

## 2014 - JCR Evaluation Form

SPECIES: Elk

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

HERD: EL320 - FORTIFICATION

HUNT AREAS: 2

PREPARED BY: ERIKA  
PECKHAM

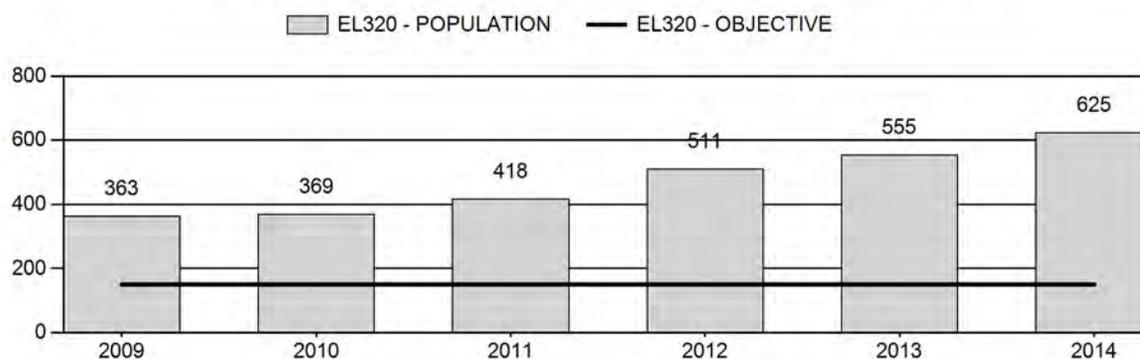
	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Population:	443	625	800
Harvest:	53	110	86
Hunters:	80	146	118
Hunter Success:	66%	75%	73%
Active Licenses:	80	146	118
Active License Success:	66%	75%	73%
Recreation Days:	295	599	500
Days Per Animal:	5.6	5.4	5.8
Males per 100 Females	61	35	
Juveniles per 100 Females	61	87	

Population Objective ( $\pm 20\%$ ) :	150 (120 - 180)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	319%
Number of years population has been + or - objective in recent trend:	6
Model Date:	02/25/2015

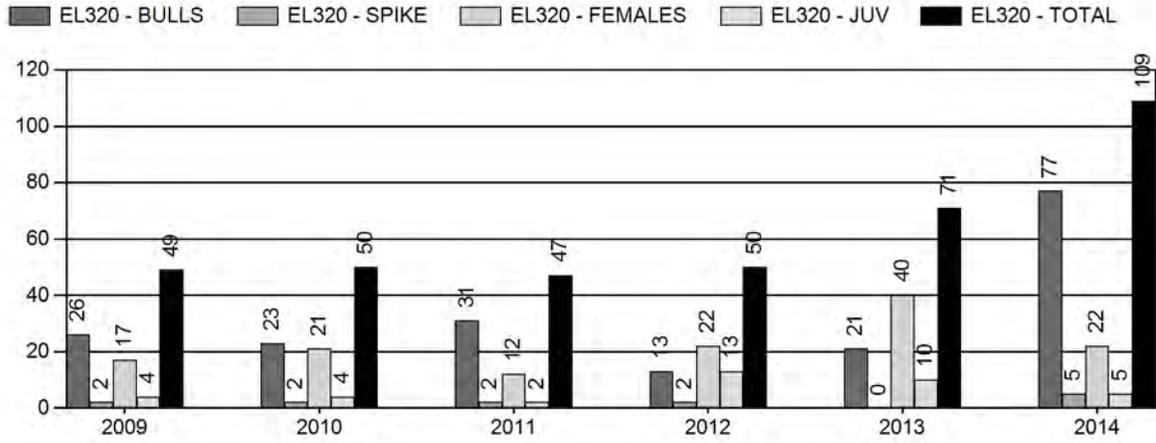
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females $\geq 1$ year old:	11.6%	14.6%
Males $\geq 1$ year old:	34.3%	15.4%
Juveniles (< 1 year old):	0%	1%
Total:	16.4%	10.5%
Proposed change in post-season population:	.5%	22%

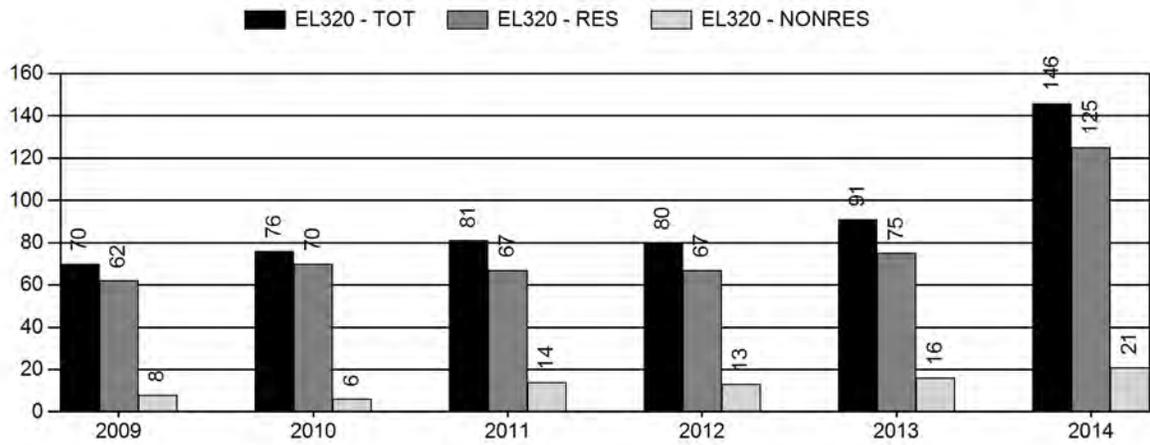
## Population Size - Postseason



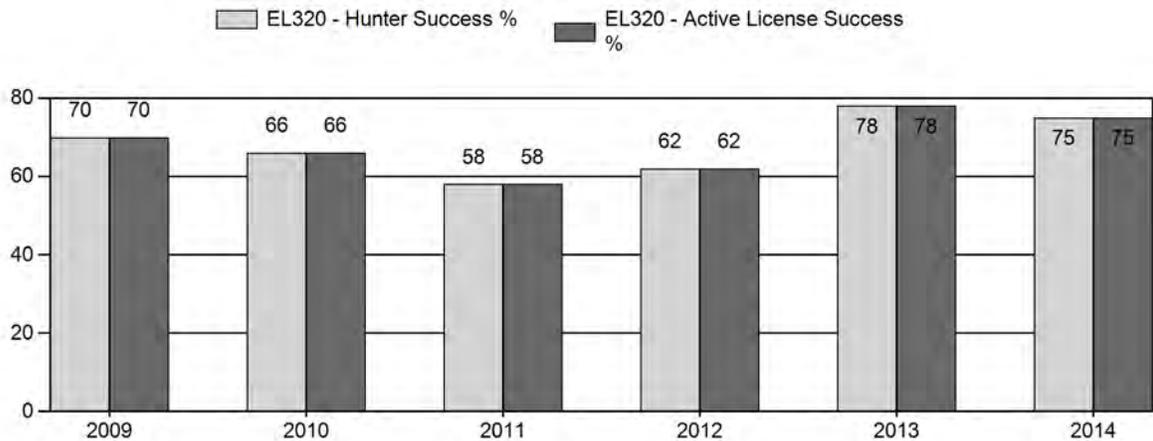
# Harvest



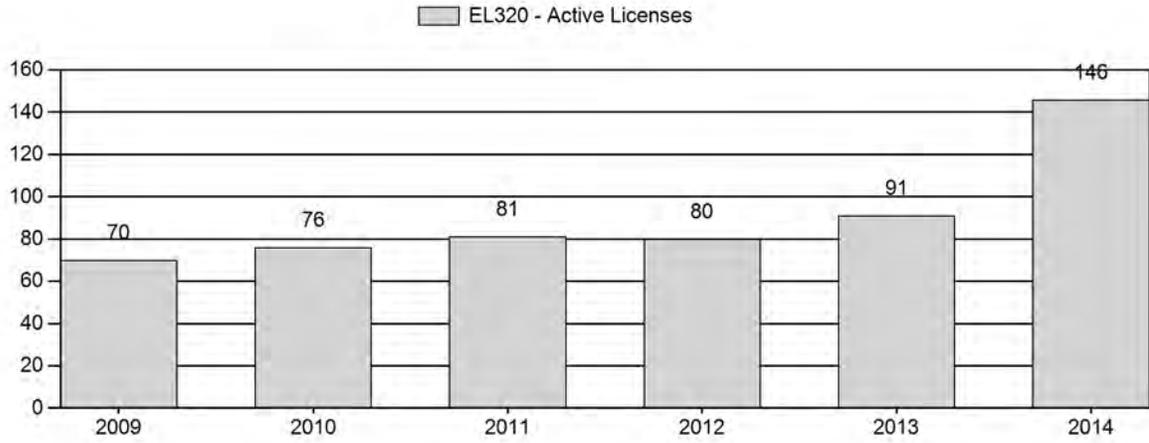
# Number of Hunters



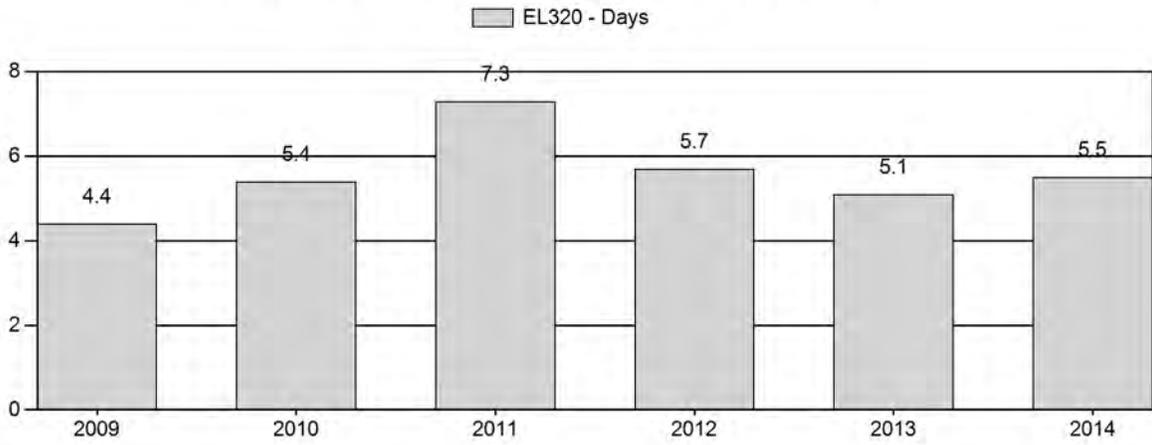
# Harvest Success



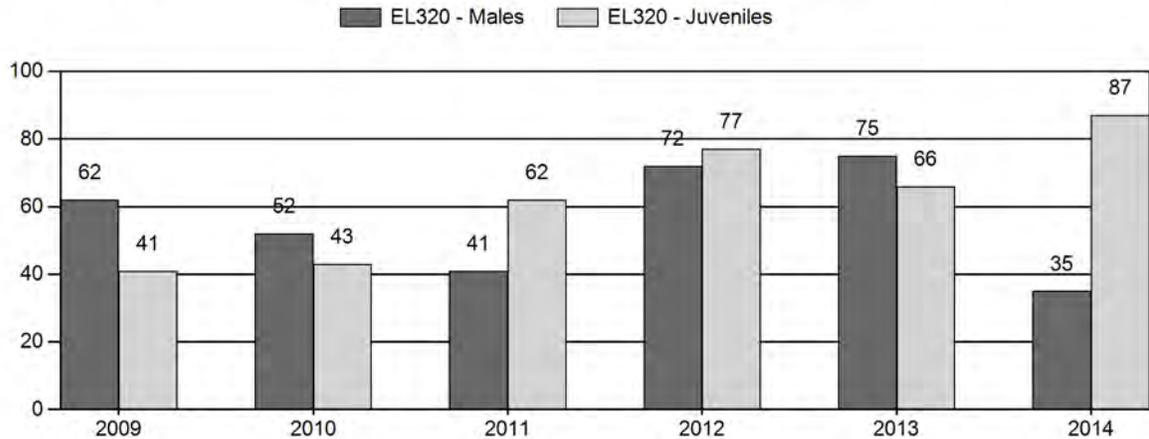
# Active Licenses



# Days per Animal Harvested



# Postseason Animals per 100 Females



**2009 - 2014 Postseason Classification Summary**

for Elk Herd EL320 - FORTIFICATION

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	363	1	17	18	31%	29	49%	12	20%	59	188	3	59	62	± 22	41	± 17	26
2010	369	13	31	44	27%	84	51%	36	22%	164	160	15	37	52	± 9	43	± 8	28
2011	418	18	18	36	20%	87	49%	54	31%	177	197	21	21	41	± 8	62	± 10	44
2012	511	32	27	59	29%	82	40%	63	31%	204	215	39	33	72	± 12	77	± 13	45
2013	555	23	63	86	31%	114	41%	75	27%	275	438	20	55	75	± 10	66	± 9	38
2014	629	25	17	42	16%	121	45%	105	39%	268	0	21	14	35	± 6	87	± 11	64

**2015 HUNTING SEASONS  
FORTIFICATION ELK HERD (EL320)**

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
2	1	Oct. 21	Nov. 1	50	Limited quota	Any elk
	4	Oct. 21	Nov. 1	70	Limited quota	Antlerless elk

Hunt Area	Type	Quota change from 2014
2	1	-80
	4	+50
<b>Herd Unit Total</b>	<b>1</b>	<b>-80</b>
	<b>4</b>	<b>+50</b>

**Management Evaluation**

**Current Postseason Population Management Objective: 150**

**Management Strategy: Recreational**

**2014 Postseason Population Estimate: ~630**

**2015 Proposed Postseason Population Estimate: ~790**

**Herd Unit Issues**

The management objective for the Fortification Elk Herd Unit is a post-season population objective of 150 elk. The management strategy is recreational management. The objective and management strategy were last reviewed in 2009.

This herd has great potential for continued growth if access cannot continue to be improved. Much of the occupied range for this herd includes land administrated by the Bureau of Land Management. Private land is scattered, but also surrounds the herd unit, 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, landowners allowing access to this elk herd seem to be relatively satisfied with the management direction for this elk herd, and have allowed access to the current number of license-holding hunters.

Coal bed methane 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 coal bed methane extraction. The phased development plan was designed when it was projected there was going to be extensive CBM development in core elk habitat. This has minimized impacts on the Fortification Elk Herd. The increased traffic was an issue with hunting in the past, however in

recent years, development and activity has tapered off substantially. The more pressing issue in this herd unit will be proper reclamation as these wells are abandoned. Additionally, more recently there is activity related to conventional oil drilling.

The 2014 post-season population estimate was about 630 elk. It is probable that this number is inflated, however field data and observations indicate that this herd is steadily trending upwards. This upwards trend has been occurring since around 2003. Both aerial classifications and increasing calf:cow ratios support this observation.

## **Weather**

Weather throughout 2013 and into 2014 was optimal for rangeland conditions in this area. The growing season commenced with plentiful rainfall and ideal conditions to produce ample forage. The winter of 2013-2014 was moderate with not much for snow accumulation, or prolonged snow cover. The winter of 2014-15 was mild with minimal snow and frequent above average temperatures. The Palmer Drought Index indicates that throughout 2014, the conditions in the Powder River drainage were “moderately moist”. During the majority of these two winters, the ground was open, with minimal snowpack.

## **Habitat**

There is no herbaceous or shrub transect within this herd unit. However, the SA Creek habitat transect is located fairly close by. In the fall of 2014, the transect survey showed the average leader growth to be 6.4 cm, which is lower than anticipated, given the favorable conditions that were experienced in the 2014 growing season. The 10 year average leader growth for this transect is ~6 cm, so 2014 was slightly above the average.

## **Field Data**

This herd is classified aurally via a helicopter. One difficulty associated with the management of this herd is achieving adequate sample size during classification surveys. The elk can be difficult to locate under dense juniper cover and frequently they do not run when disturbed by survey flights. With these factors, sightability is likely decreased and it is probable that there are a fair number of animals that are not detected during classification. Typically around 4 hours are spent in this area. Collar locations are downloaded the morning before the flight to get generalized locations. Usually the elk are found in their preferred locations and these areas are systematically searched. If there is additional time then outlying areas will be searched.

In general, the number of animals observed has been increasing since 2005. In 2014 there were 268 individuals classified, down from 275 in 2013. 2014 experienced a higher volume of hunters and slightly longer season. Because of this the elk were scattered more so than usual during the classification flight, and were more difficult to spot. In 2014 the calf to cow ratio was 87, up from the 2013 ratio of 66:100. The 2014 bull ratio decreased substantially to 35:100, which was expected due to the emphasis on bull harvest in the 2014 season.

### Classifications of Fortification Elk Herd 2004-2014

	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

As this is a small herd, the ratios can become very quickly skewed when harvest emphasis is placed on either males or females. Historically, the focus of the harvest rotates each year with either an emphasis on cows to keep the overall number in check, or bulls to keep the bull ratio in a healthy range. Hunting seasons in 2012 and 2013 had emphasis on cow harvest, since the herd was continuing to grow. These two years observed bull ratios were 72 and 75, respectively.

### Harvest

In 2014 there were 150 licenses available, 130 Type 1 and 20 Type 4. This was a substantial increase of licenses due to another landowner allowing access. It was felt that with this improved access the area could accommodate these additional licenses. The traditional season in this hunt area has been from October 21st to October 31st; however with more licenses issued it was felt that the season should be extended a few days to November 3<sup>rd</sup>. This allowed for an additional weekend and the potential to keep hunters spread out. This season time and length seemed to be adequate to allow a reasonable harvest and worked well for the private landowners who allow public access. It should be noted that the conditions during this time span were very favorable to hunting. In years when moisture is received it results in many roads being closed and decreased access to elk. Hunter success in this herd unit has averaged 67% over the preceding 5 years. Hunters in 2014 had an overall success rate of 75%. With the emphasis on Type 1 licenses, there were an estimated 82 bulls harvested in 2014, which was in line with the harvest reported by landowners. This brought the bull ratio down from 75 to 35:100 in 2014.

## **Population**

The “Constant Juvenile – Constant Adult Mortality Rate” (CJCA) spreadsheet model was chosen to use for the post season population estimate of this herd. This model equals the SCJ-SCA model with the lowest AIC value (103) and appears to depict the trend that is occurring. It is likely that the population estimate of ~630 is inflated (poor model), although the increasing trend is likely accurate. The efficacy of the Spreadsheet Model can be affected by several factors. One factor that comes into play for this herd 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 for this herd appeared to be accurate, and due to the hardiness of elk, it is unlikely that they were substantially negatively impacted in some of the more difficult winters from 2008-2010.

## **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 March of 2011, 35 cow elk were fitted with GPS collars. In addition to that collaring effort, in January of 2014 another 35 cow elk were also fitted with GPS collars. Currently there are 43 collared individuals. The collaring of the elk was funded in part by Anadarko Petroleum. Going forward, the data collected will be analyzed by a private consultant to assess the movements of the elk in relation to on-going energy development.

Several nongovernmental organizations have taken a keen interest in the area and the elk herd in particular. The viewpoint of many of these groups is that elk should be more protected within the herd unit. Coal bed methane development in the herd unit has reduced the total amount of effective elk habitat. Conventional oil development has been on the rise in the Powder River Basin and this 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. Harvesting elk towards objective should help reduce risks of overcrowding and degradation of suitable remaining habitat. A high priority is being placed upon maintaining habitat quality during development so that the area can continue to support a healthy herd of elk after energy development has tapered off.

In 2014 there were 150 licenses issued. After experiencing the season with this number of licenses, it was believed by the landowners allowing the majority of hunting that it was too many hunters for the area. During the annual landowner meeting held in January 2015, it was determined that 120 licenses would be a better fit. Due to the continued and projected growth of this herd, emphasis was put back on cow harvest, with 50 Type 1 licenses and 70 Type 4 licenses available. We will likely need to emphasize female harvest in future years to keep up with the growth of this herd. If we attain the projected harvest of 86 elk, it is likely that the population will still increase. Based on the population model, we predict a 2015 post-season population of around 800 elk.

<b>INPUT</b>	
Species:	Elk
Biologist:	Erika Peckham
Herd Unit & No.:	Fortification
Model date:	02/25/15

Clear form

<b>MODELS SUMMARY</b>		Fit	Relative AICc	Notes
CJ,CA	Constant Juvenile & Adult Survival	94	103	<input checked="" type="checkbox"/> CJ,CA Model
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	94	103	<input type="checkbox"/> SC,J,SCA Mod
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival	431	566	<input type="checkbox"/> TS,J,CA Model
TS,J,CA,MSC	Time-Specific Juv, Constant Adult Survival, Male survival coefficient	114	263	<input type="checkbox"/> TS,J,CA,MSC Model

Check best model to create report

<b>Population Estimates from Top Model</b>											
Year	Posthunt Population Est. Field Est	Field SE	Trend Count	Predicted Prehunt Population			Predicted Posthunt Population			Total	Objective
				Juveniles	Total Males	Females	Juveniles	Total Males	Females		
1993				63	71	190	56	18	161	235	150
1994				61	40	180	55	12	158	225	150
1995				91	34	177	90	34	162	286	150
1996				120	69	195	120	69	195	385	150
1997				84	116	239	84	116	239	440	150
1998				90	147	268	63	114	217	394	150
1999				137	137	238	118	82	186	387	150
2000				81	128	230	72	70	180	322	150
2001				63	97	205	59	77	171	307	150
2002				67	99	191	51	81	127	259	150
2003				73	99	145	72	84	137	294	150
2004				49	111	164	49	85	155	289	150
2005				66	103	171	61	86	158	305	150
2006				123	109	180	110	91	160	361	150
2007				53	134	201	52	117	172	342	150
2008				104	136	190	93	109	161	364	150
2009				77	144	195	73	114	176	363	150
2010				81	141	202	77	113	179	369	150
2011				122	141	206	120	105	193	418	150
2012				178	151	237	163	134	213	511	150
2013				162	197	274	151	174	230	555	150
2014				232	231	286	227	141	261	629	150
2015				303	229	347	296	194	296	786	150
2016											150
2017											150
2018											150
2019											150
2020											150
2021											150
2022											150
2023											150
2024											150
2025											150

Survival and Initial Population Estimates

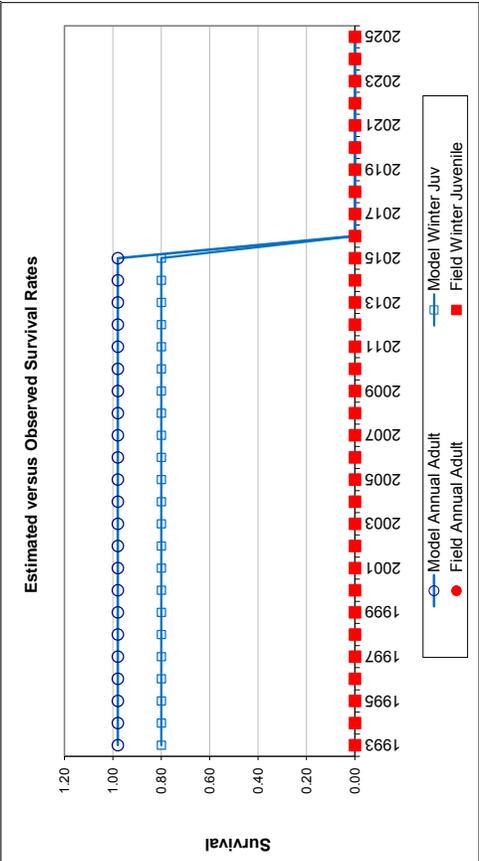
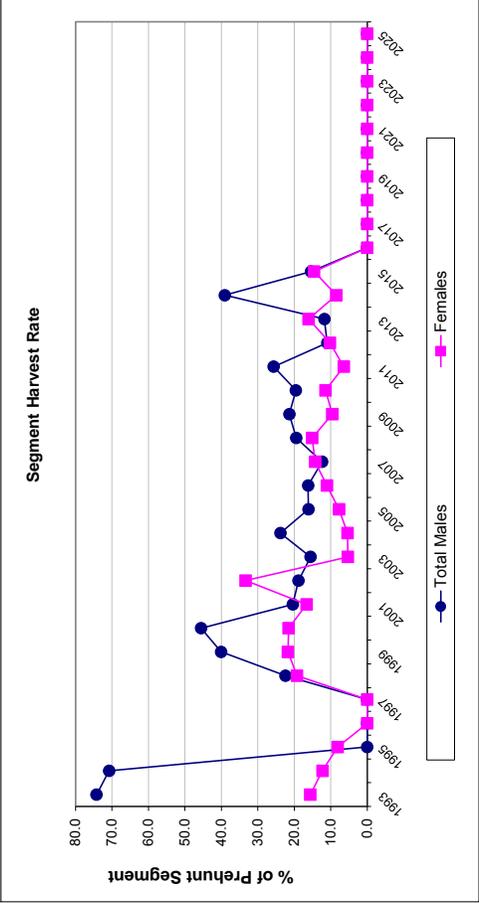
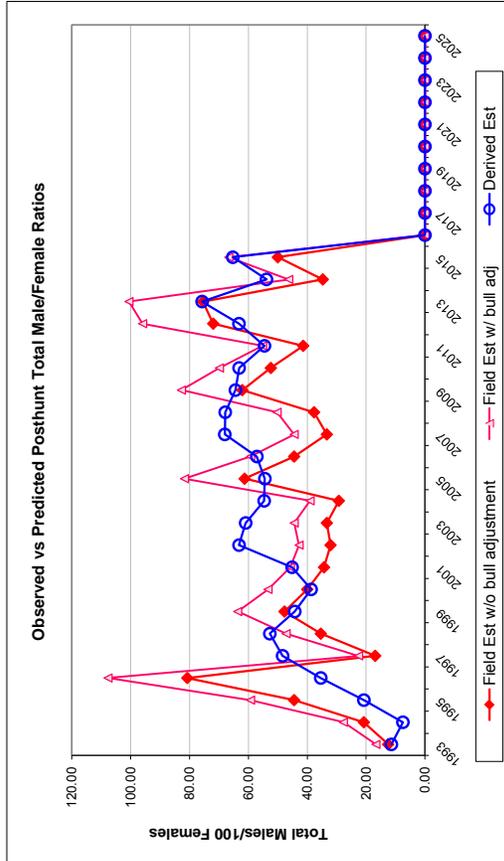
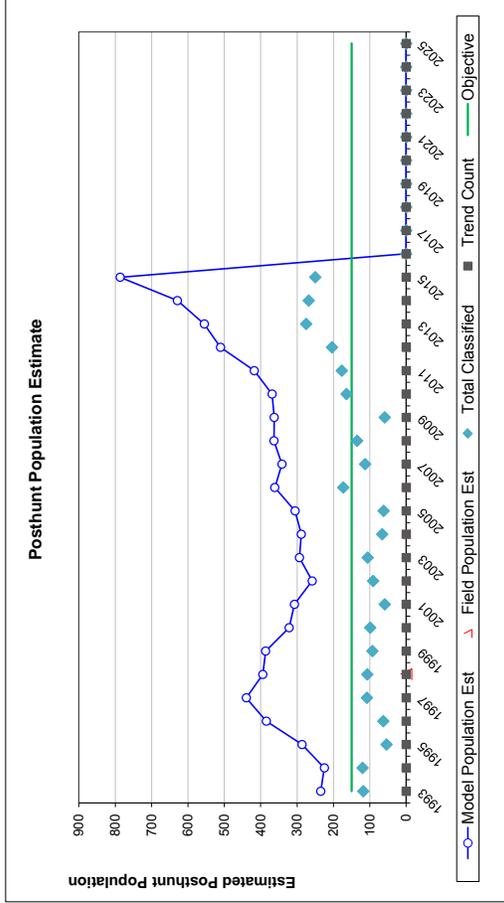
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.80		0.98	
1994	0.80		0.98	
1995	0.80		0.98	
1996	0.80		0.98	
1997	0.80		0.98	
1998	0.80		0.98	
1999	0.80		0.98	
2000	0.80		0.98	
2001	0.80		0.98	
2002	0.80		0.98	
2003	0.80		0.98	
2004	0.80		0.98	
2005	0.80		0.98	
2006	0.80		0.98	
2007	0.80		0.98	
2008	0.80		0.98	
2009	0.80		0.98	
2010	0.80		0.98	
2011	0.80		0.98	
2012	0.80		0.98	
2013	0.80		0.98	
2014	0.80		0.98	
2015	0.80		0.98	
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:	Optim cells
Juvenile Survival =	0.800
Adult Survival =	0.980
Initial Total Male Pop/10,000 =	0.002
Initial Female Pop/10,000 =	0.016

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

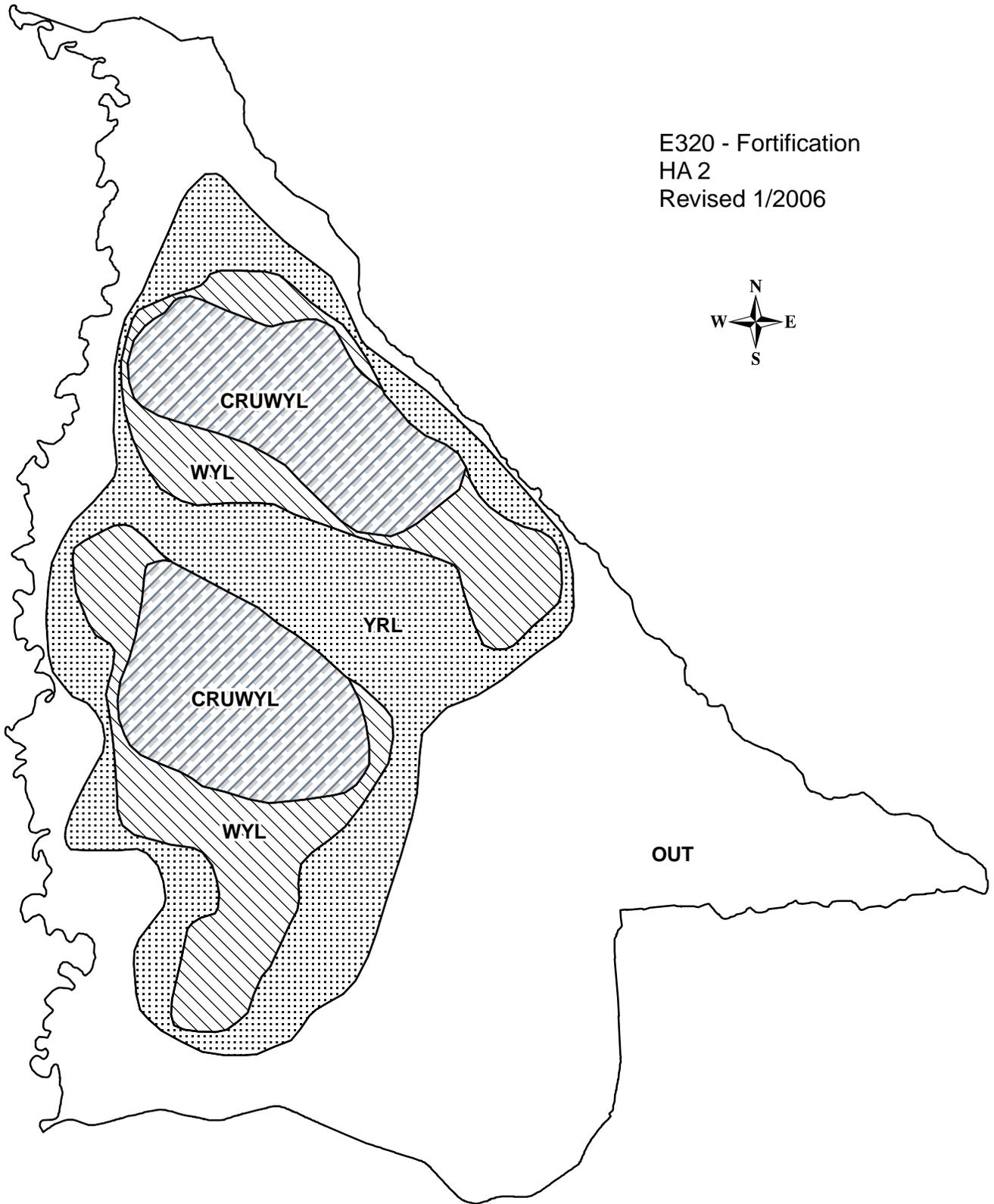
Year	Classification Counts				Harvest									
	Juvenile/Female Ratio		Total Male/Female Ratio		Juv	Yr1 males	2+ Males	Females	Total Harvest	Segment Harvest Rate (% of Prehunt Segment)				
	Derived Est	Field Est	Field SE	Derived Est						Field Est w/ bull adj	Field Est w/o bull adj	Total Males	Females	
1993		35.00	7.69	11.41	16.67	12.50	4.19	6	23	25	27	81	74.3	15.6
1994		35.06	7.84	7.49	27.71	20.78	5.71	5	12	14	20	51	70.8	12.2
1995		55.56	17.89	20.75	59.26	44.44	15.42	1	0	0	13	14	0.0	8.1
1996		61.54	19.55	35.40	107.69	80.77	23.70	0	0	0	0	0	0.0	0.0
1997		35.21	8.19	48.37	22.54	16.90	5.28	0	0	0	0	0	0.0	0.0
1998		29.23	7.62	52.71	47.18	35.38	8.58	24	0	30	47	101	22.4	19.3
1999		63.64	15.38	44.24	63.64	47.73	12.66	17	3	47	47	114	40.1	21.8
2000		40.00	10.09	38.68	53.33	40.00	10.09	8	9	44	45	106	45.6	21.6
2001		34.29	11.47	45.14	45.71	34.29	11.47	4	5	13	31	53	20.4	16.6
2002		39.62	10.22	63.17	42.77	32.08	8.94	15	4	13	58	90	18.8	33.4
2003		52.63	11.87	60.92	44.44	33.33	8.83	1	0	14	7	22	15.5	5.3
2004		31.71	10.09	54.64	39.02	29.27	9.61	0	3	21	8	32	23.8	5.4
2005		38.71	13.16	54.40	81.72	61.29	17.86	4	2	13	12	31	16.1	7.7
2006		69.14	12.02	57.11	59.26	44.44	8.90	11	1	15	18	45	16.2	11.0
2007		30.43	7.59	68.02	44.44	33.33	8.03	1	2	13	26	42	12.4	14.3
2008		57.97	11.52	67.87	50.24	37.68	8.67	10	0	24	26	60	19.5	15.1
2009		41.38	14.20	64.41	82.76	62.07	18.62	4	2	26	17	49	21.3	9.6
2010		42.86	8.54	63.16	69.84	52.38	9.75	4	2	23	21	50	19.6	11.4
2011		62.07	10.75	54.52	55.17	41.38	8.20	2	2	31	12	47	25.7	6.4
2012		76.83	12.87	63.21	95.93	71.95	12.28	13	2	13	22	50	10.9	10.2
2013		65.79	9.78	75.72	100.58	75.44	10.77	10	0	21	40	71	11.7	16.1
2014		86.78	11.57	53.85	46.28	34.71	6.22	5	5	77	22	109	39.0	8.5
2015		100.00	14.14	65.30	66.67	50.00	8.66	6	2	30	48	86	15.4	14.6
2016														
2017														
2018														
2019														
2020														
2021														
2022														
2023														
2024														
2025														

FIGURES



Comments:

E320 - Fortification  
HA 2  
Revised 1/2006





## 2014 - JCR Evaluation Form

SPECIES: Elk

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

HERD: EL321 - NORTH BIGHORN

HUNT AREAS: 35-40

PREPARED BY: TIM THOMAS

	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Trend Count:	4,873	6,069	5,600
Harvest:	1,224	1,530	1,500
Hunters:	4,046	4,427	4,400
Hunter Success:	30%	35%	34%
Active Licenses:	4,154	4,655	4,500
Active License Success	29%	33%	33%
Recreation Days:	29,782	34,931	35,000
Days Per Animal:	24.3	22.8	23.3
Males per 100 Females:	24	21	
Juveniles per 100 Females	53	38	

Trend Based Objective (± 20%) 4,350 (3480 - 5220)

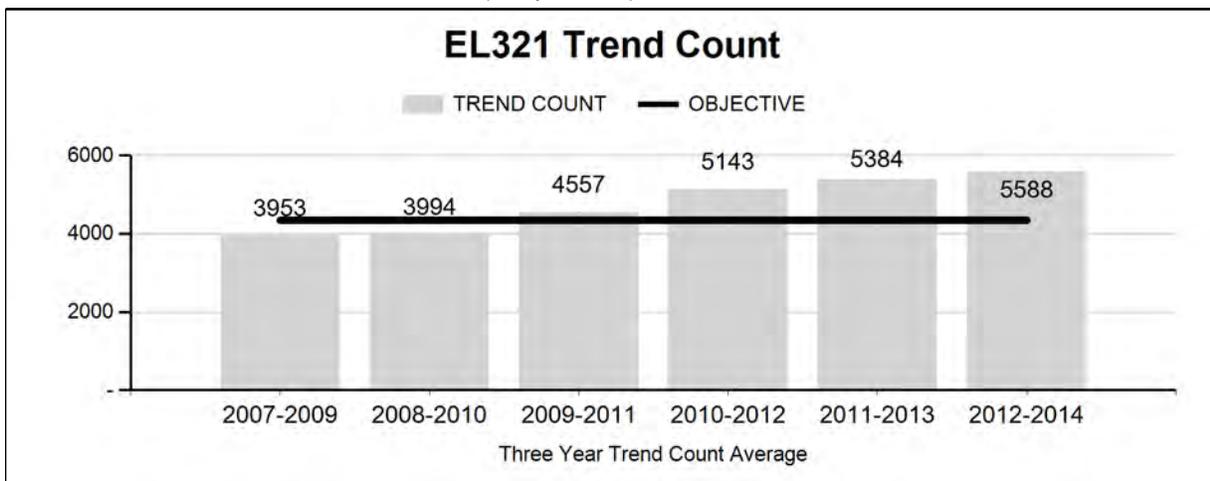
Management Strategy: Special

Percent population is above (+) or (-) objective: 40%

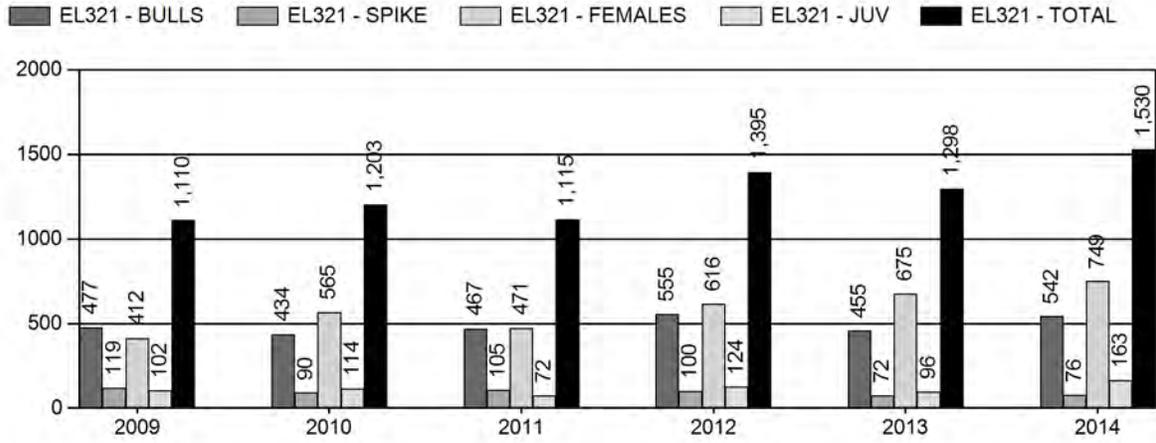
Number of years population has been + or - objective in recent trend: 10

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

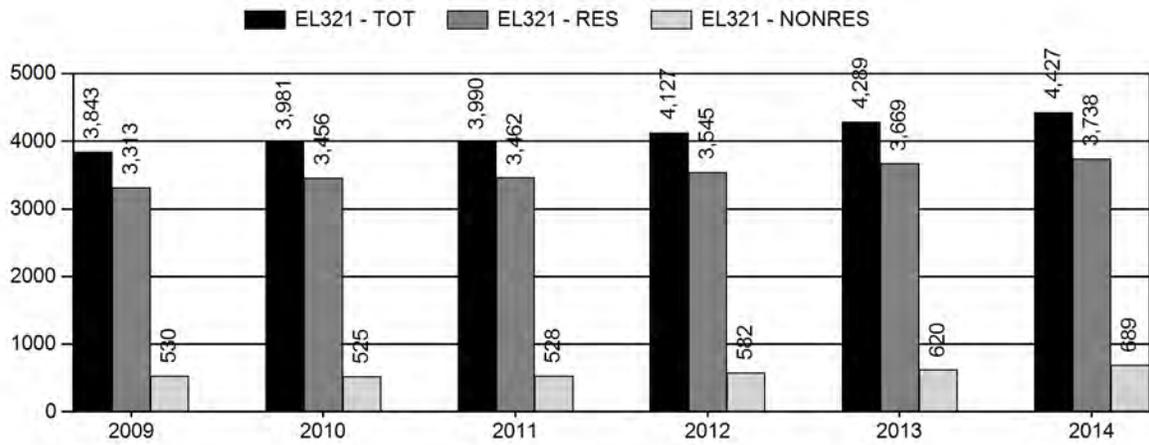
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	18%	23%
Males ≥ 1 year old:	32%	40%
Juveniles (< 1 year old):	11%	7%



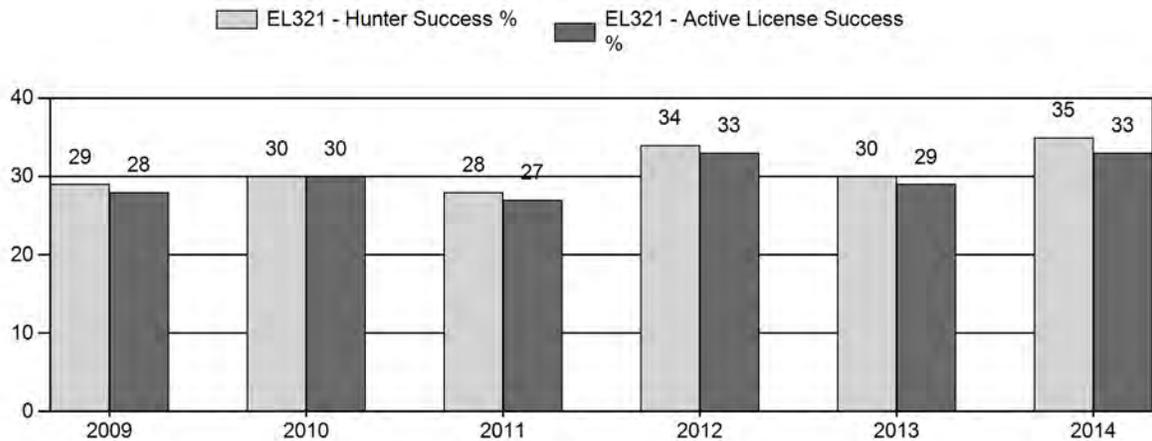
# Harvest



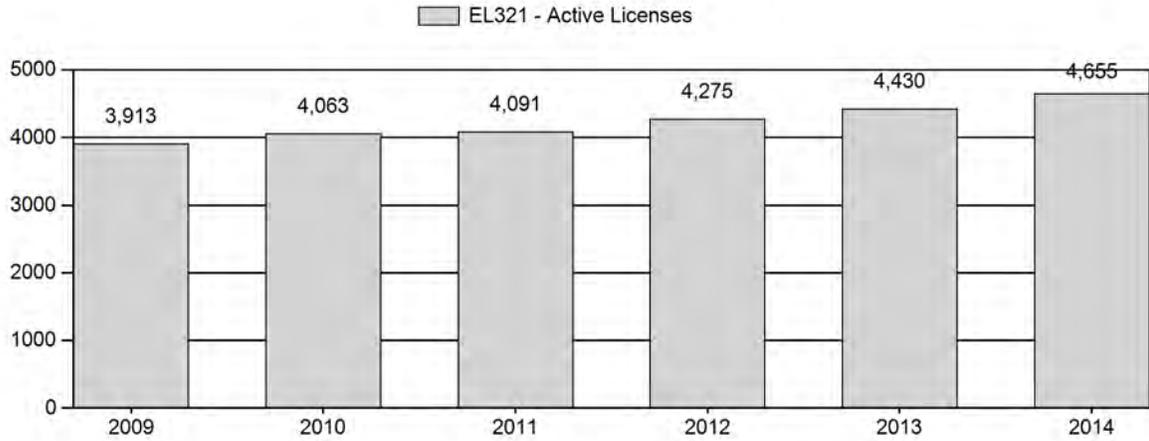
# Number of Hunters



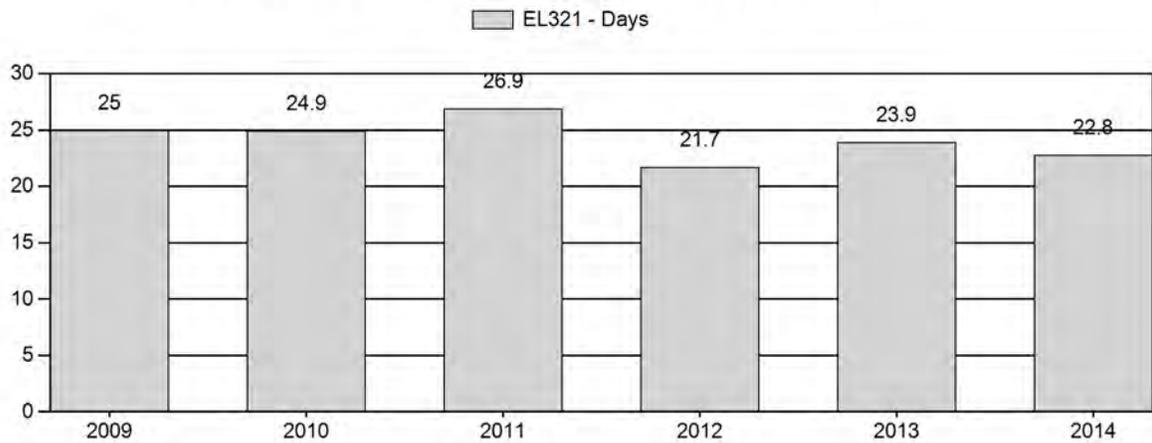
# Harvest Success



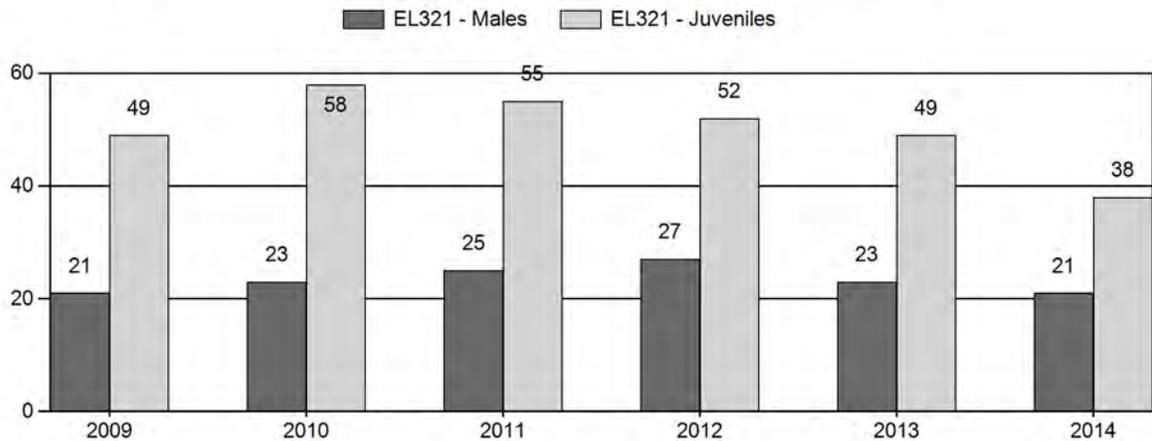
# Active Licenses



# Days per Animal Harvested



# Postseason Animals per 100 Females



## 2009 - 2014 Postseason Classification Summary

for Elk Herd EL321 - NORTH BIGHORN

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	5,530	154	79	233	13%	1,092	59%	538	29%	1,863	694	14	7	21	± 0	49	± 0	41
2010	5,250	157	76	233	13%	1,027	55%	595	32%	1,855	907	15	7	23	± 0	58	± 0	47
2011	5,500	160	103	263	14%	1,059	55%	587	31%	1,909	853	15	10	25	± 2	55	± 3	44
2012	5,400	148	111	259	15%	977	56%	509	29%	1,745	791	15	11	27	± 2	52	± 3	41
2013	0	103	43	146	13%	643	58%	312	28%	1,101	736	16	7	23	± 0	49	± 0	40
2014	0	135	86	221	13%	1,053	63%	401	24%	1,675	504	13	8	21	± 0	38	± 0	31

**2015 HUNTING SEASONS  
NORTH BIGHORN ELK HERD (EL321)**

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
35	1	Oct. 15	Nov. 5	100	Limited quota	Antlered elk
	4	Oct. 15	Dec. 15	150	Limited quota	Antlerless elk
	6	Oct. 15	Dec. 15	150	Limited quota	Cow or calf elk valid off national forest
	9	Sep. 1	Sep. 30	50	Limited quota	Any elk, archery only
36		Oct. 15	Nov. 5		General	Antlered elk
	4	Oct. 15	Nov. 30	200	Limited quota	Antlerless elk
	6	Oct. 15	Nov. 5	200	Limited quota	Cow or calf
	9	Sep. 1	Sep. 30	50	Limited quota	Any elk, archery only
37	6	Oct. 15	Nov. 5	400	General	Any elk
		Sep. 1	Sep. 30		Limited quota	Cow or calf valid off national forest or north of Wolf Creek Trail (U.S.F.S. Trail 001) on national forest
		Oct. 1	Dec. 20			Unused Area 37 Type 6 licenses valid in the entire area
	9	Sep. 1	Sep. 30	150	Limited quota	Any elk valid off national forest or south of Wolf Creek Trail (U.S.F.S. Trail 001) on national forest, archery only
38	1	Oct. 15	Nov. 5	350	Limited quota	Any elk
		Nov. 6	Nov. 15			Unused Area 38 Type 1 licenses valid for antlerless elk
	4	Oct. 1	Oct. 10	500	Limited quota	Antlerless elk
		Oct. 15	Nov. 15			Unused Area 38 Type 4 licenses valid on private land or north of Columbus Creek, the Fools Creek Road (U.S.F.S. Road 168), the Burgess Road (U.S.F.S. 15) to Burgess Junction, and U.S. Highway 14A

Hunt Area	Type	Dates of Seasons		Quota		Limitations
		Opens	Closes			
38	6	Nov. 16	Dec. 31	50	Limited quota	Cow or calf valid off national forest and off the Wyoming Game and Fish Commission's Kerns and Amsden Creek Wildlife Habitat Management Areas
	9	Sep. 1	Sep. 30	200	Limited quota	Any elk, archery only
39	1	Oct. 15 Nov. 5	Nov. 4 Nov. 15	100	Limited quota	Any elk Unused Area 39 Type 1 licenses valid for antlerless elk
	2	Oct. 15	Nov. 4	75	Limited quota	Antlered elk
	4	Oct. 1 Oct. 15	Oct. 10 Nov. 15	75	Limited quota	Antlerless elk Unused Area 39 Type 4 licenses
40	9	Sep. 1	Sep. 30	70	Limited quota	Any elk, archery only
	1	Oct. 15	Nov. 4	175	Limited quota	Any elk
	4	Oct. 15	Dec. 20	200	Limited quota	Antlerless elk
	5	Oct. 1 Oct. 15	Oct. 10 Dec. 20	50	Limited quota	Antlerless elk Unused Area 40 Type 5 licenses
	6	Sep. 1 Oct. 15	Oct. 14 Dec. 20	200	Limited quota	Cow or calf valid off national forest Unused Area 40 Type 6 licenses valid in the entire area
	9	Sep. 1	Sep. 30	75	Limited quota	Any elk, archery only
Archery 35, 36, 37		Sep. 15	Sep. 30			Refer to Section 3 of this Chapter

Hunt Area	Type	Quota change from 2014
35	1	- 50
38	1	- 50
	6	+ 50
	9	- 50
40	5	- 50
	6	- 50

<b>Herd Unit Total</b>	<b>Type</b>	<b>Quota change from 2014</b>
	<b>1</b>	<b>- 100</b>
	<b>5</b>	<b>- 50</b>
	<b>6</b>	<b>0</b>
	<b>9</b>	<b>- 50</b>

### **Management Evaluation**

**Current Mid-Winter Trend Management Objective:** 4,350

**Management Strategy:** Special

**2014 Winter Trend Count:** 6,069

**Most Recent 3-year Running Average Winter Trend Count:** ~ 5,600

### **Herd Unit Issues**

The management objective for the North Bighorn Elk Herd Unit is a mid-winter trend count of 4,350 elk. 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). The objective and management strategy were last revised in 2012.

There are several areas within hunt areas of this herd unit that act as refugia for elk, protecting them from harvest. This limits manager's ability to maintain these groups within desired population levels, leading to frustration with the general hunting public as elk move from publically accessible areas to these refuge areas, which are generally private lands with very limited access opportunities. Landowners are also frustrated as elk move off refuge areas and cause damage on adjacent ranches. This problem has grown over the past 25+ years, especially in the eastside hunt areas (Areas 35, 36, 37, and 38), as larger ranches have changed ownership and traditional views on elk management and hunter access have changed.

During the last three seasons, hunter harvested elk from this herd unit tested seropositive for exposure to the bacterium *Brucella abortus*. *B. abortus* is the bacterium that causes the disease brucellosis in livestock, elk and bison. In 2012, 25 usable blood samples were collected from hunter harvested elk in Hunt Area 40 on the west side of the Bighorn Mountains during routine statewide wildlife testing to monitor for brucellosis. Two of these samples tested seropositive. In response, an enhanced brucellosis surveillance effort was initiated in 2013.

Over 750 samples from the Bighorn Mountains (Hunt Areas 33-41, 45, 47-49 and 120) were collected in 2013, with 437 usable samples (~58%). Two additional samples from Hunt Area 40 tested seropositive in 2013. During the 2014 season, we collected 646 useable samples from elk harvested in all the Bighorn Mountain hunt areas (Table 1). Within this herd unit, we collected 338 usable samples. Four samples tested positive in 2014, including 1 bull from Hunt Area 39, 1 bull and 1 cow from Hunt Area 40, and 1 bull from Hunt Area 41. We plan to continue the enhanced brucellosis surveillance during the 2015 season. As such, antlerless elk seasons were opened earlier than traditionally in Hunt Areas 37, 38, 39 and 40 to accommodate antlerless harvest and sample collection.

Table 1. Usable blood samples collected during enhanced Brucellosis surveillance in Bighorn Mountains during 2014 hunting season. The North Bighorn Elk Herd Unit hunt areas (Areas 35-40) are in bold. Seropositive positive samples are highlighted.

Hunt Area	Usable Samples	Seropositive	Hunt Area	Usable Samples	Seropositive
033	20	0	<b>040</b>	<b>79</b>	<b>2</b>
034	32	0	041	104	<b>1</b>
<b>035</b>	<b>39</b>	<b>0</b>	045	52	0
<b>036</b>	<b>7</b>	<b>0</b>	047	12	0
<b>037</b>	<b>27</b>	<b>0</b>	048	32	0
<b>038</b>	<b>146</b>	<b>0</b>	049	40	0
<b>039</b>	<b>40</b>	<b>1</b>	120	16	0
			<b>Total</b>	<b>646</b>	<b>4</b>

## Weather

The spring and summer of 2014 was generally warm and wet, resulting in good conditions for forage production throughout the Bighorn Mountains. The winter of 2014-15 was variable. There were some early snow falls in September and early October, then relatively open conditions until early November. Cold temperatures and snowy conditions were prominent through January. Starting the first part of February, conditions fluctuated between unseasonably warm temperature and colder, snowy conditions. The average to above average snowfall combined with the cold temperatures induced elk to move onto private lands and raid stored hay crops, creating numerous damage situations during portions of this winter. Weather did not seem to have an adverse affect on individual elk, but it did influence forage production and availability, and hence elk distribution, during all seasons.

## Field Data

During trend count surveys, we counted 6,069 elk on winter ranges during January-February 2015, which is ~28% above the established mid-winter count objective of 4,350. This is the highest winter count ever in this herd unit. The highest increase in elk numbers were observed in Hunt Area 39, where almost 1,000 elk were counted, compared to usual counts near 300 elk (Table 2). This was likely a function of elk that normally winter in Garvin Basin, Montana staying in or moving back into Wyoming. Seasons have been liberalized and harvest increased in recent years to reduce elk populations to more desired levels.

Table 2. Desired elk distribution and actual winter counts in North Bighorn Elk Herd Unit during January – February 2015.

Hunt Area	Winter Count Objective	2012 Winter count	2013 Winter Count	2014 Winter Count	2014 # Over / Under Objective	3-year (2012-14) Running Mean	
35	400	841	928	926	+526	898 (+124%)	
36	800	914	905	1,002	+202	940 (+17%)	
37	800	1,175	1,598	1,466	+666	1,413 (+77%)	
38	1,000	1,255	924	1,000	0	1,060 (+6%)	
39	500	307	290	989	+489	529 (+6%)	
40	850	767	792	686	-164	748 (-12%)	
		4,350	5,259	5,437	6,069	+1,719	5,588 (+28%)

We classified 1,675 elk during January 2015, all on the west side of the Bighorn Mountains. We observed 38 calves:100 cows, a decline from recent years and the lowest observed calf:cow ratio in 10 years. This could reflect actual population dynamics or could be a function of a new observer as the Greybull Wildlife Biologist. This is sufficient production to maintain this population.

We observed 21 bulls (13 yearling; 8 adult):100 cows. The observed yearling bull to cow ratio increased over the past 10 years, from 12 yearling bulls:100 cows to 16 yearling bulls:100 cows, until a decline this year. This suggests sufficient recruitment of bulls into the population to maintain current levels of bull harvest. The observed adult bull to cow ratio has remained relatively steady over the past 10 years, averaging 8 adult bulls:100 cows. The total bull to cow ratio is a minimum bull:cow ratio as mature bulls (> 2 yrs old) tend to winter away from cow/calf/young bull groups, making them more difficult to find during surveys.

While we did not collect classification data from the eastside hunt areas, we did observe over 200 branched antlers bulls in Area 37 and over 100 branched antlered bulls on the Kerns WHMA in Area 38. With increased bull harvest and documented illegal bull harvest, we are concerned with bull numbers in this herd unit and will make efforts to monitor bull to cow ratios.

According to the 2014 hunter satisfaction survey, 62% of 1,201 hunters were satisfied with their elk hunting experience in this herd unit, 20% were dissatisfied, with the balance being neutral. This was similar to satisfaction levels for the 2013 season. Hunters were more satisfied in the limited quota hunt areas (73%) compared to the general license areas (47%) which is expected. Limited quotas areas tend to be less crowded and generally have better quality bulls, two factors that likely influence satisfaction levels. Nonresident hunters (n=233) tended to be more satisfied (63%) than resident hunters (61%, n=968), although the difference was smaller in 2014 compared to 2013. Hunter satisfaction is subjective and based on an individual values, perceptions and success.

### **Harvest Data**

Hunters harvested an estimated 1,558 elk in 2014, a 20% increase from 2013, and the highest harvest ever in this herd unit. Cow and calf harvest was the highest ever and bull harvest was the second highest ever. Cow harvest increased 13% and calf harvest increased 85% compared to 2013. Bull harvest increased 17% in 2014 (yearling bull harvest increased 5%; adult bull harvest increased 19%). During 2005-09, hunters harvested an average of 437 branch antlered bulls compared to an average of 491 branch antlered elk during 2010-2015. Estimated branch antlered bull harvest was the highest ever in 2012 (555) and 2014 (542). With an emphasis on special management in the limited quota hunt areas of this herd unit, we are concerned with the level of bull harvest in recent years.

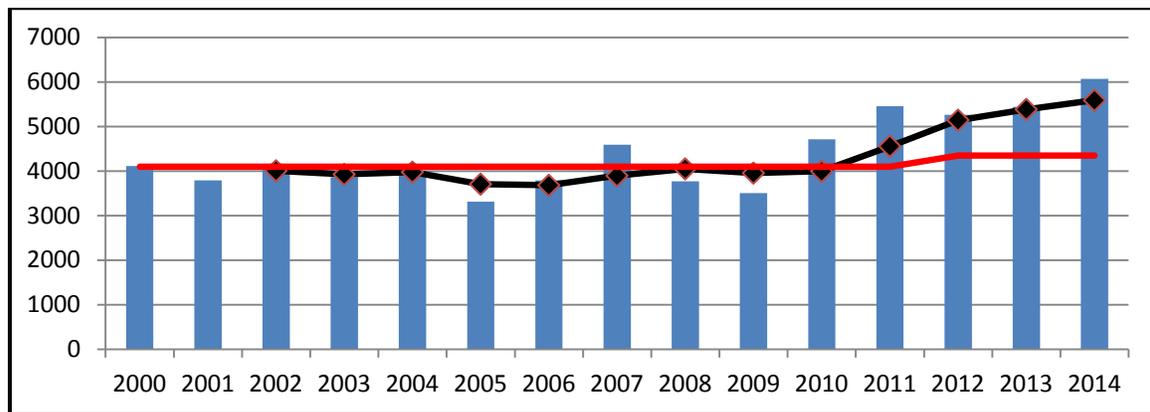
Hunter success was estimated at 35%, an increase from the 2013 season and the highest success rate since 1997. Effort increased slightly to 22.5 days of hunting per elk harvested. Open weather conditions during much of October kept elk scattered across most of the herd unit, requiring hunters to expend some additional effort to find them. The open conditions also allowed good access to most of the herd unit, resulting in good success. Extended seasons helped provide the opportunity for increased antlerless harvest, especially with fresh snow on October 1.

Archery hunters harvested an estimated 227 elk (15%) in this herd unit. They are particularly successful on bull elk, harvesting an estimated 195 bulls (32%), consisting of 175 adult bulls ( $\geq 2$  years old) and 20 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 to meet special management objectives.

## Population

We do not have a spreadsheet model developed for this herd unit because: 1) we do not manage this herd based on a population objective; and 2) up to 20% 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 and we likely count 80-90% of wintering elk in any given year.

Based on elk winter trend counts, it appears this population has increased in recent years (Fig. 1). It is difficult to know how much of this is an actual increase in the population and how much a shift of elk wintering in Wyoming versus Montana. Efforts are being made, through liberalized hunting season strategies, to reduce this population towards objective. Harvest the past 3 years has been the highest 3 years ever, averaging over 1,400 elk harvested each year.



**Figure 1.** Elk numbers, with 3-year running average (black line), observed during trend and classification surveys from 2000 – 2014 compared to the management objective (red line).

## Management Summary

In general, bull elk hunting runs from October 15 thru November 4 or 5 in this herd unit. With 4 of the 6 hunt areas in this herd unit managed under limited quota strategies, we have been successful in providing trophy quality hunting opportunities throughout the herd unit. Recent increases in bull harvest may reduce bull quality and will be closely monitored. Cow hunting, 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 35% for residents in these 3 areas (2014 resident draw odds for Type 9 license: Area 38 = 31%; Area 39 = 33%; Area 40 = 61%). Non-resident hunters needed 7 preference points to draw an Area 38 or 39 Type 9 license and 5 preference points to draw an Area 40 Type 9 license in 2014 (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 account for about 50% of the winter count for this hunt area. A Type 6 license was added to Area 36 to encourage increased elk harvest in that area also.

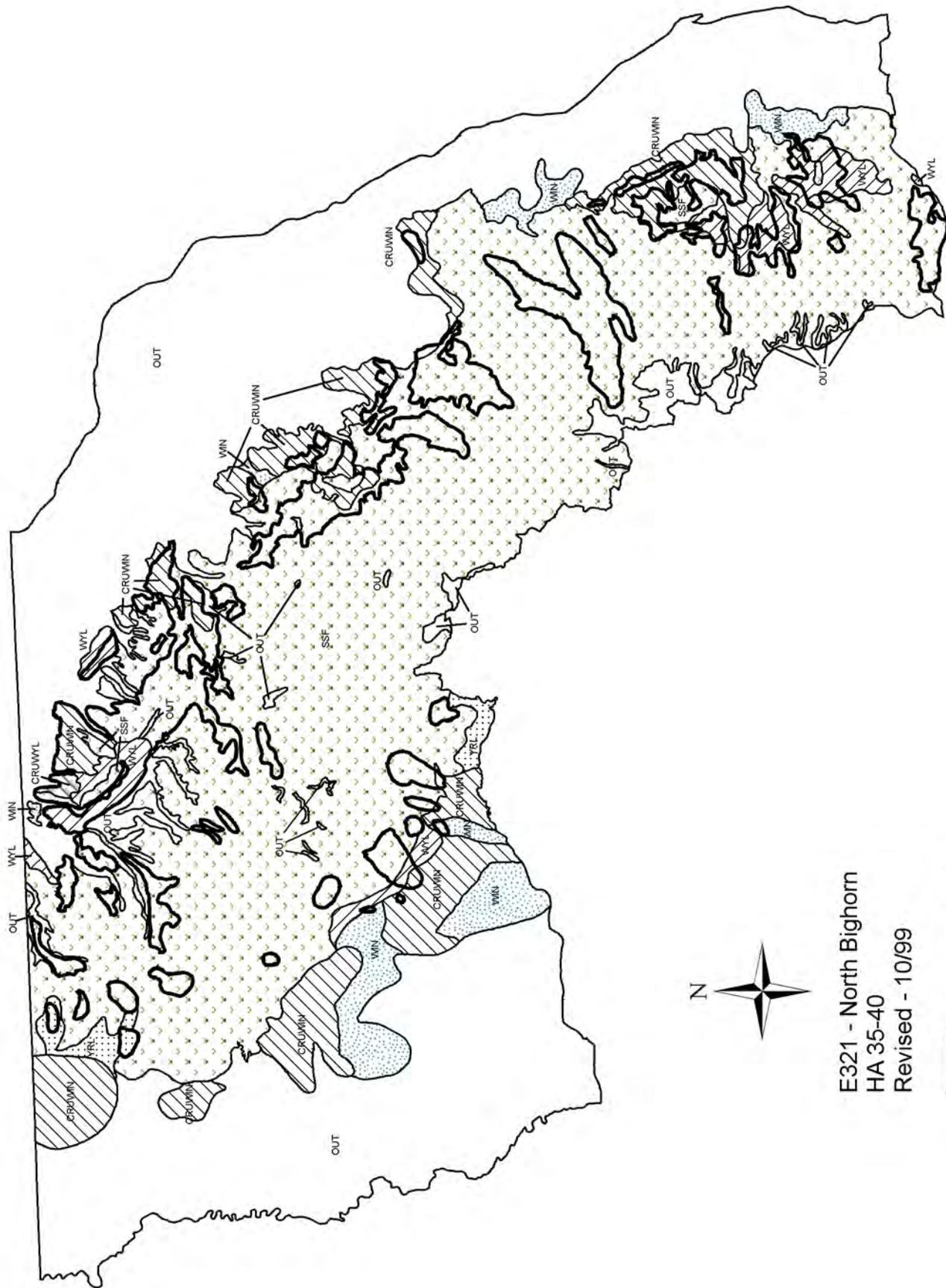
A special early firearm season is open during September in a portion of Area 37. This season strategy is designed to increase harvest as well as block a migration route to private lands, keeping elk on public lands longer. This season has been popular with most hunters and appears to have had at least limited success. This season strategy has been expanded off national forest to address high elk numbers north of Wolf Creek in this hunt area as well as potential harvest opportunities near PK Lane and Moncreiffe Ridge.

Type 1 and Type 9 licenses were reduced in Hunt Area 38 for the 2015 season in response to increased bull harvest the past 5 years, especially for branch antlered bulls. In this hunt area, hunters harvested an average of 143 branch antlered bulls annually from 2010-2014, compared to 127 branch antlered bulls during the 2005-2009 seasons and well above the 28 years average branch antlered bull harvest of 107. Thirty five percent of the total branch antlered bull harvest was from Area 38 in 2014. Also, there has been documented illegal killing of elk near the Kerns WHMA, a high percentage of which were bulls.

A late antlerless season, using a Type 6 license starting in 2015, will be used in Area 38 to address damage issues on private lands. This season is designed to harvest elk that have become habituated to leaving the WHMAs and feeding on stored hay crops. During the 2013-14 winter, about half the elk in this hunt area wintered off of the Amsden and Kerns WHMAs, causing significant damage to stored hay on private lands. Damage was not as severe during the 2014-15 winter but we want to continue to harvest elk that have learned to feed on stored crops.

Type 5 and Type 6 license types were reduced in Area 40 due to below desired elk winter counts.

With liberal seasons and favorable hunting conditions, we anticipate a slightly decreased harvest during 2015 (~1,500 elk) compared to 2014. Continued harvest, especially on cows, should help bring segments of this herd where winter counts exceed management objectives down to desired levels.



E321 - North Bighorn  
 HA 35-40  
 Revised - 10/99

Parturition Area

## 2014 - JCR Evaluation Form

SPECIES: Elk

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

HERD: EL322 - SOUTH BIGHORN

HUNT AREAS: 33-34, 47-49, 120

PREPARED BY: DAN THIELE

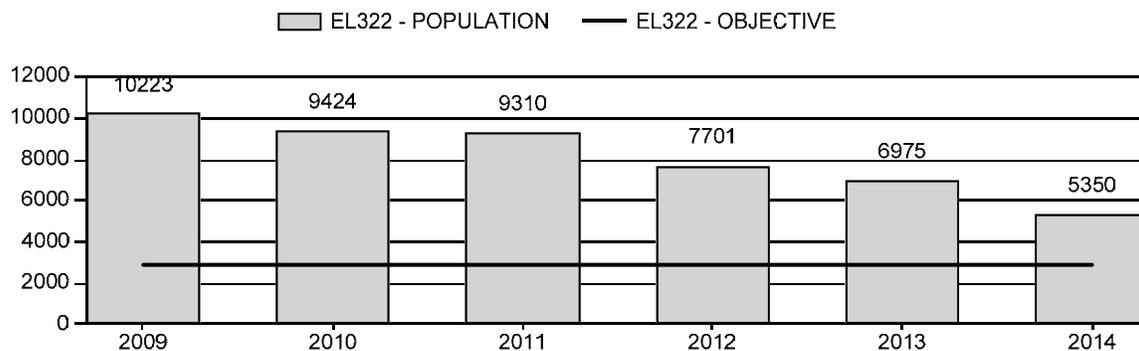
	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Population:	8,727	5,350	3,900
Harvest:	1,438	1,661	1,970
Hunters:	3,043	3,513	4,200
Hunter Success:	47%	47%	47%
Active Licenses:	3,170	3,648	4,400
Active License Success:	45%	46%	45%
Recreation Days:	21,490	26,283	29,600
Days Per Animal:	14.9	15.8	15.0
Males per 100 Females	25	25	
Juveniles per 100 Females	38	32	

Population Objective (± 20%) :	2900 (2320 - 3480)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	84%
Number of years population has been + or - objective in recent trend:	10
Model Date:	5/11/2015

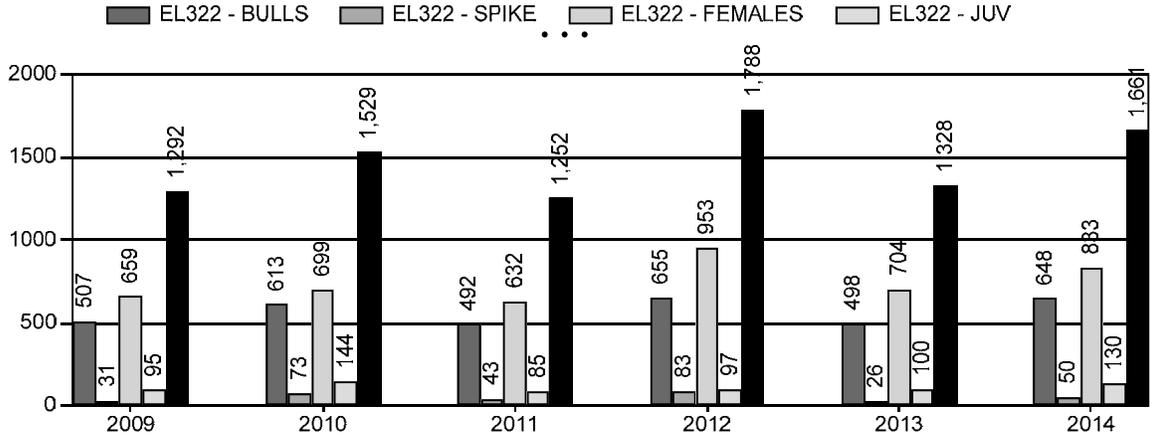
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	22%	38%
Males ≥ 1 year old:	44%	59%
Juveniles (< 1 year old):	11%	8%
Total:	23%	32%
Proposed change in post-season population:	-22%	-27%

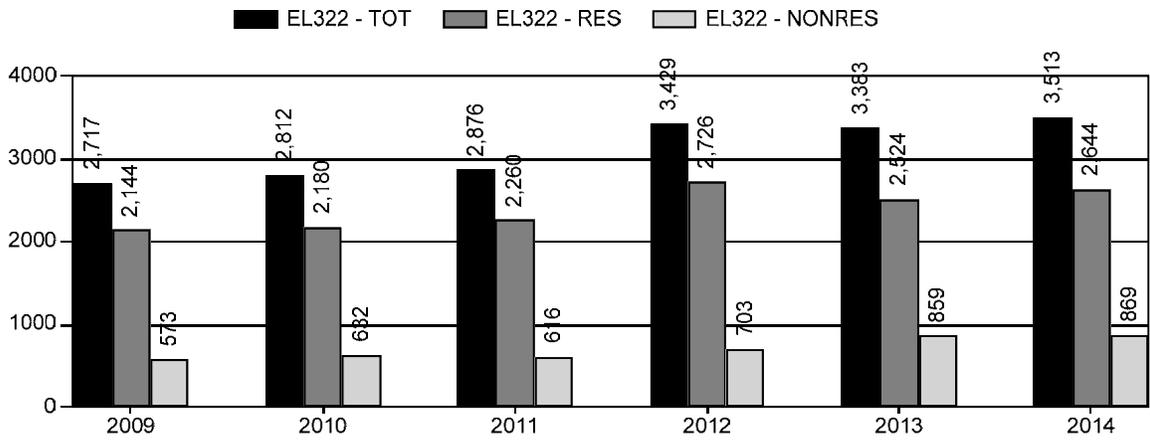
## Population Size - Postseason



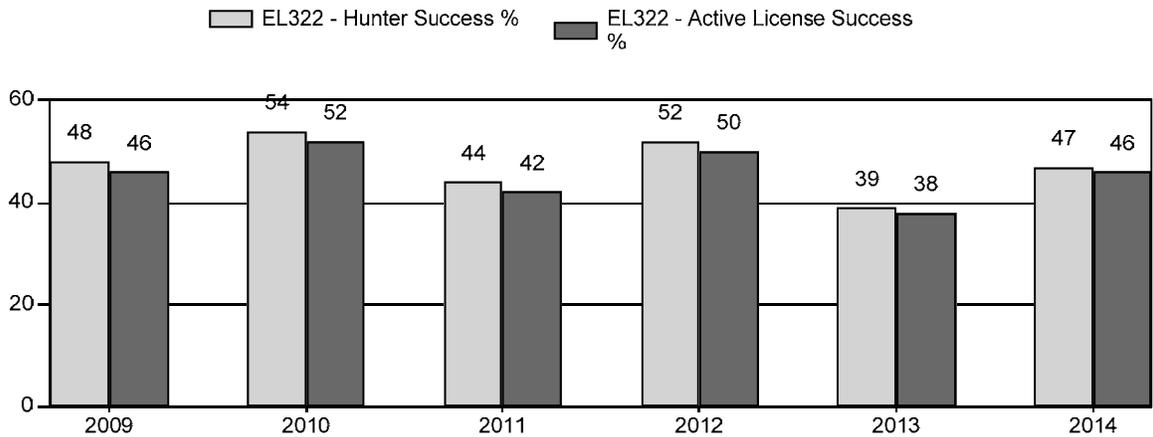
# Harvest



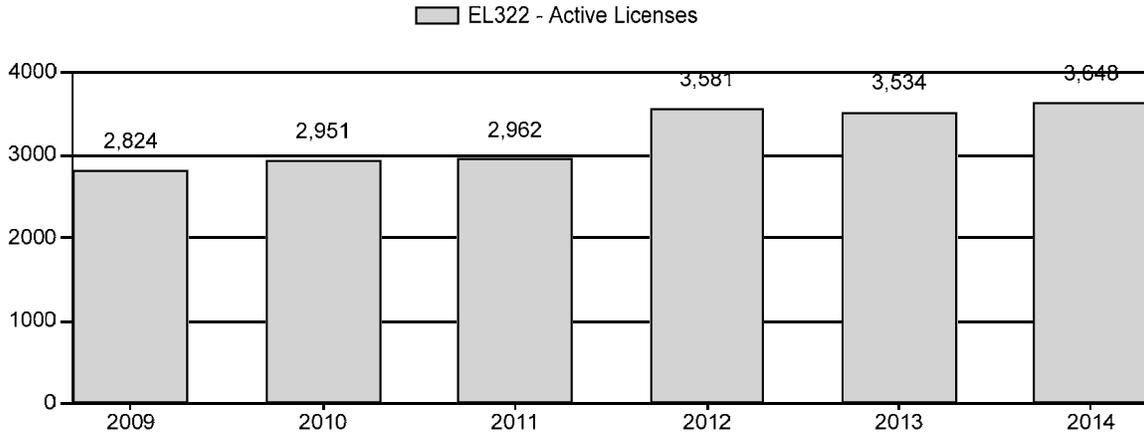
# Number of Hunters



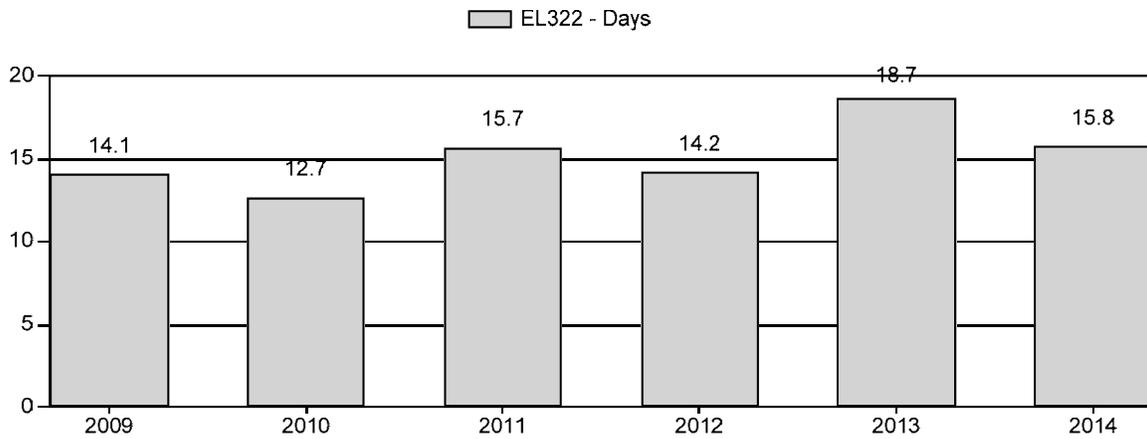
# Harvest Success



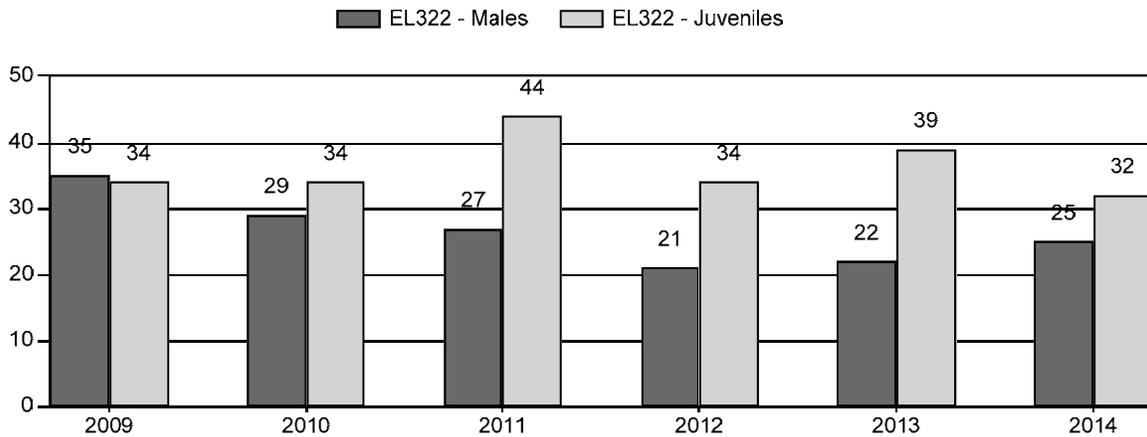
# Active Licenses



# Days per Animal Harvested



# Postseason Animals per 100 Females



## 2009 - 2014 Postseason Classification Summary

for Elk Herd EL322 - SOUTH BIGHORN

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	10,223	129	133	262	21%	757	59%	254	20%	1,273	492	17	18	35	± 3	34	± 3	25
2010	9,424	156	163	319	17%	1,119	61%	385	21%	1,823	458	14	15	29	± 2	34	± 2	27
2011	9,310	304	250	554	16%	2,064	58%	914	26%	3,532	660	15	12	27	± 1	44	± 2	35
2012	7,701	215	167	382	14%	1,814	65%	612	22%	2,808	438	12	9	21	± 1	34	± 2	28
2013	6,975	290	207	497	14%	2,224	62%	878	24%	3,599	521	13	9	22	± 1	39	± 1	32
2014	5,400	104	114	218	16%	887	64%	281	20%	1,386	403	12	13	25	± 2	32	± 2	25

**2015 HUNTING SEASONS  
SOUTH BIGHORN ELK HERD (EL322)**

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
33	1	Oct. 9 Nov. 1	Oct. 31 Dec. 15	200	Limited quota	Any elk Unused Area 33 Type 1 licenses valid for antlerless elk
	4	Aug. 15	Sep. 30	150	Limited quota	Antlerless elk valid on private lands east of Buffalo Creek and the Bar C Road (BLM Road 6214) Unused Area 33 Type 4 licenses valid in the entire area
	6	Oct. 9 Nov. 1	Dec. 15 Dec. 15	300	Limited quota	Cow or calf valid east of Buffalo Creek and the Bar C Road (BLM Road 6214) Unused Area 33 Type 6 licenses valid in the entire area
34	1	Oct. 15 Nov. 16	Nov. 15 Dec. 15	800	Limited quota	Any elk Unused Area 34 Type 1 licenses valid for antlerless elk
	6	Oct. 15	Dec. 15	600	Limited quota	Cow or calf valid off National Forest
47	1	Oct. 9 Nov. 1	Oct. 31 Dec. 6	300	Limited quota	Any elk Unused Area 47 Type 1 licenses valid for antlerless elk
	6	Oct. 9	Dec. 6	300	Limited quota	Cow or calf
48	1	Oct. 9	Oct. 31	300	Limited quota	Any elk
	4	Oct. 9	Oct. 31	50	Limited quota	Antlerless elk
	6	Oct. 9 Nov. 7	Oct. 31 Dec. 15	500	Limited quota	Cow or calf Unused Area 48 Type 1, Type 4 and Type 6 licenses valid for antlerless elk
49	1	Oct. 9 Nov. 1	Oct. 31 Dec. 21	325	Limited quota	Any elk Unused Area 49 Type 1 licenses valid for antlerless elk
	4	Oct. 9	Dec. 21	50	Limited quota	Antlerless elk
	6	Aug. 15 Oct. 9	Oct. 8 Dec. 21	800	Limited quota	Cow or calf valid on private land Unused Area 49 Type 6 licenses valid in the entire area

120	1	Oct. 9 Nov. 1	Oct. 31 Dec. 15	100	Limited quota	Any elk Unused Area 120 Type 1 licenses valid for antlerless elk
	4	Oct. 9	Dec. 15	75	Limited quota	Antlerless elk
	6	Oct. 9	Dec. 15	75	Limited quota	Cow or calf
Archery		Sep. 1	Sep. 30			Refer to Section 3 of this Chapter

Hunt Area	Type		Quota change from 2014
47	1		+50
	2		-25
49	6		+700
	7		-550
120	1		-50
<b>Herd Unit Total</b>	<b>1 &amp; 2</b>		<b>-25</b>
	<b>4</b>		<b>No change</b>
	<b>6</b>		<b>+700</b>
	<b>7</b>		<b>-550</b>

### **Management Evaluation**

**Current Postseason Population Management Objective: 2,900**

**Management Strategy: Recreational**

**2014 Postseason Population Estimate: ~5,350**

**2015 Proposed Postseason Population Estimate: ~3,900**

### **Herd Unit Issues**

The South Bighorn Elk Herd Unit has a post-season population objective of 2,900 elk with a recreational management strategy. The objective and management strategy were last revised in 1998 when Areas 33 and 34 from the Southeast Bighorn Herd Unit were combined with Areas 47, 48, 49 and 120 from the Upper Nowood-Copper Mountain Herd Unit. The herd has exceeded the population objective since it was created.

Since 1997, hunting seasons have been liberalized with increased any elk and antlerless elk license quotas, 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, 4,800 total licenses were issued for the five hunt areas comprising this herd unit. Three-hundred sixty-one licenses went unsold, 44 of which were antlerless licenses and 317 cow/calf licenses. Lack of access continues to hamper efforts to achieve harvest objectives.

### **Weather**

Weather in the South Bighorn Herd Unit turned from drought conditions to wet conditions with excellent 2013 fall precipitation. The January 2014 Palmer Drought Index for Climate Divisions 4 (Bighorn drainage) and 5 (Powder, Little Missouri and Tongue drainages) showed “moderately moist” conditions which progressed to “very moist” conditions by early fall resulting from above normal precipitation in June and August. Winter weather has been moderate with periods of

cold interspersed with very mild temperatures including late January and early February. As of March 2, 2015, total precipitation reported at the Bighorn Basin and Powder River drainage snowtel sites since October 1st was 99% and 104% of normal, respectively. Lack of spring precipitation has decreased the Bighorn Basin and Powder River drainage snowtel site precipitation totals to 83% and 80%, respectively, as of May 13<sup>th</sup>. Snow-water equivalent readings for May 13<sup>th</sup> are well below normal for the Middle Powder (21%) and Grave Springs (34%) sites

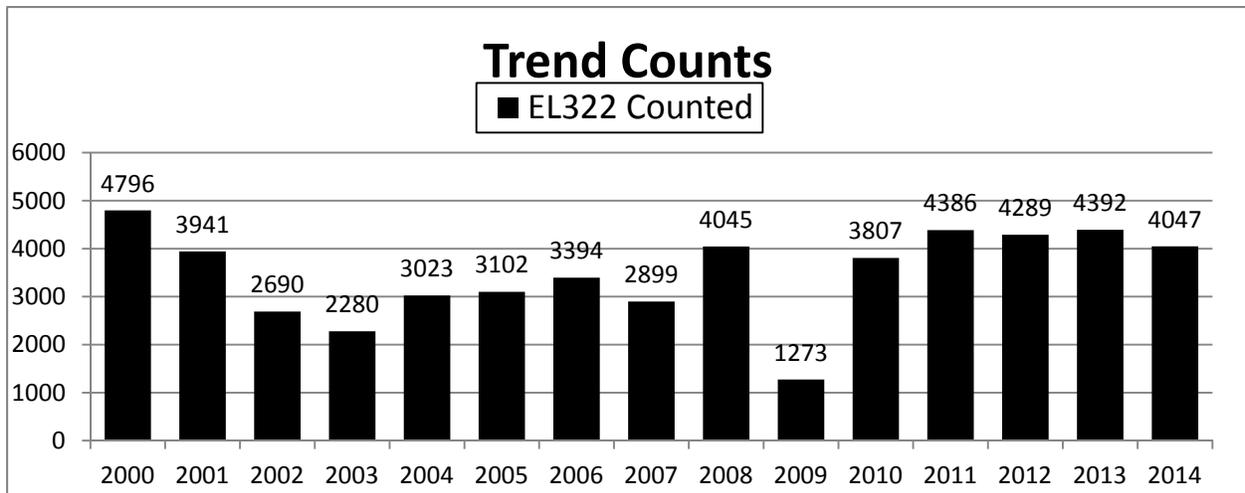
**Habitat**

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. Cattle and sheep grazing is common. The drought conditions of 2012 and early 2013 ended with above normal fall 2013 and 2014 precipitation. Timely moisture resulted in excellent herbaceous forage production in 2014.

**Field Data**

Winter trend counts remained relatively stable with 4,047 elk observed in 2014. The count was down 8% from 4,392 elk in 2013 and compares to a high of 4,796 elk observed in 2000 (Figure 1). Given that license quotas and harvest have significantly increased in recent years and hunter success and hunter effort trends remain favorable, it is unreasonable to conclude this population is decreasing to the extent predicted by the population model. It is anticipated an alternative objective will be selected during the next objective review.

Figure 1. South Bighorn Elk Herd Unit Winter Trend Counts, 2000-2014.



Postseason classifications resulted in herd ratios of 32 calves per 100 cows and 25 bulls per 100 cows. Productivity in this herd is relatively low with the calf ratio averaging 38 per 100 for the five year average. Postseason 2014 classifications were not obtained in Areas 33 and 34 due to time constraints and inability to classify entire herds. Calf ratios tend to be higher in these hunt areas. 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.

## **Harvest Data**

Harvest data does not indicate bull numbers, or total elk numbers, are significantly decreasing. Limited license (Type 1, 2 and Type 4) hunter success (48%) remained favorable in 2014 and harvest composition showed 93% of the bull harvest was comprised of adult bulls indicating hunters could be selective and were successful in finding adult bulls. Hunters holding cow/calf licenses averaged 45% success.

Hunter numbers (3,581) and active license numbers (3,729) reached new highs indicating continued hunter interest in these areas. Harvest and hunter success recovered from decreases of 22% and 9%, respectively, in 2013. Hunter success (49%) exceeded the five year average of 47% while hunter effort (15.0 days/animal) decreased from 2013 to a comparable effort to the five year average (14.9 days/animal). Hunter access to higher elevations was excellent due to mild fall weather. Hunter success at the hunt area level ranged from 31% in Area 33 to 60% in Area 49. Harvest objectives were not met due to low hunter success on some license types and 361 unsold antlerless and cow/calf licenses in the five hunt areas. Seventy-five percent of the unsold licenses were in Areas 33 and 34 where hunter access to private lands remains problematic.

Hunter satisfaction responses were generally positive reflecting decent hunter success, quality bulls and long seasons. At the herd unit scale, 63% of hunters responded positively about their hunting experience whereas 20% responded negatively and 17% provided a neutral response. The positive response was down from 66% in 2013 even though hunters experienced higher success. However, Area 33 hunters reported significantly greater dissatisfaction (38%) which influenced the herd unit results. At the hunt area level, positive responses ranged from 45% in Area 33 to 72% in Area 49.

Hunter access is largely contingent on private land access. Seven Walk-in Areas provide access to more than 37,000 acres of private lands and adjacent BLM and state lands, most of which are located in Area 120. In addition, five Hunter Management Areas provide hunter opportunity in Areas 47 and 48.

## **Population**

The 2014 post-season population is estimated at about 5,350 elk with the population exhibiting a steep decline from more than 10,000 elk in 2007. This population estimate is generated using an EXCEL spreadsheet model. The Semi-Constant Juvenile/Semi-Constant Adult model (SCJ/SCA) was chosen over the other options because it was the only model that produced a 2014 population estimate above the trend count (75% observed). This population estimate and trend are considered questionable due to poor model alignment (AIC score 997) to harvest data, postseason classifications and winter trend counts. It is more likely this population is stable to slightly decreasing. Fluctuating bull ratios are contributing to the model's poor performance. Representative bull ratios are difficult to determine because adult bulls are segregated from wintering cow/calf herds with detection varying year to year.

## **Management Summary**

The December 15<sup>th</sup> closing date in Area 33 failed to increase harvest as elk did not move into the area due to lack of snow. Harvest decreased 38% while hunter success fell to 31%. However, the January winter trend count tallied 1,437 elk indicating elk moved into the area after the

hunting season. Changes for the 2015 season include delaying the Area 33 Type 6 opening date in the western one-third of the area to November 1<sup>st</sup> to reduce hunter crowding on the mountain during the October season and target migratory elk that move into the area in November. The early Area 33 Type 4 season opening targets elk that are causing depredation problems on irrigated hay meadows, however, the TTT Ranch has not taken advantage of this season.

No changes were made for Area 34. Hunter success exceeded 40% for the third time in the last 10 years. Thirty-two percent of Type 6 licenses (201) went unsold.

In Area 47, similar seasons resulted in 53% hunter success and a 23% increase in harvest. For 2015, the Type 2 license was eliminated and Type 1 licenses were increased 50 licenses. Additionally, landowners involved in the Copper Mountain HMA expressed concern the season was too long so the closing date was changed to December 6th. Since the Copper Mountain HMA was initiated in 2010, harvest has increased by over 100%. Even so, 48 cow/calf licenses went unsold. It appears that increased harvest the past few years has reduced elk numbers. A total of 232 elk were observed during classification flights.

In Area 48, harvest increased 63% to 358 elk, the highest harvest since 398 elk were harvested in 2010, and hunter success was 57%. Thirty-nine Type 6 licenses went unsold. For 2015, the Type 6 November opening date was adjusted to correspond to the traditional Saturday opening.

Harvest increased 51% in Area 49 to 503 elk with 60% hunter success. In 2015, the Type 7 season was eliminated and the Type 6 quota was increased to 800 licenses. The Type 6 license will be valid for private land until October 9<sup>th</sup> after which it will be valid area wide. This season forces hunters to harvest elk early when potential damage issues are occurring on private land.

The Area 120 season resulted in a harvest of 108 elk and a hunter success rate of 47%. The Type 1 quota was reduced 50 licenses for 2015 due to hunter concerns that there is a lack of bulls. Hunting seasons were extended to correspond to Area 33 and Area 120.

This population is over objective and seasons are designed to maintain hunting pressure on the female segment of the herd with liberal quotas and extended seasons. License quota changes for 2015 include an increase of 150 cow/calf licenses in Area 49. For 2015, license quotas totaling 2,025 any elk and 2,900 antlerless and cow/calf licenses will be available. History suggests that a number of antlerless and cow/calf licenses will not sell. Should available licenses sell, harvest may increase over the 2014 total resulting in a questionable postseason population model estimate of 3,900 elk.

A herd management objective review has been delayed due to brucellosis positive elk being found in Areas 39, 40 and 41 in the northwest Bighorn Mountains. Four years of testing harvested elk have failed to find sero-positive elk in this herd unit. It is anticipated a winter count objective will be implemented during the review.

<b>INPUT</b>	
Species:	Elk
Biologist:	Dan Thiele
Herd Unit & No.:	South Bighorn Elk
Model date:	05/11/15

<b>MODELS SUMMARY</b>		Fit	Relative AICc	Notes
CJ,CA	Constant Juvenile & Adult Survival	714	723	
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	964	976	<input type="checkbox"/> CJ,CA Model
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival	1537	1652	<input checked="" type="checkbox"/> SC,J,SCA Mod
TS,J,CA,MSC	Time-Specific Juv, Constant Adult Survival, Male survival coefficient	499	583	<input type="checkbox"/> TS,J,CA Model <input type="checkbox"/> TS,J,CA,MSC Model

Year	Posthunt Population Est.		Trend Count		Predicted Prehunt Population		Predicted Posthunt Population		Total	Objective	
	Field Est	Field SE	Juveniles	Total	Total Males	Females	Total Males	Females			
1996			4246	2862	1599	7357	11818	2752	1380	6961	2900
1997			3616	2792	2316	7785	12893	2735	1929	7221	2900
1998			3484	3586	2574	7760	13920	3485	2188	7347	2900
1999			4383	2476	3015	8072	13563	2299	2473	7523	2900
2000			4796	3154	2998	7947	14099	2979	2487	7240	2900
2001			3941	2397	3182	7840	13419	2234	2667	7149	2900
2002			2690	3512	3172	7564	14249	3353	2679	6917	2900
2003			2280	2589	3464	7616	13669	2418	2918	6888	2900
2004			3023	2905	3465	7355	13725	2767	2764	6811	2900
2005			3102	2405	3401	7366	13172	2293	2825	6727	2900
2006			3394	2357	3342	7166	12865	2251	2777	6526	2900
2007			2899	2211	3284	6958	12453	2098	2693	6315	2900
2008			4045	2479	3164	6713	12357	2332	2482	6046	2900
2009			1273	2045	3015	6508	11568	1940	2423	5783	2900
2010			3807	2011	2860	6152	11023	1852	2105	5383	2900
2011			4386	2327	2526	5739	10592	2233	1938	5044	2900
2012			4289	1609	2457	5501	9567	1502	1645	4453	2900
2013			3599	1668	1988	4739	8396	1547	1397	3919	2900
2014			4047	1197	1756	4227	7180	1054	988	3311	2900
2015				1360	1232	3508	6100	1239	506	2188	2900
2016											2900
2017											2900
2018											2900
2019											2900
2020											2900
2021											2900
2022											2900
2023											2900
2024											2900
2025											2900

Survival and Initial Population Estimates

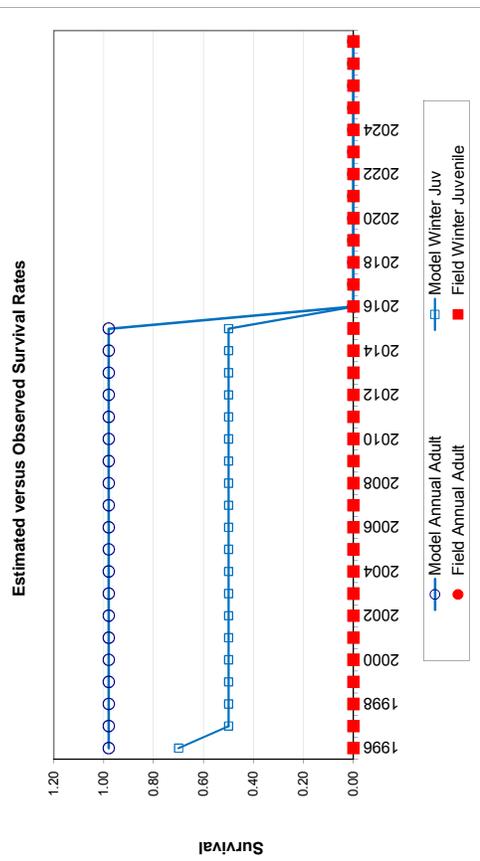
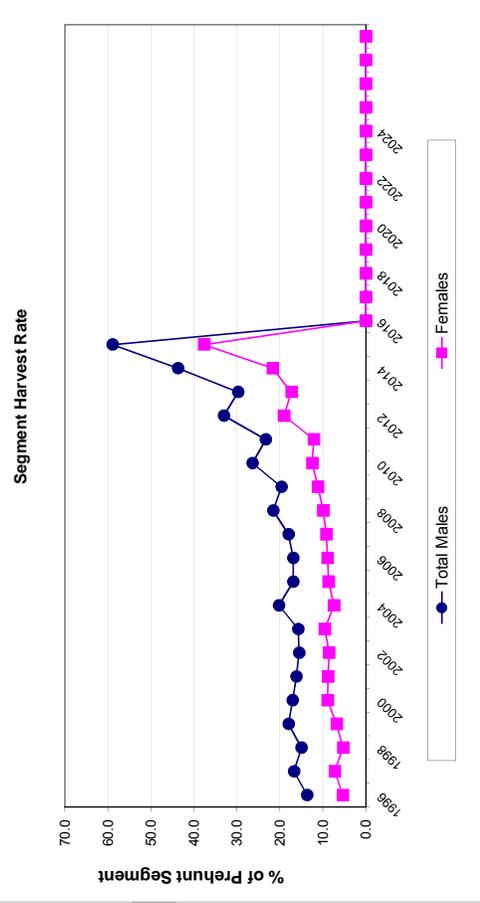
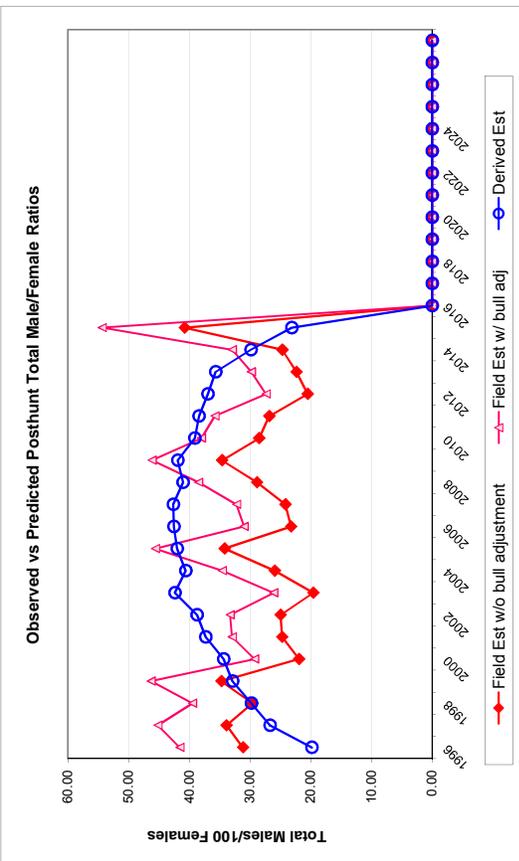
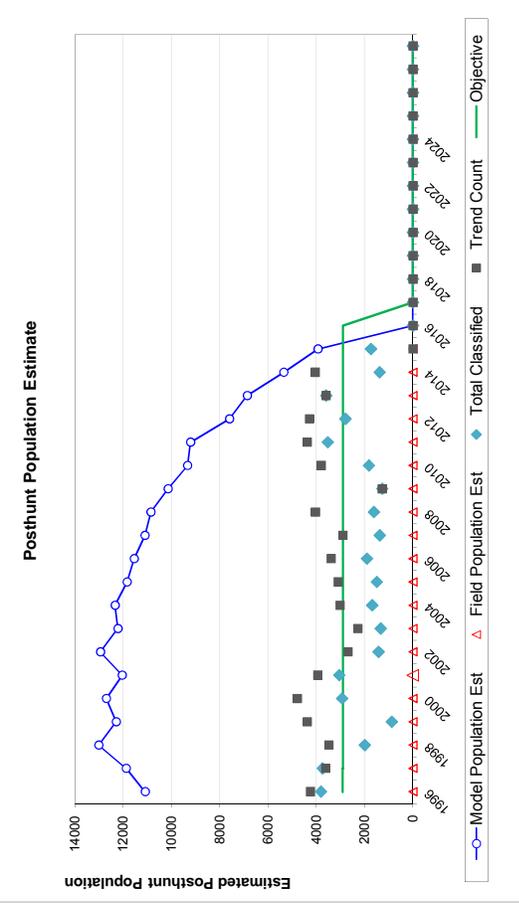
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1996	0.70		0.98	
1997	0.50		0.98	
1998	0.50		0.98	
1999	0.50		0.98	
2000	0.50		0.98	
2001	0.50		0.98	
2002	0.50		0.98	
2003	0.50		0.98	
2004	0.50		0.98	
2005	0.50		0.98	
2006	0.50		0.98	
2007	0.50		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	0.50			
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 =		0.138
Initial Female Pop/10,000 =		0.696

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		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		
	Field Est	Field SE	Field Est w/ bull adj	Field Est w/o bull adj													
1996	39.54	1.57	41.56	31.17	19.83	31.17	1.35	100	37	162	360	659	13.7	5.4			
1997	37.87	1.55	45.18	33.88	26.71	33.88	1.44	52	80	272	513	917	16.7	7.2			
1998	47.43	2.49	39.48	29.61	29.78	29.61	1.84	92	57	294	375	818	15.0	5.3			
1999	30.57	2.74	46.29	34.72	32.87	34.72	2.97	161	97	396	499	1153	18.0	6.8			
2000	41.14	1.80	29.24	21.93	34.35	21.93	1.22	159	48	417	643	1267	17.1	8.9			
2001	31.26	1.45	32.96	24.72	37.31	24.72	1.25	148	83	385	628	1244	16.2	8.8			
2002	48.48	2.96	33.29	24.97	38.74	24.97	1.95	145	17	431	589	1182	15.5	8.6			
2003	35.11	2.34	26.11	19.58	42.37	19.58	1.65	155	33	463	662	1313	15.8	9.6			
2004	40.63	2.37	34.58	25.94	40.58	25.94	1.79	125	48	589	495	1257	20.2	7.4			
2005	34.08	2.27	45.59	34.20	42.00	34.20	2.27	102	78	445	581	1206	16.9	8.7			
2006	34.49	1.96	30.99	23.24	42.55	23.24	1.54	97	31	483	582	1193	16.9	8.9			
2007	33.22	2.25	32.23	24.17	42.64	24.17	1.85	103	47	490	584	1224	18.0	9.2			
2008	38.57	2.35	38.47	28.85	41.05	28.85	1.96	134	67	553	607	1361	21.6	9.9			
2009	33.55	2.43	46.15	34.61	41.90	34.61	2.48	95	31	507	659	1292	19.6	11.1			
2010	34.41	2.03	38.01	28.51	39.11	28.51	1.81	144	73	613	699	1529	26.4	12.5			
2011	44.28	1.76	35.79	26.84	38.42	26.84	1.28	85	43	492	632	1252	23.3	12.1			
2012	33.74	1.58	27.34	20.51	36.95	20.51	1.17	97	83	655	953	1788	33.0	19.1			
2013	39.48	1.57	29.80	22.35	35.66	22.35	1.11	110	10	527	746	1393	29.7	17.3			
2014	31.82	2.18	32.92	24.69	29.86	24.69	1.87	130	50	648	833	1661	43.7	21.7			
2015	56.63	3.17	54.36	40.77	23.13	40.77	2.55	110	60	600	1200	1970	58.9	37.6			
2016																	
2017																	
2018																	
2019																	
2020																	
2021																	
2022																	
2023																	
2024																	
2025																	

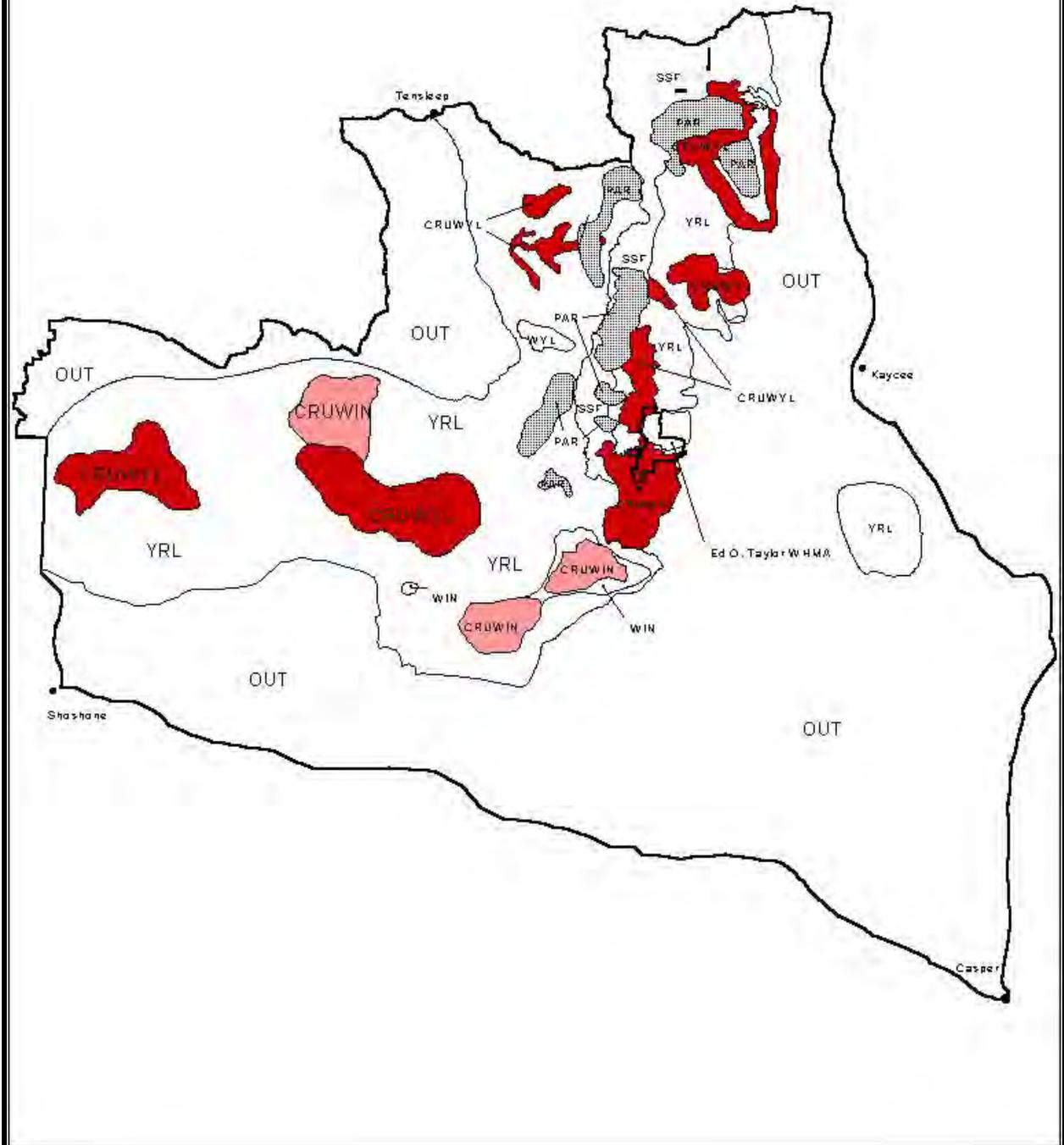
FIGURES



**Comments:** Unreliable model output possibly due to widely fluctuating bull cow ratios.

END

Elk - South Bighorn (E322)  
Areas 33, 34, 47, 48, 49, 120  
Region 3  
Revised - 2001



## 2014 - JCR Evaluation Form

SPECIES: Elk

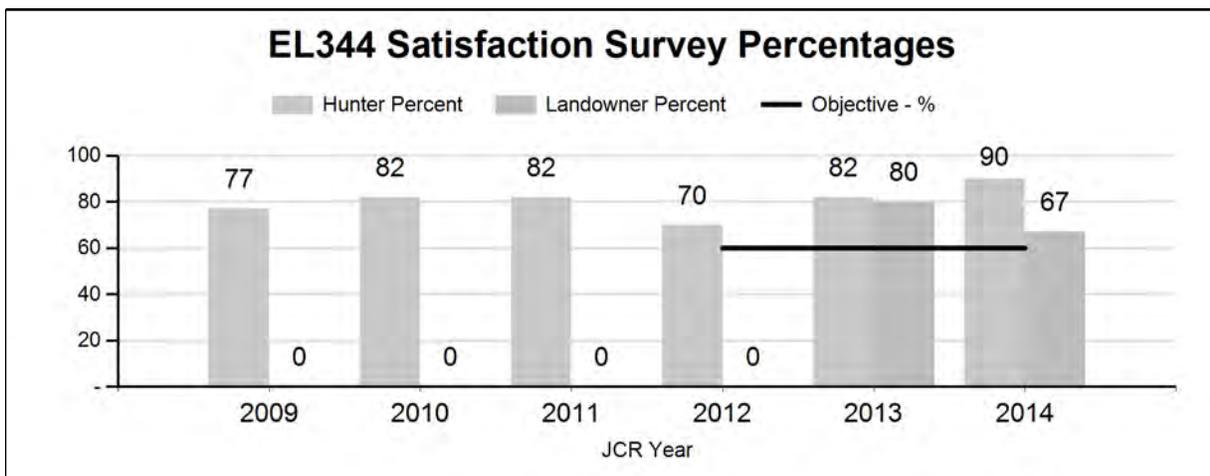
PERIOD: 6/1/2014 - 5/31/2015

HERD: EL344 - ROCHELLE HILLS

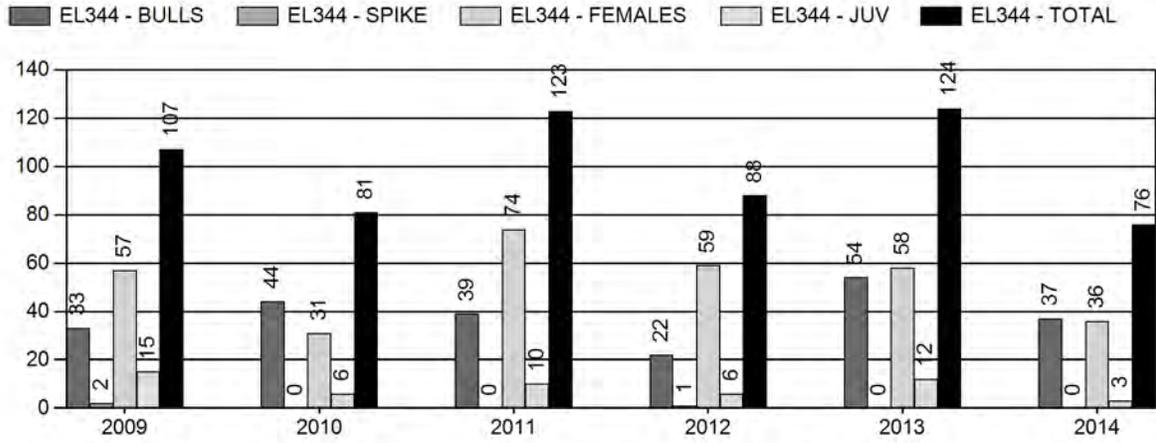
HUNT AREAS: 113, 123

PREPARED BY: ERIKA PECKHAM

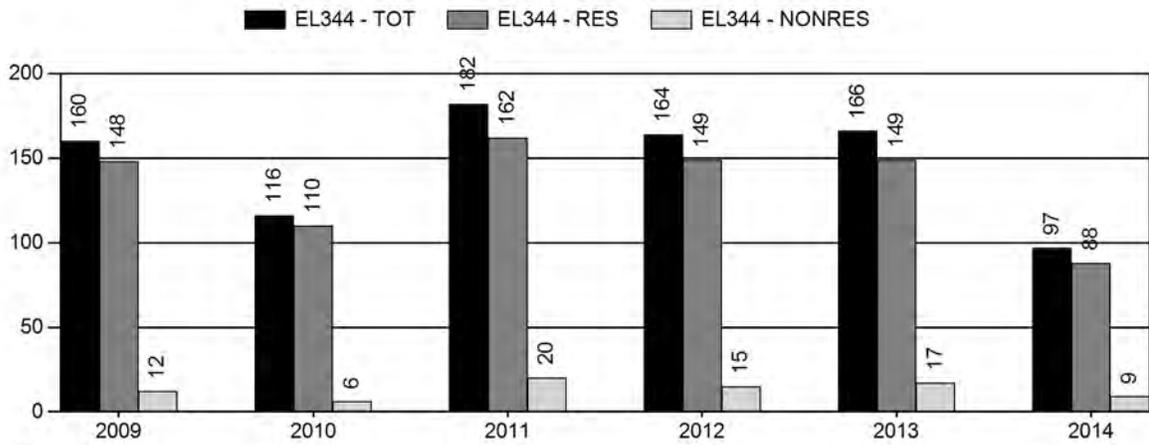
	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Hunter Satisfaction Percent	78%	90%	60%
Landowner Satisfaction Percent	80%	67%	60%
Harvest:	105	75	110
Hunters:	158	98	175
Hunter Success:	66%	77%	63%
Active Licenses:	160	98	170
Active License Success:	66%	77%	65%
Recreation Days:	689	720	1,600
Days Per Animal:	6.6	9.6	14.5
Males per 100 Females:	43	65	
Juveniles per 100 Females	43	67	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			18%
Number of years population has been + or - objective in recent trend:			0



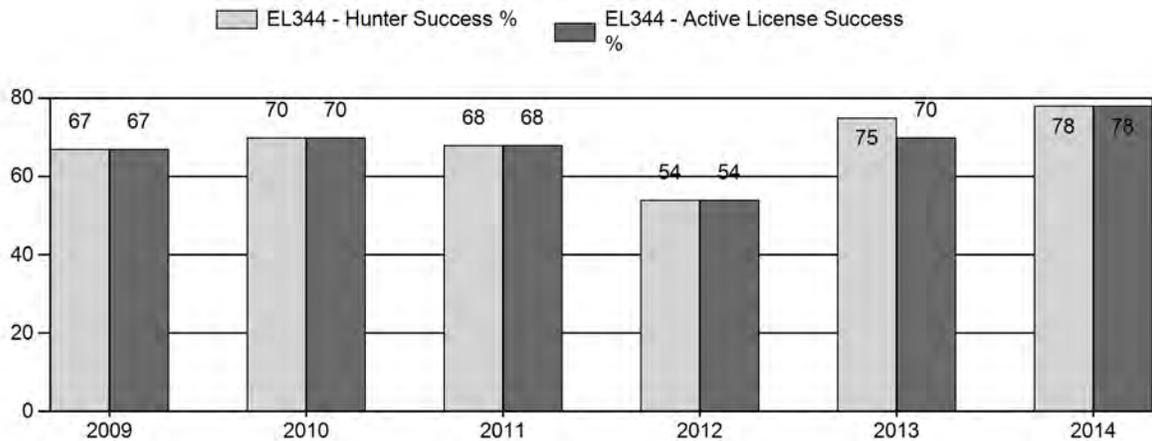
# Harvest



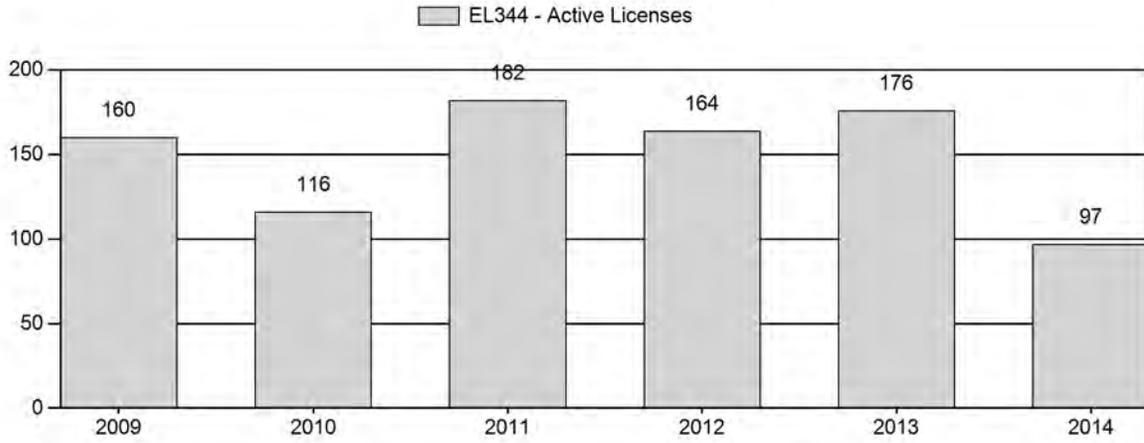
# Number of Hunters



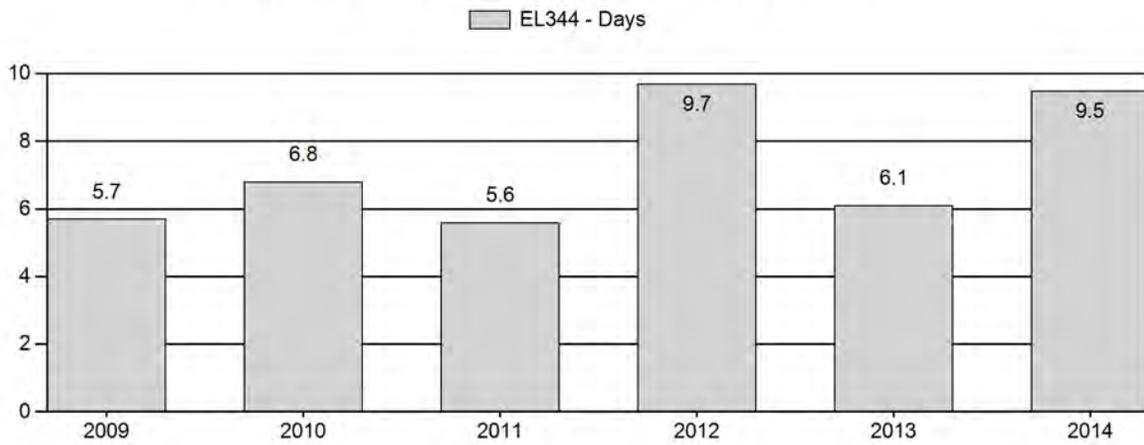
# Harvest Success



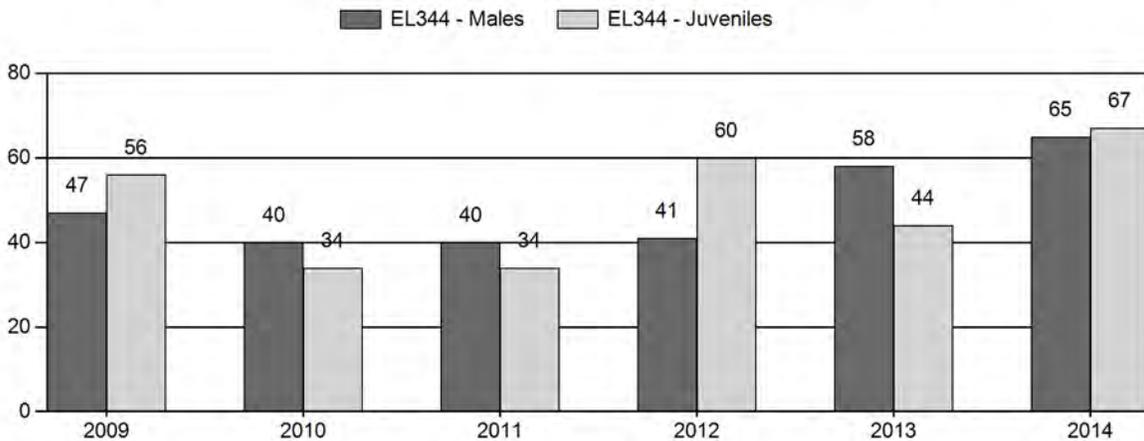
# Active Licenses



# Days per Animal Harvested



# Postseason Animals per 100 Females



**2009 - 2014 Postseason Classification Summary**

for Elk Herd EL344 - ROCHELLE HILLS

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	754	67	53	120	23%	254	49%	141	27%	515	443	26	21	47	± 0	56	± 0	38
2010	728	68	57	125	23%	316	58%	106	19%	547	350	22	18	40	± 1	34	± 1	24
2011	741	68	57	125	23%	316	58%	106	19%	547	329	22	18	40	± 3	34	± 2	24
2012	0	32	20	52	20%	128	50%	77	30%	257	0	25	16	41	± 0	60	± 0	43
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 HUNTING SEASONS  
ROCHELLE HILLS ELK HERD (EL344)**

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
113	4	Nov. 5	Nov. 30	25	Limited quota	Antlerless elk
123	1	Sept. 10	Oct. 10	75	Limited quota	Any elk
123	4	Oct. 20	Nov. 30	50	Limited quota	Antlerless elk
123	6	Oct. 20	Nov. 30	50	Limited quota	Cow or calf
Archery		Sep. 1	Sept.9			

Hunt Area	Type	Quota change from 2014
113	1	-50
	4	+25
123	1	+75
	4	0
	6	+50
<b>Herd Unit Total</b>	<b>1</b>	<b>+25</b>
	<b>4</b>	<b>+25</b>
	<b>6</b>	<b>+50</b>

**Management Evaluation**

**Current Landowner/Hunter Satisfaction Management Objective: 60%**

**Management Strategy: Private Land**

**Hunter Satisfaction Estimate: 90%**

**Landowner Satisfaction Estimate: 67%**

**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.

A difficulty with managing this herd is 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 not always the

same. The 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.

## **Weather**

Weather throughout 2013 and into 2014 was optimal for rangeland conditions in this area. The growing season commenced with plentiful rainfall and ideal conditions to produce ample forage. The winter of 2013-2014 was moderate with not much for snow accumulation, or prolonged snow cover. The winter of 2014-15 was mild with minimal snow and frequent above average temperatures. During the majority of these two winters, the ground was open, with minimal snowpack. The Palmer Drought Index indicates that throughout 2014 conditions in the Cheyenne-Niobrara drainages were “moderately moist” interspersed with a couple of months of “very moist”.

## **Habitat**

There is no habitat transect located within in the herd unit. Observations from field personnel indicated that most portions of this herd unit received moderate rainfall throughout the growing season, resulting in excellent forage production and rangeland conditions.

## **Field Data**

During the aerial classification survey in November of 2014 there were ~600 elk observed. In Hunt Area 123 there were two main groups within close proximity of each other that contained ~450 elk. Due to fences and the location of these groups, these elk were unable to be classified and instead the number of elk was estimated based on video captured while flying. This area was again flown via fixed-wing on February 23<sup>rd</sup>. The main group was located in the same area. High Definition video was taken, but due to less snow than anticipated and the location of the elk, it was too difficult to classify from the video. During the initial classification flight there were other smaller groups of elk scattered throughout the area that were able to be classified (84 in total) and were included in the classification results for this herd.

The number of elk classified in Area 113 was only 99, and they were difficult to locate, scattered in small groups throughout the area. The classification results for Hunt Area 113 indicated 56 calves per 100 cows, up from the 2013 ratio of 44. The number of animals classified or counted has fluctuated over the past several years.

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 steep, forested terrain, which makes for difficulty in spotting elk in the budgeted flight time. Overall, this population has likely been increasing in Hunt Area 123 over the years, while harvest in Area 113 has lowered the numbers.

As this herd is managed based upon landowner and hunter satisfaction, we are aiming for at least 60% of landowners and 60% of hunters to be satisfied. The harvest survey indicated that 90% of hunters were either “very satisfied” or “satisfied” with the 2014 season. An annual landowner

meeting is held in January for Hunt Area 123. As this hunt area is predominantly private, it is crucial that a meeting is held to acquire feedback from the landowners. At this meeting the majorities of landowners were in favor of the season and were satisfied with the management of the herd. Throughout a given year Department personnel meet without landowners on a fairly regular basis. Overall the majority of landowners in Hunt Area 113 are satisfied.

## **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 allow for trophy bull growth. 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 in the past. In 2014 there were 50 Type 1 licenses available in Hunt Area 113. Comments from hunters in the field were somewhat negative, stating that bulls seemed to be scarce. However, the harvest survey indicates an overall success rate of 90% with an average of 10 days spent to harvest an animal. Of the 45 animals harvested, 8 were cows, perhaps indicating that as the season drew to a close people took what they were able to find. In Hunt Area 123 there were 50 Type 4 licenses available. This hunt area could support more licenses than this, however as this is predominantly private land, the willingness of landowners to allow access is what drives license issuance. The harvest success for this area was 66% with an average of 9 days to harvest an animal, indicating how difficult access was in 2014. This herd has great potential for continued growth if access cannot be somewhat improved, particularly in Area 123. In portions of Hunt Area 113 there is a fair amount of public land, which allows for a reasonable harvest. The overall harvest success was 78% for this herd unit, which is notably higher than the statewide harvest success rate of 45%.

## **Population**

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. The 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. Although it would be preferable to have a working model, as the objective for this herd is non-numerical, it is less critical. The 2014 field estimate is around 800 elk.

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 groups of elk counted and classified in this portion of the herd increase on an annual basis. It appears that the elk in Hunt area 113 have declined in recent years. In 2008 the number of elk observed peaked at 286 and in 2012 is when the decline became very apparent, with the number of observed elk dropping to 91. Portions of 113 were hit particularly hard by drought in this time span. It is thought that they may have emigrated into surrounding areas.

## **Management Summary**

In 2014 there were Type 1 licenses issued in Hunt Area 113 and just Type 4 licenses issued for Hunt Area 123. For 2015, in Hunt Area 113, a minimal amount of Type 4 licenses will be issued and will focus on allowing potential growth in this desirable public lands area. In Hunt Area 123, Type 1, 4, and 6 licenses that are available will address concerns that landowners have with elk numbers continuing to expand while also providing opportunity to harvest mature bulls.

EL344 - Rochelle Hills  
HA 113, 123  
Revised 9/1995

