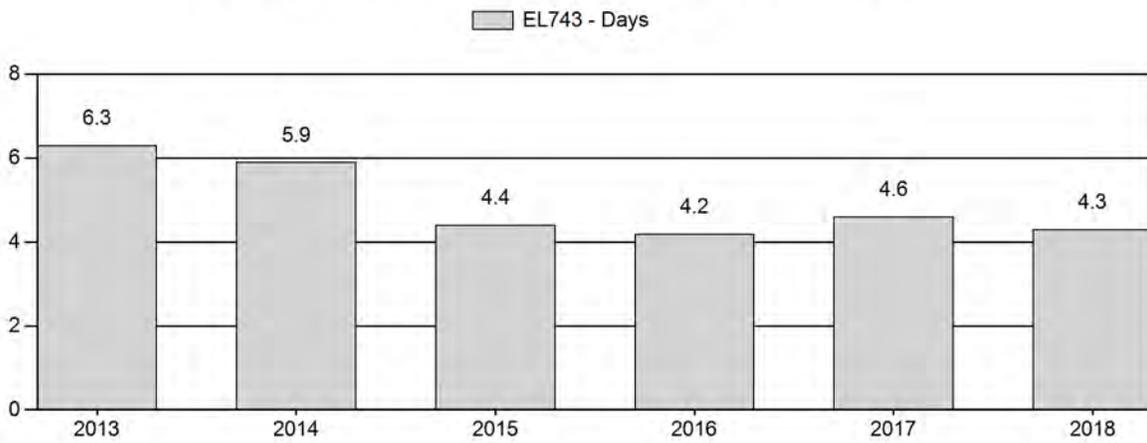
Harvest Success



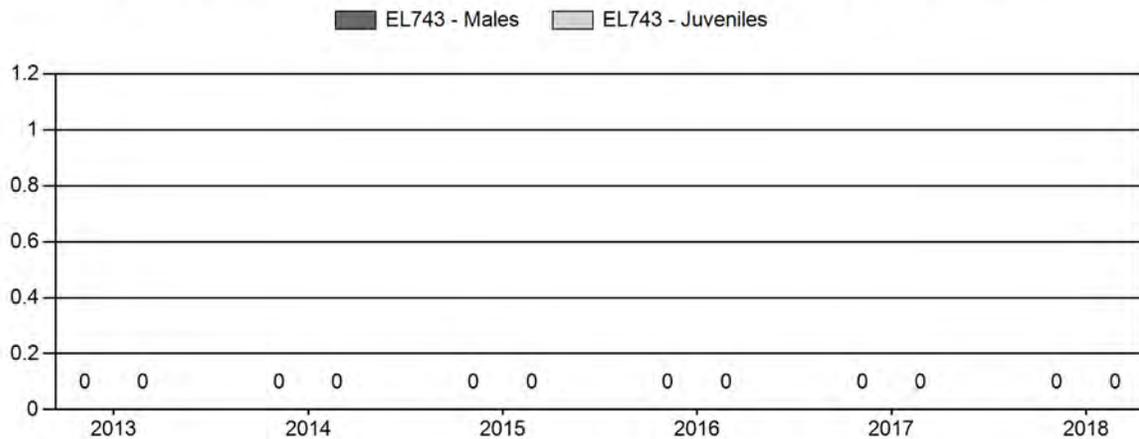
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



**2019 HUNTING SEASONS
PINE RIDGE ELK HERD (EL743)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
122	1	Oct. 15	Nov. 30	75	Limited quota	Any elk
		Dec. 1	Dec. 31			Antlerless elk
Archery	6	Oct. 15	Dec. 31	150	Limited quota	Cow or calf
		Sep. 1	Sep. 30			Refer to license and type limitations in Section 2

Management Evaluation

Current Hunter/Landowner Satisfaction Management Objective: 60% hunter/landowner satisfaction; bull quality

Management Strategy: Private Land

2018 Hunter Satisfaction Estimate: 92%

2018 Landowner Satisfaction Estimate: 90%

Most Recent 3-year Running Average Hunter Satisfaction Estimate: 88%

Most Recent 3-year Running Average Landowner Satisfaction Estimate: 93%

2018 Postseason Population Estimate: ~ 900 (*Field Estimate*)

2019 Proposed Postseason Population Estimate: ~ 900 (*Field Estimate*)

The Pine Ridge Elk Herd Unit has a management objective based on 60% or higher landowner and hunter satisfaction. As a secondary objective, managers strive to maintain a bull harvest consisting of 60% mature, branch-antlered bulls. This objective was revised in 2012, and was last reviewed in 2017. An objective based upon postseason population estimates was not feasible for this herd unit.

Herd Unit Issues

Nearly all elk in this herd reside in and along the timbered Pine Ridge escarpment in the north central portion of the herd unit. Land use consists of traditional ranching and livestock grazing mixed with areas of intensive oil and gas, wind, and uranium development. Access to hunting is tightly controlled by private landowners, and achieving adequate harvest to manage growth of this herd can be difficult, although it has been significantly improved in recent years. Given the private-land nature of this elk herd, the Department gives serious deference to landowner desires.

In past years, landowners have expressed dissatisfaction with growing elk numbers. However, the majority of landowners are now expressing satisfaction with current season structure, level of harvest, and elk numbers. Recently liberalized season structure, as well as increased commitment from landowners to harvest cow elk, have resulted in continually increasing harvest rates, which appear to be maintaining elk numbers.

Weather & Habitat

The Pine Ridge Elk Herd resides in relatively low-elevation habitat, and weather typically has minimal influence on elk productivity, survival and movements. In addition, there are no habitat or classification data collected in this herd unit given the Department's minimal management influence and budgetary constraints. Thus no meaningful analysis of weather and habitat data will be presented.

Field Data

Fixed-wing winter trend counts are conducted in this herd unit as budget and weather conditions allow. Past trend counts of this herd typically found between 150 and 350 elk. In 2013, a winter trend count conducted under optimum conditions found a total of 840 elk, indicating this herd was larger than previously believed. A trend count conducted in February 2014 found a total of 454 elk; however snow conditions were not ideal and elk were difficult to see bedded amongst exposed rocks and shrubs. In February 2015, a trend count yielded only 276 elk despite good survey conditions and thorough coverage. In November of 2015, field personnel attempted to conduct the trend count during deer helicopter classification flights, but were only able to locate 49 elk. In 2016, elk were counted during deer flights in November (total of 271 elk) as well as a trend count in February under ideal conditions (566 elk). In 2017, the trend count was conducted in November during helicopter deer flights only and yielded 648 elk. During deer flights in November of 2018, only 88 elk were seen, although field personnel placed more emphasis on finding mule deer. Field managers planned to conduct a fixed-wing flight in February to conduct a trend count but weather and availability issues prevented this from occurring. Based on past and current elk observations as well as landowner input, managers still estimate this herd likely numbers 800-1,000 elk.

Current information on this herd is somewhat limited given budget constraints and the private land nature of this herd. Despite these limitations, field managers and many landowners feel this population is stable. However, given typical calf ratios found in other central Wyoming herds (in the 40s), if the population is indeed at about 900 elk, the average level of harvest in this herd (5-year average of 75 cow/calves; 118 total elk), is not sufficient to curtail population growth. Managers therefore assume emigration may be occurring from this herd. There are few major geographical or anthropogenic barriers to elk movement in this area. Managers and landowners

routinely observe small groups of elk, particularly bulls, moving east from Pine Ridge, often crossing Highway 59. If significant emigration is occurring, this herd unit may not be properly defined if interchange is exceeding 10%. However, lack of specific information regarding these elk movements precludes re-defining the herd unit boundaries at this time.

Landowner and hunter satisfaction surveys are used to gauge management of the Pine Ridge Elk Herd. Annual survey results must show at least 60% of hunters were either “satisfied” or “very satisfied” with the previous year’s hunting season. In addition, landowner surveys must show at least 60% or more respondents are satisfied with elk numbers in their area. Should these satisfaction thresholds not be met, changes in management should be prescribed to address reasons for dissatisfaction. A secondary objective is also used in the Pine Ridge Elk Herd Unit to anchor the results of satisfaction surveys to a population parameter. In this case, age class targets are determined from the harvest survey and used as a measure of bull quality. The percentage of mature branch-antlered bulls in the male portion of the annual harvest is used, with a 3-year average of 60% minimum being the threshold for management action.

In the past, Pine Ridge landowners were mailed surveys to provide feedback on the elk population and hunting season structure. However, landowners expressed preference for in-person meetings, phone calls, or visits in recent years as opposed to the survey. Many landowners also did not return their surveys resulting in low sample sizes for landowner satisfaction. Therefore, field managers have found that discussing their satisfaction with the population and asking for opinions regarding season structure has been much more constructive. Group meetings have been held every year in recent years, but given the level of satisfaction landowners have expressed in recent years regarding elk seasons and preliminary discussions between field managers and landowners which did not indicate that any changes were desired, field managers called or visited Pine Ridge landowners individually to discuss seasons and populations.

For the 2018 season, 90% of landowners (N=10) contacted by Department personnel were satisfied. The one landowner who reported a lack of satisfaction has only recently become engaged in elk management. This landowner reported sentiments similar to concerns in the past from other Pine Ridge landowners. Field managers believe that relationship building and education regarding elk management, license allocation, hunting access etc., and resulting improved efforts from landowners to harvest cow elk have adequately addressed satisfaction issues in the past and will continue to do so in the future.

In 2018, 92% of hunters who returned surveys were “satisfied” or “very satisfied” with their hunting experience in the Pine Ridge Elk Herd Unit. For the secondary objective, the three-year average for mature bulls in the harvest was 92%. Landowner satisfaction, hunter satisfaction, and the percentage of mature bulls in the harvest all exceeded the 60% threshold for bio-year 2018.

Harvest Data

Hunter success has remained high for the last 5 years (79-95%). In the past, antlerless elk licenses were undersubscribed as landowners were unwilling to allow access for cow hunters. However, landowners have recently become more willing to allow hunting access and harvest more elk. A majority of Type 6 licenses were available as leftovers after the initial drawing in 2018, and 27 remained unsold. Despite the unsold licenses, total harvest was the second highest it has ever been in 2018 with 113 elk harvested. Of these, 63% were cows or calves. In years prior to 2013, total harvest was typically somewhere between 45 and 50 elk. Since 2012, there has been a steady increase in total harvest, ranging from 95 to 126 elk.

Perceived loss of bull quality was also a concern amongst certain landowners in the past. However, landowners in recent years agreed that bull quality was still high and that a quota of 75 Type 1 licenses being issued was desirable. License success on the Type 1 license averaged 74% in the last 5 years and was 79% in 2018. Antlerless harvest has comprised 7 – 20% of the Type 1 harvest in the past 5 years, which is most likely a result of increased landowner efforts to harvest cows rather than a lack of bull availability. In 2018, 95% of bulls harvested were branch-antlered bulls which is comparable to the previous 5-year average of 94%.

Management Summary

The hunting season in this herd unit opens on October 15 and closes on December 31. In recent years, closing dates and quotas have been extended as landowners agreed to liberalize access for cow elk hunting later in the season. Type 1 license issuance will remain at 75, and Type 6 license issuance at 150. Harvest levels in Pine Ridge have improved in recent years, although Type 6 licenses have remained undersubscribed at current issuance. Therefore, landowners and managers feel that it is not necessary to add more licenses. Under-subscription can be attributed to landowners feeling as though they are near capacity with the number of hunters they can allow to hunt. Having Type 6 license issuance remain at 150 licenses will enable landowners to achieve more harvest if conditions allow in the future. While a few landowners still feel this herd should be reduced, many are satisfied with the current population, given it has stabilized in recent years and population growth appears to have halted. Therefore, management goals for 2019 are to continue to maximize harvest to limit population growth and allow for population reduction if conditions and landowner tolerances for hunters permit.