ELK

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2018 - JCR Evaluation Form

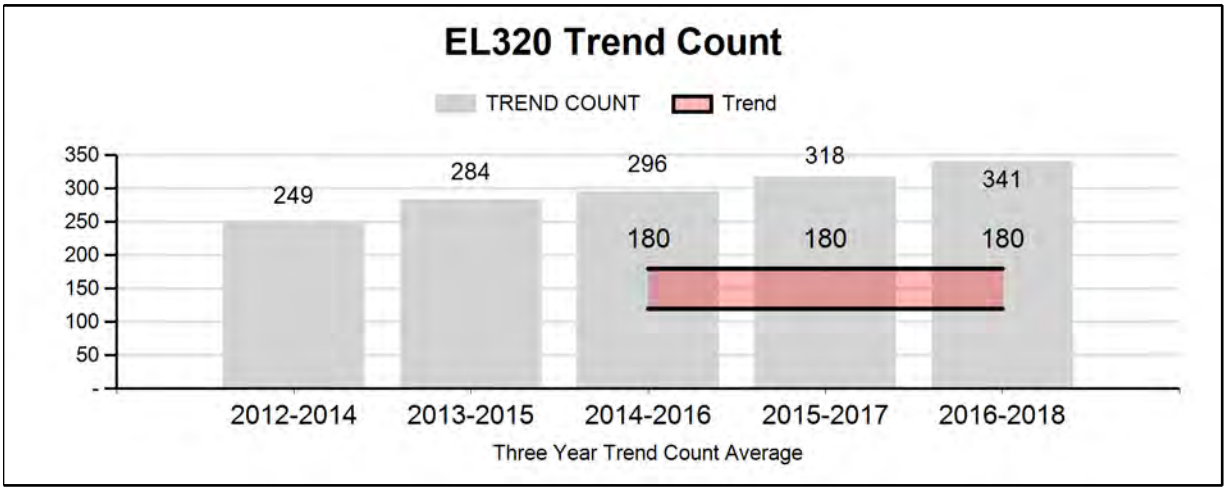
SPECIES: Elk
PERIOD: 6/1/2018 - 5/31/2019
HERD: EL320 - FORTIFICATION
HUNT AREAS: 2
PREPARED BY: ERIKA PECKHAM

	2013 - 2017 Average	2018	2019 Proposed
Trend Count:	299	378	350
Harvest:	90	91	48
Hunters:	118	145	70
Hunter Success:	76%	63%	70 %
Active Licenses:	120	156	68
Active License Success	75%	58%	72 %
Recreation Days:	437	504	250
Days Per Animal:	4.9	5.5	5.1
Males per 100 Females:	48	22	
Juveniles per 100 Females	68	57	

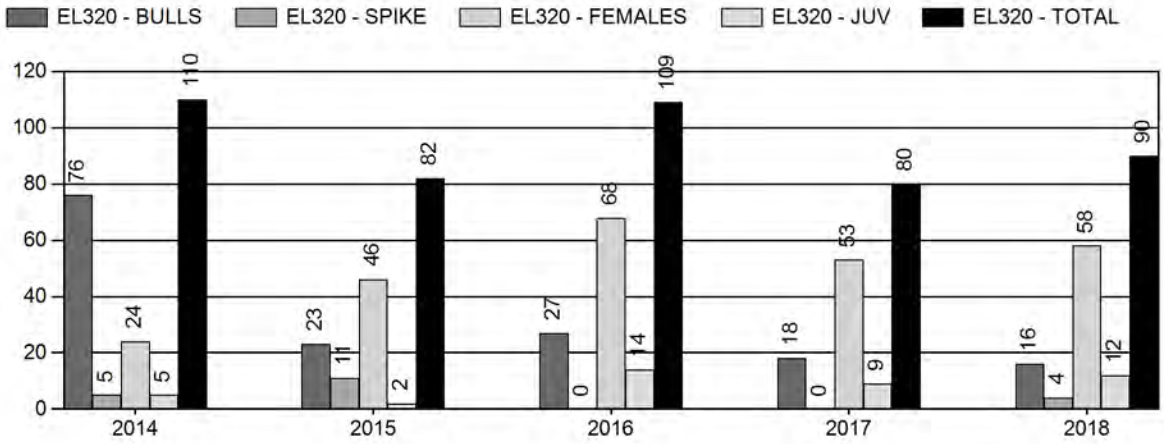
Trend Based Objective (± 20%)	150 (120 - 180)
Management Strategy:	Private Land
Percent population is above (+) or (-) objective:	152%
Number of years population has been + or - objective in recent trend:	2

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

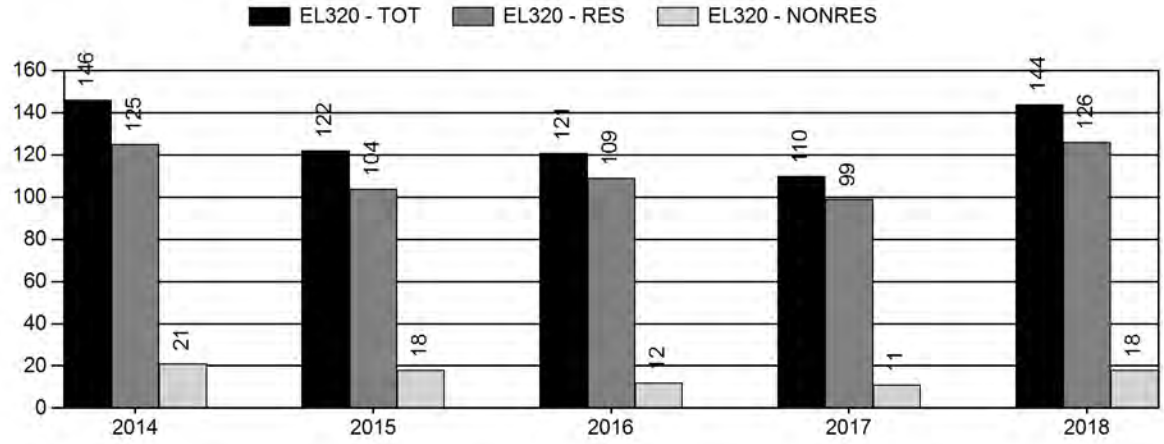
	JCR Year	Proposed
Females ≥ 1 year old:	29.5%	12.6%
Males ≥ 1 year old:	8%	0%
Juveniles (< 1 year old):	1%	4%



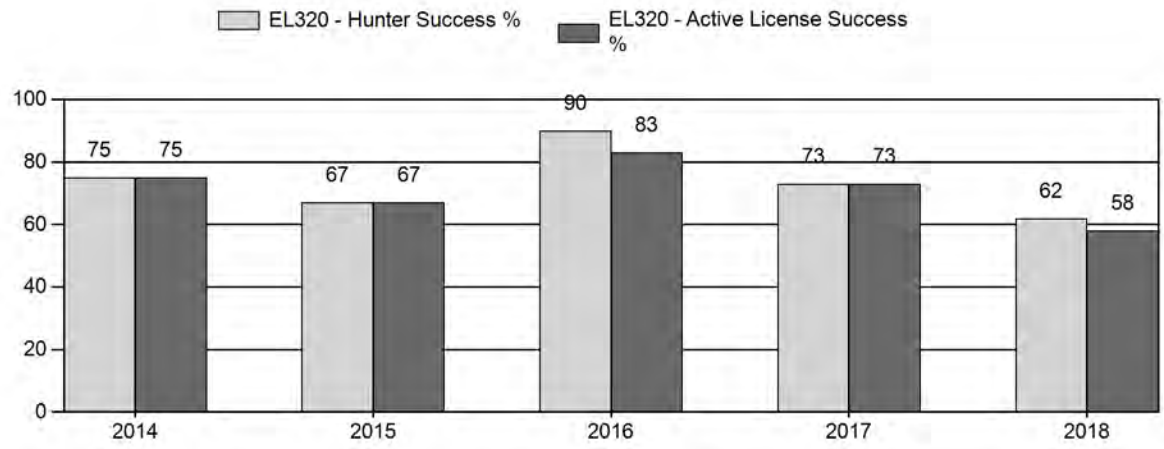
Harvest



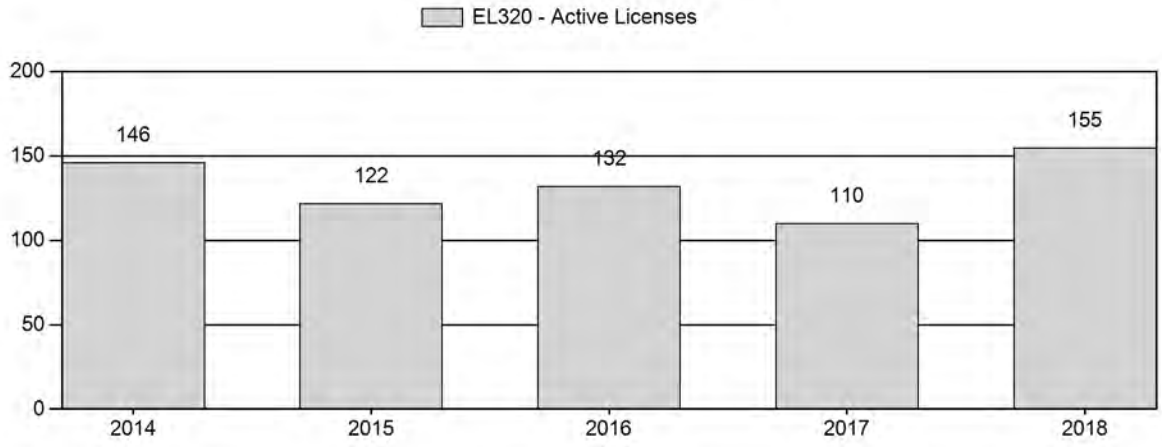
Number of Hunters



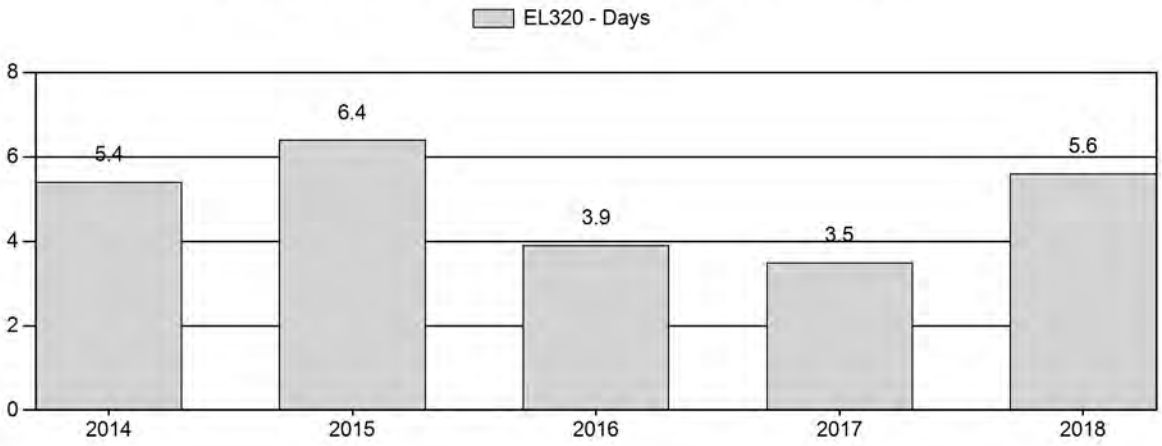
Harvest Success



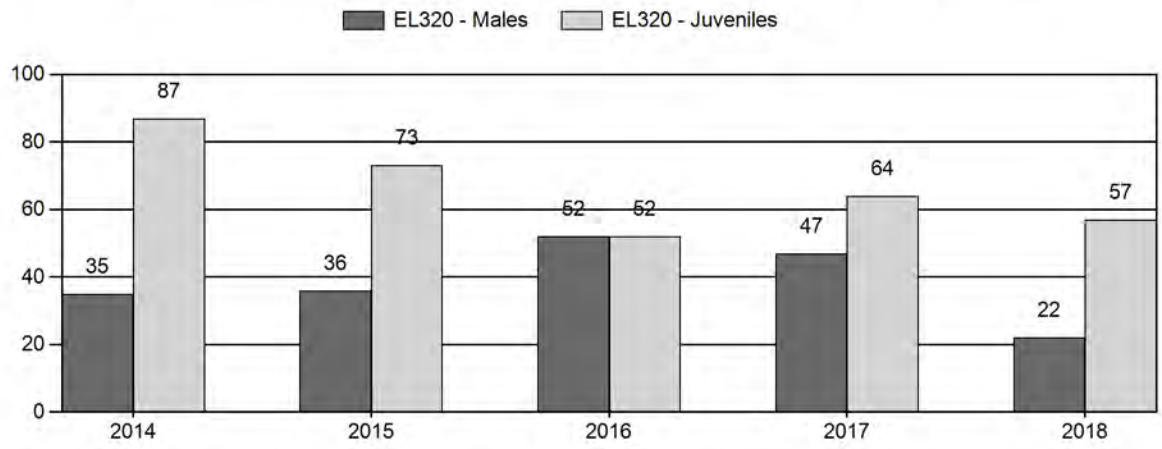
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL320 - FORTIFICATION

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	23	63	86	31%	114	41%	75	27%	275	438	20	55	75	± 10	66	± 9	38
2014	0	25	17	42	16%	121	45%	105	39%	268	0	21	14	35	± 6	87	± 11	64
2015	0	31	22	53	17%	148	48%	108	35%	309	0	21	15	36	± 6	73	± 9	54
2016	0	43	36	79	25%	153	49%	80	26%	312	517	28	24	52	± 7	52	± 7	34
2017	0	29	45	74	22%	157	47%	101	30%	332	483	18	29	47	± 0	64	± 0	44
2018	0	20	27	47	12%	217	56%	123	32%	387	537	9	12	22	± 0	57	± 0	47

2019 HUNTING SEASONS
FORTIFICATION ELK HERD (EL320)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
2	4	Oct. 21	Nov. 3	50	Limited quota	Antlerless elk
2	6	Oct. 21	Nov. 3	20	Limited quota	Cow or calf

Hunt Area	Type	Quota change from 2018
2	1	-35
2	4	+10
2	6	-20
2	7	-50

Management Evaluation
Current Trend Count Objective: 150
Management Strategy: Private Land
2018 Trend Count: 387
2019 Proposed Trend Count: 350
2018 Hunter Satisfaction: 72% Satisfied, 15% Neutral, 13% Dissatisfied

Herd Unit Issues

The Fortification Elk Herd Unit has a mid-winter trend count objective of 150 elk. The management strategy is private land management. The objective and management strategy were last reviewed and revised in 2017. Prior to this change, this herd had a population objective of 150 animals. The mid-winter trend count objective of 150 elk was correlated with a time period when landowners were satisfied with the number of elk they were seeing. During the time period when satisfaction with the number of elk was high, there were around 150 elk being detected in the postseason survey. The objective will be difficult to attain, as this herd is likely over 800 elk and increasing due to limited hunter access. As hunter access to this herd is dependent on private landowner willingness and ability to accommodate hunters, the private land management strategy is appropriate.

This herd has great potential for growth if hunter access does not improve. Much of the occupied range includes land administrated by the Bureau of Land Management. Private land is scattered, but also surrounds the occupied habitat, resulting in a tightly controlled access situation. The opinions of landowners controlling hunting access thus have a great impact on how this herd is

managed. At this time, several landowners allowing hunting access seem to be relatively satisfied with the management direction and have allowed access to the current number of license-holding hunters. A few landowners have opted to enroll in the Access Yes program for 2019 and it is hoped that this will facilitate things and potentially neighboring ranches will see the benefit of the program. However, some landowners do not take any hunters, thereby providing refuge areas for elk.

Coal bed methane (CBM) development has occurred in the herd unit and has resulted in a network of roads and other development associated with the infrastructure required to support CBM extraction. A phased development plan was implemented when extensive CBM development was projected in core elk habitat. This reduced impacts to elk. Increased traffic was an issue with hunting in the past, however in recent years, development and activity has tapered off substantially. There has been increased conventional oil exploration, however, at this time it also has slowed with little development planned in the immediate future.

The mid-winter trend count resulted in 387 elk observed. This is well above the objective of 150 and is also the highest on record. The 2018 post-season population estimate from the spreadsheet model was about 775 elk, which is likely a realistic estimate. Field data and observations indicate this herd has steadily trended upwards since 2003. The field estimate is currently around 800 elk.

Weather

Weather throughout 2017 resulted in sub-optimal rangeland conditions due to moderate drought conditions. In contrast, weather in 2018 was ideal for rangeland conditions with favorable precipitation resulting in good forage availability. The Palmer Drought Index indicates that all months of 2018 experienced “normal” conditions in the Powder River drainage. Additionally, looking at historic temperature information for November and December 2018, mean temperatures were very close to the 30-year normals.

The winter of 2018-2019 was fairly mild with minimal amounts of snow as winter commenced. The month of February brought prolonged cold temperatures and an increase in snowfall. However, over winter survival was likely not negatively impacted.

Habitat

There is currently no formal habitat monitoring occurring in this herd unit. It should be noted that various stands of sagebrush appear to be stressed with overall low vigor. The cause may be related to prolonged drought. These areas are being monitored to see if die-off is imminent or if plants will recover. To date it appears that sagebrush stands are persisting. The BLM has plans to conduct targeted timber thinning within this area. Game and Fish has also been involved in this effort with treatments continuing over the next few years.

Field Data

This herd is classified aerially via a helicopter with about four hours required to conduct the survey. Usually the elk are found in their preferred locations and these areas are systematically searched. If there is additional time, outlying areas are searched. The 2018 survey effort yielded an additional group of around 50 elk in an area that is not typically surveyed.

In general, the number of elk observed has been increasing since 2005. Survey conditions during the November 2018 classification flight were moderate with poor snow cover and cool temperatures. Elk were scattered throughout the area. A total of 387 elk were observed and classified, resulting in postseason calf to cow ratio of 57, down slightly from the 2017 ratio of 64:100. The 2018 bull ratio was 22:100, down substantially from the 47:100 observed in 2017. It should also be noted that beginning a few years ago elk have been sighted increasingly in the areas adjacent to this herd unit. They are regularly spotted south of I-90, west of the Powder River and also east of Echeta Road suggesting elk have exceeded carrying capacity and are expanding into adjacent areas.

Classifications of Fortification Elk Herd 2004-2018

	Total	Juv	YrlgMale	AdultMale	Female
2004	**66**	13	3	9	41
2005	**62**	12	7	12	31
2006	**173**	56	21	15	81
2007	**113**	21	17	6	69
2008	**135**	40	12	14	69
2009	**59**	12	1	17	29
2010	**164**	36	13	31	84
2011	**177**	54	18	18	87
2012	**204**	63	32	27	82
2013	**275**	75	23	63	114
2014	**268**	105	25	17	121
2015	**331***	108	31	22	148
2016	**312**	80	43	36	153
2017	**332**	101	29	45	157
2018	**387**	123	20	27	217

*Total is different, as there were 22 that were not classified

As this is a small herd, the ratios can very quickly become skewed when harvest emphasis is placed on either males or females. Historically, harvest strategies alternate with a focus on cows to keep the herd in check, and bulls the following year to keep a high bull ratio. Although there were some bull licenses available in 2018, cow harvest was again emphasized to control herd growth.

One difficulty associated with the management of this herd is achieving adequate sample sizes during trend-count surveys. Elk can be difficult to locate under dense juniper cover and frequently

they do not run when disturbed by survey flights. This contributes to reduced sightability, which is estimated to be 50%. Additionally, weather conditions are also a factor with lack of snow cover and warm temperatures making it difficult to spot elk. The Fortification Herd Unit might be a candidate to attempt using infa-red survey techniques to estimate the population.

Harvest

In 2018 there were 165 licenses available, 35 Type 1 any elk licenses, 40 Type 4 antlerless elk licenses, 40 Type 6 cow or calf licenses and 50 Type 7 cow or calf licenses that were designated for a December season. This was the first time in a number of years trying a late cow season. This number of licenses was in line with the number of hunters and was proportionate to the number of participating landowners allowing access. It should be noted that the conditions during the season were very favorable. Snow can result in roads being closed and decreased access to elk. In 2018, the overall success rate was 63% for the initial season, which is slightly lower than typical. The reported success rate seems higher than what field observations and landowner coupons indicate. The late season cow hunt yielded a reported success rate of 46%. During both seasons, elk seemed to be in the more rugged terrain and not in the more accessible areas where they typically can be found. This was confirmed during the post-season aerial trend survey. Days per harvest was estimated at 5.6 days, comparable to the preceding 5-year average of 4.8 days and far below the statewide average of 17.4 days per harvest.

Population

Although this herd has moved away from management by population objective, the model appears to capture the trend and provides a reasonable estimate. The "Constant Juvenile – Constant Adult Mortality Rate" (CJCA) spreadsheet model was chosen to use for the post season population estimate. This model equals the SCA-CJ model with the lowest AIC value (102) and appears to depict the observed postseason trend count. The efficacy of the spreadsheet model can be affected by several factors. One factor that comes into play is the herd size. These models work better with larger herds. The Fortification herd is a relatively small herd, and therefore the accuracy of the model likely decreases. None of the other models appeared to be accurate, and due to the hardiness of elk, it is unlikely that they were negatively impacted in the more difficult winters from 2008-2010. Other methods of estimating population may be looked into in the future. Observations on the ground indicate that elk numbers are increasing and are expanding their distribution.

Management Summary

Both BLM and Game and Fish staff have dedicated efforts to studying the behavior and movements of elk with an ongoing radio-collar study. In January of 2014, 35 cow elk were fitted with GPS collars. These collars are no longer functioning and currently there are no individuals with working collars. In the past, collaring efforts were funded in part by Anadarko Petroleum. Currently there is funding in place for 35 more collars. The anticipated collaring date is December of 2019.

Several nongovernmental organizations have taken a keen interest in the area and elk herd in particular. The viewpoint of many of these groups is that elk should be greater consideration with competing interests. Coal bed methane development has reduced the total amount of effective elk habitat. Conventional oil development is anticipated to increase at some point in the Powder River Basin and could be a factor in the Fortification Elk Herd Unit. However, even with past and current development, the population is well over the management objective. Reducing elk numbers to objective would help reduce risks of overcrowding and degradation of remaining suitable habitat. A high priority is being placed upon maintaining habitat quality during development so that the area can continue to support a healthy elk herd after energy development has ceased.

In 2018 there were 165 licenses issued. During the annual landowner meeting held in January 2019, concern was expressed regarding the harvest and it was felt that higher license quotas hurt hunter success, reducing the harvest. The late cow season was discussed and was believed to be ineffective, given the distribution of elk at the time of the season.

The 2019 hunting season will have reduced Type 4 and Type 6 quotas. The Type 1 season will be closed to increase bull quality. Furthermore, the Type 7 season will be discontinued after one year. Department employees voiced concern at the landowner meeting that the season would be inadequate in controlling elk numbers, but landowners were unwilling to commit to increased hunter access. If we attain the projected harvest of 48 cows or calves, the population is projected to increase slightly.

2018 - JCR Evaluation Form

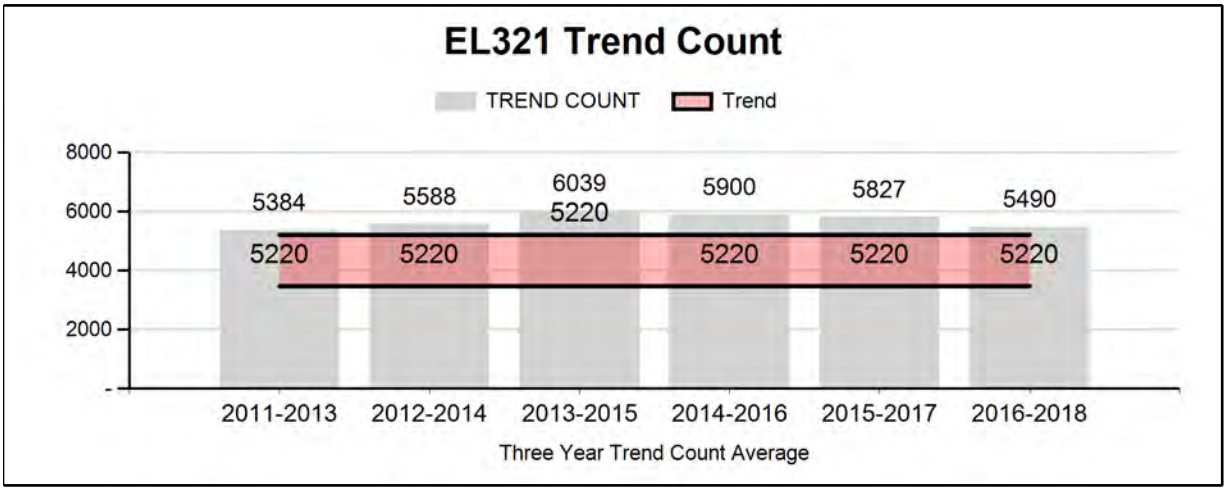
SPECIES: Elk
PERIOD: 6/1/2018 - 5/31/2019
HERD: EL321 - NORTH BIGHORN
HUNT AREAS: 35-40
PREPARED BY: TIM THOMAS

	2013 - 2017 Average	2018	2019 Proposed
Trend Count:	5,797	5,599	5,500
Harvest:	1,489	1,816	1,900
Hunters:	4,441	4,982	5,200
Hunter Success:	34%	36%	37%
Active Licenses:	4,657	5,240	5,400
Active License Success	32%	35%	35%
Recreation Days:	33,694	36,842	38,000
Days Per Animal:	22.6	20.3	20
Males per 100 Females:	22	31	
Juveniles per 100 Females	45	37	

Trend Based Objective (± 20%)	4,350 (3480 - 5220)
Management Strategy:	Special
Percent population is above (+) or (-) objective:	29%
Number of years population has been + or - objective in recent trend:	4

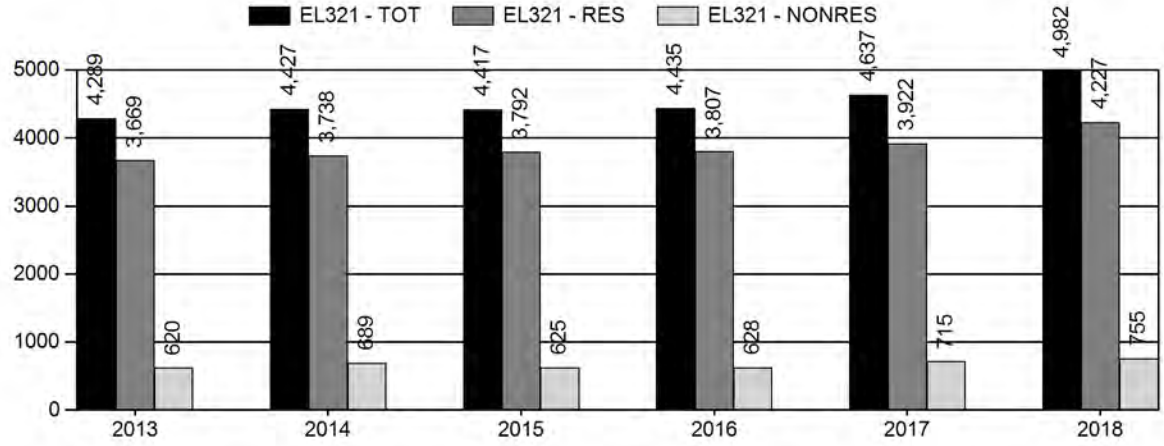
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	JCR Year	Proposed
Females ≥ 1 year old:	20%	20%
Males ≥ 1 year old:	38%	35%
Juveniles (< 1 year old):	5%	5%

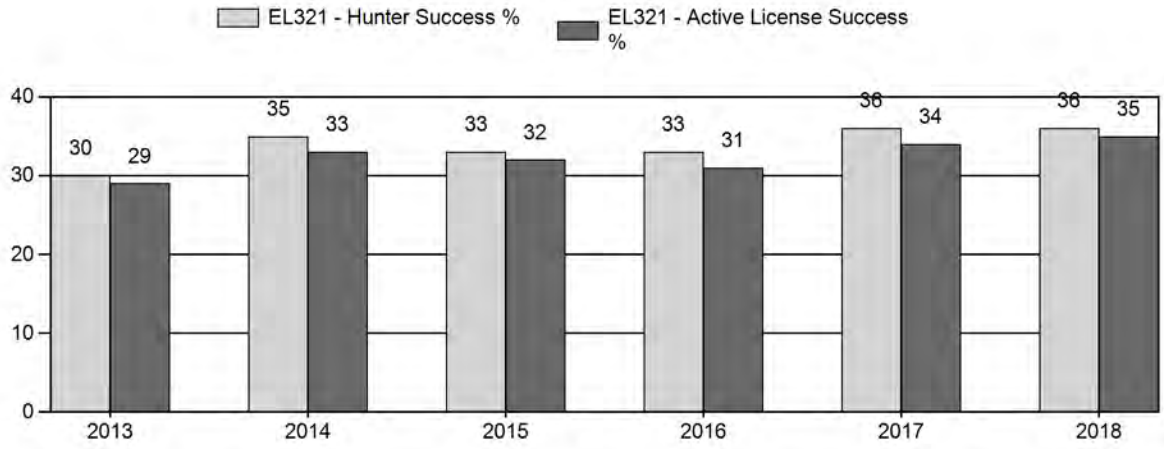


Harvest

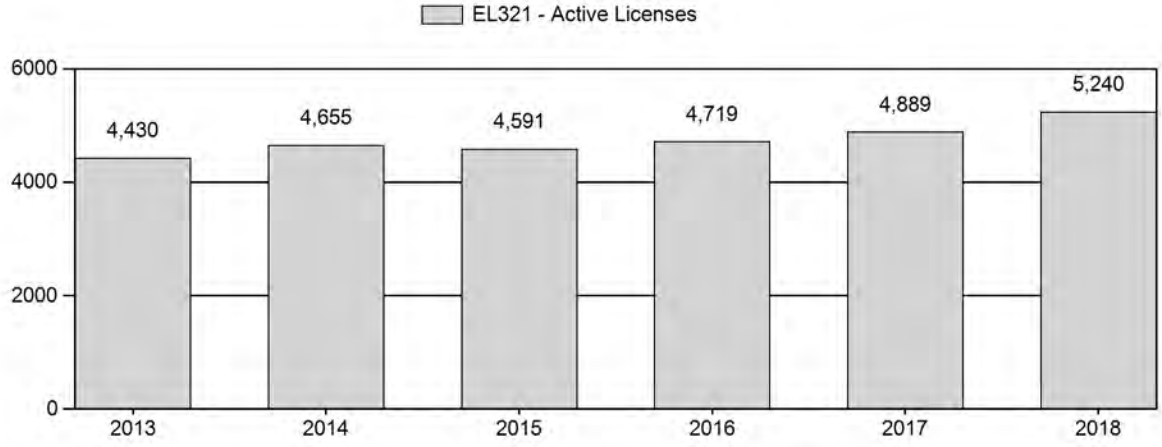
Number of Hunters



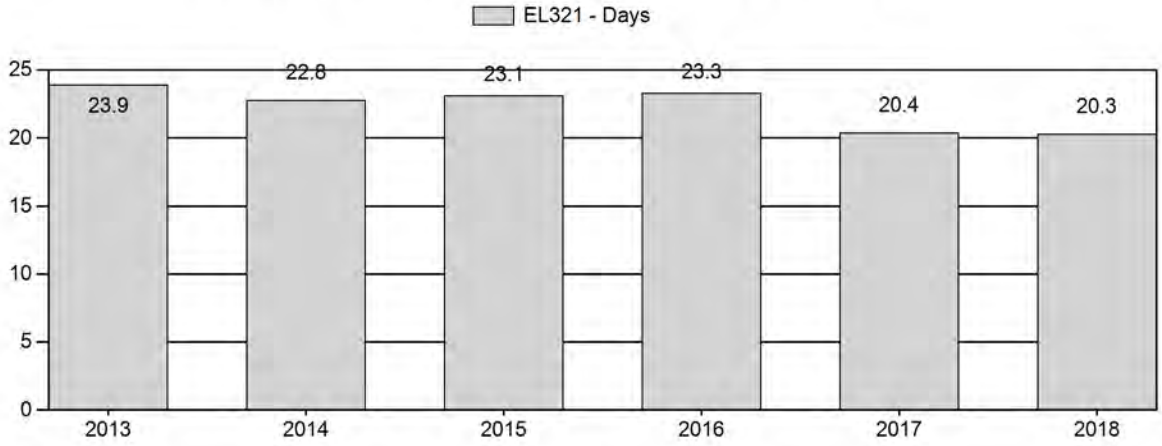
Harvest Success



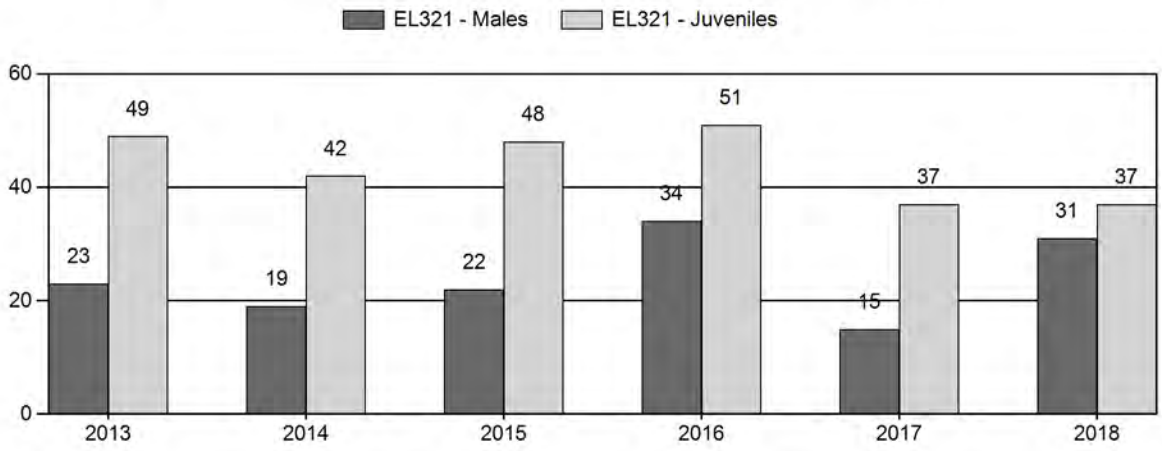
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary for Elk Herd EL321 - NORTH BIGHORN																			
		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to			
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult	
2013	0	103	43	146	13%	643	58%	312	28%	1,101	736	16	7	23	± 0	49	± 0	40	
2014	0	146	88	234	12%	1,221	62%	514	26%	1,969	504	12	7	19	± 0	42	± 0	35	
2015	0	74	101	175	13%	787	59%	377	28%	1,339	709	9	13	22	± 0	48	± 0	39	
2016	0	137	115	252	19%	734	54%	372	27%	1,358	801	19	16	34	± 0	51	± 0	38	
2017	0	105	30	135	10%	871	66%	319	24%	1,325	474	12	3	15	± 0	37	± 0	32	
2018	0	77	150	227	19%	721	59%	264	22%	1,212	509	11	21	31	± 0	37	± 0	28	

2013 - 2018 Trend Count Summary

for Elk Herd EL321 - NORTH BIGHORN

		Flight Time		
Year	Count Dates	Hours	Minutes	Number Counted
2013	JANUARY 2014, FEBRUARY 2014	10	0	5,437
2014	JANUARY 2015,	1	0	6,069
2015	JANUARY 2016, FEBRUARY 2016	0	0	6,610
2016	JANUARY 2017,	0	0	5,021
2017	JANUARY 2018, FEBRUARY 2018	10	0	5,849
2018	JANUARY 2019, FEBRUARY 2019	3	50	5,599

2019 HUNTING SEASONS
NORTH BIGHORN ELK HERD (EL321)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
35	1	Oct. 15	Nov. 5	150	Limited quota	Any elk
	4	Oct. 15	Dec. 31	250	Limited quota	Antlerless elk
	6	Oct. 15	Dec. 31	250	Limited quota	Cow or calf elk valid off national forest
	9	Sep. 1	Sep. 30	75	Limited quota	Any elk, archery only
36		Oct. 15	Nov. 5		General	Antlered elk
	4	Oct. 15	Dec. 31	300	Limited quota	Antlerless elk
	6	Oct. 1	Oct. 14	250	Limited quota	Cow or calf valid off national forest north of Rock Creek
	6	Oct. 15	Nov. 5			Cow or calf valid in the entire area
	9	Sep. 1	Sep. 30	50	Limited quota	Any elk, archery only
37		Oct. 15	Nov. 5		General	Any elk
	6	Sep. 15	Sep. 30	700	Limited quota	Cow or calf valid off national forest
	6	Oct. 1	Dec. 31			Cow or calf valid in the entire area
	9	Sep. 1	Sep. 30	150	Limited quota	Any elk, archery only
38	1	Oct. 15	Nov. 5	400	Limited quota	Any elk
	1	Nov. 6	Nov. 15			Antlerless elk
	4	Oct. 1	Oct. 10	550	Limited quota	Antlerless elk
	4	Oct. 15	Nov. 15			Antlerless elk
	6	Nov. 16	Dec. 31	50	Limited quota	Cow or calf valid off national forest; the Wyoming Game and Fish Commission's Kerns and Amsden Creek Wildlife Habitat Management Areas shall be closed
	9	Sep. 1	Sep. 30	250	Limited quota	Any elk, archery only
39	1	Oct. 15	Nov. 4	200	Limited quota	Any elk
	1	Nov. 5	Nov. 15			Antlerless elk
	4	Oct. 1	Oct. 10	75	Limited quota	Antlerless elk
	4	Oct. 15	Nov. 15			Antlerless elk
	9	Sep. 1	Sep. 30	75	Limited quota	Any elk, archery only

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
40	1	Oct. 15	Nov. 4	225	Limited quota	Any elk
	4	Oct. 15	Nov. 30	200	Limited quota	Antlerless elk
	5	Oct. 1	Oct. 10	50	Limited quota	Antlerless elk
	5	Oct. 15	Nov. 30			Antlerless elk
	6	Sep. 1	Oct. 14	100	Limited quota	Cow or calf valid off national forest
	6	Oct. 15	Nov. 30			Cow or calf valid in the entire area
	9	Sep. 1	Sep. 30	100	Limited quota	Any elk, archery only

Special Archery Season Hunt Areas	Type	Season Dates		Limitations
		Opens	Closes	
36, 37	All	Sep. 15	Sep. 30	Valid in the entire area(s)
35	1, 4	Sep. 15	Sep. 30	Valid in the entire area(s)
35	6	Sep. 15	Sep. 30	Valid off National Forest

Hunt Area	Type	Quota change from 2018
38	1	+ 50
	9	+ 50
Herd Unit Total	**Type**	**Quota change from 2018**
	1	**+ 50**
	4	**No Change**
	5	**No Change**
	6	**No Change**
	9	**+ 50**

Management Evaluation

Current Mid-Winter Trend Management Objective: 4,350
Management Strategy: Special
2018 Winter Trend Count: 5,599
Most Recent 3-year Running Average Winter Trend Count: ~ 5,500
2018 Hunter Satisfaction: 62% Satisfied; 19% Neutral; 19% Dissatisfied

Herd Unit Issues

The North Bighorn Elk Herd Unit is located in north central Wyoming. It covers the northern portion of the Bighorn Mountains and associated foothills. The Sheridan and Cody Regions share management, with the Sheridan wildlife biologist having herd unit reporting responsibility. This herd unit contains six elk hunt areas, specifically Hunt Areas 35-40.

The management objective for the North Bighorn Elk Herd Unit is a mid-winter trend count of 4,350 elk (±20%; 3,480-5,220). The management strategy is special management overall, with special management emphasis in limited quota hunt areas (Areas 35, 38, 39 and 40) and recreational management emphasis in general license hunt areas (Areas 36 and 37). We revised the management objective and strategy in 2012. We conducted the objective and management strategy 5-year evaluation in 2017 with no changes recommended.

There are several areas, consisting primarily of private lands, within the various hunt areas that act as refuge for elk, providing a safe harbor from harvest. This limits managers' ability to maintain these groups within desired population levels, leading to frustration for the general hunting public as elk move from publically accessible areas to refuge areas. Landowners are also frustrated as elk move off these refuge areas once hunting season is closed and cause damage to stored and standing crops. This problem has grown over the past 25+ years, especially on the eastside of this herd unit - specifically Hunt Areas 35, 36 and 37 - as larger ranches have changed ownership and views on elk management and hunter access have changed.

During four of the last seven hunting seasons (2012, 2013, 2014 and 2016), hunters harvested elk from this herd unit that tested seropositive for exposure to the bacterium *Brucella abortus*. *B. abortus* is the bacterium that causes the disease brucellosis in livestock, elk and bison, and undulant fever in humans. In 2012, hunters collected and submitted blood samples from harvested elk in Hunt Area 40 on the west side of the Bighorn Mountains during routine statewide monitoring for brucellosis. Two of these samples tested seropositive for exposure to *B. abortus*. In response to this finding, an enhanced brucellosis surveillance effort was initiated in all elk hunt areas in the Bighorn Mountains in 2013 and has occurred every year since then.

Weather

Temperature and precipitation data referenced in this section were collected at the Buffalo (#481165), Burgess Junction (#481220), Shell (#488124) and Sheridan Airport (#488155) weather stations located within this herd unit. Historic climate data are reported by the Western Region Climate Center on their website (www.wrcc.dri.edu).

Spring 2018 was generally warm and wet, with slightly above normal temperatures and above normal precipitation, resulting in a good start for forage production in the Bighorn Mountains. Precipitation during May was almost twice the long-term mean. Precipitation was near normal (June and July) to above normal (August) during the summer. Temperatures through the summer were near or slightly above normal. During the fall of 2018, precipitation was below normal (September), well above normal (October) or near normal (November), with temperatures slightly below normal. Precipitation was 50% of normal during December and near normal for January. Temperatures were above average in December and January, turning cold in February. Average monthly temperature was between 5^0F and 15^0F below average for February. March was generally

below normal and April was near normal for both temperature and precipitation. May saw below average temperatures (~5 - 15^0F lower) and 1.7-2.5 times average precipitation. Cool wet weather during parturition could negatively influence neonate survival. Late snow fall during May kept elk from calving in some higher elevation parturition areas. On May 26, only six female elk were observed in the Garden of the Gods area, a historic parturition area.

Adult elk appeared to have entered the winter in good condition, allowing them to survive the winter fairly well. Cold temperatures, as low as -20^0 F, in early February through early March resulted in elk movements to non-traditional areas. Elk damage to stored crops in some areas increased during this time period. While calves are more susceptible to adverse effects of cold temperatures due to limited body reserves and small body size, over-winter mortality probably wasn't significant due to the otherwise open winter conditions.

Field Data

Biologists and wardens conduct winter trend counts during January – February using aerial survey techniques with rotary and fixed-wing aircraft. Good snow cover and favorable flying conditions dictate the timing of these surveys annually. Managers on the west side (Areas 39 and 40) usually also classify elk during these surveys.

We counted 5,599 elk on winter ranges during January-February 2019, which is ~29% above the established mid-winter count objective of 4,350 (Table 1). This is the fourth highest winter count, but it is below the previous five year (2013-2017) average of 5,797 elk. The slightly declining trend in trend counts suggests we may have stopped the growth of this herd and may be finally decreasing it towards objective.

Table 1. Desired elk distribution and actual winter trend counts in North Bighorn Elk Herd Unit.

Hunt Area	Winter Count Objective	2016 Winter Count	2017 Winter Count	2018 Winter Count	2018 # Over / Under Objective	3-year (2016-18) Running Mean
35	400	148	360	528	+128	345
36	800	905	652	510	-290	689
37	800	1,668	2,108	1,822	+1,022	1,866
38	1,000	942	1,404	1,527	+527	1,291
39	500	452	451	527	+27	477
40	850	906	874	685	-165	822
	4,350	5,021	5,849	5,599	+1,249	5,490 (+29%)

Winter trend counts are similar to previous years. Recent research demonstrated female elk can winter on different winter ranges between years, accounting for some annual variation in surveys. In recent years, we have also seen elk movements not previously documented. Elk that historically wintered in Area 35 have started wintering in the northern portion of Area 34 in the South Bighorn Herd Unit.

Upwards of 1,500 elk winter in Garvin Basin, MT annually. Based on previous research, these elk return to Wyoming during the summer months. Due to the fact these elk are outside Wyoming, we do not survey these elk during our trend counts and are not included in our management objective. We have liberalized season strategies, resulting in an increase in harvest in recent years to reduce

elk to more desired levels. Limited access to private lands along the foothills of the Bighorns makes attaining harvest goals difficult.

We classified 1,212 elk during January 2019, down slightly from recent years but still above the desired sample size at the 90% confidence level. All elk classified were on the west side (Areas 39 and 40) of the Bighorn Mountains. We observed 37 calves:100 cows, that same as in January 2018 and the lowest calf:cow ratio since 2002. Assuming this ratio accurately reflects the true population dynamics, this could be a function of unfavorable environmental conditions last winter. It could also be a density dependent response to high elk numbers.

We observed 31 bulls (11 yearling; 21 adult):100 cows. This is only the third time we have observed over 30 bulls:100 cows. The observed yearling bull to cow ratio suggests average recruitment of bulls in 2018. This level of recruitment should be sufficient to maintain current levels of bull harvest. Due to the winter behavior of mature bulls (> 2 yrs old), which tend to winter away from cow/calf/young bull groups, is often difficult to assess the true bull to cow ratio. Over the past 10 years, the observed bull:cow ratio has fluctuated from 15-34 bulls:100 cows. We did locate several wintering bulls groups in some hunt areas that are not included in the above ratio because the corresponding cow/calf groups weren't classified. For example, we observed at least 178 branched antlered bulls in Area 37 and 158 branched antlered bulls in Area 38. In 2018, 91% of the reported bull harvest was branch antlered bulls, suggesting adequate bulls in the population.

According to the 2018 hunter satisfaction survey, 62% of 1,276 hunters were satisfied with their elk hunting experience, 19% were dissatisfied, with the balance (n=20%) being neutral. Satisfaction decreased slightly compared to the 2017 season, possibly due to poor weather conditions during much of the hunting season. Hunters were more satisfied in the limited quota hunt areas (70%) compared to the general license areas (53%) which is expected. Limited quotas areas tend to be less crowded, have higher success and generally have better quality bulls, factors that likely influence hunter satisfaction levels. Nonresident hunters (n=1) tended to be more satisfied (65%) than resident hunters (61%, n=1,034), although the difference is not as pronounced as it has been in previous years. Hunter satisfaction is subjective and based on individual values, perceptions and success.

Harvest Data

An estimated 4,978 hunters harvested an estimated 1,792 elk in 2018, an 7% increase over the 2017 harvest (Fig. 1). This is the highest estimated harvest recorded. Cow and calf harvest were the highest ever while bull harvest was the second highest ever.

During 2009-2013, hunters harvested an average of 575 total bulls compared to an average of 695 bull elk during 2014-2018. Adult bull harvest averaged 478 during 2009-2013 compared to an average 626 during 2014-2018. Estimated branched antlered bull harvest was over 500 bulls six of the past seven years. With an emphasis on special management in the limited quota hunt areas, we are concerned with the level of bull harvest in recent years. We will continue to monitor bull quality and hunter satisfaction. Yearling bull harvest has remained relatively stable over the past five years, ranging from 61 to 76. This is actually a decline from the previous decade, suggesting a shift in hunter selection for branched antlered bulls (Fig. 2). This shift could be a result of more branched antlered bulls being available in the population for harvest.

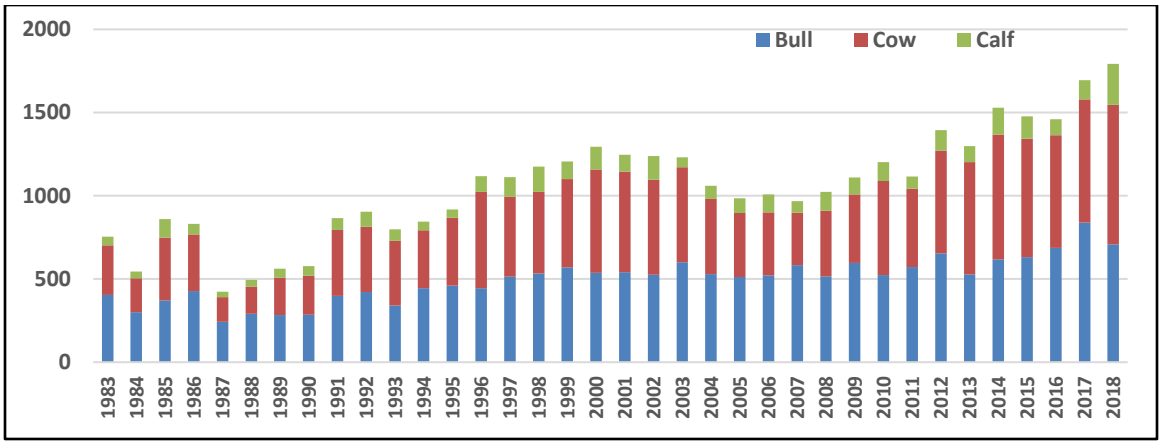


Figure 1. Estimated elk harvest from 1983 – 2018 by bull, cow and calf.

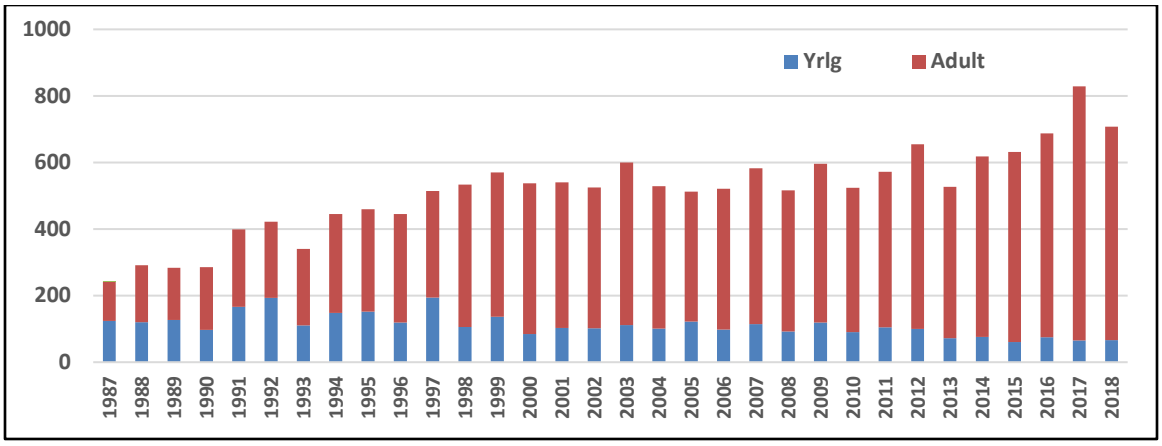


Figure 2. Estimated bull elk harvest from 1987 – 2018 by yearling and adult bulls.

Hunter success was estimated at 36%, the same as in 2017 and highest success rate since 1997. Effort, as measured by the number of days hunted to harvest an elk, was 20.6 days/harvest, similar to 2017. Relatively open weather conditions during late October and early November kept elk scattered across most of the herd unit. The open conditions allowed good access resulting in good success. Extended hunting season strategies helped provide opportunity for antlerless harvest.

Archery hunters harvested an estimated 260 elk in this herd unit, a 6% increase from the 2017 archery harvest (n=251) and 15% of the total harvest. Statewide, archery hunts harvested ~11% of the elk harvested in 2018. Archers are particularly successful on bull elk, harvesting an estimated 243 bulls (33% of total bull harvest), consisting of 234 adult bulls (≥ 2 years old) and 9 yearling bulls. Several hunt areas in this herd unit are generally considered some of the best opportunities for trophy elk archery hunting in Wyoming. This level of bull harvest, by either archery or firearm hunters, may not be sustainable over time to maintain special management objectives and will be monitored.

Population

We do not have an integrated spreadsheet model developed for this herd unit because: 1) we do not manage this herd based on a post-season population objective; 2) this is an interstate elk herd;

and 3) up to 25% of this herd migrates onto the Crow Indian Reservation in Montana each fall, where harvest is unregulated and unmonitored. We manage this herd based on mid-winter trend counts. Elk generally winter in traditional areas within this herd unit where they are reasonably visible, and we likely count 70-90% of wintering elk in any given year.

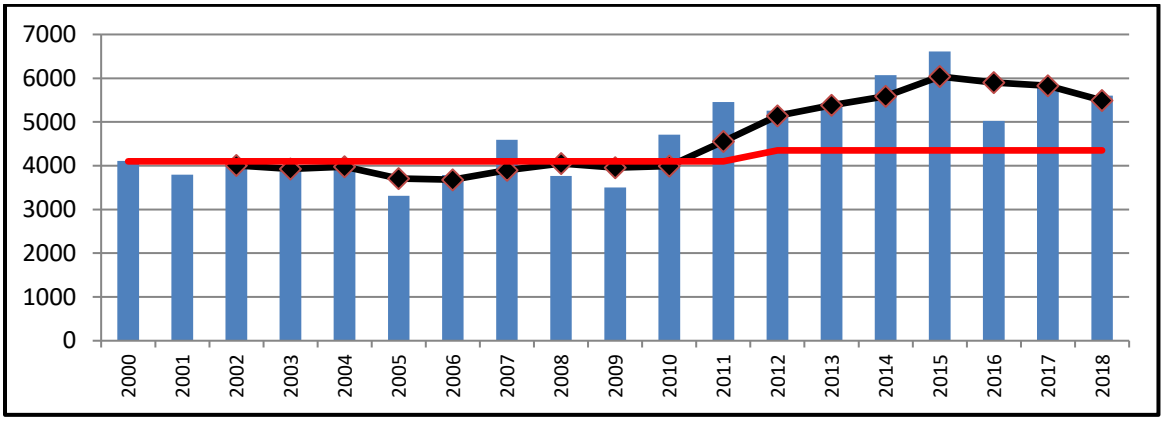


Figure 2. Elk numbers, with 3-year running average (black line), observed during trend and classification surveys compared to the management objective (red line).

While a trend count is not a complete census, it does provide a minimum known annual population. We have not developed a correction factor so it is difficult to accurately estimate a population above the known trend count. Based on elk winter trend counts, it appears this population may have peaked about 2015 and may be slowly decreasing (Fig. 2). It is difficult to know how much of this is an actual decrease in the population and how much is variation inherent in wildlife surveys. Also, shifts in elk wintering in Wyoming versus Montana due to varying winter conditions and Area 35 elk wintering in Area 34 can affect winter trend counts independent of actual population changes. Efforts are being made, through liberalized hunting season strategies, to reduce this population towards objective. Harvest the past five years has been the highest five years ever, averaging over 1,588 elk harvested each year (Fig. 1).

Management Summary

In general, bull elk hunting runs from October 15th thru November 4th or 5th. With four of the six hunt areas managed under limited quota strategies, we have been successful to date in maintaining trophy quality hunting opportunities throughout the herd unit. Recent increases in bull harvest may reduce average age and subsequent bull quality, and will be closely monitored. Antlerless harvest, either on full price antlerless licenses or reduced price cow or calf licenses, varies among hunt areas based on local management desires and concerns.

Archery hunting is allowed during the month of September. In Hunt Areas 35, 36, and 37, Type 9 (archery only) license holders can hunt the entire month, while other license holders (i.e. General, Type 1, Type 4 or Type 6 license holders) can hunt starting September 15. In Hunt Areas 38, 39, and 40, archery hunting is by Type 9 license only. These areas are extremely popular, with draw odds of around 29% for residents in these three areas (2018 resident draw odds for Type 9 license: Area 38 = 23%; Area 39 = 32%; Area 40 = 49%). Non-resident hunters needed 9+ preference points to draw an Area 38 Type 9 license, five points for a 39 Type 9 license and 8+ preference points to draw an Area 40 Type 9 license in 2018 (regular preference points draw).

A significant number of elk in Area 35 move to private lands south of U.S. Highway 16 in September to forage on alfalfa meadows. The Area 35 Type 6 season was implemented to target these private land elk, which may account for 75% of the winter count for this hunt area. In 2016, the Wyoming Office of State Land and Investments completed the Bull Creek Ranch #1 exchange which secured 5,235 deeded acres into State ownership with managed public access. This acquisition, along with existing BLM and State leases, provided access for significant public hunting opportunity which resulted in numerous elk being harvested. The Bull Creek Ranch #2 land exchange completed in February 2018 secured acquisition of the remaining 3,200 deeded acres of the Bull Creek Ranch into State ownership. This property provides crucial elk and deer winter range, and provides an opportunity to increase elk harvest to manage this sub-population. Type 4 (antlerless elk), Type 6 (cow or calf elk) and Type 9 (any elk, archery only) were all increased slightly in Area 35 for the 2018, resulting in record harvest. License numbers will remain the same for 2019.

Type 6 (cow or calf elk) licenses in Area 36 were increased for the 2018 season, resulting in the highest harvest levels in nearly 20 years. For 2019, license numbers will remain the same. An early October (October 1-14) season is designed to address elk damage on irrigated meadows in the Shell Creek drainage.

There is a split in the antlerless elk seasons in Hunt Areas 38, 39, and 40. These seasons run for 10 days, are closed for four days, and reopen in conjunction with other license types. This split is in response to feedback from antlered elk hunters worried that hunting pressure up to the opening day of their season could impact harvest opportunities. This split has seemed to pacify most hunters while providing opportunity to increase antlerless harvest. Based on reported day of harvest in 2018, an estimated 29% of the cow harvest in these hunt areas occurred during this early October season. This early October season has become very popular with hunters.

For the 2019 season, we propose increasing Area 38 Type 1 and Type 9 licenses by 50 licenses each. We reduced these license types in 2015 to reduce harvest on bulls. At the time, we were experiencing high legal and illegal bull harvest. These are highly desirable licenses and we have had requests to return to previous license numbers.

A late season Type 6 (cow or calf) license was created in 2015 in Area 38 to address damage issues on private lands. This season was designed to harvest elk that have become habituated to leaving the Amsden and Kerns WHMAs and feeding on stored hay crops. Weather conditions were fairly mild during the 2015 season and hunters harvested only five elk. In 2016, hunters harvested 11 elk on this license, in 2017 hunters harvested 12 elk, and in 2018 hunters harvested 20 elk. While we will use this season strategy again in 2019, some landowners have indicated they no longer support this late season. We will evaluate this license type and may remove it for the 2020 season.

The existing season structure and license allocation seems to be working well in Areas 39 and 40, and will be maintained for the 2019 season.

With continued liberal seasons and favorable hunting conditions, we anticipate a similar harvest (~1,900 elk) in 2019. Sustained harvest, especially on cows, should help bring some segments of this herd where winter counts exceed management objectives down to desired levels. Until access to key private lands improves in some areas, our ability to reach desired harvest, and hence

populations, will be limited. We continue to investigate possible access agreements to facilitate harvest.

Since brucellosis was first detected from a hunter harvested elk in Hunt Area 40 in 2012, we have tested 3,915 blood samples, primarily from hunter harvested elk in the Bighorn Mountains. There have been a total of 11 serepositives to date. There were no seropositive blood samples collected during 2017 and 2018.

Table 2. Usable blood samples collected during enhanced Brucellosis surveillance in Bighorn Mountains during 2018 hunting season. The North Bighorn Elk Herd Unit hunt areas (Areas 35-40) are in bold and highlighted. There were no serepositive samples in 2018.

Hunt Area	Usable Samples	Seropositive	Hunt Area	Usable Samples	Seropositive
033	25	0	**040**	**88**	**0**
034	48	0	041	102	0
035	**45**	**0**	045	101	0
036	**16**	**0**	047	14	0
037	**47**	**0**	048	52	0
038	**104**	**0**	049	93	0
039	**62**	**0**	120	28	0
			Total	**825**	**0**

In 2018, we collected and tested 825 blood samples, with 362 samples from the North Bighorn Elk Herd Unit (Table 2). Our lab has increased the useable sample rate by developing techniques allowing testing of hemolyzed samples. We initiated an enhanced brucellosis surveillance program starting in 2013, which will continue during the 2019 season. This involves mailing sample kits to hunters, placing collection coolers at exit points, field contacts and check stations.

In response to finding seropositive elk in the Bighorn Mountains, we developed a research proposal and solicited funding from the U.S. Department of Agriculture Animal and Plant Health Inspection Servcie (APHIS). The study objectives are:

1. Evaluate movement of possible source herds to determine if elk are migrating into/near the Bighorn Mountains.
2. Evaluate movement/dispersal of migratory elk in the Bighorn Mountains with a focus on Hunt Area 40.
3. Evaluate movement and interactions of elk herds in the northern Bighorns to determine how brucellosis may spread if it becomes established.
4. Perform a landscape genetics study to further evaluate relatedness of elk herds in and around the Bighorns.

Using Native Range Capture Service, we captured 58 elk in February, 2016. Elk were capture via a net-gun fired from a helicopter. Once entangled, elk were hobbled, blood samples were taken, ear tags attached, and an Advanced Telemetry System's (ATS) GPS collar attached. Elk were then released on-site. Of the 58 captured, 46 were within the North Bighorn Herd Unit. We captured another 53 elk in February, 2017, with 29 of those elk in this herd unit. We captured another 61 elk in February, 2018, with 20 of those elk in this herd unit. We captured 24 elk in February, 2019, with 13 of those elk in this herd unit.

We currently have ~72 elk with active satellite collars in the Bighorn Mountains. The Cody disease biologist oversees and coordinates this project.

In 2018, we collected retropharyngeal lymph nodes from 59 elk to test for chronic wasting disease (CWD). Two elk, one from Hunt Area 35 and one from Hunt Area 37, tested positive for CWD. White-tailed deer from overlapping areas have previously tested positive.

2018 - JCR Evaluation Form

SPECIES: Elk
HERD: EL322 - SOUTH BIGHORN
HUNT AREAS: 33-34, 47-49, 120

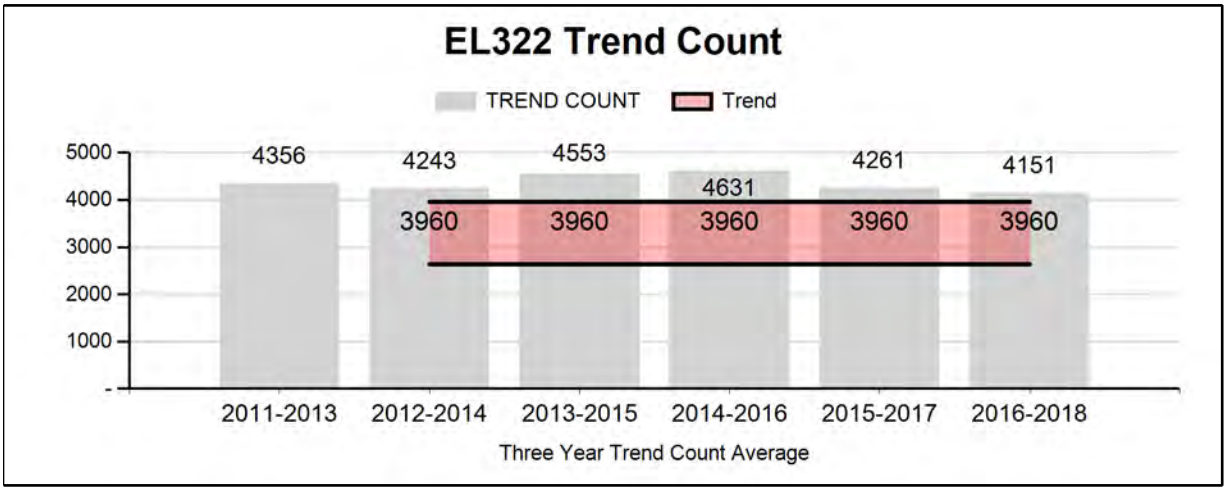
PERIOD: 6/1/2018 - 5/31/2019
PREPARED BY: CHEYENNE STEWART

	2013 - 2017 Average	2018	2019 Proposed
Trend Count:	4,244	4,892	5,000
Harvest:	1,751	1,822	1,800
Hunters:	3,670	3,888	3,800
Hunter Success:	48%	47%	47 %
Active Licenses:	3,812	4,059	4,000
Active License Success	46%	45%	45 %
Recreation Days:	26,513	27,676	27,500
Days Per Animal:	15.1	15.2	15.3
Males per 100 Females:	25	41	
Juveniles per 100 Females	34	26	

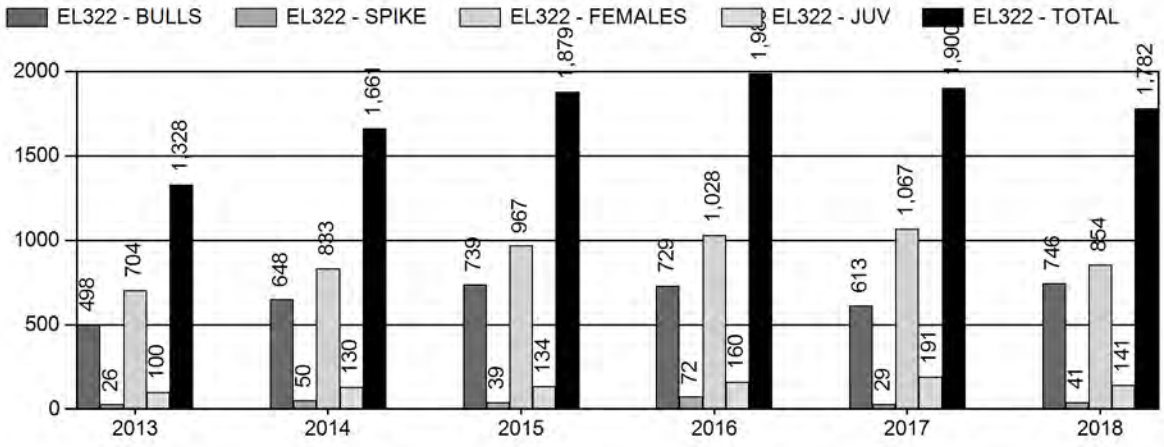
Trend Based Objective (± 20%)	3,300 (2640 - 3960)
Management Strategy:	Private Land
Percent population is above (+) or (-) objective:	48%
Number of years population has been + or - objective in recent trend:	6

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

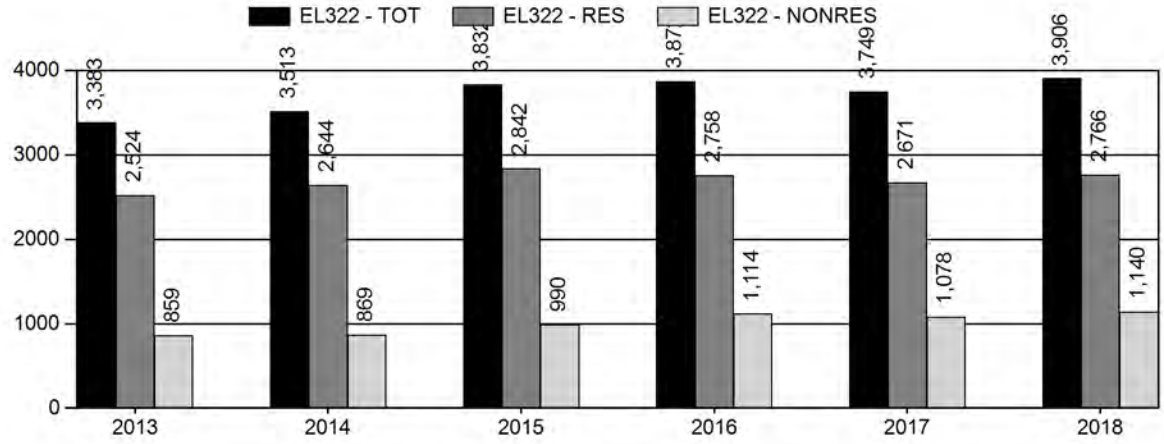
	JCR Year	Proposed
Females ≥ 1 year old:	na%	na%
Males ≥ 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%



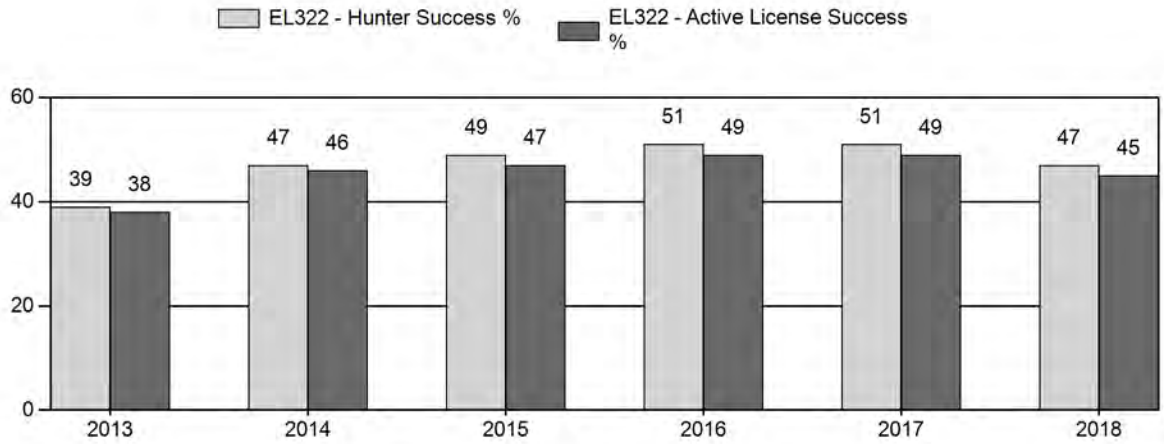
Harvest



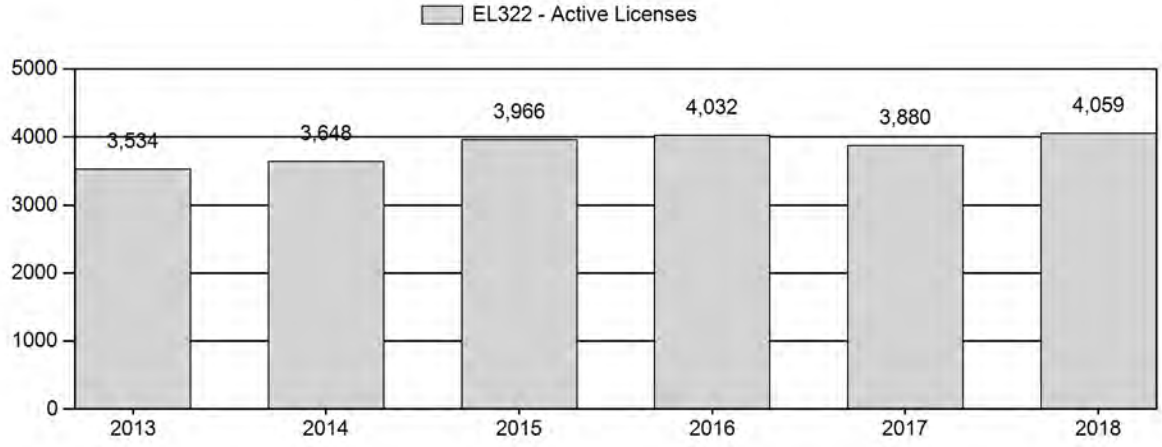
Number of Hunters



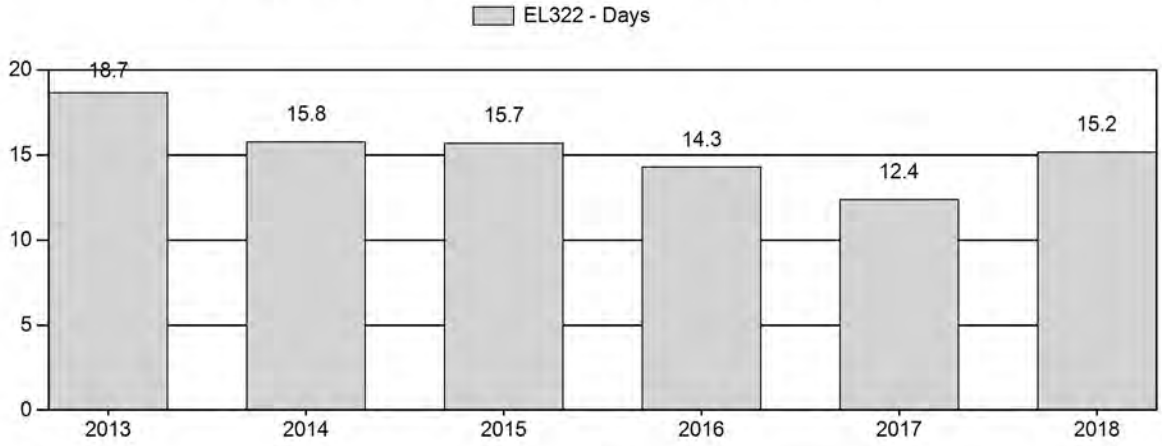
Harvest Success



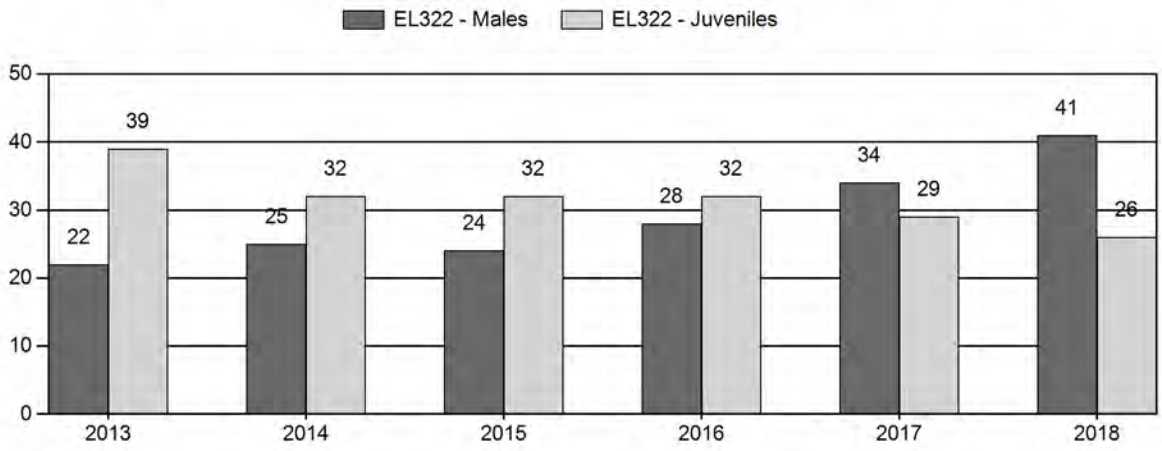
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL322 - SOUTH BIGHORN

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	5,490	290	207	497	14%	2,224	62%	878	24%	3,599	521	13	9	22	± 1	39	± 1	32
2014	5,060	104	114	218	16%	887	64%	281	20%	1,386	403	12	13	25	± 2	32	± 2	25
2015	6,525	125	137	262	16%	1,071	64%	345	21%	1,678	405	12	13	24	± 2	32	± 2	26
2016	6,000	164	128	292	17%	1,054	63%	338	20%	1,684	415	16	12	28	± 2	32	± 2	25
2017	0	92	165	257	21%	754	61%	222	18%	1,233	449	12	22	34	± 0	29	± 0	22
2018	0	60	124	184	25%	446	60%	117	16%	747	0	13	28	41	± 0	26	± 0	19

2013 - 2018 Trend Count Summary
for Elk Herd EL322 - SOUTH BIGHORN

		Flight Time		
Year	**Count Dates**	**Hours**	**Minutes**	**Number Counted**
2013	MARCH 2014, JANUARY 2014	0	0	4,392
2014	JANUARY 2015	0	0	4,047
2015	JANUARY 2016	0	0	5,221
2016	JANUARY 2017, FEBRUARY 2016, FEBRUARY 2017	6	0	4,626
2017	JANUARY 2017, JANUARY 2018, FEBRUARY 2018, FEBRUARY 2017	9	9	2,935
2018	FEBRUARY 2019, JANUARY 2018, FEBRUARY 2018	4	30	4,892

2019 HUNTING SEASONS

SOUTH BIGHORN ELK HERD (EL322)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
33	1	Oct. 9	Oct. 31	200	Limited quota	Any elk
33	1	Nov. 1	Dec. 31			Antlerless elk
33	4	Aug. 15	Sept. 30	150	Limited quota	Antlerless elk valid on private land east of Buffalo Creek and the Bar C Road (BLM Road 6214)
33	4	Oct. 9	Dec. 31			Antlerless elk valid in the entire area
33	6	Nov. 1	Dec. 31	300	Limited quota	Cow or calf
34	1	Oct. 15	Nov. 15	800	Limited quota	Any elk
34	1	Nov. 16	Dec. 31			Antlerless elk
34	6	Aug. 15	Sep. 30	700	Limited quota	Cow or calf valid on private land north of the North Fork Powder River
34	6	Oct. 15	Dec. 31		Limited quota	Cow or calf valid off National Forest
47	1	Oct. 9	Oct. 31	200	Limited quota	Any elk
47	1	Nov. 1	Nov. 30			Antlerless elk
47	6	Oct. 9	Nov. 30	150	Limited quota	Cow or calf
48	1	Oct. 9	Oct. 31	350	Limited quota	Any elk
48	1	Nov. 7	Dec. 15			Antlerless elk
48	4	Oct. 9	Oct. 31	100	Limited quota	Antlerless elk
48	4	Nov. 7	Dec. 15			Antlerless elk
48	6	Oct. 9	Oct. 31	600	Limited quota	Cow or calf
48	6	Nov. 7	Dec. 15			Cow or calf
49	1	Oct. 9	Oct. 31	350	Limited quota	Any elk
49	1	Nov. 7	Dec. 21			Antlerless elk
49	4	Oct. 9	Oct. 31		Limited quota	Antlerless elk
49	4	Nov. 7	Dec. 21	100		Antlerless elk
49	6	Aug. 15	Oct. 31	850	Limited quota	Cow or calf
49	6	Nov. 7	Dec. 21			Cow or calf
120	1	Oct. 9	Oct. 31	125	Limited quota	Any elk
120	1	Nov. 1	Dec. 15			Antlerless elk

120	4	Oct. 9	Dec. 15	75	Limited quota	Antlerless elk
120	6	Oct. 9	Dec. 15	75	Limited quota	Cow or calf

Special Archery Season Hunt Areas	Season Dates	
	Opens	Closes
33, 34, 47, 48, 49, 120	Sep. 1	Sep. 30

SUMMARY OF CHANGES IN LICENSES NUMBERS

Hunt Area	Type	Quota change from 2018
48	4	+50
49	4	+50
49	6	-50
120	1	+25
Herd Unit Total	**1**	**+25**
	4	**+100**
	6	**-50**

Management Evaluation

Current Winter Trend Count Objective: 3,300
Management Strategy: Private Lands
2018 Postseason Population Estimate: 6,115
2016-18 Winter Trend Count Average (3 Yr): 4,151
2019 Proposed Postseason Population Estimate: 6,200
2018 Hunter Satisfaction: 68% Satisfied, 17% Neutral, 15% Dissatisfied

Herd Unit Issues

The South Bighorn Elk Herd unit consists of hunt areas 33-34, 47-49, and 120. Management of the herd is shared between the Sheridan, Cody, and Casper regions, with the Buffalo Wildlife Biologist having reporting responsibility. When the herd unit was reviewed in 2016, the objective was changed to a mid-winter trend count of 3,300 elk based on a three year running average and a private land management strategy was adopted. Hunt area sub-objectives were established to address elk distribution across the herd unit with 1,100 elk for Area 33, 1,000 elk for Area 34, 200 elk for Area 47, 400 elk for Area 48, 300 elk for Area 49 and 300 elk for Area 120. A private lands management strategy is well adapted to this herd as hunting access is largely dependent on private land access.

Since 1997, hunting seasons have been liberalized with increased license quotas for any elk and antlerless elk, the addition of cow/calf licenses, and extended hunting seasons. Harvest has increased significantly, although at less than desired levels because of the inability to sell antlerless and cow/calf licenses in some hunt areas. Last year, 5,050 total licenses were allocated for the six hunt areas comprising this herd unit. In the last three years, the number of unsold licenses has increased, from 200 in 2016 to over 300 in 2018. Restrictive private land access continues to hamper efforts to achieve harvest objectives.

Weather

Weather conditions are summarized based on Natural Resources Conservation Services Applied Climate Information System (www.wcc.nrcs.usda.gov) available data from the Bear Trap Meadow, Middle Powder, Grave Springs, Kaycee, Casper WSO AP, Black Mountain, and Worland FAA AP stations (Station IDs 325, 625, 501, 5055, 1570, 0778, and 9785, respectively) for precipitation and temperature. The Palmer Drought Index (www.ncdc.noaa.gov) from Climate Division 5 (Powder, Little Missouri and Tongue drainages) is used to summarize drought conditions.

June precipitation was greater than the period of record (POR) average (118-229%) on the southern and eastern portions of the unit and lower than the POR average (48-76%) in the northern and western portions of the unit. The average June temperature (52ºF) was 3ºF colder than the 20-year average. Summer (July – September) was dry across the entire unit (28-78% of POR average) with average temperatures (49-60ºF) relative to the 20-year averages (51-61ºF). Fall weather varied greatly, without any extreme wet or dry conditions (47-130%) and with a slightly warmer (+2ºF) November. Winter has resulted in generally average precipitation at the higher elevations and dryer than average precipitation in the lower elevations (27-66%) with a notably colder than average February (-4ºF) and overall slightly depressed snow water equivalent. Winter and spring conditions prior to the 2018 biological year (January – May 2018) were average across the unit (60-142%). Although some drier conditions occurred within the unit, the generally average conditions were corroborated by the broader-scale climate data, which classified all of 2018 as having “mid-range” climate conditions.

Habitat

There are no habitat transects for grass production in this herd unit. The South Bighorn Herd Unit is primarily private, state and BLM lands with a limited amount of U.S. Forest Service in Area 34. The unit has diverse habitat types ranging from high elevation timber, grasslands and mountain mahogany stands to low elevation sagebrush grasslands. Cattle and sheep grazing are common. Spring moisture and snow run-off conditions are key components to herbaceous forage production. The dry summer 2018 conditions may have impacted elk forage production and growing season. The varying conditions across the unit may also result in changes in elk movement behavior.

Field Data

The post-season trend counts were conducted in February 2019 and resulted in a total of 4,892 elk observed, which provides a minimum population for the herd unit. The 2018 results were notably higher from 2017 and the three-year running average for the herd unit (n = 4,151) is over the 3,300 elk objective (Figure 1).

In 2017, the main congregation of wintering elk in hunt area 33 was missed due to new personnel conducting the survey. This resulted in a significantly reduced herd unit trend count and three-year running average. Based on the 2016 and 2018 trend counts, this population is over the sub-objective. Over the past three years, elk that spend the majority of the year in hunt area 35 began wintering in the northern portion of hunt area 34. It is estimated that 1,055 of the elk counted in hunt area 34 in 2018 would more accurately be classified as hunt area 35 elk. This would result in the 2018 minimum population in hunt area 34 to be closer to 1,315. In 2017, it is estimated that 674 of the elk counted in hunt area 34 were hunt area 35 elk, however a large group of elk in the

Gardiner Mountain area was missed during the survey, so the minimum population would likely be close to 1,000 elk. Elk in hunt area 34 are over the sub-objective, given the three-year average of actual elk counted during the trend count survey (1,651) as well as when calculating the three-year average based on the estimated minimum population (1,168). The 2018 winter trend count resulted in only 750 elk being observed from areas 47, 48 and 49, the lowest number counted since 2008. Area 47 appears to have reached its winter count goal of 200 elk, while areas 48 and 49 are still over their winter count goals. Hunt area 120 was at the sub-objective during the 2018 trend count, but is below the sub-objective over the last three years (Table 1).

Figure 1. South Bighorn Elk Herd Unit Winter Trend Counts, 2000-2018.

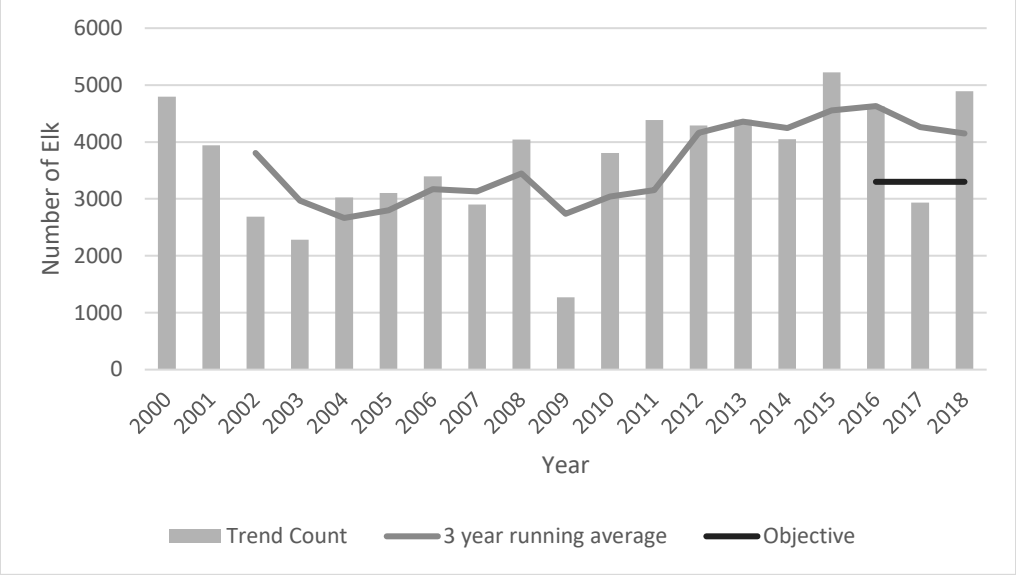


Table 1. Post-season trend count sub-objectives and results from 2016-2018.

Hunt Area	Objective	2016 Result	2017 Result	2018 Result	2016 - 2018 Average
33	1,100	1,354	101	1,466	974
34	1,000	1,189	1,394	2,370	1,651
47	200	118	193	160	157
48	400	964	495	360	606
49	300	659	545	227	477
120	300	342	207	309	286
Total	3,300	4,626	2,935	4,892	4,151

Post-season classifications have been limited to hunt areas 47, 48, and 49 since 2017 due to time constraints, limitations in fixed-wing aircraft, and inability to classify large herds in Areas 33, 34, and 120. The sample size for elk classified in 2018 was 747 elk, which was the lowest number of elk classified in over 20 years. The 2018 classifications resulted in herd ratios of 26 calves per 100 cows and 41 bulls per 100 cows. The low calf ratio is likely a result of poor sample size. Productivity in this herd is relatively low with the calf ratio averaging 33 per 100 for the previous five-year average. Calf ratios tend to be higher in Areas 33 and 34, where classifications are not

conducted. The bull ratio is believed to be higher based on hunter success and composition of the bull harvest (>90% adult bulls). Representative classifications are difficult to attain due to bulls wintering away from cow/calf herds.

The annual postseason landowner survey was conducted in hunt areas 33 and 34. Of the 29 respondents, 31% indicated the population was above desired levels while 55% thought the numbers were at desired levels. Four respondents thought there were too few elk. Seventy-two percent of respondents note that the 2019 seasons should be the same as the 2018 seasons. These responses are similar to those reported in 2017.

Harvest Data

Total harvest (1,782) was lower than the previous three years (1,879 in 2015, 1,989 in 2016, and 1,900 in 2017), but higher than the previous five-year average (1,751). Bull harvest (787) was higher than the previous five years, however antlerless harvest (995) was down. Hunter success (46%) and active license success (44%) matched the previous five-year averages. Hunter success at the hunt area level ranged from 41% in hunt area 49 to 67% in hunt area 120. Harvest composition showed 100% of the bull harvest was comprised of adult bulls indicating hunters could be selective and were successful in finding adult bulls. Hunter effort (15.5 days/animal) matches the five-year average.

Hunter numbers (3,906) and active license numbers (4,059) were higher than any of the previous five years and indicate continued hunter interest in these areas. Hunt areas 33, 34, and 47 continue to have unsold licenses, likely due to limited access. Hunter satisfaction responses were generally positive reflecting good hunter success, quality bulls and long seasons. At the herd unit scale, 68% of hunters responded positively about their hunting experience whereas 15% responded negatively and 17% provided a neutral response. These results have not changed notably in the past three years.

At the hunt area scale, satisfaction did not vary as much as it did in 2017. Hunt areas 49, 34, and 47 had satisfaction rates ranging from 57-65% and hunt areas 33, 48, and 120 had higher satisfaction rates (71-86%).

Hunter opportunity is largely contingent on private land access. Six Access Yes Walk-in Areas provided access to almost 38,000 acres of private lands plus adjacent BLM and state lands, most of which are located in Area 120. In addition, four Hunter Management Areas provide hunter opportunity in Areas 47 and 48.

Population

The mid-winter trend count objective is most appropriate for this herd, as opposed to a pre or post season population estimate objective. Quality classification data is essential to run population estimate models and since classifications are only possible for a small percentage of the herd (15% in 2018, for example), population models are completely unreliable.

A ball park population estimate can be made using the mid-winter trend count total adjusted for 80% sightability, resulting in a post-season estimate. With the 2018 trend count results of 4,892 elk counted, the post-season population estimate would be 6,115 elk. If you adjust the 2018 trend count based on the assumption that 1,315 of the elk counted in hunt area 34 were elk that spend the majority of the year in hunt area 35, then the population estimate would be 4,471 elk. The

three-year running average from the trend count data suggests that the population is fairly stable and above objective, with high annual variation due to the trend count as a sampling method (Figure 1). The population is expected to continue slow and steady growth unless hunter access improves markedly. The 2019 proposed post-season population estimate (6,200) is based on the assumption of moderate population increases and that hunt area 35 elk will be counted in hunt area 34.

Management Summary

This herd unit is above objective and we expect the population to continue population growth.

Hunt area 33 is above the sub-objective, with a reliable trend count survey conducted this year. Harvest success, hunter satisfaction, and landowner responses all indicate that management needs to continue to focus on maintaining or decreasing this segment of the herd. The liberal quota for Type 6 licenses to encourage cow/calf harvest did not sell out in 2018. The Type 4 Aug. 15 to Sept. 30 season was implemented to address damage situations on private land. Beginning in 2019, utilization of this season will be assessed annually to determine if the season is fulfilling the goal of obtaining measurable harvest to prevent damage. If the license type is not achieving the goal, we will propose the removal of the August/September season. We propose no changes to this season for 2019.

In hunt area 34, the trend count was more than double the sub-objective. This is the third year that elk from hunt area 35 have wintered in hunt area 34, and they moved into hunt area 34 earlier this year. Movement of these elk between herd units during the hunting season will be closely monitored during the 2019 hunting season. If these movements become an annual pattern, we will have to determine a long-term strategy to ensure that harvest objectives are met for both herd units and hunt areas. In the meantime, we continue to maintain liberal Type 6 quotas in hunt area 34, and with 176 unsold licenses in 2018, we expect to have leftover licenses available throughout the 2019 season as well. The mid-winter trend counts are severely affected by the elk movements between hunt areas 34 and 35, which will have to be addressed moving forward. The Type 4 Aug. 15 to Sept. 30 season was implemented to address damage situations on private land. Beginning in 2019, utilization of this season will be assessed annually to determine if the season is fulfilling the goal of obtaining measurable harvest to prevent damage. If the license type is not achieving the goal, we will propose the removal of the August/September season. We propose no changes to this season for 2019.

For the 2018 hunting season, a little over a 1,000 elk were harvested from areas 47, 48 and 49. The 2018 winter trend count resulted in only 750 elk being observed from areas 47, 48 and 49, the lowest number counted since 2008. Area 47 appears to have reached its winter count goal of 200 elk, while areas 48 and 49 are still over their winter count goals. Current and future management strategies will continue to focus on reducing elk numbers in this segment of the population. Only a slight adjustment in license quotas was made in areas 48 and 49. The increase in type 4 licenses will allow more type 4 (full priced) license holders the opportunity to buy multiple licenses, thus hopefully reducing the overall number of hunters in the field.

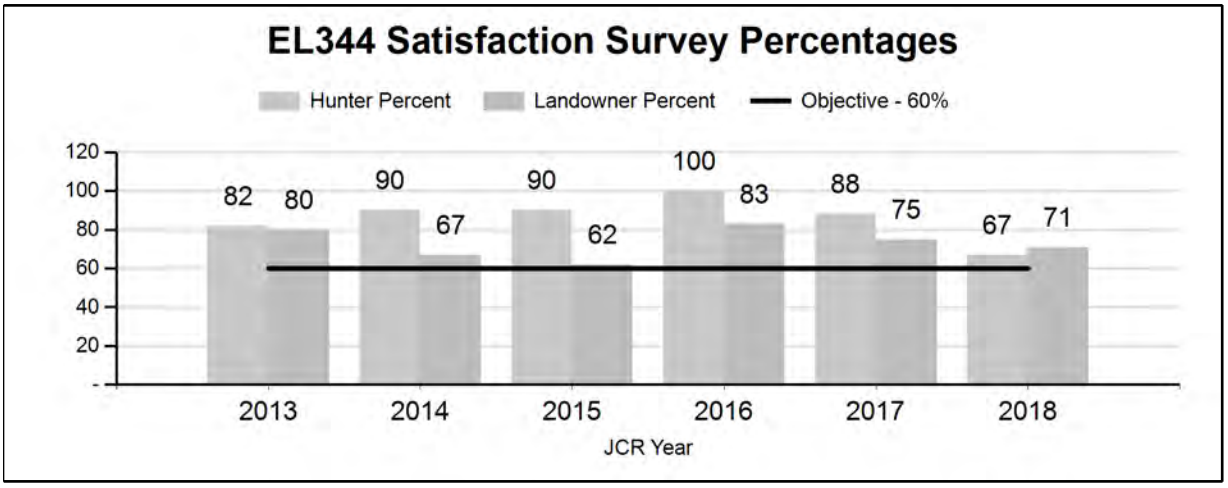
The Area 120 season resulted in a harvest of 152 elk and a hunter success rate of 72%. License quotas currently result in hunter densities that are approaching a level unacceptable to hunters, however success rates have increased every year since 2013. The three-year winter trend count

is averaging 286 elk, just below the hunt area sub-objective of 300 elk. A moderate increase in the Type 1 licenses was made for the 2019 hunting season.

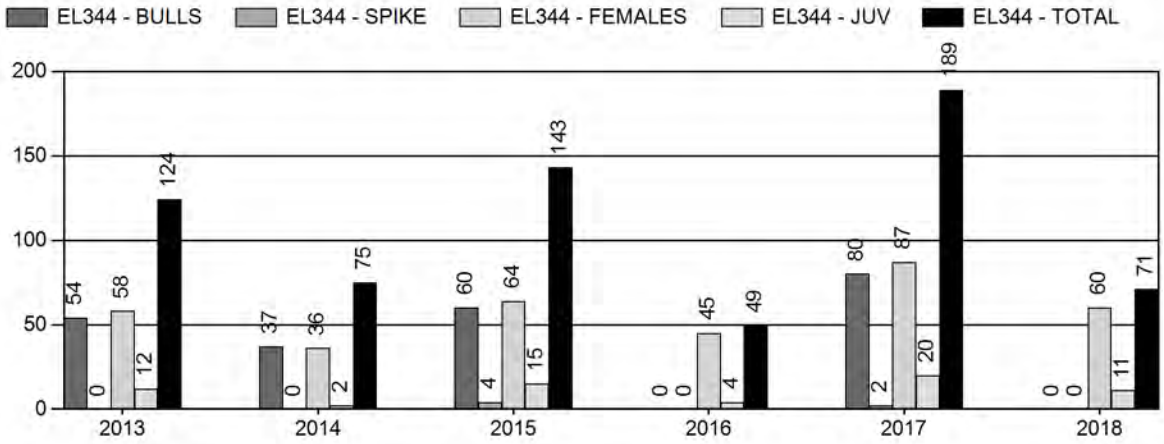
2018 - JCR Evaluation Form

SPECIES: Elk
PERIOD: 6/1/2018 - 5/31/2019
HERD: EL344 - ROCHELLE HILLS
HUNT AREAS: 113, 123
PREPARED BY: ERIKA PECKHAM

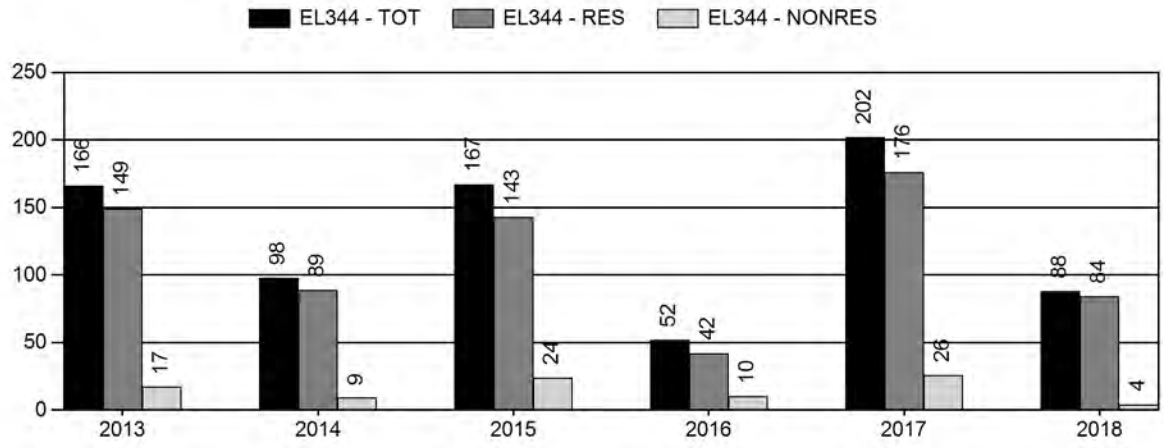
	2013 - 2017 Average	2018	2019 Proposed
Hunter Satisfaction Percent	88%	67%	60%
Landowner Satisfaction Percent	70%	71%	60%
Harvest:	116	71	60
Hunters:	137	88	80
Hunter Success:	85%	81%	75%
Active Licenses:	145	93	78
Active License Success:	80%	76%	77%
Recreation Days:	631	296	250
Days Per Animal:	5.4	4.2	4.2
Males per 100 Females:	74	31	
Juveniles per 100 Females	50	39	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			9%
Number of years population has been + or - objective in recent trend:			6



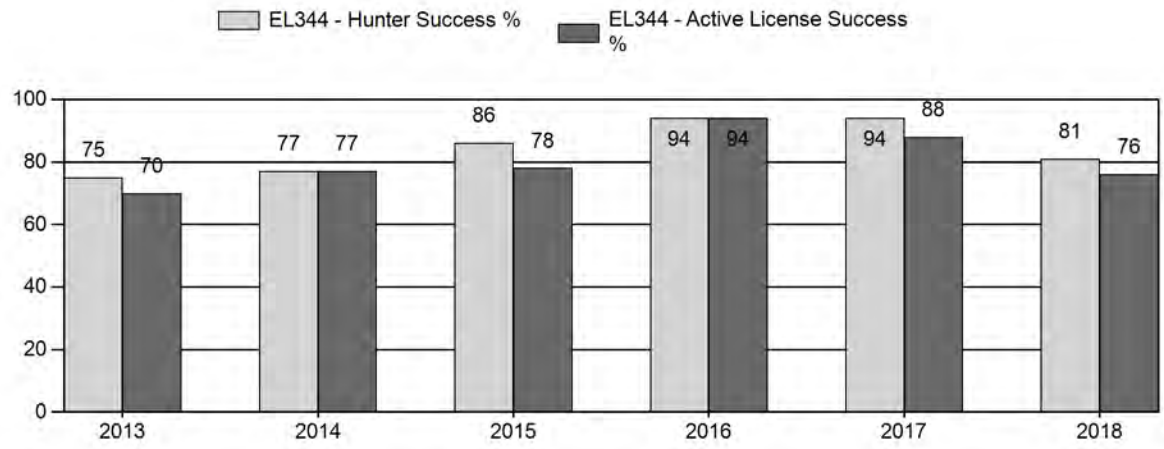
Harvest



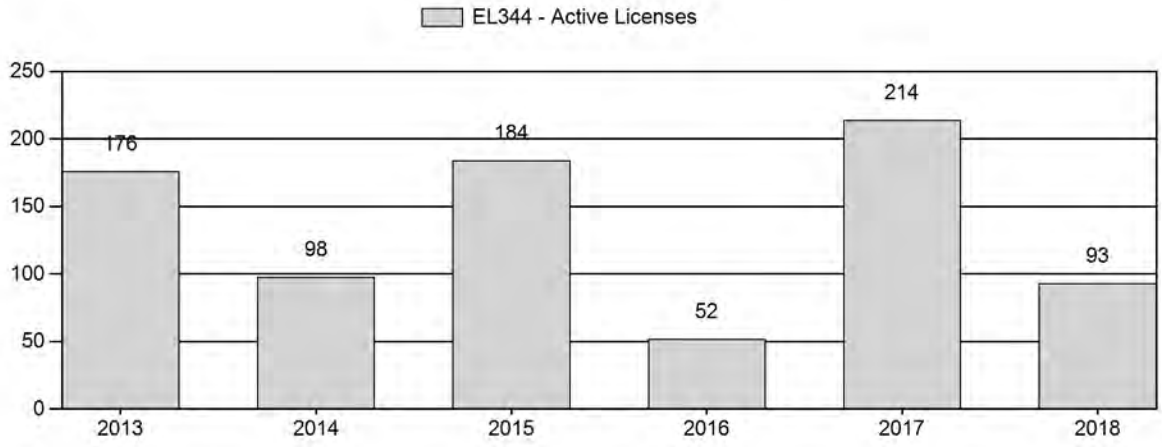
Number of Hunters



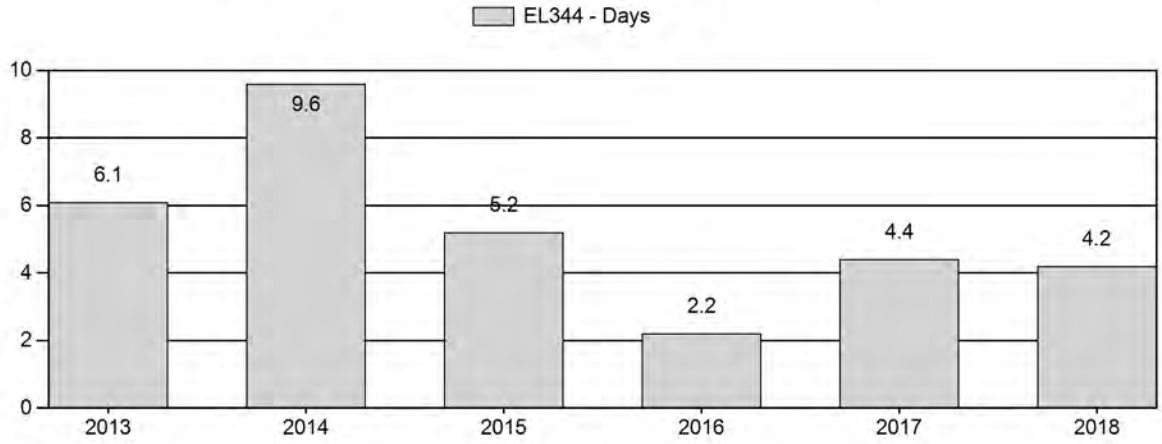
Harvest Success



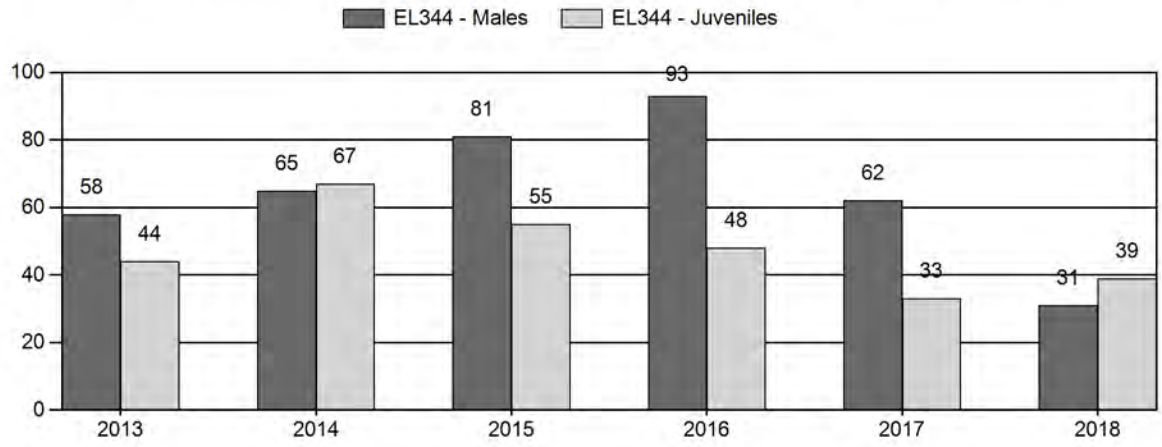
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL344 - ROCHELLE HILLS

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	26	30	56	29%	96	49%	42	22%	194	464	27	31	58	± 0	44	± 0	28
2014	0	22	29	51	28%	79	43%	53	29%	183	0	28	37	65	± 0	67	± 0	41
2015	0	61	47	108	34%	133	42%	73	23%	314	0	46	35	81	± 0	55	± 0	30
2016	0	43	72	115	38%	124	41%	60	20%	299	0	35	58	93	± 0	48	± 0	25
2017	0	20	18	48	32%	78	51%	26	17%	152	0	26	23	62	± 0	33	± 0	21
2018	0	82	59	141	18%	462	59%	181	23%	784	0	18	13	31	± 0	39	± 0	30

2019 HUNTING SEASONS
ROCHELLE HILLS ELK HERD (EL344)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	License	Limitations
113	1	Nov. 5	Nov. 30	40	Limited quota	Any elk
113	4	Nov. 5	Nov. 30	40	Limited quota	Antlerless elk

SUMMARY OF CHANGES IN LICENSE NUMBERS

Hunt Area	Type	Quota change from 2018
113	1	+40
113	4	+40
123	4	-50
123	6	-50
Herd Unit Total	**1**	**+40**
	4	**-10**
	6	**-50**

Hunt Special Archery Season Hunt	Opening Date	Limitations
113	Sep. 1-Sep. 30	Refer to Section 2 of this Chapter

Management Evaluation
Current Landowner/Hunter Satisfaction Management Objective: 60%
Management Strategy: Private Land
2018 Landowner Satisfaction Estimate: 71%
2018 Hunter Satisfaction: 64% Satisfied, 22% Neutral, 14% Dissatisfied

Herd Unit Issues

The management objective for the Rochelle Hills Elk Herd Unit is based on landowner and hunter satisfaction. The management strategy is private land. The objective and management strategy were last revised in 2012 and were reviewed in 2017.

A major difficulty with managing this herd is hunter access. The majority of the elk in Area 123 are found on private land and the opinions of landowners on the desired number of elk are varied. Elk tend to concentrate in certain areas at particular times of the year so perceptions differ on the number of licenses needed to manage harvest. Several landowners desire to keep large mature bulls on their property resulting in tightly controlled access. Those landowners who want more harvest often have the majority of the elk utilizing their lands outside of the hunting season.

Hunt Area 113 has significant amounts of publically accessible lands, especially on the Thunder Basin National Grasslands, and is a coveted elk hunt in this area of the state. However, when pressured, elk in this hunt area move to private lands where access to hunt is limited. Balancing hunter numbers with the number of elk available on public lands, while attempting to get adequate harvest in the entire hunt area is challenging when designing hunting seasons.

Weather

Moisture patterns were favorable for the 2018 growing season. Residual forage was readily available going into the winter of 2018-2019. The winter of 2018-2019 started out relatively mild, with minimal snow and average temperatures. As the winter progressed into February, temperatures became more severe. Conditions were not adverse enough to affect elk survival. The Palmer Drought Index indicates that overall moisture conditions were average or above average throughout 2018 in the Cheyenne-Niobrara drainage.

Habitat

This herd unit is comprised of various habitat types. Elk can be found in all of the habitat types in this area, however they do show preference for the timbered ponderosa pine hills that are scattered throughout this herd unit. Ponderosa pine hills are punctuated by sagebrush flats and various cottonwood galleries on a few different drainages.

There is no formal habitat monitoring occurring in this herd unit. Observations in 2017 and 2018 showed that there was decent production of cool season grass and forbs. This is in line with observed weather conditions.

Field Data

During the aerial classification survey in December of 2018 there were ~1,400 elk observed which is far greater than the ~670 elk observed during the 2017 survey.

There was one large herd observed in Hunt Area 123 in a location that they are typically found this time of year. Due to fences and the location of this herd, these elk were not classified and

instead the number of elk was estimated based on photographs. However, this group was substantially larger than in 2017 with an estimated number of ~700 elk, in contrast to the ~400 that were observed in 2017. This group of elk has been consistently increasing over the last several years. During the classification flight there were only a couple of other small groups of elk classified (n=13) found in Hunt Area 123 which were included in the classification results. The distribution of elk seemed to be typical for the time of year.

The number of elk classified in Hunt Area 113 totaled 378 elk located in small groups throughout the area. This number is also an increase from the 119 that were observed in 2017. The classification results for Hunt Area 113 indicated 48 calves per 100 cows, down from the 2017 ratio of 64 calves per 100 cows. The number of animals classified or counted has fluctuated over the past several years; however, the number of elk observed was notably higher in 2018. It is possible there is movement of Hunt Area 123 elk to Hunt Area 113.

One problem associated with the surveillance and management of this herd is achieving meaningful sample sizes during classification surveys. This is a large geographical area, with areas of steep, forested terrain, which makes it difficult to locate elk in the budgeted flight time. Additionally, the location where the large herd of elk is typically congregated in Hunt Area 123 makes it very difficult to classify. It is possible that there is a better time of year to survey these elk before they are in a large herd. Overall, elk numbers are increasing in Hunt Area 123, while harvest and range conditions in Hunt Area 113 have resulted in lower numbers, with the exception of 2018. It is possible that this portion of the herd is also starting to trend upwards.

This herd is managed for landowner and hunter satisfaction. We are striving for at least 60% of landowners and 60% of hunters to be satisfied. In 2018, Hunt Area 113 was closed and Hunt Area 123 was hunted with Type 4 and Type 6 licenses. The harvest survey indicated that 64% of hunters were either “very satisfied” or “satisfied”. The annual landowner meeting was held in January 2019 for Hunt Area 123. As this hunt area is predominantly private, it is crucial that a meeting is held to acquire feedback from landowners. At this meeting a general license season was proposed as this would provide maximum flexibility for each individual ranch to structure their hunting season. The overwhelming majority of those present were very opposed to a general license season structure; therefore this concept was abandoned. A common theme from landowners present at the meeting is this area is known for trophy bulls and they are not seeing the quality of bulls observed in past years. In Hunt Area 123, 78% of respondents were satisfied with elk numbers, with the remainder stating that they were neutral. In February, a meeting with Hunt Area 113 landowners found 88% of those responding were satisfied with the number of elk.

Harvest

Historically, this herd has been hunted conservatively, with Hunt Areas 113 and 123 being closed for up to two years at a time to produce trophy bulls. Additionally, when bulls are hunted, it is important to provide enough licenses so that it is not just a landowner hunt, but an opportunity for the hunting public. While this regimen of hunting seasons has had the potential to produce large mature bulls, it has also resulted in very high bull to cow ratios at times. In 2018, there were 50 Type 4 licenses and 50 Type 6 available in Hunt Area 123. The Hunt Area 113 season was closed. The harvest survey indicates an overall success rate of 81% with an average of 4.2 days to harvest

an animal, indicating that elk were plentiful and accessible. This is notably higher than the overall statewide success of 45%.

This herd has great potential for continued growth if hunter access cannot be improved, particularly in Hunt Area 123. In portions of Hunt Area 113 there is a fair amount of public land which allows for a reasonable harvest. Additionally, with the re-routing of county roads due to shifts in coal mining activity, some areas of public land are even more accessible than they have been in the past. The potential negative impact of the increased vehicle access is that elk may be displaced from public lands in this portion of the hunt area, although to date it seems that they are still relatively accessible.

Population

The 2018 field estimate is around 1,600 elk. This field estimate is based on the trend surveys, historic population model and estimates, field observations and landowner observations of elk throughout the year. The Rochelle Hills elk herd appears to have increased in recent years, particularly in Hunt Area 123. There is no working population model for this herd. Various factors contribute to not having a reliable model for this herd. First, there is known immigration and emigration to and from this herd because elk are not geographically or otherwise constrained to the herd unit boundaries. Secondly, this is a small population, relatively speaking, which also contributes to inaccuracies within the model. Alternating hunting seasons also results in inconsistent classification results. Although it would be preferable to have a working model, because the herd objective is non-numerical, it is less critical.

Landowner satisfaction is critical to managing this herd and some major landowners have indicated they are satisfied with the number of elk, or want even more. It is important to note that at the Hunt Area 123 landowner meeting, Game and Fish personnel stressed the fact that elk are increasingly substantially and rapidly in this area. It was reiterated at this meeting that the amount of harvest that has historically occurred in this hunt area is not nearly enough to mitigate herd growth. Even with all of this information, the vast majority of landowners would like to see more elk and are content with the number of elk that are present. Given landowners control hunter access, it is imperative that landowners are agreeable to proposed hunting seasons.

Although overall this population seems to be increasing, it should be noted that the majority of the increase has been observed in Hunt Area 123. The numbers of elk counted and classified in this portion of the herd have trended upward and 2018 was no exception. It appears that elk numbers in Hunt Area 113 declined and then recovered in recent years. In 2008, the number of elk observed peaked at 286 elk. The number of elk observed during the 2018 classification flight was 378, a substantial increase from 119 in 2017.

Management Summary

In 2018, Hunt Area 113 was closed. For the 2019 sesason there will be 40 Type 1 and 40 Type 4 licenses available. This season structure allows an adequate number of licenses to cover landowner license demand and still provide public hunting opportunity. Furthermore, alternating hunting seasons meet harvest objectives to manage elk numbers. In 2018 in Hunt Area 123 there were 50

Type 4 and 50 Type 6 licenses available. Hunting seasons in this hunt area are coordinated closely with landowners as hunter access is critical to achieving harvest objectives. For the 2019 season Hunt Area 123 will be closed. This is based on landowner willingness to take hunters. Without landowner cooperation there is little hunter access.