

2014 - JCR Evaluation Form

SPECIES: Elk

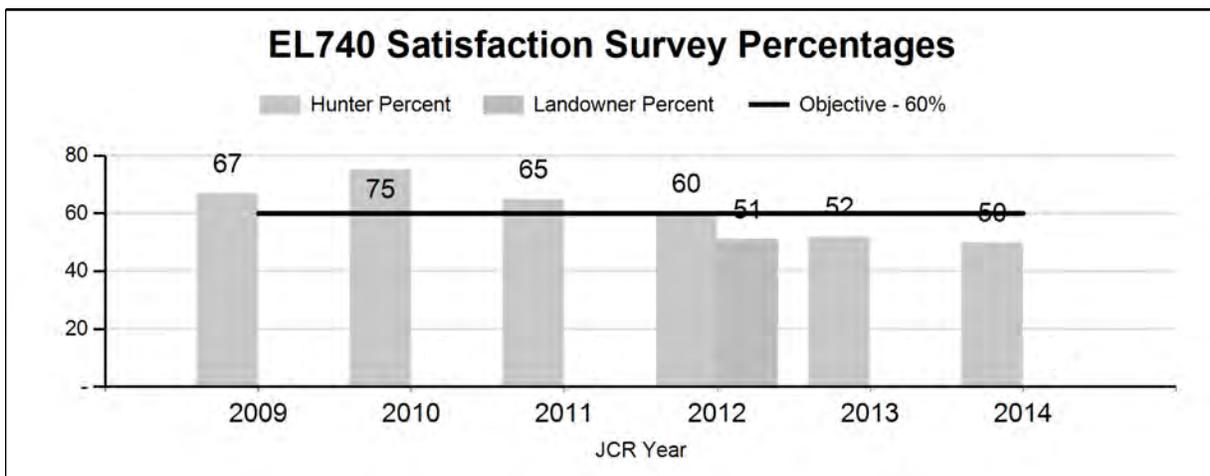
PERIOD: 6/1/2014 - 5/31/2015

HERD: EL740 - BLACK HILLS

HUNT AREAS: 1, 116, and 117

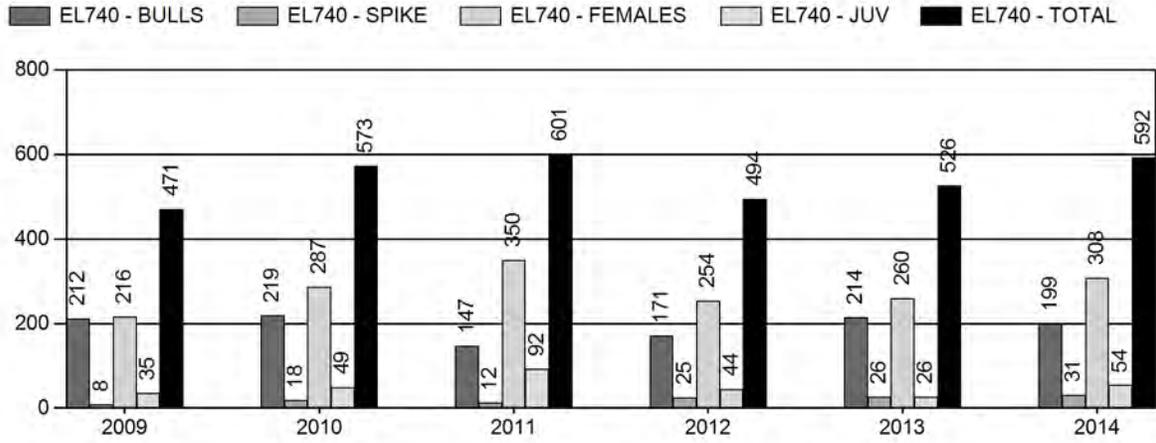
PREPARED BY: JOE SANDRINI

	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Hunter Satisfaction Percent	62%	50%	60%
Landowner Satisfaction Percent	51%	48% ¹	50%
Harvest:	533	592	600
Hunters:	1,257	1,740	1,750
Hunter Success:	42%	34%	34%
Active Licenses:	1,309	1,848	1,850
Active License Success:	41%	32%	32 %
Recreation Days:	13,648	18,220	18,000
Days Per Animal:	25.6	30.8	30
Males per 100 Females:	29	<i>n/a</i>	
Juveniles per 100 Females	33	<i>n/a</i>	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			<i>n/a</i>
Number of years population has been + or - objective in recent trend:			

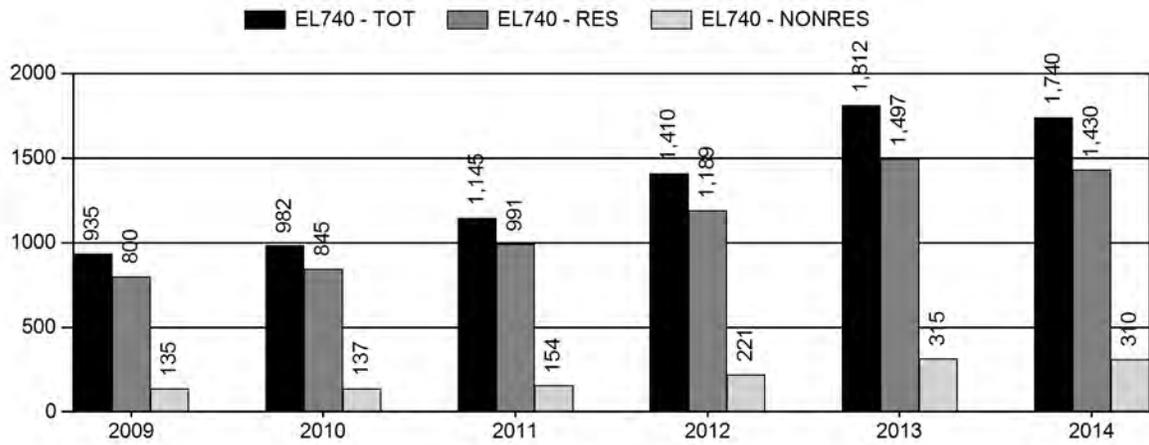


¹ Based upon individual contacts with 30 Landowners in Jan. & Feb. 2014

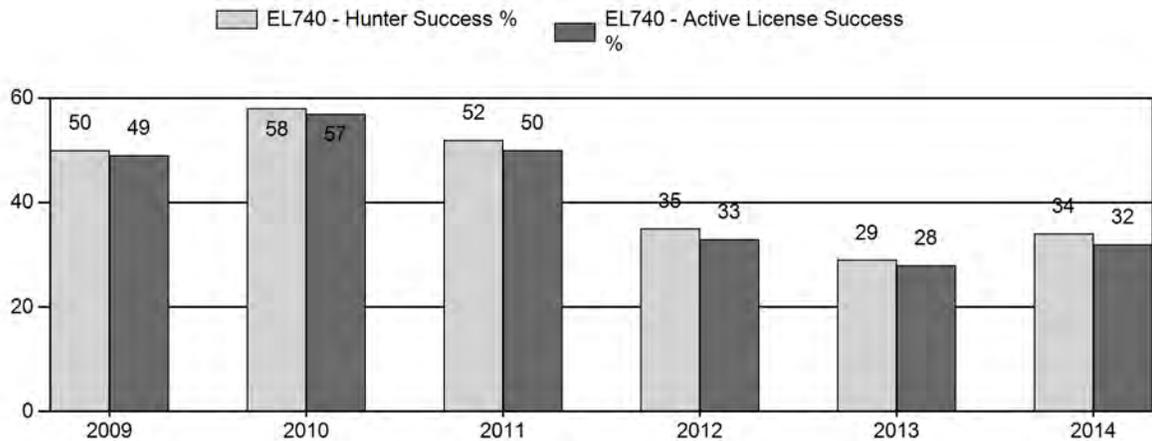
Harvest



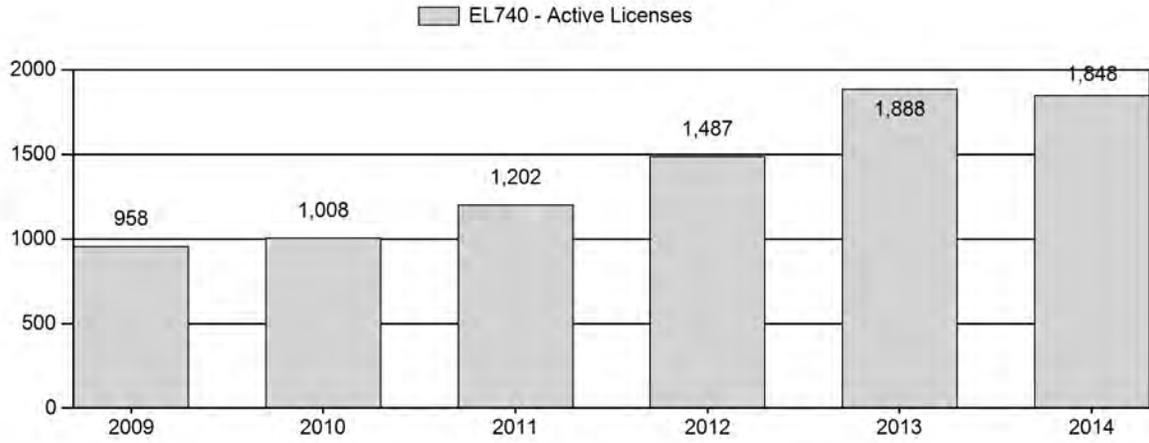
Number of Hunters



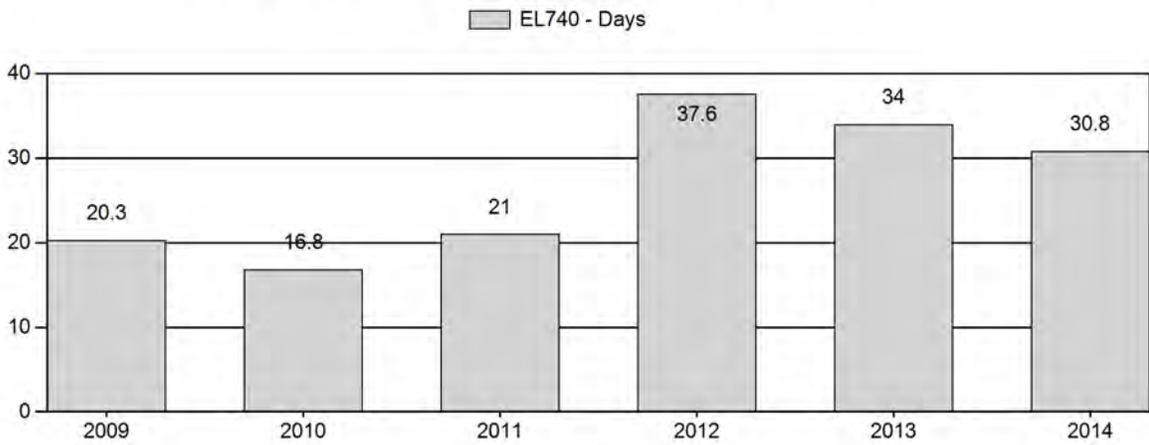
Harvest Success



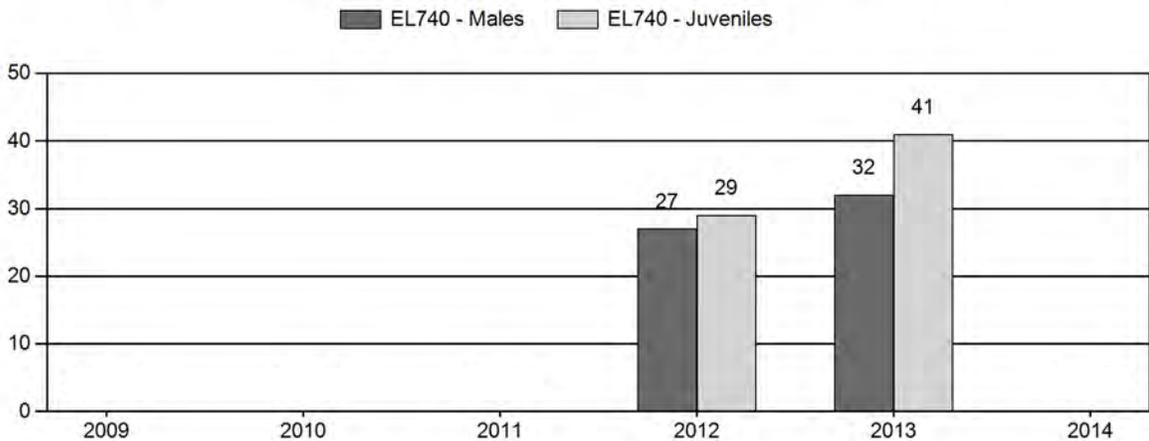
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



**2015 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	6	Oct. 15	Jan. 31	250	Limited quota	Cow or calf
116	8	Aug. 15	Oct. 14	50	Limited quota	Cow or calf valid off national forest
117	1	Oct. 15	Nov. 30	275	Limited quota	Any elk
117	1	Dec. 1	Jan. 31			Unused Area 117 Type 1 licenses valid for antlerless elk
117	4	Oct. 15	Jan. 31	250	Limited quota	Antlerless elk
117	6	Oct. 15	Jan. 31	250	Limited quota	Cow or calf
117	8	Aug. 15	Oct. 14	50	Limited quota	Cow or calf valid off national forest

Special Archery Season Hunt Areas	Season Dates	
	Opens	Closes
1, 116, 117	Sep. 1	Sep. 30

SUMMARY OF CHANGES IN LICENSE NUMBER

Hunt Area	Type	Change from 2014
Herd Unit Totals	1	none
	4	none
	6	none
	8	none

Management Evaluation

Current Hunter/Landowner Satisfaction Management Objective: 60% landowner & hunter

Management Strategy: Private Land

Secondary Management Strategy: Age distribution of harvested bulls

2014 Hunter Satisfaction Estimate: 50%

2014 Landowner Satisfaction Estimate: 48% ¹

Most Recent 3-year Running Average Hunter Satisfaction Estimate: 54%

Most Recent 3-year Running Average Landowner Satisfaction Estimate: 50%

2014 Postseason Population Estimate: ~ 2,500 (*Field Estimate*)

2015 Proposed Postseason Population Estimate: ~ 2,500 (*Field Estimate*)

HERD UNIT ISSUES: The Black Hills Elk Herd Unit has a management objective 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% that are ½ to 2 years old; 60% that are 3 to 5 years old; and 20% that are 6 years old, or older (\pm 5% in all categories). These management objectives and strategies were adopted in 2013.

We can neither construct a population model, nor generate a population estimate for this herd as the Department has never 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 population models. Consequently, no attempts have been made to model this population since 1996. Instead, this herd was managed in an ad hoc fashion over the past decade and a half to provide ample recreational opportunity and address depredation complaints. Across the herd unit, elk management has been hampered due to constrained access to private land for elk hunting. Consequently, non-numerical management objectives were adopted in 2013. Field personnel anecdotally estimate Wyoming's Black Hills elk population to have numbered about 2,500 at the close of the 2014 hunting season.

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 either in time or space. Rather, they tend to move about depending upon range conditions, snow depth and human activity, with some areas seeing regular elk use and other areas 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 95% public land, and represents the largest contiguous block of public land extensively inhabited by elk. Elk do occur on other portions of the Black Hills National Forest and dispersed sections of State and other federally owned lands. However, elk use, and consequently harvest, in those areas are not consistent.

¹ Based upon recorded contacts with 30 landowners in Jan. & Feb., 2014.

Landowner satisfaction with elk numbers was first quantified in the spring of 2013, as we prepared to move the herd unit objective away from a numerical value. At that time, 167 Black Hills landowners, who had elk on their property at least occasionally, were mailed a short survey with a prepaid return envelope to gauge their satisfaction with elk numbers and support for moving to a non-numerical objective. A total of 71 landowners responded, and 60% noted they were satisfied, very satisfied, or neutral with respect to elk numbers in the Black Hills. However, Department criteria for satisfaction at the time did not consider “neutral” respondents, which is unfortunate because these individuals are not expressing specific dissatisfaction with elk numbers. Therefore, a value of 51% was recorded as the 2012 bio-year landowner satisfaction measure. During the first two months of 2014, 30 large landowners who regularly harbor elk, allow some level of hunting and often experience conflict with elk were contacted individually by Department personnel. In all, 48% of these landowners reported being either satisfied or very satisfied with elk numbers. In this survey, respondents were given the choice of “no opinion” instead of “neutral.” While the widespread mail sample of 2013 captured many non-traditional landowners and folks who experience little in the way of elk damage, one on one visits in 2014 focused on more traditional, ranching landowners.

The criteria used to gauge landowner satisfaction have recently been modified. During bio-year 2014, Wildlife Division Administration formalized measurement of satisfaction for landowners by deciding that those reporting elk numbers are at, or about at, desired levels are satisfied, while those reporting numbers to be above or below desired levels are unsatisfied. No landowner satisfaction survey data meeting these standards were collected during bio-year 2014. The adopted management framework for this herd indicates 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, or an annual meeting with “key” landowners are to be conducted on non-survey years.²

In this herd unit, it is difficult to broadly quantify landowner satisfaction because numerous properties are small by Wyoming standards, and many not dependent on agriculture for profit. A significant portion of these type of landowners enjoy having elk around and would like to see more, as would other non-traditional landowners who have purchased larger tracts for hunting. On the other hand, there are more traditional ranching landowners negatively impacted by elk and frustrated with the damage they cause. As such, these two contingents are diametrically opposed in what they desire in the way of elk numbers. The end result is conflict not only between the disparate positions, but with Department satisfaction criteria based desired elk numbers, as both situations contribute equally to quantified dissatisfaction.

In the normal course of duties, Department field personnel contact landowners on an almost daily basis. While these visits did not quantify Department satisfaction criteria specific to elk numbers during bio-year 2014, no strong feelings relative to changing elk management were expressed. In fact, no elk damage claims were made in either the Sundance or Moorcroft game warden districts. To the south, the two claims filed in the Newcastle district were essentially continuations of previous, similar claims spawned in retaliation for law enforcement actions.

² See “Final Black Hills Herd Unit and Population Review” adopted by the Dept. and Commission in 2013.

Overall, field personnel report landowners to be rather ambivalent about elk in 2014; with some noting occasional conflicts with elk; others expressing real satisfaction with numbers and hunt quality; and a fair number north of I-90 noting changes in distribution that led to fewer elk in traditional locations and elk where none have been previously seen. To sum it up, the Department did not get any serious complaints from landowners about the elk numbers or season structure. Damage concerns exist in some places, but with elk moving onto un hunted private land adjacent to damage areas, or moving into South Dakota, this low level situation is unlikely to change.

The Black Hills elk herd unit boundary has been revised several times over the past 30 years as hunt area boundaries were altered. The most recent change came in 2013, when HA 116 was expanded in order for the herd unit to encapsulate the Wyoming Black Hills ecosystem, and allow general license hunting. Future changes in hunt area boundaries are not anticipated. The herd's seasonal range map was updated in February, 2014 using field observations, contacts with landowners, and the knowledge of local Game & Fish personnel to delineate ranges. Delineation of crucial winter and winter ranges were not made at this time due to the lack of data required to define them.

WEATHER: Drought conditions, which were generally persistent throughout the Black Hills between 2000 and 2006, began to moderate some in 2007. Between 2007 and 2011, annual temperatures were near or below the previous 30-year average and annual precipitation each year was at or above that average (<http://www.ncdc.noaa.gov/cag/time-series/us>). Notably, 2010 was colder and wetter than both the 30-year and 100-year averages, and the winter of 2010-11 severe. Overall, the predominant weather pattern between 2007 and 2011 was characterized by generally cool summers, more persistent snow cover in late fall and winter, and above normal spring moisture. This combination of average winter weather and fair forage conditions seemed to have been neither detrimental, nor beneficial for Black Hills elk; but did result in some localized depredation complaints in late December and early January each year.

Drought returned to the Black Hills in 2012, with well above normal summer temperatures and little rainfall during the growing season. Forage production that year was very poor, and the dry conditions led to several large wildfires in the southern half of the herd unit. These warm and dry conditions continued through the 2012-13 winter (<http://www.ncdc.noaa.gov/cag/time-series/us>). Spring of 2013 finally saw a break in this pattern when temperatures dropped below normal and good precipitation was again received. As the growing season progressed, temperatures were above average and precipitation well above normal. This resulted in excellent forage growth. In early October, 2013 winter storm Atlas blanketed the Black Hills with anywhere from about a foot of wet heavy snow near Newcastle, to over five feet near Cement Ridge. The remainder of the 2013 fall and the 2013-14 winter brought very close to average temperatures and snow fall, which resulted in continuous snow cover over much of the Black Hills until late May. Spring weather in 2014 was similar to the previous year with temperatures just below normal and about 20% more precipitation than average. This was followed by a summer with close to average temperatures and precipitation about 25% above normal. This yielded a second year in a row of excellent forage production. To date, the 2014-15 winter has been generally mild with below normal to near normal amounts of snowfall in most locations.

Based on weather and habitat conditions over the past seven years, elk have likely entered the winter in good condition, except during 2012. This assertion is supported by data collected from radio collared cow elk along the Wyoming / South Dakota Stateline that revealed calf survival was lower in 2012 (0.65, $n = 37$, $SE = 0.04$) compared to 2013 (0.76, $n = 34$, $SE = 0.08$); and pregnancy rates of cow elk were significantly reduced in 2013 compared to 2012 [0.93 ($n=40$) in 2012 and 0.66 ($n=43$) in 2013] (Simpson unpublished). Overall, closer to average winter temperatures and precipitation since 2007, punctuated by occasional severe weather, has likely increased winter stress on elk compared to the previous 8-year period (2000-2007). In summary, recent weather patterns have been generally favorable for elk. However, fluctuations in weather patterns such as the 2012 drought and a few significant snow events have exacerbated elk damage at times.

HABITAT: The Black Hills is the western most extension of many eastern plant species. These species are often 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 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 BBNF and significant amounts of private land in this ecosystem. These fires have been beneficial for elk by creating early successional plant communities and increasing available forage. However, there are no habitat evaluation or vegetation surveys located within this herd unit related directly to elk forage or cover.

Elk habitat quantity and quality are good, but security areas may be decreased or lacking in areas due to high road densities. High 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 cover in areas and numerous roads, the elk population significantly expanded through the 1990's and into the early years of the next decade. Several factors have benefited this population. First, herbaceous forage is abundant, and wildfires have increased this forage. Second, despite high road densities, much of the land inhabited by elk is privately owned. This private land experiences limited human activity, so roads there may not significantly impact elk. Many of these same private land areas provide elk refuge from hunting pressure during the fall. The USFS has also increased the number of road closures on the Black Hills National Forest over the past 10-years, and adopted a revised travel management plan in 2010, although enforcement of closures is lax.

FIELD DATA: Collection of classification data was suspended in 1996, and only occasionally are limited classification data garnered during other field activities. In December of 2013, 230 elk were classified in HA 117 yielding a calf:cow ratio of 41:100; a mature bull:cow ratio of 18:100 with a yearling bull:cow ratio 12:100 and total bull:cow ratio of 30:100. A similar sample in 2012 revealed an almost identical mature bull:cow ratio and a slightly reduced yearling bull:cow ratio, but a 30% lower calf:cow ratio. These data mirror larger samples collected in the Black Hills of South Dakota by SDGF&P, and are pretty similar to the other, limited and incidental classification data collected in Wyoming over the past decade. SDGF&P collects pre-season

classification data on elk in the Black Hills every year, and since 2003 these data have consistently yielded calf:cow ratios near 50:100, and more variable bull:cow ratios, which have averaged 30:100 (South Dakota Department of Game, Fish and Parks, 2015).

While classification data are lacking, tooth age data have been collected from harvested elk since 1987.³ Tooth age data can estimate annual recruitment by considering the percentage of yearlings in the female segment of the harvest (Figure 1). Since 1987, this figure has averaged⁴ 16.4% (std. dev. 8.0%) suggesting 10 to 20 yearling bulls and 10 to 20 yearling cows are normally added per 100 adult cows into this population annually. However, recruitment of yearling elk has declined since 2000. Between 1987 and 1999, as this herd grew rapidly, older age classes of female elk were well distributed throughout the harvest and there was an increasing percentage of yearling cows represented in the harvest. However, this trend reversed itself beginning in 2000 (Figure 1). A Student's T-Test indicates yearling recruitment was significantly higher between 1987 and 1999 when there were an average of 20% yearlings in the female harvest, versus an average of 11% after 2000 ($p=0.0002$).⁵ Since 2000, with significantly increased license issuance and extended hunting seasons, there has been a general increase in the percentage of harvested female elk over age 5 and a decline in the percentage of young (≤ 2 years old) females taken, while the relative percentage of mid-aged cows has remained fairly stable (Figure 2). This trend, while less pronounced, has generally continued over the past five years.

Of course there is greater hunter selectivity when it comes to take of bulls. Since 2000, tooth age data have revealed a slight decline in the relative percentages of both middle-aged (3-5 year old) and young (≤ 2 years old) males in the bull harvest, with a slight increase in the percentage of older bulls (6^+ years old) harvested (Figure 3). However, since 2008, this trend has begun to shift, as a greater proportion of younger bulls (≤ 5 years old) have been harvested. Over the past 10 years, bull hunter success has remained unchanged in HA 117 (where the bulk of the tooth age data are returned) while antlerless hunter success has generally increased. Taken with the disparate increases in any elk versus antlerless elk license issuance here, it makes sense that we have impacted the antlerless segment of the herd more than the mature bull segment. This is evident in the shift towards harvesting older cows and could be elevating bull:cow ratios. If this population has stabilized or is declining, one would expect to see an increase in the percentage of younger aged bulls harvested, as availability of older bulls declines, while bull:cow ratios remain static or increase. It does appear we may be shifting harvest pressure on to younger-aged bulls (Figure 3 & Table 1). If these recent trends continue, our ability to meet our secondary objective may become difficult without reductions in Type 1 license issuance.

³ Budgetary constraints prevented tooth age data collection in 2002 & 2003.

⁴ Omitting 1990 data reduces this average to 15.3% with a std. dev. 6.2%.

⁵ Including 1990 data in T-test yields a significant difference ($P=0.0002$) with $Mean_{(1987-1990)}$ of 22%; and $Mean_{(2000-2013)}$ of 10.8%.

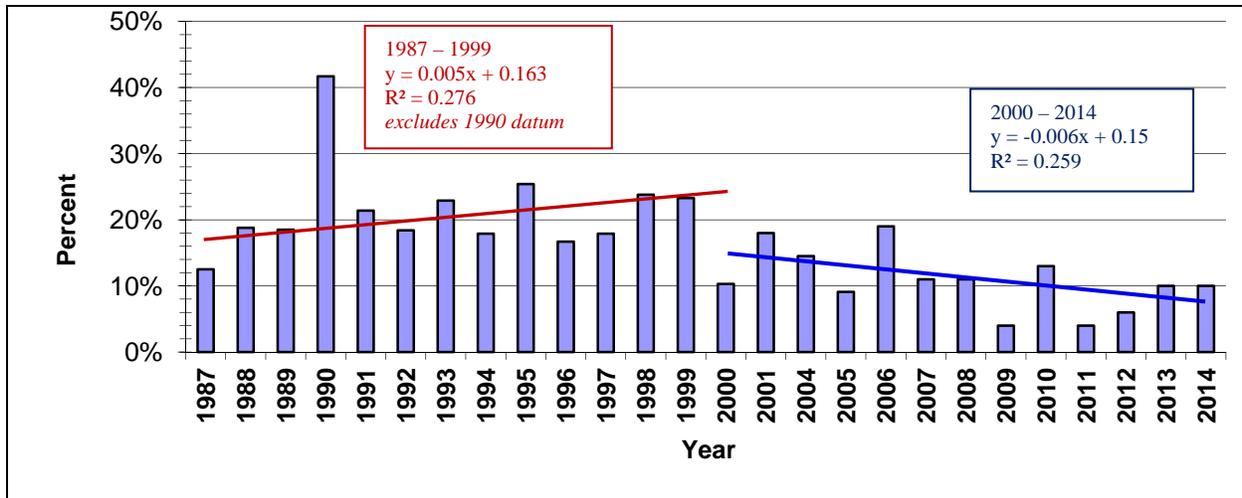


Figure 1. Percentage of yearlings in the female segment of the elk harvest (1987 – 2014).

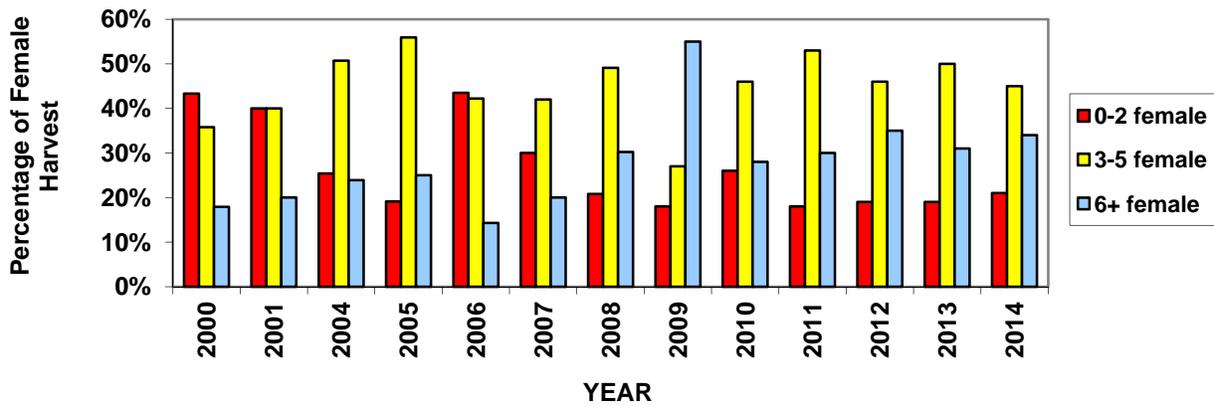


Figure 2. Relative percentages of various age classes of female elk harvested (2000 – 2014).

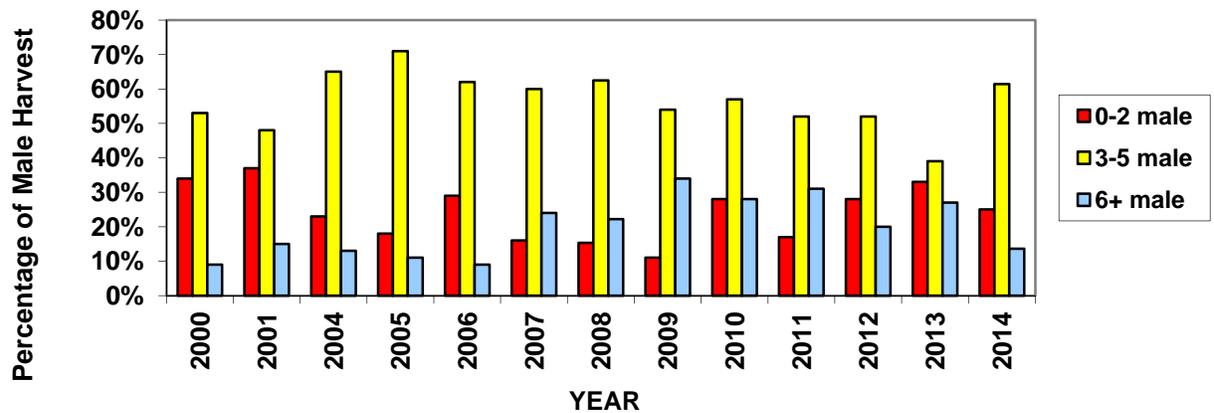


Figure 3. Relative percentages of various age classes of male elk harvested (2000 – 2014).

HARVEST: The low number of yearling females present in the harvest in recent years suggests reduced recruitment, as does the fact elk are not pioneering into unoccupied habitats as they once were. However, while adequate harvest may be achieved some years south of I-90, poor success by hunters pursuing female elk in HA 116 is likely allowing that portion of the herd to grow. This stems from a few landowners restricting access to the majority of elk during the hunting season. However, between 2008 and 2012 it was difficult to gauge total take and the potential rate of increase north of I-90 because a substantial portion the herd unit moved into general license HA 129. Due to harvest survey constraints, there was no way to determine how many elk were harvested from that part of the herd unit formerly included in HA 129, which is now in general license HA 116. Conservative elk management in South Dakota, coupled with known interstate movements, further confound these data. Consequently, over the years, the bulk of tooth age data have returned from HA 1 and 117, any decrease in recruitment should only be ascribed south of I-90.

Segment of Bull Harvest	Objective	2012	2013	2014
Bulls 0-2 yrs. old	20%	28%	33%	25%
		3 yr. mean		29%
Bulls 3-5 yrs. old	60%	52%	39%	61%
		3 yr. mean		51%
Bulls 6+ yrs. old	20%	20%	27%	14%
		3 yr. mean		20%

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

Limited quota license issuance and harvest are positively correlated within this herd unit. Between 1992 and 2002, license issuance increased exponentially while harvest increased more linearly. Between 2002 and 2010 changes in harvest were not as disparate with changes in license issuance. But, over the past three years, license issuance again has substantially outpaced increases in harvest. Consequently, hunter success has dropped. Overall, active hunting licenses have increased about 250% since 1999, while harvest increased a bit more than 100% (Figure 4). Access to private land for hunting remains limited and field personnel have great difficulty placing the increased number of hunters, many of whom make repeated phone calls to local game managers and landowners without securing a place to hunt.

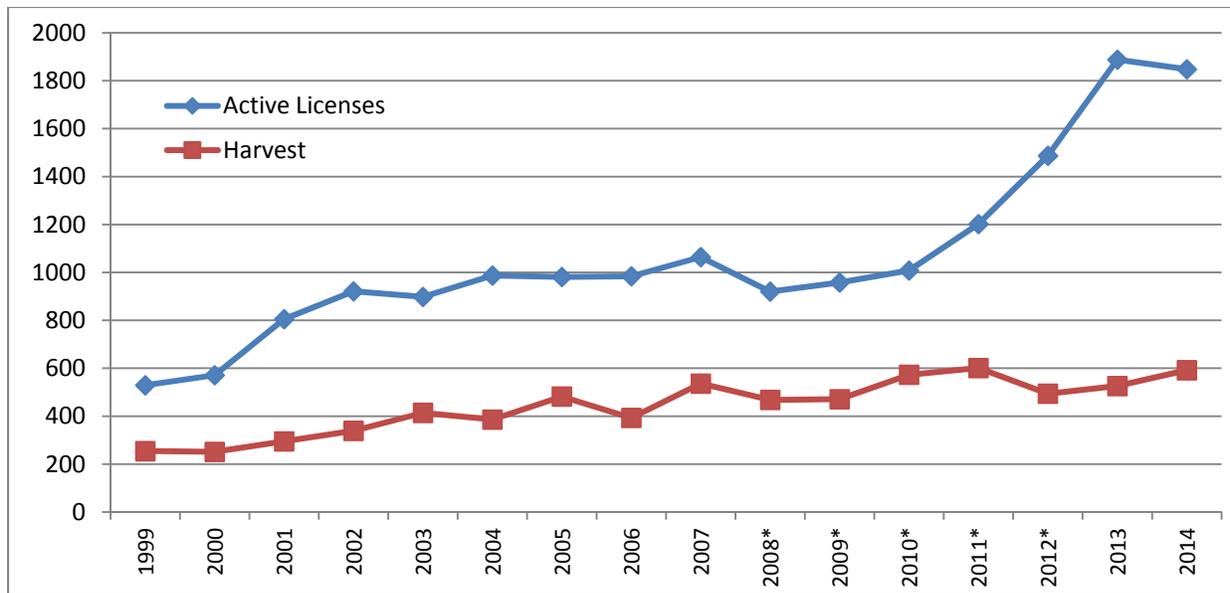


Figure 4. Active hunting licenses & elk harvest in the Black Hills Herd Unit (1999 – 2014). *Note, between 2008 and 2012 large portions of Hunt Areas 116 & 117 were put into General License Hunt Area 129 and active license numbers not captured. In 2013 these areas were included in Hunt Area 116.

Elk harvest bounced back to predicted levels in 2014, as weather conditions allowed hunters easier access to elk compared to 2013, which was severely impacted by winter storm “Atlas.” We believe the approximately 25% relative increase in hunter success in 2014 compared to 2013 was due more to this than any changes in elk number.

Statewide, at the herd unit level, elk hunter success is highly correlated with reported hunter satisfaction (84% in 2013, and over 90% in previous years). In 2013, HA 116 moved from limited quota license hunting to a liberal general license season combined with a significant number of reduced priced cow/calf licenses, which did not sell out in the draw. This resulted in a large number of license holders hunting the small amount of accessible public land, where few elk reside or were harvested. This same scenario played itself out in 2014. Consequently, hunter success on general licenses was only 17% in 2013 and 15% in 2014; and active license success on all cow/calf licenses about 42% in 2014, with total active license success in Hunt Area 116 running about 22% each of the past two years. These poor success rates are reflected in low hunter satisfaction in HA 116. Only 47% of the HA 116 elk hunters reported being satisfied or very satisfied with their hunt in 2013.⁶ These figures bias the herd unit hunter satisfaction numbers low as well, since about 55% of the hunters at the herd unit level were sampled from HA 116. In contrast, during 2013, hunter satisfaction in HA 1 and HA 117 was 63% and 56%, respectively. In these two hunt areas, hunter satisfaction was within a couple percentage points of that reported in 2012, but these values were still below the 64% reported for both areas in 2011, when hunter satisfaction and success were the highest in recent years.

Given average yearling recruitment of 30 yearling elk per 100 cows (based upon 15% yearling cows in total cow elk harvest) and assuming a pre-season herd composition of 40 bulls per 100

⁶ 2014 hunter satisfaction data not available until 19 March, 2015

cows and 47 calves per 100 cows (based on SDGF&P data), the 2014 estimated harvest of 624 total elk (including 582 adult elk) would have removed the annual recruitment of yearlings from a total population of just over 3,600 elk. Therefore, based upon anecdotal population estimates, the 2014 harvest should have at minimum kept the number of adult elk in this herd at its current level, or reduced it. However, several hundred elk (perhaps nearly 1,000 head) regularly cross the Stateline, and a significant number of these winter in South Dakota making it difficult to determine what effect harvest is having on our post-season population.

POPULATION: Despite the lack of a population estimate, indications are elk numbers increased quite a bit over the past 30 years. The population appeared to increase rapidly during the 1990's and early part of the next decade when elk significantly expanded their distribution. Silvicultural practices and wildfires throughout the region have created habitat favorable for elk. Although habitat changes have continued to favor elk in recent years, they have not continued to pioneer into previously unoccupied areas. Harvest statistics and tooth age data also suggest population growth may have been curbed recently, at least south of Interstate Highway 90 (I-90). Given the high quality habitat in the region and limited access to hunt elk on private land, this population will likely continue to exhibit growth potential in areas where limited hunter take, due to access constraints, thwarts efforts to obtain adequate harvest.

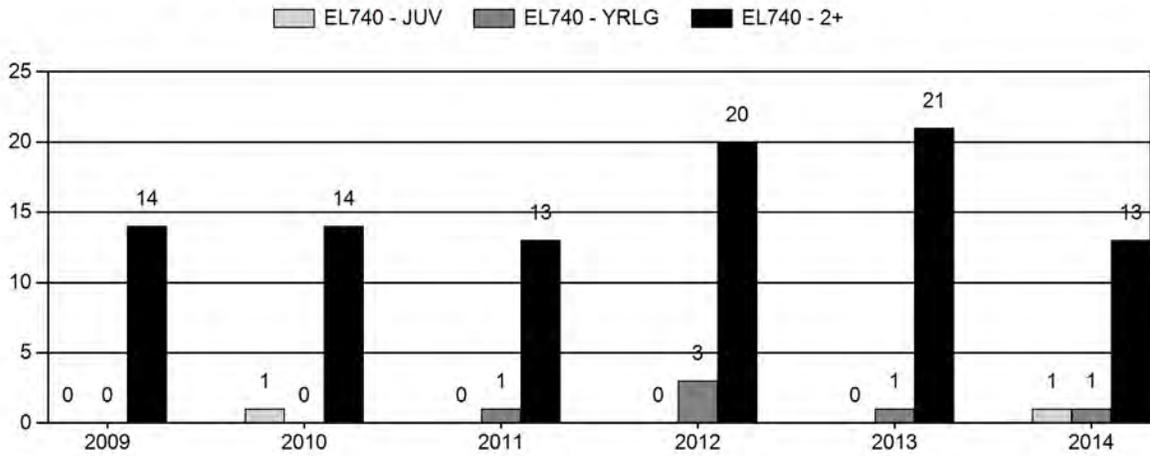
MANAGEMENT SUMMARY: Changes implemented during the 2013 Black Hills elk hunting season included expanding HA 116 to include all of the lands within Wyoming's Black Hills ecosystem previously enrolled in HA 129, and hunting this area under a combination of General and Type 6 and 8 cow/calf licenses. Also, because hunter success and satisfaction had dropped south of I-90, issuance of all license types in HA 1 and HA 117 were reduced as well. It is also important to note that while only 48% of the landowners surveyed in 2014 were satisfied with elk numbers, a whopping 82% did not want a change in license numbers and several expressed dissatisfaction with the long hunting season. This statistic bears out the fact that while many traditional landowners complain about elk numbers, few are willing to allow hunting at the levels needed to significantly reduce this population. As a result, no changes to the hunting season structure have been implemented since 2013. This strategy seems to be reducing or holding elk numbers in check where there is adequate access for hunting, but may be allowing subherds in areas without adequate hunter access to increase.

Given mean hunter participation and success rates over the past decade and a half, the 2015 harvest should result in about 600 elk. This harvest estimate is predicated on a similar number of elk being harvested from HA 116 on general licenses and continued average success rates in other hunt areas. However, the long season for antlerless elk hunting in HA's 116 and 117 (five and a half months) could increase antlerless harvest above predicted values if access to elk improves. If projected harvest levels are reached, elk numbers should decline south of I-90, while elk numbers north of the Interstate may stabilize or increase. Based on an estimated preseason herd composition of 47:100:40 (calf:cow:bull) and a recruitment rate of 30 yearling elk per 100 cows, a harvest of 600 total elk (or about 550 adult elk), would remove the annual yearling recruitment from a herd of about 3,400 elk (all age classes), a number well above what field personnel believe to be present at this time.

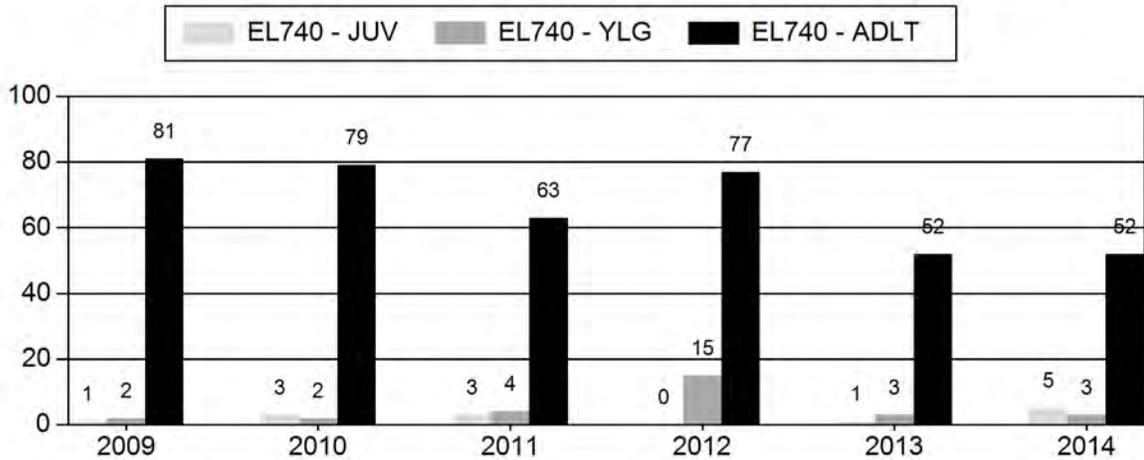
Literature Cited

South Dakota Department of Game, Fish and Parks. 2015. South Dakota Elk Management Plan 2015-2019. Completion Report 2015-01. South Dakota Department of Game, Fish and Parks, Pierre, South Dakota, USA.

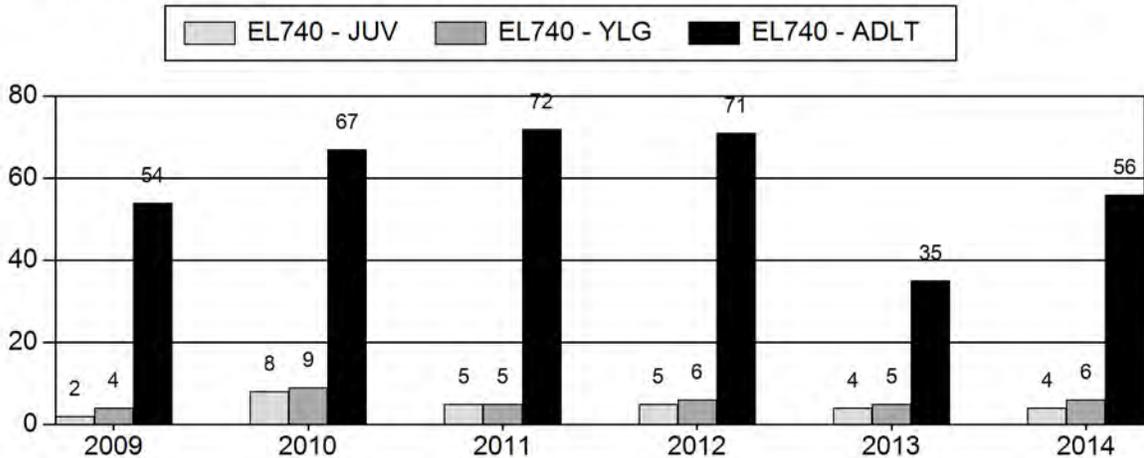
Age Structure of Field Checked Males



Age Structure Data (Field and Laboratory) - Male



Age Structure Data (Field and Laboratory) - Female



2014 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2014 - 5/31/2015

HERD: EL741 - LARAMIE PEAK/MUDDY MOUNTAIN

HUNT AREAS: 7, 19

PREPARED BY: HEATHER O'BRIEN

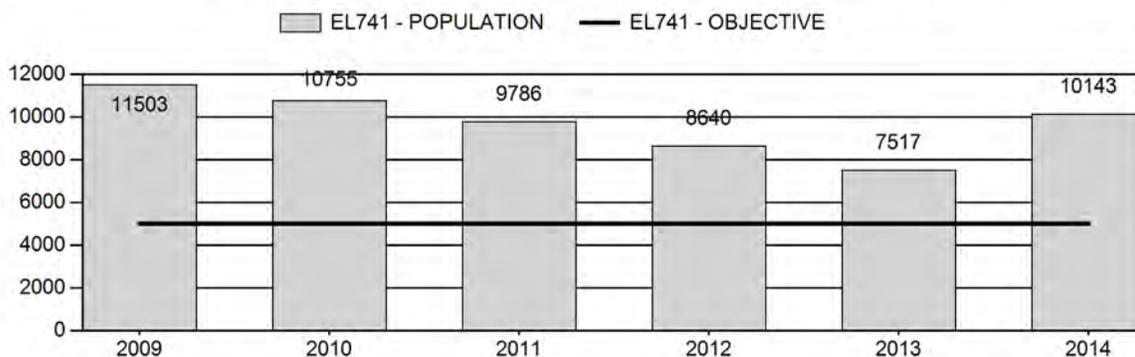
	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Population:	9,640	10,143	8,420
Harvest:	2,293	2,561	2,295
Hunters:	4,529	4,728	4,500
Hunter Success:	51%	54%	51%
Active Licenses:	4,607	4,824	4,600
Active License Success:	50%	53%	50%
Recreation Days:	36,346	35,110	36,400
Days Per Animal:	15.9	13.7	15.9
Males per 100 Females	34	25	
Juveniles per 100 Females	37	37	

Population Objective ($\pm 20\%$) :	5000 (4000 - 6000)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	103%
Number of years population has been + or - objective in recent trend:	14
Model Date:	3/10/2015

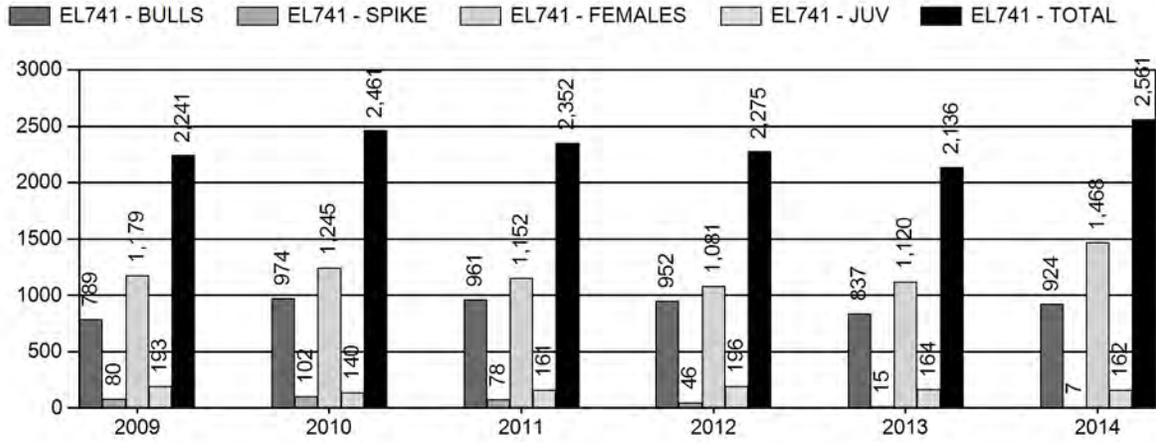
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	20.5%	20.0%
Males ≥ 1 year old:	27.5%	32.0%
Juveniles (< 1 year old):	6.7%	8.4%
Total:	19.7%	21.0%
Proposed change in post-season population:	-14.5%	-17.0%

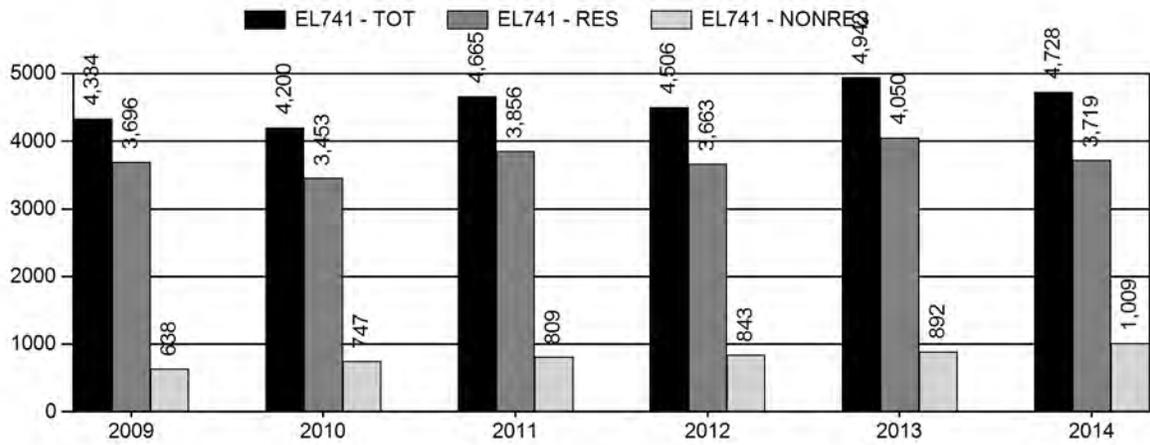
Population Size - Postseason



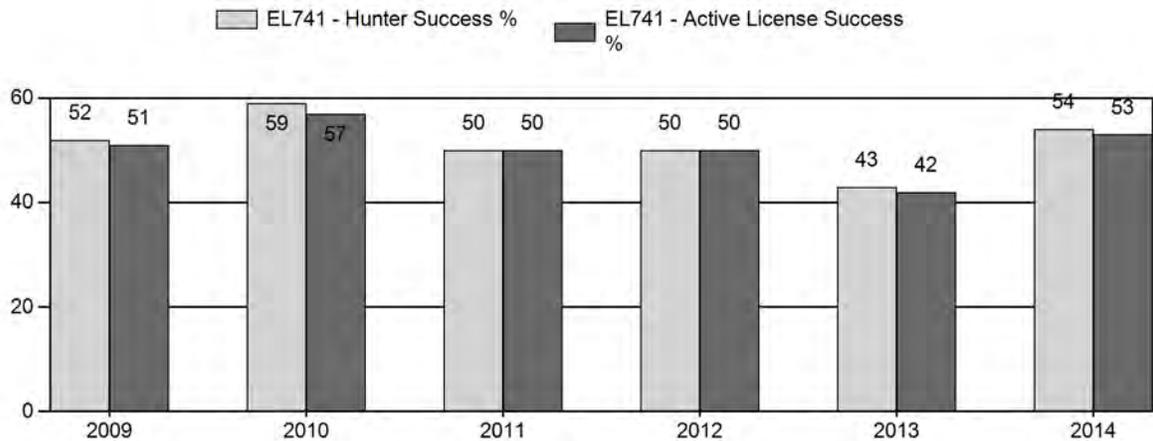
Harvest



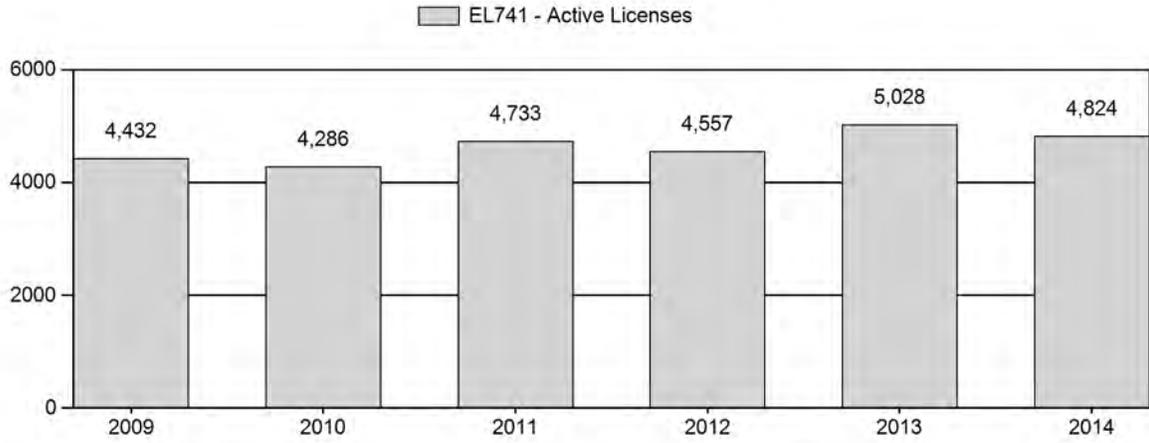
Number of Hunters



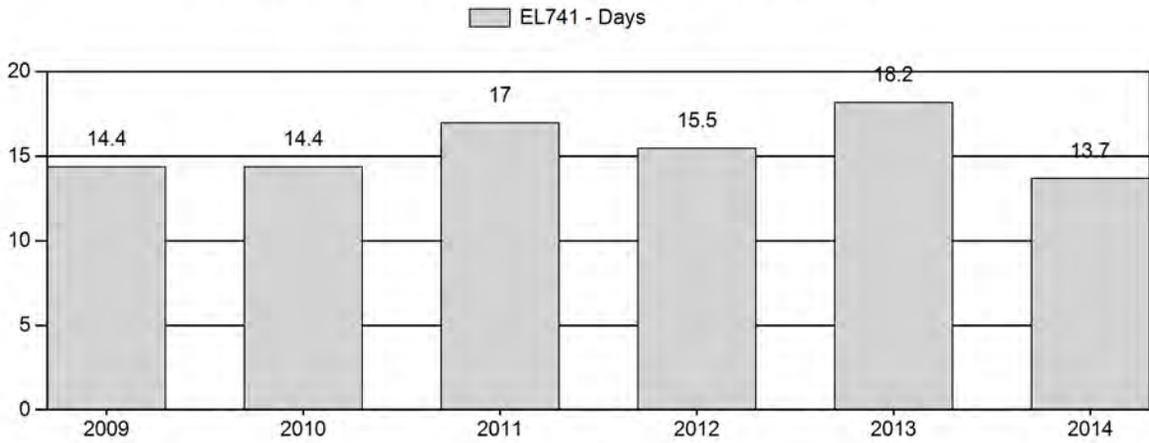
Harvest Success



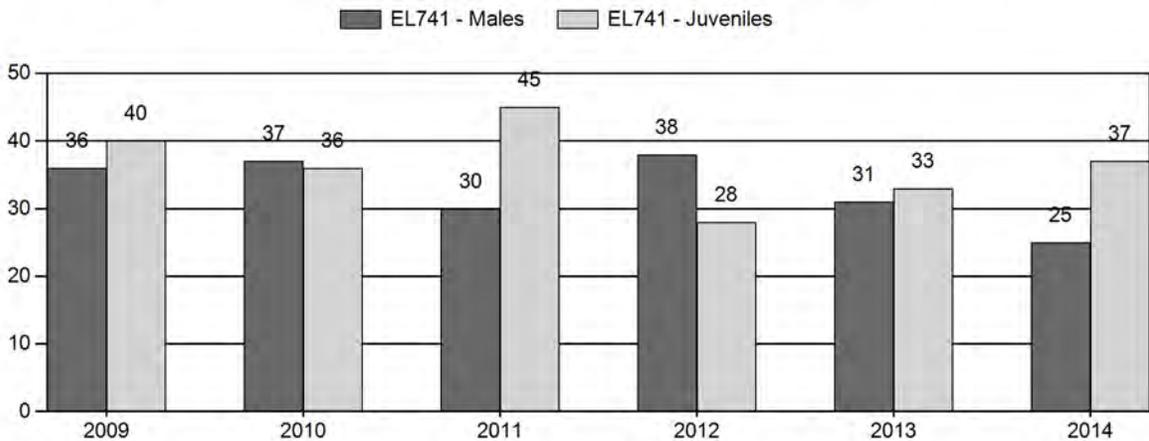
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2009 - 2014 Postseason Classification Summary
for Elk Herd EL741 - LARAMIE PEAK/MUDDY MOUNTAIN

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	11,503	259	572	831	21%	2,281	57%	908	23%	4,020	607	11	25	36	± 2	40	± 2	29
2010	10,755	475	639	1,114	21%	3,020	58%	1,094	21%	5,228	545	16	21	37	± 1	36	± 1	26
2011	9,786	324	548	872	17%	2,890	57%	1,298	26%	5,060	539	11	19	30	± 1	45	± 1	35
2012	8,640	143	362	505	23%	1,334	60%	379	17%	2,218	617	11	27	38	± 2	28	± 2	21
2013	7,517	328	487	815	19%	2,605	61%	869	20%	4,289	535	13	19	31	± 1	33	± 1	25
2014	9,743	383	468	851	15%	3,454	62%	1,270	23%	5,575	592	11	14	25	± 1	37	± 1	30

**2015 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			Unused Area 7 Type 1 licenses valid for antlerless elk
	4	Oct. 15	Dec. 31	800	Limited quota	Antlerless elk
	6	Aug. 15	Oct. 14	2,200	Limited quota	Cow or calf valid in Platte County and on private land in Albany and Converse Counties
		Oct. 15	Dec. 31			Unused Area 7 Type 6 licenses valid in the entire area
	7	Jan. 1	Jan. 31	500	Limited quota	Cow or calf
	19	1	Oct. 1	Oct. 14	150	Limited quota
2		Nov. 1	Nov. 20	150	Limited quota	Any elk
4		Oct. 1	Oct. 14	125	Limited quota	Antlerless elk
5		Nov. 1	Jan. 31	125	Limited quota	Antlerless elk
6		Oct. 1	Oct. 14	225	Limited quota	Cow or calf
		Nov. 1	Jan. 31			Unused Area 19 Type 6 licenses
		Nov. 21	Jan. 31			Unused Area 19 Type 1, Type 2 and Type 4 licenses valid for antlerless elk
Archery		Sep. 1	Sep. 30			Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2014
7	1	0
	4	-450
	6	+450
	7	0
19	1	0
	2	0
	4	0
	5	0
	6	0
Total	1	0
	4/5	-450
	6	+450
	7	0

Management Evaluation

Current Postseason Population Management Objective: 5,000

Management Strategy: Special

2014 Postseason Population Estimate: 10,100

2015 Proposed Postseason Population Estimate: 8,400

2014 Hunter Satisfaction: 68% Satisfied, 17% Neutral, 14% 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 last reviewed in 2013, when managers and landowners agreed to maintain both the population objective and the special management strategy for bulls.

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 and hunter management areas greatly expands access to 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. 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 at low prevalence (8% in 2012 hunter-harvested elk).

Weather & Habitat

The summer of 2012 was the driest on record since 1904 in much of Wyoming. Extensive wildfires displaced and redistributed elk, especially in the east-central portion of the herd unit. The severe drought and resulting wildfires likely impacted calf survival, as post-season ratios were markedly low at 28 calves per 100 cows. The winter of 2012 continued to be dry, with very low snow accumulation and snow pack, allowing wide distribution of elk at higher elevations. April of 2013 finally saw a break in the drought, when temperatures dropped below normal for the entire month and significant precipitation was received. This cooler and wetter pattern continued through the summer of 2013 in much of the herd unit. In early October 2013, winter storm “Atlas” blanketed the area with 12-36” of wet snow, with greater depths at higher elevations. The snow and resulting muddy conditions forced the cancellation of hunting for some license holders, and made accessing elk difficult in many locations. Travel conditions improved for late seasons, but by then it was apparent winter storm Atlas had a negative impact on early hunter participation and harvest success. The 2013-2014 winter brought temperature and precipitation conditions near the recent 30-year average, and the growing season of 2014 brought a much-needed break in drought conditions. Grass and forb growth were excellent, making 2014 the best growing season the region had seen in years. The spring and summer of 2014 undeniably produced improved range conditions that benefitted elk across the Laramie Range. Winter 2014-2015 was generally mild, and cow hunters had fairly easy access to much of the herd unit. 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. While calf survival can vary from year to year, adult elk in this herd are thought to have rather high rates of survival as there are few natural predators and little mortality from disease and winter weather. Prior to 2005, antlerless license issuance was not adequate to keep up with the production of this herd. Since then, antlerless license issuance has continued to increase, and the population has stabilized or begun to decrease as harvest pressure on cows has greatly intensified. In 2014, the calf ratio was below average for the third year in a row, with 37 calves per 100 cows. Cow harvest continues to remain high, and late-season access to hunt was generally good in the herd unit for 2014. While the low calf production/survival of 2012-2014 will stem population growth, continued high license issuance and harvest of cows will be necessary to further reduce this herd toward objective.

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. It should be noted that the accuracy of bull ratios can change from year to year in this herd. While the herd is covered thoroughly during post-season classifications, changes in distribution of elk, ability to locate large cow/calf groups, and concealment of bulls in timber during January can skew results from year to year. Issuance of Type 1 any elk licenses consistently increased in the herd unit along with population growth, and has remained high since 2009. From 2010-present, Type 1 license has fluctuated between 1,500 and 1,750 licenses, depending upon hunter, landowner, and manager perceptions of bull quality. Tooth-age and antler-class data collected annually show a slight decrease in average bull age and of Class-II antlered bulls in 2014, though landowner perceptions are that bull quality remained high (see Appendix A). Observed bull ratios in 2014 were very high in Area 19 (57 per 100 cows) and very low in Area 7 (19 per 100 cows) as a result of poor classification conditions and disproportionate number of cow/calf groups found in open habitats. Thus these data are not considered an accurate representation of true bull ratios. Regardless, hunters, landowners, and managers seem to be satisfied with current bull ratios and quality within the herd unit. Consequently, Type 1 license issuance will be maintained as in Area 7.

Harvest Data

License success in this herd unit is typically in the 50th percentile. Hunter days per animal have generally increased since 2008, as the population has dropped in size and more effort is necessary to harvest an elk. Hunter crowding on public lands with higher license issuance may be another factor that contributes to higher hunter days per animal. It should also be noted that days per animal can be high in this herd unit as hunters have high expectations regarding bull quality, and will exert more effort in finding a mature bull. Archery hunting has also become more popular in the herd unit, as hunters want to maximize their time in the field to harvest a mature bull. Days per animal improved in 2014 compared to 2013, when weather conditions resulted in poor access during September and October. Habitat and access conditions were both much improved during the 2014 hunting season by comparison. Overall harvest success in 2014 (54%) was higher than the average harvest success of the previous ten years (52%). Total harvest also improved in 2014, with the highest cow harvest (1,468) and overall harvest (2,561) on record for the herd unit. Total harvest of cows and calves was exceptional in both hunt areas for 2014. In Area 19, 200 cows and calves were harvested, while in Area 7 over 1,300 were harvested. Both totals represent the highest cow/calf harvests on record for the herd unit, and maybe be attributed to good weather, improved access, and increased license numbers in 2014. Area 7-Type 7 harvest success was outstanding, as over 225 cows and calves harvested over the January season.

Population

The 2014 postseason population estimate was approximately 10,100 and trending downward from an estimated high of 12,300 elk in 2005, though the model is considered to be of poor quality. Postseason classification data and harvest data are applied to the model to predict population size and trends for this herd. Since 2014 postseason bull ratios were considered inaccurate due to survey conditions and timing, long-term averages were applied to the model. No sightability or other population estimate data are currently available to further align the model.

The “Constant Juvenile Survival, Constant Adult Survival” (CJ,CA) spreadsheet model was selected to represent the Laramie Peak / Muddy Mountain Herd Unit for 2014. In 2012 & 2013, the “Time-Specific Juvenile Survival – Constant Adult Survival” (TSJ,CA) spreadsheet model was selected. The TSJ,CA model is no longer considered an accurate representation of the herd, as the model estimates the post-season population in 2014 to be nearly identical to the total number of elk observed during classification surveys. This is certainly not true, as a fair proportion of occupied elk habitat within the herd was not surveyed. The CJ,CA model seems the more representative of herd trends, though it selects the lower constraint for calf survival and the upper constraint for adult survival. The SCJ,CA model is similar to the TSJ,CA model in that it predicts a post-season population size that is nearly identical to the total number of elk observed during helicopter surveys, which is not realistic. The TJS,CS,MSC model was not considered for the Laramie Peak / Muddy Mountain Herd, since it does not have a high level of natural predation. The other three models produce trends that seem representative for this herd, but the SCJ,CA and TSJ,CA models estimate a population size that is unrealistically low. All models score similarly so the difference in AIC is unimportant in model selection for this herd. The CJ,CA model is currently the best representation of the herd, and follows trends with license issuance and harvest success. Additional population estimate and/or survival data would help to better align this model. Overall, this model is of poor quality.

Management Summary

Season dates for this herd have changed from year to year, and in general have been liberalized over time to maximize harvest and reduce damage on agricultural fields. Meetings with Area 7 and Area 19 landowners were held to discuss ideas to maximize female harvest and maintain bull quality. Season dates and limitations will be similar for the 2015 season, with two minor changes. A total of 450 Type 4 licenses will be converted to Type 6 licenses in Area 7, as managers would like to shift toward more additional cow/calf licenses to potentially reduce hunter crowding. For Area 19, unused licenses will be valid for antlerless elk through January, to extend hunter opportunity and maximize cow harvest. All other license types will be maintained with the same season dates and quotas as in 2014. Currently, access is predicted to

be similar in 2015 compared to previous years. If additional access is secured in Area 19, increased license issuance will be considered by managers. Goals for 2015 are to continue reduction of the herd toward objective, maintain bull ratios within special management limits, maintain good harvest success, and reduce elk damage to agricultural fields.

If we attain the projected harvest of 2,295 elk with average calf ratios, this herd will decline further toward objective. The predicted 2015 postseason population size of the Laramie Peak / Muddy Mountain Elk Herd is approximately 8,400 animals, which is 68% above objective.

INPUT	
Species:	Elk
Biologist:	Heather O'Brien
Herd Unit & No.:	EL741 Laramie/Muddy
Model date:	02/27/15

Clear form

MODELS SUMMARY		Relative AICc	Fit	Notes
C/J,CA	Constant Juvenile & Adult Survival	379	370	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	380	371	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	341	215	
TSJ,CA,MSC	Time-Specific Juv, Constant Adult Survival, Male survival coefficient	322	184	

Check best model to create report

- C/J,CA Model
- SCJ,SCA Mod
- TSJ,CA Model
- TSJ,CA,MSC Model

Year	Posthunt Population Est. Field Est	Field SE	Trend Count	Population Estimates from Top Model				Objective
				Predicted Prehunt Population Juveniles	Total	Predicted Posthunt Population Total Males	Females	
1993				3889	11784	3808	6611	5000
1994				3278	12251	3203	7068	5000
1995				2929	12637	2874	1580	5000
1996				3265	13552	3194	1867	5000
1997				3609	14348	3473	2039	5000
1998				3910	15309	3777	2382	5000
1999				3576	15610	3490	2780	5000
2000				3981	16545	3845	3041	5000
2001				4489	17655	4415	3378	5000
2002				3733	17894	3627	3709	5000
2003				4290	18815	4101	3768	5000
2004				4376	19417	4255	4078	5000
2005				4959	20715	4828	4345	5000
2006				4176	20545	4012	4518	5000
2007				4862	21235	4522	4503	5000
2008				4643	21044	4318	4362	5000
2009				3918	19879	3706	4399	5000
2010				3299	18586	3145	4053	5000
2011				3782	17833	3605	3616	5000
2012				2368	15580	2153	3347	5000
2013				2426	14208	2246	2881	5000
2014			5313	2416	12960	2238	2361	5000
2015				2079	10944	1886	1861	5000
2016							4673	5000
2017								5000
2018								5000
2019								5000
2020								5000
2021								5000
2022								5000
2023								5000
2024								5000
2025								5000

Survival and Initial Population Estimates

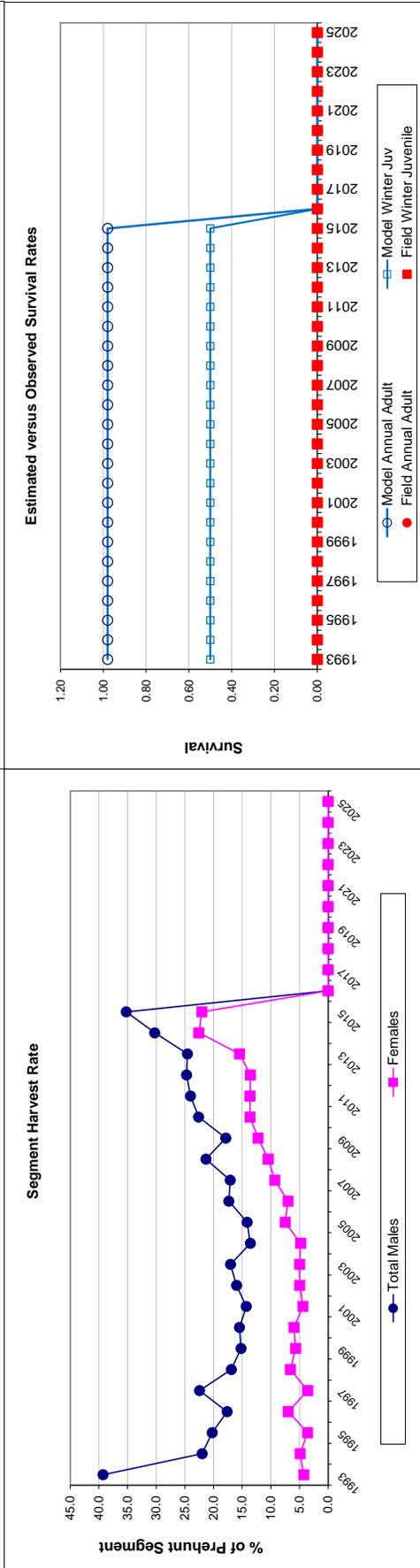
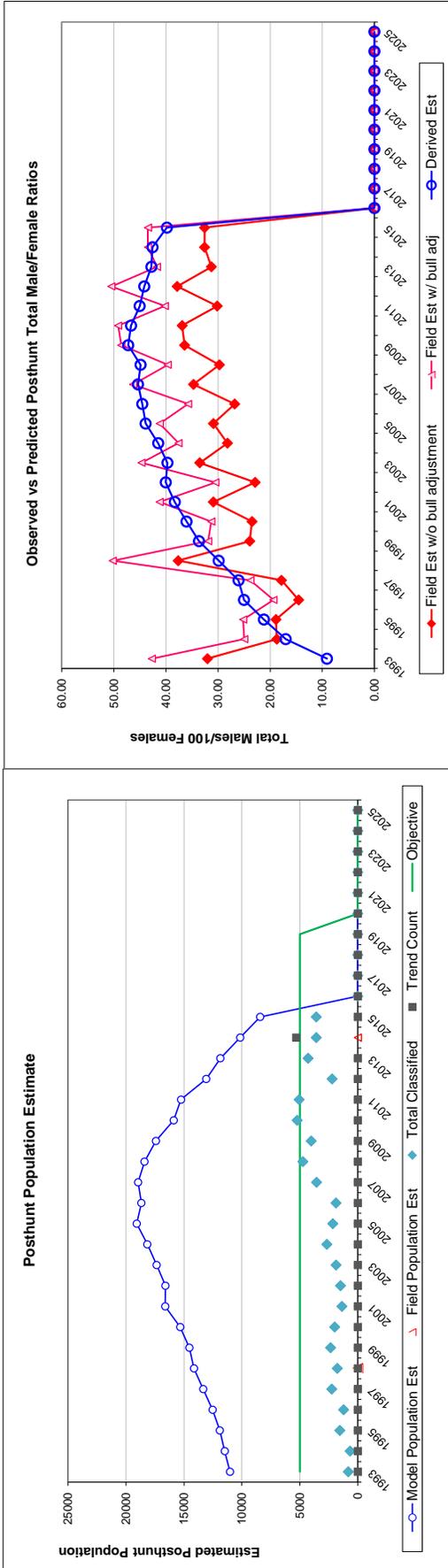
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.50		0.98	
1994	0.50		0.98	
1995	0.50		0.98	
1996	0.50		0.98	
1997	0.50		0.98	
1998	0.50		0.98	
1999	0.50		0.98	
2000	0.50		0.98	
2001	0.50		0.98	
2002	0.50		0.98	
2003	0.50		0.98	
2004	0.50		0.98	
2005	0.50		0.98	
2006	0.50		0.98	
2007	0.50		0.98	
2008	0.50		0.98	
2009	0.50		0.98	
2010	0.50		0.98	
2011	0.50		0.98	
2012	0.50		0.98	
2013	0.50		0.98	
2014	0.50		0.98	
2015	0.50		0.98	
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Juvenile Survival =		0.500
Adult Survival =		0.980
Initial Total Male Pop/10,000 =		0.060
Initial Female Pop/10,000 =		0.661

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Total Bulls Adjustment Factor	75%

Year	Classification Counts										Harvest					Segment Harvest Rate (% of Prehunt Segment)	
	Juvenile/Female Ratio					Total Male/Female Ratio					Harvest					Total Males	Females
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/ bull adj	Field Est w/o bull adj	Field SE	Juv	Yrl males	2+ Males	Females	Total Harvest	Total Males	Females			
1993		57.60	4.57	9.10	42.70	32.03	3.12	73	105	249	266	693	39.3	4.2			
1994		45.32	4.03	17.02	24.96	18.72	2.34	68	73	235	330	706	22.0	4.9			
1995		38.58	2.33	21.20	25.18	18.88	1.51	50	50	314	252	666	20.2	3.6			
1996		42.80	2.80	25.03	19.37	14.52	1.46	65	35	328	508	936	17.6	7.0			
1997		44.40	2.15	26.07	23.78	17.83	1.23	124	42	494	263	923	22.4	3.6			
1998		47.38	2.70	29.89	50.21	37.66	2.33	121	98	342	511	1072	16.9	6.6			
1999		42.25	2.06	33.66	31.89	23.92	1.45	78	68	385	451	982	15.2	5.7			
2000		45.59	2.37	36.06	31.30	23.47	1.57	124	112	394	486	1116	15.5	6.0			
2001		50.07	3.15	38.30	41.22	30.91	2.31	67	91	421	369	948	14.3	4.4			
2002		39.15	2.43	40.04	30.51	22.89	1.75	97	71	570	440	1178	16.0	5.0			
2003		43.22	2.41	39.72	44.70	33.52	2.05	172	61	642	451	1326	17.0	5.0			
2004		43.29	2.00	41.49	37.59	28.20	1.52	110	54	528	449	1141	13.6	4.8			
2005		48.79	2.46	43.91	41.19	30.89	1.83	119	103	547	728	1497	14.1	7.5			
2006		39.56	2.21	44.55	35.75	26.81	1.73	149	54	807	693	1703	17.3	7.0			
2007		45.57	1.83	45.37	46.29	34.72	1.54	309	86	757	925	2077	17.1	9.3			
2008		44.41	1.54	44.87	39.66	29.74	1.19	296	55	1019	1032	2402	21.3	10.5			
2009		39.81	1.56	47.25	48.58	36.43	1.48	193	80	789	1179	2241	17.9	12.2			
2010		36.23	1.28	46.70	49.18	36.89	1.29	140	102	974	1245	2461	22.6	13.6			
2011		44.91	1.50	45.05	40.23	30.17	1.17	161	78	961	1152	2352	24.0	13.6			
2012		28.41	1.65	44.17	50.47	37.86	1.98	196	46	952	1081	2275	24.7	13.6			
2013		33.36	1.31	42.79	41.71	31.29	1.26	164	15	837	1120	2136	24.5	15.5			
2014		40.37	1.65	42.58	43.46	32.59	1.44	162	7	924	1468	2561	30.3	22.6			
2015		40.37	1.65	39.82	43.46	32.59	1.44	175	20	900	1200	2295	35.2	22.0			
2016																	
2017																	
2018																	
2019																	
2020																	
2021																	
2022																	
2023																	
2024																	
2025																	

FIGURES



Comments:

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 a 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 1997-2014. 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. Sample size has varied from year to year depending upon hunter response rates. In 2014, a total of 800 “any elk” hunters and 975 antlerless elk hunters in the herd unit were solicited for tooth samples. Of those solicited, 164 returned teeth from bulls and 137 returned teeth from cows. Samples received from calf elk were removed from resulting totals so as not to skew statistics on adult age classes.

Average tooth age of sampled adult males has slowly increased from 1999-2013, while average tooth age of female elk has remained relatively stable (see Figures 1 & 2). In 2014, the average age of female elk sampled rose to 5.88, while the average age of male elk declined slightly from 6.07 to 6.02. Median age of both males and females was 5.5 years old. Of those bulls sampled, 52% were age 2-5 and 45% were age 6-10. Of those cows sampled, 53% were age 2-5 and 33% were age 6-10. This disparity between harvested bull age versus harvested cow age illustrates hunter preferences for older aged bulls, though the gap between male and female age was not as divergent in 2014 as previous years.

Percentage of bulls aged 6-10 gradually increased from 2001-2013, indicating that older age-class bulls have been increasingly 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 (see Figure 3). 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. Percentage of bulls aged 6-10 decreased slightly from 2013 to 2014, but was still a higher percentage compared to data collected from 2008-2012. Bulls harvested in 2013 were on average older, though it is not apparent why this was the case. Regardless, one

must assume inherent biases within this sampling scheme apply equally across years. Thus, emerging trends in mean and median ages of sampled bulls warrant discussion.

The increasingly high percentage of older age-class bull elk is a surprising trend, considering that managers believe this herd has been stable or slightly decreasing since 2009. License issuance has remained high, and one would expect it to become more and more difficult to find and harvest older age-class bulls in a declining population. At the same time, average tooth age of sampled cows has slowly increased, while license issuance and season length have been liberalized. This seems to suggest that females are still able to reach older age classes in the herd before they are harvested, indicating that perhaps the herd is not decreasing in size as much as managers were expecting.

Trends in antler class of classified bull elk are more difficult to interpret on their own. The percentage of Class II bulls declined from 2008-2011, but then increased in 2012 and 2013. During the same time period, average tooth-age of harvested bulls increased steadily from 5.01 to 6.07. The divergence between the two data sets in 2012-2013 suggests antler quality is not always correlated positively with bull age for this herd. Factors such as nutrition, genetics, or classification biases may also be contributing to antler quality. In 2014, both percentage of Class II bulls observed and average tooth-age of harvested bulls declined slightly. However, harvest success and hunter days for Type 1 licenses were similar to 5-year averages, indicating hunters did not have increased difficulty finding mature bulls in 2014. Years of consistent pressure in this herd may require future reductions of Type 1 licenses in order to maintain trophy bull quality, if the population begins to decline. 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 seem to indicate this herd can continue to support the current number of any-elk licenses for the 2015 season without compromising bull ratios or bull quality. Managers will need to further scrutinize harvest data and hunter feedback in 2015 and perhaps begin to reduce issuance of Type 1 licenses.

Figure 1. Tooth-age data analysis for adult bull elk harvested within the Laramie Peak/Muddy Mountain Herd Unit, 1997 - 2014.

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	0
1998	1	16	19	10	10	4	3	2	1	2	1	0	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	0
2000	22	36	41	28	24	13	6	1	3	1	1	0	0	0	1	0	0	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	0
2004	7	8	16	19	6	10	5	3	1	0	1	0	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	0
2007	1	11	24	18	12	12	8	3	0	0	1	1	0	0	0	1	0	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	0
2010	4	3	16	27	32	27	13	2	1	2	5	1	0	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	0
2012	2	9	9	22	22	20	9	3	4	0	1	0	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	0
2014	3	4	19	27	35	31	17	13	7	5	2	0	0	1	0	0	0	0	0	0	0	0	0

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

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

Figure 2. Tooth-age data analysis for adult female elk harvested within the Laramie Peak/Muddy Mountain Herd Unit, 1997 - 2014.

Year	Number of Adult Females 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	8	3	5	9	5	1	1	2	1	1	3	0	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	0
1999	14	22	16	20	8	8	6	7	3	1	8	3	3	1	0	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	0	1	0
2001	11	15	24	11	15	9	10	5	4	4	3	3	0	0	0	1	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	0
2005	26	14	39	34	21	14	16	15	4	6	5	0	4	4	0	0	0	1	0	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	0
2008	8	11	14	14	17	8	11	5	3	2	1	2	3	1	0	2	1	0	0	1	0	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	0
2011	4	4	11	10	14	6	7	6	2	1	0	0	0	0	1	2	0	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	0
2013	5	1	11	20	14	8	4	3	3	2	1	4	0	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	0

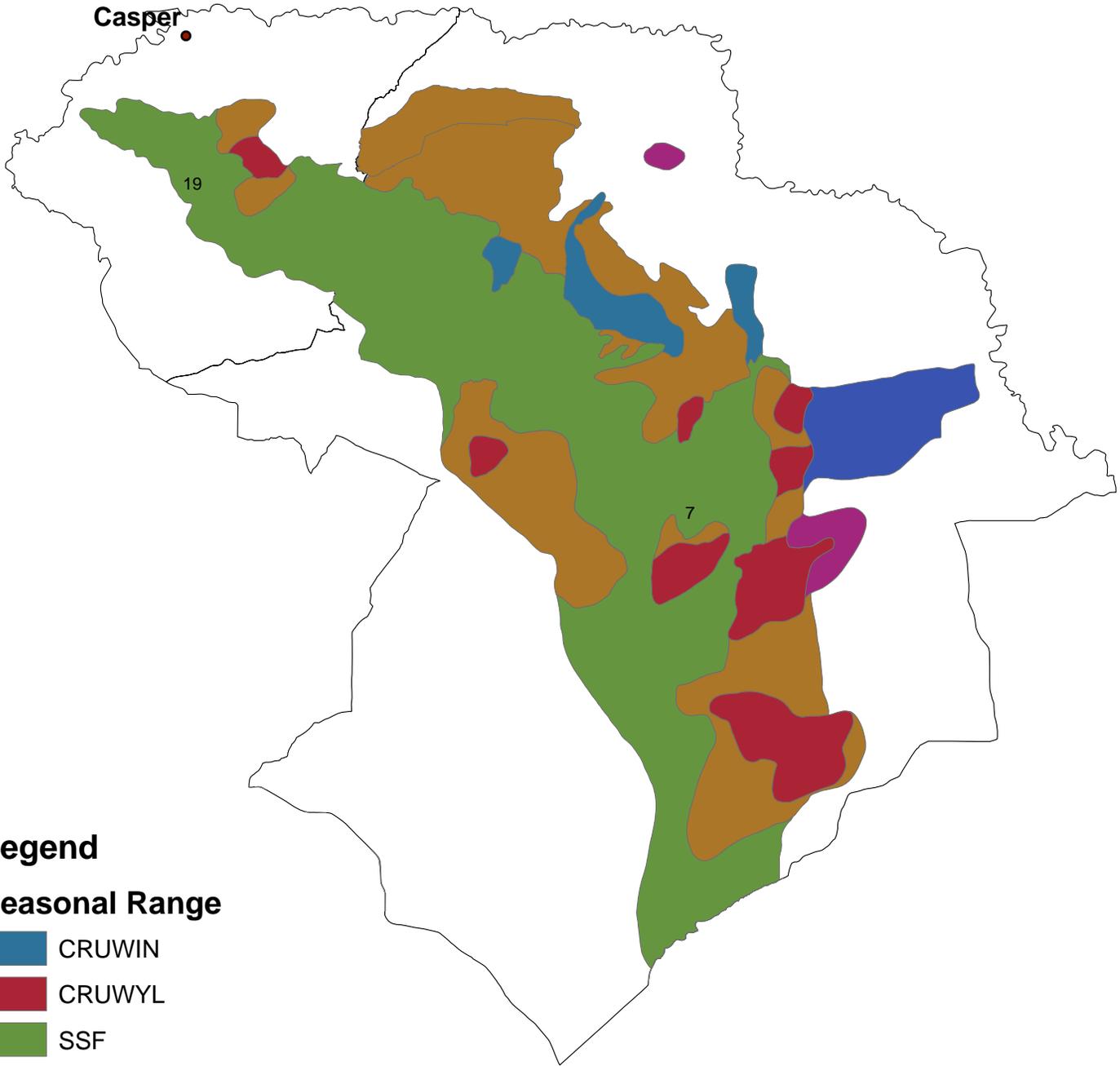
Year	Percentages					
	1	2-5	6-10	11-12	13+	13+
1997	21%	56%	15%	8%	0%	0%
1998	5%	60%	28%	3%	3%	3%
1999	12%	55%	21%	9%	4%	4%
2000	14%	57%	20%	5%	4%	4%
2001	10%	57%	28%	5%	1%	1%
2004	14%	59%	25%	2%	0%	0%
2005	13%	52%	26%	5%	4%	4%
2007	4%	53%	31%	6%	6%	6%
2008	8%	53%	28%	3%	9%	9%
2010	6%	54%	32%	3%	5%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

Year	1	2-5	6-10	11-12	13+	N	Avg Age
1997	8	22	6	3	0	39	4.38
1998	3	36	17	2	2	60	4.90
1999	14	66	25	11	5	121	5.02
2000	19	77	27	7	5	135	4.61
2001	11	65	32	6	1	115	4.84
2004	8	33	14	1	0	56	4.27
2005	26	108	55	10	9	208	5.16
2007	4	57	34	7	6	108	5.97
2008	8	56	29	3	9	105	5.71
2010	5	43	25	2	4	79	5.49
2011	4	39	22	0	3	68	5.34
2012	10	39	18	5	1	73	5.20
2013	5	46	20	5	0	76	5.70
2014	9	73	45	5	5	137	5.88

Figure 3. Antler classification of bull elk from the Laramie Peak/Muddy Mountain Herd Unit, 2008-2014.

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

**Laramie Peak/Muddy Mountain Elk Herd Unit
(EL741)
Revised May 18, 2010
Hunt Areas 7 & 19**



Legend

Seasonal Range

-  CRUWIN
-  CRUWYL
-  SSF
-  WIN
-  WYL
-  YRL

2014 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2014 - 5/31/2015

HERD: EL742 - RATTLESNAKE

HUNT AREAS: 23

PREPARED BY: HEATHER O'BRIEN

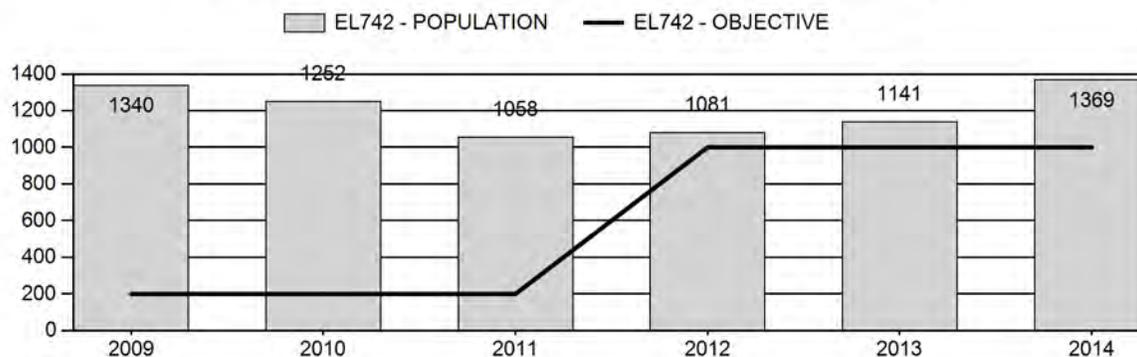
	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Population:	1,174	1,369	1,273
Harvest:	155	210	170
Hunters:	353	374	360
Hunter Success:	44%	56%	47%
Active Licenses:	374	411	400
Active License Success:	41%	51%	42%
Recreation Days:	3,173	3,587	3,200
Days Per Animal:	20.5	17.1	18.8
Males per 100 Females	42	180	
Juveniles per 100 Females	37	56	

Population Objective ($\pm 20\%$) :	1000 (800 - 1200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	37%
Number of years population has been + or - objective in recent trend:	24
Model Date:	3/10/2015

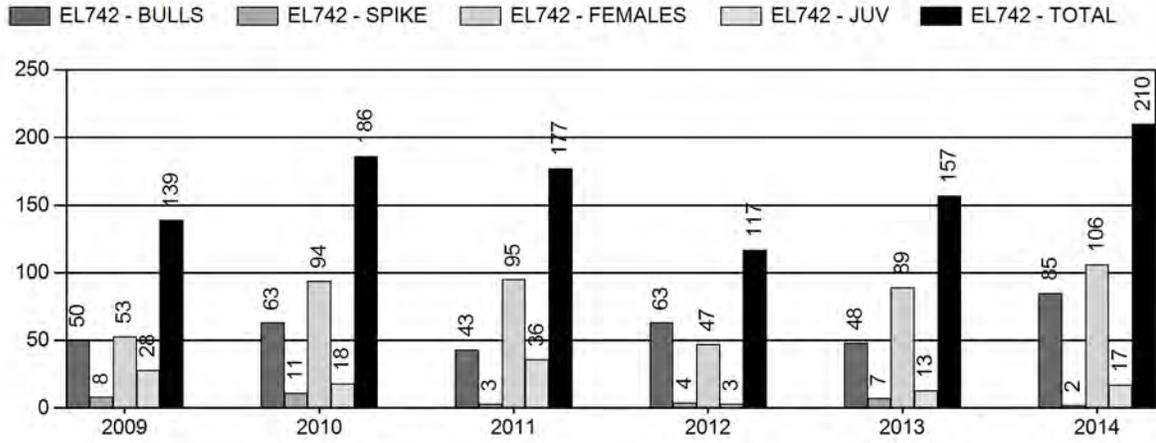
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	12.0%	11.1%
Males ≥ 1 year old:	21.5%	18.1%
Juveniles (< 1 year old):	5.4%	5.2%
Total:	13.1%	11.6%
Proposed change in post-season population:	-9.2%	-7.0%

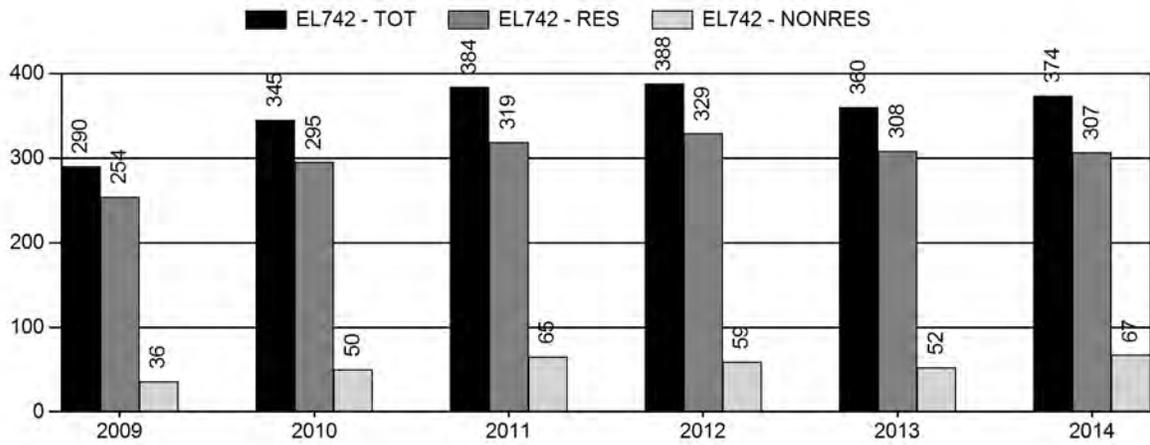
Population Size - Postseason



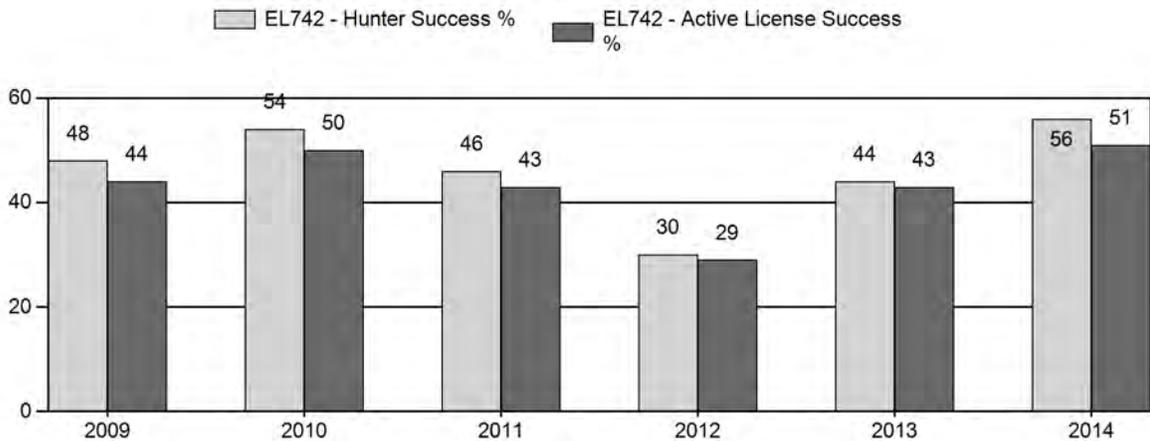
Harvest



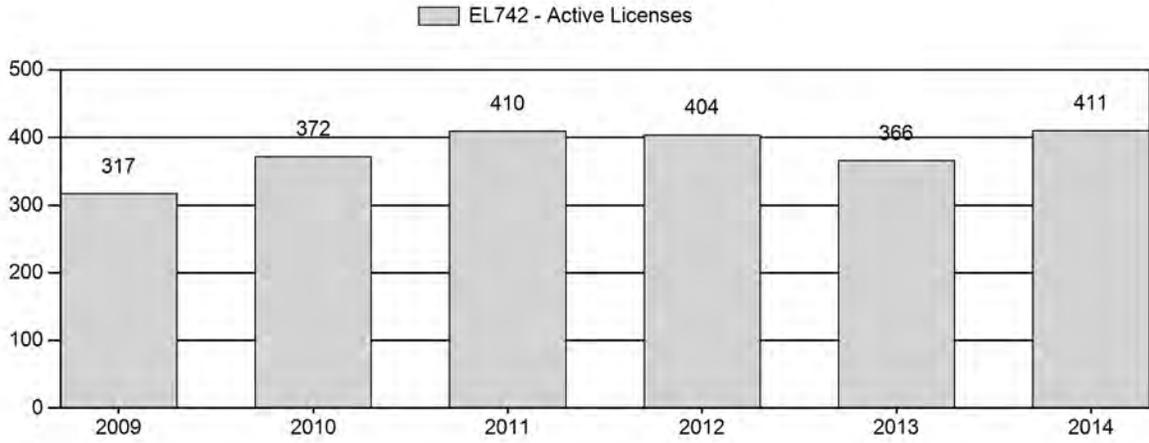
Number of Hunters



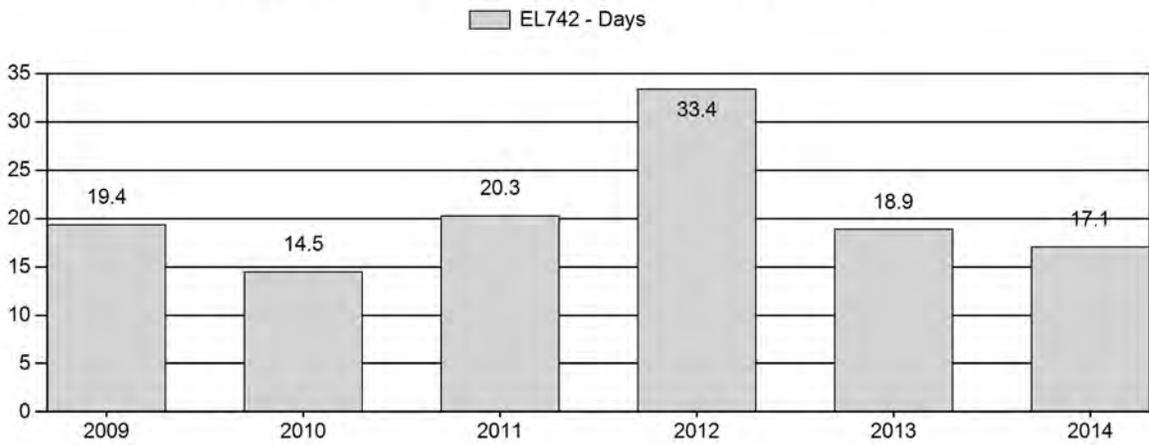
Harvest Success



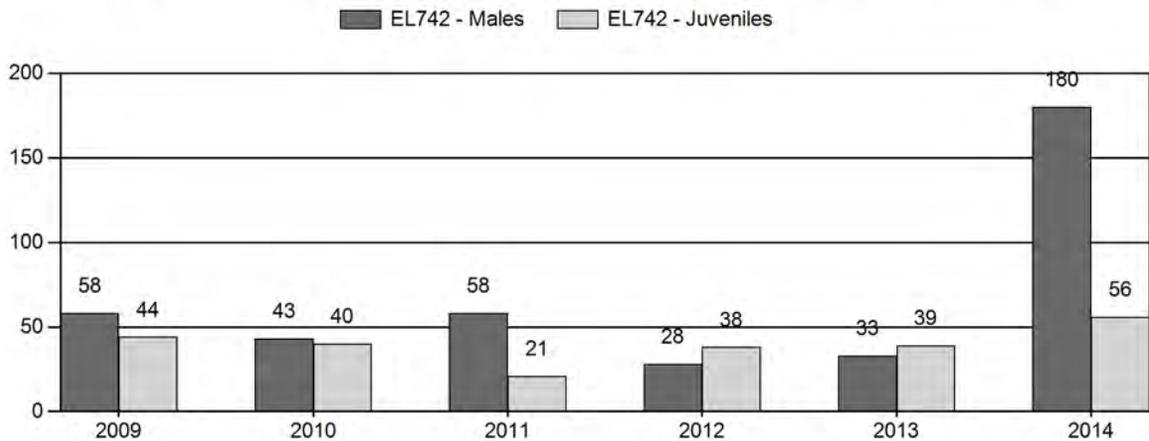
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2014 Postseason Classification Summary

for Elk Herd EL742 - RATTLESNAKE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	1,286	38	34	72	21%	195	58%	68	20%	335	375	19	17	37	± 6	35	± 5	25
2009	1,340	27	84	111	29%	192	49%	85	22%	388	579	14	44	58	± 7	44	± 6	28
2010	1,252	24	47	71	23%	166	55%	66	22%	303	415	14	28	43	± 7	40	± 6	28
2011	1,058	17	90	107	32%	185	56%	38	12%	330	443	9	49	58	± 7	21	± 4	13
2012	1,081	26	32	58	17%	204	60%	77	23%	339	384	13	16	28	± 4	38	± 5	29
2013	1,141	26	102	128	19%	390	58%	153	23%	671	479	7	26	33	± 3	39	± 3	30
2014	1,360	35	113	148	54%	82	30%	46	17%	276	406	43	138	180	± 28	56	± 12	20

**2015 HUNTING SEASONS
RATTLESNAKE ELK (EL742)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
23	1	Oct. 1	Oct. 31	125	Limited quota	Any elk
		Nov. 15	Dec. 15			Unused Area 23 Type 1 license
	4	Oct. 1	Oct. 31	125	Limited quota	Antlerless elk
		Nov. 15	Dec. 15			Unused Area 23 Type 4 license, also valid in Area 128
6	Oct. 1	Oct. 31	200	Limited quota	Cow or calf	
	Nov. 15	Dec. 15			Unused Area 23 Type 6 licenses, also valid in Area 128	
	7	Dec. 1	Dec. 15	25		Cow or calf, also valid in Area 128
Archery						Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2014
23	1	0
	4	0
	6	0
	7	+25

Management Evaluation

Current Postseason Population Management Objective: 1,000

Management Strategy: Recreational

2014 Postseason Population Estimate: 1,400

2015 Proposed Postseason Population Estimate: 1,300

2014 Hunter Satisfaction: 68% Satisfied, 21% Neutral, 12% 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 from a postseason population objective of 200 to 1,000 elk. The old objective was antiquated, unreasonable, and inadequate to meet the expectations of hunters, landowners, and managers.

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 concern in this herd unit.

Weather

The winter of 2010-2011 was severe throughout the herd unit, although no significant elk mortality was detected. Conditions were warm and dry for the herd unit in 2011 and forage production was below average. Snow pack and resulting spring moisture were below average for the winter of 2011-2012 which likely had a negative impact on lactating cows and their calves. The summer of 2012 was the driest on record since 1904 in much of Wyoming, and the winter of 2012 continued the trend with very low snow accumulation and snow pack. The spring of 2013 was cool with significant precipitation, and average rainfall over the summer as well. Still, habitat conditions appeared to be poor for much of the growing season. Heavy precipitation during the fall of 2013 caused a beneficial late green-up, but also made travel very difficult for hunters. The 2013-2014 winter brought temperature and precipitation conditions near the recent 30-year average, and the growing season of 2014 brought a much-needed break in drought conditions. Grass and forb growth was excellent, making 2014 the best growing season the region had seen in years. The spring and summer of 2014 undeniably produced improved range conditions that benefitted elk. 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 that are preferred by elk. Anecdotal observations and discussions with landowners in the region indicate that summer and winter forage availability for elk was very good in 2014. Herbaceous forage species were observed to be in very good condition in 2014 compared to previous years, and elk appeared to be in excellent body condition by winter 2014. Healthier range conditions may have also improved distribution of elk, and in turn influenced higher harvest success observed in 2014.

Field Data

Observed calf ratios are highly erratic in this herd unit due to varying survey conditions and levels of effort across years. Thus it is difficult to correlate changes in population size or make decisions regarding license issuance based on observed calf ratios. Instead managers continue to focus on maximizing cow harvest without over-saturating the area with hunter pressure. Increases in 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 as low as 13 to as high as 58 per 100 cows. 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, or elk are immigrating/emigrating to and from adjacent hunt areas. 2014 classification results were highly skewed in favor of bulls, as large cow/calf groups were missed during survey flights. Again, license issuance and season structure changes in this herd are not typically made based on observed bull ratios. Instead, seasons are designed to maximize cow harvest and maintain 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, indicating that opportunity has 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 and reduced harvest success in most years. In 2014, weather conditions were mostly favorable and access to elk was good. This was reflected in improved overall harvest success of 56%, which is the highest harvest success since 1996. The new split season in 2013 & 2014 also facilitated movement of elk off of private refugia. Elk have moved off refuge areas on private land and back onto public during the closure in both

years. Late-season licenses were also valid for use in the adjacent Hunt Area 128. Field personnel continue to receive positive comments from hunters and landowners who are pleased with both of these changes to the hunting season. Overall harvest has increased significantly in 2013 & 2014 compared to previous years, and was the highest on record in 2014 .

Population

The 2014 postseason population estimate was approximately 1,400 and decreasing. Postseason classification data and harvest data are applied to the model to predict population size and trends for this herd. No sightability or other population estimate data are currently available to further align the model.

The “Constant Juvenile Survival – Constant Adult Survival” (CJ,CA) 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 in some years have been seen but could not be classified. The TSJ,CA model was discarded, as it predicts population sizes that are lower than actual observed survey totals. When juvenile survival was increased in years known to have mild winter conditions, the SCJ,CA model also predicted a population size lower than actual numbers of elk observed. The TSJ,CA,MSC model was not used as it does not seem applicable or necessary for this herd, which does not have elevated predation rates from large carnivores. While the CJ,CA model appears to be the best choice to represent the herd, it should be noted that this model selected for the lowest juvenile and the highest adult constraints, 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, in an attempt to maximize cow harvest. For 2013 & 2014, season dates were also extended significantly for bull hunting. Total elk harvested was the highest on record in 2014, and harvest success was at an 18-year high. Since this has worked well, the same season is being implemented for 2015, with the addition of 25 late-season

cow/calf licenses. Goals for 2015 are to continue high harvest pressure on cows, extend late-season cow hunting opportunity, continue extended opportunity to hunt bulls, and maintain/improve overall harvest success.

If we attain the projected harvest of approximately 170 elk and assuming average calf production/survival, this herd will decrease to slightly above objective. The predicted 2015 postseason population estimate for the Rattlesnake Elk Herd is approximately 1,300 animals, or 30% above objective.

INPUT	
Species:	Elk Heather O'Brien Rattlesnake
Herd Unit & No.:	02/27/15
Model date:	

Clear form

MODELS SUMMARY		Relative AICc	Fit	Notes
C/J,CA	Constant Juvenile & Adult Survival	355	346	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	380	371	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	329	203	
TSJ,CA,MSC	Time-Specific Juv, Constant Adult Survival, Male survival coefficient	327	189	

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population		Predicted Posthunt Population		Objective	
	Field Est	Field SE		Juveniles	Total	Juveniles	Total		
1993				291	136	872	98	852	200
1994				462	153	892	114	881	200
1995				362	203	955	166	935	200
1996				274	235	989	180	967	200
1997				458	231	1002	179	972	200
1998				733	266	1043	221	1013	200
1999				352	363	1138	323	1052	200
2000				487	385	1100	308	1011	200
2001				269	393	1082	323	1020	200
2002				363	365	1049	311	997	200
2003				461	373	1045	322	1003	200
2004				405	405	1073	338	1024	200
2005				559	410	1082	355	1061	200
2006			786	411	458	1151	398	1066	200
2007			544	330	465	1124	397	1046	200
2008			385	359	453	1089	371	1016	200
2009			858	477	435	1066	371	1008	200
2010			899	407	453	1077	371	974	200
2011			1037	233	441	1032	390	916	200
2012			912	337	419	936	346	884	1000
2013				342	406	933	345	835	1000
2014			957	312	404	884	308	767	1000
2015				289	360	811	289	712	1000
2016									1000
2017									1000
2018									1000
2019									1000
2020									1000
2021									1000
2022									1000
2023									1000
2024									1000
2025									1000

Survival and Initial Population Estimates

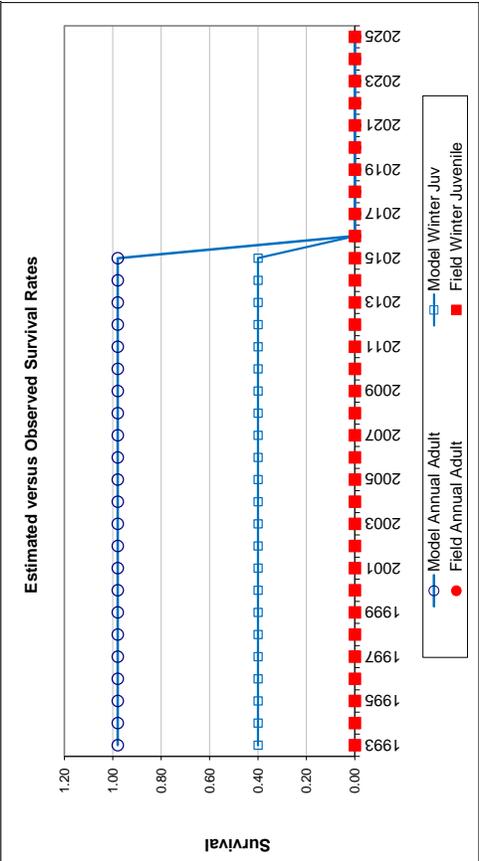
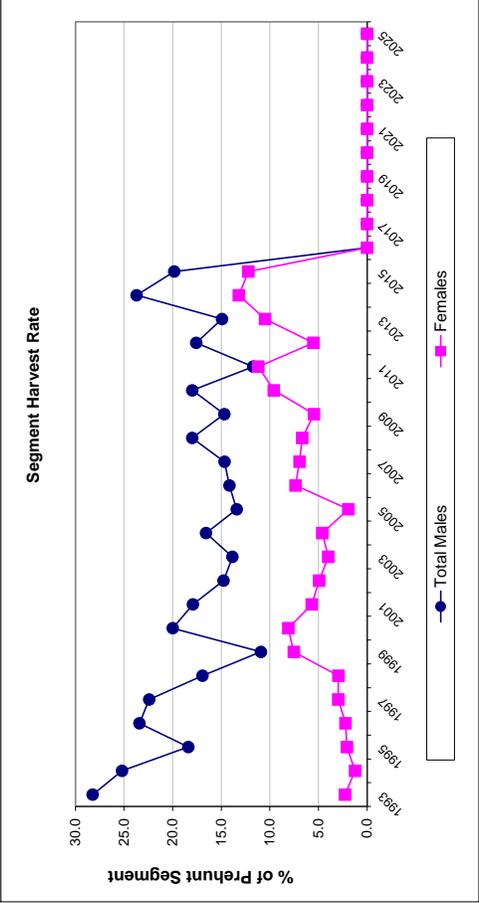
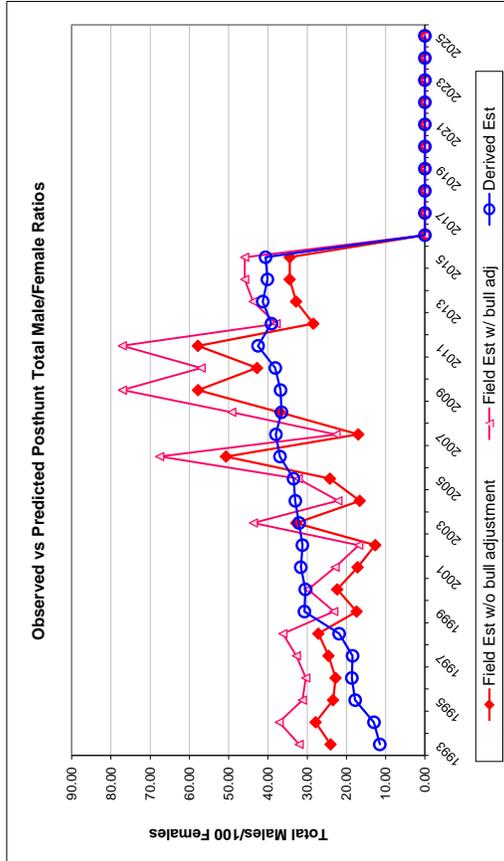
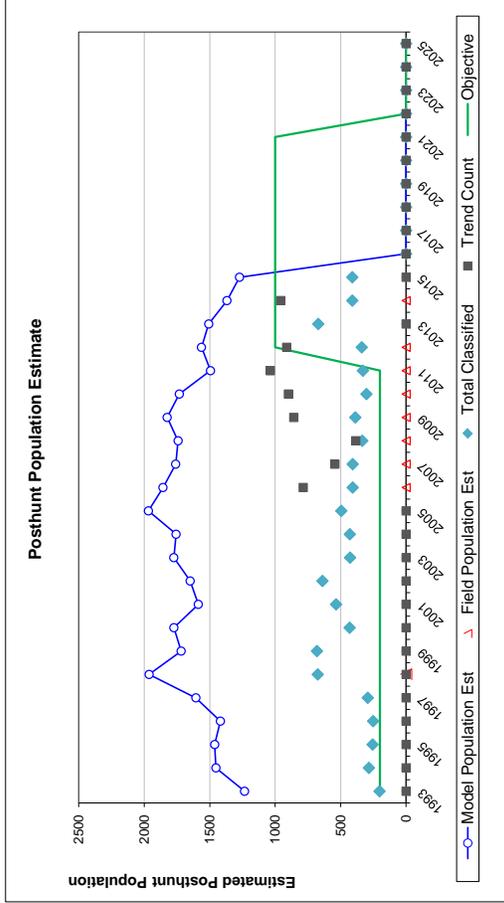
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.40		0.98	
1994	0.40		0.98	
1995	0.40		0.98	
1996	0.40		0.98	
1997	0.40		0.98	
1998	0.40		0.98	
1999	0.40		0.98	
2000	0.40		0.98	
2001	0.40		0.98	
2002	0.40		0.98	
2003	0.40		0.98	
2004	0.40		0.98	
2005	0.40		0.98	
2006	0.40		0.98	
2007	0.40		0.98	
2008	0.40		0.98	
2009	0.40		0.98	
2010	0.40		0.98	
2011	0.40		0.98	
2012	0.40		0.98	
2013	0.40		0.98	
2014	0.40		0.98	
2015	0.40		0.98	
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Juvenile Survival =		0.400
Adult Survival =		0.980
Initial Total Male Pop/10,000 =		0.010
Initial Female Pop/10,000 =		0.085

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Total Bulls Adjustment Factor	75%

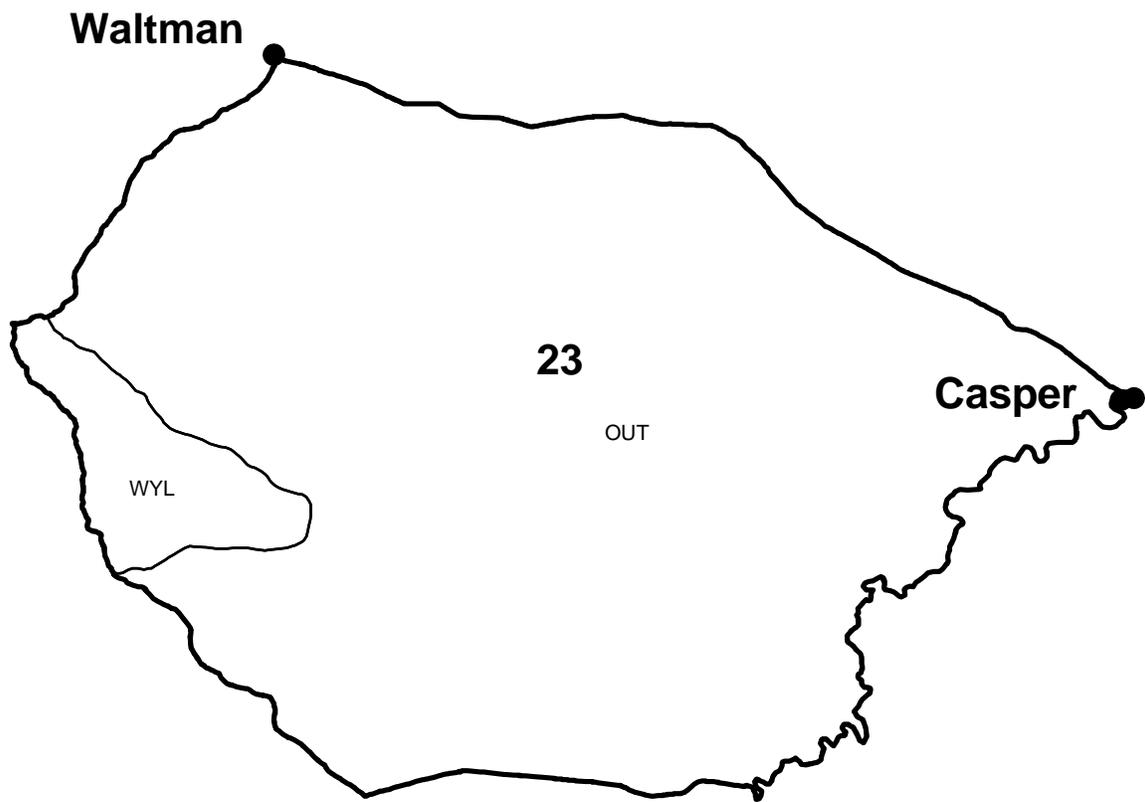
Year	Classification Counts										Harvest				Segment Harvest Rate (% of Prehunt Segment)			
	Juvenile/Female Ratio					Total Male/Female Ratio					Juv		Yrl males		2+ Males		Females	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/ bull adj	Field Est w/o bull adj	Field SE	Juv	Yrl males	2+ Males	Females	Total Harvest	Total Males	Females				
1993		33.33	5.87	11.48	32.04	24.03	4.81	6	10	25	18	59	28.2	2.3				
1994		51.90	7.06	12.97	37.13	27.85	4.75	4	5	30	10	49	25.2	1.2				
1995		38.61	5.82	17.75	31.22	23.42	4.28	1	10	24	18	53	18.4	2.1				
1996		28.14	4.85	18.61	30.34	22.75	4.09	2	13	37	20	72	23.4	2.2				
1997		46.78	6.34	18.41	32.75	24.56	4.23	3	28	19	27	77	22.4	3.0				
1998		71.98	6.04	21.85	36.18	27.14	3.19	4	4	37	28	73	16.9	3.0				
1999		32.60	3.09	30.69	23.20	17.40	2.12	8	5	31	78	122	10.9	7.5				
2000		45.00	5.03	30.48	29.79	22.34	3.26	29	0	70	81	180	20.0	8.1				
2001		24.01	2.80	31.62	22.87	17.15	2.30	22	11	53	56	142	17.9	5.7				
2002		34.25	3.25	31.22	16.86	12.64	1.81	20	4	45	47	116	14.8	4.9				
2003		44.81	5.19	32.04	43.71	32.78	4.25	10	16	31	38	95	13.9	4.0				
2004		38.63	4.40	33.01	22.14	16.61	2.64	9	6	55	45	115	16.6	4.6				
2005		51.96	5.30	33.47	32.27	24.20	3.27	7	2	48	19	76	13.4	1.9				
2006		37.33	4.86	36.92	67.59	50.69	5.93	12	2	57	77	148	14.2	7.4				
2007		30.32	3.78	37.96	22.62	16.97	2.68	12	0	62	71	145	14.7	6.9				
2008		34.87	4.91	36.53	49.23	36.92	5.09	4	0	74	66	144	18.0	6.7				
2009		44.27	5.77	36.78	77.08	57.81	6.89	28	8	50	53	139	14.7	5.5				
2010		39.76	5.79	38.12	57.03	42.77	6.07	18	11	63	94	186	18.0	9.6				
2011		20.54	3.66	42.51	77.12	57.84	7.02	41	3	44	105	193	11.7	11.2				
2012		37.75	5.05	39.11	37.91	28.43	4.23	3	4	63	47	117	17.6	5.5				
2013		39.23	3.74	41.31	43.76	32.82	3.34	13	7	48	89	157	14.9	10.5				
2014		38.24	4.71	40.13	45.94	34.45	4.41	17	2	85	106	210	23.7	13.2				
2015		38.24	4.71	40.60	45.94	34.45	4.41	15	5	60	90	170	19.8	12.2				
2016																		
2017																		
2018																		
2019																		
2020																		
2021																		
2022																		
2023																		
2024																		
2025																		

FIGURES



Comments:

Elk - Rattlesnake
Hunt Area 23
Casper Region
Revised 8/94



2014 - JCR Evaluation Form

SPECIES: Elk

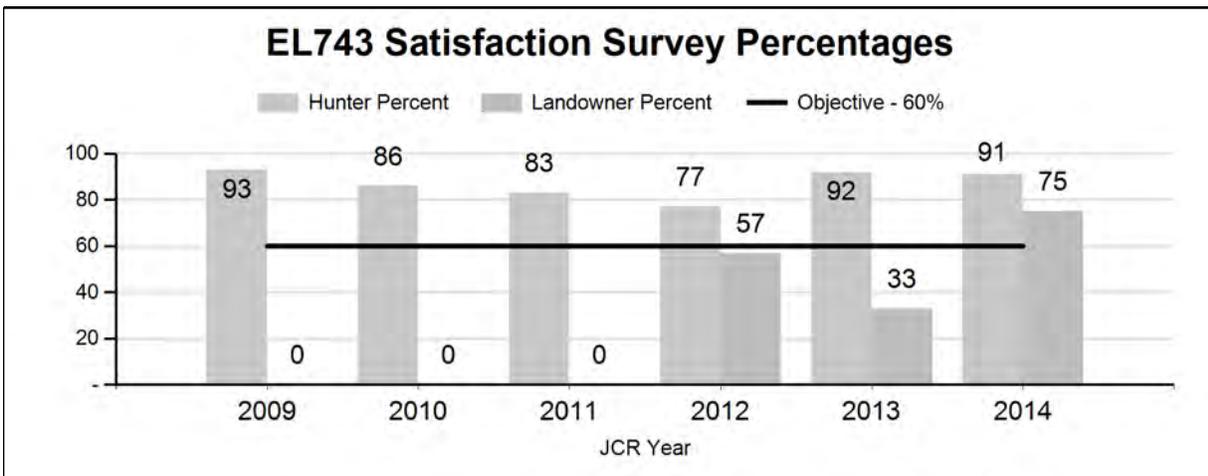
PERIOD: 6/1/2014 - 5/31/2015

HERD: EL743 - PINE RIDGE

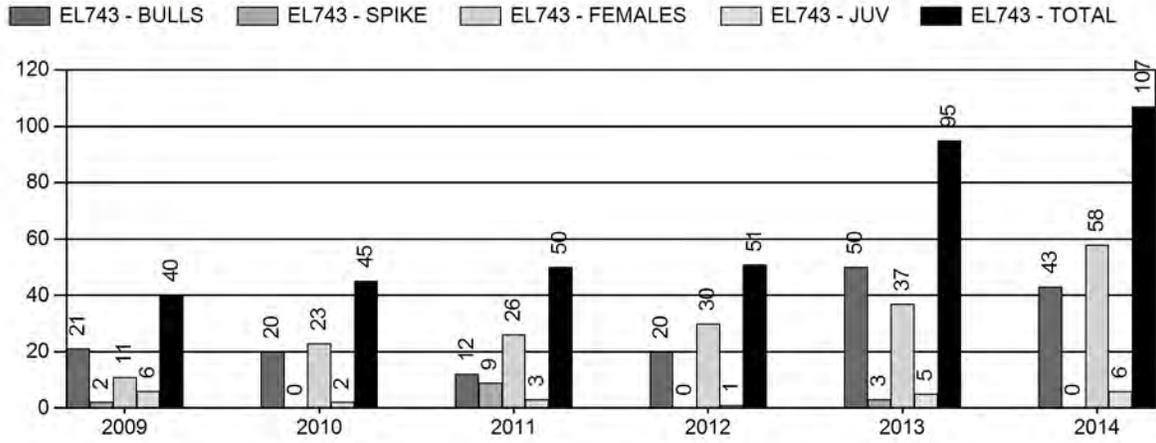
HUNT AREAS: 122

PREPARED BY: WILLOW HIBBS

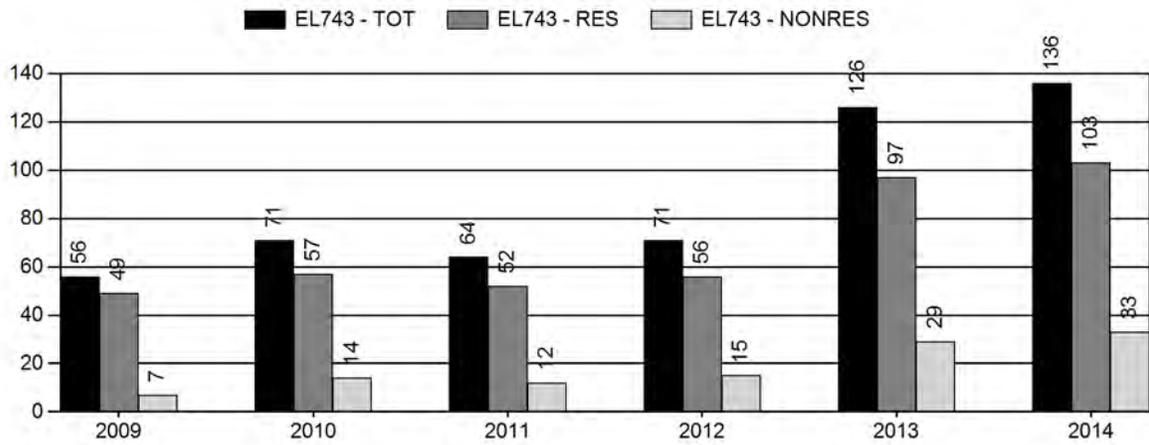
	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Hunter Satisfaction Percent	87%	91%	90%
Landowner Satisfaction Percent	46%	75%	75%
Harvest:	56	107	120
Hunters:	78	136	150
Hunter Success:	72%	79%	80%
Active Licenses:	83	143	155
Active License Success:	67%	75%	77%
Recreation Days:	380	629	750
Days Per Animal:	6.8	5.9	6.2
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:			23%
Number of years population has been + or - objective in recent trend:			0



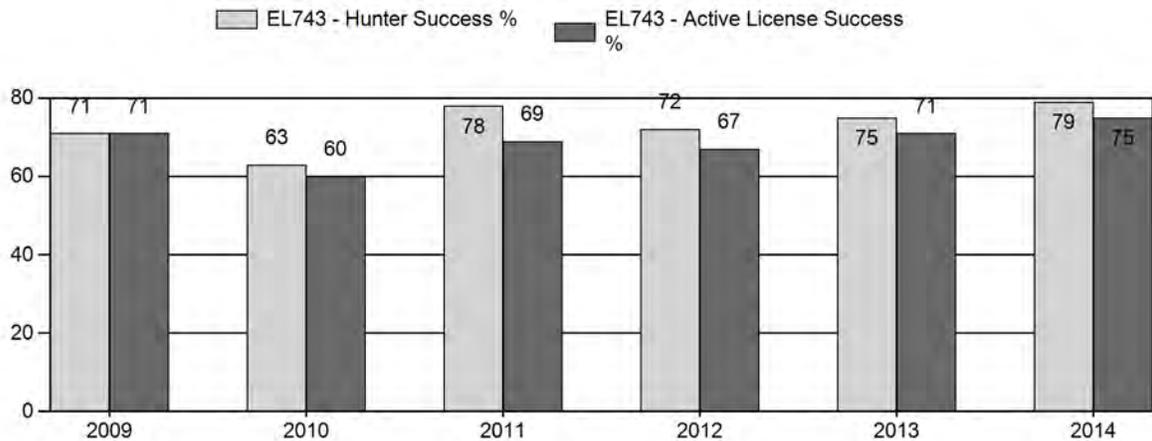
Harvest



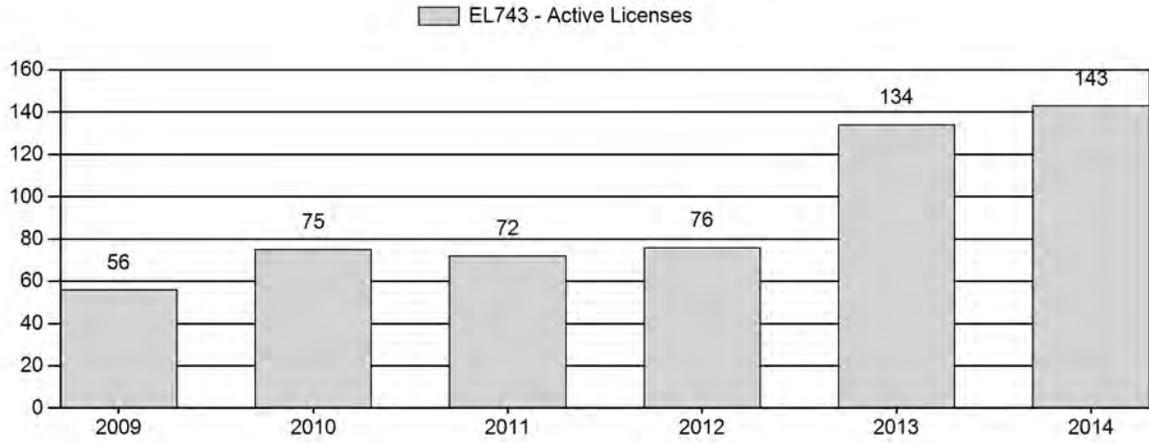
Number of Hunters



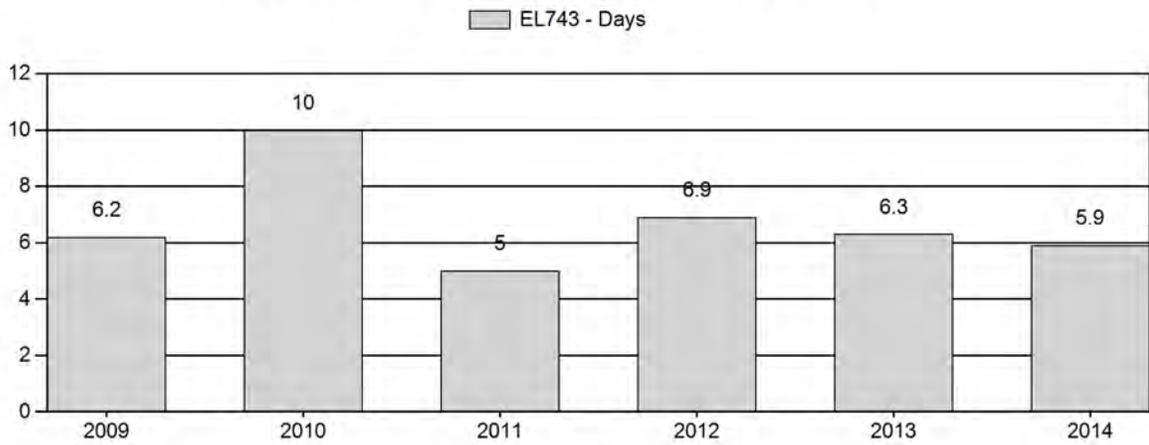
Harvest Success



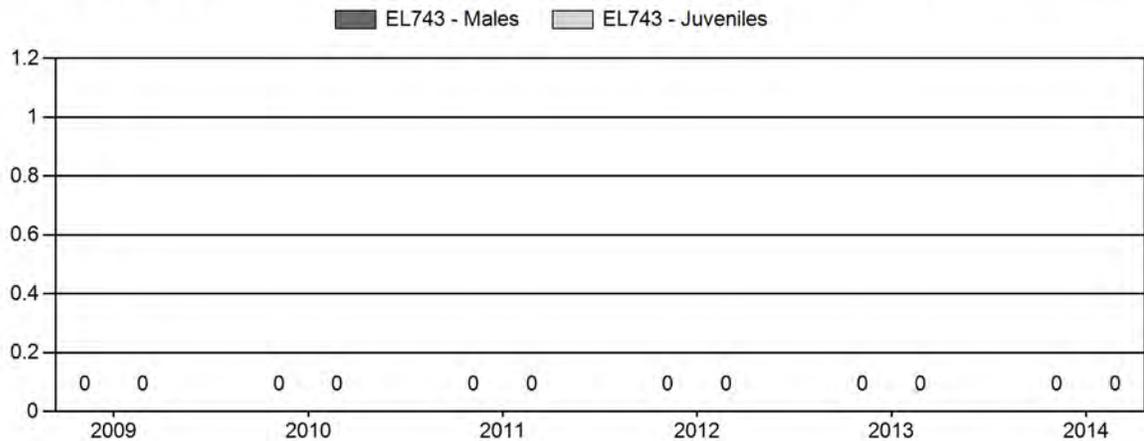
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



**2015 HUNTING SEASONS
PINE RIDGE ELK HERD (EL743)**

Hunt Area	Type	Date of Seasons		Quota	License	Limitations
		Opens	Closes			
122	1	Oct. 15	Nov. 30	75	Limited quota	Any elk
		Dec. 1	Dec. 15			
Archery	6	Oct. 15	Dec. 15	125	Limited quota	Cow or calf
		Sep. 1	Sep. 30			Refer to license and type limitations in Section 2

Hunt Area	Type	Quota change from 2014
122	6	+25

Management Evaluation

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

Management Strategy: Private Land

2014 Hunter Satisfaction Estimate: 89%

2014 Landowner Satisfaction Estimate: 75%

Most Recent 3-year Running Average Hunter Satisfaction Estimate: 86%

Most Recent 3-year Running Average Landowner Satisfaction Estimate: 55%

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. 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 is very difficult. Until recently, nearly all landowners within occupied habitat have

expressed complete satisfaction with elk numbers and management. However, this past year, some landowners have begun to express concern regarding elk numbers and associated issues such as fence damage, competition with livestock, and access to elk during the hunting season. As a result, the Department again held a landowner meeting in February 2015 to discuss elk management on the Pine Ridge (Appendix II: February 2015 Pine Ridge Elk Landowner Meeting Attendance). Despite concerns being voiced by some landowners during routine field contacts, general satisfaction with elk numbers and management direction was again expressed by landowners attending this meeting.

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 the 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. It is assumed the elk moved away from the Pine Ridge prior to the flight. Based on past observations and landowner input, managers still estimate that there are likely 900-1,000 elk in this herd.

Landowner and hunter satisfaction surveys are used to gauge management of the Pine Ridge Elk Herd. Annual survey results must show that at least 60% of hunters were either "satisfied" or "very satisfied" with the previous year's hunting season. In addition, landowner surveys must show that at least 60% or more respondents are satisfied with elk numbers in their area (Appendix I: 2014 Pine Ridge Elk Landowner Survey Results). 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 trend average of 60% minimum being the threshold for management action. In 2014, 75% of

landowners (N=5) believed the elk herd to be “at or about at desired levels”, while 89% of hunters who returned surveys were “satisfied” or “very satisfied” with their hunting experience in the Pine Ridge Elk Herd Unit. Unfortunately, landowner survey response rates have been very poor the past two years. As a result, field personnel will continue to make concerted efforts to increase landowner outreach to better gauge their desired management approach. For the secondary objective, the three-year average for mature bulls in the harvest was 98%. Landowner satisfaction, hunter satisfaction, and the percentage of mature bulls in the harvest all exceeded the 60% threshold for bio-year 2014.

Harvest Data

Hunter success in this herd unit is typically in the 50-70th percentile and fluctuates with access and license issuance. Hunter success has remained high for the last 5 years, but in the past, antlerless elk licenses have typically remained undersubscribed as landowners have been unwilling to allow access for cow hunters. While a majority of cow licenses were available as leftovers in 2014, they were all eventually sold. This is most likely due to increased efforts by landowners to harvest cow elk. The harvest survey reports a harvest of 58 cows; however, during the 2015 landowner meeting, over 80 harvested cows were accounted for based on landowner recollection. Due to a newfound willingness to allow more cow hunting, landowners requested an increase in Type 6 licenses in an attempt to better manage this herd and maintain it at current levels.

Perceived loss of bull quality was also a concern amongst certain landowners in the past. While some landowners initially requested a reduction in Type 1 licenses to address bull quality within the survey, those landowners attending the 2015 meeting agreed that bull quality was still high and that the 2014 quota of 75 was desirable.

Management Summary

The hunting season in this herd unit opens on October 15th following the close of deer seasons. In more recent years, closing dates have been extended as landowners have agreed to somewhat liberalize access for cow elk hunting later in the season. Similar season dates will be used for 2015 and Type 1 license issuance will remain at 75. Type 6 license issuance was increased by 25 to accommodate increased access now being provided by landowners.

Elk - Pine Ridge
Hunt Area 122
Casper Region
Revised 5/88

Midwest

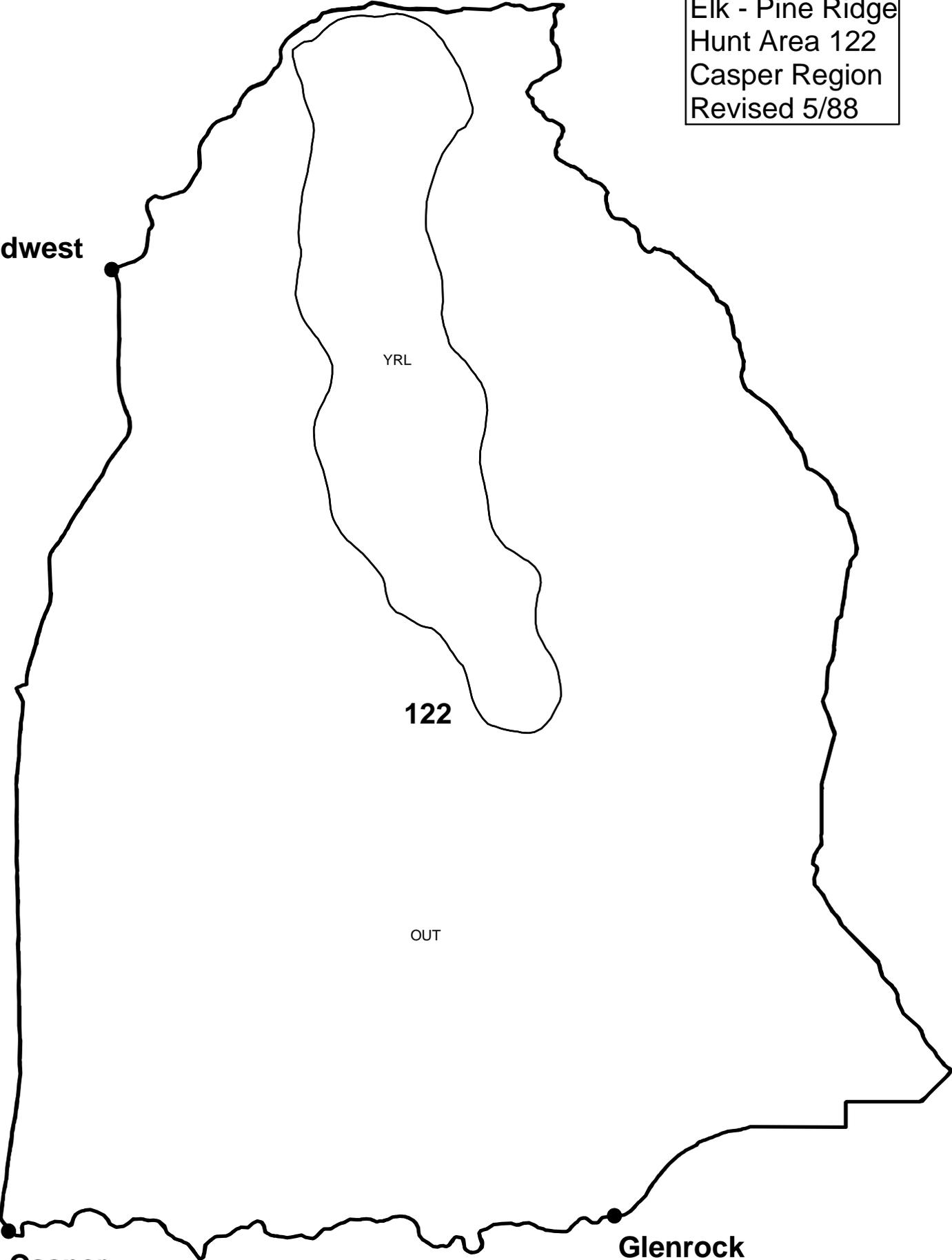
YRL

122

OUT

Casper

Glenrock



**APPENDIX I:
2014 PINE RIDGE ELK LANDOWNER SURVEY RESULTS**

2014 Satisfaction w/ Pine Ridge Elk Population Size	2015 Bull Hunting Recommendation	2015 Antlerless Hunting Recommendation	2015 Season Length Recommendation	Additional Comments
At or about at desired levels	Less licenses	About the same licenses	Extended season length (earlier)	We should lengthen the season and give fewer tags. This should allow for more elk being harvested without the problem of people drawing tags without permission to hunt. I strongly oppose giving out more tags, it only creates more problems.
Left blank	Less licenses	More licenses	Extended season length (for cows)	I don't think the numbers of elk can be controlled by taking more bulls. The quality of bulls has decreased and the number of cows have greatly increased to the extent they are now ranging to Hwy 387 and causing traffic problems.
At or about at desired levels	Less licenses (less resident, more non-resident)	More licenses	The same season length	
Above desired levels	More licenses	More licenses	Shorter season length	We are having trespass problems and hunter vandalism/property damage. This year we had two gates damaged and one cow killed during the season. Poor behavior by sportsmen makes it difficult to allow more hunting. We need alternatives to hunting to control the population of elk.
At or about at desired levels	Less licenses	More licenses	Shorter season length (Nov 1 – Nov 30 Bulls; Nov 1 – Dec 14 Cows)	Less G&F input; they tell hunters there's lots of elk and leave out that it's hard to access.

SURVEY TOTALS (population size)	
At or about at	3
Above	1
Below	0
Total	4
% At or about at	75%
% Above	25%

PLEASE SIGN IN!

PINE RIDGE ELK
 Landowner Meeting
 February, 2015

ATTENDANCE

NAME	ADDRESS
Shannon Wheeler Perri Wheeler	P.O. Box 270 Edgerton, WY. 82635
Scott Hornbuckle	1558 Ross Rd. Douglas, WY 82633
Doug Cooper	1025 S. Durbin Casper, WY 82601
Josh Moore	4095 Ross Rd Douglas WY 82633
Kerri Paddock	2421 Ross Rd Douglas WY 82633
Keith Moore	3493 Ross Road Douglas, WY 82633
David Moore	3493 Ross rd Douglas, WY 82633
Bart & Gay Lynn Byrd	2775 Ross Rd, Douglas, WY 82633