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Acknowledgement

The field data contained in these reports was collected by the combined efforts of the Laramie Region Wildlife Division personnel including District Wildlife Biologists, District Game Wardens, the Wildlife Technicians, the Habitat Biologist, the Wildlife Management Coordinator and Region Supervisor, and other Department personnel and volunteers working at check stations. The authors wish to express their appreciation to all those who assisted in data collection.

2013 - JCR Evaluation Form

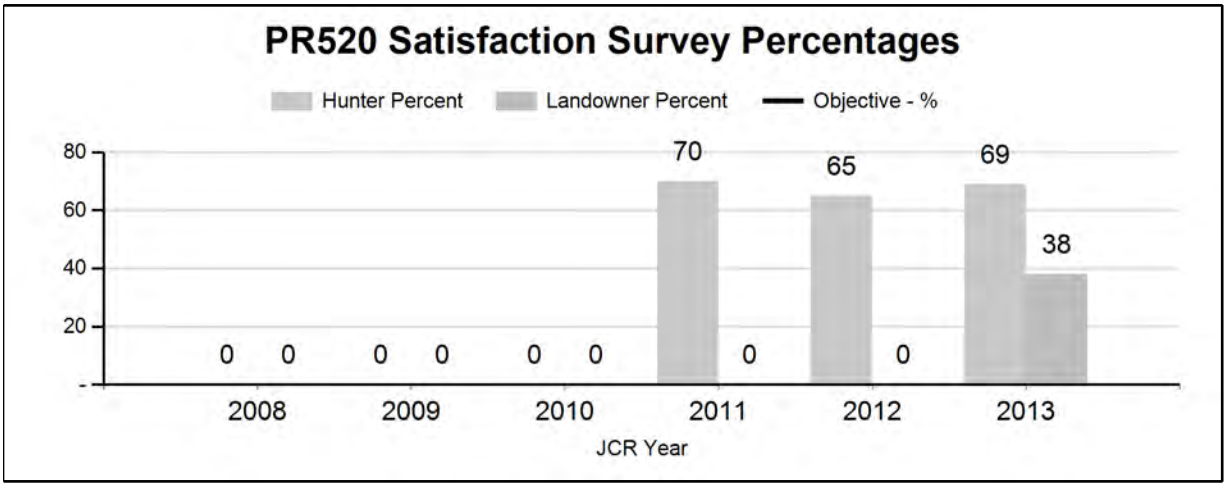
SPECIES: Pronghorn
HERD: PR520 - CHALK BLUFFS
HUNT AREAS: 111

PERIOD: 6/1/2013 - 5/31/2014

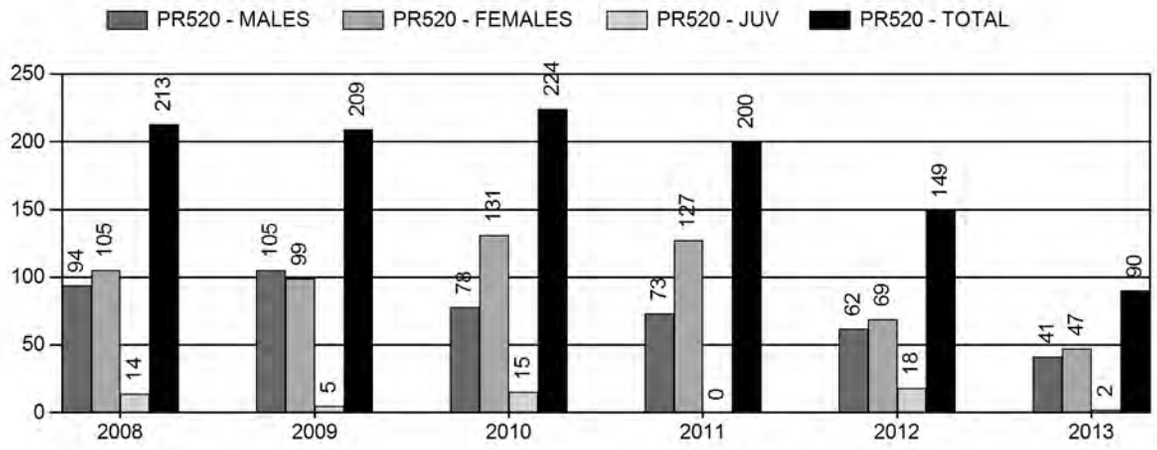
PREPARED BY: MARTIN HICKS

	2008 - 2012 Average	2013	2014 Proposed
Hunter Satisfaction Percent	67%	69%	60%
Landowner Satisfaction Percent	0%	38%	60%
Harvest:	199	90	70
Hunters:	270	148	140
Hunter Success:	74%	61%	50%
Active Licenses:	303	175	145
Active License Percentage:	66%	51%	48%
Recreation Days:	1,277	568	400
Days Per Animal:	6.4	6.3	5.7
Males per 100 Females:	25	16	
Juveniles per 100 Females	44	30	

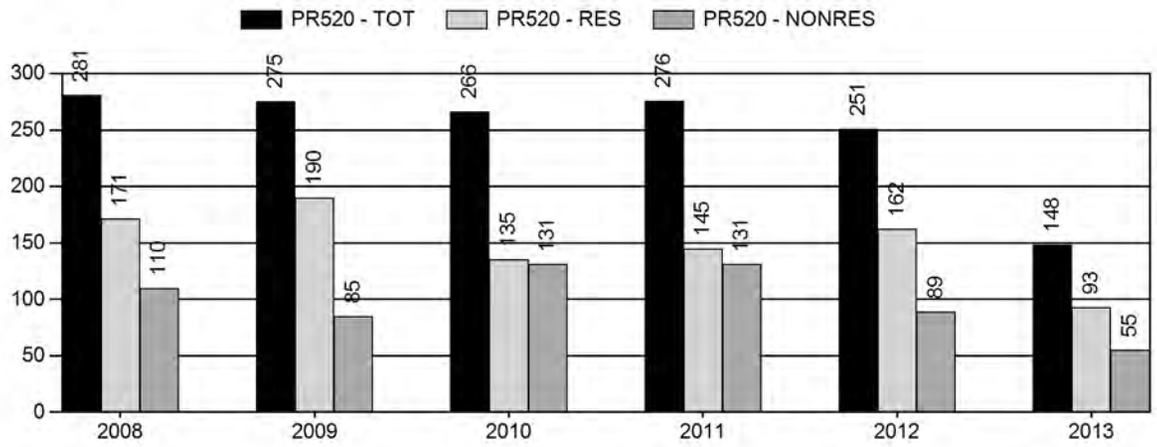
Satisifaction Based Objective	60%
Management Strategy:	Recreational
Percent population is above (+) or (-) objective:	-6%
Number of years population has been + or - objective in recent trend:	1



Harvest



Number of Hunters



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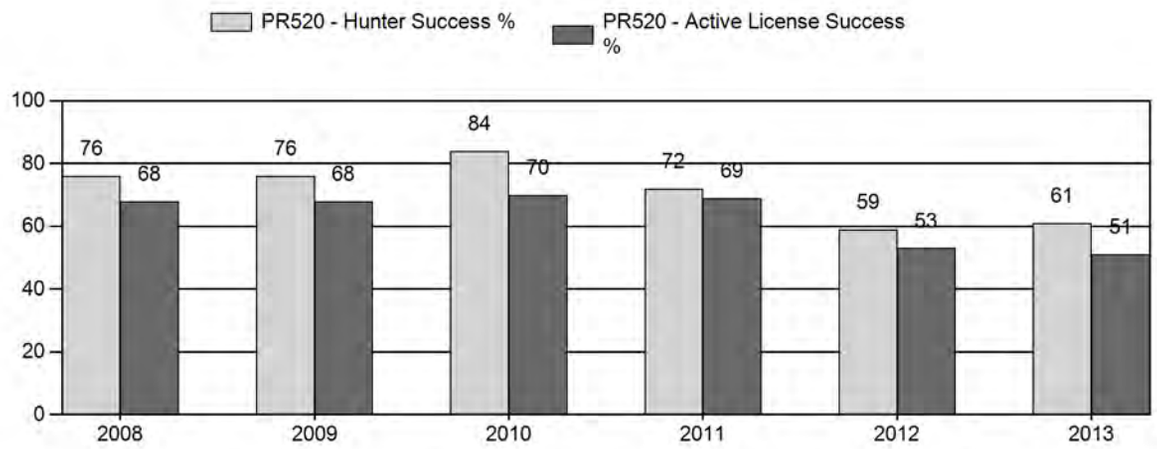

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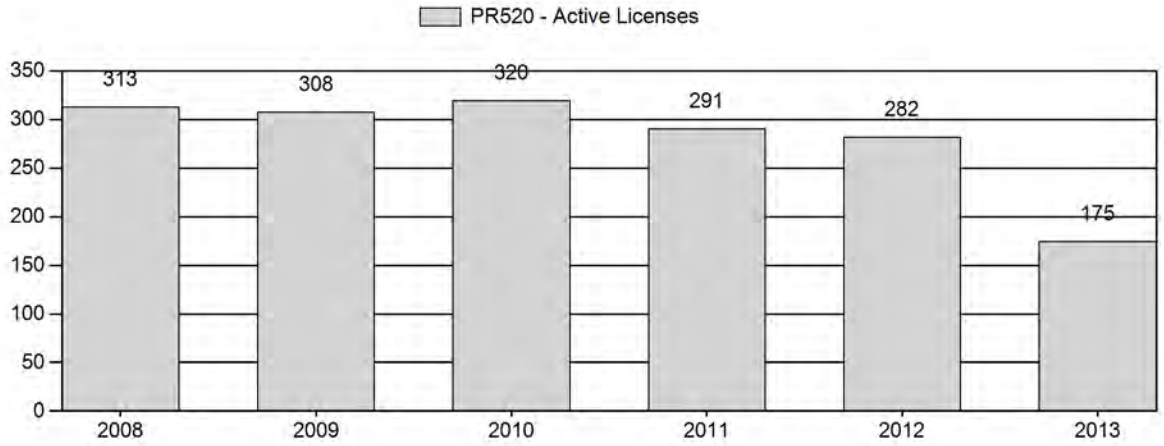
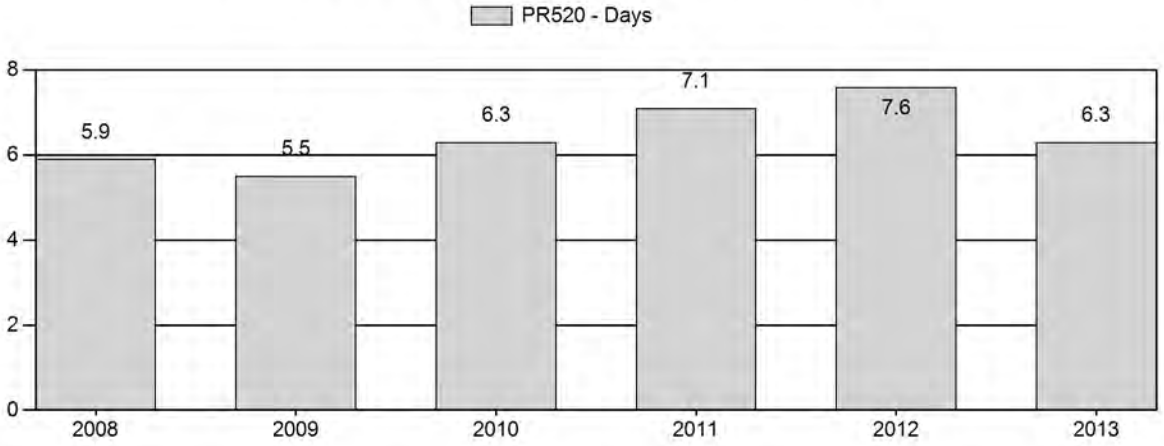
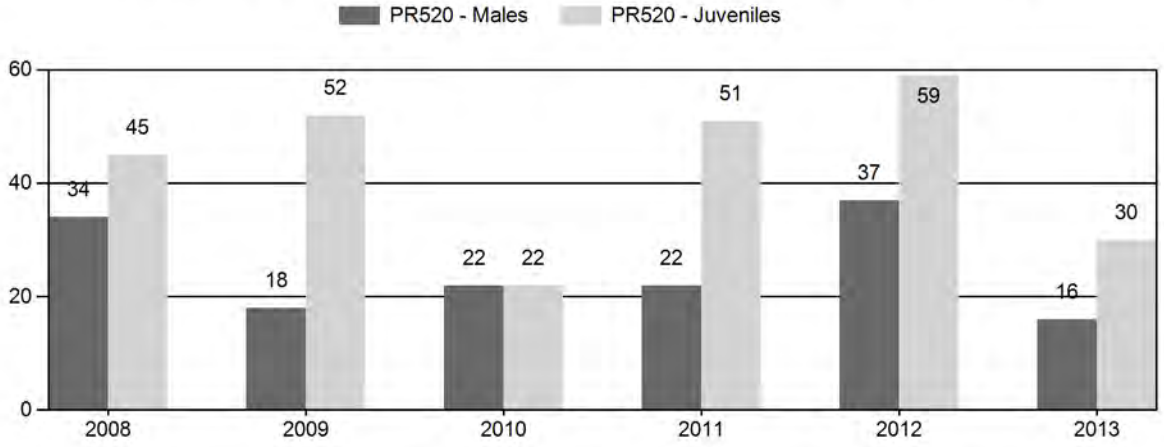


Days Per Animal Harvested



Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR520 - CHALK BLUFFS

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	0	2	24	26	19%	77	56%	35	25%	138	304	3	31	34	± 0	45	± 0	34
2009	0	1	15	16	11%	89	59%	46	30%	151	348	1	17	18	± 0	52	± 0	44
2010	0	0	17	17	15%	78	70%	17	15%	112	289	0	22	22	± 0	22	± 0	18
2011	0	1	14	15	13%	67	58%	34	29%	116	370	1	21	22	± 0	51	± 0	41
2012	0	4	11	15	19%	41	51%	24	30%	80	285	10	27	37	± 0	59	± 0	43
2013	0	0	11	11	11%	69	68%	21	21%	101	357	0	16	16	± 0	30	± 0	26

2014 HUNTING SEASONS
CHALK BLUFFS PRONGHORN HERD (PR520)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
111	1	Sept. 20	Oct.14	100	Limited Quota; any antelope
	6	Sept. 20	Oct.14	50	Limited Quota; doe or fawn
		Nov. 15	Dec. 31		Unused Area 111 Type 1 and Type 6 licenses valid for doe or fawn
Archery		Aug. 15	Sept. 19		Refer to Section 3 of this Chapter

Hunt Area	Type	Quota change from 2013
111	1	0
	6	-50

Management Evaluation
Current Management Objective: Landowner and hunter satisfaction; Target goal ≥ 60%
Management Strategy: Recreational
2013 Hunter Satisfaction Estimate: 67%
2013 Landowner Satisfaction Estimate: 38%
Most Recent 3-year Running Average Hunter Satisfaction Estimate: 69%
Most Recent 3-year Running Average Landowner Satisfaction Estimate: 38%
Population Estimate: ~400

Herd Unit Issues
The management objective for the Chalk Bluffs Pronghorn Herd Unit was a numeric post-season population objective and was changed starting in 2013 to a landowner and hunter satisfaction objective of 60% satisfaction. The change was based on public involvement during the 2013 herd objective review process. The management strategy is a recreational management with a pre-season buck ratio range of 20-59 Bucks:100 Does.

This herd unit is predominately private land with little public access. Urban and industrial development has decreased the amount of occupied habitat. Pronghorn do move into Wyoming from Colorado when weather events occur and pronghorn become dependent on winter wheat resulting in damage complaints from landowners. To address this problem there is a late season doe/fawn license available to hunters.

There is not a postseason population estimate for a variety of reasons: 1) Open population with Colorado and Nebraska, 2) Restricted access due to urban encroachment and industrial gas development, which prevents our ability to influence harvest, 3) Poor classification data, which is always well below the adequate sample size and 4) No reliable working model.

Weather
Weather during 2013 was mild with above average precipitation in August and September providing additional forage to put pronghorn in good condition going into the 2013/14 winter. However, an early October snow storm most likely stressed pronghorn and could have contributed to higher than normal mortality rates. Refer to the following website links for weather data: http://www.ncdc.noaa.gov/temp-and-precip/time-series/ and http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html.

Habitat
We have not established habitat transects in this herd unit, nor do we intend to. Pronghorn in this herd unit are dependent on agricultural fields when they are not in Colorado. Seasons are designed to reduce damage when densities increase past the comfort levels of landowners.

Field Data
Due to our inability to collect data there is little confidence in classification data. Comparison to the adjacent Hawk Springs Herd Unit where fawn ratios have increased, it was expected that the same held true for this herd unit, resulting in an increase in the population. This herd unit is challenging to manage due to interstate movement into Colorado and an increase in industrial and residential expansion, license numbers will remain conservative. A sharp decline in success and an increase in effort for Type 6 licenses have resulted in a proposed decrease of 50. Type 1 licenses will remain at 100. A late season license will continue to be available to address damage concerns when pronghorn move in from Colorado. The landowner and hunter satisfaction survey showed that 69% of the hunters were satisfied and 38% of the landowners were satisfied. This is the first year that the objective is a satisfaction survey so there is not a three year running trend for landowners. The small sample size (n=13) does not provide a reliable response. However, the 38% that were satisfied is plausible given the concerned comments received from landowners regarding crop damage. The three-year running average of 69% for sportsmen is surprising given there is little access and fewer pronghorn available to harvest.

Harvest Data
Hunter harvest success in 2013 decreased by 18% (refer to page 2 of the JCR). This is plausible given poor access and an increase in urban and industrial development. Hunter effort was similar in 2013 compared to the five-year average. It is difficult to ascertain the reason for the similar effort. License numbers decreased as a result of past success and effort and perceived population trends. Lack of access and a decrease in the population should result in an increase in effort. Perhaps the hunters that did have access were able to take advantage of the pronghorn movement from Colorado into Wyoming later in the season.

Population
There is not a reliable working model for this herd unit due to lack of classification and harvest data in conjunction with an open population due to movement into Colorado. As a result management strategies were converted from a post-season population objective to a hunter and landowner satisfaction survey. Perceived population trends based on personnel, landowner and hunter observations indicate this population is declining. Lack of adequate habitat due to urban and industrial development is the most probable reason.

Management Summary

This season traditionally starts the third Saturday in September and runs for about three weeks. To simplify regulations and standardize the opening date with the Hawk Springs Herd Unit the opening date is now September 20. In an attempt to address the decreasing herd along with difficulties in obtaining desired harvest the Type 6 licenses were decreased by 50. Landowners are still in favor of the late season hunt from November 15 – December 31. Based on past seasons we predict a harvest of 40 bucks, 25 does and 5 fawns for a total of 70 pronghorn.

PH520 - Chalk Bluffs
HA 111
Revised - 8/87

2013 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2013 - 5/31/2014

HERD: PR521 - HAWK SPRINGS

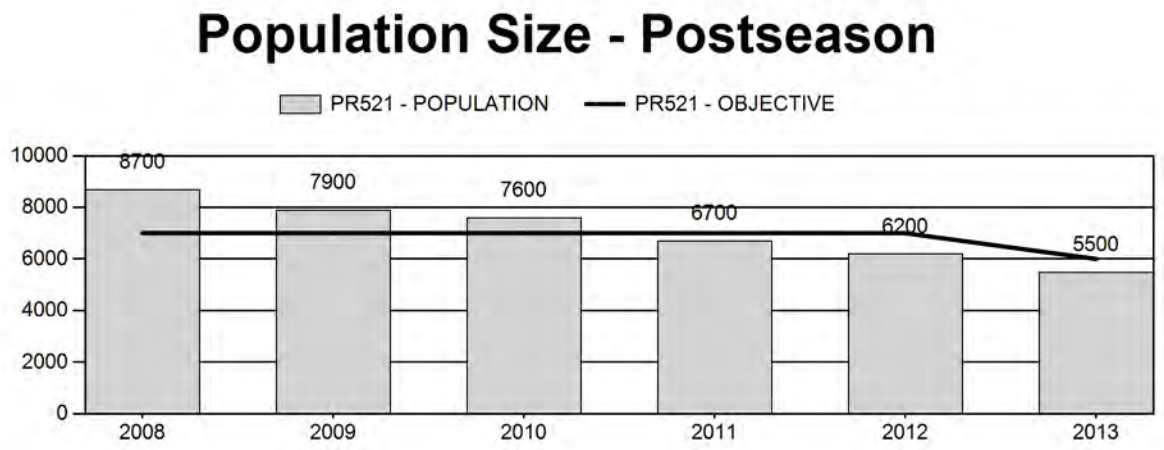
HUNT AREAS: 34-36 | PREPARED BY: MARTIN HICKS

	2008 - 2012 Average	2013	2014 Proposed
Population:	7,420	5,500	5,100
Harvest:	1,089	1,125	985
Hunters:	1,213	1,233	1,170
Hunter Success:	90%	91%	84%
Active Licenses:	1,396	1,462	1,330
Active License Percent:	78%	77%	74%
Recreation Days:	4,667	5,403	4,600
Days Per Animal:	4.3	4.8	4.7
Males per 100 Females	42	52	
Juveniles per 100 Females	47	50	

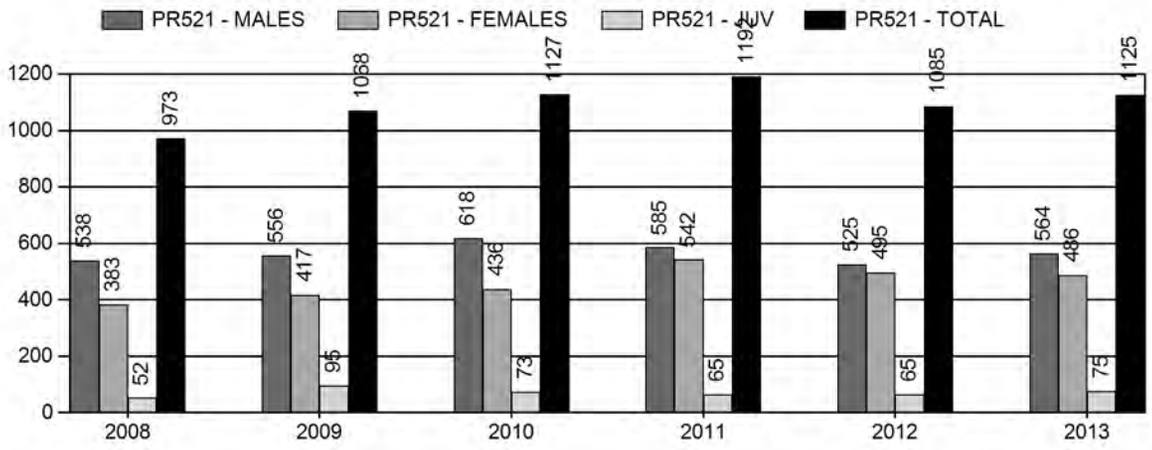
Population Objective:	6,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-8.3%
Number of years population has been + or - objective in recent trend:	20
Model Date:	03/03/2014

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

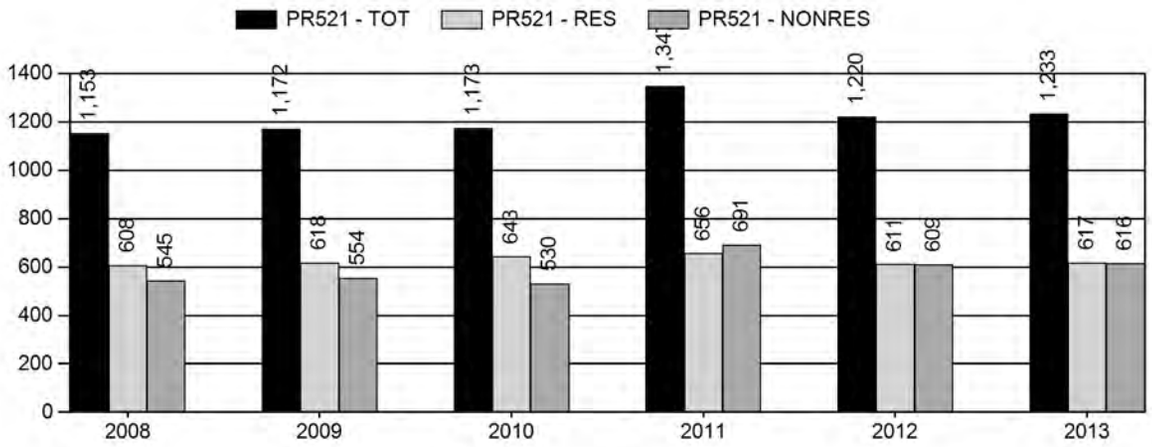
	JCR Year	Proposed
Females ≥ 1 year old:	13%	11%
Males ≥ 1 year old:	39%	40%
Juveniles (< 1 year old):	4%	4%
Total:	16%	15%
Proposed change in post-season population:	-11%	-8%



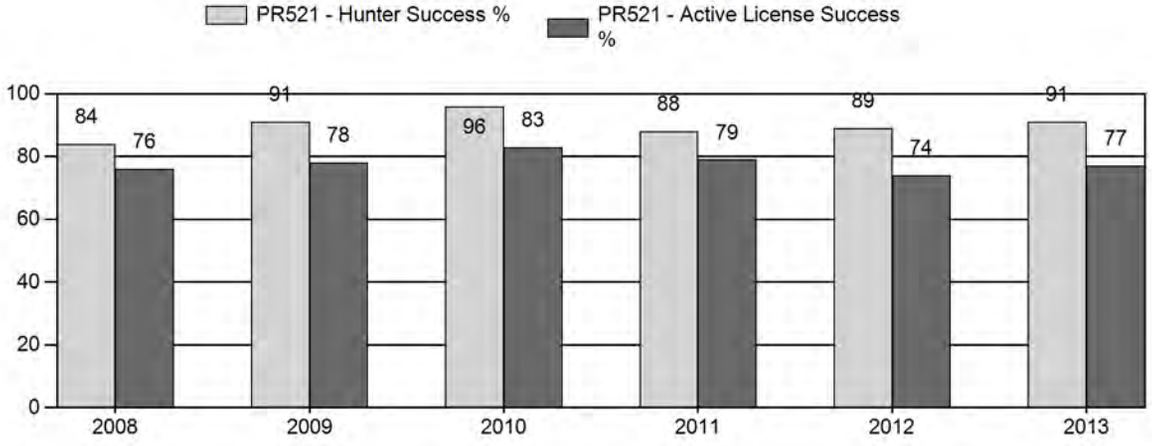
Harvest



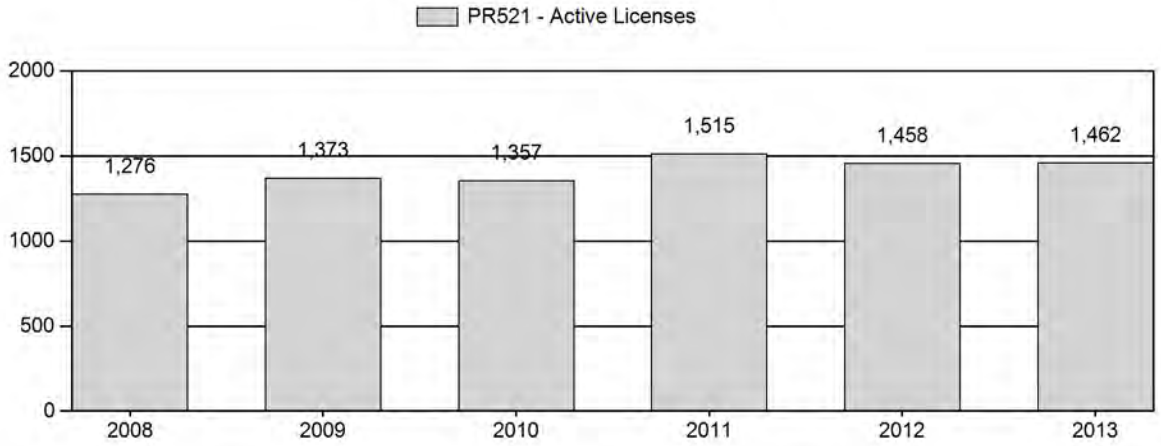
Number of Hunters



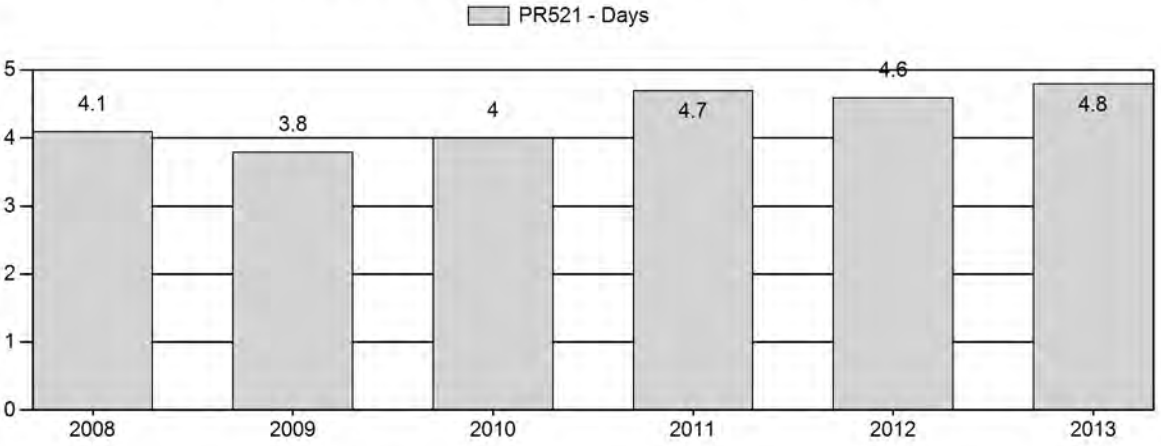
Harvest Success



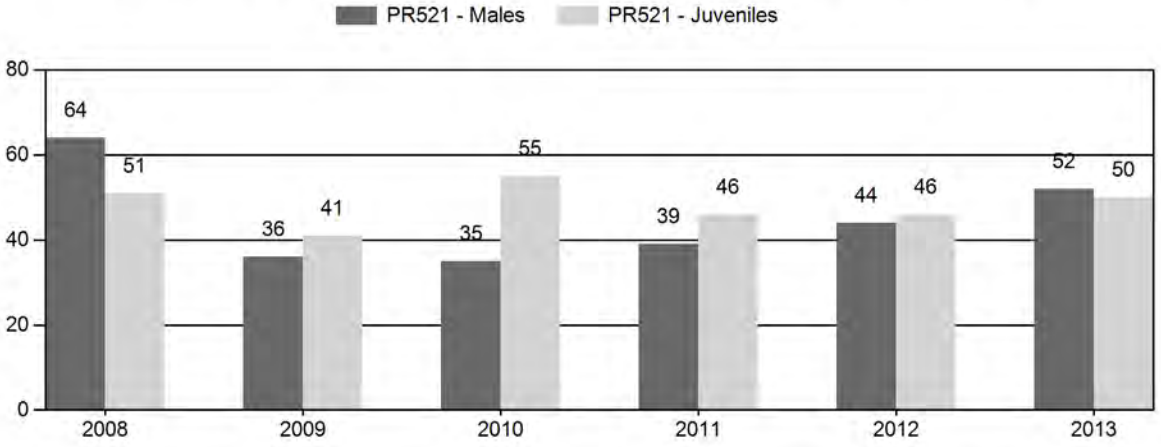
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR521 - HAWK SPRINGS

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	9,800	158	177	335	30%	524	47%	265	24%	1,124	1,418	30	34	64	± 7	51	± 6	31
2009	9,000	144	166	310	20%	872	57%	359	23%	1,541	1,010	17	19	36	± 4	41	± 4	30
2010	8,800	69	161	230	18%	658	53%	360	29%	1,248	1,183	10	24	35	± 4	55	± 5	41
2011	8,000	104	160	264	21%	669	54%	309	25%	1,242	1,378	16	24	39	± 4	46	± 5	33
2012	7,400	94	132	226	23%	517	53%	240	24%	983	1,297	18	26	44	± 5	46	± 6	32
2013	6,800	88	201	289	26%	558	50%	279	25%	1,126	1,184	16	36	52	± 6	50	± 6	33

2014 HUNTING SEASON
HAWK SPRINGS PRONGHORN HERD (PR521)

Hunt Area	Type	Date of Seasons Opens	Closes	Quota	Limitations
34	1	Sept. 20	Oct. 14	800	Limited quota; any antelope
	6	Sept. 20	Dec. 31	500	Limited quota; doe or fawn
ARCHERY					
34,35,36		Aug. 15	Sept. 19	Refer to Section 3 of this Chapter	

Hunt Area	Type	Quota change from 2013
34	1	+550
34	6	+225
34	7	-150(deleted)
35	1	-375(deleted)
35	6	-300(deleted)
36	1	-175(deleted)
36	6	-125(deleted)
Total	**1**	**0**
	6	**-200**
	7	**-150(deleted)**

Management Evaluation
Current Management Objective: 6,000
Management Strategy: Recreational
2013 Postseason Population Estimate: ~5,500
2014 Postseason Population Estimate: ~5,100

Herd Unit Issues
The management objective for the Hawk Springs Herd Unit is a post-season population objective of 6,000 pronghorn, which is a decrease of 1,000 from the previous objective of 7,000. In addition hunt areas 34-36 were combined to simplify management and hunting regulations. The numeric herd objective was decreased and hunt areas combined based on internal recommendations and public involvement during the 2013 herd objective review process. The management strategy is recreational management with a pre-season buck ratio range of 20-59 Bucks:100 Does.

The 2013 post-season population estimate was about 5,500 pronghorn with the population slowly trending downward from a high of 9,300 in 2006. The last line-transect survey conducted in this herd unit was June 2007 that resulted in a population estimate of 21,000 pronghorn. This survey implied the herd increased by 62% from the previous line-transect conducted in 2003 with a population estimate of 8,100. Given poor fawn production, poor habitat conditions and loss of habitat this estimate does not seem plausible. As a result this model is anchored to the 2003 line-transect estimate.

The southern end of the herd unit along Interstate Highway 80 to U.S. Highway 85 has experienced an increase in urban and industrial development resulting in a decrease in occupied habitat. The northern 2/3 of the unit is comprised of dryland farming, irrigated farming, land enrolled into the Conservation Reserve Program and native rangeland. The majority of issues with landowners occur when there are high densities of pronghorn on irrigated and non-irrigated agricultural fields. This typically results in damage issues, which is the rationale behind the late season doe/fawn licenses.

The majority of this herd unit is comprised of private land (84%). Access is available through the Department's PLPW program and limited access to 350 square miles of state land.

Weather

Weather during 2013 and into 2014 was wetter and colder than normal. Fawn survival increased compared to 2012, most likely to mild winter condition and above average summer/fall moisture. Ungulates went into the winter in good body condition as a result of the fall moisture. Winter conditions were somewhat mild with low snowpack but with periods of extreme cold temperatures, followed up with above freezing periods. Refer to the following websites for weather data: http://www.ncdc.noaa.gov/temp-and-precip/time-series/ and http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html.

Habitat

We do not have established habitat transects for this herd. Mule deer transects were established in 2000. However, they have been abandoned recently due to lack useful data. Transects were established within mule deer crucial winter range, looking at different plant species that are specific to mule deer diets, not pronghorn. Habitat indices did indicated that shrubs were underutilized with low production and lacked the nutrient requirements needed during winter months. Pronghorn in this herd unit are mostly dependent on irrigated and dryland crops.

Field Data

This herd has been stable to declining due to poor fawn production for the past ten years (10-year average: 48 fawns:100 does. However, the sample size (n=1,124) in 2013 was 21% lower the 80% C.I. (n=1,418) and was also only met 2 out of the past 5 years (page 4) so ratios need to be interpreted with caution. Doe/fawn license issuance has fluctuated around 750 for the past 5 years. Buck ratios have been well within the recommended recreational management range, (52 Bucks:100 Does in 2012) but limited access prevents additional opportunity to put hunters in the field. The sample size for field check tooth data collected in the field was too small to provide accurate estimates for population parameters. The age data collected indicates a majority of male pronghorn are ≥3 years old, which is likely a result of hunters looking for a mature buck.

Females ranged from 1+ to 3+ years of age. Of the hunters surveyed in 2013, 87% were satisfied with their hunt, which is higher than the three-year average of 82%. Based on comments in the field during the 2013 hunting season, hunters had more success accessing private land and they appreciated the number of acres enrolled into the PLPW program.

Harvest Data

Hunter success of 91% in 2013 was similar to the ten-year and the state-wide average of 89%. There was a drastic decline in success towards the southern end of the herd unit, which was 50% in Hunt Area 36. Urban sprawl, industrial gas development and loss of private land access are most likely the reasons for the lower success rate. Hunter effort was 4.8 days per harvest in 2013 which was slightly higher than the ten-year average of 4.5 days per harvest and the 2013 state-wide effort of 4.0 days. Factors impacting success also contributed to increase in harvest effort.

Population

The "Constant Juvenile – Constant Adult Survival" (CJ,CA) spreadsheet model was chosen for the post season population estimate of this herd. The model ranks fair with 20 years of data. The model is aligned with two of the three past line-transects, providing a standard error. This model also has the lowest AIC score, and the model aligns fairly well with observed data. The line-transect in 2007 was ignored and the independent estimates of 2001 and 2003 are similar to model estimates. The model predicted a decreasing trend since 2007; given poor fawn production and increased female harvest since 2002 this seems plausible. WGFD personnel observations indicate that pronghorn densities would support this trend. Some landowners still feel there are too many pronghorn but the amount of damage has decreased in the last 2-3 years. Trends in harvest statistics (stable success, increasing effort) seem to support model simulations of a slightly decreasing population.

Management Summary

The season opening date was standardized to September 20th along with the combination of Hunt Areas 34-36 into Hunt Area 34 during the herd objective review process in 2013. The combination of hunt areas and reduction in the numeric objective will do three things: 1) simplify management/harvest for both the department and landowners, 2) provide opportunity for hunters by opening up the entire herd unit to hunt, and 3) manage the population at a more reasonable level.

The 2014 season is designed to try and maintain the population within 10% of the new objective of 6,000 pronghorn. Given previous harvest rates and the 1,300 licenses available (800 Type 1 licenses, and 500 Type 6 licenses) we expect to harvest around 985 pronghorn, resulting in a post-season population estimate of 5,100 pronghorn.

INPUT	
Species:	Pronghorn
Biologist:	Martin Hicks
Herd Unit & No.:	PH521
Model date:	03/03/14

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	146	155	☑ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	153	162	☐ SCJ,SCA Mod	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	102466753	102466862	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	2633	1329	5466	**9427**	2620	1032	5290	**8942**	1751	5665	**7416**				7000
1994	1957	1716	5552	**9225**	1917	1378	5288	**8583**	1834	5425	**7258**				7000
1995	1722	1797	5316	**8835**	1704	1450	5245	**8399**	1835	5340	**7175**	6102	1199		7000
1996	2800	1798	5234	**9832**	2790	1431	5114	**9335**	2164	5565	**7729**				7000
1997	1682	2121	5454	**9257**	1633	1616	5249	**8498**	1941	5302	**7243**				7000
1998	2404	1902	5196	**9502**	2379	1446	4975	**8800**	2034	5293	**7327**	5788	647		7000
1999	1724	1994	5187	**8905**	1691	1482	4937	**8111**	1840	5034	**6874**				7000
2000	1545	1803	4933	**8282**	1519	1360	4834	**7713**	1681	4901	**6582**				7000
2001	2151	1648	4803	**8602**	2148	1263	4786	**8197**	1804	5071	**6875**	8065	1399		7000
2002	1813	1768	4970	**8551**	1813	1296	4925	**8034**	1719	5089	**6807**				7000
2003	2556	1684	4987	**9227**	2539	1225	4889	**8653**	1884	5279	**7163**	8069	1122		7000
2004	2324	1847	5173	**9344**	2292	1363	5014	**8669**	1926	5306	**7231**				7000
2005	2659	1887	5200	**9746**	2628	1434	4985	**9047**	2102	5381	**7482**				7000
2006	2968	2060	5273	**10301**	2918	1527	4943	**9388**	2268	5420	**7688**				7000
2007	2353	2223	5311	**9887**	2264	1713	4916	**8893**	2224	5172	**7395**				7000
2008	2563	2179	5068	**9811**	2506	1587	4647	**8740**	2184	5006	**7190**				7000
2009	2020	2140	4906	**9066**	1915	1529	4447	**7891**	1930	4621	**6551**				7000
2010	2477	1892	4528	**8897**	2397	1212	4049	**7658**	1792	4412	**6204**				7000
2011	1997	1756	4324	**8077**	1926	1112	3728	**6766**	1659	4046	**5705**				7000
2012	1841	1626	3965	**7431**	1769	1048	3420	**6238**	1446	3677	**5123**				7000
2013	1802	1417	3603	**6822**	1719	796	3069	**5584**	1297	3430	**4726**				7000
2014	1599	1271	3361	**6231**	1522	704	2921	**5148**							6000
2015															
2016															
2017															
2018															
2019															
2020															
2021															
2022															
2023															
2024															
2025															

Survival and Initial Population Estimates

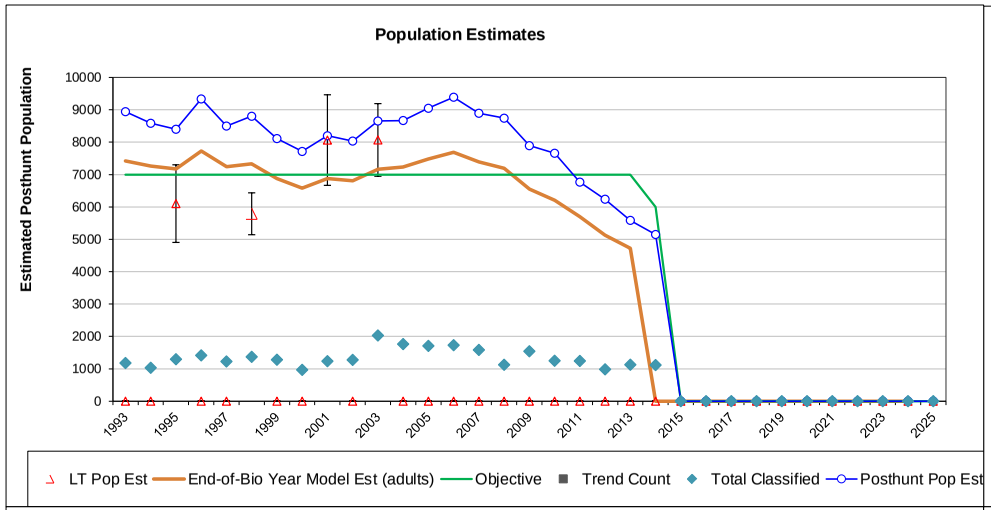
Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.63			0.90		
1994	0.63			0.90		
1995	0.63			0.90		
1996	0.63			0.90		
1997	0.63			0.90		
1998	0.63			0.90		
1999	0.63			0.90		
2000	0.63			0.90		
2001	0.63			0.90		
2002	0.63			0.90		
2003	0.63			0.90		
2004	0.63			0.90		
2005	0.63			0.90		
2006	0.63			0.90		
2007	0.63			0.90		
2008	0.63			0.90		
2009	0.63			0.90		
2010	0.63			0.90		
2011	0.63			0.90		
2012	0.63			0.90		
2013	0.63			0.90		
2014	0.63			0.90		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

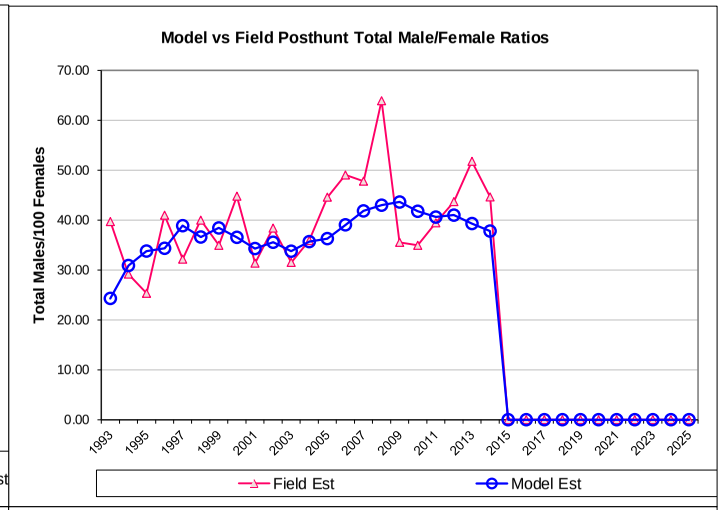
Parameters:	Optim cells
Juvenile Survival =	0.627
Adult Survival =	0.898
Initial Total Male Pop/10,000 =	0.133
Initial Female Pop/10,000 =	0.547

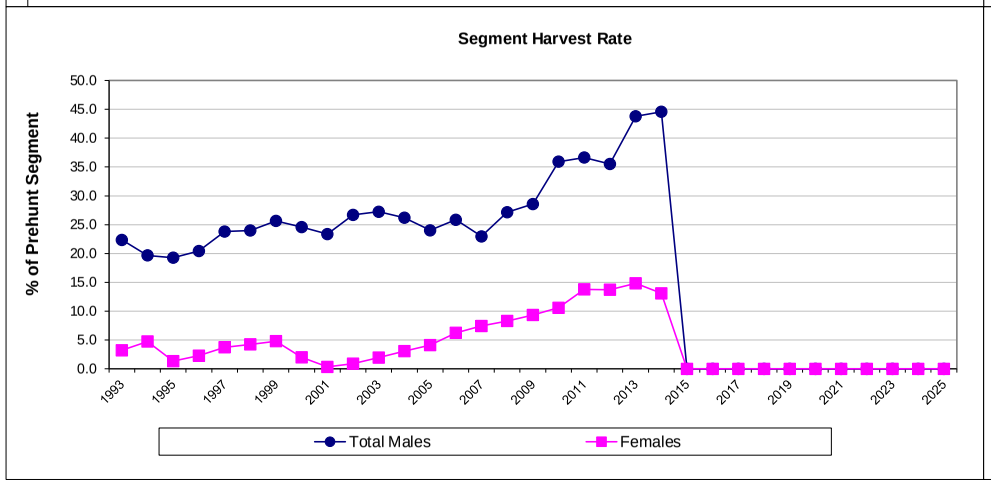
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

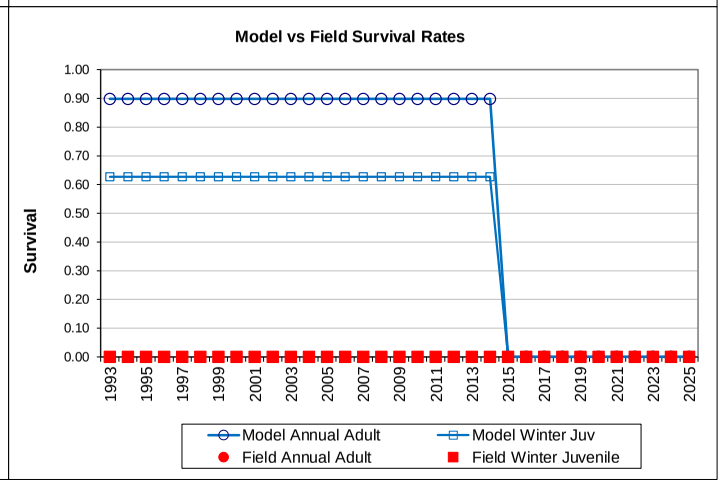
	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		48.17	3.37	24.31	39.71	2.97	270	160	11	441	22.4	3.2
1994		35.25	2.76	30.90	29.19	2.45	307	240	36	583	19.7	4.8
1995		32.40	2.29	33.80	25.33	1.97	315	65	17	397	19.3	1.3
1996		53.51	3.36	34.36	40.99	2.82	334	109	9	452	20.4	2.3
1997		30.85	2.32	38.89	32.18	2.38	459	186	45	690	23.8	3.8
1998		46.26	3.03	36.61	40.00	2.76	415	201	22	638	24.0	4.3
1999		33.25	2.41	38.44	34.95	2.49	465	227	30	722	25.7	4.8
2000		31.33	2.74	36.55	44.81	3.44	403	90	24	517	24.6	2.0
2001		44.79	3.04	34.31	31.38	2.43	350	15	3	368	23.4	0.3
2002		36.49	2.61	35.57	38.41	2.70	429	41	0	470	26.7	0.9
2003		51.26	2.64	33.77	31.53	1.93	417	89	16	522	27.2	2.0
2004		44.92	2.58	35.69	35.90	2.24	440	145	29	614	26.2	3.1
2005		51.15	2.98	36.30	44.61	2.72	412	195	29	636	24.0	4.1
2006		56.29	3.23	39.06	49.05	2.95	484	300	46	830	25.8	6.3
2007		44.30	2.79	41.85	47.82	2.93	464	359	81	904	23.0	7.4
2008		50.57	3.81	43.00	63.93	4.47	538	383	52	973	27.2	8.3
2009		41.17	2.58	43.63	35.55	2.35	556	417	95	1068	28.6	9.4
2010		54.71	3.59	41.78	34.95	2.68	618	436	73	1127	35.9	10.6
2011		46.19	3.18	40.61	39.46	2.87	585	542	65	1192	36.6	13.8
2012		46.42	3.63	41.00	43.71	3.49			495	1085	35.5	13.7
2013		50.00	3.67	39.32	51.79	3.75			486	1125	43.8	14.8
2014		47.59	3.48	37.81	44.66	3.34			400	985	44.6	13.1
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

FIGURES





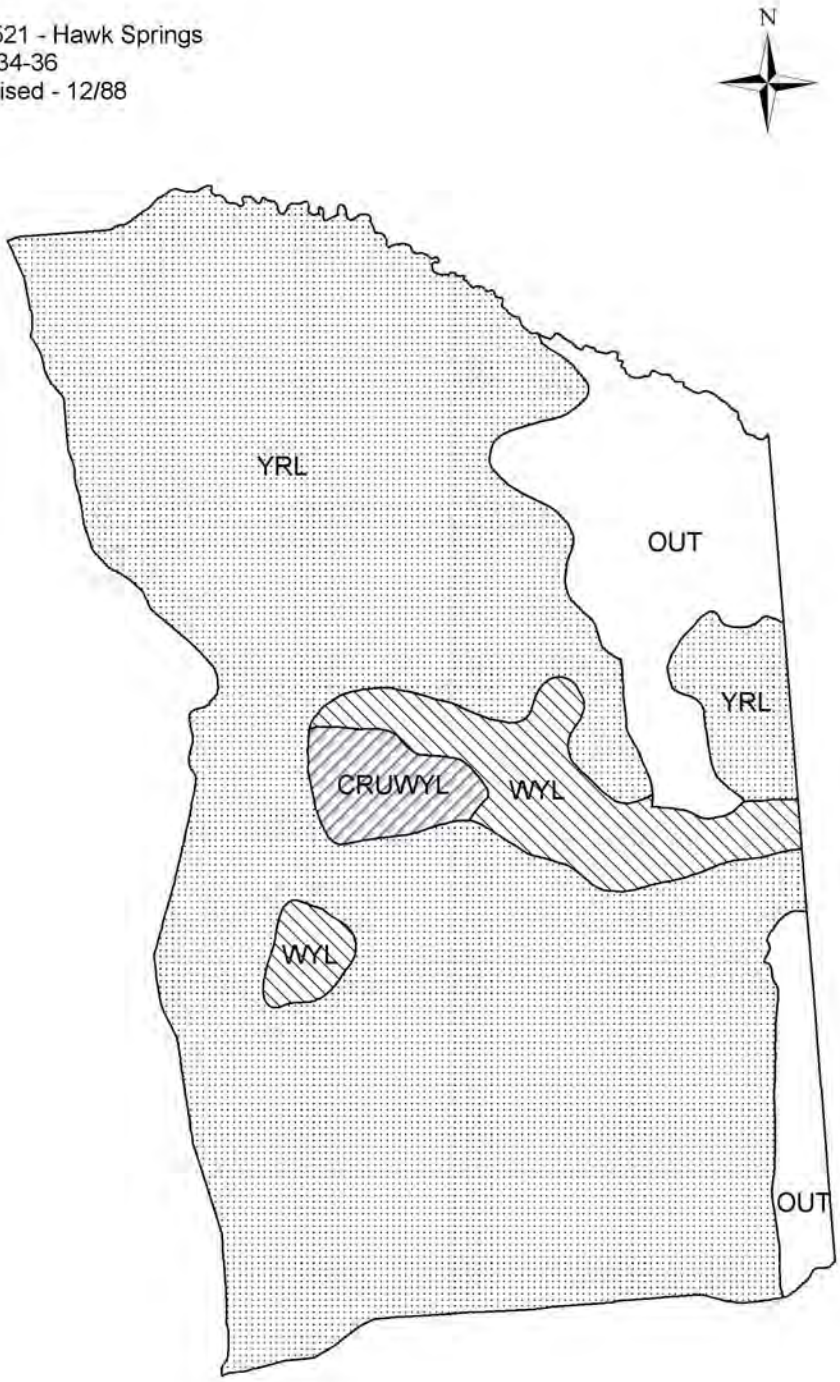




Comments:

END

PH521 - Hawk Springs
HA 34-36
Revised - 12/88



2013 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2013 - 5/31/2014

HERD: PR522 - MEADOWDALE

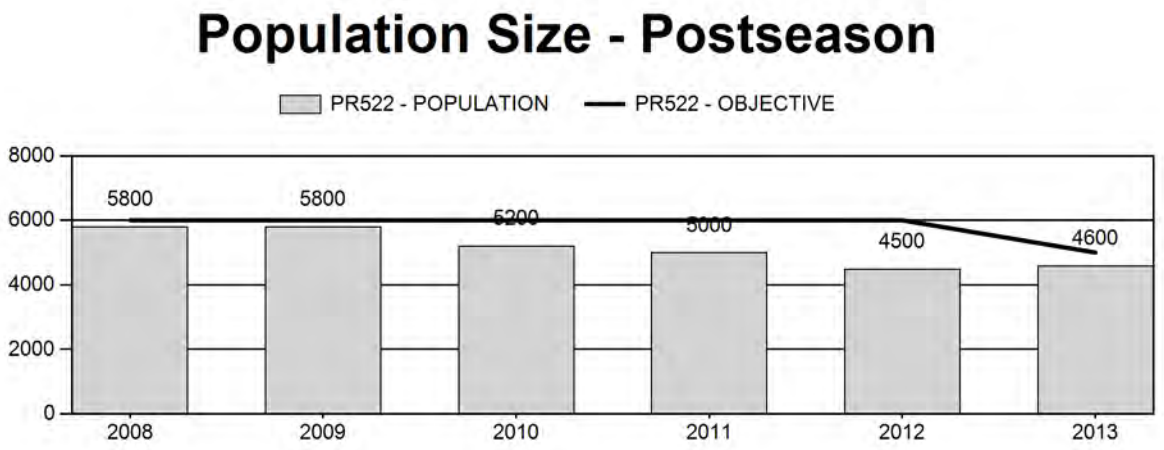
HUNT AREAS: 11 | PREPARED BY: MARTIN HICKS

	2008 - 2012 Average	2013	2014 Proposed
Population:	5,260	4,600	4,400
Harvest:	647	495	495
Hunters:	687	667	670
Hunter Success:	94%	74%	74%
Active Licenses:	781	707	700
Active License Percent:	83%	70%	71%
Recreation Days:	2,166	2,172	2,100
Days Per Animal:	3.3	4.4	4.2
Males per 100 Females	35	50	
Juveniles per 100 Females	56	63	

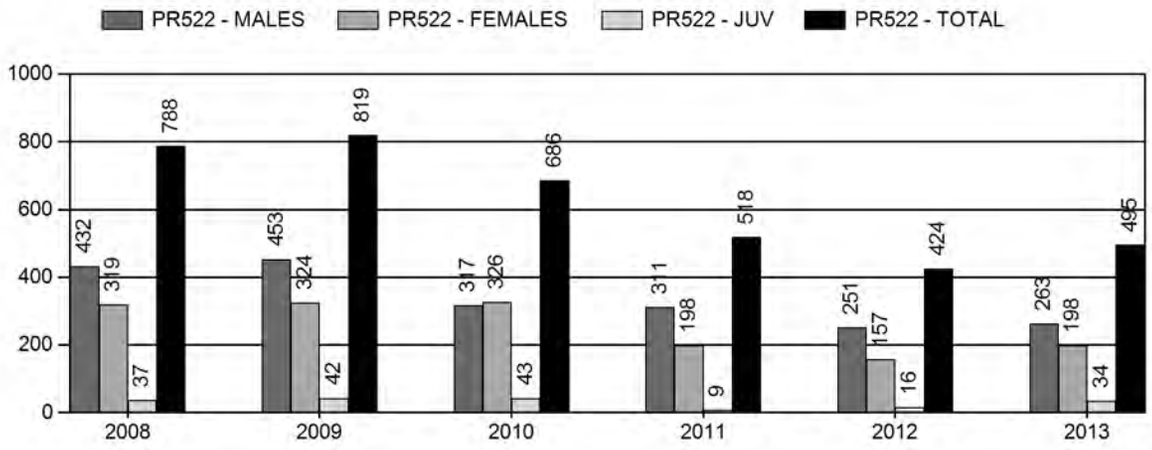
Population Objective:	5,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-8%
Number of years population has been + or - objective in recent trend:	8
Model Date:	03/03/2014

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

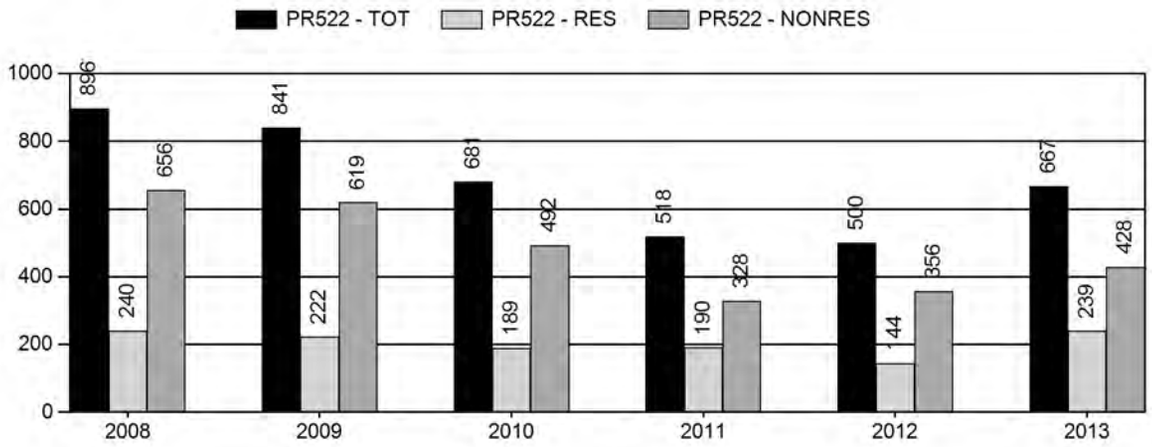
	JCR Year	Proposed
Females ≥ 1 year old:	7%	7%
Males ≥ 1 year old:	30%	29%
Juveniles (< 1 year old):	2%	2%
Total:	9%	10%
Proposed change in post-season population:	+6%	-6%



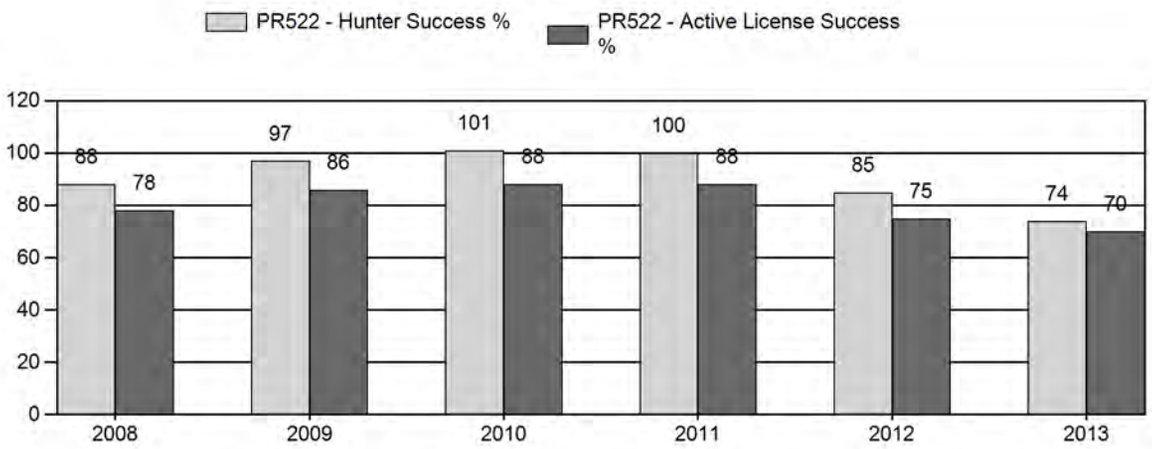
Harvest



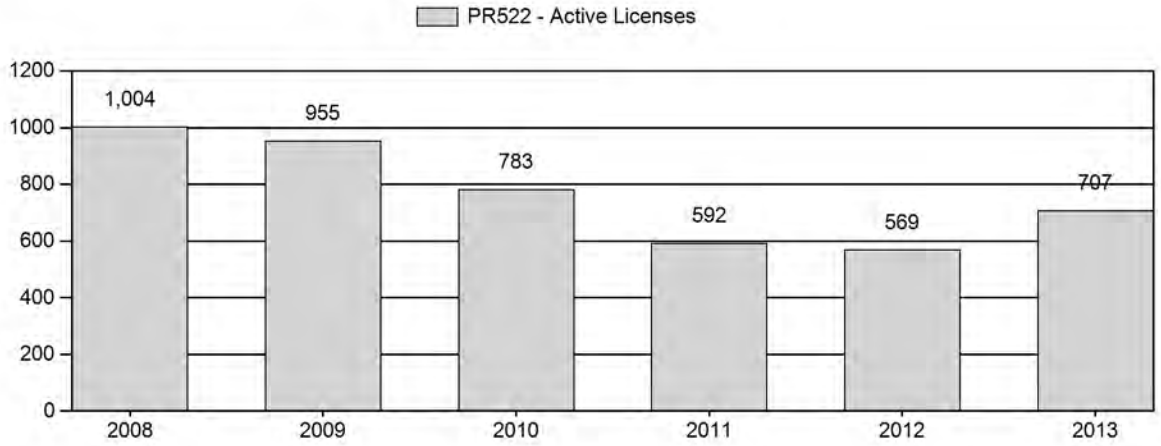
Number of Hunters



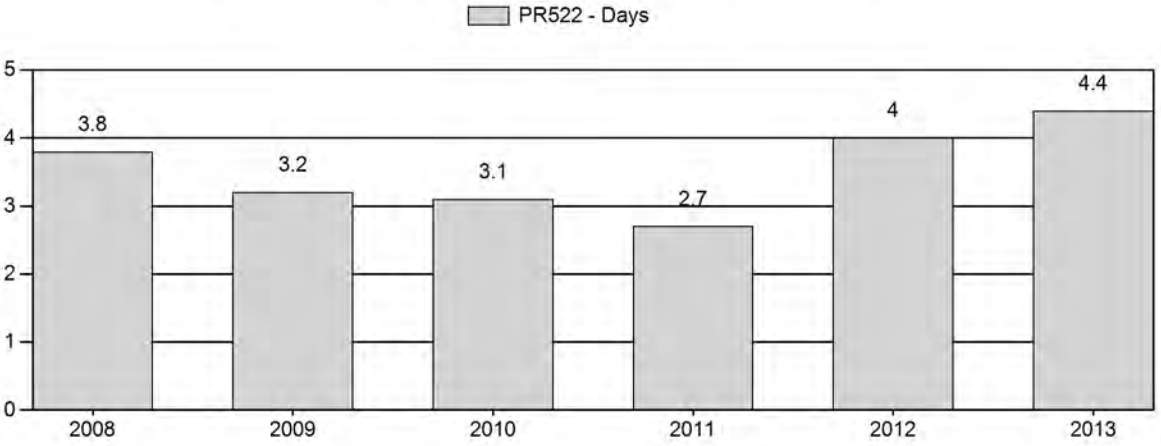
Harvest Success



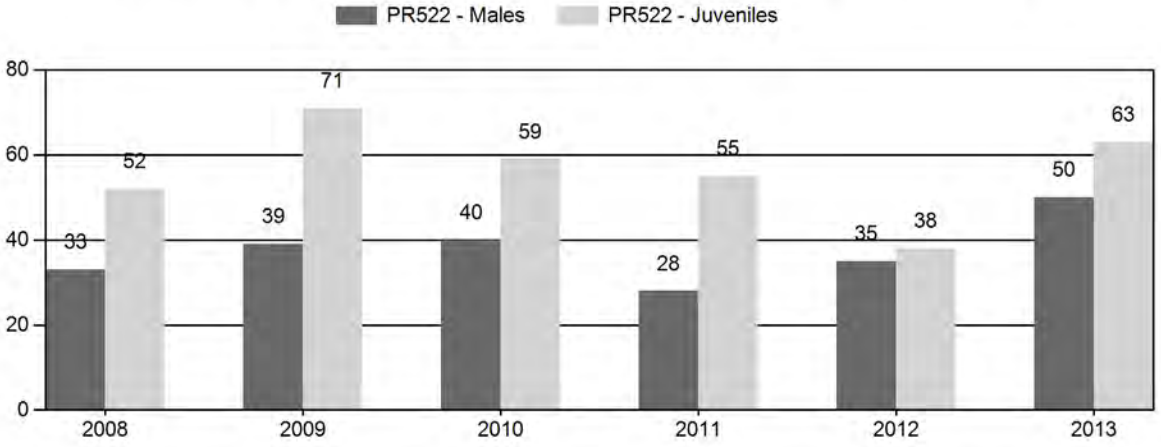
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR522 - MEADOWDALE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	6,700	72	111	183	18%	562	54%	293	28%	1,038	1,544	13	20	33	± 4	52	± 6	39
2009	6,700	71	194	265	19%	684	48%	483	34%	1,432	1,744	10	28	39	± 4	71	± 6	51
2010	6,000	80	137	217	20%	543	50%	319	30%	1,079	1,404	15	25	40	± 5	59	± 6	42
2011	5,500	32	140	172	15%	612	55%	334	30%	1,118	1,426	5	23	28	± 4	55	± 5	43
2012	4,900	62	133	195	20%	553	58%	211	22%	959	838	11	24	35	± 4	38	± 5	28
2013	5,100	60	139	199	23%	402	47%	252	30%	853	1,154	15	35	50	± 6	63	± 8	42

2014 HUNTING SEASONS
MEADOWDALE PRONGHORN HERD (PR522)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
11	1	Oct. 1	Oct. 15	350	Limited quota; any antelope
		Oct. 16	Oct. 31		Unused Area 11 Type 1 licenses valid for doe or fawn
	6	Oct. 1	Oct. 31	200	Limited quota; doe or fawn
Archery		Aug. 15	Sept. 30		Refer to Section 3 of this Chapter

Hunt Area	Type	Quota change from 2013
11	1	0
11	6	0
Total	**1**	**0**
	6	**0**

Management Evaluation
Current Management Objective: 5,000
Management Strategy: Recreational
2013 Post-season Population Estimate: ~4,600
2014 Post-season Population Estimate: ~4,400

Herd Unit Issues
The management objective for the Meadowdale Pronghorn Herd Unit of 6,000 was decreased to 5,000 as a result of internal and public input during the 2013 herd objective review process. The management strategy is recreational management, which is a 30-59 buck:100 doe range.

The 2013 post-season population estimate was about 4,600 with the population trending down from the high of 7,000 pronghorn in 2004. The last line-transect was conducted in June of 2003 that resulted in an estimate of 5,800 pronghorn. The northern portion of the herd unit continues to have the highest densities of pronghorn which has resulted in more acres of private lands enrolled into the PLPW walk-in program, as well as landowners opening access, particularly during the doe/fawn season.

There has been little urban and industrial development within this herd unit. The herd unit is comprised of 90% private land and some accessible state land. Land use is comprised of native range land, irrigated and dry land agriculture fields, and land enrolled into the Conservation Reserve Program. The majority of access is in the northern portion of the herd unit via the PLPW program and private land opened up address damage situations.

Weather
Weather during 2013 and into 2014 was wetter and colder than normal. Pre-season fawn ratios were the highest observed in the past five years, most likely to mild winter condition and above average summer/fall moisture. Ungulates went into the winter in good body condition as a result

of the fall moisture. Winter conditions were somewhat mild with low snowpack and with periods of extreme cold temperatures, followed by above freezing periods. Refer to the following websites for weather data: http://www.ncdc.noaa.gov/temp-and-precip/time-series/ and http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html.

Habitat

We do not have established habitat transects for this herd. Mule deer transects within the Goshen Rim Herd were established in 2000. However, they have been abandoned recently due to lack of useful data. The transects were established to monitor vegetation used by mule deer. Data lacks any meaningful analysis since vegetation type is not utilized by pronghorn. Habitat data indicated that shrubs were underutilized with low production and lacked the nutrient requirements needed during winter months. Pronghorn in this herd unit are mostly dependent on irrigated and dryland crops.

Field Data

Fawn production typically runs around 58 fawns:100 does, except during severe drought years (2002 and 2012). Bucks per 100 does have fluctuated from a low of 28:100 to a high of 59:100 within the last ten years, still with recreational management range. However, in 2013 the sample size was 27% below the 90% CI (n=1,154) so classification needs to be interpreted with caution. Pre-season classification data is collected from the ground in August. The vegetation typically dries out by that time making it difficult to locate small bachelor herds of bucks and even larger herds of does and fawns. Low fawn recruitment and aggressive seasons that were designed to reduce the population have resulted in a decreasing population trend, placing the population slightly below the new objective of 5,000 pronghorn. With the population at a desired level there is not a proposal to increase Type 6 licenses, and given the classification sample the Type 1 licenses are proposed to remain at 350. Sample size for tooth data collected in the field is too small to infer any population dynamics. In 2013 91% of the hunters were satisfied, which was the same as the three-year average. Based on conversations from hunters in the field they are pleased amount of access with Walk in Areas (WIA)'s and private land access. Landowners are still concerned about damage issues but would rather have a short season with plenty of doe/fawn licenses available than a long season.

Harvest Data

The 2013 hunter success of 70% was significantly lower than the ten-year average of 95%. Effort in 2013 was 4.4 days per harvest which is greater than the long-term average of 3.3 days per harvest. These two harvest statistics appear to support a decline in population. However, movement from Hunt Area 9 on the north end of the herd unit confounds population assumptions. At any given time there could be an increase or decrease of pronghorn depending on movement across Highway 18/20. It is difficult to interpret the sudden drop in success and increase in effort. The number of acres enrolled into the PLPW program remained the same and the above average precipitation in September and October Reduced damage complaints and likely dispersed pronghorn more, which could explain the decrease in hunter success and increase in effort.

Population

The "Constant Juvenile – Constant Adult Survival" (CJCA) spreadsheet model was chosen to use for the post-season population estimate of this herd. This model did have the lowest AIC score (224), and the population estimate appears reasonable. This model is ranked fair based on model criteria outlined in the User Guide: Spreadsheet Model for Ungulate Population data.

There is adequate years of population and harvest data and the population is aligned with independent population estimates derived from line-transects conducted in 1996, 1998, 2000 and 2003 (there are standard errors available 2 out of the last ten years). Simulated data aligns fairly well with observed data lending more credibility to the model. The model has predicted a decreasing population trend since 2004. This seems plausible given average to below average fawn production and increased female harvest since 2005. WGFD personnel observations indicate that pronghorn densities would support this trend in the southern portion of the herd unit. However, the northern 1/3 of the herd unit continues to have high densities of pronghorn. Landowners in that portion of the herd unit have damage problems and have voiced their concern at several department meetings over the past two years. Interchange from the Cheyenne River Pronghorn Herd Unit to the north prevents a closed population assumption, therefore providing lower confidence in the model.

Management Summary

The 2013 season was the first to see Hunt Areas 11 and 12 combined. Based on input from landowners and sportsmen obtained in the 2013 herd objective review process there was support for this combination as well as a decrease in the numeric objective from 6,000 to 5,000. A minority of landowners were concerned about draw odd for nonresident hunters with the combination. The only application process that was not a 100% draw was the nonresident random. Hunters that have at least one preference point or choose to apply for the random special were guaranteed a Type 1 license. The majority of landowners and sportsmen indicated the combination allowed for more opportunity and simplified the regulations. License numbers should maintain or slightly decrease the population. However, with the Hunt Area 9 Type 6 license (n=650) there is the potential to reduce the population below the objective. Given past harvest rates (60%) with the Area 9 Type 6 license that will most likely not be the case

Given previous harvest rates we expect to attain a harvest of 495 pronghorn. The 2014 post-season population estimate is 4,400 pronghorn, 12% below the objective of 5,000, but within the ±20% recommended range for herd management.

INPUT	
Species:	Pronghorn
Biologist:	Martin Hicks
Herd Unit & No.:	PH522
Model date:	02/06/14

☑ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	224	233	☐ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	235	244	☐ SCJ,SCA Mod	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	152	261	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	1038	875	2531	**4444**	1011	698	2404	**4113**	882	2538	**3421**				6000
1994	1394	865	2488	**4746**	1360	657	2302	**4318**	916	2511	**3427**				6000
1995	1149	897	2461	**4507**	1129	703	2348	**4179**	914	2513	**3427**				6000
1996	1848	896	2462	**5206**	1848	676	2392	**4915**	1050	2722	**3772**	5800	940		6000
1997	1139	1029	2667	**4836**	1117	819	2544	**4480**	1023	2699	**3722**				6000
1998	1539	1002	2645	**5187**	1528	829	2581	**4937**	1128	2831	**3959**	5100	670		6000
1999	1712	1105	2775	**5591**	1688	876	2720	**5284**	1203	2999	**4201**				6000
2000	1467	1179	2939	**5585**	1462	963	2887	**5312**	1243	3116	**4359**	5500	760		6000
2001	1550	1218	3054	**5821**	1534	1033	2945	**5512**	1325	3182	**4507**				6000
2002	1469	1299	3119	**5886**	1446	1087	2991	**5524**	1355	3205	**4559**				6000
2003	2110	1328	3140	**6578**	2075	1009	2964	**6048**	1408	3311	**4719**	5800	890		6000
2004	2038	1380	3245	**6663**	1994	1059	3108	**6161**	1436	3432	**4868**				6000
2005	2023	1407	3364	**6794**	1983	1068	3071	**6122**	1443	3387	**4830**				6000
2006	2018	1414	3319	**6751**	1983	1073	3030	**6086**	1449	3348	**4797**				6000
2007	2025	1420	3281	**6727**	2006	987	2910	**5902**	1370	3237	**4607**				6000
2008	1654	1343	3172	**6169**	1613	867	2822	**5302**	1160	3061	**4220**				6000
2009	2118	1137	2999	**6254**	2072	638	2643	**5353**	1036	2986	**4022**				6000
2010	1719	1015	2927	**5661**	1672	666	2568	**4907**	983	2825	**3808**				6000
2011	1511	963	2769	**5243**	1501	621	2551	**4673**	986	2842	**3828**				6000
2012	1063	967	2785	**4814**	1045	693	2613	**4351**	876	2711	**3587**				6000
2013	1666	858	2657	**5181**	1628	569	2439	**4636**	907	2718	**3624**				6000
2014	1370	889	2663	**4922**	1332	603	2443	**4378**							5000
2015															
2016															
2017															
2018															
2019															
2020															
2021															
2022															
2023															
2024															
2025															

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.43			0.95		
1994	0.43			0.95		
1995	0.43			0.95		
1996	0.43			0.95		
1997	0.43			0.95		
1998	0.43			0.95		
1999	0.43			0.95		
2000	0.43			0.95		
2001	0.43			0.95		
2002	0.43			0.95		
2003	0.43			0.95		
2004	0.43			0.95		
2005	0.43			0.95		
2006	0.43			0.95		
2007	0.43			0.95		
2008	0.43			0.95		
2009	0.43			0.95		
2010	0.43			0.95		
2011	0.43			0.95		
2012	0.43			0.95		
2013	0.43			0.95		
2014	0.43			0.95		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

Parameters:	Optim cells
Juvenile Survival =	0.431
Adult Survival =	0.950
Initial Total Male Pop/10,000 =	0.088
Initial Female Pop/10,000 =	0.253

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

	Classification Counts										Harvest	
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		40.99	2.37	34.57	45.76	2.55	161	116	24	301	20.2	5.0
1994		56.03	3.23	34.77	31.54	2.23	189	169	31	389	24.0	7.5
1995		46.69	2.46	36.46	33.72	1.99	177	103	18	298	21.7	4.6
1996		75.03	3.99	36.37	56.85	3.29	200	64	0	264	24.6	2.9
1997		42.70	2.56	38.59	32.19	2.14	191	112	20	323	20.4	4.6
1998		58.18	3.70	37.89	45.98	3.16	158	59	10	227	17.3	2.5
1999		61.68	3.41	39.82	52.45	3.06	208	50	21	279	20.7	2.0
2000		49.94	3.09	40.10	30.96	2.27	196	47	5	248	18.3	1.8
2001		50.75	2.76	39.88	42.36	2.45	168	99	14	281	15.2	3.6
2002		47.10	2.36	41.64	31.69	1.83	192	116	21	329	16.3	4.1
2003		67.19	5.01	42.28	44.20	3.77	290	160	32	482	24.0	5.6
2004		62.81	4.77	42.52	34.97	3.24	292	124	40	456	23.3	4.2
2005		60.15	4.26	41.83	35.71	3.02	308	266	37	611	24.1	8.7
2006		60.80	3.88	42.60	59.10	3.81	310	263	32	605	24.1	8.7
2007		61.73	4.33	43.27	39.96	3.24	394	338	18	750	30.5	11.3
2008		52.14	3.76	42.32	32.56	2.77	432	319	37	788	35.4	11.1
2009		70.61	4.20	37.89	38.74	2.80	453	324	42	819	43.8	11.9
2010		58.75	4.14	34.69	39.96	3.21	317	326	43	686	34.3	12.3
2011		54.58	3.71	34.77	28.10	2.43	311	198	9	518	35.5	7.9
2012		38.16	3.09	34.71	35.26	2.94			156	421	28.3	6.2
2013		62.69	5.04	32.30	49.50	4.29			198	495	33.7	8.2
2014		51.46	3.89	33.36	38.83	3.24			200	495	32.2	8.3
2015												
2016												
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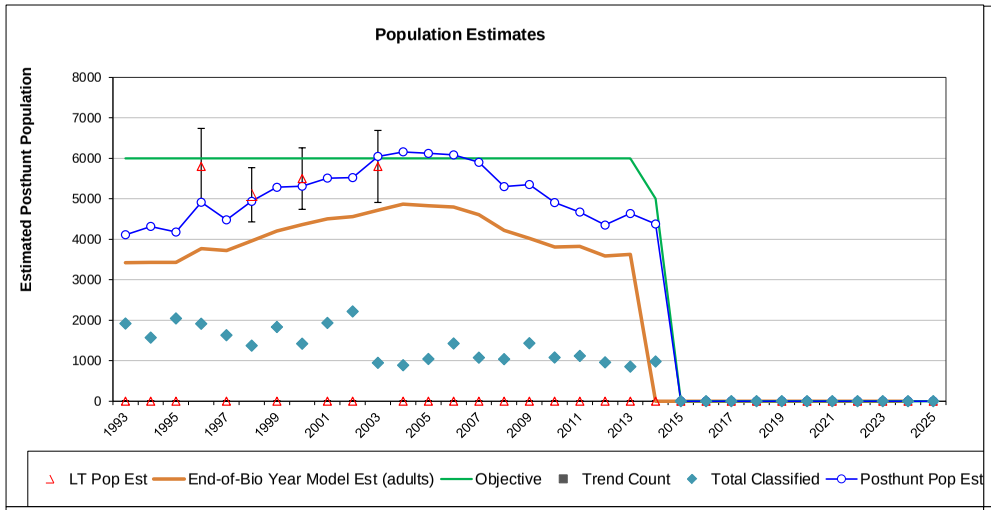
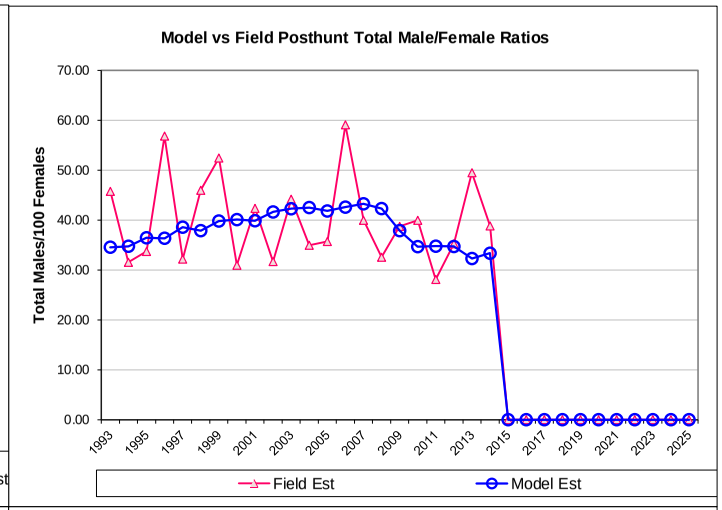
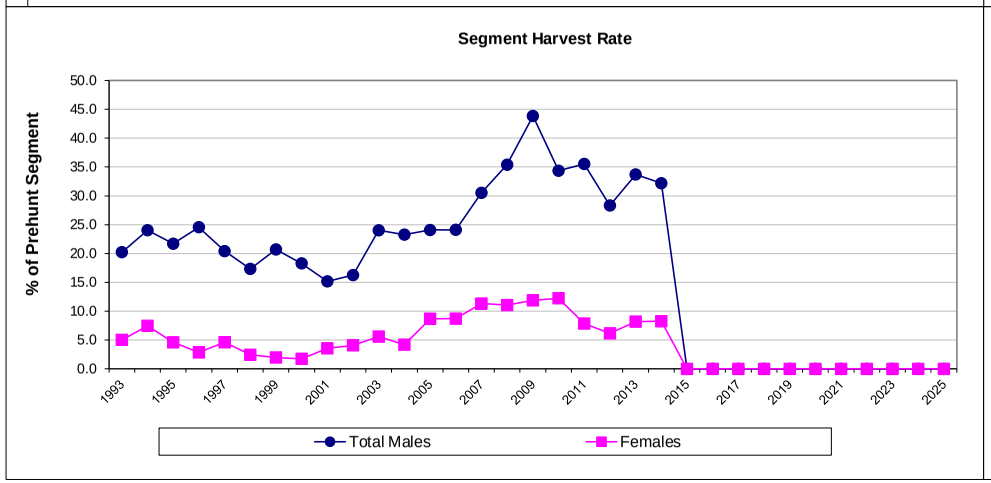
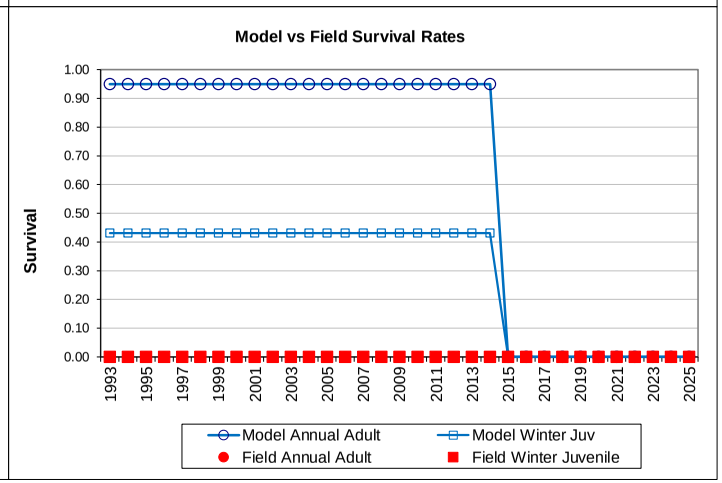
FIGURES









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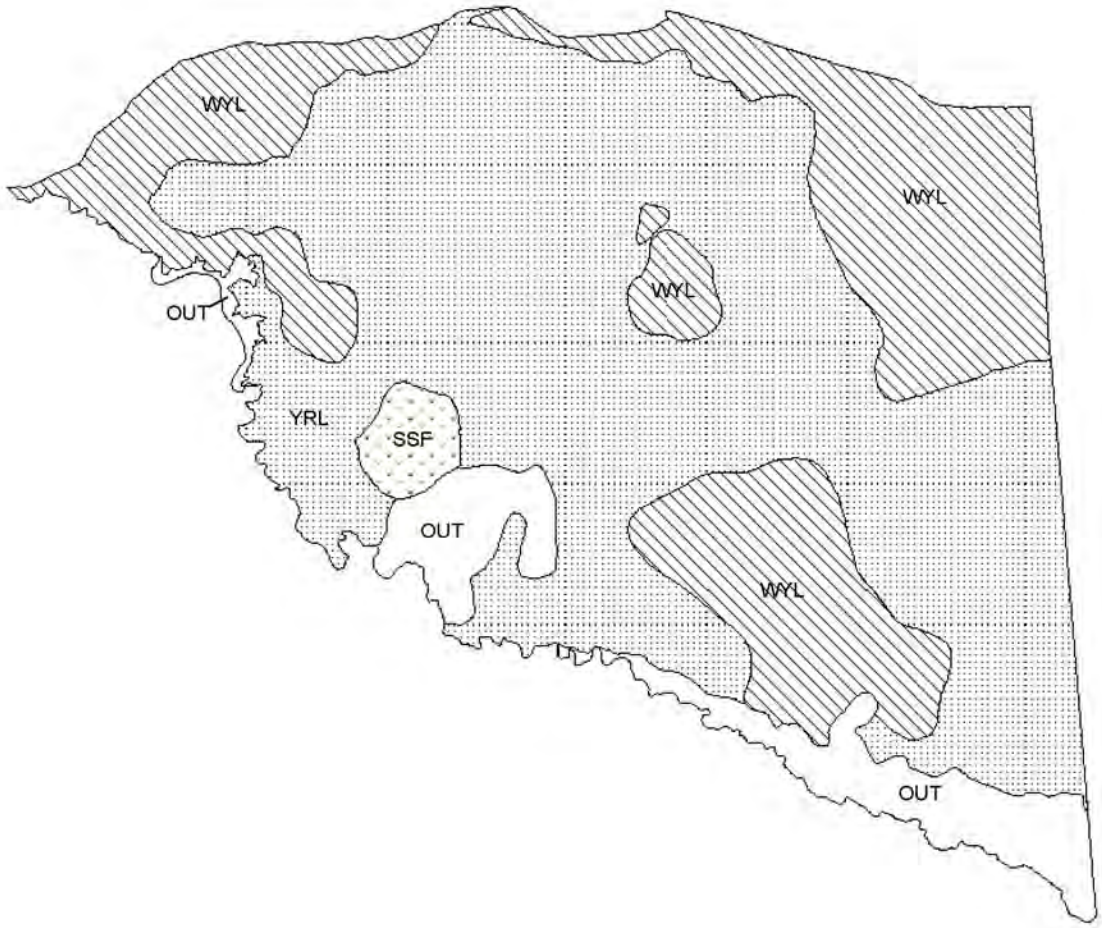


2013 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2013 - 5/31/2014

HERD: PR523 - IRON MOUNTAIN

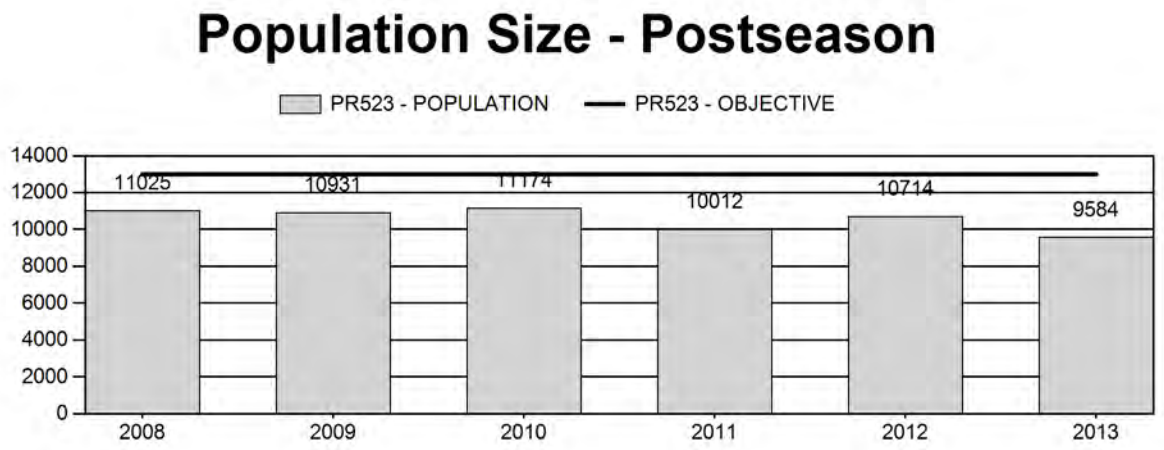
HUNT AREAS: 38 | PREPARED BY: LEE KNOX

	2008 - 2012 Average	2013	2014 Proposed
Population:	10,771	9,584	9,603
Harvest:	1,607	1,292	1,479
Hunters:	1,742	1,511	1,700
Hunter Success:	92%	86%	87%
Active Licenses:	1,986	1,668	1,975
Active License Percent:	81%	77%	75%
Recreation Days:	6,024	5,190	6,000
Days Per Animal:	3.7	4.0	4.1
Males per 100 Females	50	58	
Juveniles per 100 Females	63	60	

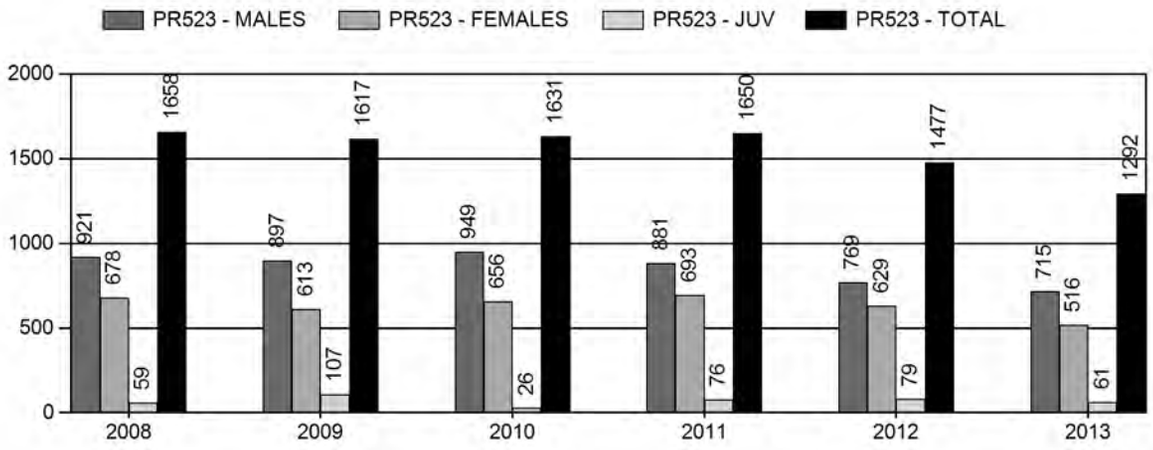
Population Objective:	13,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-26.3%
Number of years population has been + or - objective in recent trend:	10
Model Date:	5/13/2014

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

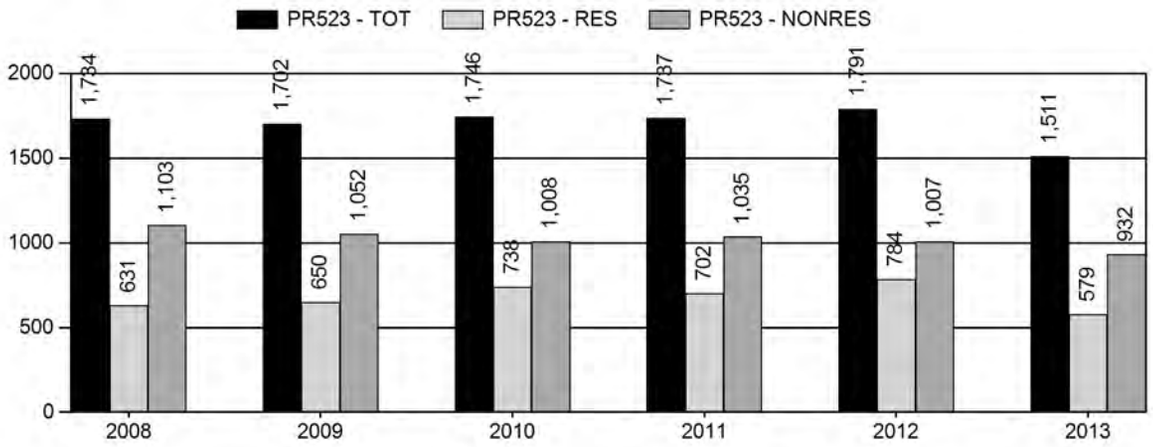
	JCR Year	Proposed
Females ≥ 1 year old:	6.5%	6%
Males ≥ 1 year old:	15.5%	16%
Juveniles (< 1 year old):	1.5%	2%
Total:	7.5%	8%
Proposed change in post-season population:	2%	2%



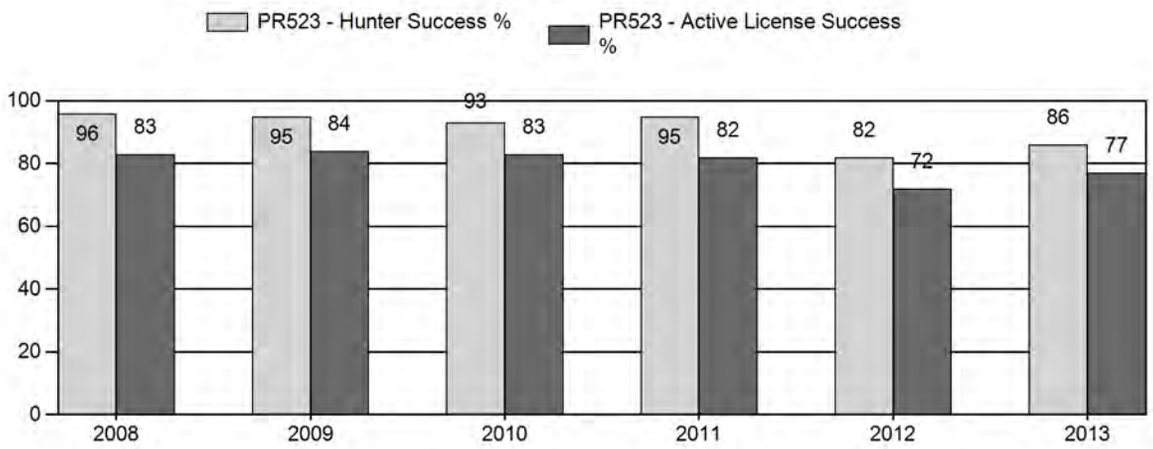
Harvest



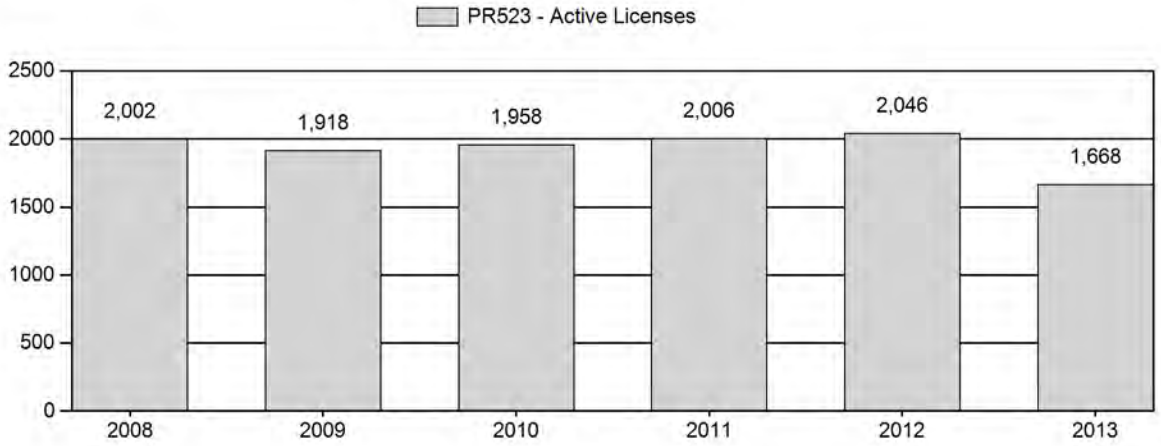
Number of Hunters



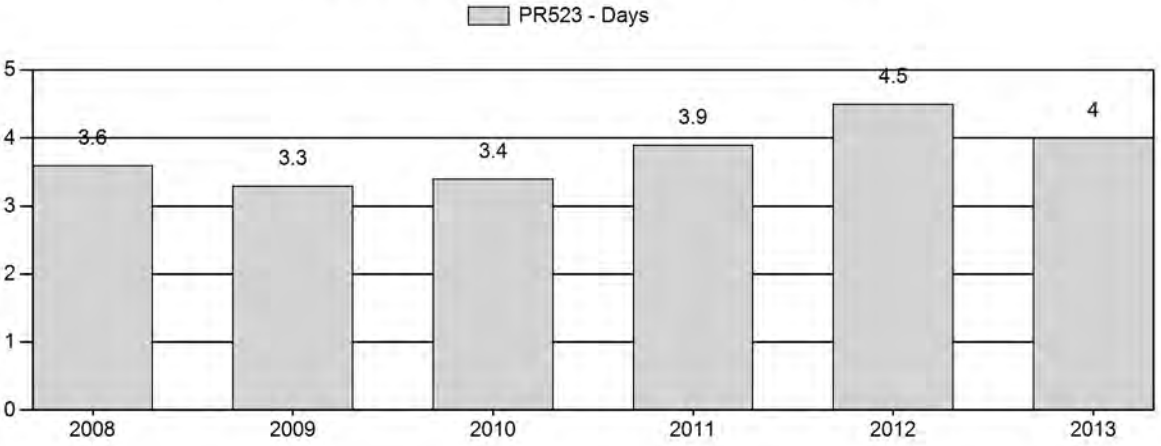
Harvest Success



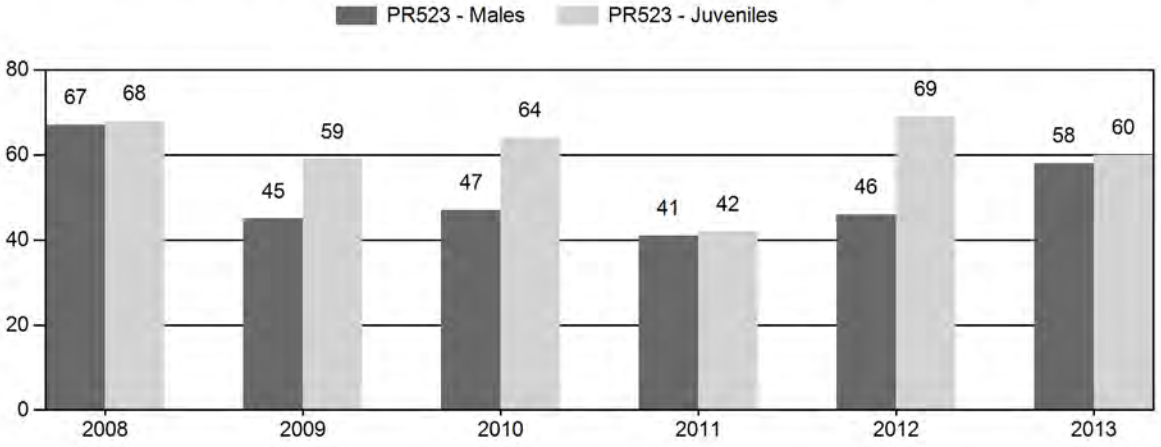
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR523 - IRON MOUNTAIN

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	12,848	136	249	542	28%	815	43%	556	29%	1,913	2,140	17	31	67	± 6	68	± 6	41
2009	12,709	160	259	419	22%	931	49%	550	29%	1,900	1,899	17	28	45	± 4	59	± 5	41
2010	12,968	182	370	552	22%	1,186	48%	755	30%	2,493	2,176	15	31	47	± 4	64	± 4	43
2011	11,827	51	89	140	23%	339	55%	141	23%	620	0	15	26	41	± 7	42	± 7	29
2012	12,359	100	260	360	21%	789	47%	547	32%	1,696	2,355	13	33	46	± 4	69	± 6	48
2013	12,349	120	233	353	27%	608	46%	364	27%	1,325	1,987	20	38	58	± 6	60	± 6	38

2014 HUNTING SEASONS
IRON MOUNTAIN PRONGHORN (PR523)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
38	1	Oct. 5	Oct. 31	1100	Limited quota licenses; any antelope
	6	Oct. 5	Oct. 31	875	Limited quota licenses; doe or fawn
		Nov. 1	Dec. 31		
Archery					Refer to Section 3 of this Chapter

Area	Type	Quota change from 2014
38	7	-50
Herd Totals	**7**	**-50**

Management Evaluation
Current Postseason Population Management Objective: 13,000
Management Strategy: Recreational
2013 Postseason Population Estimate: 9,600
2014 Proposed Postseason Population Estimate: 9,600

The management objective for the Iron Mountain Pronghorn Herd Unit is a post-season population objective of 13,000 pronghorn. The management strategy is recreational management with a post hunt buck ratio of 20 to 59:100 does. The objective and management strategy was last revised in 2003 and is currently under review.

Herd Unit Issues
The Iron Mountain Herd Unit consists of Hunt Areas 38, 39, 40 and 104 (combined into Hunt Area 38 for the 2014 season) which are predominately private lands with traditional agricultural uses. The 2013 post-season population estimate was 9,584 with the population trending slightly upward. Access limitations hinder our ability to manage this herd. Efforts to increase harvest in accessible areas have resulted in reduced success and decreased hunt quality.

Weather
Weather during the spring and summer of 2013 remained extremely dry. The Palmer Drought Severity Index (PDSI) ranked drought conditions in SE Wyoming as extreme through the month of August and could be the reason fawn ratios declined from 69 fawns: 100 does in 2012 to 60 fawns: 100 does in 2013. However the fall of 2013 was extremely wet with September 2013 being the wettest September recorded in Laramie and pronghorn were in good body condition

going into winter. For specific weather information please refer to the following link: http://www.ncdc.noaa.gov/.

Habitat

Turnover in personnel, changes in individual job responsibilities of employees, and evolving WGFD agency priorities have resulted in some issues with consistent habitat data collection and interpretation of data. Some transects, years after their initial establishment, have been identified as being in "non-representative" locations. Site selection was often influenced by terrain and/or land ownership status (i.e public access). Changing land uses (wind turbines, roads, fence construction, other developments, etc.) have influenced habitat use by wildlife in some locations, and in some instances have resulted in major shifts in animal usage of the area being monitored. Department personnel are currently evaluating shrub transects and the types of information being collected, and will be looking for ways to improve efficiency of data collection, types of data being collected, and refining criteria for site selection for future transects. The reader is referred to the Strategic Habitat Plan Annual Report for further background information on shrub transects.

Field Data

A total of 1,325 pronghorn were classified which is below the recommended classification objective of 1,987. Fawn ratios declined from 69 fawns: 100 does in 2012 to 60 fawns: 100 does in 2013. The five year average for this herd is 58 fawns: 100 does indicating fawn ratios are above the 5 year average for this herd. Buck ratios increased to 58 bucks: 100 does which is at the high end of recreational management but is more of a factor of limited hunter access than harvest management. The hunter satisfaction survey showed 78% of hunters were either satisfied or very satisfied with their hunt which is lower than some public land herds but is comparable to past years for this herd.

Harvest Data

The few landowners who do allow hunter access reduced access in 2013 due to ongoing issues with road and property damages. To address this issue we cut 350 licenses from the 2013 season which is reflected in the hunter effort declining to 4 days and hunter success increasing from 72% in 2012 to 77% in 2013. This herd remains a low priority area for hunters due to the lack of access. Most licenses are purchased after the draw by non-residents who make up 60% of the license holders.

Population

The population has remained fairly stable. The spreadsheet model for this herd estimates a post hunt population of 9,584. This estimate uses the Constant Juvenile & Adult Survival model which had a AIC score of 27 and a best fit score of 17. This is a poor model due to little data available; ratio data, if available, considered highly biased because of poor sample sizes or an inability to survey the entire area; results not biologically defensible. To get the model to run we truncated years to 2002 to eliminate years of poor classification data. We also did not include LT estimates as they are also of poor quality due to such large deviations in terrain height resulting in large standard errors. Field staff and landowners are happy with current numbers and believe the population is stable or slightly growing.

Management Summary

This herd has always been hard to manage due to limited population data and a large percentage of inaccessible private lands. We combined Hunt Areas 38, 39, 40 and 104 for 2014 to simplify regulations and allow hunters more opportunity to move where the pronghorn are most accessible. We are leaving the license issuance as status quo for the first year of the combination of hunt areas so we can better understand the effects from this change and address them in 2015.

INPUT	
Species:	Pronghorn
Biologist:	Lee Knox
Herd Unit & No.:	PR523 Iron Mountain
Model date:	07/23/12

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	18	28	☑ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	4035	4055	☐ SCJ,SCA M	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	4	82	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
2002	2644	2277	6235	**11157**	2578	1420	5818	**9817**	2284	6438	**8722**				13000
2003	3145	2170	6116	**11431**	3070	1360	5660	**10090**	2437	6488	**8925**				13000
2004	3128	2315	6164	**11607**	3054	1466	5659	**10179**	2524	6475	**8999**				13000
2005	3194	2398	6151	**11744**	3120	1622	5442	**10184**	2706	6275	**8981**				13000
2006	3267	2571	5962	**11799**	3194	1663	5214	**10071**	2760	6089	**8849**				13000
2007	3234	2622	5785	**11640**	3161	1607	5042	**9811**	2681	5916	**8597**				13000
2008	3834	2547	5620	**12001**	3769	1534	4874	**10177**	2866	6013	**8878**				13000
2009	3374	2722	5712	**11809**	3257	1736	5038	**10030**	2838	5955	**8793**				13000
2010	3601	2696	5657	**11955**	3573	1652	4936	**10161**	2895	5995	**8890**				13000
2011	2369	2750	5695	**10814**	2285	1781	4933	**8999**	2484	5447	**7931**				13000
2012	3588	2359	5175	**11122**	3496	1504	4478	**9477**	2740	5532	**8272**				13000
2013	3146	2603	5256	**11005**	3079	1817	4688	**9584**	2870	5574	**8444**				13000
2014	3209	2726	5295	**11230**	3128	1856	4619	**9603**							13000
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Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
2002	0.79			0.89		
2003	0.79			0.89		
2004	0.79			0.89		
2005	0.79			0.89		
2006	0.79			0.89		
2007	0.79			0.89		
2008	0.79			0.89		
2009	0.79			0.89		
2010	0.79			0.89		
2011	0.79			0.89		
2012	0.79			0.89		
2013	0.79			0.89	#REF!	
2014	0.79			0.89		
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Parameters:	Optim cells
Juvenile Survival =	0.789
Adult Survival =	0.886
Initial Total Male Pop/10,000 =	0.228
Initial Female Pop/10,000 =	0.624

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	95%

	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
2002		42.41	2.15	36.52	36.46	1.95	779	379	60	1218	37.6	6.7
2003		51.42	2.81	35.48	36.94	2.26	736	415	68	1219	37.3	7.5
2004		50.75	2.23	37.56	34.15	1.72	772	459	67	1298	36.7	8.2
2005		51.93	2.35	38.98	42.74	2.07	705	645	68	1418	32.3	11.5
2006		54.80	3.71	43.12	44.23	3.22	825	680	66	1571	35.3	12.5
2007		55.90	3.24	45.32	47.35	2.90	922	675	66	1663	38.7	12.8
2008		68.22	3.75	45.31	47.24	2.92	921	678	59	1658	39.8	13.3
2009		59.08	3.18	47.66	45.01	2.65	897	613	107	1617	36.2	11.8
2010		63.66	2.96	47.66	46.54	2.40	949	656	26	1631	38.7	12.8
2011		41.59	4.17	48.29	41.30	4.15	881	693	76	1650	35.2	13.4
2012		69.33	3.86	45.59	45.63	2.90	778	634	83	1495	36.3	13.5
2013		59.87	3.97	49.53	58.06	3.89	715	516	61	1292	30.2	10.8
2014		60.60	4.10	51.49	49.14	3.56	791	614	73	1479	31.9	12.8
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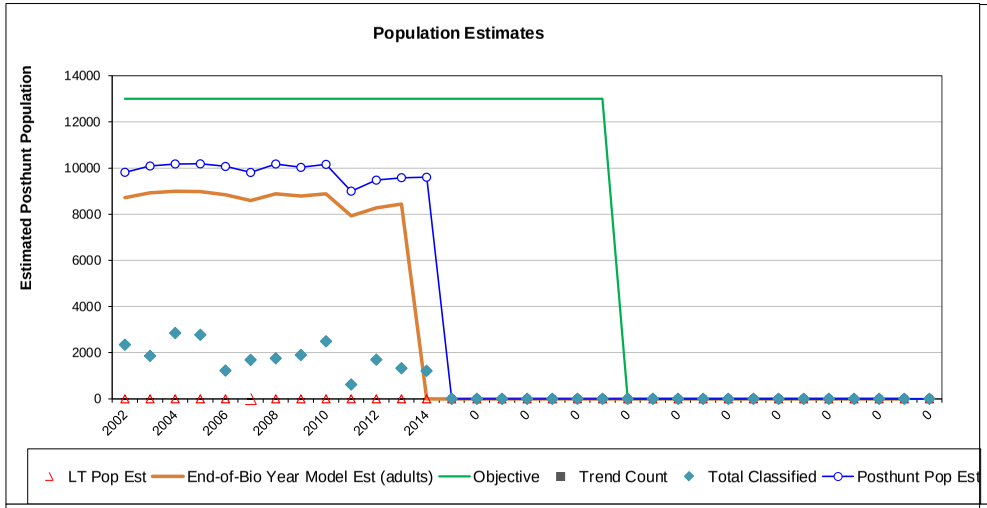
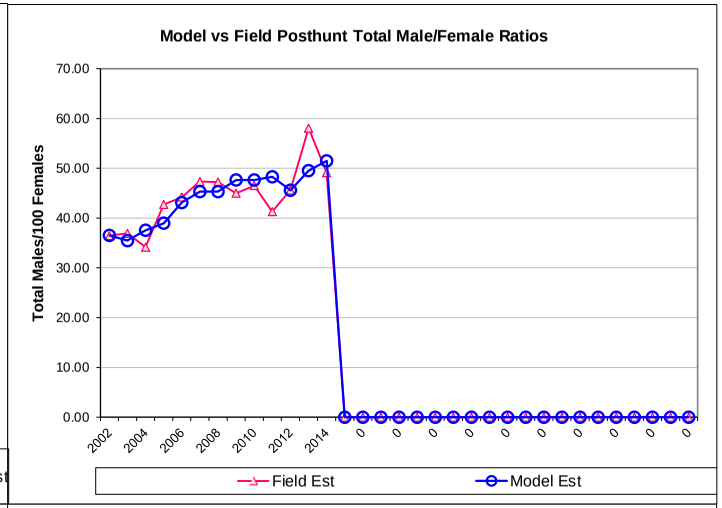
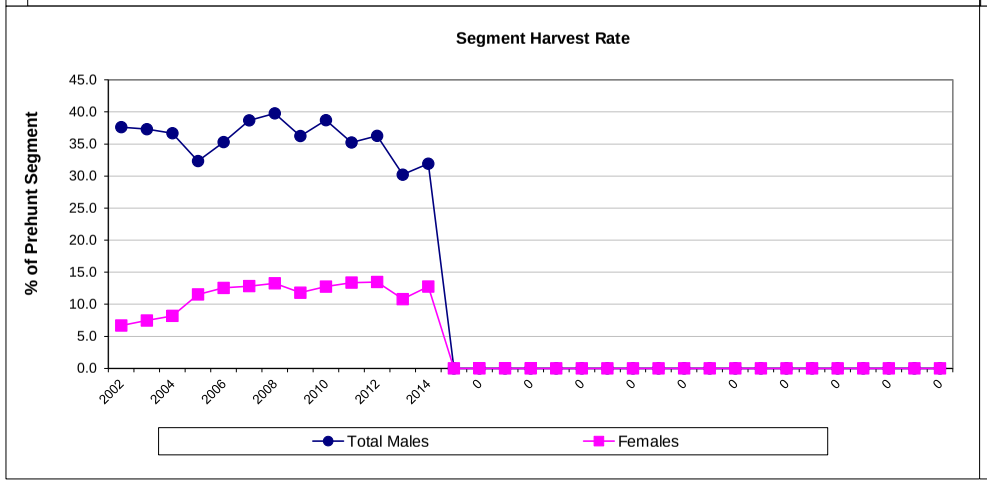
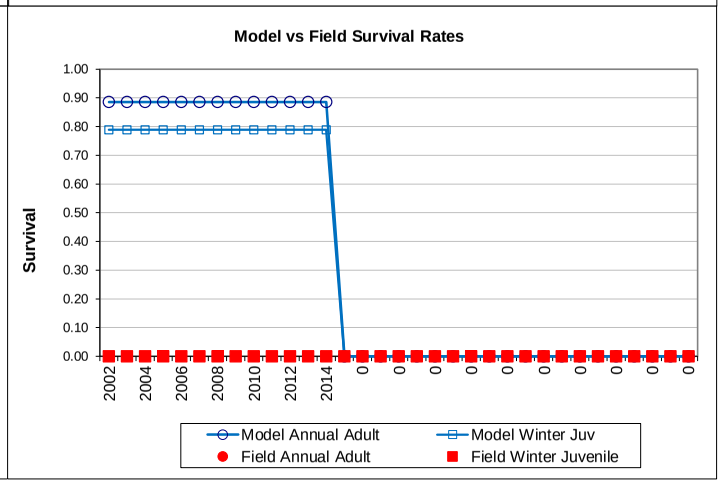
FIGURES









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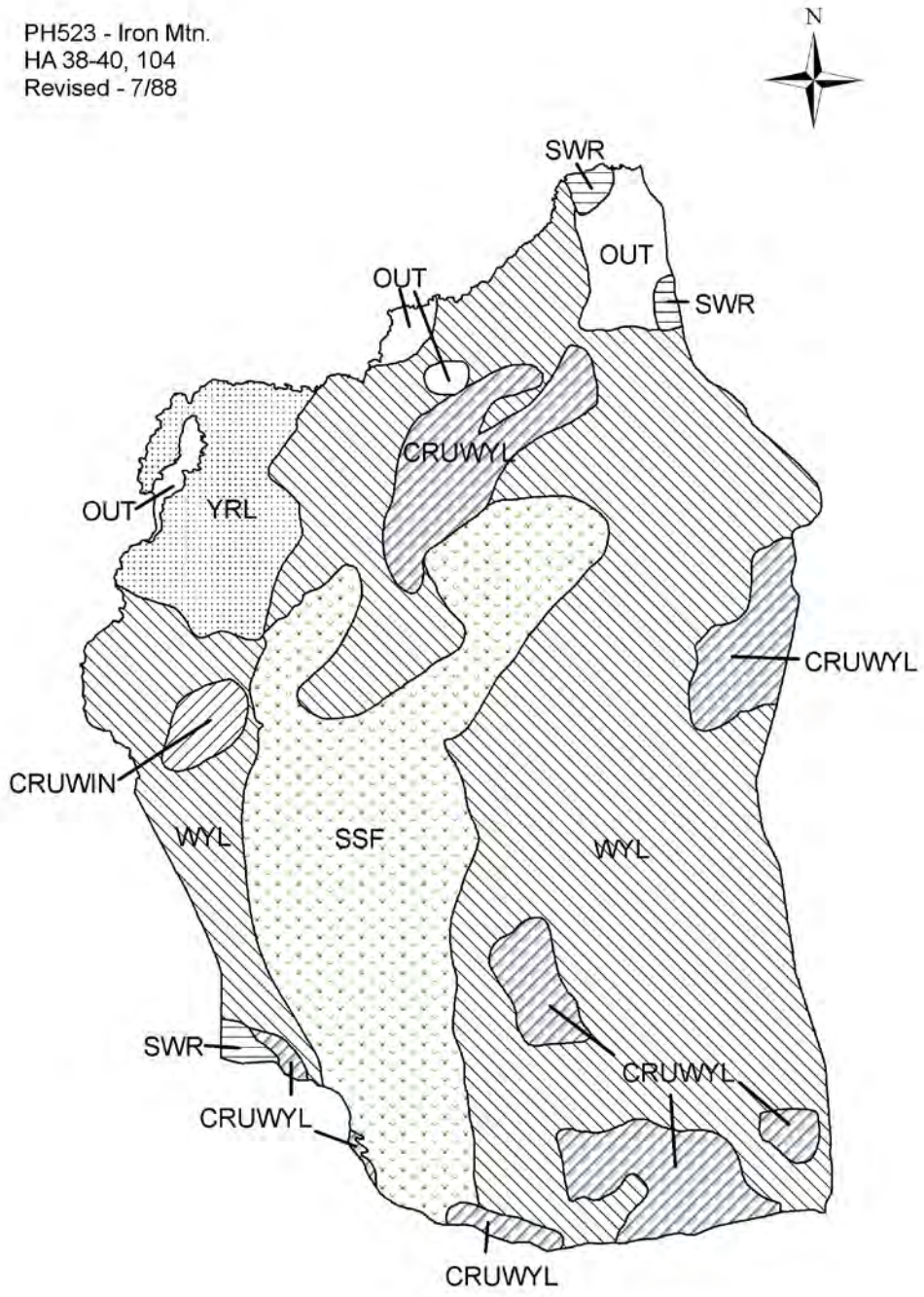
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2013 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2013 - 5/31/2014

HERD: PR524 - DWYER

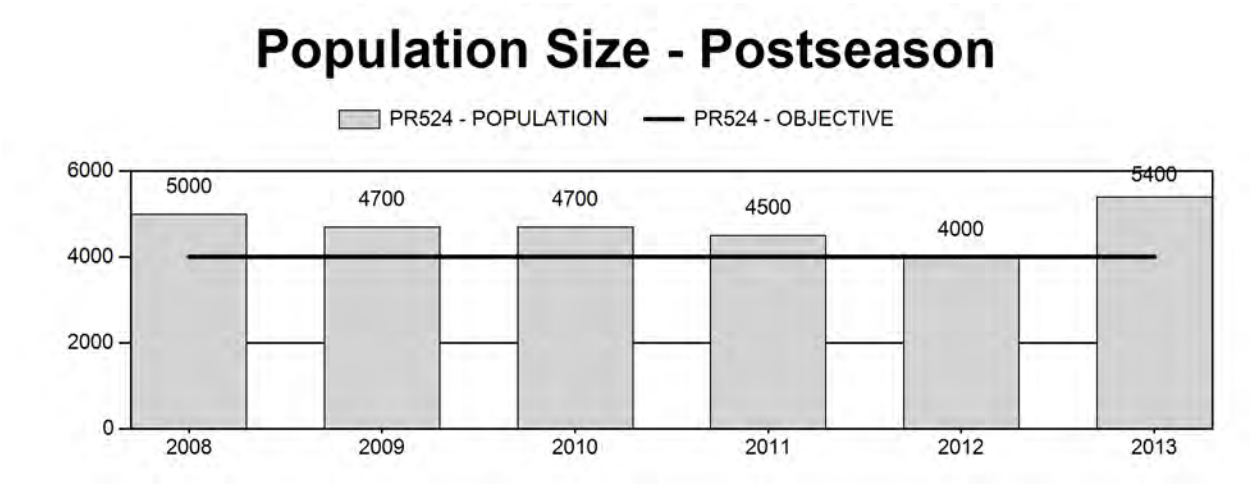
HUNT AREAS: 103 | PREPARED BY: MARTIN HICKS

	2008 - 2012 Average	2013	2014 Proposed
Population:	4,580	5,400	5,400
Harvest:	502	533	525
Hunters:	515	561	555
Hunter Success:	97%	95%	95 %
Active Licenses:	601	662	655
Active License Percent:	84%	81%	80 %
Recreation Days:	1,899	2,145	2,140
Days Per Animal:	3.8	4.0	4.1
Males per 100 Females	53	59	
Juveniles per 100 Females	48	47	

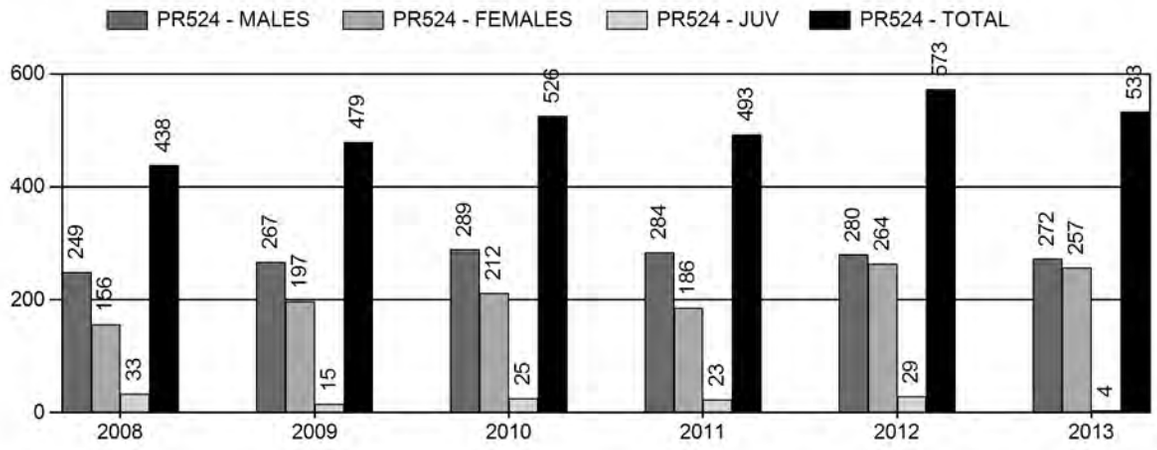
Population Objective:	4,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	35%
Number of years population has been + or - objective in recent trend:	1
Model Date:	03/02/2014

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

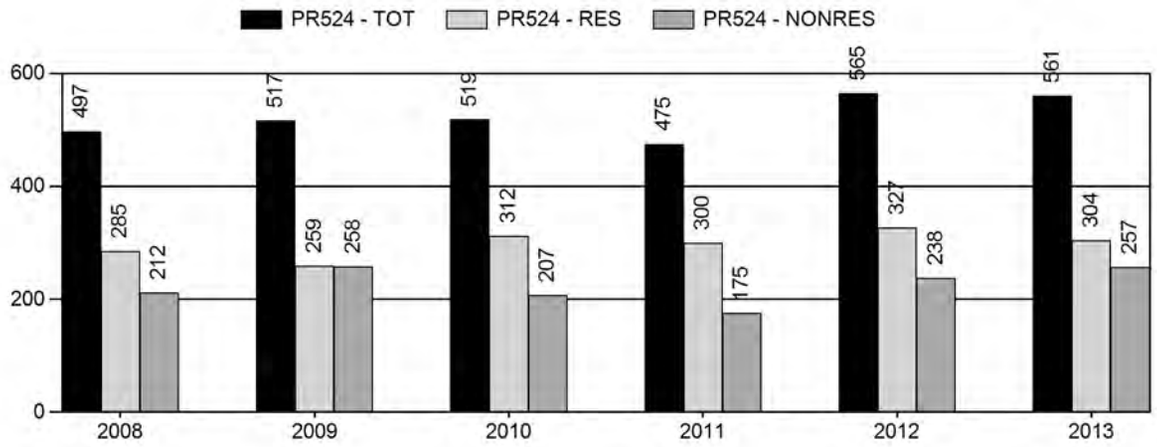
	JCR Year	Proposed
Females ≥ 1 year old:	8%	8%
Males ≥ 1 year old:	16%	17%
Juveniles (< 1 year old):	0%	0%
Total:	9%	8%
Proposed change in post-season population:	-3%	0%



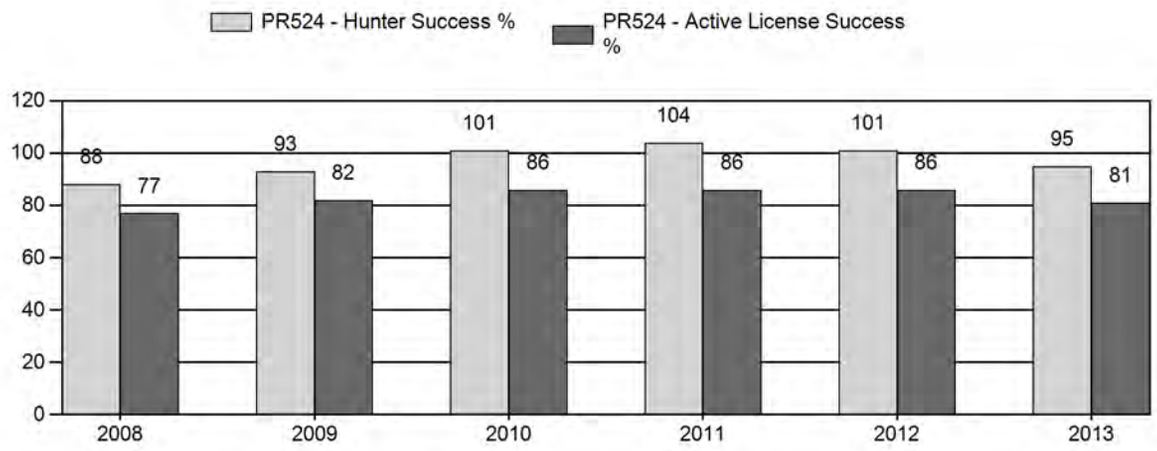
Harvest



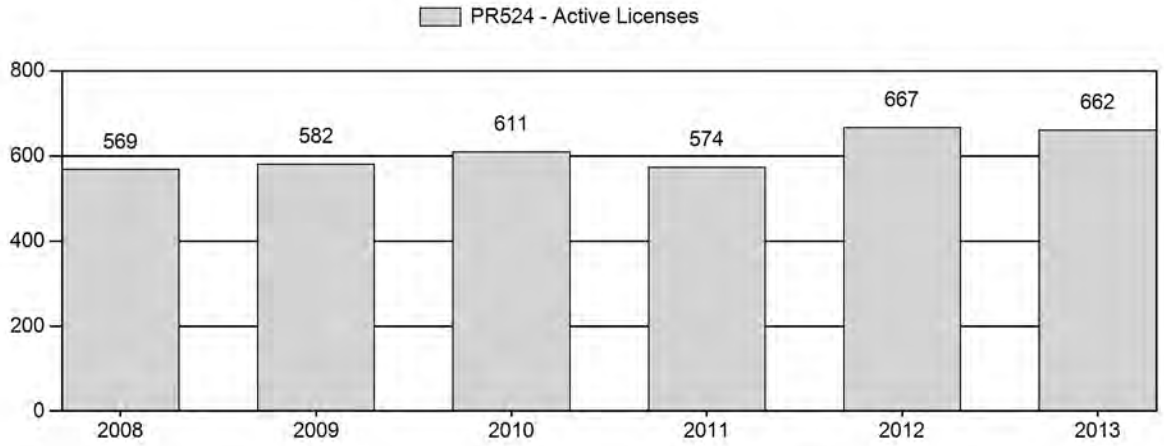
Number of Hunters



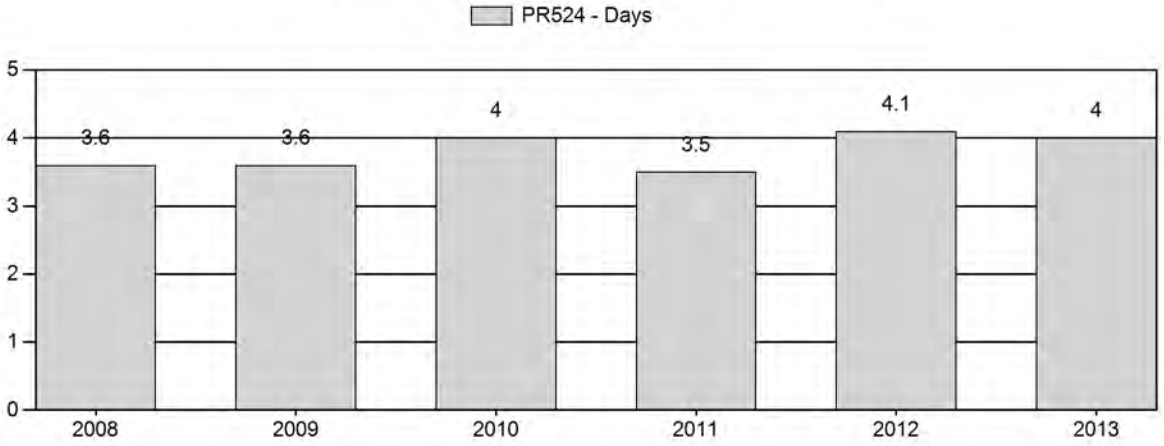
Harvest Success



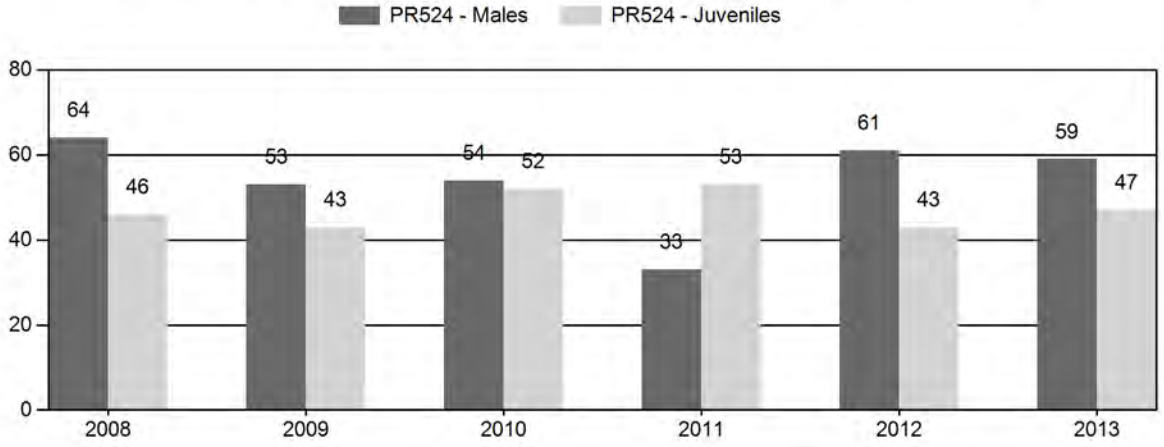
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR524 - DWYER

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	5,500	102	258	360	31%	560	47%	259	22%	1,179	984	18	46	64	± 6	46	± 5	28
2009	5,200	60	123	183	27%	345	51%	147	22%	675	1,036	17	36	53	± 7	43	± 6	28
2010	5,200	78	113	191	26%	356	49%	185	25%	732	807	22	32	54	± 7	52	± 7	34
2011	5,000	56	115	171	18%	512	54%	271	28%	954	1,345	11	22	33	± 4	53	± 6	40
2012	4,500	93	106	199	30%	326	49%	140	21%	665	1,224	29	33	61	± 8	43	± 7	27
2013	6,000	105	221	326	29%	552	49%	258	23%	1,136	1,146	19	40	59	± 6	47	± 5	29

2014 HUNTING SEASONS
DWYER PRONGHORN HERD (524)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
103	1	Oct. 5	Oct. 31	375	Limited quota; any antelope
	6	Oct. 5	Dec. 31	250	Limited quota; doe or fawn
	7	Oct. 5	Dec. 31	175	Limited quota; doe or fawn valid in that portion of Area 103 south of Cottonwood Creek.
Archery		Aug. 15	Oct. 4	Refer to Section 3 of this Chapter	

Hunt Area	Type	Quota change from 2013
103	1	0
103	6	+50
103	7	-50

Management Evaluation
Current Management Objective: 4,000
Management Strategy: Recreational
2013 Post-season Population Estimate: ~5,400
2014 Post-season Population Estimate: ~5,400

Management Issues
The management objective for the Dwyer Pronghorn Herd Unit is a post-season population objective of 4,000 pronghorn. The management strategy is recreational management with a 20-59 buck:100 doe ratio range. The objective and management strategy were last revised in 2000 and were reviewed again in 2014. After several rounds of public meetings and internal recommendations the Laramie Region will propose to the Wyoming Game and Fish Commission in June, 2014 to maintain a numeric objective of 4,000 with a recreational management strategy.

This population had been trending downward from a high of 6,200 in 2003. The last line-transect survey was conducted in June 2003 and resulted in an estimated population of 5,800 pronghorn. There will be a LT conducted at the end of the 2013 biological year.

There has been very little in the way of land conversion to urban or industrial development. The herd unit is comprised of native rangeland and irrigated cropland (alfalfa is the main crop). The herd unit is 82% private land, 14% BLM and 4% state land. Access to private land drives harvest and without the department's Private Lands Public Wildlife (PLPW) program opportunity would be limited. Unfortunately there was a loss of acres that were enrolled into the Walk in Areas (WIA) program. However, landowner's that experience crop damage have opened up access and after the 2014 herd objective review process several landowners came forward and stated they would allow access for the 2014 season.

Weather
Weather during 2013 and into 2014 was wetter and colder than normal. Pre-season fawn ratios of 47:100 were higher than 2012 by 8% and were slightly higher than the ten-year average of 45:100. The increase is most likely a result of mild winter conditions and above average

summer/fall moisture. Ungulates went into the winter in good body condition as a result of the fall moisture. Winter conditions were somewhat mild with low snowpack but with periods of extreme cold temperatures, followed by periods of above freezing. Refer to the following websites for weather data: http://www.ncdc.noaa.gov/temp-and-precip/time-series/ and http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html.

Habitat

We do not have established habitat transects for this herd. Mule deer transects were established in 2000 for the Laramie Mountains Mule Deer Herd Unit, which overlays the Dwyer Herd Unit. Transect data from mixed mountain shrubs communities indicate the shrubs are decadent with little nutrient value. Mountain mahogany (*Cercocarpus montanus*), Antelope bitterbrush (*Purshia tridentate*) and Skunkbrush sumac (*Rhus trilobata*) are the three shrub species monitored. Transect data indicates the shrubs have little reproduction (except bitterbrush), are underutilized (except bitterbrush) and it appears that deer are keying in on other shrub species. No sagebrush species are monitored for pronghorn use.

Field Data

Fawn production typically runs around 45 fawn:100 does. However, the only time the classification sample size was met in the last ten years was 2008, (44 fawns:100 does). Sample size with a 90% C.I. was met the past five years. In 2013 the sample size of 1,136 was slightly lower than the 90% C.I. of 1,146 (page 4 of the 2013 JCR). The majority of this herd unit is dependent on mild winters and average to above average spring precipitation. Pronghorn will migrate to higher elevations (~7,000 ft) as green up occurs. However, if winter conditions force the herd to move onto winter range sooner in the fall or leave later in the spring, the herd will become dependent on agricultural crops (mainly irrigated alfalfa). This holds true for drought conditions as well. As with any herd, fawn production is based on animal health, available habitat and weather conditions. During the past ten years one of more of these factors has contributed to poor fawn production.

Bucks per 100 does have fluctuated from a low of 30:100 to a high of 64:100 in the last ten years, well within recreational management levels. Since the majority of the herd unit is comprised of private land adult male survival is typically higher than herd units with predominately public lands. Private land is usually not open to the general public hunting. This is most likely the explanation for buck ratios on the upper end of the recreational management range.

Hunter satisfaction for 2013 was 85%, similar to the three-year average of 87%. Based on hunter contacts during the 2013 hunting seasons there were plenty of positive comments about opportunity provided by the PLPW program. Hunters that did not ask for permission or find available state lands were disgruntled and no happy with their hunt, so the high satisfaction rate is somewhat surprising.

Harvest Data

When analyzing overall harvest statistics for the past five years hunter success and effort have fluctuated only slightly. There has not been any major change to the landscape and for the most part access has remained the same. There has been a decrease in acres enrolled into the Walk-in Area (WIA) program, but at the same time some access has opened up on private land for doe harvest. However, the Type 7 licenses experienced a decrease in success and a sharp increase in effort. In the 2015 season setting process this license type will be considered for removal. It no longer seems necessary to force hunters south of Cottonwood Creek to address damage issues. By allowing the hunter the opportunity to hunt the entire area they will no longer be forced into

an area and have a unsuccessful hunt if the access is not there. It is expected that harvest trends will most likely remain stable unless there is a drastic change (more or less) in hunting access.

Population

The "Constant Juvenile – Constant Adult Survival" (CJCA) spreadsheet model was chosen to use for the post season population estimate of this herd with a population estimate of 5,400. This is a fair model for the following reasons: 1) there is adequate population data, 2) Simulations run through 3 out of the 4 independent density estimates and 3) the model aligns well with observed data. For further information the reader is referred to Morrison, 2012. The model's AIC score was significantly lower than the other two models. A decreasing population trend is consistent with poor fawn production, at times low buck ratios and personnel, landowner and hunter observations. A line-transect will be conducted for the 2013 biological year to provide an additional density estimate.

Management Summary

Seasons have traditionally opened on October 5th and run through the end of October, with the exception of late doe/fawn seasons. License numbers have fluctuated from 600 to 900 in the last ten years. At times irrigated alfalfa fields have any were from 200-300 pronghorn foraging on them in August-October, and then again later in the winter. The number of doe/fawn permits throughout the hunt area have increased to address damage and to decrease the population. The Type 7 license was decreased by 50 licenses. Hunter densities appear to have reached their saturation point and there have been fewer damage situations south of Cottonwood Creek. Unless there is a need, this license type will most likely be removed from the 2015 packet and evaluated during the season setting process. Type 1 licenses will remain the same as the 2013 season at 375. Lack of access for bucks precludes an increase for Type 1 licenses.

If the projected harvest of 525 pronghorn is attained coupled with normal fawn recruitment and survival the pronghorn population will remain around 5,400, 35% above the objective of 4,000.

Literature cited:

Morrison, T. (2012) User Guide: Spreadsheet Model for Ungulate Population data, *draft*. Cooperative Fish and Wildlife Research Unit, 29

INPUT	
Species:	Pronghorn
Biologist:	Martin Hicks
Herd Unit & No.:	PH524
Model date:	02/06/14

☑ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	123	132	☑ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	82012	82021	☐ SCJ,SCA Mod	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	1708	1817	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	934	1628	3815	**6377**	934	1498	3790	**6222**	1670	3830	**5499**				4000
1994	1905	1636	3753	**7294**	1898	1317	3665	**6881**	1766	3989	**5754**				4000
1995	1253	1730	3909	**6892**	1246	1413	3781	**6441**	1665	3903	**5568**				4000
1996	1846	1632	3825	**7303**	1835	1322	3674	**6832**	1752	3973	**5724**	5800	940		4000
1997	1470	1717	3893	**7080**	1470	1419	3673	**6561**	1738	3861	**5599**				4000
1998	1501	1703	3784	**6989**	1484	1400	3627	**6510**	1720	3823	**5543**	5100	670		4000
1999	1537	1686	3746	**6970**	1494	1382	3556	**6433**	1702	3752	**5453**				4000
2000	1784	1668	3677	**7128**	1762	1368	3490	**6620**	1772	3772	**5544**	5500	760		4000
2001	1722	1736	3697	**7155**	1707	1448	3530	**6685**	1833	3797	**5631**				4000
2002	1315	1797	3721	**6833**	1299	1456	3567	**6323**	1716	3714	**5430**				4000
2003	1429	1682	3640	**6751**	1401	1370	3445	**6216**	1665	3623	**5288**	5800	890		4000
2004	1380	1632	3551	**6563**	1362	1287	3358	**6007**	1576	3532	**5108**				4000
2005	1347	1544	3461	**6352**	1321	1235	3279	**5835**	1516	3445	**4961**				4000
2006	2212	1486	3376	**7073**	2161	1237	3208	**6606**	1763	3620	**5384**				4000
2007	1061	1728	3548	**6336**	1037	1416	3346	**5800**	1603	3424	**5027**				4000
2008	1552	1571	3356	**6478**	1516	1297	3184	**5997**	1631	3412	**5043**				4000
2009	1425	1599	3343	**6367**	1408	1305	3127	**5840**	1610	3327	**4937**				4000
2010	1694	1578	3260	**6533**	1667	1260	3027	**5954**	1640	3305	**4945**				4000
2011	1715	1607	3239	**6561**	1689	1295	3035	**6019**	1697	3247	**4944**				4000
2012	1367	1663	3182	**6212**	1335	1355	2892	**5582**	1656	3100	**4756**				4000
2013	1420	1623	3038	**6081**	1415	1324	2755	**5494**	1626	2999	**4624**				4000
2014	1469	1593	2939	**6001**	1464	1285	2675	**5424**							
2015															
2016															
2017															
2018															
2019															
2020															
2021															
2022															
2023															
2024															
2025															

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.57			0.92		
1994	0.57			0.92		
1995	0.57			0.92		
1996	0.57			0.92		
1997	0.57			0.92		
1998	0.57			0.92		
1999	0.57			0.92		
2000	0.57			0.92		
2001	0.57			0.92		
2002	0.57			0.92		
2003	0.57			0.92		
2004	0.57			0.92		
2005	0.57			0.92		
2006	0.57			0.92		
2007	0.57			0.92		
2008	0.57			0.92		
2009	0.57			0.92		
2010	0.57			0.92		
2011	0.57			0.92		
2012	0.57			0.92		
2013	0.57			0.92		
2014	0.57			0.92		
2015						
2016						
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2021						
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2023						
2024						
2025						

Parameters:	Optim cells
Juvenile Survival =	0.574
Adult Survival =	0.920
Initial Total Male Pop/10,000 =	0.163
Initial Female Pop/10,000 =	0.382

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		24.48	1.62	42.67	46.31	2.41	118	23	0	141	8.0	0.7
1994		50.76	4.81	43.60	37.16	3.92	290	80	6	376	19.5	2.3
1995		32.04	2.30	44.26	40.52	2.66	288	116	6	410	18.3	3.3
1996		48.26	3.22	42.65	41.16	2.90	281	137	10	428	18.9	3.9
1997		37.75	2.81	44.09	48.86	3.33	271	200	0	471	17.4	5.7
1998		39.67	2.75	45.02	38.03	2.68	276	143	16	435	17.8	4.2
1999		41.03	3.60	45.00	53.36	4.28	276	173	39	488	18.0	5.1
2000		48.51	4.63	45.36	57.74	5.21	272	170	20	462	17.9	5.1
2001		46.57	4.02	46.97	57.68	4.64	262	152	13	427	16.6	4.5
2002		35.33	3.78	48.28	50.00	4.74	310	140	14	464	19.0	4.1
2003		39.25	3.57	46.21	48.13	4.08	284	177	25	486	18.6	5.3
2004		38.88	3.48	45.96	40.00	3.55	313	175	17	505	21.1	5.4
2005		38.90	3.45	44.61	52.31	4.18	281	166	23	470	20.0	5.3
2006		65.51	5.61	44.00	50.43	4.69	226	153	46	425	16.7	5.0
2007		29.89	3.72	48.71	29.54	3.69	284	183	21	488	18.1	5.7
2008		46.25	3.48	46.80	64.29	4.34	249	156	33	438	17.4	5.1
2009		42.61	4.20	47.82	53.04	4.85	267	197	15	479	18.4	6.5
2010		51.97	4.71	48.40	53.65	4.81	289	212	25	526	20.1	7.2
2011		52.93	3.98	49.61	33.40	2.95	284	186	23	493	19.4	6.3
2012		42.94	4.34	52.25	61.04	5.49			264	573	18.5	9.1
2013		46.74	3.52	53.44	59.06	4.13			257	533	18.4	9.3
2014		50.00	3.87	54.22	62.00	4.48			240	525	19.3	9.0
2015												
2016												
2017												
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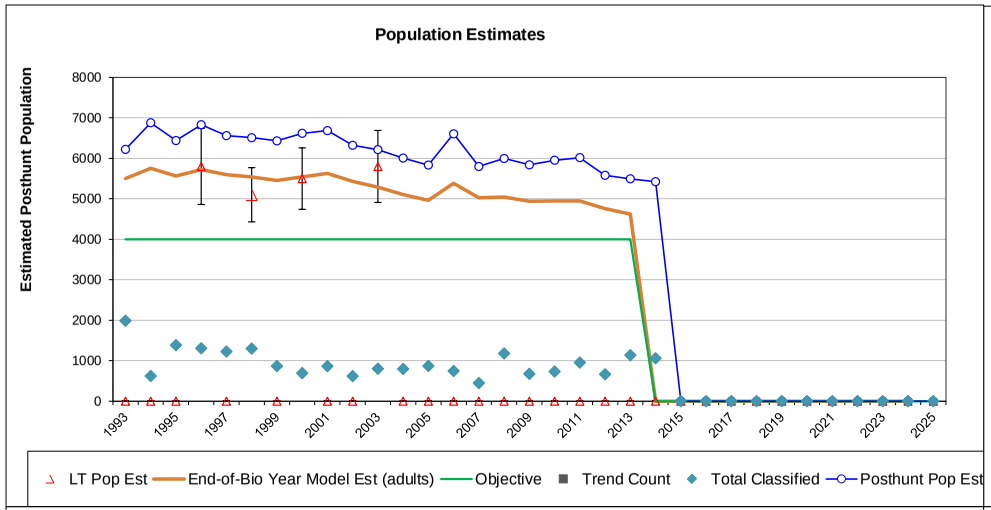
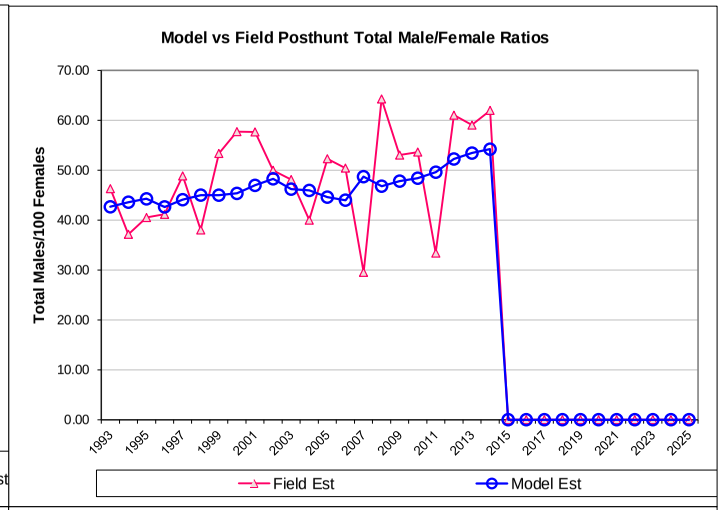
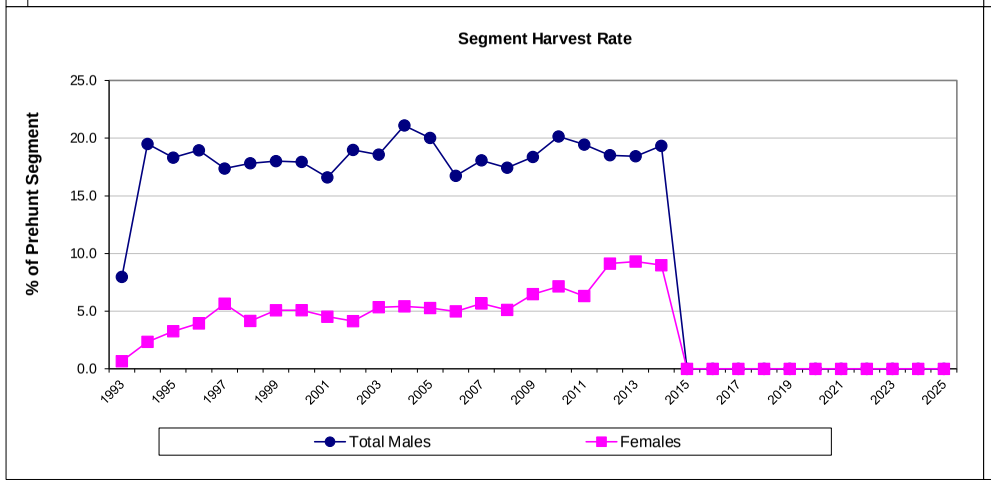
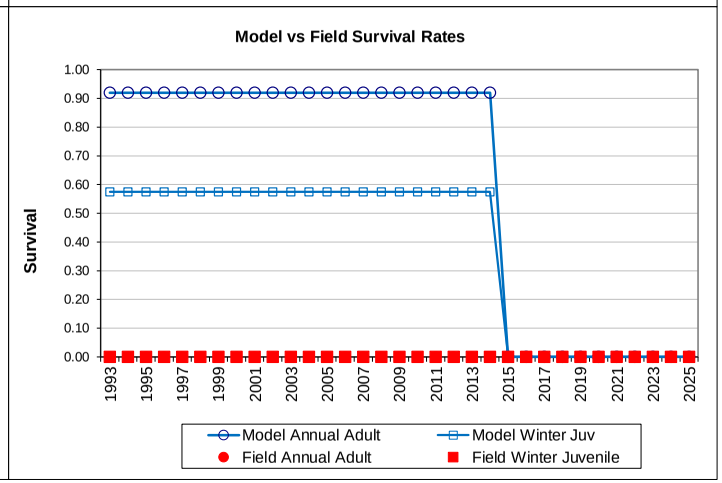
2023												
2024												
2025												

FIGURES









Comments:

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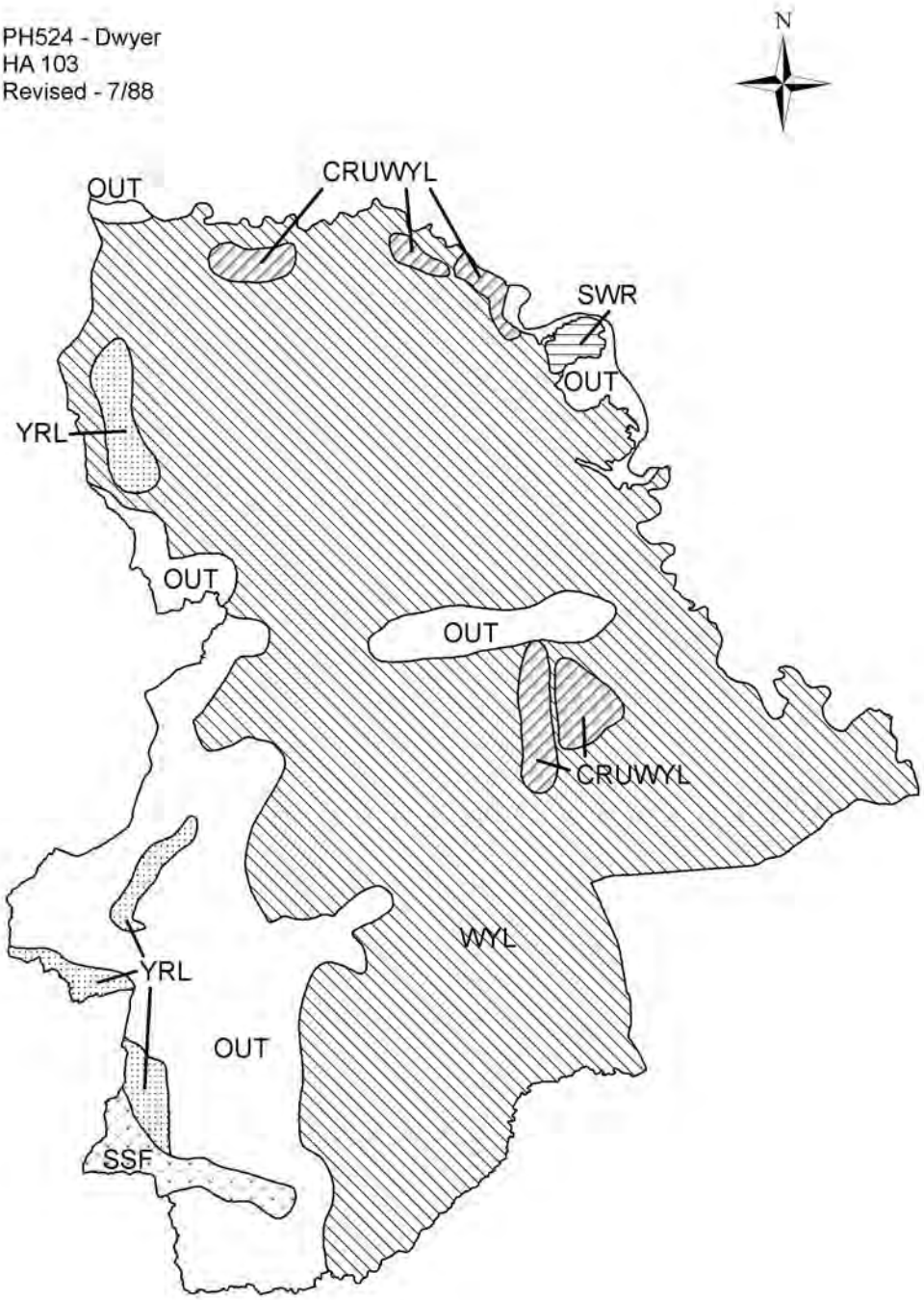
PH524 - Dwyer
HA 103
Revised - 7/88



2013 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2013 - 5/31/2014

HERD: PR525 - MEDICINE BOW

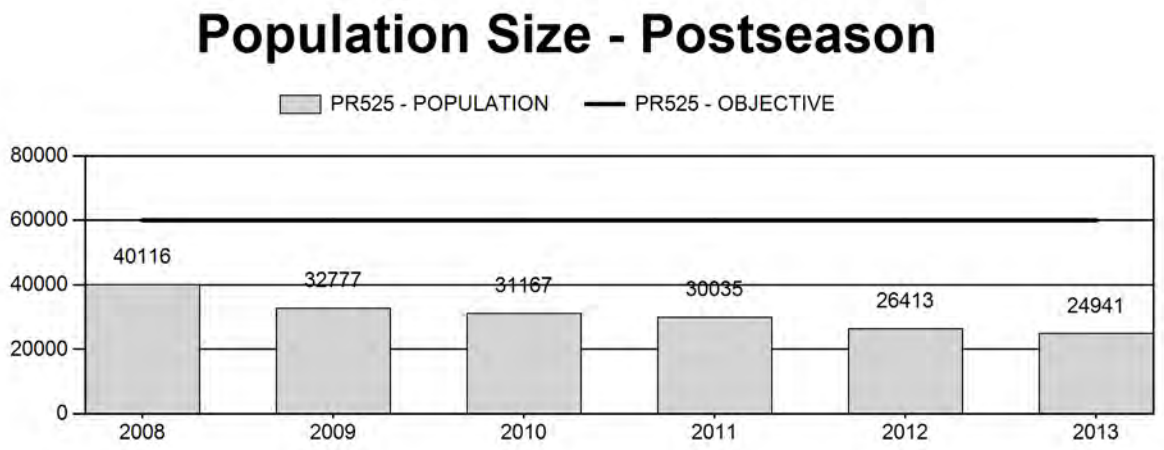
HUNT AREAS: 30-32, 41-42, 46-48 | PREPARED BY: LEE KNOX

	2008 - 2012 Average	2013	2014 Proposed
Population:	32,102	24,941	31,479
Harvest:	7,001	4,140	2,560
Hunters:	7,626	5,028	2,800
Hunter Success:	92%	82%	91%
Active Licenses:	8,404	5,627	3,200
Active License Percent:	83%	74%	80%
Recreation Days:	24,067	16,282	9,000
Days Per Animal:	3.4	3.9	3.5
Males per 100 Females	49	34	
Juveniles per 100 Females	62	63	

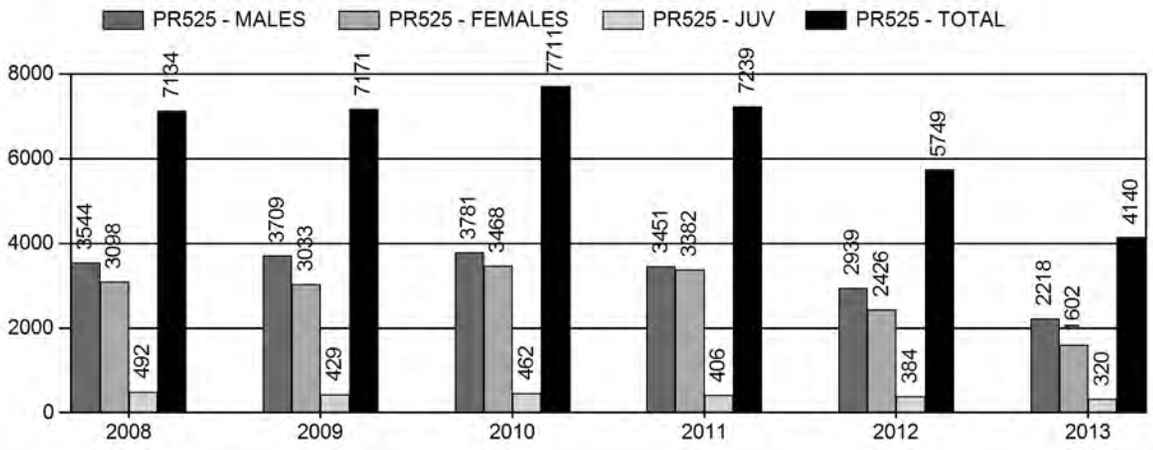
Population Objective:	60,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-58.4%
Number of years population has been + or - objective in recent trend:	8
Model Date:	5/13/2014

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

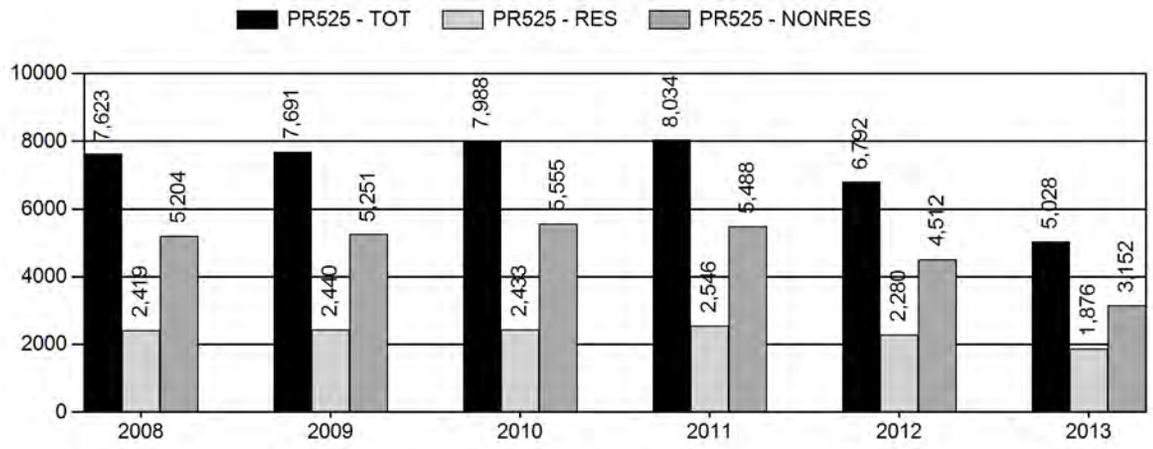
	JCR Year	Proposed
Females ≥ 1 year old:	11.8%	2.8%
Males ≥ 1 year old:	20.9%	29.1%
Juveniles (< 1 year old):	2%	1%
Total:	10.51%	8%
Proposed change in post-season population:	4%	20%



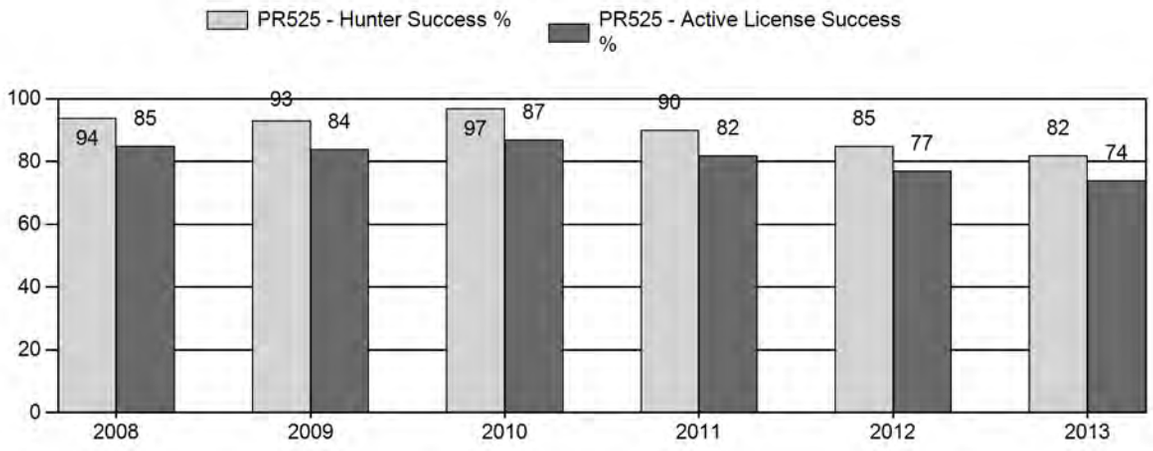
Harvest



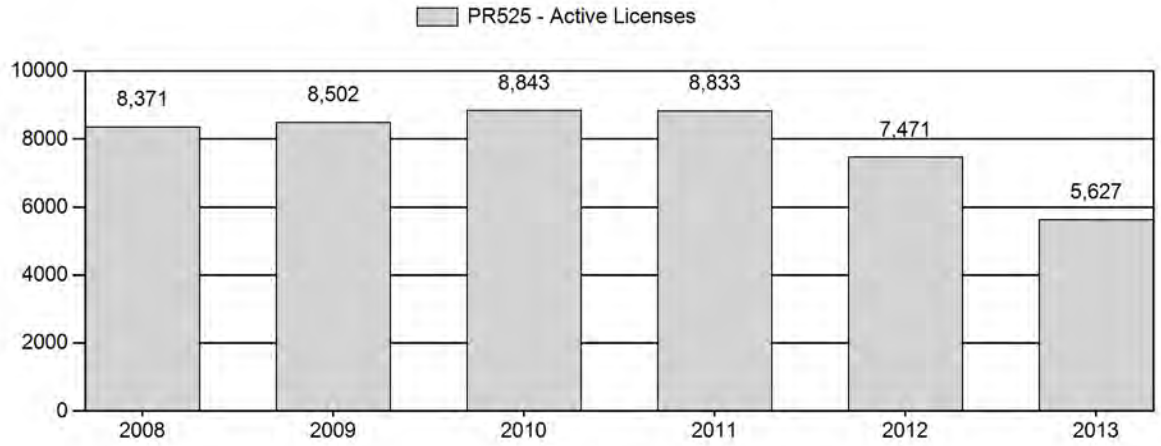
Number of Hunters



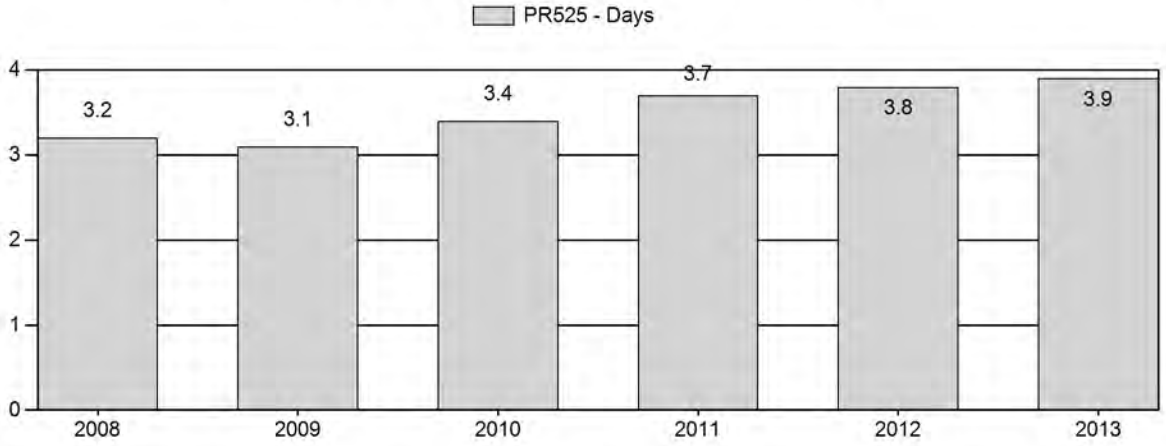
Harvest Success



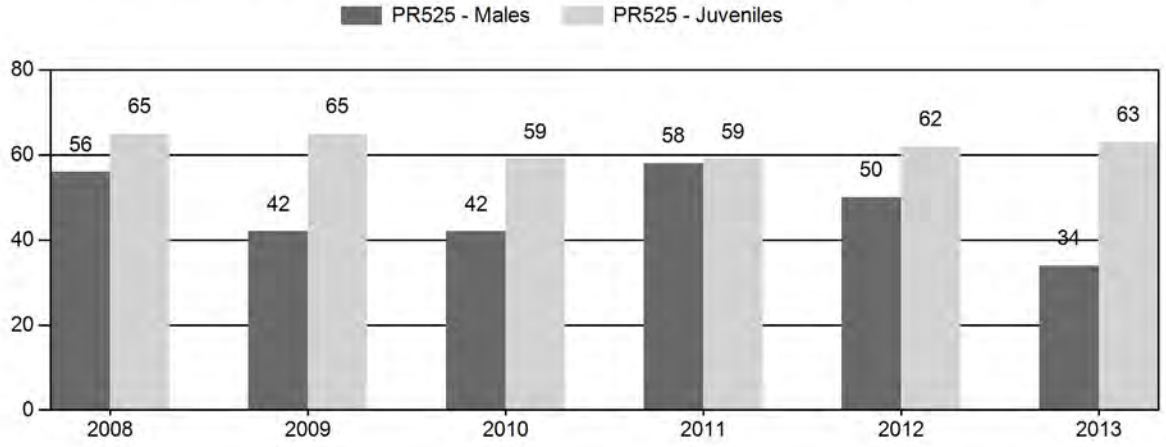
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR525 - MEDICINE BOW

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	37,435	427	906	1,333	25%	2,383	45%	1,547	29%	5,263	2,469	18	38	56	± 3	65	± 3	42
2009	31,355	451	940	1,391	20%	3,290	48%	2,149	31%	6,830	2,289	14	29	42	± 2	65	± 3	46
2010	31,142	446	840	1,286	21%	3,072	50%	1,809	29%	6,167	1,978	15	27	42	± 2	59	± 3	42
2011	34,419	299	994	1,293	27%	2,222	46%	1,306	27%	4,821	2,104	13	45	58	± 3	59	± 3	37
2012	30,060	312	616	928	24%	1,857	47%	1,143	29%	3,928	2,433	17	33	50	± 3	62	± 4	41
2013	27,634	301	614	915	17%	2,708	51%	1,698	32%	5,321	2,221	11	23	34	± 2	63	± 3	47

2014 HUNTING SEASONS
MEDICINE BOW PRONGHORN (PR525)

Hunt Area	Type	Dates of Opens	Season Closes	Quota	Limitations
30	1	Oct. 5	Oct. 31	400	Limited quota licenses; any antelope
	6	Oct. 5	Oct. 31	50	Limited quota licenses; doe or fawn
31	1	Sep. 25	Oct. 31	150	Limited quota licenses; any antelope
	6	Sep. 25	Oct. 31	50	Limited quota licenses; doe or fawn
32	1	Sep. 25	Oct. 31	300	Limited quota licenses; any antelope
	6	Sep. 25	Oct. 31	200	Limited quota licenses; doe or fawn
41	1	Sep. 25	Oct. 31	50	Limited quota licenses; any antelope
	6	Sep. 25	Oct. 31	50	Limited quota licenses; doe or fawn
42	1	Sep. 25	Oct. 31	400	Limited quota licenses; any antelope
	6	Sep. 25	Oct. 31	50	Limited quota licenses; doe or fawn
46	1	Sep. 25	Oct. 31	100	Limited quota licenses; any antelope
	2	Oct. 5	Oct. 31	150	Limited quota licenses; any antelope
	6	Sep. 25	Oct. 31	75	Limited quota licenses; doe or fawn
	7	Oct. 5	Oct. 31	75	Limited quota licenses; doe or fawn
47	1	Sep. 25	Oct. 31	400	Limited quota licenses; any antelope
	2	Oct. 5	Oct. 31	150	Limited quota licenses; any antelope
	6	Sep. 25	Oct. 31	75	Limited quota licenses; doe or fawn
	7	Oct. 5	Oct. 31	75	Limited quota licenses; doe or fawn
48	1	Sep. 25	Oct. 31	150	Limited quota licenses; any antelope
	2	Oct. 5	Oct. 31	150	Limited quota licenses; any antelope
	6	Sep. 25	Oct. 31	50	Limited quota licenses; doe or fawn
	7	Oct. 5	Oct. 31	50	Limited quota licenses; doe or fawn
Archery					
30,31,32,41, 42,46,47,48		Aug. 15			Refer to Section 3 of this Chapter

Area	Type	Change from 2012
30	1	-100
	6	-150
31	1	-200
	6	-150
32	1	-100
	6	-200
42	1	-150
	6	-150
46	1	-50
	2	-100
	6	-175
	7	-225
47	1	-300
	2	-100
	6	-475
	7	-175
48	1	-50
	2	-50
	6	-250
	7	-250
Herd Totals	**1 & 2**	**-1200**
	6 & 7	**-2200**
	TOTAL	**-3400**

Management Evaluation
Current Postseason Population Management Objective: 60,000
Management Strategy: Recreational
2013 Postseason Population Estimate: ~ 25,000
2014 Proposed Postseason Population Estimate: ~ 31,500

The management objective for the Medicine Bow Pronghorn Herd Unit is a postseason population objective of 60,000. The management strategy is recreational management which requires maintaining for buck ratios of 20 to 59:100 does. The objective and management strategy were last revised in 2001 and is scheduled to be reviewed in 2014.

Herd Unit Issues
The Medicine Bow Herd Unit encompasses hunt areas 30, 31, 32, 41, 42, 46, 47 and 48. These hunt areas vary between predominantly public land and exclusively private land. Large scale wind farms and coal mining within this herd and may be negatively impacting habitat and productivity. Field staff documented Epizootic Hemorrhagic Disease (EHD) throughout the herd unit and in certain hunt areas observed drastic reductions in populations. It was thought for many years that poor habitat conditions in the Medicine Bow Herd Unit warranted a reduction in population size below objective. Our harvest strategy has been to reduce the population to a level that will allow range conditions to improve; however, we do not have data to demonstrate it

is working or how long the population would have to be suppressed to see a positive effect on habitat. The current population is not acceptable to the public or landowners and we will manage this herd to increase the population to a objective. The 2013 post-season population estimate was about 25,000 with the population decreasing from a high of 49.700 in 2004.

Weather

Weather during the spring and summer of 2013 remained extremely dry. The Palmer Drought Severity Index (PDSI) ranked drought conditions in SE Wyoming as extreme through the month of August although the southern portion of this herd started receiving moisture in July. The fall of 2013 was ranked as extremely wet with September 2013 being the wettest September recorded in Laramie. For specific weather information please refer to the following link: http://www.ncdc.noaa.gov/.

Habitat

Turnover in personnel, changes in individual job responsibilities of employees, and evolving WGFD agency priorities have resulted in some issues with consistent habitat data collection and interpretation of data. Some transects, years after their initial establishment, have been identified as being in "non-representative" locations. Site selection was often influenced by terrain and/or land ownership status (i.e public access). Changing land uses (wind turbines, roads, fence construction, other developments, etc.) have influenced habitat use by wildlife in some locations, and in some instances have resulted in major shifts in animal usage of the area being monitored. Department personnel are currently evaluating shrub transects and the types of information being collected, and will be looking for ways to improve efficiency of data collection, types of data being collected, and refining criteria for site selection for future transects. The reader is referred to the Strategic Habitat Plan Annual Report for further background information on shrub transects.

Field Data

A total of 5,321 pronghorn were classified in 2013, exceeding the estimated classification objective of 2,221. Buck ratios declined for the third straight year to 34:100 does, approaching the low end of recreational management. Both mature and yearling buck numbers were notably down by 32%. Classification methods were changed from aerial to ground in 2013 and may have influenced the buck ratio, but most likely drought and EHD were the dominant factors. With the dry spring fawn ratios were anticipated to be low but they remained at 63 fawns:100 does. The hunter satisfaction survey shows 80% of hunters were either satisfied or very satisfied with their hunt with 9.8% remaining neutral, which is comparable to past years. This is surprising since a majority of hunters checked in the field commented that they had a difficult time finding pronghorn compared to past years. During field checks this hunting season 406 pronghorn were aged by analyzing the front incisors. Over 50% of the males and females harvested were over 3 years old, which in the past is typically over 70%, indicating we are over harvesting.

Harvest Data

Hunter success for all active licenses types declined for the third straight year to 74% from the long term average of 84%, and hunter effort increased by a day in 2013. Hunters had a difficult time finding pronghorn. We received 27 days of moisture in September and 15 days of rain in October for a minimum of 5 inches of precipitation total. Hunters had a difficult time getting

around in the muddy conditions and many got stuck. The Natrona County Sheriff's office flew the northern part of the herd unit and sent help to stranded hunters. There was a distinct drop in hunter success in seasons that opened on Oct. 5th due to these conditions. EHD caused large declines in populations that were noticed during hunting season in hunt areas 30, 31, 47 48 and 46. We have issued a liberal number of licenses for the past 6 years to purposely reduce the population to address habitat concerns. Department staff and hunters observed noticeably fewer pronghorn on the landscape, which would explain the reduction in hunter success.

Population

The spreadsheet model for this herd indicates the population is declining with a post hunt population of 24,941. This estimate was derived using the time-Specific juvenile and Constant Adult Survival model which had a AIC score of 264 and a best fit score of 160. The last usable Line transect was conducted in 2002 with an estimate of 39,551 with a standard error of 6,829. Line Transects were also conducted in 2007 and 2012 but are not usable due to data collection issues, severe drought, and extremely large standard errors. The model is of good quality, predicted end of year population trends align well with past line transect estimates, and is comparable with what field personnel have noted from landowner and hunter comments. The model has 15-20 years of data; ratio data available for all years in model; juvenile and adult survival estimate with standard errors available at least 2 out of 10 years(Grogan et al) and at least one sample-based population estimate with standard error available.

Management Summary

The 2014 post season population is predicated to be approximately 31,500 pronghorn. If the projected harvest of 2,500 is attained and the 5 year average fawn ratio of 61 fawns: 100 does is maintained, the population should increase by 10,000 or more pronghorn. The reduction in licenses in 2013 was not enough to keep the population from decreasing further. Epizootic Hemorrhagic Disease was documented throughout the herd unit and it is still unclear how severe of an effect it had on this herd. The harvest strategy has been to reduce the population to a level that will allow range conditions to improve however; we do not have enough data to suggest it is working, or how long the population would have to be suppressed to see a positive effect. While we have reduced the pronghorn herd, livestock grazing rates have remained the same and effects to habitat are undistinguishable. With hunters and landowners becoming very concerned with the pronghorn population, current disease outbreaks, and the population estimated at 35,000 below the objective, we will be reducing licenses significantly to address these concerns.

Bibliography of Herd Specific Studies

Grogan, R. Lindzey, F. *Pronghorn survival in Wyoming.* Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie, WY, 82071, USA

INPUT	
Species:	Pronghorn
Biologist:	Lee Knox
Herd Unit & No.:	Medbow Pronghorn
Model date:	02/03/14

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	362	370	☐ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	40716	40725	☐ SCJ,SCA M	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	160	264	☑ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	10495	10695	21681	**42870**	9935	6654	17326	**33915**	7545	17303	**24849**				45000
1994	9684	7394	16957	**34036**	9375	4848	14926	**29148**	6004	15303	**21307**				45000
1995	7787	5884	14997	**28667**	7639	3953	13941	**25533**	5856	15109	**20965**				45000
1996	10523	5739	14807	**31069**	10442	4009	14269	**28720**	8290	17827	**26117**				45000
1997	9693	8125	17470	**35288**	9579	6069	16610	**32257**	9749	19543	**29291**	37921			45000
1998	12291	9554	19152	**40997**	12251	7680	18672	**38603**	9494	19722	**29217**				45000
1999	11556	9304	19328	**40188**	11451	7099	18604	**37154**	8591	19299	**27890**	20726	4656		45000
2000	12487	8419	18913	**39818**	12363	5565	17979	**35907**	8868	20455	**29323**				60000
2001	12295	8690	20046	**41031**	12121	6156	19068	**37345**	9766	21772	**31538**				60000
2002	13253	9570	21337	**44160**	13014	6622	19992	**39629**	11736	24167	**35903**	39551	6829		60000
2003	15577	11501	23684	**50762**	15251	8070	21561	**44882**	14037	26549	**40586**				60000
2004	16301	13757	26018	**56075**	15833	10046	23789	**49669**	12782	25543	**38324**				60000
2005	16509	12526	25032	**54067**	16212	8764	22357	**47332**	10871	23453	**34324**				60000
2006	14315	10653	22984	**47953**	13933	6693	19780	**40407**	12112	24195	**36307**				60000
2007	16588	11869	23712	**52169**	15950	7890	20417	**44257**	11276	22840	**34115**				60000
2008	14530	11050	22383	**47963**	13989	7152	18975	**40116**	8849	19747	**28596**				60000
2009	12641	8672	19352	**40665**	12169	4592	16016	**32777**	9149	19705	**28854**				60000
2010	11372	8966	19311	**39649**	10864	4807	15497	**31167**	8944	18787	**27731**				60000
2011	10821	8765	18411	**37998**	10375	4969	14691	**30035**	6924	16396	**23320**				60000
2012	9890	6786	16068	**32743**	9469	3526	13418	**26413**	5754	14962	**20716**				60000
2013	9194	5639	14662	**29495**	8842	3199	12900	**24941**	7240	17171	**24411**				60000
2014	10372	7095	16827	**34295**	10161	4983	16334	**31479**							60000
2015															
2016															
2017															
2018															
2019															
2020															
2021															
2022															
2023															
2024															
2025															

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.40			0.90		
1994	0.40			0.90		
1995	0.63			0.90		
1996	0.90			0.90		
1997	0.90			0.90		
1998	0.42			0.90		
1999	0.40			0.90		
2000	0.65			0.90		
2001	0.71			0.90		
2002	0.90			0.90		
2003	0.90			0.90	0.77	0.05
2004	0.50			0.90	0.94	0.03
2005	0.40			0.90	0.73	0.06
2006	0.90			0.90		
2007	0.56			0.90		
2008	0.40			0.90		
2009	0.87			0.90		
2010	0.90			0.90		
2011	0.40			0.90		
2012	0.40			0.90		
2013	0.90			0.90		
2014	0.00			0.90		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

Parameters:	Optim cells
Adult Survival =	0.899
Initial Total Male Pop/10,000 =	1.069
Initial Female Pop/10,000 =	2.168

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles	Total Harvest	Total Males	Females
1993		48.40	1.07	49.33	50.67	1.11	3673	3959	509	8141	37.8	20.1
1994		57.11	1.36	43.60	42.73	1.12	2315	1847	281	4443	34.4	12.0
1995		51.92	1.17	39.23	39.18	0.97	1755	960	134	2849	32.8	7.0
1996		71.07	2.02	38.76	38.02	1.32	1573	489	73	2135	30.1	3.6
1997		55.48	1.58	46.51	46.32	1.40	1869	782	104	2755	25.3	4.9
1998		64.18	1.60	49.88	50.94	1.36	1703	436	37	2176	19.6	2.5
1999		59.79	1.70	48.14	49.44	1.50	2005	658	95	2758	23.7	3.7
2000		66.02	1.81	44.52	43.97	1.37	2595	849	112	3556	33.9	4.9
2001		61.33	2.04	43.35	43.35	1.62	2304	889	158	3351	29.2	4.9
2002		62.11	2.01	44.85	42.39	1.56	2680	1222	217	4119	30.8	6.3
2003		65.77	2.11	48.56	43.45	1.59	3119	1930	296	5345	29.8	9.0
2004		62.65	1.96	52.87	64.92	2.01	3373	2026	425	5824	27.0	8.6
2005		65.95	2.19	50.04	51.36	1.85	3420	2432	270	6122	30.0	10.7
2006		62.28	2.18	46.35	43.07	1.70	3600	2913	347	6860	37.2	13.9
2007		69.96	2.12	50.06	52.36	1.74	3618	2995	580	7193	33.5	13.9
2008		64.92	2.12	49.37	55.94	1.91	3544	3098	492	7134	35.3	15.2
2009		65.32	1.81	44.81	42.28	1.35	3709	3033	429	7171	47.0	17.2
2010		58.89	1.75	46.43	41.86	1.39	3781	3468	462	7711	46.4	19.8
2011		58.78	2.05	47.61	58.19	2.04	3451	3382	406	7239	43.3	20.2
2012		61.55	2.31	42.23	49.97	2.01			2409	5755	48.0	16.5
2013		62.70	1.94	38.46	33.79	1.29			1602	4140	43.3	12.0
2014		61.64	1.95	42.17	44.21	1.56			448	2560	29.8	2.9
2015												
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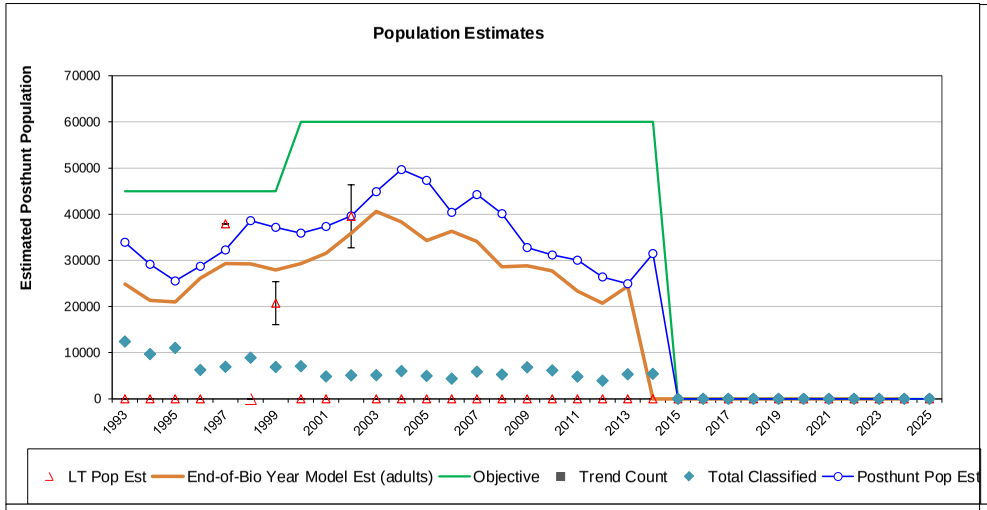
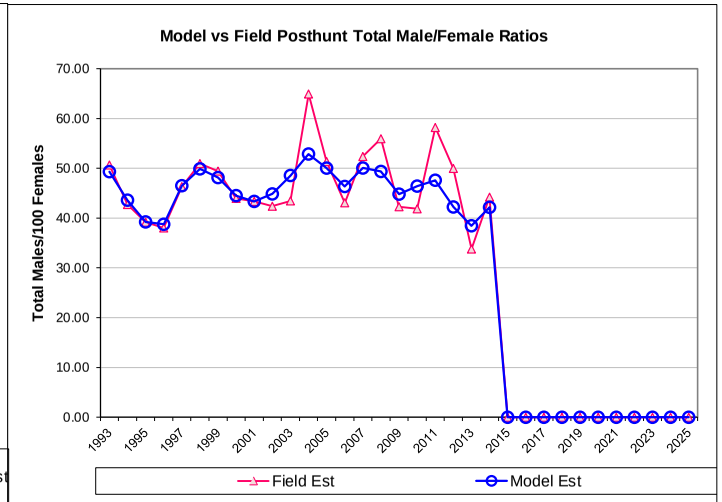
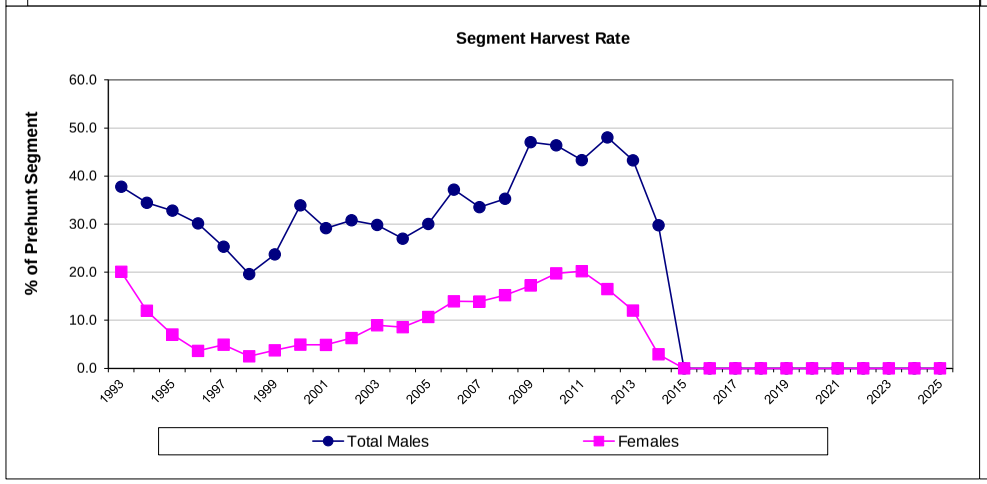
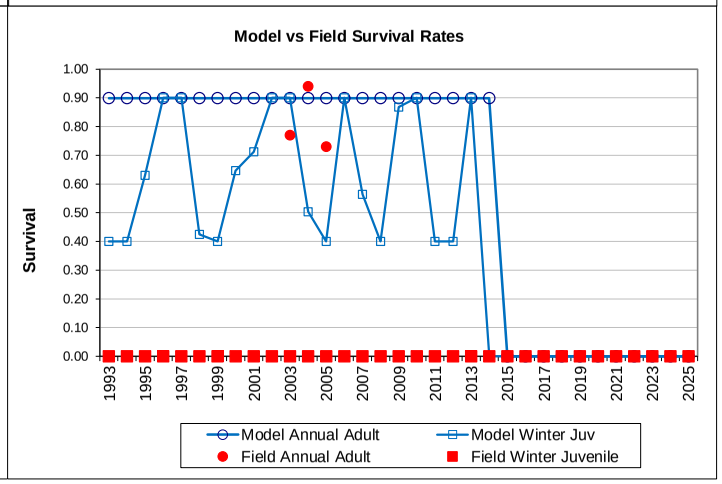
FIGURES





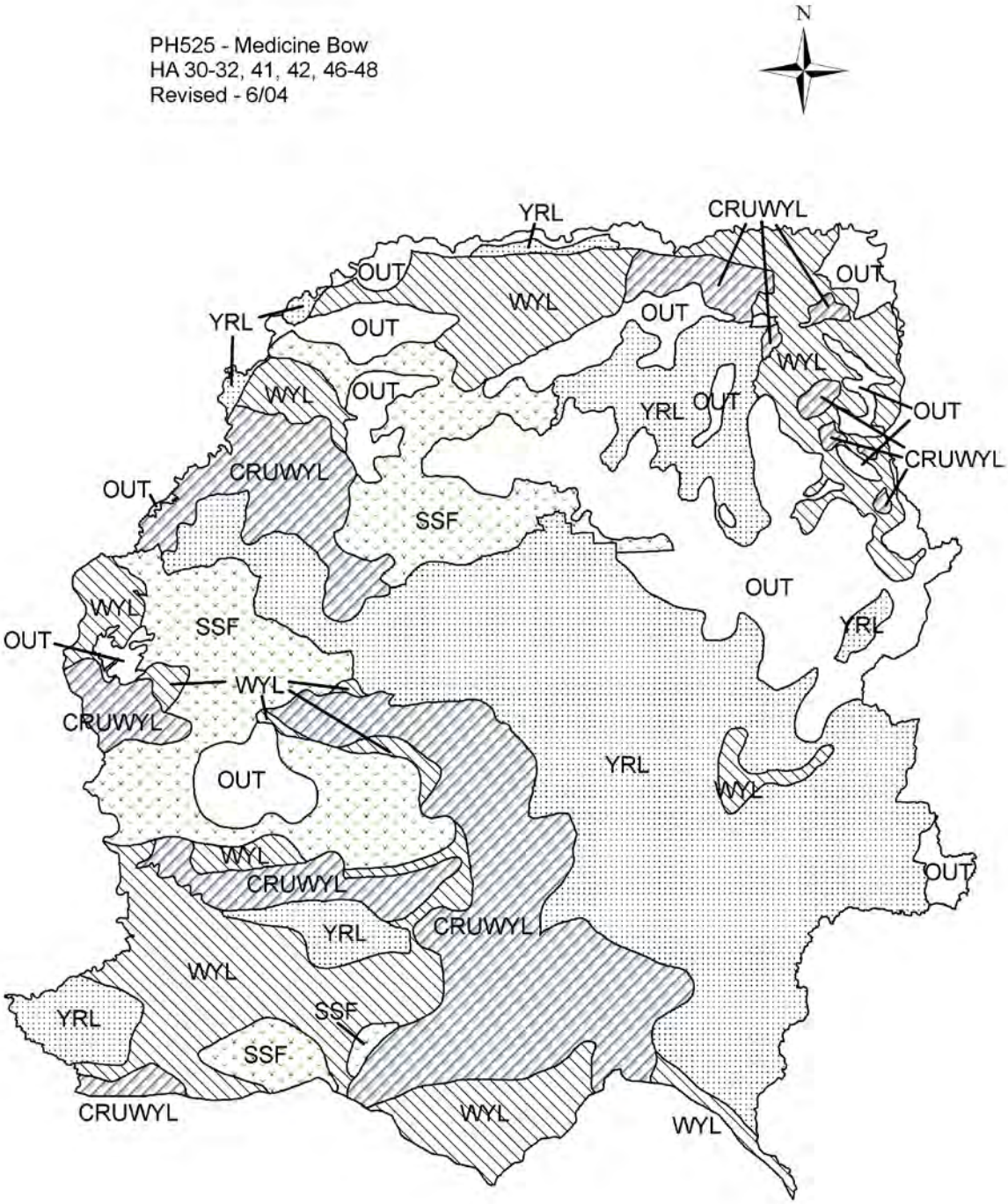




Comments:

END

PH525 - Medicine Bow
HA 30-32, 41, 42, 46-48
Revised - 6/04



2013 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2013 - 5/31/2014

HERD: PR526 - COOPER LAKE

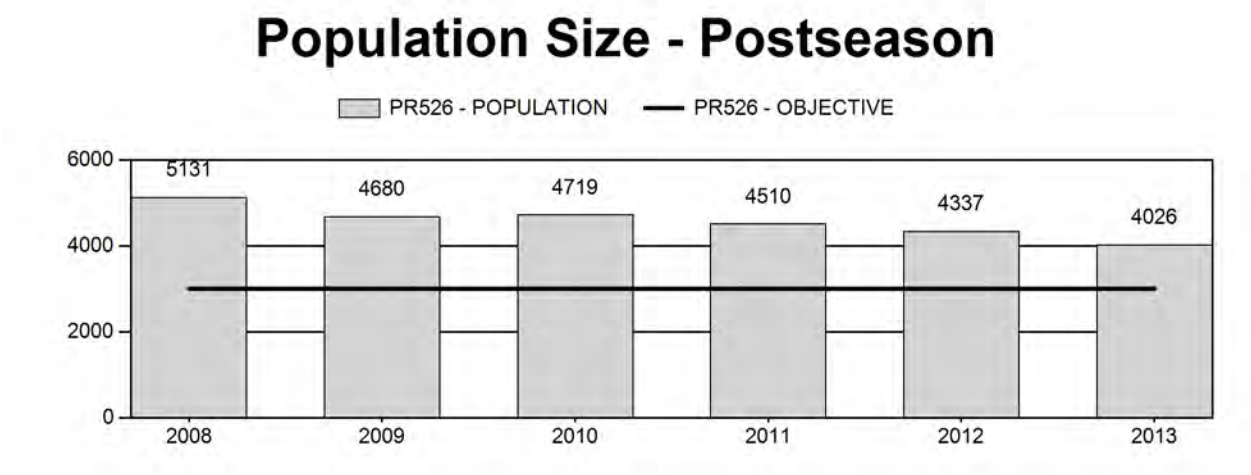
HUNT AREAS: 43 | PREPARED BY: LEE KNOX

	2008 - 2012 Average	2013	2014 Proposed
Population:	4,675	4,026	3,922
Harvest:	671	678	630
Hunters:	726	767	700
Hunter Success:	92%	88%	90 %
Active Licenses:	787	793	850
Active License Percent:	85%	85%	74 %
Recreation Days:	2,239	2,634	2,600
Days Per Animal:	3.3	3.9	4.1
Males per 100 Females	42	31	
Juveniles per 100 Females	74	77	

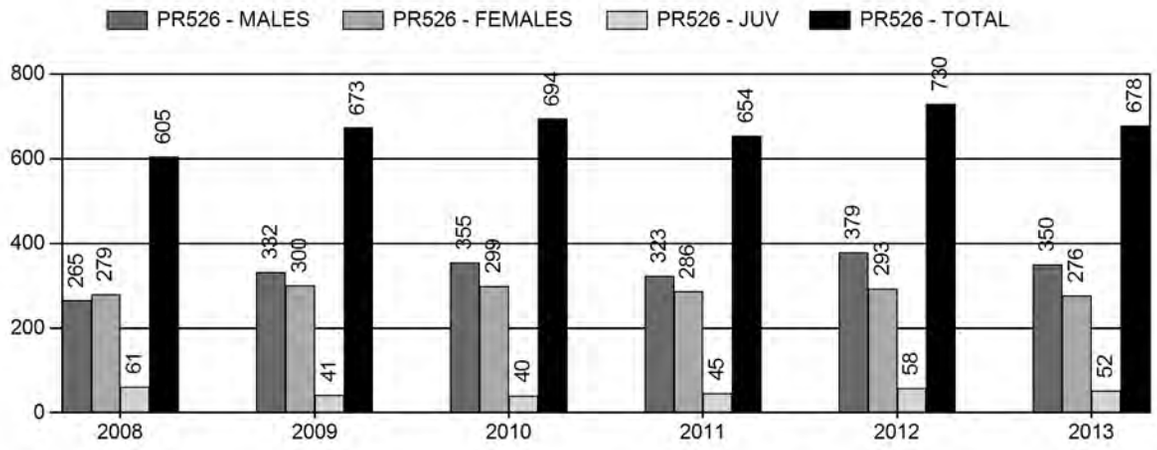
Population Objective:	3,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	34%
Number of years population has been + or - objective in recent trend:	20
Model Date:	5/12/2014

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

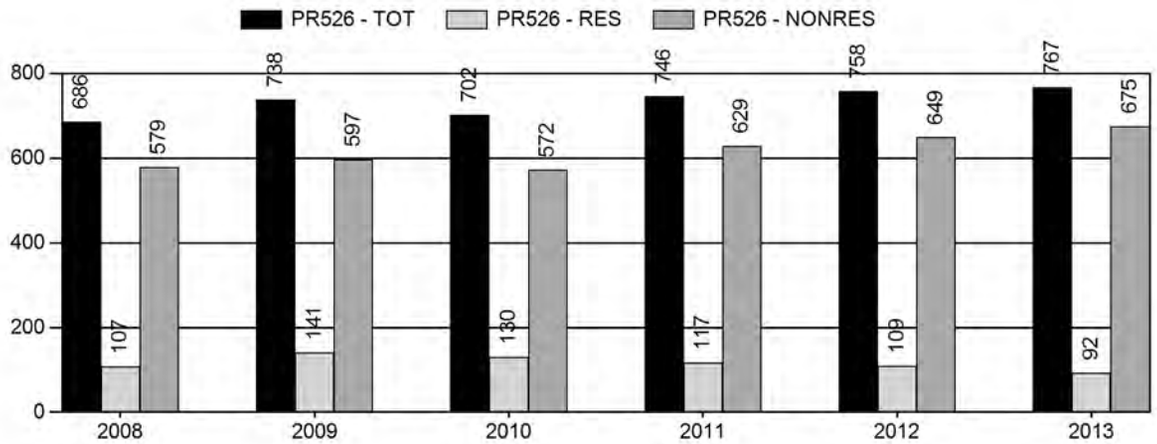
	JCR Year	Proposed
Females ≥ 1 year old:	9%	9%
Males ≥ 1 year old:	15%	15%
Juveniles (< 1 year old):	2%	2%
Total:	8%	8%
Proposed change in post-season population:	6%	6%



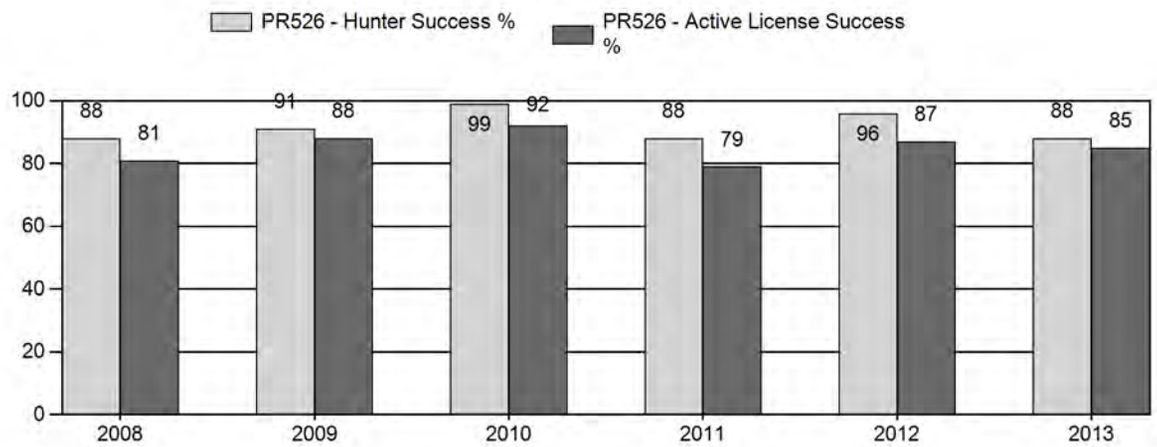
Harvest



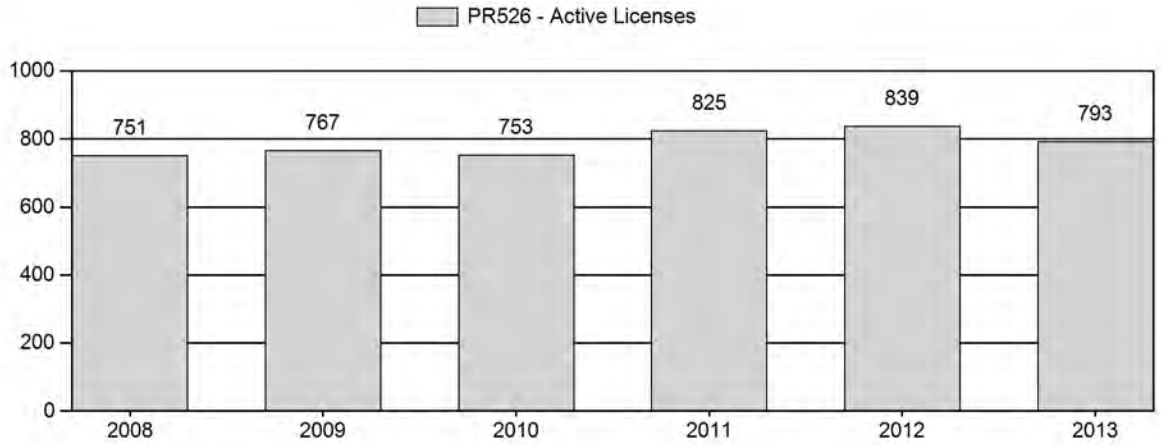
Number of Hunters



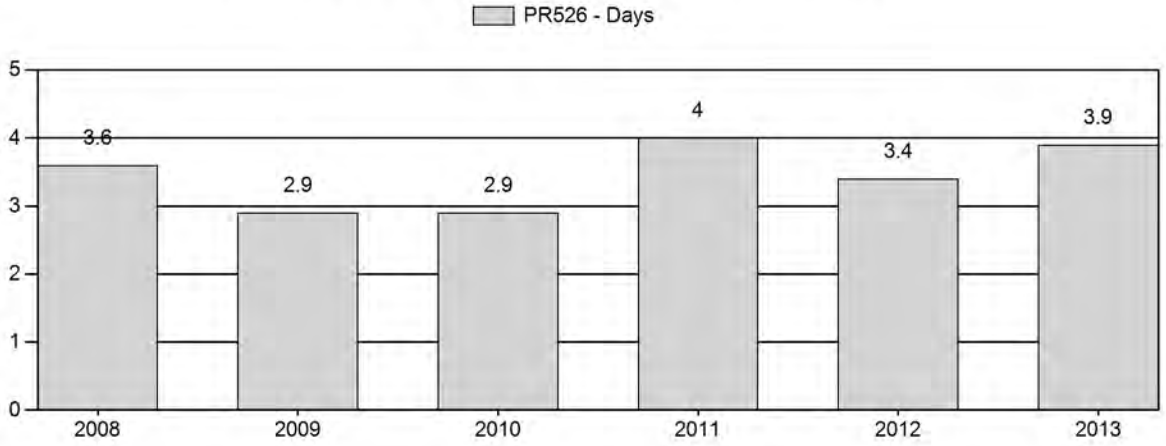
Harvest Success



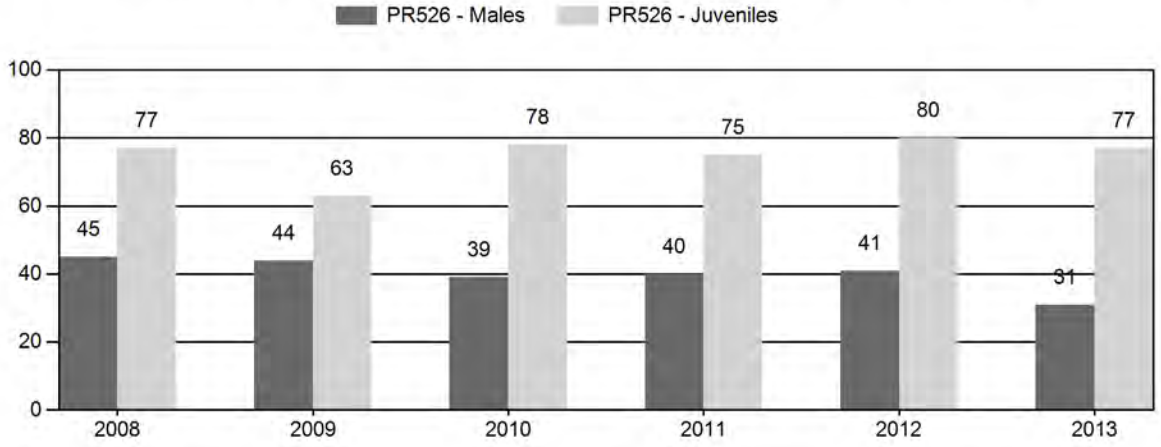
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 HUNTING SEASONS
COOPER LAKE PRONGHORN(PR526)

Hunt Area	Type	Dates Season Opens	Closes	Quota	Limitations
43	1	Sept. 15	Oct. 14	400	Limited quota licenses; any antelope
	6	Sept. 15	Oct. 14	450	Limited quota licenses; doe or fawn
Archery					
43		Aug. 15	Sept. 14		Refer to Section 3 of this Chapter

Management Evaluation
Current Postseason Population Management Objective: 3,000
Management Strategy: Recreational
2013 Postseason Population Estimate: ~ 4,000
2014 Proposed Postseason Population Estimate: ~ 3900

The management objective for the Cooper Lake Pronghorn Herd Unit is a post-season population objective of 3,000 pronghorn. The management strategy is recreational management with a buck ratio of 20 to 59:100 does. The objective and management strategy was last revised in 2013.

Herd Unit Issues
The 2013 post-season population estimate was 4,026 with the population trending slowly downward from 5,000 in 2008. The last line transect was conducted in 2006 and estimated the end of year population at 5,400 with a standard error of 570. This herd is predominately private land with increasing urban sprawl near Laramie, and a large wind farm in the western portion of the herd. Limited public access has hindered efforts to decrease this herd through harvest. Currently most public hunting is limited to the Diamond Lake and Laramie River Hunter Management Areas (HMA) which currently encompass half of the Herd Unit. Field staff have documented Epizootic Hemorrhagic Disease (EHD) in the herd unit, but it is unclear to what level this has affected the population.

Weather
Weather during the spring and summer of 2013 remained extremely dry. The Palmer Drought Severity Index (PDSI) ranked drought conditions in SE Wyoming as extreme through the month of August although range conditions in the Cooper Lake Herd started improving in July. The fall of 2013 was ranked as extremely wet with September 2013 being the wettest September recorded in Laramie. For specific weather information please refer to the following link: http://www.ncdc.noaa.gov/.

Habitat
Turnover in personnel, changes in individual job responsibilities of employees, and evolving WGFD agency priorities have resulted in some issues with consistent habitat data collection and interpretation of data. Some transects, years after their initial establishment, have been identified as being in "non-representative" locations. Site selection was often influenced by terrain and/or land ownership status (i.e public access). Changing land uses (wind turbines, roads, fence construction, other developments, etc.) have influenced habitat use by wildlife in some locations, and in some instances have resulted in major shifts in animal usage of the area being monitored. Department personnel are currently evaluating shrub transects and the types of information being collected, and will be looking for ways to improve efficiency of data collection, types of data being collected, and refining criteria for site selection for future transects. The reader is referred to the Strategic Habitat Plan Annual Report for further background information on shrub transects.

Field Data
A total of 850 pronghorn were classified which far below the estimated 1,784 classification objective. Fawn ratios decreased slightly from 80:100 in 2012 to 77 fawns: 100 does in 2013, but is still higher than surrounding herds and near average for this herd unit. Drought and EHD caused buck ratios to decline from the 5 year average of 41 bucks: 100 does to 31 bucks, which is still within the target range for recreational management. Hunter success remained comparable to 2012 at 90% in the Type 1's and 85% in the Type 6's. Hunter effort increased for both license types from the record amount of rain in September making conditions difficult to get around. The hunter satisfaction survey showed 87% of hunters were either satisfied or very satisfied with their hunt which is a decline of 94% in 2012 but still indicates a quality hunt.

Harvest Data
We issued 900 licenses which did not completely sell in the resident draw but were picked up after the draw by non-residents who account for over 85% of the licenses. The total number of type 1 licenses will be decreased by 50 to address the decline in buck ratio, especially the lack of yearling bucks. With the current high success rate we are near the license issuance threshold on the HMAs and an increase may actually decrease the amount of harvest.

Population
The model estimates the population is near 4,000 pronghorn and predicts it will decline to 3700 in 2014. The Constant Juvenile- Constant Adult Mortality Rate (CJCA) spreadsheet model was chosen to use for the post season population estimate of this herd. The model chosen had the lowest AIC of all three models and the end of year population estimate trends well with the past LTs. This model is ranked poor due to small sample sizes and no survival data or sample based population estimate. This model seems plausible predicting a downward trend in the population which has also been noted by landowners and field personnel.

Management Summary
With the current amount of public access and a predicted harvest of 640 pronghorn the model predicts that the population will continue trending downward towards the management objective. Modeling efforts predict a 2014 post-season population of about 3,900. We reduced the number

of Type 1s by 50 to address the low yearling and mature buck ratios. Harvest in this herd largely relies on two large HMAs in the hunt area which has been instrumental in moving this population towards objective. With the current number of licenses issued the herd should gradually reach the objective with a smaller chance of over harvesting.

INPUT	
Species:	Pronghorn
Biologist:	Lee Knox
Herd Unit & No.:	Cooper Lake 526
Model date:	02/06/14

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	133	141	☑ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	134	143	☐ SCJ,SCA M	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	90	188	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	1168	583	2189	**3940**	1124	425	1999	**3547**	625	2150	**2775**				3000
1994	1195	613	2107	**3914**	1155	454	1969	**3578**	662	2132	**2794**				3000
1995	928	649	2089	**3666**	917	520	2058	**3496**	686	2182	**2869**	2486	325		3000
1996	1819	673	2139	**4631**	1808	556	2080	**4445**	908	2389	**3297**				3000
1997	2099	890	2341	**5329**	2085	747	2252	**5084**	1149	2611	**3760**				3000
1998	1787	1126	2558	**5471**	1773	979	2437	**5189**	1308	2724	**4032**	5496	1706		3000
1999	2034	1282	2669	**5985**	1997	1075	2517	**5589**	1438	2839	**4277**	4234	399		3000
2000	1854	1410	2782	**6046**	1824	1133	2628	**5586**	1457	2913	**4370**				3000
2001	2106	1428	2854	**6389**	2074	1120	2669	**5863**	1495	3002	**4496**				3000
2002	1715	1465	2942	**6121**	1642	1146	2737	**5525**	1416	2965	**4381**	4636	548		3000
2003	1697	1388	2905	**5991**	1645	1048	2661	**5354**	1327	2895	**4222**				3000
2004	1508	1300	2838	**5646**	1464	959	2546	**4969**	1205	2746	**3952**				3000
2005	2147	1181	2691	**6020**	2010	815	2463	**5287**	1150	2755	**3905**				3000
2006	1872	1127	2699	**5699**	1837	768	2423	**5029**	1100	2709	**3809**	5401	569		3000
2007	1933	1078	2655	**5666**	1880	721	2429	**5029**	1058	2720	**3778**				3000
2008	2048	1037	2666	**5750**	1981	745	2359	**5085**	1102	2665	**3767**				3000
2009	1652	1080	2612	**5343**	1607	714	2282	**4603**	996	2518	**3514**				3000
2010	1928	977	2467	**5372**	1884	586	2138	**4608**	929	2437	**3366**				3000
2011	1782	910	2388	**5081**	1733	555	2074	**4362**	817	2360	**3177**				3000
2012	1848	800	2313	**4962**	1782	370	1992	**4144**	770	2319	**3089**				3000
2013	1745	754	2273	**4772**	1688	369	1969	**4026**	760	2242	**3002**				3000
2014	1682	744	2197	**4624**	1630	414	1878	**3922**							3000
2015															
2016															
2017															
2018															
2019															
2020															
2021															
2022															
2023															
2024															
2025															

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.41			0.95		
1994	0.41			0.95		
1995	0.41			0.95		
1996	0.41			0.95		
1997	0.41			0.95		
1998	0.41			0.95		
1999	0.41			0.95		
2000	0.41			0.95		
2001	0.41			0.95		
2002	0.41			0.95		
2003	0.41			0.95		
2004	0.41			0.95		
2005	0.41			0.95		
2006	0.41			0.95		
2007	0.41			0.95		
2008	0.41			0.95		
2009	0.41			0.95		
2010	0.41			0.95		
2011	0.41			0.95		
2012	0.41			0.95		
2013	0.41			0.95		
2014	0.41			0.95		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

Parameters:	Optim cells
Juvenile Survival =	0.410
Adult Survival =	0.950
Initial Total Male Pop/10,000 =	0.058
Initial Female Pop/10,000 =	0.219

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		53.34	3.24	26.63	28.15	2.15	144	173	40	357	27.2	8.7
1994		56.71	4.57	29.09	35.29	3.35	144	125	36	305	25.8	6.5
1995		44.44	3.51	31.06	31.03	2.79	117	28	10	155	19.8	1.5
1996		85.08	7.07	31.45	49.21	4.83	106	53	10	169	17.3	2.7
1997		89.65	6.32	38.02	41.41	3.71	130	81	12	223	16.1	3.8
1998		69.83	4.29	44.02	45.88	3.23	134	110	12	256	13.1	4.7
1999		76.21	4.73	48.03	48.42	3.46	188	138	34	360	16.1	5.7
2000		66.63	3.56	50.66	61.83	3.38	251	140	27	418	19.6	5.5
2001		73.78	3.65	50.04	48.50	2.73	280	169	29	478	21.6	6.5
2002		58.29	3.38	49.79	33.79	2.37	290	186	66	542	21.8	7.0
2003		58.42	3.55	47.77	39.67	2.74	309	222	48	579	24.5	8.4
2004		53.15	3.08	45.82	38.34	2.49	310	265	40	615	26.2	10.3
2005		79.78	4.44	43.89	40.99	2.82	333	208	125	666	31.0	8.5
2006		69.33	3.45	41.77	49.70	2.74	327	251	31	609	31.9	10.2
2007		72.79	4.05	40.61	32.16	2.35	325	206	48	579	33.2	8.5
2008		76.83	7.43	38.89	44.72	5.13	265	279	61	605	28.1	11.5
2009		63.24	4.43	41.34	44.38	3.49	332	300	41	673	33.8	12.6
2010		78.13	4.82	39.58	39.40	3.03	355	299	40	694	40.0	13.3
2011		74.63	4.89	38.12	40.07	3.21	323	286	45	654	39.0	13.2
2012		79.90	8.29	34.60	40.67	5.23			292	743	53.7	13.9
2013		76.77	5.76	33.19	31.05	3.15			276	678	51.0	13.4
2014		76.55	5.44	33.87	39.33	3.46			291	638	44.3	14.5
2015												
2016												
2017												
2018												
2019												
2020												
2021												
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2023												
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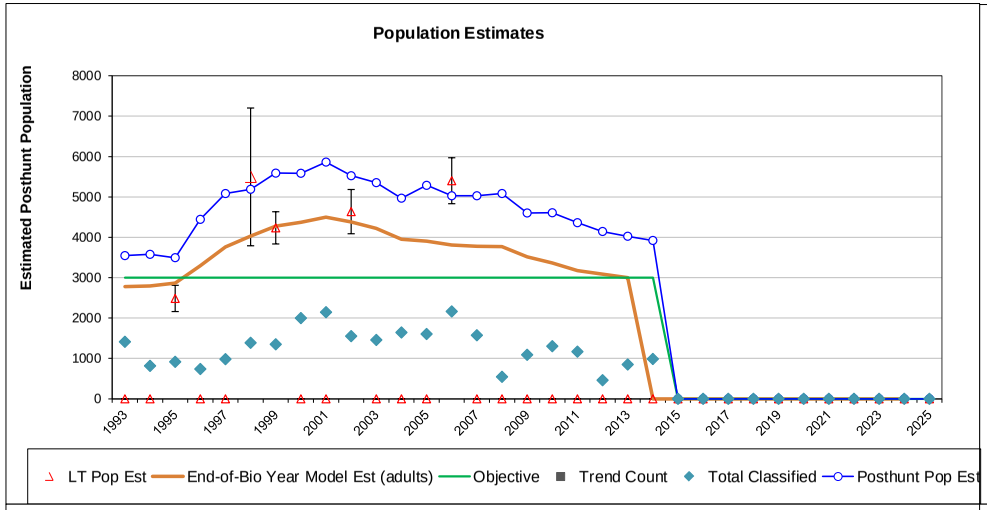
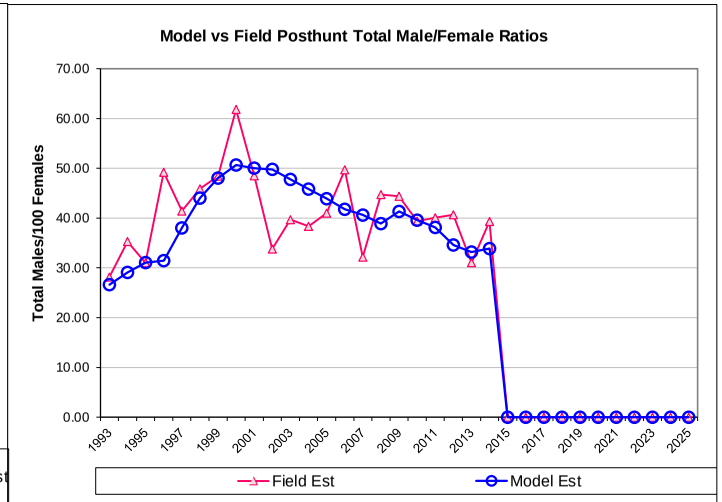
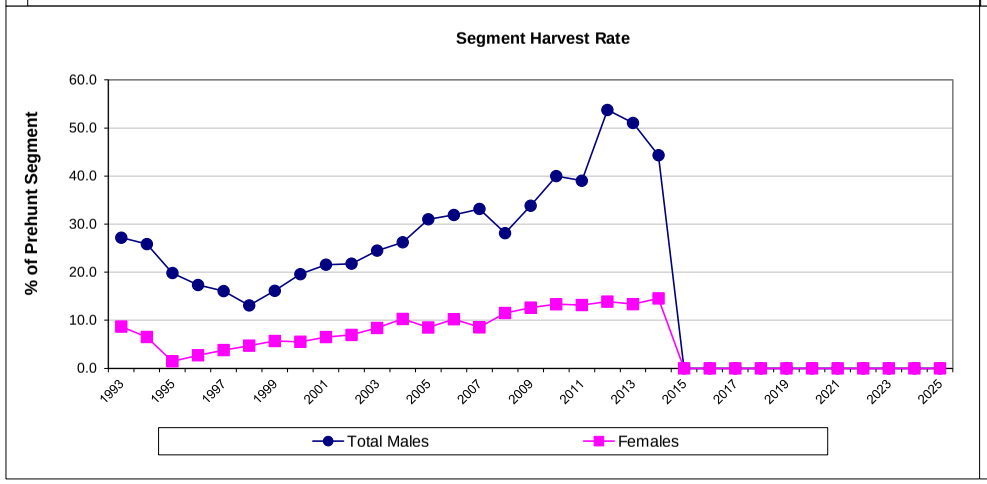
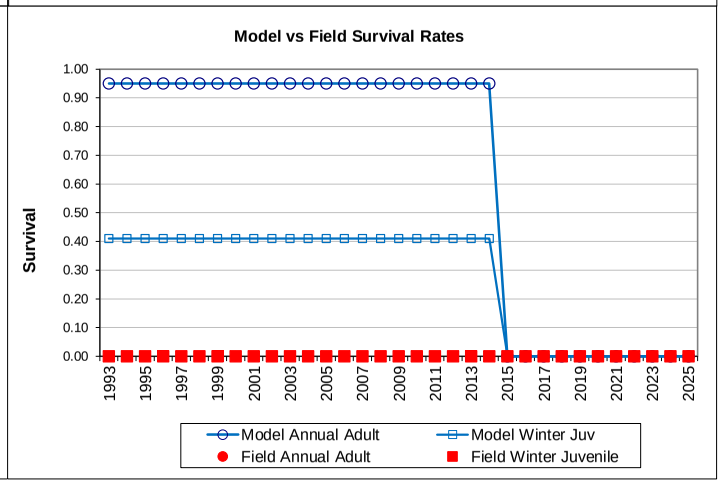
2025												

FIGURES









Comments:

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PH526 - Cooper Lake
HA 43
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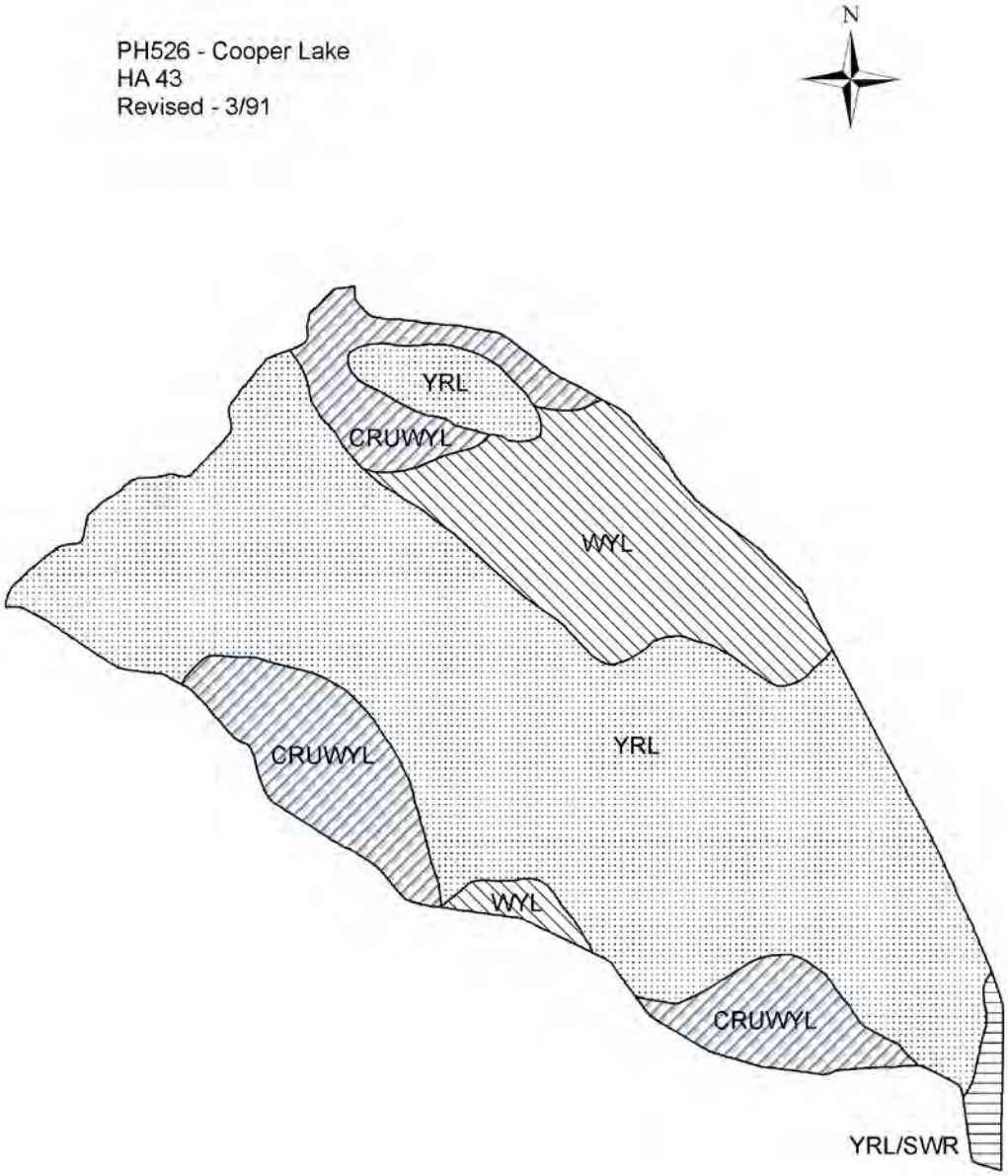


2013 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2013 - 5/31/2014

HERD: PR527 - CENTENNIAL

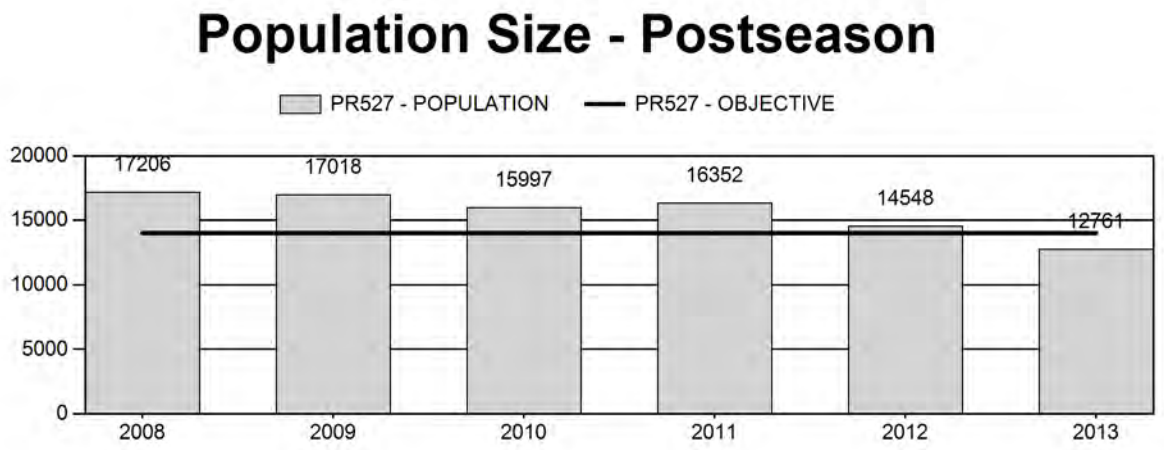
HUNT AREAS: 37, 44-45 | PREPARED BY: LEE KNOX

	2008 - 2012 Average	2013	2014 Proposed
Population:	16,224	12,761	12,537
Harvest:	1,382	1,126	820
Hunters:	1,600	1,335	900
Hunter Success:	86%	84%	91 %
Active Licenses:	1,781	1,498	1,100
Active License Percent:	78%	75%	75 %
Recreation Days:	5,924	4,725	3,000
Days Per Animal:	4.3	4.2	3.7
Males per 100 Females	42	36	
Juveniles per 100 Females	73	61	

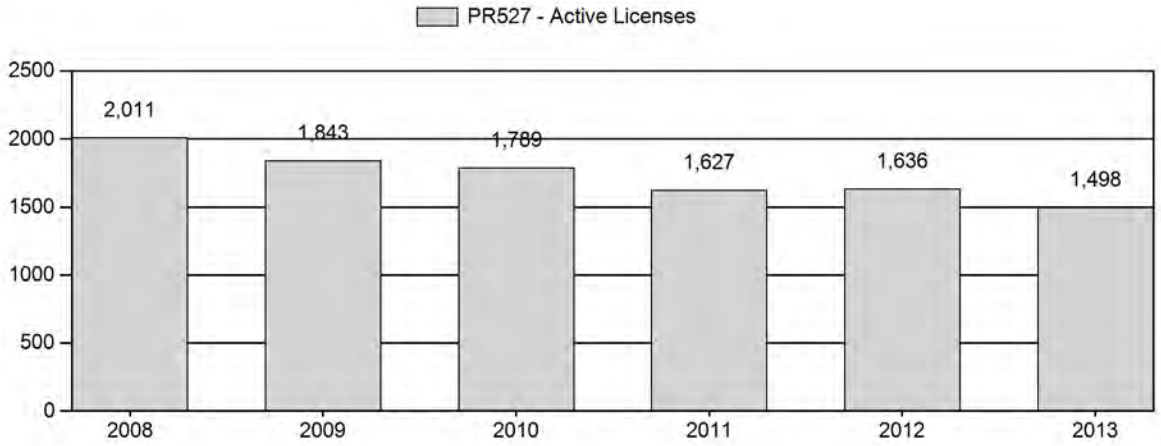
Population Objective:	14,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-8.8%
Number of years population has been + or - objective in recent trend:	1
Model Date:	5/13/2014

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

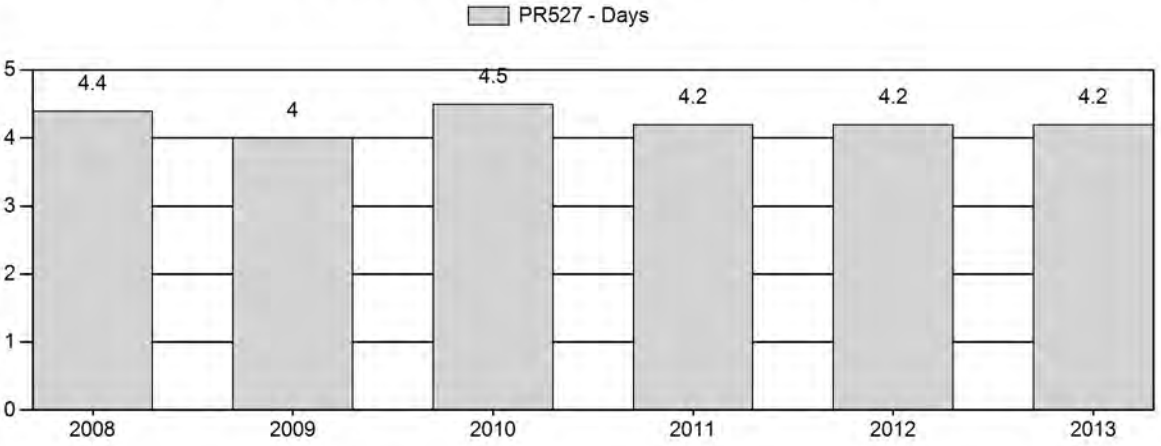
	JCR Year	Proposed
Females ≥ 1 year old:	4.3%	3.5%
Males ≥ 1 year old:	8.4%	8%
Juveniles (< 1 year old):	.8%	1%
Total:	6.76%	7%
Proposed change in post-season population:	13.6%	5%



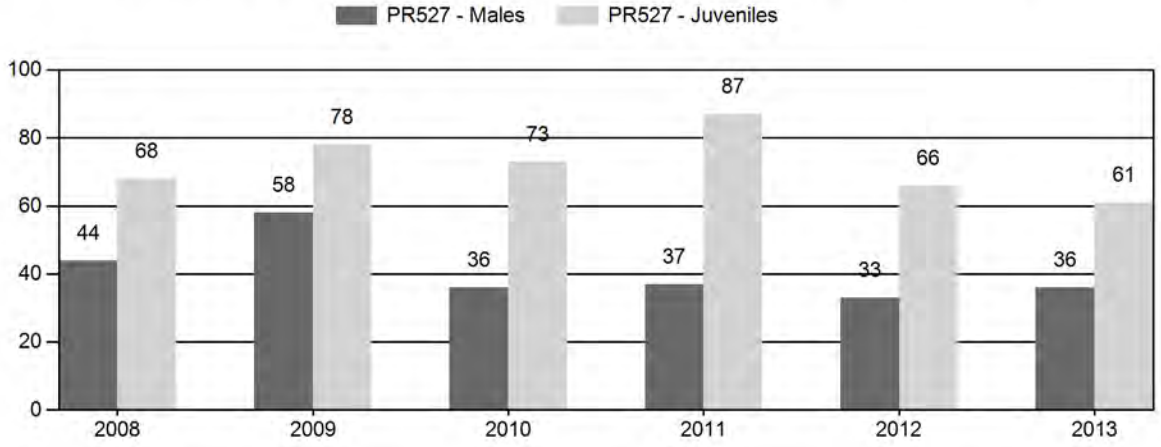
Active Licenses



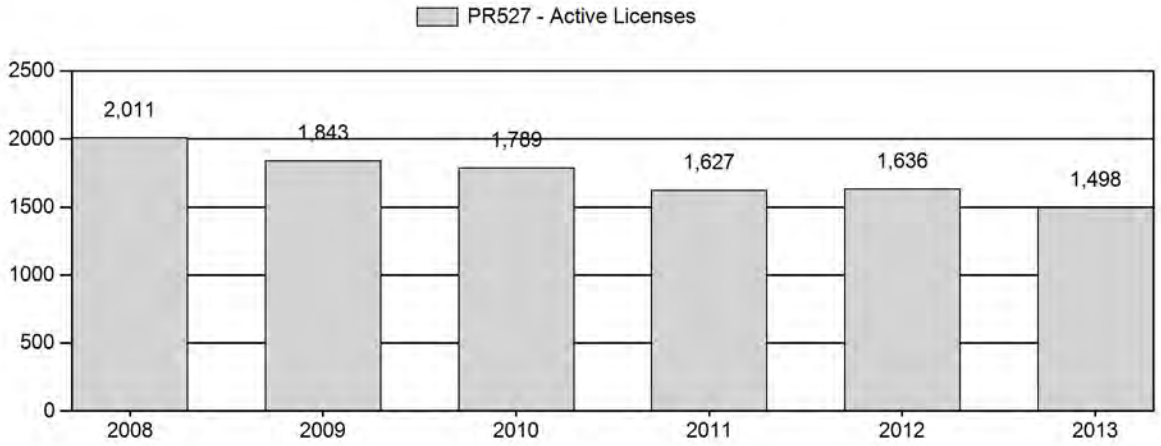
Days Per Animal Harvested



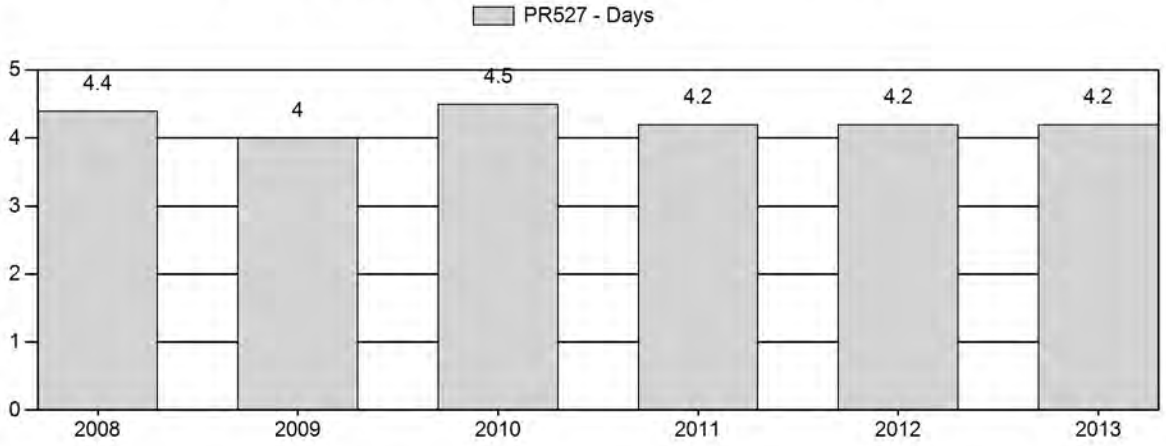
Preseason Animals per 100 Females



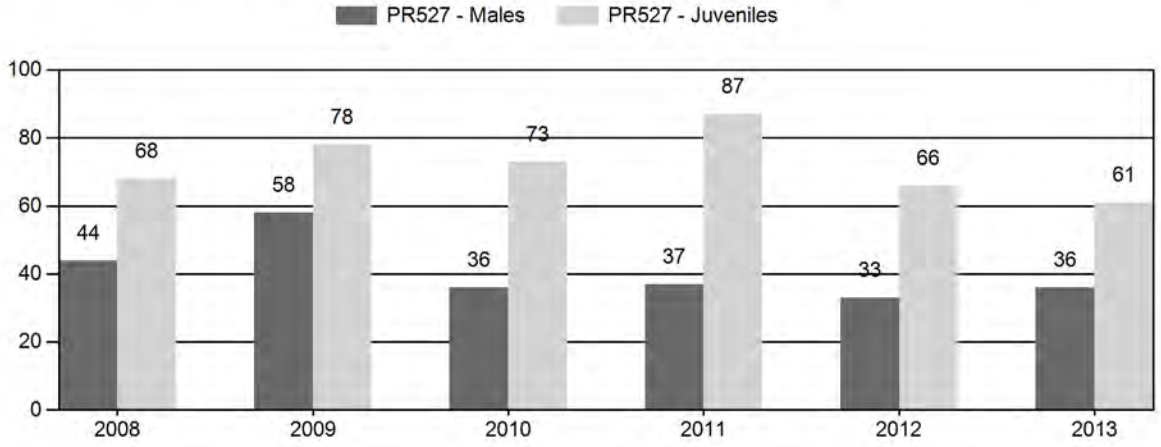
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR527 - CENTENNIAL

		MALES				FEMALES		S				Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yl ng	Ad ult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	18,993	202	386	588	21%	1,343	47%	915	32%	2,846	2,381	15	29	44	± 3	68	± 4	47
2009	18,619	359	405	764	24%	1,326	42%	1,035	33%	3,125	3,122	27	31	58	± 4	78	± 5	50
2010	17,462	131	357	488	17%	1,337	48%	978	35%	2,803	2,589	10	27	36	± 3	73	± 5	54
2011	17,734	59	214	273	16%	741	45%	641	39%	1,655	2,886	8	29	37	± 4	87	± 7	63
2012	15,891	190	252	442	17%	1,326	50%	878	33%	2,646	2,016	14	19	33	± 3	66	± 4	50
2013	13,999	113	239	352	18%	975	51%	595	31%	1,922	1,832	12	25	36	± 3	61	± 5	45

2014 HUNTING SEASONS
CENTENNIAL PRONGHORN (PR527)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
37	1	Sep. 20	Oct. 14	225	Limited quota licenses; any antelope
	6	Sep. 20	Oct. 14	75	Limited quota licenses; doe or fawn
44	1	Sep. 13	Oct. 5	150	Limited quota licenses; any antelope
	6	Sep. 13	Oct. 5	150	Limited quota licenses; doe or fawn
45	1	Sep. 13	Sep. 30	350	Limited quota licenses; any antelope
	6	Sep. 13	Sep. 30	350	Limited quota licenses; doe or fawn
		Oct. 1	Oct. 14		Unused Area 45 Type 1 and Type 6 licenses valid in that portion of Area 45 south of Wyoming Highway 130
Archery					
37,44,45		Aug. 15			Refer to Section 3 of this Chapter

Hunt Area	License Type	Quota change from 2013
37	1 7	-50 -25
44	1 6	-50 -100
45	1 6	-50 -150
Herd Unit Total	**1** **6** **7**	**-150** **-250** **-25**

Management Evaluation

Current Postseason Population Management Objective: 14,000
Management Strategy: Recreational
2013 Postseason Population Estimate: ~ 12,800
2014 Postseason Population Estimate: ~ 12,500

The Management objective for the Centennial Pronghorn Herd Unit is a post-season population of 14,000. The management strategy is recreational management requiring a buck ratio of 20 to 59:100 does. The objective and management strategy was last revised in 2013.

Herd Unit Issues

The Centennial Pronghorn Herd Unit encompasses Hunt Areas 37, 44, and 45 which are predominately private land with little public access. The 2013 post-season population estimate was approximately 12,800 with the population trending slowly downward from 24,000 in 2004. The last line transect was conducted in 2007 and predicted the end of bio year population of 17,500. Harvest strategies are designed to maximize harvest where possible. Most of the harvest is limited to Hunter Management Areas where the threshold of hunter densities has been reached and an increase in license issuance would actually decrease harvest. This herd has experienced loss of habitat from an increase in subdivisions, and a wind farm is scheduled to be developed in Hunt Area 44 near the Colorado border, which may also cause a loss of access.

Weather

Weather during the spring and summer of 2013 remained extremely dry. The Palmer Drought Severity Index (PDSI) ranked drought conditions in SE Wyoming as extreme through the month of August although range conditions in the Centennial Herd started improving in July. The fall of 2013 was extremely wet with September 2013 being the wettest September recorded in Laramie. For specific weather information please refer to the following link: http://www.ncdc.noaa.gov/.

Habitat

Turnover in personnel, changes in individual job responsibilities of employees, and evolving WGFD agency priorities have resulted in some issues with consistent habitat data collection and interpretation of data. Some transects, years after their initial establishment, have been identified as being in "non-representative" locations. Site selection was often influenced by terrain and/or land ownership status (i.e public access). Changing land uses (wind turbines, roads, fence construction, other developments, etc.) have influenced habitat use by wildlife in some locations, and in some instances have resulted in major shifts in animal usage of the area being monitored. Department personnel are currently evaluating shrub transects and the types of information being collected, and will be looking for ways to improve efficiency of data collection, types of data being collected, and refining criteria for site selection for future transects. The reader is referred to the Strategic Habitat Plan Annual Report for further background information on shrub transects.

Field Data

A total of 1,922 pronghorn were classified, exceeding the estimated classification objective of 1,832. Fawn production declined for the second year from 66 fawns: 100 does in 2012 to 61 fawns: 100 does in 2013 which is most likely due to continued effects from the extreme drought conditions in the summer of 2012 that extended into the spring of 2013. Buck ratios increased from 33 bucks: 100 does in 2012 to 36 bucks: 100 does in 2013 which is in the middle of the recommended ratios for recreational management. Hunter success for the herd unit was 75% overall which has been on a slight decline since 2003. Success for reduced price licenses declined but success for full price licenses increased slightly. The Hunter Satisfaction Survey

showed 85% of hunters were satisfied or very satisfied with their hunt with 8% of respondents remaining neutral.

Harvest Data

The biggest challenge is trying to manage harvest on the few accessible public lands and HMAs without decreasing the quality and abundance of game. A confounding influence is that some segments of the herd move back and forth between Colorado and Wyoming. In the past we have not been able to manage this herd through harvest due to high fawn ratios and limited access. We estimate the population has been reduced by half since 2004 and we are near objective. It is most likely a factor of low fawn ratios caused by drought conditions than harvest but we will be reducing licenses throughout the herd unit to address the decline.

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 did not have the lowest relative AIC score but had the most reasonable population estimate. To get a model to run the years were truncated to 2000 and constrained the juvenile survival rate to 0.3 which is not biologically defensible. The model estimates the Centennial pronghorn herd has slowly trended downward since 2004 when the population was estimated at 24,000 and is currently near the population objective. The model is of poor quality due to significant interchange with populations in Colorado, lacks adult and juvenile survival data and there isn't a sample base population estimate. Harvest data indicates a decline, and field personnel, hunters, and landowners are seeing fewer pronghorn.

Management Summary

If we attain the projected harvest of 820 pronghorn and have fawn ratios near 70, the population will level out near the objective. We predict a 2014 post-season population of approximately 12,500. With the reduction in licenses, harvest success should improve on the HMAs but also maintain the population near objective. We removed the type 7 in Hunt Area 37 which restricted hunter movement and is no longer necessary.. The season in Hunt Area 44 is 5 days longer to address landowners concerns to run the season into deer season and spread out the harvest on HMAs.

INPUT	
Species:	Pronghorn
Biologist:	Lee Knox
Herd Unit & No.:	Centennial Pronghorn
Model date:	02/25/14

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	199	209	☑ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	200	209	☐ SCJ,SCA M	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	199	274	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
2000	7887	5875	12614	**26375**	7838	5165	12210	**25214**	5926	12511	**18437**	17371	2924		6000
2001	7882	5808	12260	**25951**	7830	5152	11885	**24867**	5916	12208	**18124**				6000
2002	8231	5798	11964	**25993**	8192	4878	11512	**24582**	5698	11914	**17612**				6000
2003	7750	5584	11676	**25009**	7673	4666	11102	**23440**	5407	11428	**16835**	12369	1463		6000
2004	9372	5299	11199	**25870**	9276	4211	10753	**24240**	5207	11354	**16561**				6000
2005	8045	5103	11127	**24275**	7976	3604	10415	**21994**	4416	10826	**15242**				14000
2006	7148	4327	10609	**22084**	7079	3417	9874	**20370**	4158	10184	**14341**				14000
2007	6204	4074	9980	**20258**	6116	3104	9346	**18567**	3707	9547	**13254**	17454	3121		14000
2008	6374	3633	9356	**19363**	6286	2621	8670	**17577**	3279	8938	**12218**				14000
2009	6837	3214	8760	**18810**	6756	2363	8090	**17209**	3128	8474	**11603**				14000
2010	6075	3066	8305	**17445**	5995	2282	7704	**15980**	2942	8006	**10948**				14000
2011	6787	2883	7845	**17515**	6701	2118	7315	**16134**	2897	7756	**10653**				14000
2012	5033	2839	7601	**15473**	4957	2159	7013	**14130**	2681	7207	**9887**				14000
2013	4310	2627	7062	**13999**	4203	1988	6570	**12761**	2398	6676	**9074**				14000
2014	4546	2350	6542	**13439**	4457	1800	6280	**12537**							14000
2015															
2016															
2017															
2018															
2019															
2020															
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2030															
2031															
2032															

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
2000	0.30			0.91		
2001	0.30			0.91		
2002	0.30			0.91		
2003	0.30			0.91		
2004	0.30			0.91		
2005	0.30			0.91		
2006	0.30			0.91		
2007	0.30			0.91		
2008	0.30			0.91		
2009	0.30			0.91		
2010	0.30			0.91		
2011	0.30			0.91		
2012	0.30			0.91		
2013	0.30			0.91		
2014	0.30			0.91		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						
2026						
2027						
2028						
2029						
2030						
2031						
2032						

Parameters:	Optim cells
Juvenile Survival =	0.300
Adult Survival =	0.912
Initial Total Male Pop/10,000 =	0.587
Initial Female Pop/10,000 =	1.261

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles	Total Harvest	Total Males	Females
2000		62.53	3.19	46.57	59.42	3.08	645	367	44	1056	12.1	3.2
2001		64.29	2.74	47.37	50.46	2.33	596	341	48	985	11.3	3.1
2002		68.80	3.17	48.46	50.99	2.58	836	411	35	1282	15.9	3.8
2003		66.37	3.48	47.83	28.57	2.01	835	522	70	1427	16.4	4.9
2004		83.68	3.17	47.31	47.90	2.15	989	406	87	1482	20.5	4.0
2005		72.30	2.78	45.86	48.08	2.10	1363	647	63	2073	29.4	6.4
2006		67.37	3.22	40.79	39.43	2.25	828	668	62	1558	21.0	6.9
2007		62.16	2.96	40.83	40.19	2.22	882	576	80	1538	23.8	6.3
2008		68.13	2.92	38.83	43.78	2.17	920	624	80	1624	27.9	7.3
2009		78.05	3.24	36.69	57.62	2.62	773	609	74	1456	26.5	7.6
2010		73.15	3.08	36.92	36.50	1.93	713	546	73	1332	25.6	7.2
2011		86.50	4.67	36.75	36.84	2.61	696	482	78	1256	26.6	6.8
2012		66.21	2.88	37.35	33.33	1.83	618	534	69	1221	23.9	7.7
2013		61.03	3.17	37.20	36.10	2.24	581	448	97	1126	24.3	7.0
2014		69.49	3.41	35.92	35.08	2.16	500	238	81	819	23.4	4.0
2015												
2016												
2017												
2018												
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2020												
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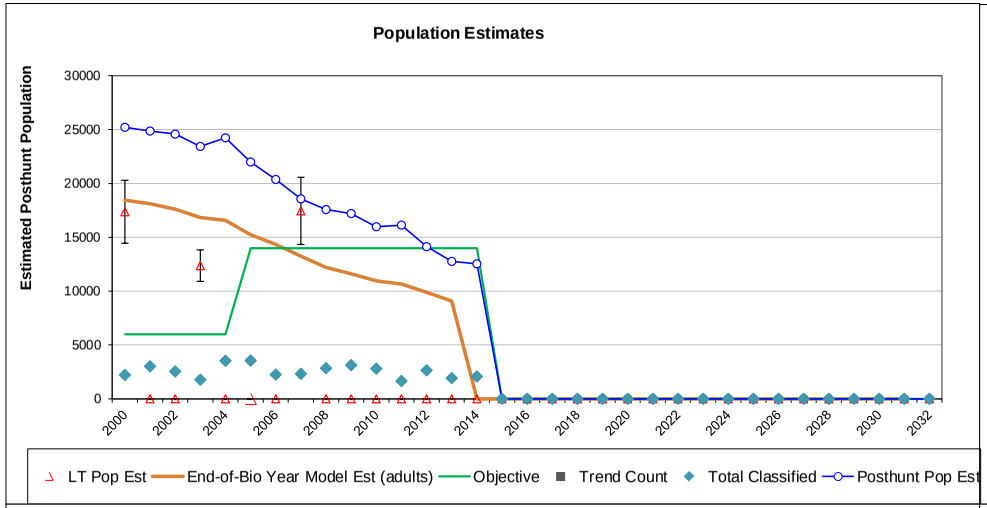
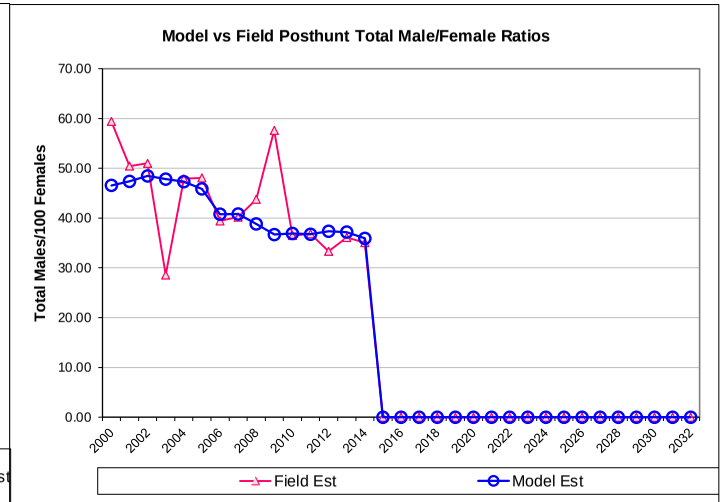
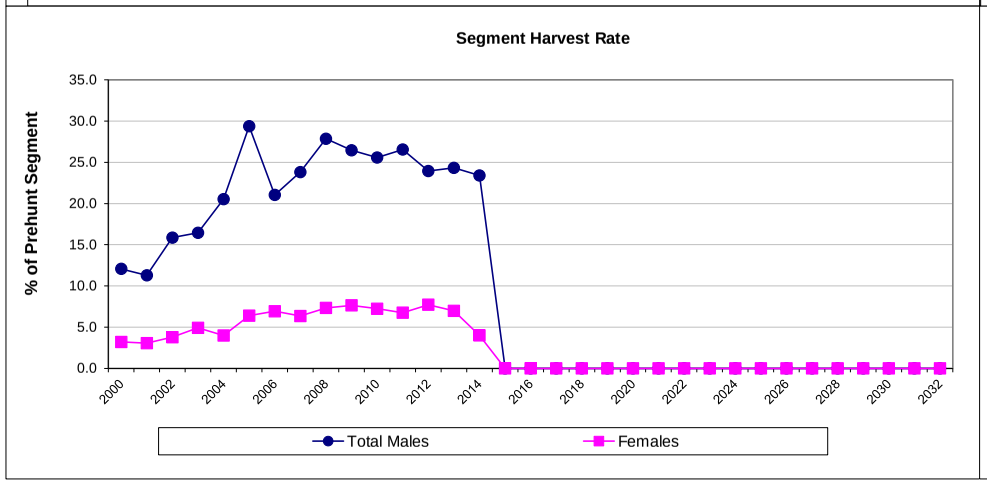
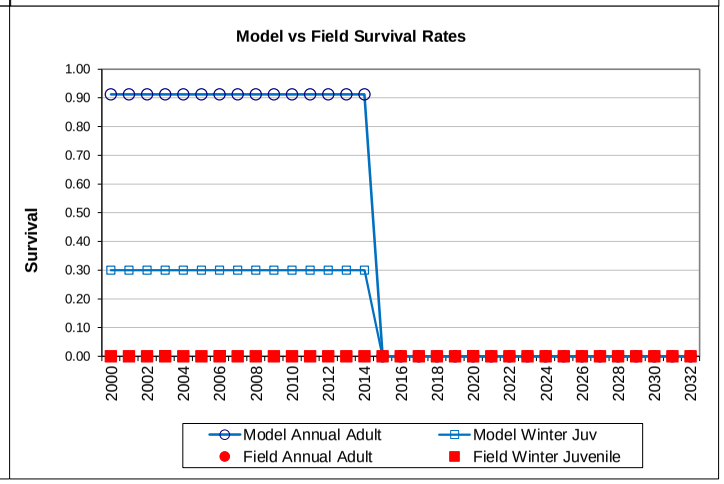
2030												
2031												
2032												

FIGURES



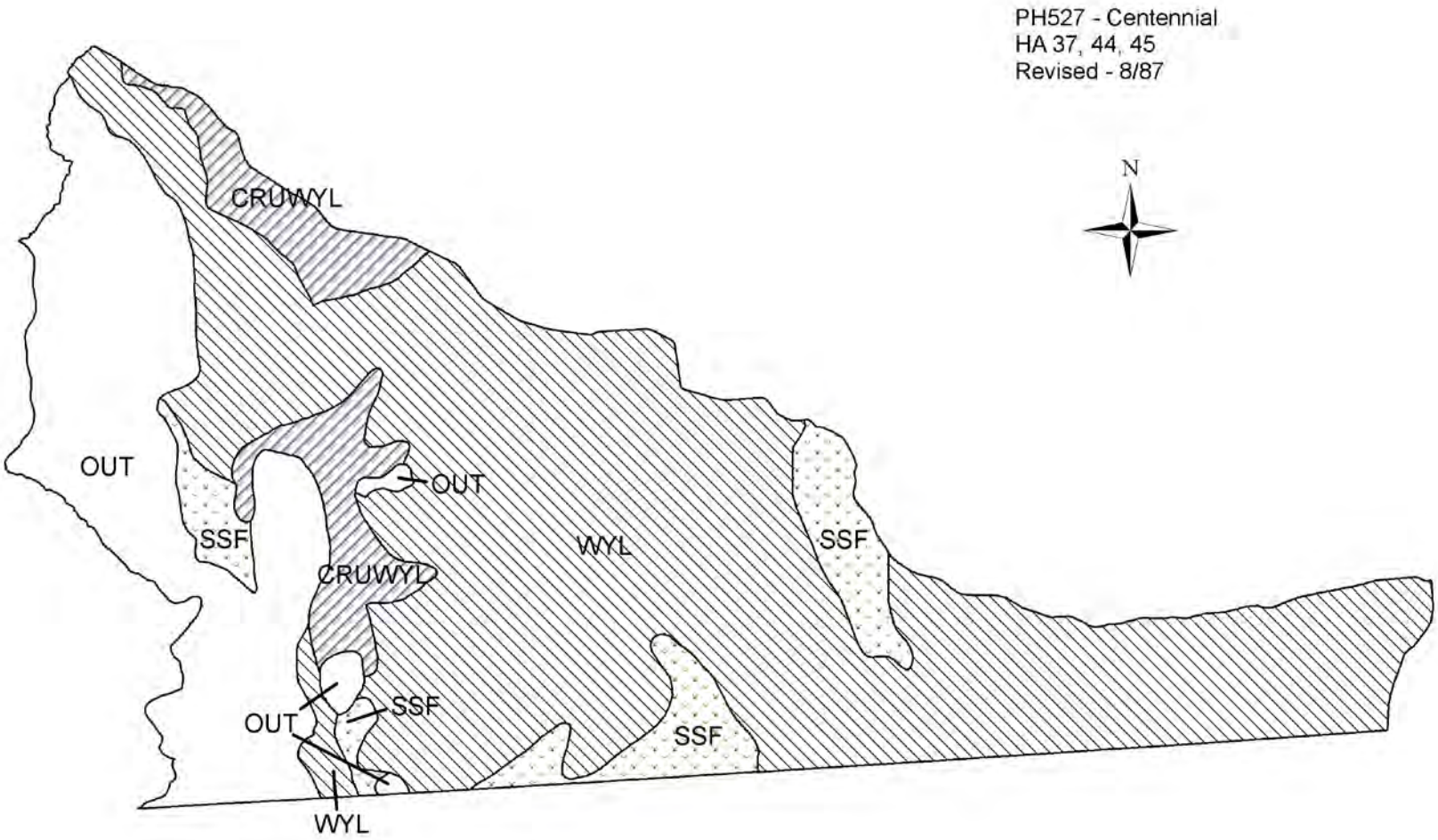






Comments:

END


PH527 - Centennial
HA 37, 44, 45
Revised - 8/87
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WYL

2013 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2013 - 5/31/2014

HERD: PR528 - ELK MOUNTAIN

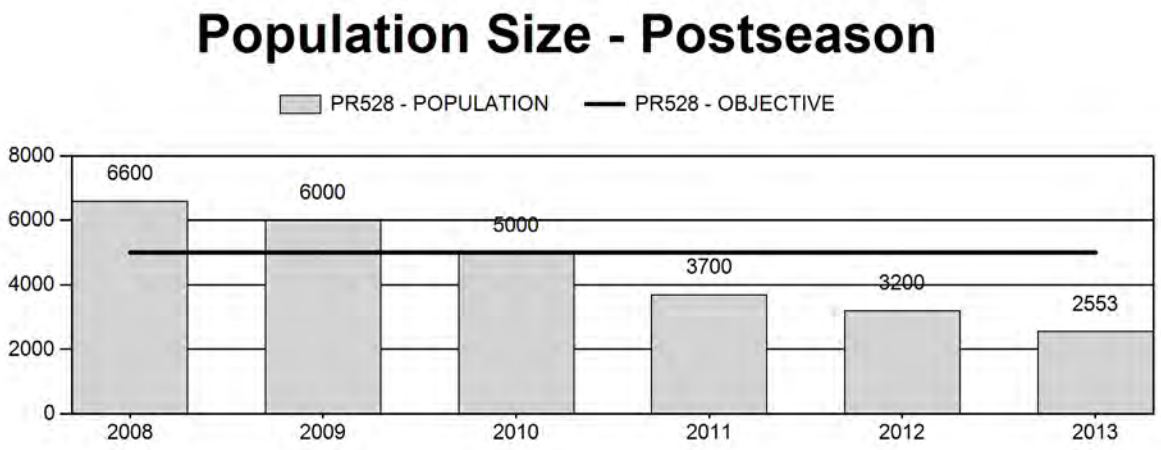
HUNT AREAS: 50 | PREPARED BY: WILL SCHULTZ

	2008 - 2012 Average	2013	2014 Proposed
Population:	4,900	2,553	2,914
Harvest:	919	707	335
Hunters:	1,019	795	400
Hunter Success:	90%	89%	84%
Active Licenses:	1,088	829	450
Active License Percent:	84%	85%	74%
Recreation Days:	3,413	2,645	1,250
Days Per Animal:	3.7	3.7	3.7
Males per 100 Females	39	33	
Juveniles per 100 Females	47	47	

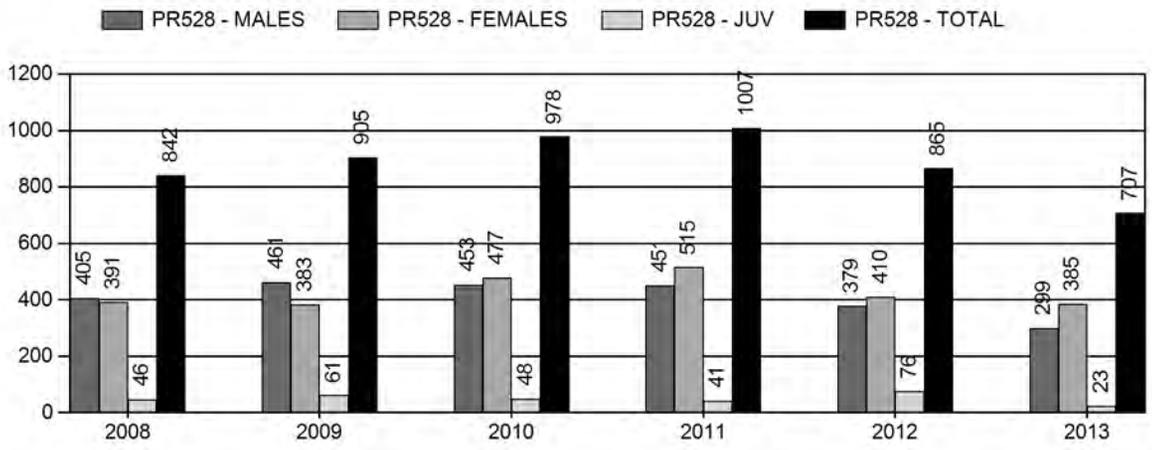
Population Objective:	5,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-48.9%
Number of years population has been + or - objective in recent trend:	3
Model Date:	04/18/2014

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

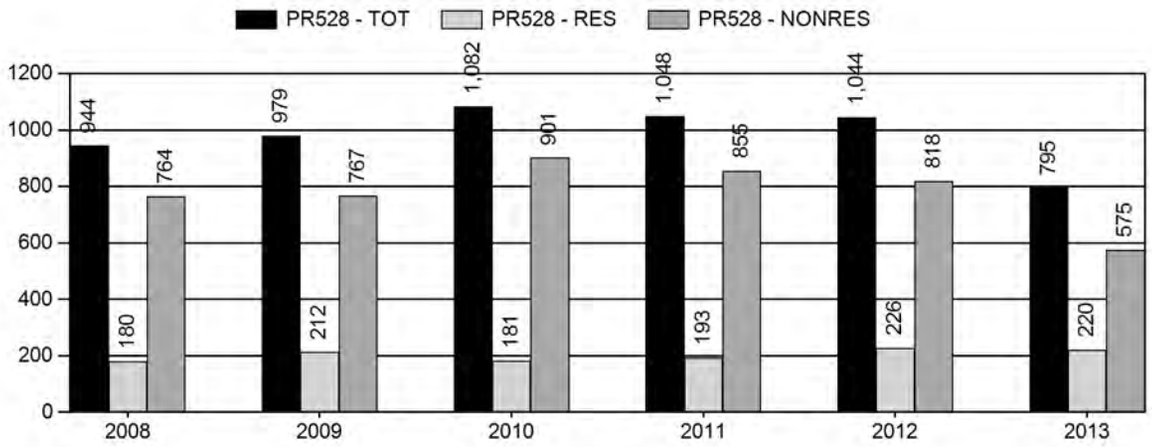
	JCR Year	Proposed
Females ≥ 1 year old:	16.1%	3.6%
Males ≥ 1 year old:	39.9%	33.8%
Juveniles (< 1 year old):	1.5%	3.6%
Total:	14%	.02%
Proposed change in post-season population:	-15.3%	-8.1%



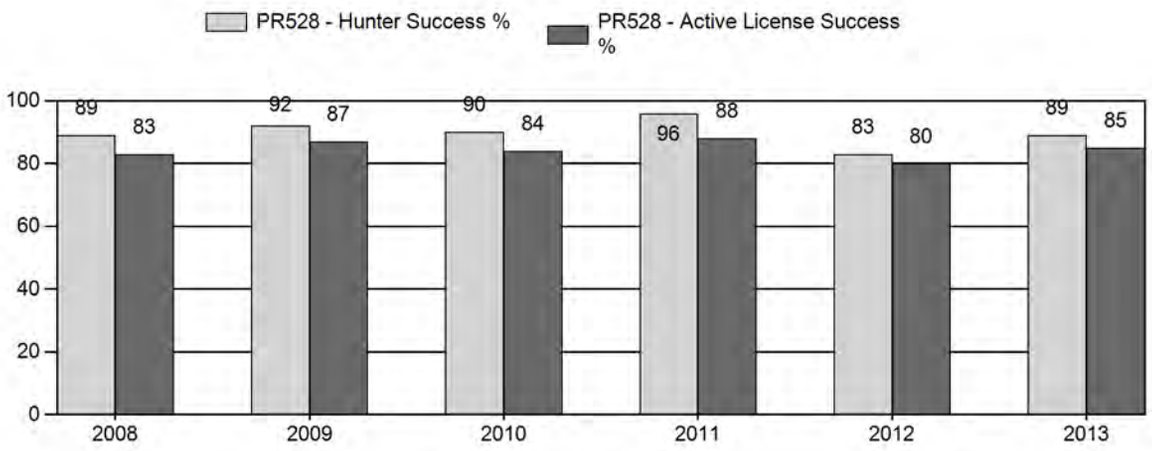
Harvest



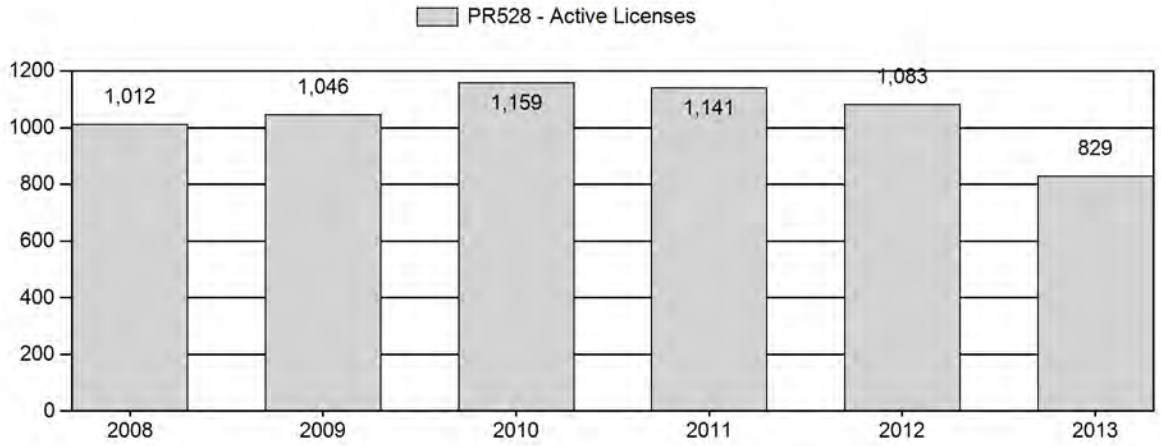
Number of Hunters



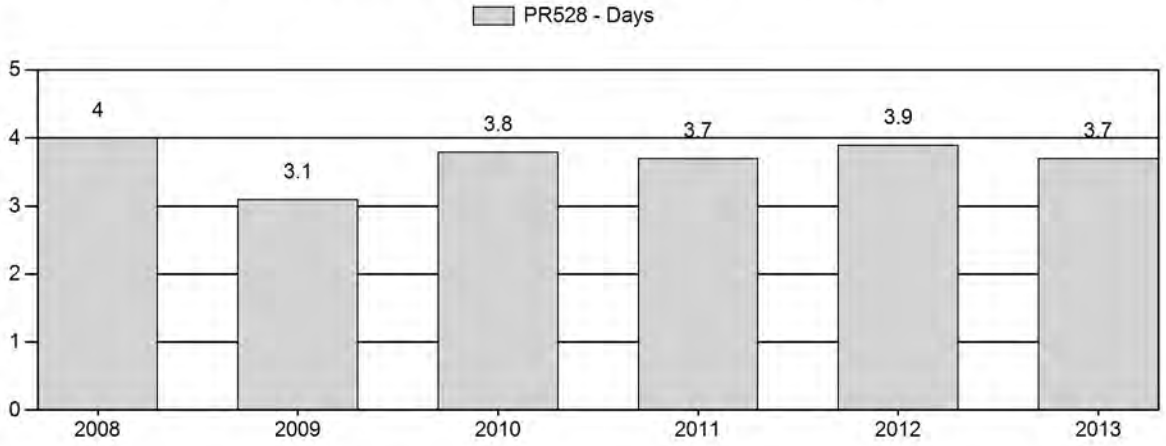
Harvest Success



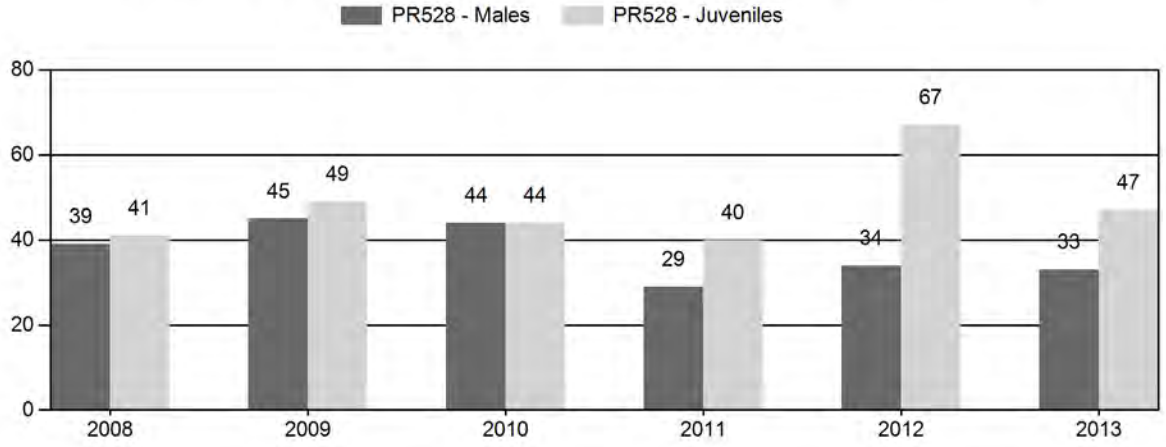
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR528 - ELK MOUNTAIN

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	7,600	84	234	318	22%	808	55%	331	23%	1,457	1,831	10	29	39	± 4	41	± 4	29
2009	7,000	111	272	383	23%	846	52%	412	25%	1,641	1,617	13	32	45	± 4	49	± 4	34
2010	6,000	91	305	396	23%	907	53%	396	23%	1,699	1,668	10	34	44	± 4	44	± 4	30
2011	4,800	82	140	222	17%	764	59%	303	24%	1,289	1,221	11	18	29	± 3	40	± 4	31
2012	4,200	73	115	188	17%	545	50%	367	33%	1,100	1,098	13	21	34	± 4	67	± 6	50
2013	3,331	75	95	170	18%	510	55%	239	26%	919	1,000	15	19	33	± 4	47	± 5	35

ELK MOUNTAIN PRONGHORN (PR528)
Hunt Area 50
2014 Hunting Seasons

Hunt Area	Type	Dates of Seasons Opens	Dates of Seasons Closes	Limited Quota	Limitations
50	1	Sep. 16	Oct. 31	300	Limited quota licenses; any antelope
	6	Sep. 16	Oct. 31	100	Limited quota licenses; doe or fawn
	0	Sep. 1	Sep. 15	50	Limited quota licenses; any antelope, muzzle-loading firearms only

Hunt Area	Type	Quota change from 2013
50	1	-100
50	6	-400
Herd Unit Total	**1**	**-100**
	6	**-400**

Management Evaluation
Current Management Objective: 5,000
Management Strategy: Recreational
2013 Postseason Population Estimate: 2,600
2014 Proposed Postseason Population Estimate: 2,900

Pronghorn in the Elk Mountain herd unit are managed toward a numeric objective of 5,000. The population was estimated using a spreadsheet model developed in 2012 and updated in 2014. The herd is managed for recreational opportunity. The objective was last reviewed in 1997 and is planned for review in 2014.

Herd Unit Issues
The Elk Mountain herd unit is comprised predominantly of either private or land-locked public land. Hunter access to these lands is limited, particularly east of Elk Mountain, where most pronghorn in this herd unit are found during the hunting season. Private lands open to hunters receive a large amount of pressure. Much of the herd unit's sagebrush ecosystem remains intact. However, increased agricultural, energy, and residential development does threaten the sagebrush habitat in this area.

Weather
Weather in this herd unit was relatively normal during the past bio-year. This weather pattern most likely had a neutral to positive influence on pronghorn. For specific

meteorological information for the Elk Mountain herd unit the reviewer is referred to the following link:
http://www.ncdc.noaa.gov/cag/

Habitat

Habitat conditions improved in 2013 with an increase in timely spring and fall precipitation. However, much of the transition and winter ranges were severely impacted by the drought conditions experienced in bio-year 2012. No pronghorn habitat production/utilization data was available for this herd unit. However, annual production rates should have improved from the previous year, while utilization rates on winter ranges likely continued to be high.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality and consequently heavily influence population management for any particular big game specie.

Shrub communities within the Laramie Region that are annually assessed by game wardens, wildlife biologists, and terrestrial habitat biologists, include: true mountain mahogany, antelope bitterbrush, skunkbrush sumac, big sagebrush, and four-wing saltbush. A majority of these transects were established approximately 12–13 years ago. Transects were established for several different reasons, including: measuring habitat response prior to or following treatments (i.e. prescribed fire, wildfire, mowing), concern over historic or current domestic livestock or wild ungulate utilization levels, selection of "representative habitats" utilized by wildlife on identified winter ranges, and to compare present results with historic data sets.

Field Data

Preseason ratios for this herd were 33 bucks and 47 fawns/100does in 2013. Buck ratios and fawn ratios both decreased in recent classification trend. Sample size from the classification survey (n=919) was less than the adequate size (n=1,000) required for an estimate 90% confidence interval. Traditionally, classification data in this herd unit had been collected from fixed-wing aircraft. However, beginning in 2011, classification surveys were conducted from the ground and may contain more sampling biases in comparison with surveys conducted prior to 2011.

Harvest Data

The 2013 harvest survey indicated a total of 700 pronghorn were harvested which was a decrease of 18% from 2012. Overall harvest success increased 5% to 85% for 830 active licensed hunters in 2013. The days/pronghorn decreased slightly from 3.9 to 3.7 days/harvest. The increase in harvest success and decrease in day/harvest were attributed to decreases in license numbers which were made in 2013 as a means to balance hunter opportunity with a decreased population size.

Population
Spreadsheet model estimates indicated the Elk Mountain herd is currently below the management objective of 5,000 pronghorn. The CJ, CA model was selected again for the Elk Mountain herd unit in 2013. The model's population estimates are plausible and match trends in harvest and preseason classifications. However, the model does not intersect the 2007 and 2010 Line-Transect density estimation surveys. A portion of the Elk Mountain herd unit was used a control area for the University of Wyoming's Dunlap Wind Farm research project. We incorporated adult survival rates from this research into the model for 2010 and 2011.

We rated this model as fair, and biologically defensible in our evaluation. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model (Morrison 2012).

Line-Transect Survey
A line-transect survey was conducted in June of 2013 to develop a bio-year 2012 end of year density/population estimate for this herd unit. The results (Appendix A) of this survey were plausible and were incorporated into the spreadsheet model.

Management Summary
License numbers are reduced again for the 2014 season. Liberal seasons in combination with severe winters and summer drought have reduced pronghorn numbers in this herd unit over the past 5 years. The decreased license numbers should result in increasing harvest success rates and lowering the days/pronghorn rates. The popular muzzleloader only season will continue to be offered in 2014. License numbers could have been reduced further with respect to the current management objective but will be re-evaluated in 2015, after a public objective review process has been completed.

Literature Cited
Morrison, T. 2012. User Guide: Spreadsheet Model for Ungulate Population data Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 41 pp.

Bibliography of Herd Specific Studies
None.

2012 PR528 - ELK MOUNTAIN Pronghorn Line-Transect Summary

Survey Dates:	6/6/2013 - 6/7/2013
Survey Cost:	$ 2,060.00
Flight Service:	OWYHEE AIR, LLC.
Aircraft:	MAULE
Observers:	Schultz SE=1067.2

Weather Conditions:

Temperature (Degrees Fahrenheit):	60 F
Cloud Cover (%):	<30%
Wind Speed (MPH):	0 - 20

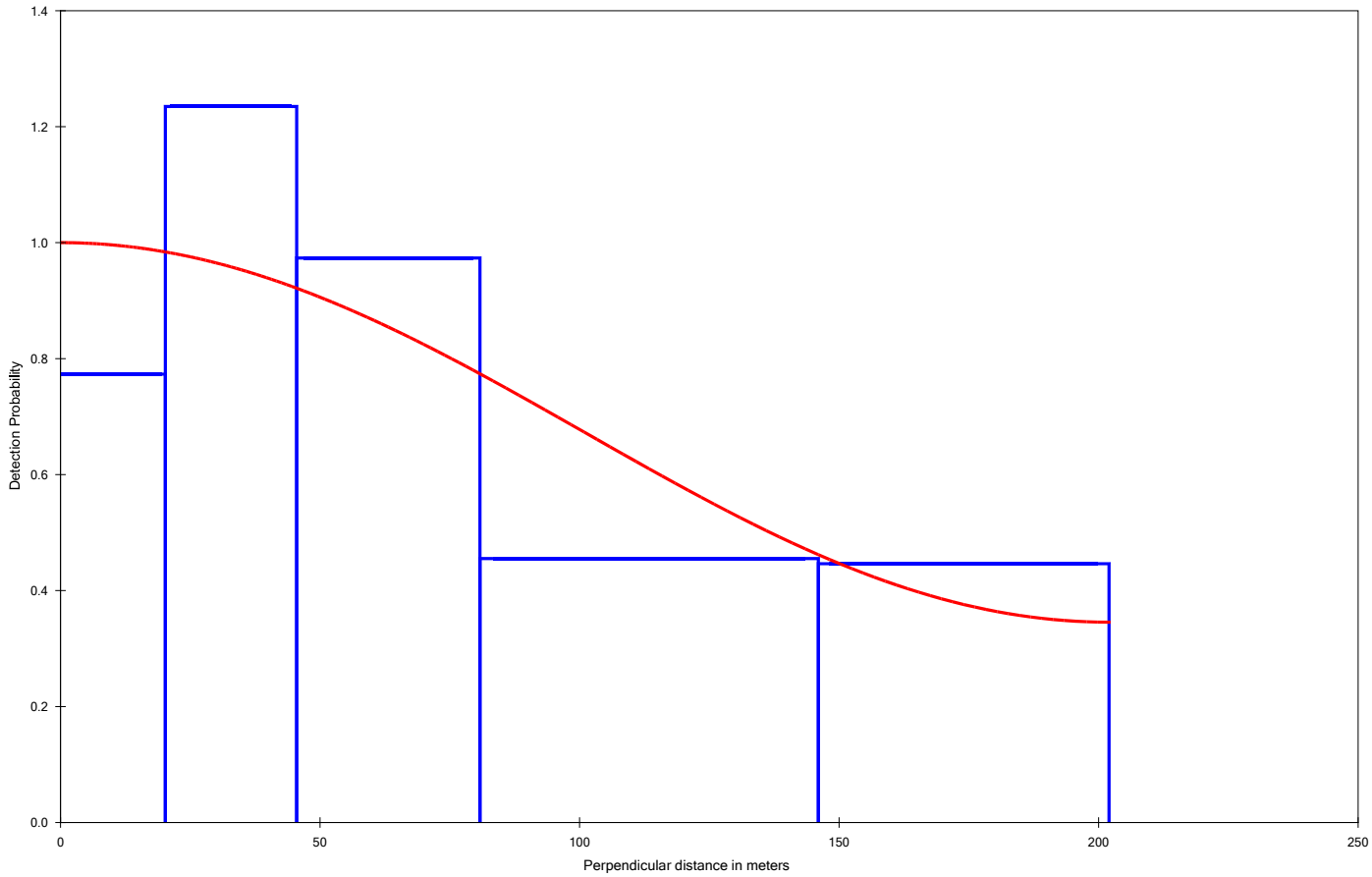
Transect Limits:	106.16 to 106.55
Transect Direction:	North/South
Transect Interval (Minutes of Longitude):	1.5
Transect Length: (Mi.):	663
Transect Altitude (AGL):	304 ft.

Occupied Habitat (mi^2):	586
Density Estimate (Animals/mi^2 with Confidence Intervals):	7.8 (4.9 - 12.3)
Population Estimate (with Confidence Intervals):	4,553 (2,869 - 7,226)

```
----------------------------------
Encounter rate for all data combined
Detection probability for all data combined
Expected cluster size for all data combined
Density for all data combined

Distances:
----------
Analysis based on distance intervals
Width specified as:    202.0000
Left most value set at:       0.0000000

Clusters:
---------
Analysis based on exact sizes
Expected value of cluster size computed by: regression of log(s(i)) on g(x(i))

Estimators:
-----------
Estimator  1
Key: Uniform
Adjustments - Function                 : Cosines
            - Term selection mode      : Sequential
            - Term selection criterion : Akaike Information Criterion (AIC)
            - Distances scaled by      : W (right truncation distance)

Estimator selection: Choose estimator with minimum  AIC
Estimation functions: constrained to be nearly monotone non-increasing

Multipliers:                   Value      SE         DF
----------------------------------------------------------------
Sampling fraction              2.0000        0.00000 Inf

Variances:
----------
Variance of n: Empirical estimate from stratified sample with
               overlapping strata (Estimator O2)
Variance of f(0): MLE estimate

Goodness of fit:
----------------
Based on grouped distance data intervals

Glossary of terms
-----------------
Data items:
n    - number of observed objects (single or clusters of animals)
L    - total length of transect line(s)
k    - number of samples
K    - point transect effort, typically K=k
T    - length of time searched in cue counting
ER   - encounter rate (n/L or n/K or n/T)
W    - width of line transect or radius of point transect
x(i) - distance to i-th observation
s(i) - cluster size of i-th observation
r-p  - probability for regression test
chi-p- probability for chi-square goodness-of-fit test


Parameters or functions of parameters:
m    - number of parameters in the model
A(I) - i-th parameter in the estimated probability density function(pdf)
f(0) - 1/u = value of pdf at zero for line transects
u    - W*p = ESW, effective detection area for line transects
h(0) - 2*PI/v
v    - PI*W*W*p, is the effective detection area for point transects
p    - probability of observing an object in defined area
ESW  - for line transects, effective strip width = W*p
EDR  - for point transects, effective detection radius  = W*sqrt(p)
rho  - for cue counts, the cue rate
DS   - estimate of density of clusters
E(S) - estimate of expected value of cluster size
D    - estimate of density of animals
N    - estimate of number of animals in specified area
```

```
       Detection Fct/Global/Model Fitting


 Effort        :    663.3000
 # samples     :    34
 Width         :    202.0000
 Left          :       0.0000000
 # observations:    87

** Warning: The number of adjustment parameters allowed has
  been reduced to   4 because of limited number of intervals. **


 Model  1
    Uniform key, k(y) = 1/W
       Results:
       Convergence was achieved with    1 function evaluations.
       Final Ln(likelihood) value =  -144.96359
       Akaike information criterion =   289.92719
       Bayesian information criterion =   289.92719
       AICc =   289.92719
       Final parameter values:


 Model  2
    Uniform key, k(y) = 1/W
    Cosine adjustments of order(s) :  1
       Results:
       Convergence was achieved with    8 function evaluations.
       Final Ln(likelihood) value =  -139.51000
       Akaike information criterion =   281.02002
       Bayesian information criterion =   283.48593
       AICc =   281.06708
       Final parameter values:  0.48650027

    Likelihood ratio test between models  1 and  2
       Likelihood ratio test value    =    10.9072
       Probability of a greater value =   0.000958
*** Model  2 selected over model  1 based on minimum AIC


 Model  3
    Uniform key, k(y) = 1/W
    Cosine adjustments of order(s) :  1, 2
       Results:
       Convergence was achieved with   25 function evaluations.
       Final Ln(likelihood) value =  -138.89599
       Akaike information criterion =   281.79199
       Bayesian information criterion =   286.72382
       AICc =   281.93484
       Final parameter values:  0.53572273     0.14124855
      ** Warning: Parameters are being constrained to obtain monotonicity. **

    Likelihood ratio test between models  2 and  3
       Likelihood ratio test value    =     1.2280
       Probability of a greater value =   0.267792
*** Model  2 selected over model  3 based on minimum AIC
       Detection Fct/Global/Parameter Estimates


 Effort        :    663.3000
 # samples     :    34
 Width         :    202.0000
 Left          :       0.0000000
 # observations:    87

 Model
    Uniform key, k(y) = 1/W
    Cosine adjustments of order(s) :  1


              Point        Standard    Percent Coef.        95 Percent
  Parameter   Estimate       Error      of Variation     Confidence Interval
  ---------  -----------  -----------  --------------  ----------------------
    A( 1)     0.4865       0.1435
    f(0)     0.73590E-02  0.71021E-03       9.65      0.60770E-02  0.89114E-02
    p        0.67271      0.64923E-01       9.65      0.55552      0.81463
    ESW       135.89       13.114           9.65       112.22       164.55
  ---------  -----------  -----------  --------------  ----------------------
```

Detection Fct/Global/Plot: Detection Probability



Perpendicular distance in meters

Detection Fct/Global/Chi-sq GOF Test

Cell i	Cut Points		Observed Values	Expected Values	Chi-square Values
1	0.000	20.2	10	12.86	0.637
2	20.2	45.5	20	15.49	1.312
3	45.5	80.8	22	19.26	0.390
4	80.8	146.	19	25.57	1.690
5	146.	202.	16	13.81	0.346

Total Chi-square value = 4.3759 Degrees of Freedom = 3.00

Probability of a greater chi-square value, P = 0.22363

The program has limited capability for pooling. The user should judge the necessity for pooling and if necessary, do pooling by hand.

Cluster size/Global/Estimates

```
Effort        :    663.3000
# samples     :    34
Width         :    202.0000
Left          :       0.0000000
# observations:    87
```

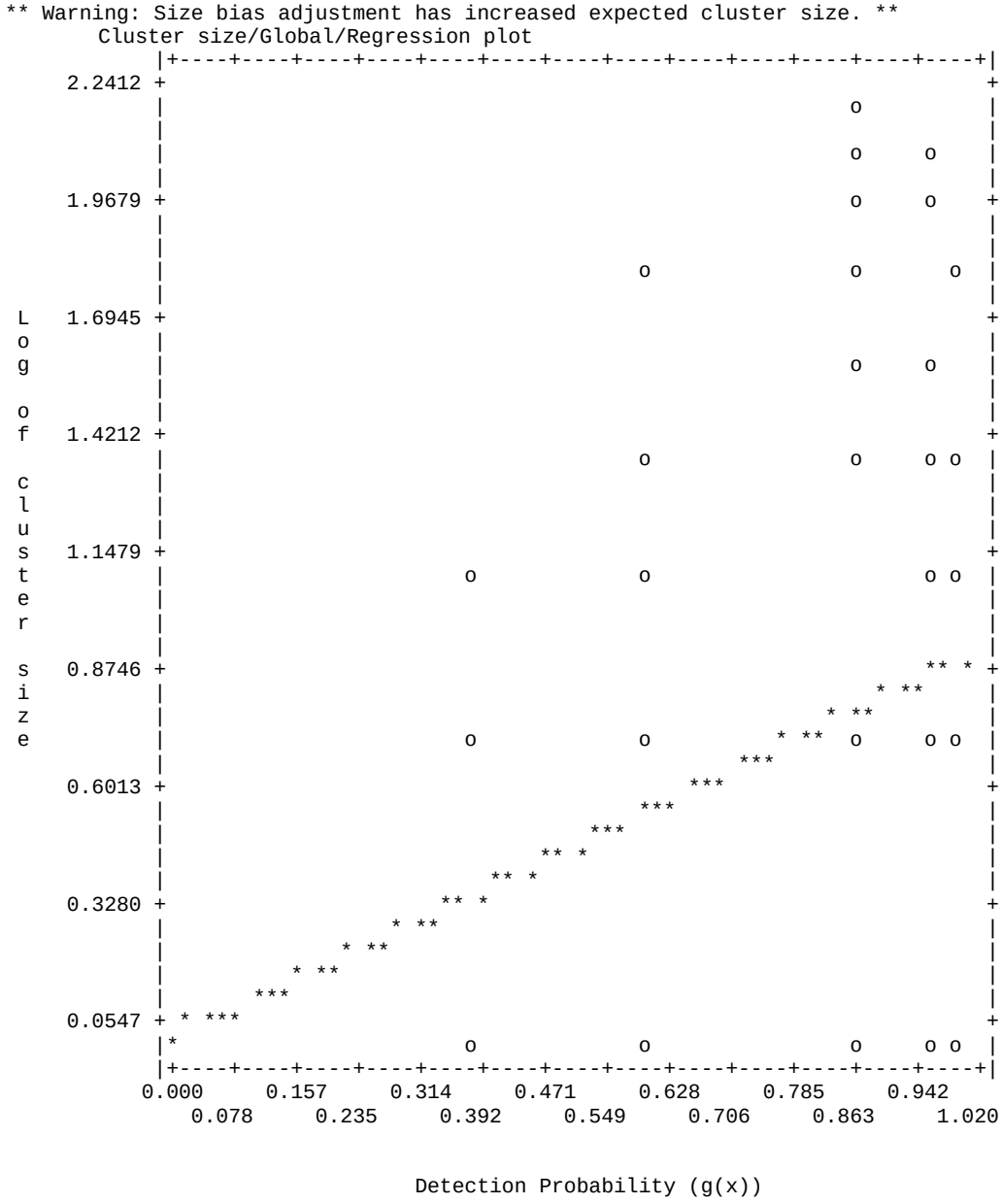
Expected cluster size estimated based on regression of: log(s(i)) on g(x(i))
** Warning: Exact distance values, rather than distance intervals,
have been used in size bias regression calculations. **

```
Regression Estimates
--------------------
Slope      =    0.879673       Std error   =    0.326448
Intercept  =    0.986228E-02   Std error   =    0.256856
Correlation=    0.2805         Students-t  =     2.69468
Df         =     85            Pr(T < t)   =    0.995755
```

Expected cluster size = 3.1079 Standard error = 0.25986

Mean cluster size = 2.5747 Standard error = 0.22455
** Warning: Size bias adjustment has increased expected cluster size. **

Cluster size/Global/Regression plot



Density Estimates/Global

```
Effort        :    663.3000
# samples     :    34
Width         :    202.0000
Left          :       0.0000000
# observations:    87

Model  2
   Uniform key, k(y) = 1/W
   Cosine adjustments of order(s) :  1
```

Parameter	Point Estimate	Standard Error	Percent Coef. of Variation	95% Percent Confidence Interval	
DS	2.4999	0.54739	21.90	1.6186	3.8612
E(S)	3.1079	0.25986	8.36	2.6326	3.6689
D	7.7694	1.8210	23.44	4.8953	12.331
N	**4553.0**	1067.2	23.44	2869.0	7226.0

```
Measurement Units
---------------------------------
Density: Numbers/Sq. miles
    ESW: meters

Component Percentages of Var(D)
-------------------------------
Detection probability   :  17.0
Encounter rate          :  70.3
Cluster size            :  12.7
```

Estimation Summary - Encounter rates

	Estimate	%CV	df	95% Confidence Interval	
n	87.000				
k	34.000				
L	663.30				
n/L	0.13116	19.65	33.00	0.88265E-01	0.19491
Left	0.0000				
Width	202.00				

Estimation Summary - Detection probability

	Estimate	%CV	df	95% Confidence Interval	
Uniform/Cosine					
m	1.0000				
LnL	-139.51				
AIC	281.02				
AICc	281.07				
BIC	283.49				
Chi-p	0.22363				
f(0)	0.73590E-02	9.65	86.00	0.60770E-02	0.89114E-02
p	0.67271	9.65	86.00	0.55552	0.81463
ESW	135.89	9.65	86.00	112.22	164.55

Estimation Summary - Expected cluster size

	Estimate	%CV	df	95% Confidence Interval	
Average cluster size					
	2.5747	8.72	86.00	2.1656	3.0611
Uniform/Cosine					
r	0.28054				
r-p	0.99576				
E(S)	3.1079	8.36	85.00	2.6326	3.6689

Estimation Summary - Density&Abundance

	Estimate	%CV	df	95% Confidence Interval	
Uniform/Cosine					
DS	2.4999	21.90	49.72	1.6186	3.8612
D	7.7694	23.44	64.48	4.8953	12.331
N	4553.0	23.44	64.48	2869.0	7226.0

INPUT	
Species:	PRONGHORN
Biologist:	WILL SCHULTZ
Herd Unit & No.:	ELK MTN. PR528
Model date:	04/18/14

MODEL EVALUATION: FAIR

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	103	111	☑ CJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	106	115	☐ SCJ,SCA Mod	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	49	133	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	1729	1623	4409	**7762**	1657	1114	3890	**6661**	1395	3914	**5310**	4650	1238		5000
1994	2653	1368	3836	**7856**	2588	929	3356	**6873**	1495	3694	**5189**				5000
1995	1366	1465	3620	**6451**	1310	1117	3338	**5766**	1325	3348	**4673**	2883	638		5000
1996	2040	1298	3281	**6619**	2022	982	3235	**6239**	1412	3487	**4899**				5000
1997	1893	1384	3417	**6694**	1885	981	3368	**6235**	1365	3572	**4938**				5000
1998	1689	1338	3501	**6528**	1683	932	3418	**6034**	1265	3558	**4823**				5000
1999	2028	1240	3487	**6754**	2010	900	3355	**6265**	1331	3583	**4914**				5000
2000	1851	1304	3511	**6666**	1835	941	3381	**6158**	1318	3559	**4877**	3734	847		5000
2001	2090	1292	3488	**6869**	2073	914	3403	**6391**	1358	3649	**5007**				5000
2002	2543	1331	3576	**7450**	2533	943	3494	**6970**	1512	3861	**5373**				5000
2003	2181	1481	3784	**7446**	2158	1077	3639	**6873**	1524	3878	**5402**				5000
2004	2624	1493	3801	**7918**	2616	1019	3697	**7333**	1594	4067	**5661**	6777	1038		5000
2005	3061	1562	3986	**8609**	3054	1130	3870	**8054**	1821	4344	**6165**				5000
2006	2421	1785	4257	**8463**	2395	1291	4050	**7736**	1773	4310	**6083**				5000
2007	2796	1738	4224	**8757**	2751	1241	3824	**7817**	1822	4177	**5999**	8620	1438		5000
2008	1677	1786	4094	**7556**	1626	1340	3664	**6630**	1605	3715	**5320**				5000
2009	1773	1573	3641	**6987**	1706	1065	3220	**5991**	1367	3332	**4698**				5000
2010	1426	1339	3265	**6030**	1373	841	2740	**4954**	1062	2764	**3826**	8046	1285		5000
2011	1074	1041	2709	**4824**	1029	545	2142	**3716**	733	2115	**2848**				5000
2012	1396	718	2073	**4187**	1312	291	1633	**3237**	703	1836	**2539**	4553	1067		5000
2013	843	689	1799	**3331**	818	360	1376	**2553**	578	1777	**2355**				5000
2014	975	566	1741	**3283**	970	291	1653	**2914**							5000
2015															5000
2016															5000
2017															5000
2018															5000
2019															5000
2020															5000
2021															5000
2022															5000
2023															5000
2024															5000
2025															5000

Survival and Initial Population Estimates

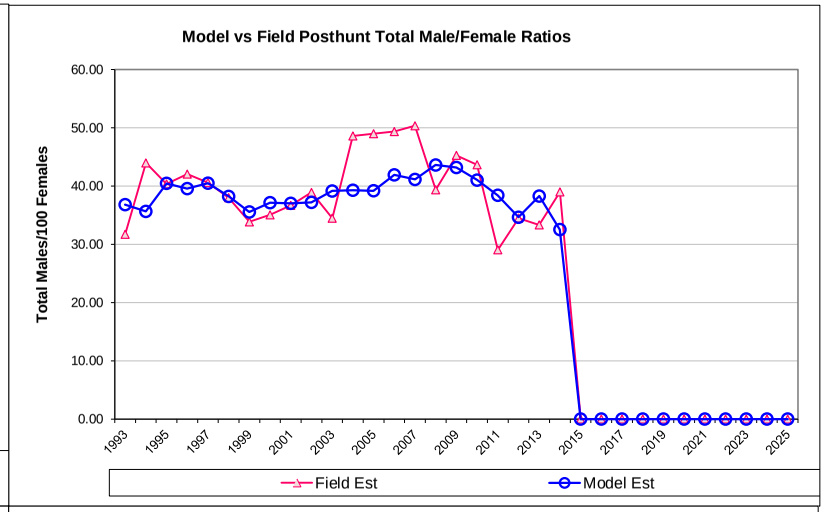
Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.54			0.89		
1994	0.54			0.89		
1995	0.54			0.89		
1996	0.54			0.89		
1997	0.54			0.89		
1998	0.54			0.89		
1999	0.54			0.89		
2000	0.54			0.89		
2001	0.54			0.89		
2002	0.54			0.89		
2003	0.54			0.89		
2004	0.54			0.89		
2005	0.54			0.89		
2006	0.54			0.89		
2007	0.54			0.89		
2008	0.54			0.89		
2009	0.54			0.89		
2010	0.54			0.88	0.88	0.06
2011	0.54			0.82	0.82	0.07
2012	0.54			0.89		
2013	0.54			0.89		
2014	0.54			0.89		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

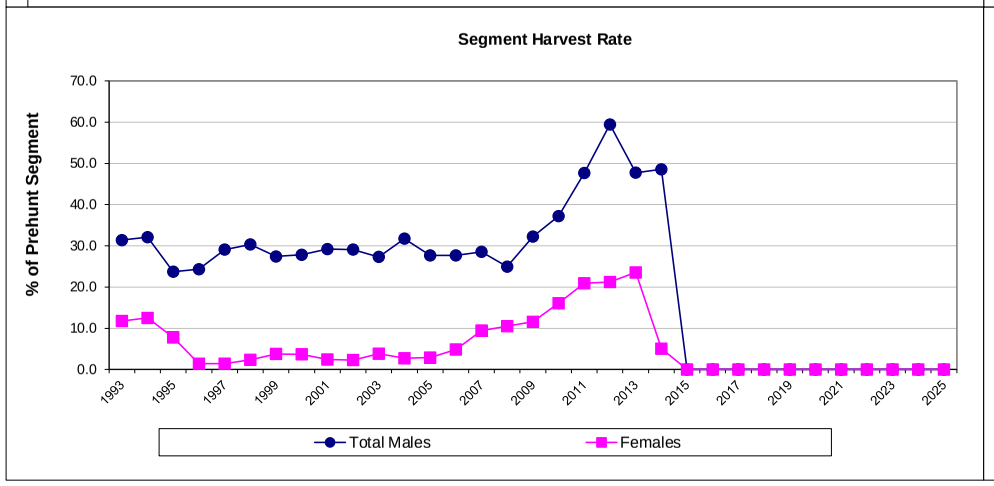
Parameters:	Optim cells
Juvenile Survival =	0.543
Adult Survival =	0.889
Initial Total Male Pop/10,000 =	0.162
Initial Female Pop/10,000 =	0.441

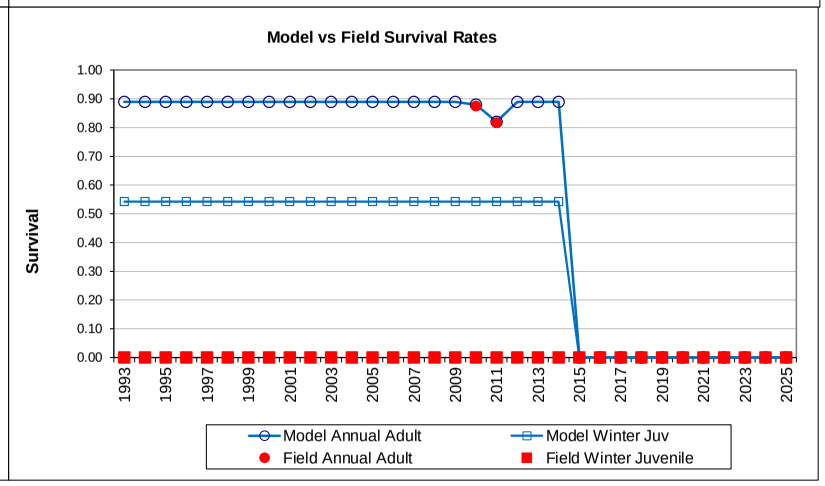
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

	Classification Counts										Harvest	
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles	Total Harvest	Total Males	Females
1993		39.22	2.92	36.81	31.72	2.56	463	472	66	1001	31.4	11.8
1994		69.15	4.55	35.65	43.97	3.35	399	436	59	894	32.1	12.5
1995		37.75	2.34	40.47	40.38	2.44	316	256	51	623	23.7	7.8
1996		62.16	4.13	39.57	42.06	3.18	287	42	16	345	24.3	1.4
1997		55.40	4.15	40.50	40.60	3.38	366	44	7	417	29.1	1.4
1998		48.25	3.17	38.22	38.01	2.71	369	75	5	449	30.3	2.4
1999		58.15	3.59	35.56	33.85	2.52	309	120	16	445	27.4	3.8
2000		52.71	3.19	37.15	35.06	2.44	330	118	14	462	27.8	3.7
2001		59.92	3.54	37.04	36.68	2.56	343	77	15	435	29.2	2.4
2002		71.09	4.70	37.20	38.91	3.13	352	75	9	436	29.1	2.3
2003		57.64	3.86	39.15	34.48	2.76	368	132	21	521	27.3	3.8
2004		69.04	4.25	39.29	48.61	3.34	431	94	7	532	31.8	2.7
2005		76.80	4.42	39.20	48.99	3.24	393	105	6	504	27.7	2.9
2006		56.88	2.86	41.93	49.36	2.60	449	188	24	661	27.7	4.9
2007		66.20	5.06	41.14	50.35	4.20	451	363	41	855	28.6	9.5
2008		40.97	2.67	43.62	39.36	2.61	405	391	46	842	24.9	10.5
2009		48.70	2.93	43.19	45.27	2.79	461	383	61	905	32.2	11.6
2010		43.66	2.63	41.02	43.66	2.63	453	477	48	978	37.2	16.1
2011		39.66	2.69	38.42	29.06	2.22	451	515	41	1007	47.7	20.9
2012		67.34	4.55	34.65	34.50	2.92	388	400	76	864	59.4	21.2
2013		46.86	3.67	38.28	33.33	2.95	299	385	23	707	47.8	23.5
2014		56.00	4.18	32.53	39.00	3.29	250	80	5	335	48.5	5.1
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

FIGURES



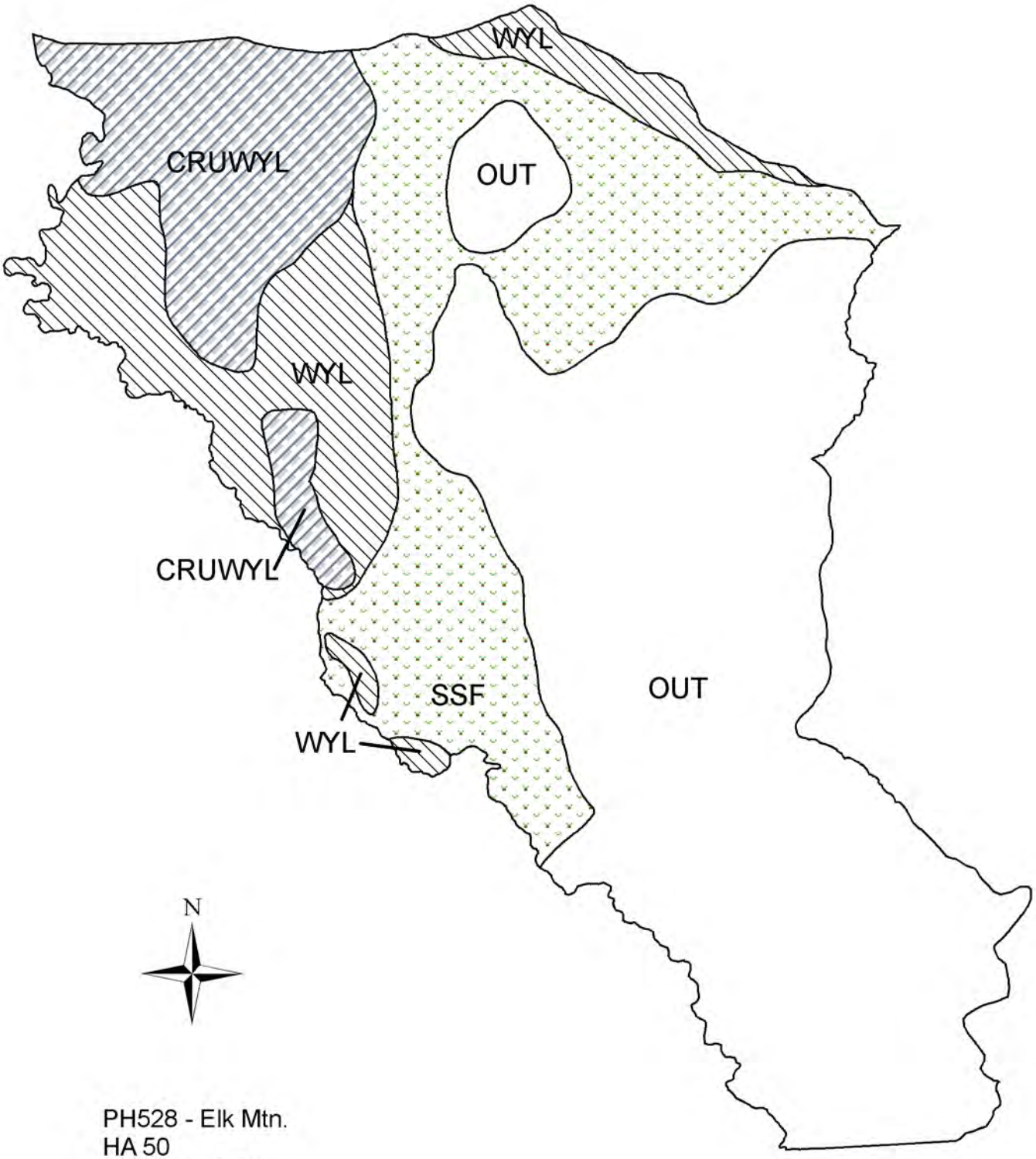




Comments:

The CJ,CA model was used to due the relative simplicity and low AIC_c score. Model postseason estimate is plausible.

END



PH528 - Elk Mtn.
HA 50
Revised - 8/87

2013 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2013 - 5/31/2014

HERD: PR529 - BIG CREEK

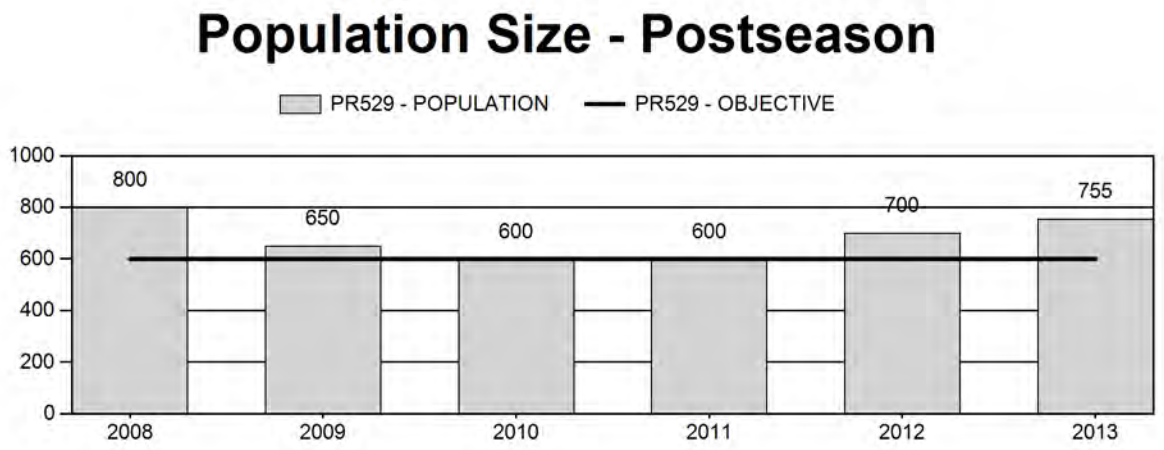
HUNT AREAS: 51 | PREPARED BY: WILL SCHULTZ

	2008 - 2012 Average	2013	2014 Proposed
Population:	670	755	643
Harvest:	85	41	85
Hunters:	82	44	90
Hunter Success:	104%	93%	94%
Active Licenses:	98	48	100
Active License Percent:	87%	85%	85%
Recreation Days:	327	169	340
Days Per Animal:	3.8	4.1	4
Males per 100 Females	43	36	
Juveniles per 100 Females	36	60	

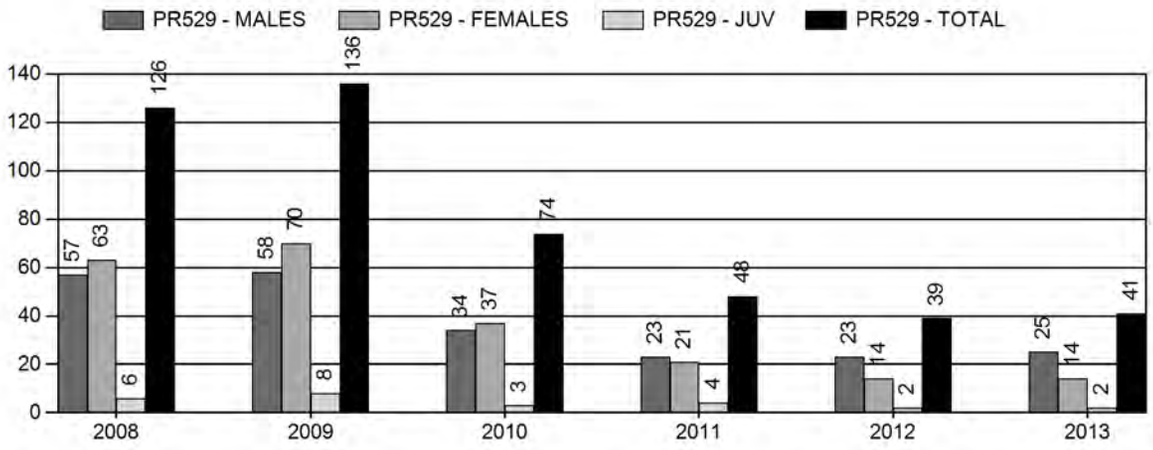
Population Objective:	600
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	26%
Number of years population has been + or - objective in recent trend:	1
Model Date:	04/18/2014

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

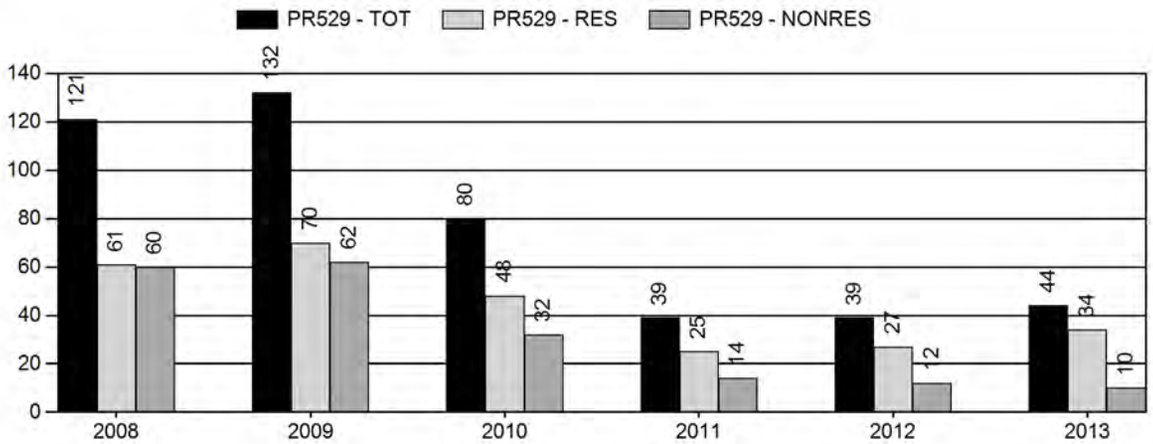
	JCR Year	Proposed
Females ≥ 1 year old:	3.3%	8.8%
Males ≥ 1 year old:	13.0%	29.6%
Juveniles (< 1 year old):	.1%	2.6%
Total:	4.3%	10.7%
Proposed change in post-season population:	-4.3%	-11.8%



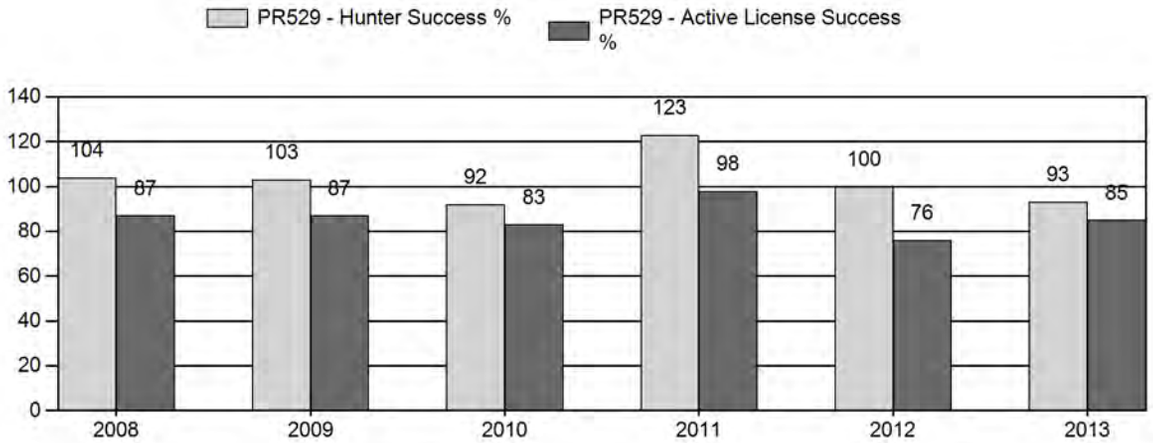
Harvest



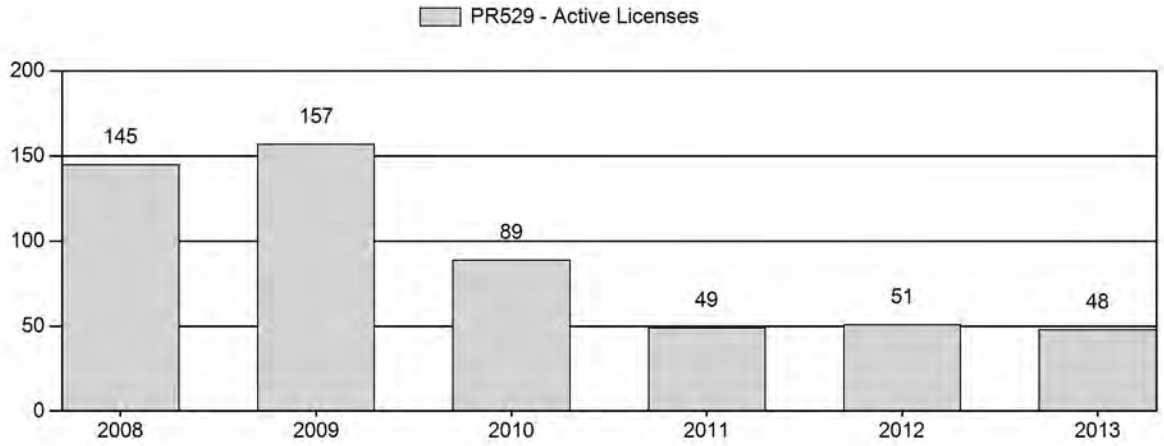
Number of Hunters



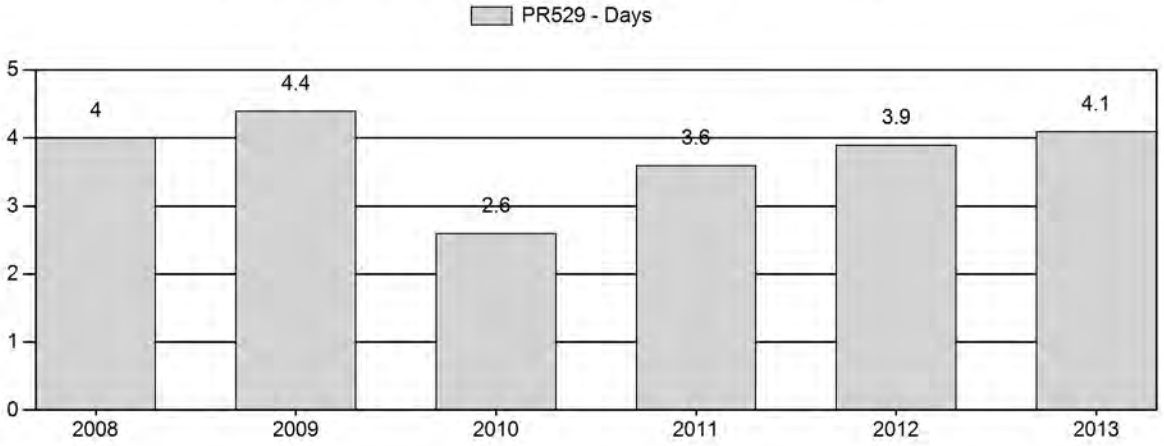
Harvest Success



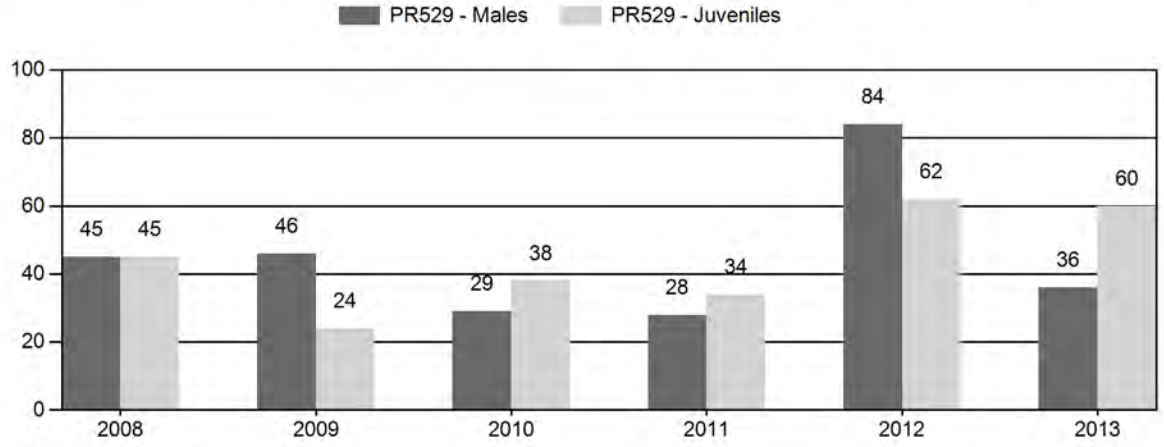
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR529 - BIG CREEK

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	1,000	9	25	34	24%	75	52%	34	24%	143	500	12	33	45	± 14	45	± 14	31
2009	800	42	84	126	27%	272	59%	64	14%	462	476	15	31	46	± 5	24	± 3	16
2010	700	13	49	62	17%	214	60%	82	23%	358	361	6	23	29	± 5	38	± 6	30
2011	650	15	33	48	17%	170	62%	57	21%	275	446	9	19	28	± 6	34	± 6	26
2012	750	32	60	92	34%	110	41%	68	25%	270	441	29	55	84	± 16	62	± 13	34
2013	800	8	43	51	18%	141	51%	84	30%	276	503	6	30	36	± 8	60	± 11	44

BIG CREEK PRONGHORN (PR529)
Hunt Area 51
2014 Hunting Season

Hunt Area	Type	Dates of Seasons Opens	Closes	Limited Quota	Limitations
51	1	Sep. 16	Nov. 14	50	Limited quota licenses; any antelope
	6	Sep. 16	Nov. 14	50	Limited quota licenses; doe or fawn

Hunt Area	Type	Quota change from 2013
Herd Unit Total	**1**	**+25**
	6	**+25**

Management Evaluation
Current Management Objective: 600
Management Strategy: Recreational
2013 Postseason Population Estimate: 760
2014 Proposed Postseason Population Estimate: 640

Pronghorn in the Big Creek herd unit are managed toward a numeric objective of 600. The population was estimated using a spreadsheet model developed in 2012 and update in 2013. The herd is managed for recreational opportunity. The management objective was last reviewed in 1997 and is planned for review in 2014.

Herd Unit Issues
Pronghorn damage to alfalfa crops has decreased due to the low number of pronghorn observed in this herd unit. Access is difficult except for on those private lands receiving damage. Recent changes in land use have been observed in this herd unit. Several sections of abandoned wheat fields have been converted into cattle pastures which have been grazed intensively. Development in the Trail Run subdivision is also continuing.
In the past these areas provided pronghorn with seasonal habitat and the observed changes in land use appear to be displacing pronghorn into other areas.

In 2011, the Carbon County Predator Management District, in cooperation with WGFD, initiated a coyote removal project for the benefit of the Big Creek herd unit. This project focused removal efforts on the very southeast portion of the herd unit. Preliminary data appeared to indicate fawn ratios have increased in this localized area. The coyote removal project continued through the fall of 2013. The final report from Wildlife Services' was appended to the document (Appendix A).

Weather
Weather in this herd unit was relatively normal during the past bio-year. This weather pattern most likely had a neutral to positive influence on pronghorn. For specific meteorological information for the Big Creek herd unit the reviewer is referred to the following link:
http://www.ncdc.noaa.gov/cag/

Habitat
Habitat conditions improved in 2013 with an increase in timely spring and fall precipitation. However, much of the transition and winter ranges were severely impacted by the drought conditions experienced in bio-year 2012. No pronghorn habitat production/utilization data was available for this herd unit. However, annual production rates should have improved from the previous year, while utilization rates on winter ranges likely continued to be high.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality and consequently heavily influence population management for any particular big game specie.

Shrub communities within the Laramie Region that are annually assessed by game wardens, wildlife biologists, and terrestrial habitat biologists, include: true mountain mahogany, antelope bitterbrush, skunkbrush sumac, big sagebrush, and four-wing saltbush. A majority of these transects were established approximately 12–13 years ago. Transects were established for several different reasons, including: measuring habitat response prior to or following treatments (i.e. prescribed fire, wildfire, mowing), concern over historic or current domestic livestock or wild ungulate utilization levels, selection of "representative habitats" utilized by wildlife on identified winter ranges, and to compare present results with historic data sets.

Field Data
The 2013 preseason ratios were 36 bucks and 60 fawns per 100 does produced from an inadequate sample of 276 pronghorn obtained through ground surveys. 2012 fawn ratios decreased from 62 fawns/100 does, to 60 fawns/100 does. Sample size from the classification survey (n=276) was less than the adequate size (n=503) required for an estimate with a 90% confidence interval. This herd unit is adjacent to the North Park, Colorado, and movement of pronghorn between Colorado and Wyoming complicates management activities, including the monitoring of pronghorn herd composition.

Harvest Data
The harvest survey data for the 2013 hunting season indicated a total of 41 pronghorn were harvested with 85% harvest success for 48 active licensed hunters.

Population
In 2013 the CJ,CA spreadsheet model was selected again for the Big Creek herd unit because it produced the best AICc score. The population estimate is plausible. Accuracy of the end of year density/population estimates developed from line-transect density surveys were suspect and likely an over estimation. Small sample sizes and interstate movements of pronghorn for this herd unit may bias line-transect survey estimates.

We rated this model as poor, and not biologically defensible in our evaluation. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model (Morrison 2012). The poor rating was primarily due to inadequate sample sizes for preseason classification surveys and the likely violation of an assumption that this is a closed population.

Line-Transect Survey
A line-transect survey was conducted in June of 2013 to develop a bio-year 2012 end of year density/population estimate for this herd unit. The results (Appendix B) of this survey were considered to be overestimated due to observation bias. However, the results of this survey were incorporated into the spreadsheet model.

Management Summary
We increased harvest opportunity for 2014 in the Big Creek herd unit, increasing the 25 Type 1 and Type 6 licenses from 25 to 50 for each type. Interstate movement of pronghorn complicates monitoring and subsequent management activities in this herd unit. Ocular estimates and discussions with landowners provide better information about this herd unit's population dynamics and status.

Literature Cited
Morrison, T. 2012. User Guide: Spreadsheet Model for Ungulate Population data Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 41 pp.

Bibliography of Herd Specific Studies
None.

Big Creek Pronghorn Antelope Recruitment Project

Carbon County Predatory Management Board (CCPMD), USDA/APHIS/Wildlife Services (WS'), Wyoming Game and Fish Department (WG&FD)
05/26/2011-9/05/2013

The Big Creek Pronghorn Antelope Recruitment Project consisted of a 3 year cooperative effort aimed at the removal of coyotes (*Canis latrans)* within Wyoming Antelope Hunt Area 51 to increase the viability of the Pronghorn Antelope *(Antilocapra Americana)* herd that fawn in this area. At the request of the WG&FD, efforts were conducted by WS'/CCPMD personnel stationed in Carbon County and the WS' District Supervisor and pilot stationed in Casper WY. Specifically, removal took place on lands owned/leased by Big Creek Ranches and the Munroe Ranch. The total land area of these two ranches is approximately 65,528 ac. Average elevation of the area in which coyotes were taken was 8,065 ft. Coyotes were taken at 7,680 ft. and the highest was 8,450 ft. indicated by GPS. This area is a cow/calf production ranching area adjacent to the Medicine Bow National Forest. Private lands lay in the main valley which is interspersed with many irrigation ditches for hay production and several small creeks and reservoirs. Hwy 230 generally travels through the valley in a North/South direction. Due to the proximity of the Colorado State Line and the land in which these ranch holdings encompass, removal activities took place over parts of Hunt Area 51. The goal of this project was to validate that coyote removal will prove beneficial to Pronghorn Antelope fawn recruitment. The effort to remove coyotes from these two ranches began on 05/26/2011 with aerial hunting flight and continued until 09/05/2013. Ground work and aerial hunting continued as weather, recreational hunting use of lands, and time demanded by other pertinent WS' Carbon County duties permitted.

A total of 175 coyotes and 2 dens were removed from the project area. *Of the 175 coyotes taken, 150 (due to overlaying waypoints) were plotted as GPS points on the attached topographic maps and 107 were retrieved for comprehensive data collection.* 21 coyotes from the 107 retrieved were sampled for Plague/Tularemia and 3 for Parvovirus/Hydatid testing.

Below is a series of Coyote findings and totals related to the completed project:

5/26/11-11/16/1	1/31/12-9/6/12	4/24/13-9/5/13	
14.4 hrs.	**23.8 hrs.**	**15.5 hrs.**	**Aerial hunting time only.**
185.6 hrs.	**163.0 hrs.**	**77.3 hrs.**	**Ground work time only.**
21	**-**	**-**	**Plague samples taken. 14 neg., 7 pos.**
21	**-**	**-**	**Tularemia samples taken. 21 neg.**
-	**-**	**3**	**Parvovirus/Hydatid samples taken. (N/R).**
5	**5**	**5**	**USDA/APHIS/WS Personnel.**
55	**68**	**52**	**Coyotes total removed from project area.**
1	**1**	**0**	**Coyote den removed from project area.**

107 of 175 total (61%) coyotes taken verified for sampling and analysis.

5/26/11-11/16/11	1/31/12-9/6/12	4/12/13-9/5/13	
15	**18**	**7**	**Adult male coyotes verified.**
0	**1**	**-**	**Juvenile male verified.**
19	**20**	**8**	**Adult female coyotes verified.**
2	**5**	**4**	**Male pups verified.**
2	**3**	**2**	**Female pups verified.**
-	**1**	**-**	**pup not verified.**

5/26/11-11/18/11

5 Adult female coyotes showed the presence of placental scars on their uterus verifying they had recently whelped. 2 females had 8 pups each, 2 females had 4 pups each and 1 female had 6 pups. Avg. 6 .0 pups per female of 5 verified.

2 Adult male coyotes were of advanced age due to tooth wear and 1 adult female coyote was infested with wormlike stomach parasites of unknown determination.

1/31/12-9/6/12

3 Adult female coyotes had a total of 21 unborn whelps at time of take (7,7,5). 4 females showed the presence of placental scars on their uterus totaling 19 whelps at time of take (4,4,5,6). Avg. 5.7 pups per female of 7 verified.

4/24/13-9/5/13

2 Adult female coyotes showed presence of placental scars on their uterus totaling 8 whelps at time of take (5,3). Avg. 4 pups per female of 2 verified.

2 Adult male coyotes showed advanced signs of Sarcoptic Mange parasitic skin disease.

Stomach content occurrences on 38 verified coyotes 5/26/11-11/16/11.

3	**Empty**	**1**	**Sage grouse**	**4**	**Pronghorn**
1	**Deer**	**16**	**Rodent**	**4**	**Rabbit**
7	**Grass/Vegetation**	**12**	**Cow/Calf**	**1**	**weasel**

Stomach content occurrences on 48 verified coyotes 1/31/12-9/6/12.

16	**Empty**	**1**	**Bird**	**16**	**Rodent**
2	**Unknown**	**2**	**Deer**	**4**	**Pronghorn**
7	**Cow/Calf**	**1**	**Eaten by vultures**	**3**	**Grass**
3	**Rabbit**	**1**	**Plastic ear tag (calf)**		

Stomach content occurrences on 21 verified coyotes 4/24/13-9/5/13.

2	**Empty**	**1**	**Bird**	**7**	**Rodent**
1	**Duck**	**2**	**Rabbit**	**3**	**Grass/Vegetation**
6	**Cow/Calf**	**4**	**Pronghorn**		

After review of the attached collected data and the WGFD 2004-2013 Preseason Classification Summary presented by the WG&F Dept. I believe that it is an adequate assumption that coyote removal does benefit Pronghorn Antelope fawn recruitment.

During a period of time (3/1/13-7/1/13) additional coyote removal activities took place adjacent to the North and West of Big Creek and Munroe Ranches. This is due to a similar project called the Platte Valley Mule Deer project (PVMDP) being conducted for the first year of a three year term. The removal of these additional coyotes may have affected the number of coyotes available to remove on the BC Project. Also, it may have attributed to an inadvertent increased effort that would support increased fawn recruitment in Pronghorn Antelope.

Livestock protection and PVMD coyote removal efforts will continue in the future on the areas encompassed by the BC Pronghorn Antelope Project. Please contact me if there any questions related to this report.

Special thanks to:

CCPMD Board Members

Will Shultz (G&F Biologist, Saratoga)

Carbon County WS' CCPMD Specialists' (Troy Aleshire, Dan Braig, Tracy Villwok, Luke Spanbauer)

Jerry Hyatt (WS' Pilot)

Mike Pipas (WS' Disease Biologist)

Sincerely,

Craig Acres

USDA/APHIS/WS

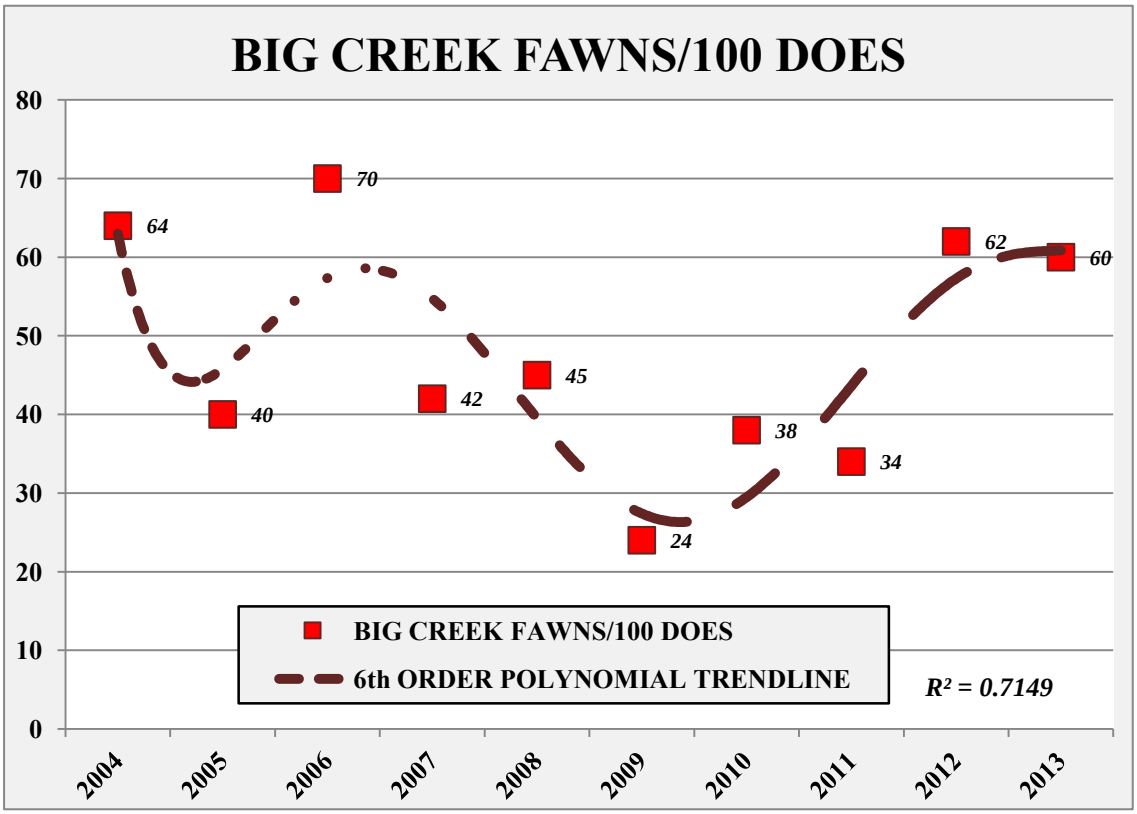
Staff Biologist

12/10/2013

2004 - 2013 Preseason Classification Summary

for Pronghorn Herd PR529 - BIG CREEK

YEAR	YR. MALE/100 DOES	AD.MALE/100 DOES	TOTAL MALE/100 DOES	BIG CREEK FAWNS/100 DOES
2004	13	29	42	64
2005	17	25	41	40
2006	0	0	62	70
2007	17	36	53	42
2008	12	33	45	45
2009	15	31	46	24
2010	6	23	29	38
2011	9	19	28	34
2012	29	55	84	62
2013	6	30	36	60



2012 PR529 - BIG CREEK Pronghorn Line-Transect Summary

Survey Dates:	6/7/2013 - 6/7/2013
Survey Cost:	$ 1,290.00
Flight Service:	OWYHEE AIR, LLC.
Aircraft:	MAULE
Observers:	Burton SE=186.98

Weather Conditions:

Temperature (Degrees Fahrenheit):	60 F
Cloud Cover (%):	< 30%
Wind Speed (MPH):	0 - 15

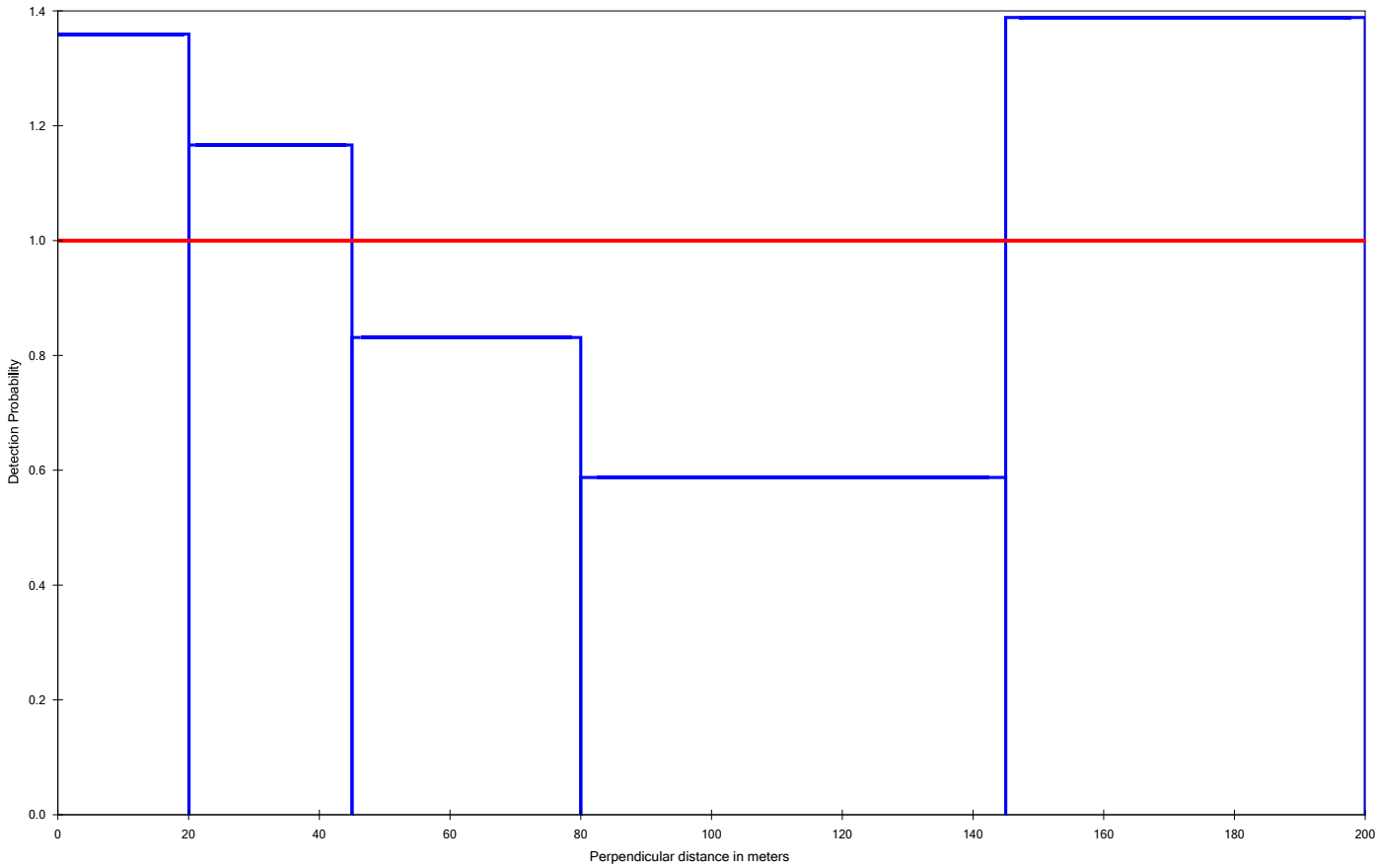
Transect Limits:	106.23 to 106.45
Transect Direction:	North/South
Transect Interval (Minutes of Longitude):	1.0
Transect Length: (Mi.):	335
Transect Altitude (AGL):	301 ft.

Occupied Habitat (mi^2):	208
Density Estimate (Animals/mi^2 with Confidence Intervals):	6.6 (5.0 - 8.7)
Population Estimate (with Confidence Intervals):	1,364 (1,032 - 1,801)

```
---------------------------------
 Encounter rate for all data combined
 Detection probability for all data combined
 Expected cluster size for all data combined
 Density for all data combined

 Distances:
 ----------
 Analysis based on distance intervals
 Width specified as:    200.0000
 Left most value set at:       0.0000000

 Clusters:
 ---------
 Analysis based on exact sizes
 Expected value of cluster size computed by: regression of log(s(i)) on g(x(i))

 Estimators:
 -----------
 Estimator  1
 Key: Uniform
 Adjustments - Function                 : Simple polynomials
             - Term selection mode      : Sequential
             - Term selection criterion : Akaike Information Criterion (AIC)
             - Distances scaled by      : W (right truncation distance)

 Estimator selection: Choose estimator with minimum  AIC
 Estimation functions: constrained to be nearly monotone non-increasing

 Multipliers:                   Value      SE         DF
 ----------------------------------------------------------------
 Sampling fraction              2.0000        0.00000 Inf

 Variances:
 ----------
 Variance of n: Empirical estimate from stratified sample with
                overlapping strata (Estimator O2)
 Variance of f(0): MLE estimate

 Goodness of fit:
 ----------------
 Based on grouped distance data intervals


 Glossary of terms
 -----------------
 Data items:
 n    - number of observed objects (single or clusters of animals)
 L    - total length of transect line(s)
 k    - number of samples
 K    - point transect effort, typically K=k
 T    - length of time searched in cue counting
 ER   - encounter rate (n/L or n/K or n/T)
 W    - width of line transect or radius of point transect
 x(i) - distance to i-th observation
 s(i) - cluster size of i-th observation
 r-p  - probability for regression test
 chi-p- probability for chi-square goodness-of-fit test


 Parameters or functions of parameters:
 m    - number of parameters in the model
 A(I) - i-th parameter in the estimated probability density function(pdf)
 f(0) - 1/u = value of pdf at zero for line transects
 u    - W*p = ESW, effective detection area for line transects
 h(0) - 2*PI/v
 v    - PI*W*W*p, is the effective detection area for point transects
 p    - probability of observing an object in defined area
 ESW  - for line transects, effective strip width = W*p
 EDR  - for point transects, effective detection radius  = W*sqrt(p)
 rho  - for cue counts, the cue rate
 DS   - estimate of density of clusters
 E(S) - estimate of expected value of cluster size
 D    - estimate of density of animals
 N    - estimate of number of animals in specified area
```

```
       Detection Fct/Global/Model Fitting


 Effort        :    335.8000
 # samples     :    23
 Width         :    200.0000
 Left          :       0.0000000
 # observations:   110

** Warning: The number of adjustment parameters allowed has
  been reduced to   4 because of limited number of intervals. **


 Model  1
    Uniform key, k(y) = 1/W
       Results:
       Convergence was achieved with    1 function evaluations.
       Final Ln(likelihood) value =  -173.51473
       Akaike information criterion =   347.02945
       Bayesian information criterion =   347.02945
       AICc =   347.02945
       Final parameter values:


 Model  2
    Uniform key, k(y) = 1/W
    Simple polynomial adjustments of order(s) :  2
       Results:
       Convergence was achieved with    2 function evaluations.
       Final Ln(likelihood) value =  -173.51473
       Akaike information criterion =   349.02945
       Bayesian information criterion =   351.72995
       AICc =   349.06650
       Final parameter values:      0.00000000
      ** Warning: Parameters are being constrained to obtain monotonicity. **

    Likelihood ratio test between models  1 and  2
       Likelihood ratio test value    =     0.0000
       Probability of a greater value =   1.000000
 *** Model  1 selected over model  2 based on minimum AIC
       Detection Fct/Global/Parameter Estimates


 Effort        :    335.8000
 # samples     :    23
 Width         :    200.0000
 Left          :       0.0000000
 # observations:   110

 Model
    Uniform key, k(y) = 1/W


              Point        Standard    Percent Coef.        95 Percent
  Parameter   Estimate       Error      of Variation     Confidence Interval
  ---------  -----------  -----------  --------------  ----------------------
    f(0)     0.50000E-02      0.00000       0.00      0.50000E-02  0.50000E-02
    p         1.0000          0.00000       0.00       1.0000       1.0000
    ESW       200.00          0.00000       0.00       200.00       200.00
  ---------  -----------  -----------  --------------  ----------------------
```

Detection Fct/Global/Plot: Detection Probability



Perpendicular distance in meters

Detection Fct/Global/Chi-sq GOF Test

Cell i	Cut Points		Observed Values	Expected Values	Chi-square Values
1	0.000	20.1	15	11.03	1.426
2	20.1	45.0	16	13.72	0.380
3	45.0	80.0	16	19.25	0.549
4	80.0	145.	21	35.75	6.086
5	145.	200.	42	30.25	4.564

Total Chi-square value = 13.0048 Degrees of Freedom = 4.00

Probability of a greater chi-square value, P = 0.01125

The program has limited capability for pooling. The user should judge the necessity for pooling and if necessary, do pooling by hand.

Cluster size/Global/Estimates

```
Effort        :    335.8000
# samples     :    23
Width         :    200.0000
Left          :       0.0000000
# observations:   110

Expected cluster size estimated based on regression of: log(s(i)) on g(x(i))
** Warning: Exact distance values, rather than distance intervals,
have been used in size bias regression calculations. **

All X/G(X) measurements have nearly identical values.
No size bias adjustment. Average cluster size used instead.


Expected cluster size =   1.5455     Standard error    =  0.85316E-01

Mean cluster size     =   1.5455     Standard error    =  0.85316E-01
```

Density Estimates/Global

```
Effort        :    335.8000
# samples     :    23
Width         :    200.0000
Left          :       0.0000000
# observations:   110

Model  1
   Uniform key, k(y) = 1/W
```

Parameter	Point Estimate	Standard Error	Percent Coef. of Variation	95% Percent Confidence Interval	
DS	4.2421	0.53226	12.55	3.2735	5.4973
E(S)	1.5455	0.85316E-01	5.52	1.3854	1.7240
D	6.5560	0.89869	13.71	4.9636	8.6591
N	1364.0	186.98	13.71	1032.0	1801.0

```
Measurement Units
---------------------------------
Density: Numbers/Sq. miles
    ESW: meters

Component Percentages of Var(D)
-------------------------------
Encounter rate          :  83.8
Cluster size            :  16.2
```

Estimation Summary - Encounter rates

	Estimate	%CV	df	95% Confidence Interval	
n	110.00				
k	23.000				
L	335.80				
n/L	0.32758	12.55	22.00	0.25278	0.42450
Left	0.0000				
Width	200.00				

Estimation Summary - Detection probability

	Estimate	%CV	df	95% Confidence Interval	
Uniform/Polynomial					
m	0.0000				
LnL	-173.51				
AIC	347.03				
AICc	347.03				
BIC	347.03				
Chi-p	0.11253E-01				
f(0)	0.50000E-02	0.00	110.00	0.50000E-02	0.50000E-02
p	1.0000	0.00	110.00	1.0000	1.0000
ESW	200.00	0.00	110.00	200.00	200.00

```
      Estimation Summary - Expected cluster size

                        Estimate      %CV     df     95% Confidence Interval
                       -----------------------------------------------------
Average cluster size
                        1.5455        5.52   109.00  1.3854       1.7240
Uniform/Polynomial
                r       0.0000
                r-p    0.50000
                E(S)    1.5455        5.52   109.00  1.3854       1.7240
      Estimation Summary - Density&Abundance

                        Estimate      %CV     df     95% Confidence Interval
                       -----------------------------------------------------
Uniform/Polynomial
                DS      4.2421       12.55    22.00  3.2735       5.4973
                D       6.5560       13.71    31.11  4.9636       8.6591
                N       1364.0       13.71    31.11  1032.0    1801.0
```

INPUT	
Species:	PRONGHORN
Biologist:	WILL SCHULTZ
Herd Unit & No.:	BIG CR. PR529
Model date:	04/18/14

MODEL EVALUATION: POOR

☐ Clear form

MODELS SUMMARY

		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	176	185	☑ CJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	176	185	☐ SCJ,SCA Mod	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	147	249	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	311	258	956	**1525**	301	221	904	**1426**	286	948	**1234**	1119	486		600
1994	320	280	929	**1529**	308	229	866	**1402**	294	911	**1205**				600
1995	346	288	893	**1527**	336	245	782	**1363**	318	835	**1153**				600
1996	395	312	818	**1525**	383	268	740	**1391**	351	808	**1159**	670	169		600
1997	206	344	792	**1342**	185	289	705	**1179**	319	720	**1039**	680	124		600
1998	318	313	706	**1336**	313	261	652	**1226**	329	708	**1036**				600
1999	383	322	693	**1399**	383	268	621	**1272**	355	695	**1050**				600
2000	248	347	681	**1277**	245	284	620	**1148**	333	659	**992**				600
2001	372	326	646	**1344**	366	278	593	**1237**	358	664	**1022**				600
2002	318	351	650	**1319**	315	282	577	**1174**	349	635	**984**				600
2003	173	342	622	**1137**	163	277	569	**1010**	304	588	**892**				600
2004	366	298	576	**1241**	366	222	550	**1139**	305	624	**929**	1308	183		600
2005	244	299	612	**1154**	236	229	576	**1041**	277	614	**891**				600
2006	421	271	602	**1293**	411	172	537	**1120**	263	619	**882**				600
2007	255	258	606	**1119**	246	173	491	**910**	224	530	**754**	737	182		600
2008	235	219	519	**974**	229	157	450	**836**	205	489	**694**				600
2009	113	201	479	**793**	104	137	402	**643**	154	410	**564**				600
2010	154	151	402	**707**	151	113	361	**625**	145	386	**531**	1462	298		600
2011	127	142	378	**647**	122	117	355	**594**	144	383	**527**				600
2012	232	141	375	**748**	230	116	360	**705**	168	407	**574**	1364	187		600
2013	237	164	398	**800**	235	137	383	**755**	169	407	**576**				600
2014	172	166	399	**736**	166	116	361	**643**							600
2015															600
2016															600
2017															600
2018															600
2019															600
2020															600
2021															600
2022															600
2023															600
2024															600
2025															600

Survival and Initial Population Estimates

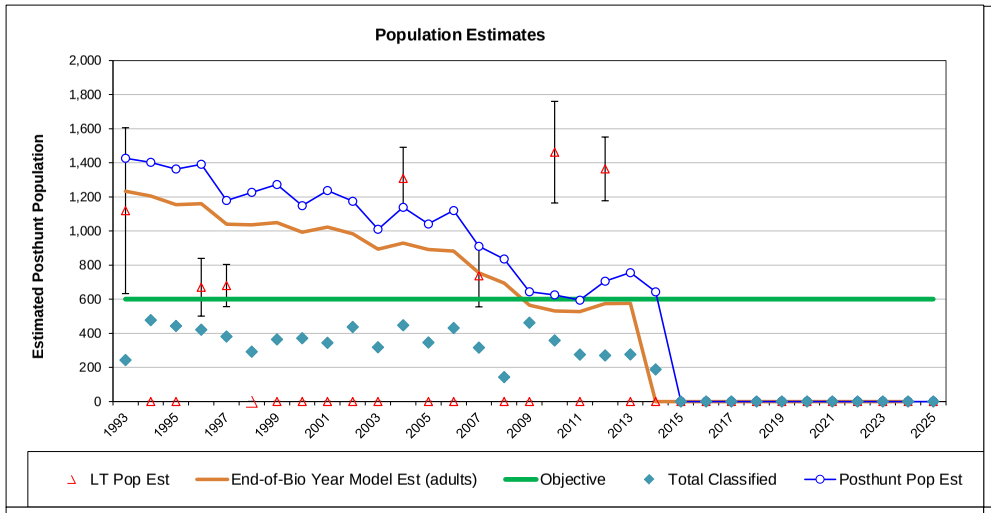
Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.50			0.95		
1994	0.50			0.95		
1995	0.50			0.95		
1996	0.50			0.95		
1997	0.50			0.95		
1998	0.50			0.95		
1999	0.50			0.95		
2000	0.50			0.95		
2001	0.50			0.95		
2002	0.50			0.95		
2003	0.50			0.95		
2004	0.50			0.95		
2005	0.50			0.95		
2006	0.50			0.95		
2007	0.50			0.95		
2008	0.50			0.95		
2009	0.50			0.95		
2010	0.50			0.95		
2011	0.50			0.95		
2012	0.50			0.95		
2013	0.50			0.95		
2014	0.50			0.95		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

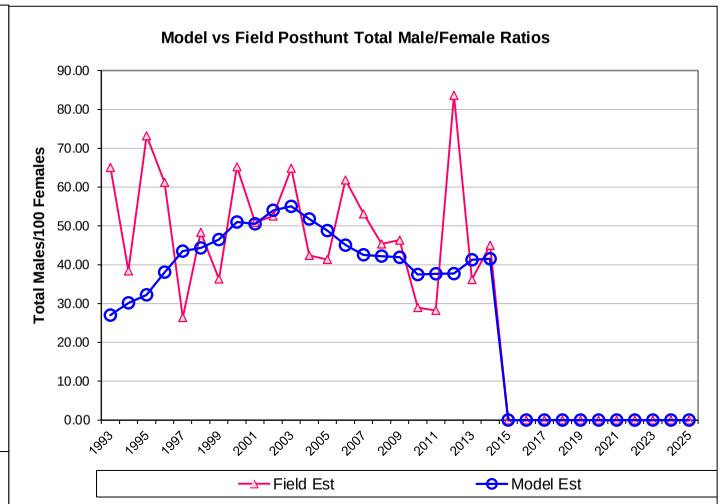
Parameters:	Optim cells
Juvenile Survival =	0.497
Adult Survival =	0.950
Initial Total Male Pop/10,000 =	0.026
Initial Female Pop/10,000 =	0.096

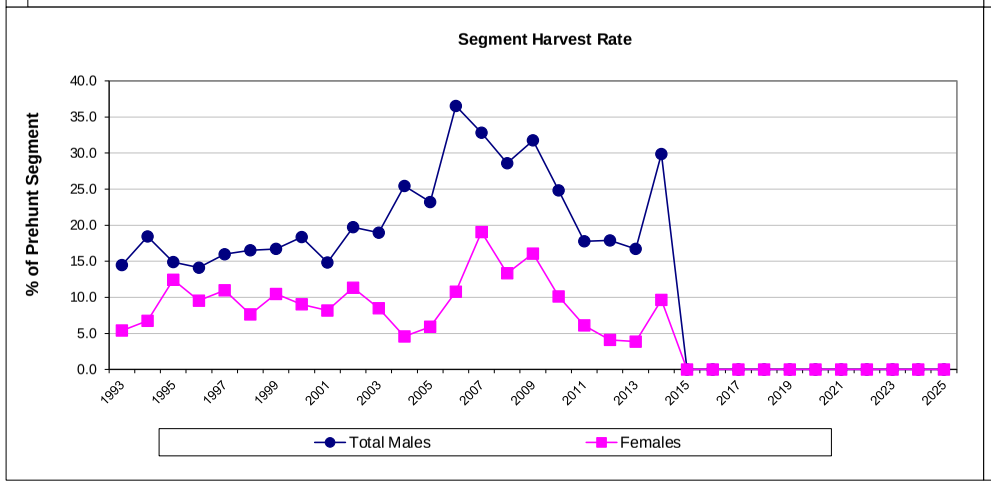
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

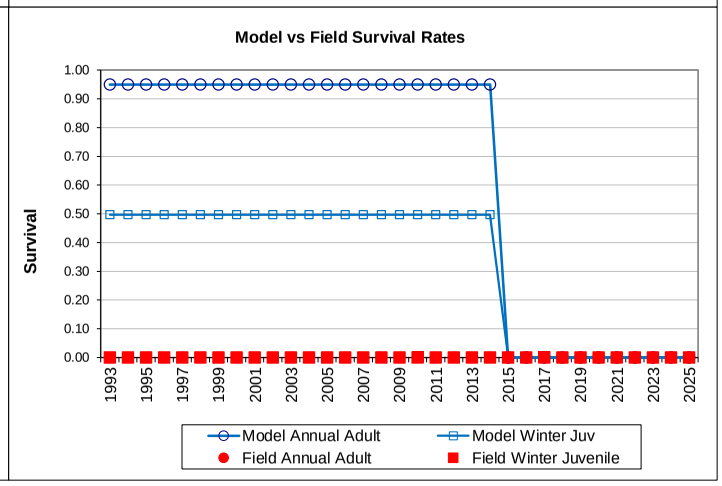
	Classification Counts										Harvest	
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles	Total Harvest	Total Males	Females
1993		32.52	5.92	27.02	65.04	9.34	34	47	9	90	14.5	5.4
1994		34.42	4.09	30.18	38.41	4.39	47	57	11	115	18.4	6.8
1995		38.76	5.07	32.25	73.21	7.79	39	101	9	149	14.9	12.4
1996		48.26	5.97	38.10	61.19	7.01	40	71	11	122	14.1	9.5
1997		26.00	3.62	43.50	26.40	3.65	50	79	19	148	16.0	11.0
1998		45.03	6.58	44.32	48.34	6.89	47	49	4	100	16.5	7.6
1999		55.26	6.72	46.48	36.32	5.10	49	66	0	115	16.7	10.5
2000		36.41	5.20	51.00	65.22	7.65	58	56	3	117	18.4	9.0
2001		57.58	7.42	50.54	50.91	6.82	44	48	5	97	14.8	8.2
2002		48.85	5.79	54.02	52.53	6.08	63	67	2	132	19.7	11.3
2003		27.88	4.65	55.03	64.85	8.05	59	48	9	116	19.0	8.5
2004		63.59	6.92	51.79	42.40	5.27	69	24	0	93	25.4	4.6
2005		39.79	5.40	48.79	41.36	5.53	63	33	7	103	23.2	5.9
2006		69.89	7.99	45.04	61.83	7.33	90	59	9	158	36.5	10.8
2007		41.98	6.07	42.56	53.09	7.08	77	105	8	190	32.8	19.0
2008		45.33	9.37	42.23	45.33	9.37	57	63	6	126	28.6	13.3
2009		23.53	3.27	41.91	46.32	4.99	58	70	8	136	31.8	16.1
2010		38.32	4.98	37.48	28.97	4.18	34	37	3	74	24.8	10.1
2011		33.53	5.13	37.68	28.24	4.62	23	21	4	48	17.8	6.1
2012		61.82	9.54	37.71	83.64	11.82	23	14	2	39	17.9	4.1
2013		59.57	8.21	41.27	36.17	5.91	25	14	2	41	16.7	3.9
2014		43.00	7.84	41.53	45.00	8.08	45	35	5	85	29.9	9.6
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

FIGURES





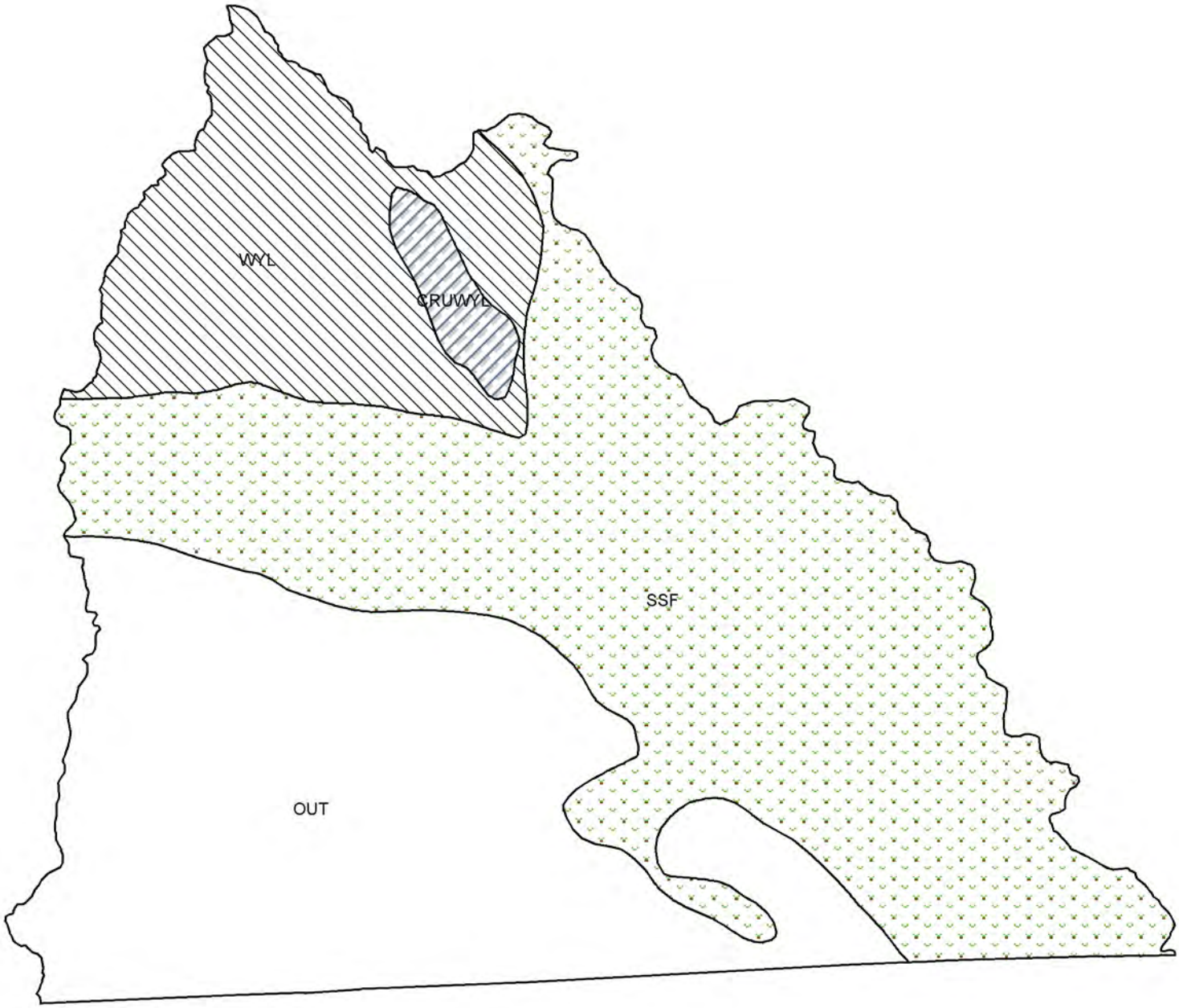




Comments:

The CJ,CA model was used to due the relative simplicity and low AIC_C score. Model postseason estimate is plausible.

END



PH529 - Big Creek
HA 51
Revised - 7/87

2013 - JCR Evaluation Form

SPECIES: Bighorn Sheep | PERIOD: 6/1/2013 - 5/31/2014

HERD: BS516 - DOUGLAS CREEK

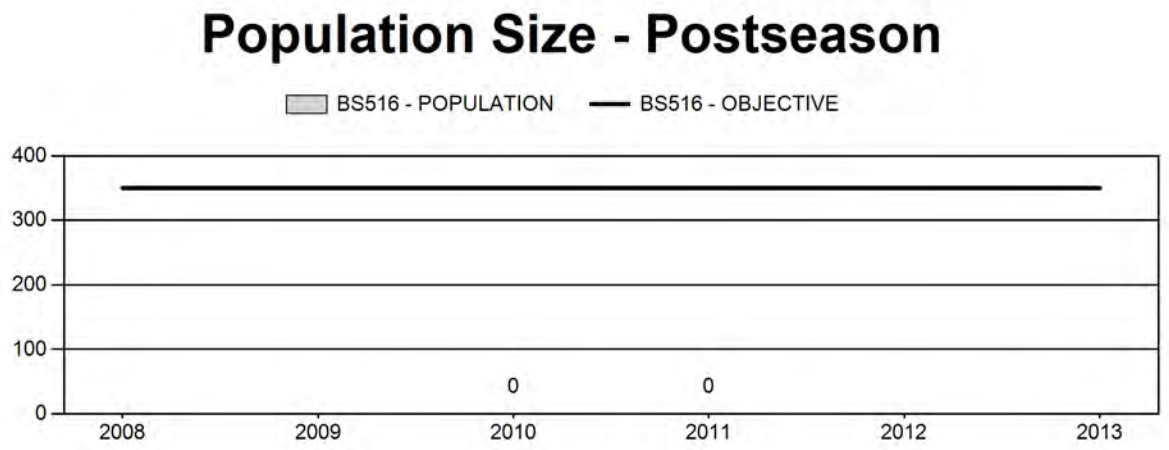
HUNT AREAS: 18 | PREPARED BY: LEE KNOX

	2008 - 2012 Average	2013	2014 Proposed
Population:	0	N/A	75
Harvest:	1	0	1
Hunters:	1	0	100
Hunter Success:	100%	0%	1%
Active Licenses:	1	0	1
Active License Percent:	100%	0%	100%
Recreation Days:	2	0	10
Days Per Animal:	2	0	10
Males per 100 Females	29	68	
Juveniles per 100 Females	32	74	

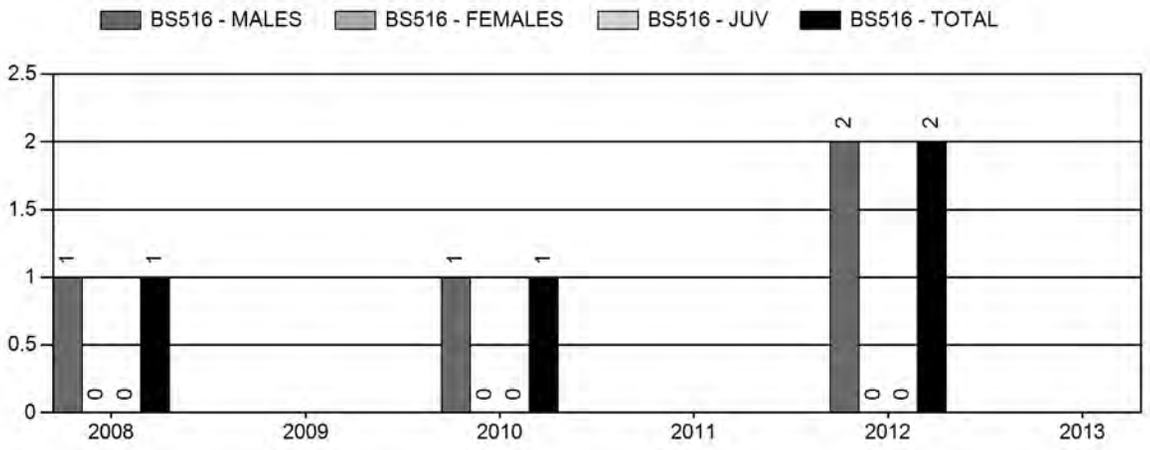
Population Objective:	350
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	20
Model Date:	None

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

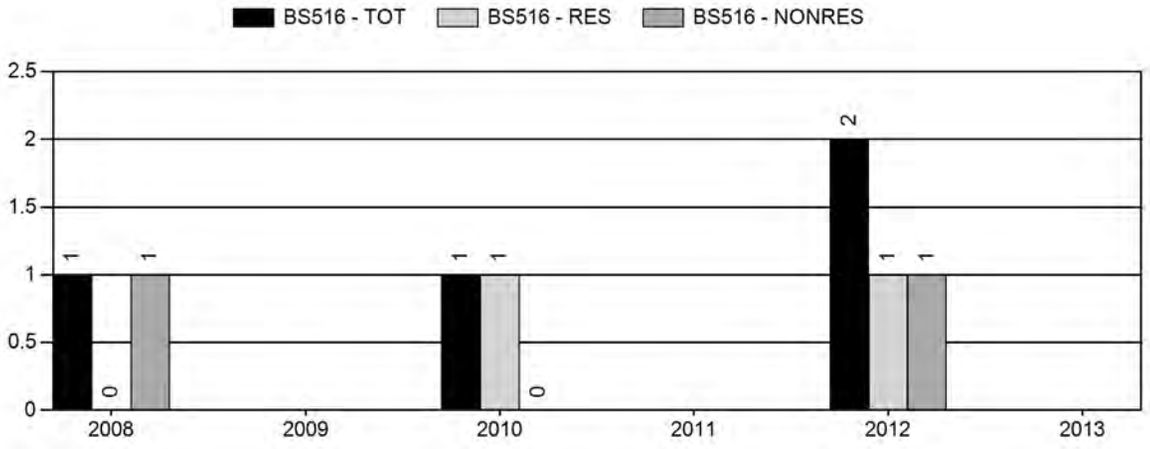
	JCR Year	Proposed
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	0%	0%
Juveniles (< 1 year old):	0%	0%
Total:	0%	0%
Proposed change in post-season population:	0%	0%



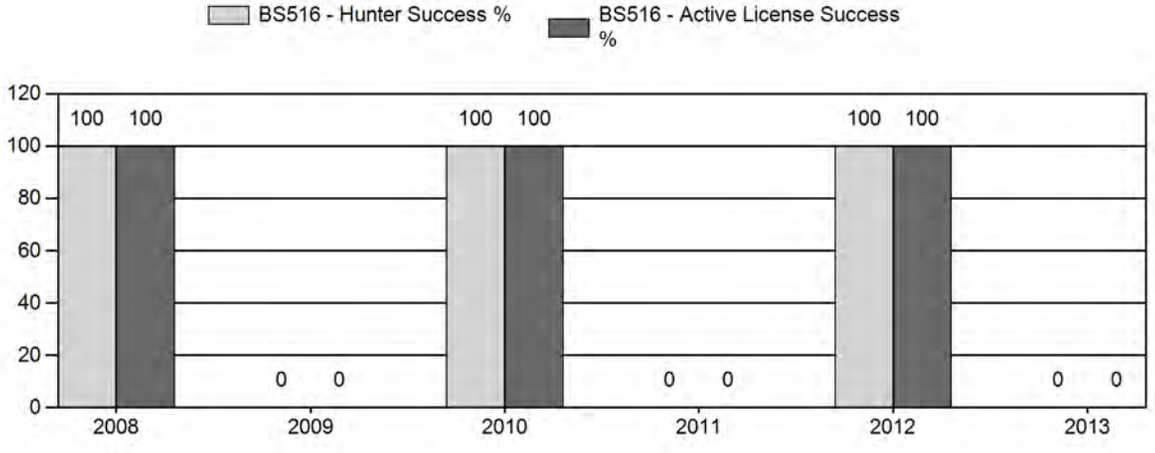
Harvest



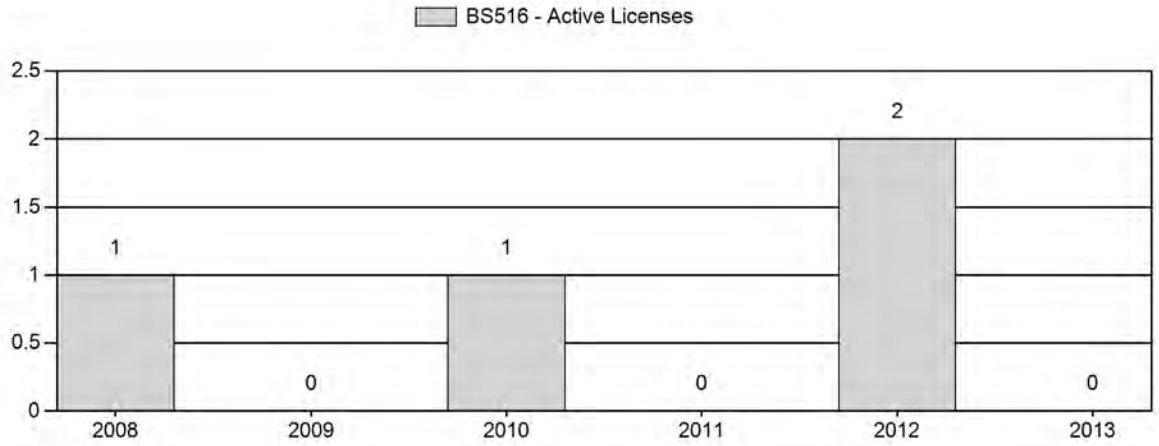
Number of Hunters



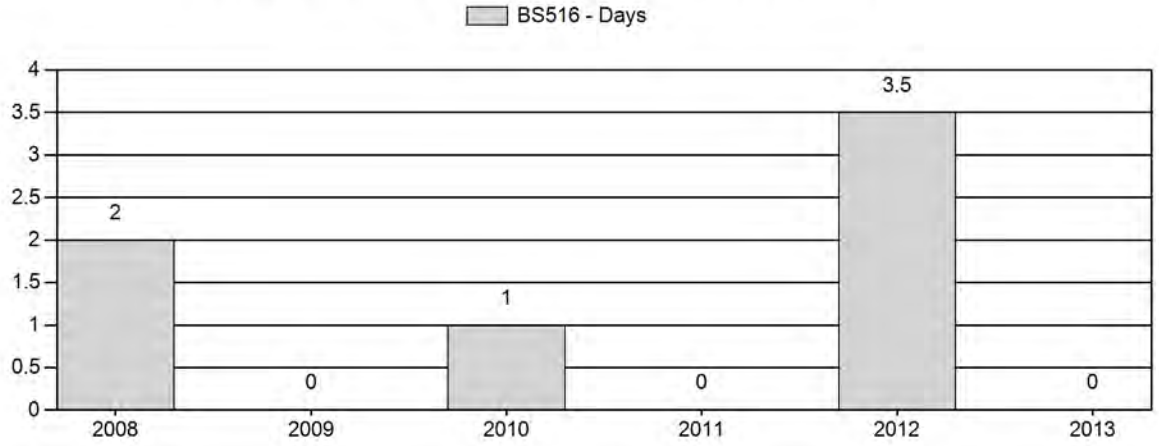
Harvest Success



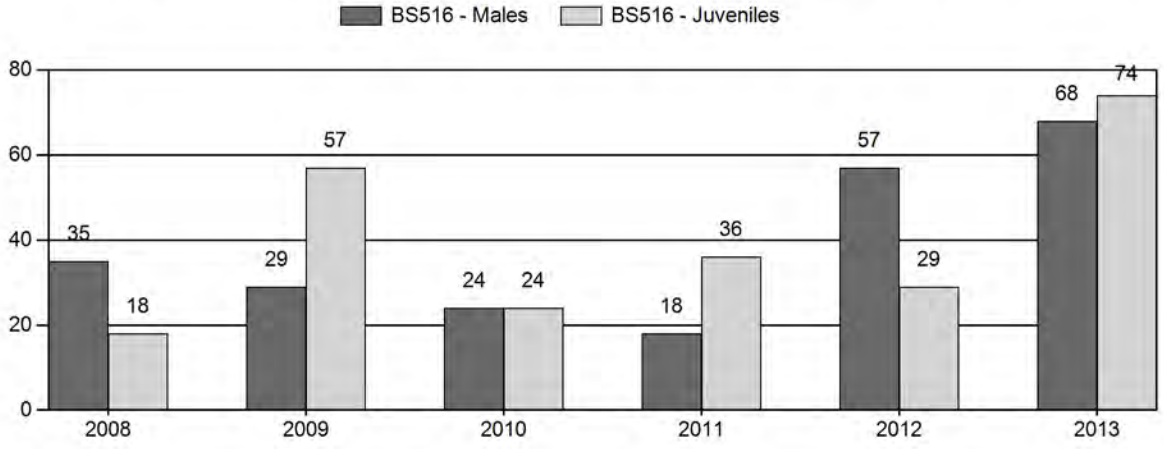
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Bighorn Sheep Herd BS516 - DOUGLAS CREEK

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	0	1	5	6	23%	17	65%	3	12%	26		0	6	29	35	± 0	18	± 0	13
2009	0	0	4	4	15%	14	54%	8	31%	26		92	0	29	29	± 0	57	± 0	44
2010	0	1	3	4	16%	17	68%	4	16%	25		74	6	18	24	± 0	24	± 0	19
2011	0	0	4	4	12%	22	65%	8	24%	34		0	0	18	18	± 0	36	± 0	31
2012	0	1	3	4	31%	7	54%	2	15%	13		0	14	43	57	± 0	29	± 0	18
2013	0	6	7	13	28%	19	41%	14	30%	46		0	32	37	68	± 0	74	± 0	44

2014 HUNTING SEASONS

DOUGLAS CREEK BIGHORN SHEEP (BS516)

Hunt Area	Type	Dates of Opens	Season Closes	Quota	Limitations
18,21	1	Sept. 1	Oct.31	2	Limited quota licenses; any ram; (two resident licenses issued).
18,21 Archery					Refer to Section 3 of this Chapter

Area	Type	Change from 2012
18	1	+2
Herd Totals	**1**	**+2**

Management Evaluation
Current Postseason Population Management Objective: 350
2013 Postseason Population Estimate: ~ 75
2014 Proposed Postseason Population Estimate: ~ 75

The management objective for the Douglas creek Bighorn Sheep Herd Unit is a post-season population objective of 350 bighorn sheep. The management strategy is special management which maintains for a mean age of harvested rams between 6 and 8 years old. The objective and management strategy were last revised in 1986 and will be reviewed in 2016.

Herd unit Issues
The Douglas Creek Herd Unit is located primarily in the Savage Run and Platte River Wilderness areas in the Snowy Range Mountains on the Medicine Bow National Forest. The herd is under special management guidelines which require the mean age of harvested rams to be between 6-and 8 years old. This direction was taken to provide trophy opportunity to the public and allow this herd to grow. Pine Beetles have dramatically changed the landscape in the Medicine Bow National Forest where a large percentage of mature pines have died and starting to fall over. The impacts from the beetle kill are unclear but could improve sheep habitat as the forest becomes more open. Area 18 was closed from 2004 through 2007 and then again in 2009, 2011, and 2013 because this population has remained well-below desired levels due to low lamb recruitment. Hunt Area 18 and Area 21 of the Encampment River Herd were opened to provide some limited opportunity for two residents to hunt bighorn sheep.

Weather
Weather during the spring and summer of 2013 remained extremely dry. The Palmer Drought Severity Index (PDSI) ranked drought conditions in SE Wyoming as extreme through the month of August. However the fall of 2013 was extremely wet with September 2013 being the wettest September recorded in Laramie. For specific weather information please refer to the following link: http://www.ncdc.noaa.gov/.

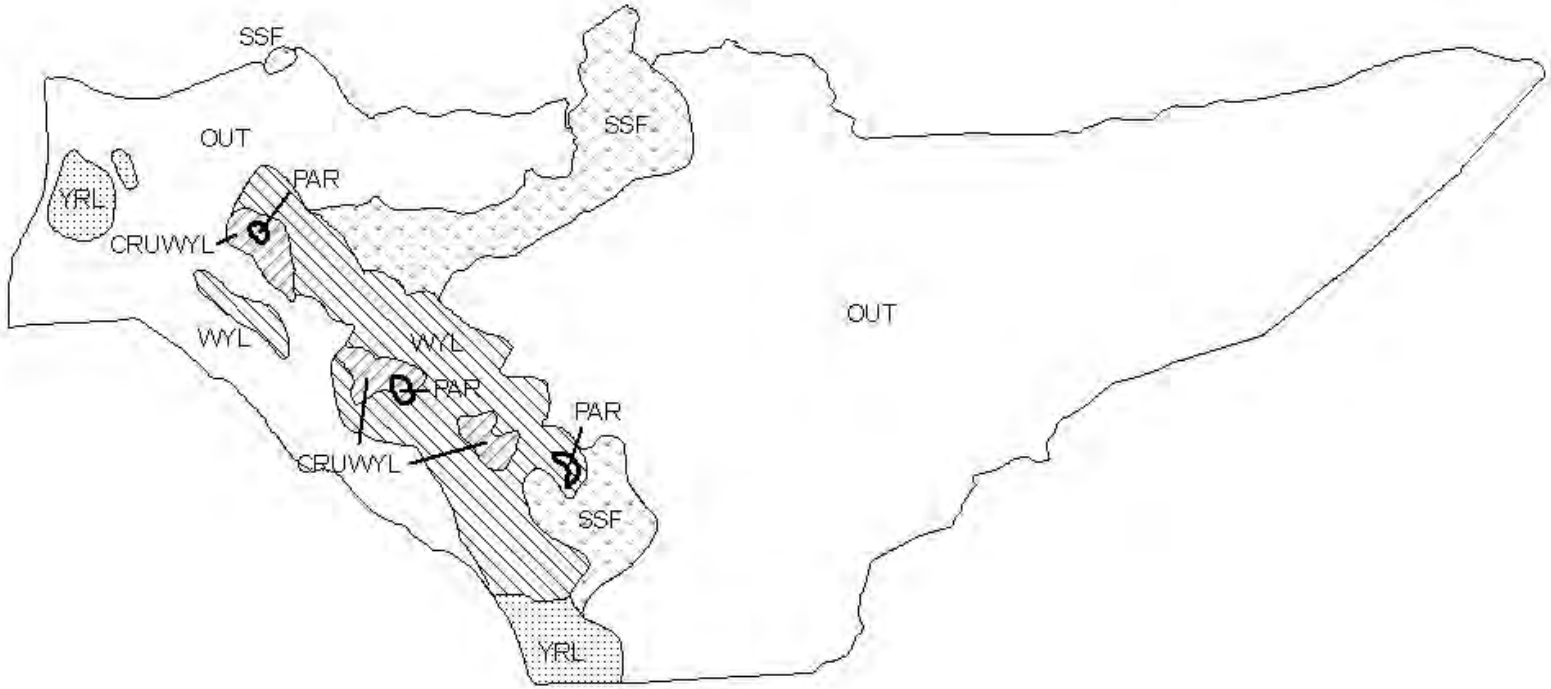
Habitat
Turnover in personnel, changes in individual job responsibilities of employees, and evolving WGFD agency priorities have resulted in some issues with consistent habitat data collection and interpretation of data. Some transects, years after their initial establishment, have been identified as being in "non-representative" locations. Site selection was often influenced by terrain and/or land ownership status (i.e public access). Changing land uses (wind turbines, roads, fence construction, other developments, etc.) have influenced habitat use by wildlife in some locations, and in some instances have resulted in major shifts in animal usage of the area being monitored. Department personnel are currently evaluating shrub transects and the types of information being collected, and will be looking for ways to improve efficiency of data collection, types of data being collected, and refining criteria for site selection for future transects. The reader is referred to the Strategic Habitat Plan Annual Report for further background information on shrub transects.

Field Data
We have very little data on this population. The general public provides a few reports during the summer and hunting seasons. Our field personnel make some effort to document the status of segments of the herd during other big game surveys and an annual winter ground survey. Our observation data consistently documents low post-weaning lamb survival. Poor habitat conditions, the lack of well-defined seasonal migrations, and perhaps lingering effects of Pasteurellosis or some other disease may be stagnating this population.

Harvest Data
Hunters typically harvest seven year old rams when the season is open so there is adequate opportunity for the limited number of licenses.

Population
There isn't a model for a variety of reasons including: little data available, considered highly biased because of poor sample sizes or an inability to survey the entire area;; model does not run; results not biologically defensible. During 2013 fall classifications personnel accounted for 46 different sheep. These included 13 rams, 19 ewes and 14 lambs. The season was closed in 2013.

Management Strategy
In 2014 Hunt Area 18 and Area 21 of the Encampment River Herd will be opened to provide some limited opportunity for two residents to hunt bighorn sheep.



BHS516 - Douglas Creek
HA 18
Revised 7/02

2013 - JCR Evaluation Form

SPECIES: Bighorn Sheep | PERIOD: 6/1/2013 - 5/31/2014

HERD: BS517 - LARAMIE PEAK

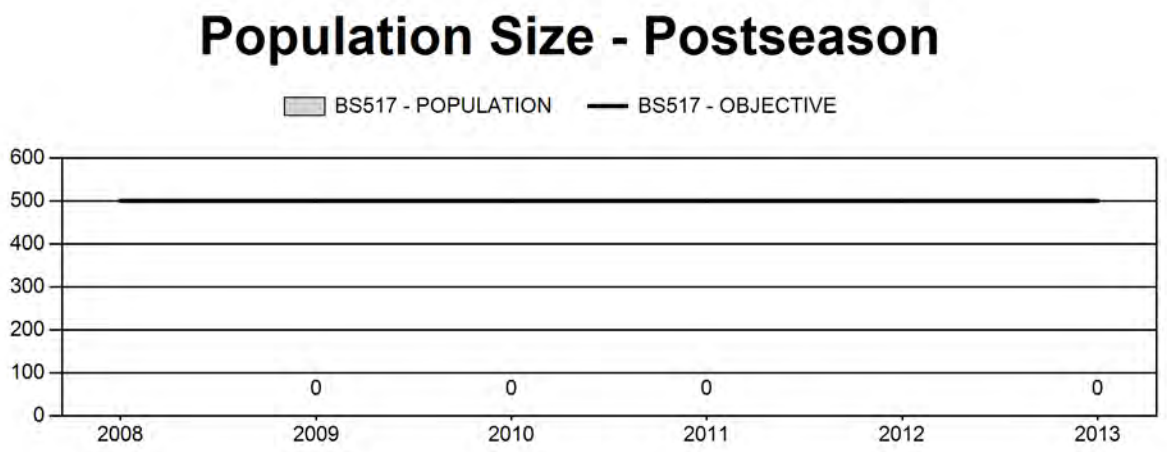
HUNT AREAS: 19 | PREPARED BY: MARTIN HICKS

	2008 - 2012 Average	2013	2014 Proposed
Population:	0	N/A	N/A
Harvest:	7	5	8
Hunters:	8	6	8
Hunter Success:	88%	83%	100 %
Active Licenses:	8	6	8
Active License Percent:	88%	83%	100 %
Recreation Days:	76	76	75
Days Per Animal:	10.9	15.2	9.4
Males per 100 Females	52	34	
Juveniles per 100 Females	38	38	

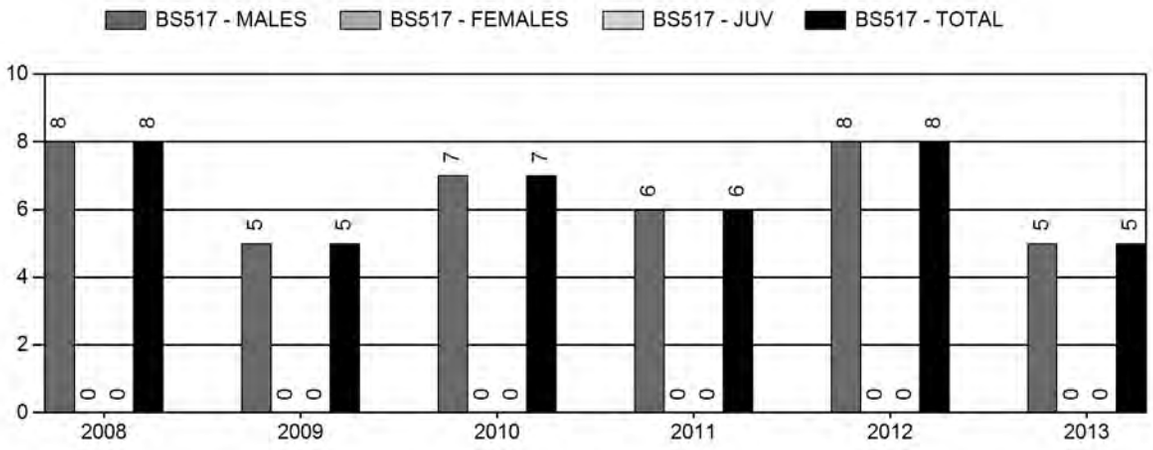
Population Objective:	500
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

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

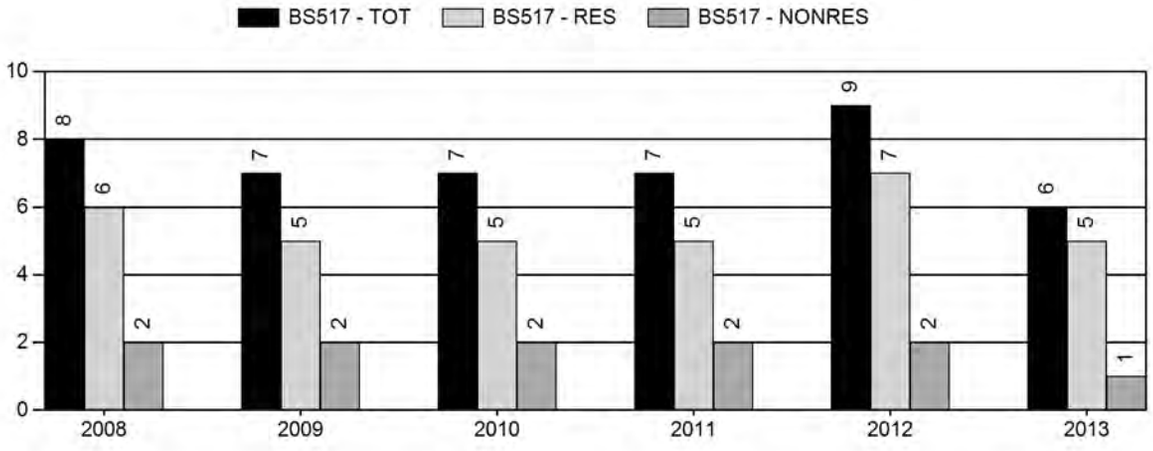
	JCR Year	Proposed
Females ≥ 1 year old:	na%	na%
Males ≥ 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%
Total:	na%	na%
Proposed change in post-season population:	na%	na%



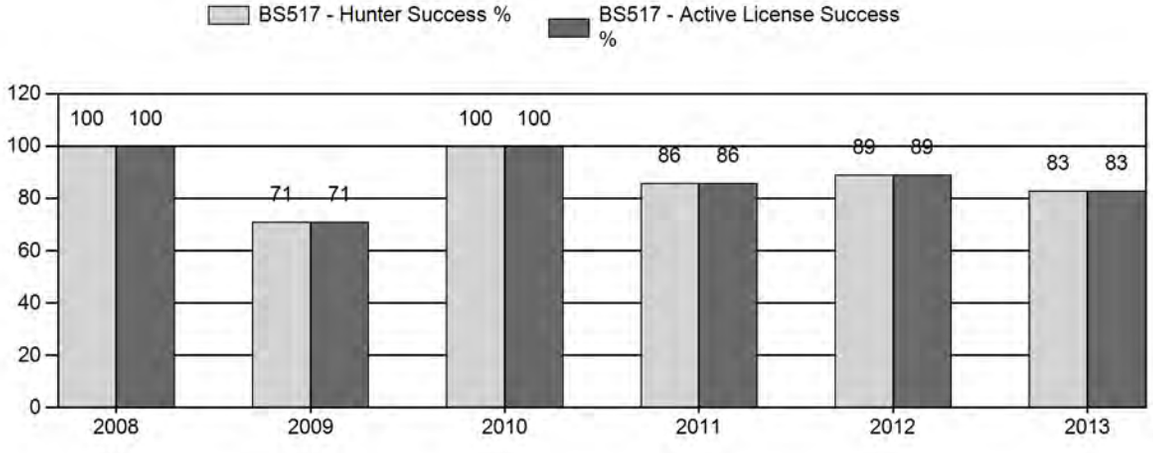
Harvest



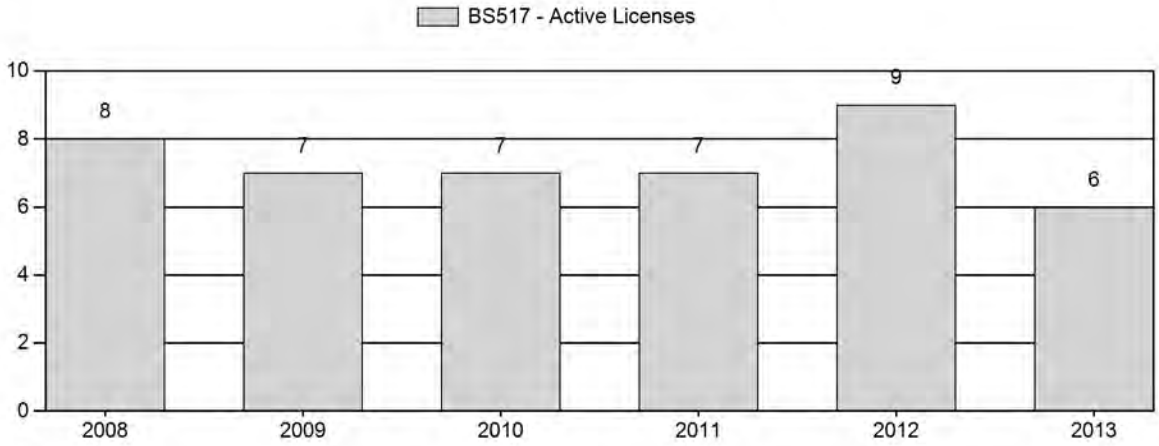
Number of Hunters



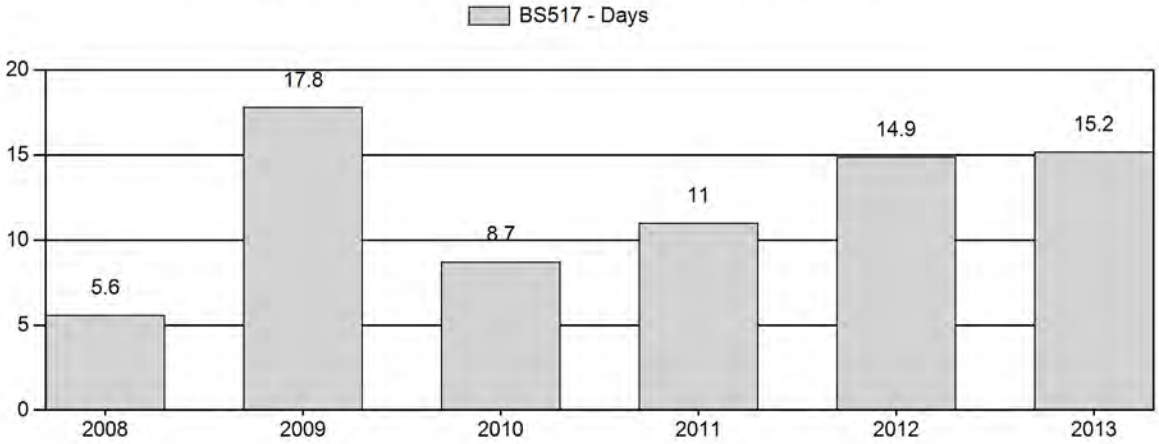
Harvest Success



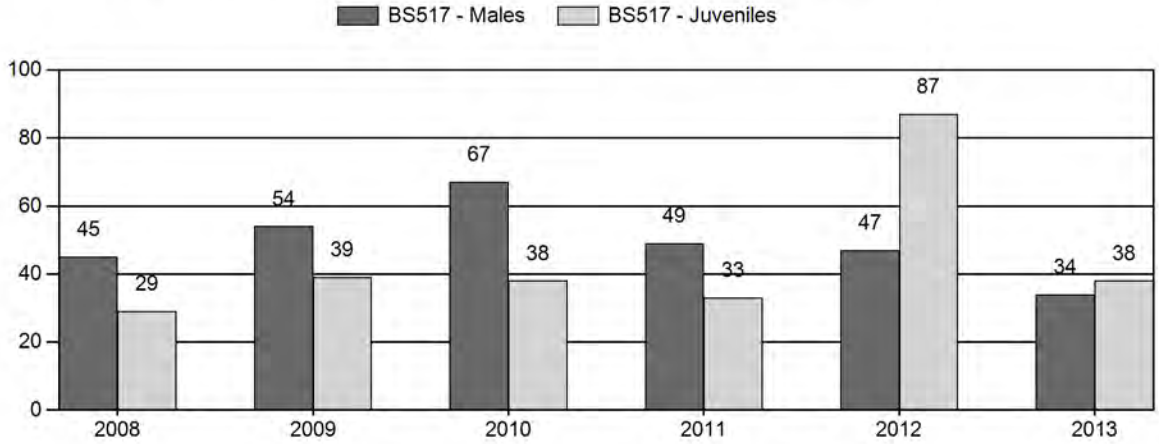
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Bighorn Sheep Herd BS517 - LARAMIE PEAK

		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
2008	0	3	26	29	26%	65	58%	19	17%	113	0	5	40	45	± 0	29	± 0	20
2009	0	3	33	36	28%	67	52%	26	20%	129	0	4	49	54	± 0	39	± 0	25
2010	0	3	23	26	32%	39	49%	15	19%	80	0	8	59	67	± 0	38	± 0	23
2011	0	4	20	24	27%	49	55%	16	18%	89	0	8	41	49	± 0	33	± 0	22
2012	0	0	7	7	20%	15	43%	13	37%	35	0	0	47	47	± 0	87	± 0	59
2013	0	7	16	23	20%	68	58%	26	22%	117	0	10	24	34	± 0	38	± 0	29

2014 HUNTING SEASONS
LARAMIE PEAK BIGHORN SHEEP HERD (BHS517)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
19	1	Sep. 1	Oct. 31	8	Limited quota licenses; any ram
Archery		Aug. 15	Aug. 31		Refer to Section 3 of this Chapter

Hunt Area	Type	Quota change from 2013
19	1	0

Management Evaluation
Current Postseason Population Management Objective: 500
Management Strategy: Recreational
2013 Post-season Population Estimate: ~250
2014 Post-season Population Estimate: ~250

Herd Unit Issues
The management objective for the Laramie Peak Bighorn Sheep herd is a post-season population objective of 500 wild sheep. The management strategy is recreational management. The objective and strategy were last revised in 1978. The population objective was reviewed during the winter/spring of 2014. Based on department staff, landowner, and public comments the following population management alternative objectives have been proposed for Commission approval at their June meeting. If the alternative objective is approved it will go into effect for the 2014 biological year. Below are the criteria for the alternative objective:

1) 5-year running average of ≥ 75% hunter success
2) 5-year running average age of harvested rams between 6 and 8 years of age
3) Documented occurrence of adult rams in the population

The Laramie Peak Herd Unit is comprised of 70% private land. The southern portion (south of WY Hwy 34) is over 90% private land. Hunters can expect to pay a trespass/trophy or outfitter fee to hunt on private land. There are two state sections that hunters can access that hold sheep throughout the season and have produced adult rams in past hunting seasons. A portion of occupied sheep habitat was within the 2012 Arapahoe fire that burned over 98,000 acres. This affected sheep distribution post-fire, but above average summer/fall precipitation in 2013 and spring precipitation in 2014 resulted in increased vegetation production for pre-winter diets and early spring green up that will benefit parturition areas for pregnant ewes. The fire will have long-term benefits for wild sheep, but initially there has been a flush of noxious weed (e.g. cheatgrass, Canada thistle) that land managers will need to address. A majority of wild sheep are harvested within the northern portion of the herd unit. The Laramie Peak Wildlife Habitat Management Unit is essential for sheep habitat and harvest where 200 plus sheep inhabit.

In 2007 forty-two sheep were released in this area from the Perma-Paradise Herd in Montana. These sheep have thrived and improved the overall genetics and health of the existing herd.

During the winter of 2014 the WGFD gathered biological samples for disease surveillance, with a target goal of 150 bighorn sheep across Wyoming through the use of drop nets, free-darting, and aerial captures. The goal of this effort is to obtain information on each herd and its overall health. Some animals will be fitted with GPS radio-collars to increase our understanding of movements and habitat use. The goal for the Laramie Peak Herd Unit was to collect samples from 15 wild sheep between Sybille Canyon and Iron Mountain. Three bighorn sheep were darted in February and disease samples were collected. In addition, 3 mule deer were caught via drop net and sampled to determine if there is overlap of pathogens associated with wild sheep. There is very little known about the different bacterial pathogens existing sheep state-wide, and this will provide base-line data that will be invaluable to sheep managers. Sampling efforts will continue through March and then resume in December 2014, to avoid parturition.

Weather

Weather during 2013 and into 2014 was wetter and colder than normal. Ungulates went into the winter in good body condition as a result of the fall moisture. Winter conditions were somewhat mild with low snowpack but with periods of extreme cold temperatures, followed up with above freezing periods. A high winter mortality rate is not expected for this wild sheep herd. Spring precipitation has been above normal with expected flooding events on the Laramie and North Laramie Rivers. Refer to the following websites for weather data: http://www.ncdc.noaa.gov/temp-and-precip/time-series/ and http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html.

Habitat

There are currently no habitat transects specifically for wild sheep. Eighteen transects have been established within the Laramie Range looking at mixed mountain shrub communities as they relate to mule deer use. Since dietary needs for wild sheep differ from mule deer it is hard to correlate any similarities. Precipitation dictates vegetation production. In 2010 and 2011 there was ample forage available due to above average moisture. In 2012 there was very little vegetation available, resulting in wild sheep going into the winter in poor body condition. In 2013 increased precipitation resulted in increased grass, forb and shrub leader production. Habitat transects are in the process of a thorough review to determine what data to collect and how to interpret it, and ultimately apply results to big game management. Above normal spring moisture in 2014 will result in high sediment loads into the North Laramie River and Cottonwood Creek watersheds due to wild fire events in 2010. Overall this will improve riparian habitat since the ash increase the nutrients within the soils. Improved riparian habitat has already been observed in spring of 2014.

Field Data

The 2013 post-season estimate of 250 sheep is based on pre and post-season herd composition data, along with field personnel and hunter observations. There is not a reliable working model for this herd unit. This is a smaller herd unit that provides limited

hunting opportunities, and for various reasons, does not lend itself to efficient collection of population monitoring data.

Since 1964 there have been a total of 228 wild sheep released from two herd sources: Whiskey Mountain in Wyoming and Perma-Paradise in Montana (Table 1). These transplants have helped to supplement the herd and improve overall herd health.

Table 1. Transplant release data for the Laramie Peak Bighorn Sheep Herd.

Year	Number	Release Location	Source Herd
1964	40	North Laramie River Canyon	Whiskey Mountain Herd
1965	36	Labonte Canyon	Whiskey Mountain Herd
1966	21	Labonte Canyon	Whiskey Mountain Herd
1973	42	Duck Creek Canyon	Whiskey Mountain Herd
1982	27	Marshall	Whiskey Mountain Herd
1989	20	Marshall	Whiskey Mountain Herd
2007	42	Hay Canyon	Perma-Paradise- MT
Total	228		

Lamb recruitment continues to improve compared to ratios prior to the 2007 release. There was a total of 117 wild sheep classified in 2013. The majority of those sheep came from the Duck Creek sub-herd (n=69). The rest of the wild sheep were surveyed in the North Laramie, Sybille Canyon, and Iron Mountain sub-herds. Following this augmentation classification ratios were 33 rams:100 ewes and 38 lambs:100 ewes, which was a significant increase in lamb production compared to pre-transplant surveys. Ram ratios remain at adequate levels for adult harvest.

In 2013, 5 out of 8 sheep licenses were successful. Two licenses will carryover to 2014 due to medical hardships. The average age was 6 years, a decrease from the long-term average of 8 years. There were two five-year old rams harvested that brought the average age down. The harvest does not reflect the overall age of rams within the population. Field personnel and hunters observed 30-40 rams that varied in age classes on Reese and Collins Peak during the season. Three sheep were harvested from the Duck Creek sub-herd, one from the Sybille Canyon sub-herd and one from the Iron Mountain sub-herd.

Harvest Data

Success has reached $\geq$ 75% four out of the five years. This last year active license hunters harvested 5 out of 6 rams, with a success rate of 83%. Hunters who pre-scout or hire an outfitter typically harvest their ram within 3-5 days. This year the average hunter effort was 15 days, which is slightly higher than the ten-year average of 12 days per harvest. Hunters that chose to not use an outfitter spend more time scouting and hunting. There is limited public land within occupied wild sheep habitat. Overcrowding is an issue that results in pushing bighorn sheep onto private land, where there is no access. To maintain high harvest success no more than 8 licenses are issued. In the past when the quota increased to 12, success decreased drastically.

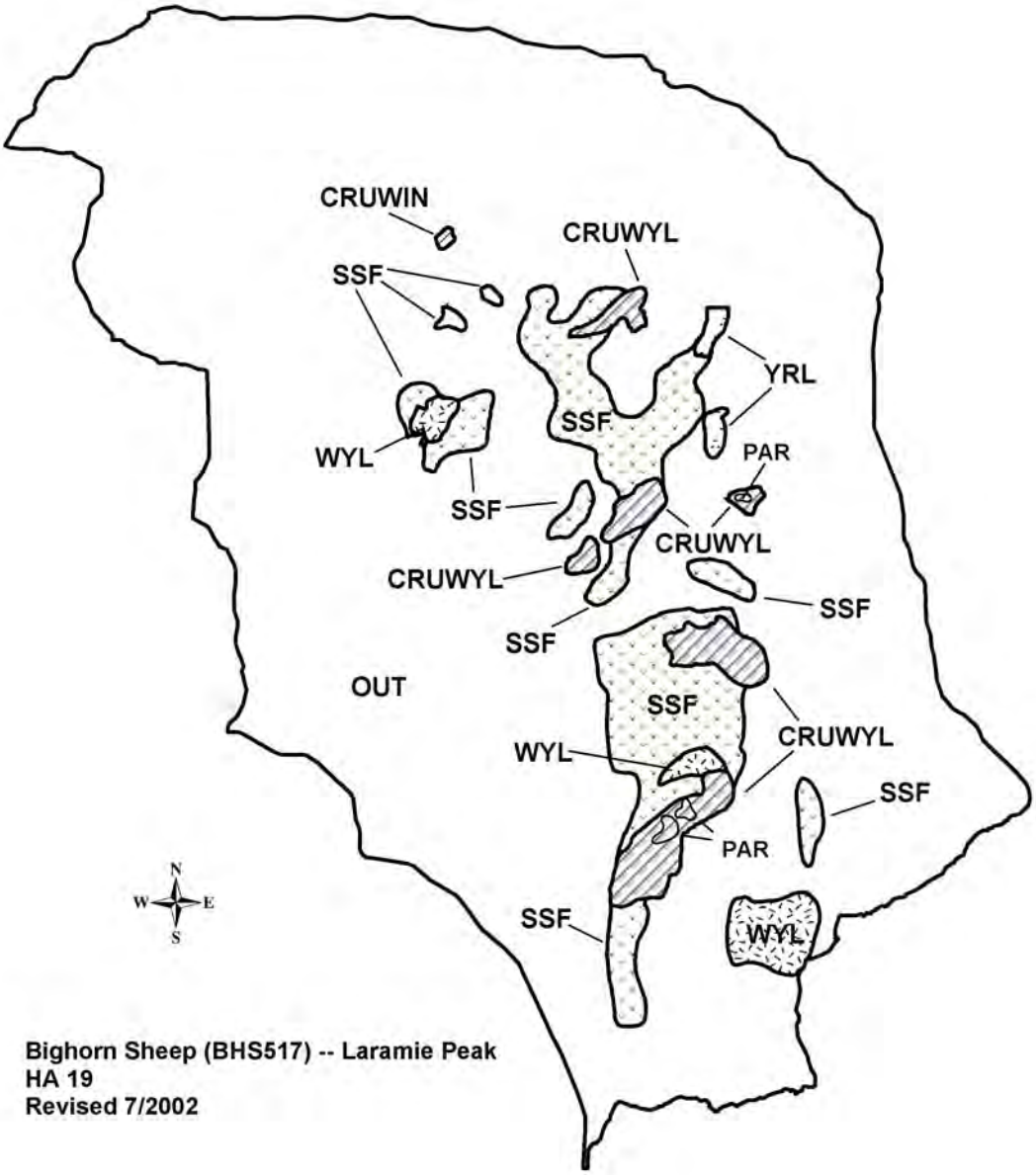
The Laramie Peak bighorn sheep season has been September 1-October 31 for the past 24 years. Prior to that, the season ran from September 1- October 14. The increased season

length appears to provide adequate opportunity to harvest a ram, given this is typically a once in a lifetime license.

In 2012 there were several fires that burned within bighorn sheep occupied habitat. The Arapahoe, Cow Camp and Russell's Camp fires burned over 112,000 acres, with the Arapahoe fire the largest (98,000 acres). Throughout the area there is observed recovery in vegetation. Photo points have been established throughout the fire to document plant succession. Perennial forbs and grasses along with aspen have re-established post-fire.

There is not a reliable working model for this herd unit due to limited population data collected on an annual basis.

For the 2014 season, 8 licenses will be offered for any ram along with 2 carryover licenses for a total of 10. Hunters should have a high probability of harvesting a mature ram. There is some concern with ten hunters going to the field that success will be compromised. To improve harvest success hunters will need to put more time into scouting and hunting if they are accessing public lands.



Bighorn Sheep (BHS517) -- Laramie Peak
HA 19
Revised 7/2002

2013 - JCR Evaluation Form

SPECIES: Bighorn Sheep | PERIOD: 6/1/2013 - 5/31/2014

HERD: BS519 - ENCAMPMENT RIVER

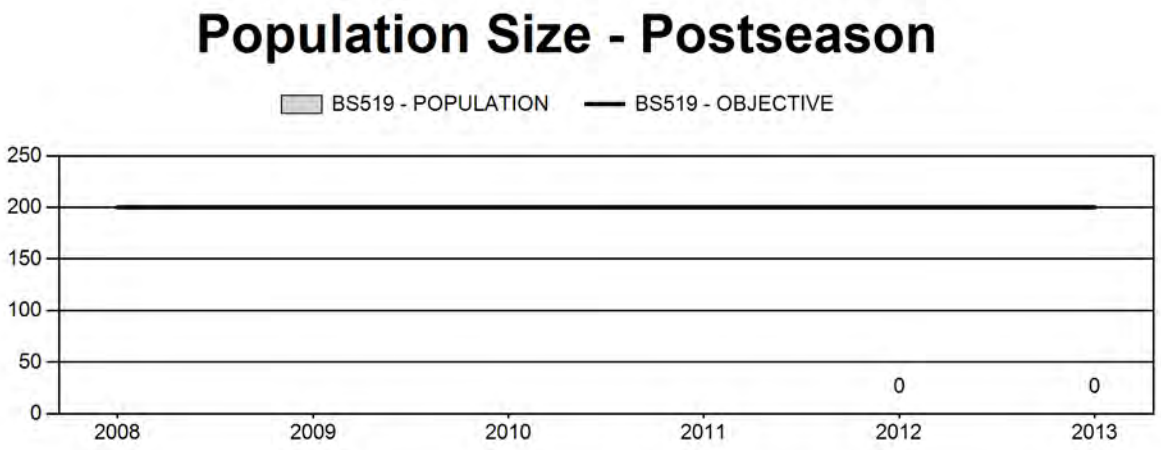
HUNT AREAS: 21 | PREPARED BY: WILL SCHULTZ

	2008 - 2012 Average	2013	2014 Proposed
Population:	0	N/A	N/A
Harvest:	0	0	1
Hunters:	0	0	1
Hunter Success:	0%	0%	100 %
Active Licenses:	0	0	1
Active License Percent:	0%	0%	100 %
Recreation Days:	1	0	1
Days Per Animal:	0	0	1
Males per 100 Females	73	30	
Juveniles per 100 Females	25	50	

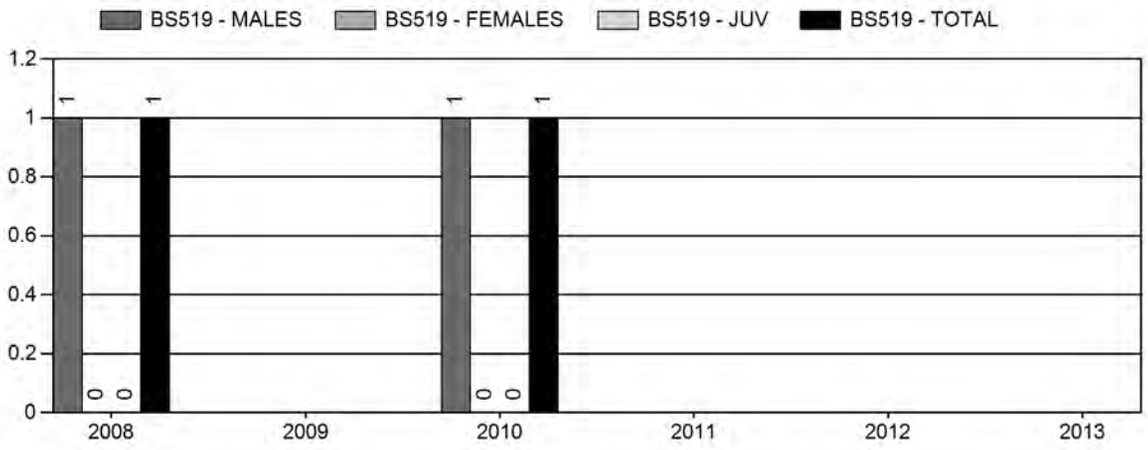
Population Objective:	200
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	20
Model Date:	None

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

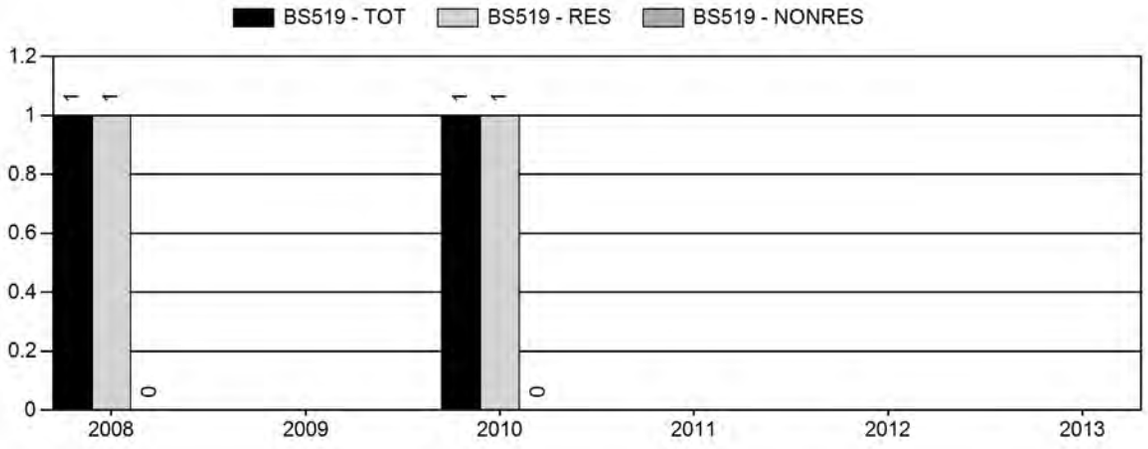
	JCR Year	Proposed
Females ≥ 1 year old:	NA%	NA%
Males ≥ 1 year old:	NA%	NA%
Juveniles (< 1 year old):	NA%	NA%
Total:	NA%	NA%
Proposed change in post-season population:	NA%	NA%



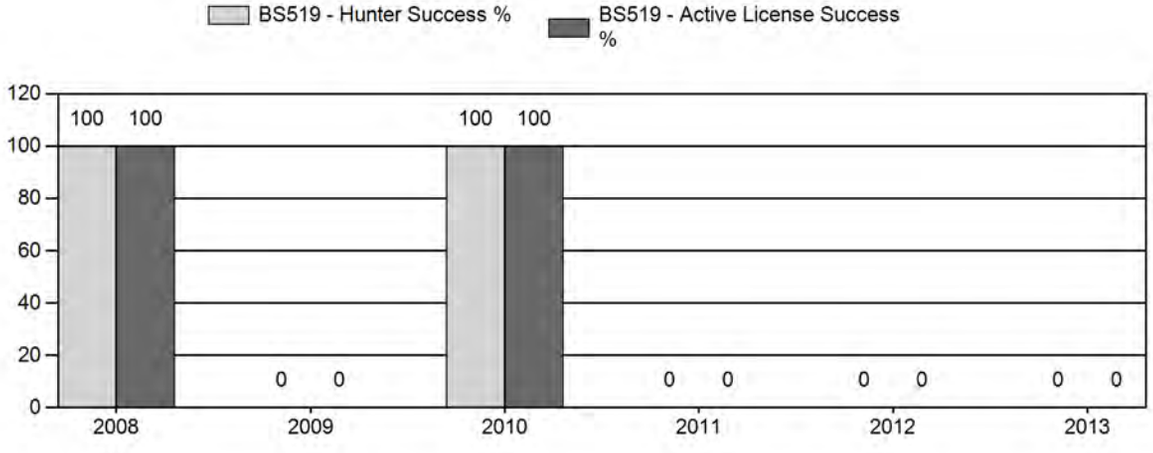
Harvest



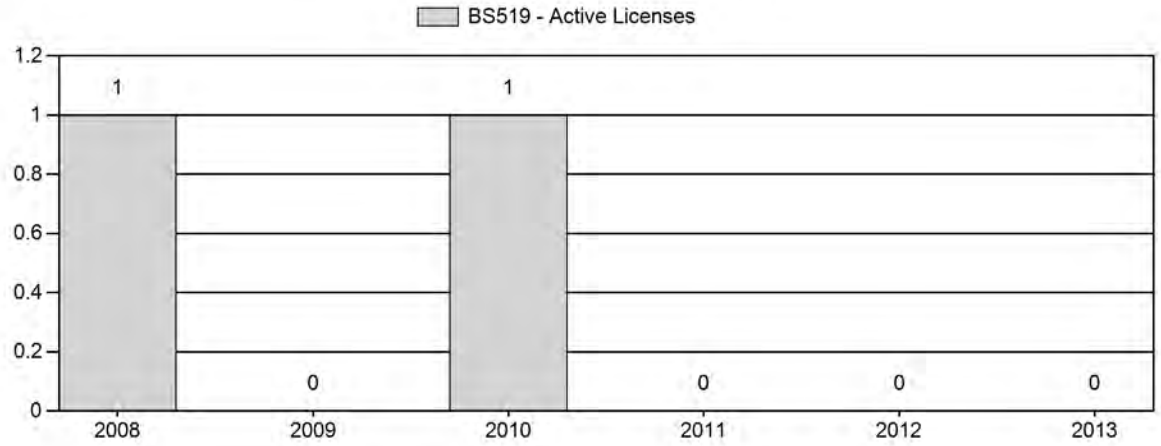
Number of Hunters



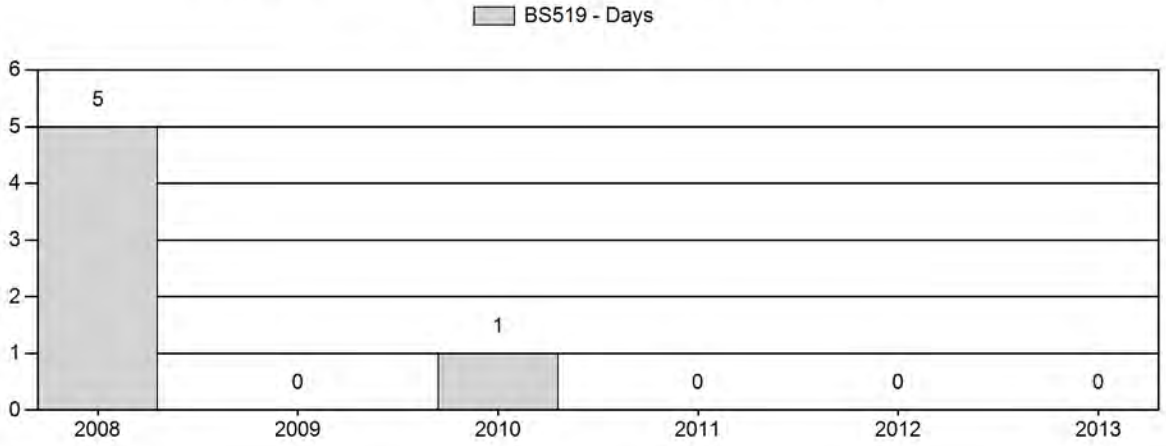
Harvest Success



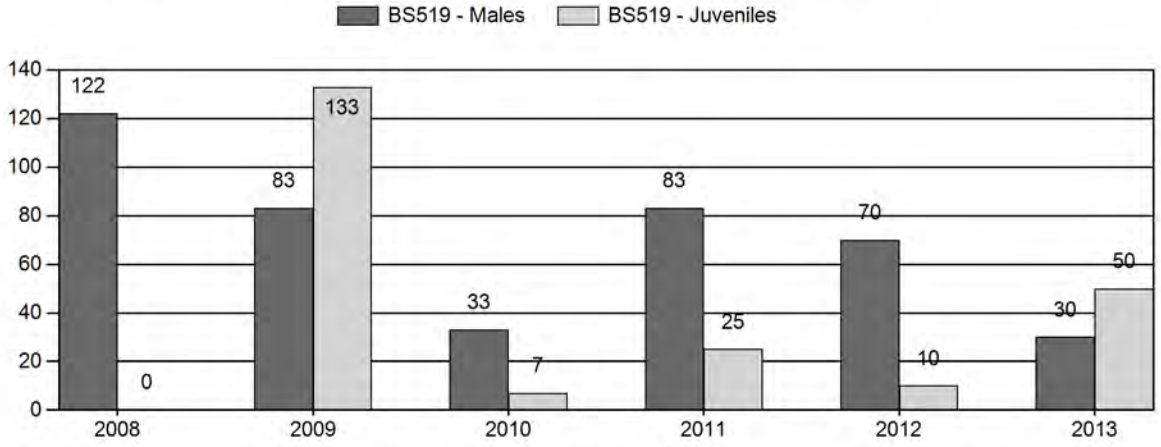
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Bighorn Sheep Herd BS519 - ENCAMPMENT RIVER

		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
2008	0	1	10	11	55%	9	45%	0	0%	20	46	11	111	122	± 0	0	± 0	0
2009	0	0	5	5	26%	6	32%	8	42%	19	0	0	83	83	± 0	133	± 0	73
2010	0	0	5	5	24%	15	71%	1	5%	21	0	0	33	33	± 0	7	± 0	5
2011	0	0	10	10	40%	12	48%	3	12%	25	0	0	83	83	± 0	25	± 0	14
2012	0	0	7	7	39%	10	56%	1	6%	18	0	0	70	70	± 0	10	± 0	6
2013	0	0	3	3	17%	10	56%	5	28%	18	0	0	30	30	± 0	50	± 0	38

Encampment River Bighorn Sheep (BS519)
Hunt Area 21
2014 Hunting Season

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	License	Limitations
18, 21	1	Sep. 1	Oct. 31	2	Limited quota	Any ram (2 residents)

Hunt Area	Type	Quota change from 2013
18, 21	1	+2
Herd Unit Total	**1**	**+2**

Management Evaluation
Current Management Objective: 200
Management Strategy: Special
2013 Postseason Population Estimate: NA
2014 Proposed Postseason Population Estimate: NA

Bighorn sheep in the Encampment River herd unit are managed toward a numeric objective of 200. A population model has not been constructed for the herd unit. The herd is managed under the bighorn sheep special management strategy. The objective was last reviewed in 1987.

Herd Unit Issues
Bighorn sheep numbers in this herd unit appeared to peak in the late 1970s, not long after reintroduction efforts. Bighorn sheep numbers have been in decline since the early 1980s. This decline has been attributed to decadent habitat. Domestic sheep in grazing on the west slope of the Sierra Madres also poses a disease concern for managers. The population is now at such a low number it is assumed natural recovery is not possible. Limited harvest opportunities have been offered in past years, in combination with the Douglas Creek bighorn sheep herd unit.

The State of Wyoming, and thus Wyoming Game and Fish Department, has intervened on behalf of the U.S. Forest Service, in the U.S. District Court case, BIODIVERSITY CONSERVATION ALLIANCE vs. BUTCH BLAZER, et al. This case is currently awaiting a ruling, and may affect future management of bighorn sheep in this herd unit.

Weather
Weather in this herd unit was relatively normal during the past bio-year. This weather pattern most likely had a neutral to positive influence on bighorn sheep. For specific

meteorological information for the Encampment River herd unit the reviewer is referred to the following link:
http://www.ncdc.noaa.gov/cag/

Habitat
Habitat conditions improved in 2013 with an increase in timely spring and fall precipitation. However, much of the transition and winter ranges were severely impacted by the drought conditions experienced in bio-year 2012. No bighorn sheep habitat production/utilization data was available for this herd unit. However, annual production rates should have improved from the previous year, while utilization rates on winter ranges likely continued to be high.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality and consequently heavily influence population management for any particular big game specie.

Shrub communities within the Laramie Region that are annually assessed by game wardens, wildlife biologists, and terrestrial habitat biologists, include: true mountain mahogany, antelope bitterbrush, skunkbrush sumac, big sagebrush, and four-wing saltbush. A majority of these transects were established approximately 12–13 years ago. Transects were established for several different reasons, including: measuring habitat response prior to or following treatments (i.e. prescribed fire, wildfire, mowing), concern over historic or current domestic livestock or wild ungulate utilization levels, selection of "representative habitats" utilized by wildlife on identified winter ranges, and to compare present results with historic data sets.

Field Data
Adequate classification data for this herd has been difficult to collect. 2013 postseason classification observations were obtained while conducting mule deer and elk surveys from a helicopter in December of 2013. The classification results were 3 adult rams, 10 ewes, and 5 lambs. Past postseason classification efforts returned similar results. Based on the trend of this classification data, a reasonable population estimate of 20-40 bighorn sheep should be considered for this herd unit.

Population
A population model has not been constructed for this herd unit due to limited classification and no annual survival information. A review of the management objective, currently at 200 bighorn sheep, will be evaluated within the next 2-years.

Harvest Data
The hunting season in Hunt Areas 18 and 21 was closed in 2013.

Management Summary

There will be an open hunting season for this bighorn sheep in this herd unit in 2014. Two (2) resident licenses will be offered for the combination of Hunt Areas 18 and 21.

Bibliography of Herd Specific Studies

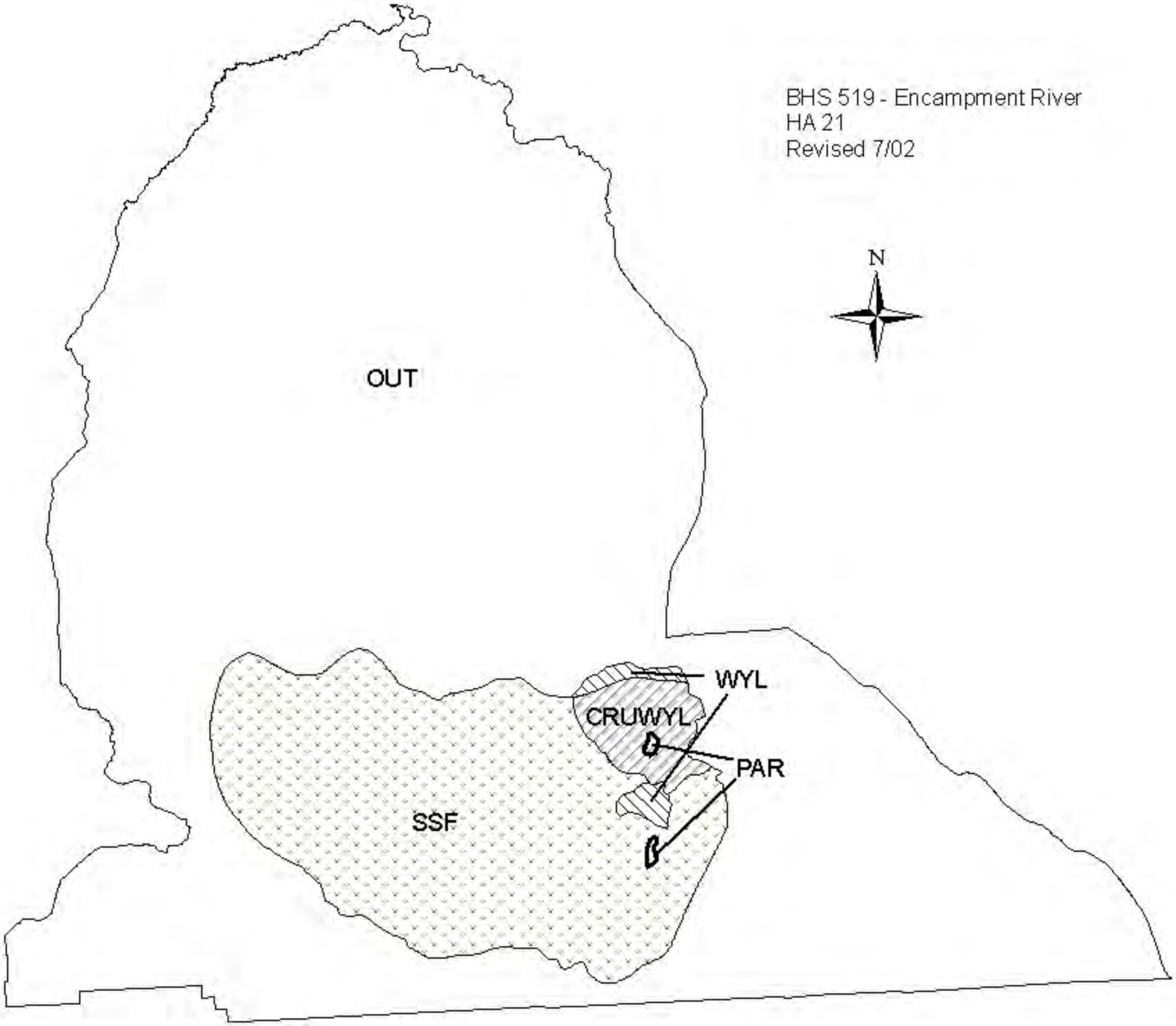
Arnett, E.B. 1990. Bighorn sheep habitat selection patterns and response to fire and timber harvest in Southcentral Wyoming. M.S. Thesis, University of Wyoming, Laramie. USA. 156 pp.

Cook, J.G. 1990. Habitat, nutrition, and population ecology of two transplanted bighorn sheep populations in southcentral Wyoming. Ph.D. Thesis, University of Wyoming, Laramie. Wyoming. USA. 310 pp.

_____ E.B. Arnett, L.L. Irwin, F. Lindzey. 1989. Ecology and Population Dynamics of Two Transplanted Bighorn Sheep Herds in Southcentral Wyoming. University of Wyoming, Laramie. Wyoming. USA. 234 pp.

Haas, W.L. 1979. Ecology of an introduced herd of Rocky Mountain bighorn sheep in southcentral Wyoming. M.S. Thesis, Colorado State University, Fort Collins. Colorado. USA. 343 pp.

_____ and E. Decker. 1980. A study of a recently introduced bighorn sheep herd in Proc. Bien Symp. North Wild Sheep and Goat Coun. 2:143-166.


BHS 519 - Encampment River
HA 21
Revised 7/02
N
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CRUWYL
PAR
SSF

2013 - JCR Evaluation Form

SPECIES: Elk | PERIOD: 6/1/2013 - 5/31/2014

HERD: EL531 - IRON MOUNTAIN

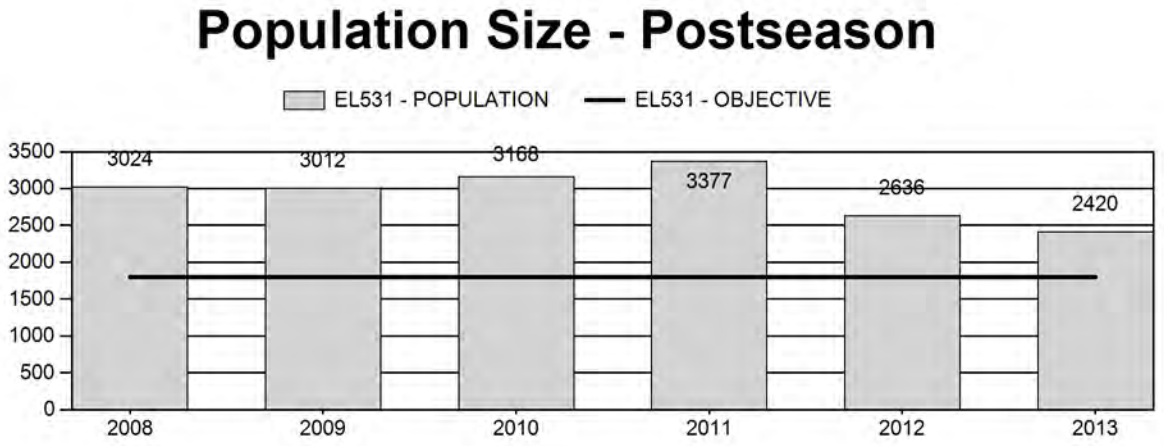
HUNT AREAS: 6 | PREPARED BY: LEE KNOX

	2008 - 2012 Average	2013	2014 Proposed
Population:	3,043	2,420	2,037
Harvest:	689	716	655
Hunters:	1,206	1,814	1,300
Hunter Success:	57%	39%	50%
Active Licenses:	1,253	1,916	1,550
Active License Percent:	55%	37%	42%
Recreation Days:	7,246	12,539	12,000
Days Per Animal:	10.5	17.5	18.3
Males per 100 Females	18	29	
Juveniles per 100 Females	46	49	

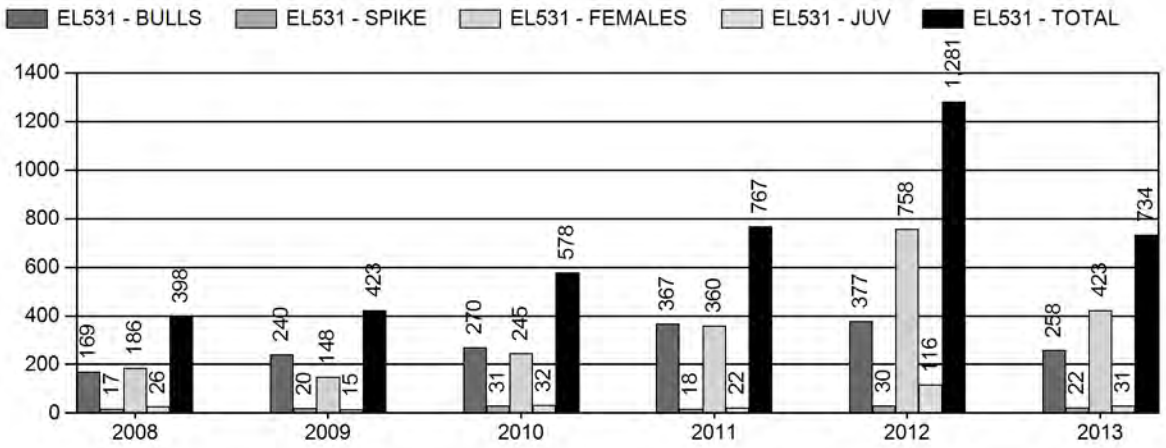
Population Objective:	1,800
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	34%
Number of years population has been + or - objective in recent trend:	10
Model Date:	2/21/2014

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

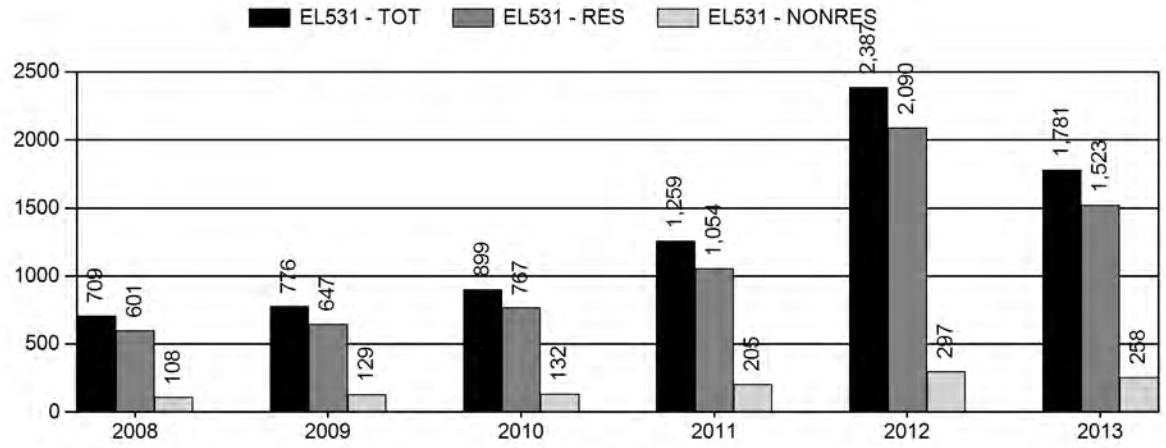
	JCR Year	Proposed
Females ≥ 1 year old:	24%	13%
Males ≥ 1 year old:	38%	40%
Juveniles (< 1 year old):	4.5%	4.5%
Total:	23%	24%
Proposed change in post-season population:	25%	26%



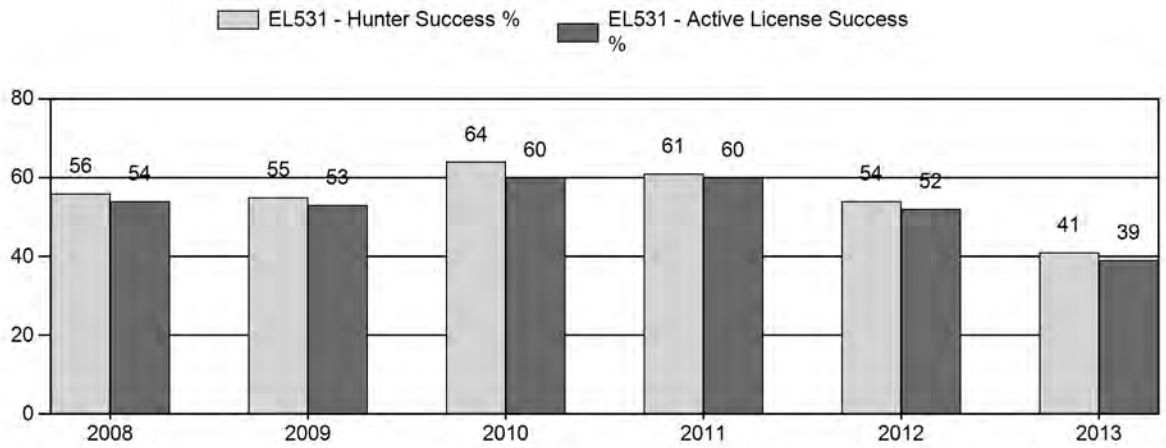
Harvest



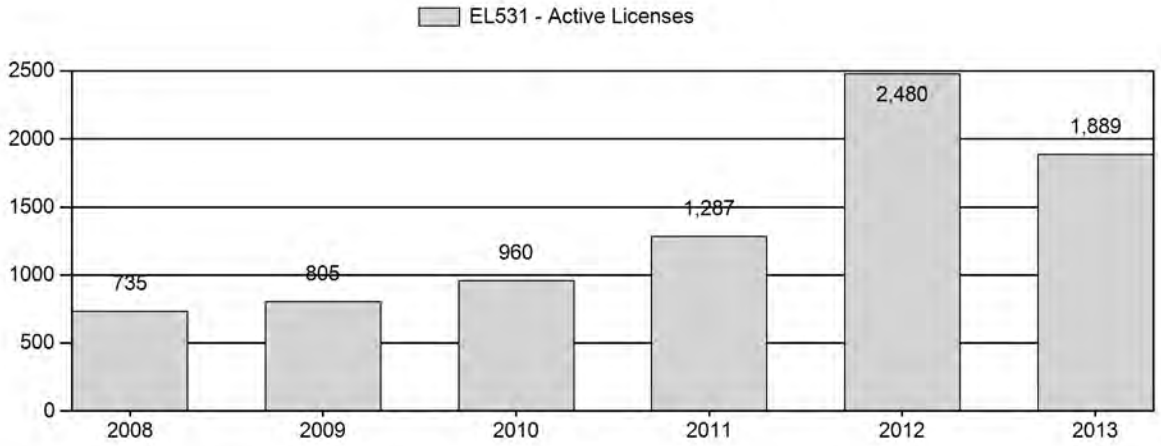
Number of Hunters



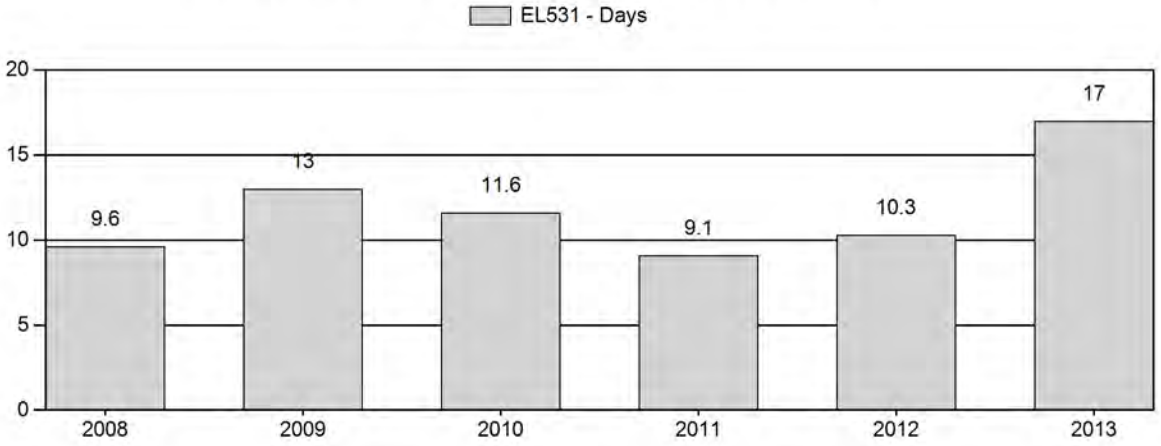
Harvest Success



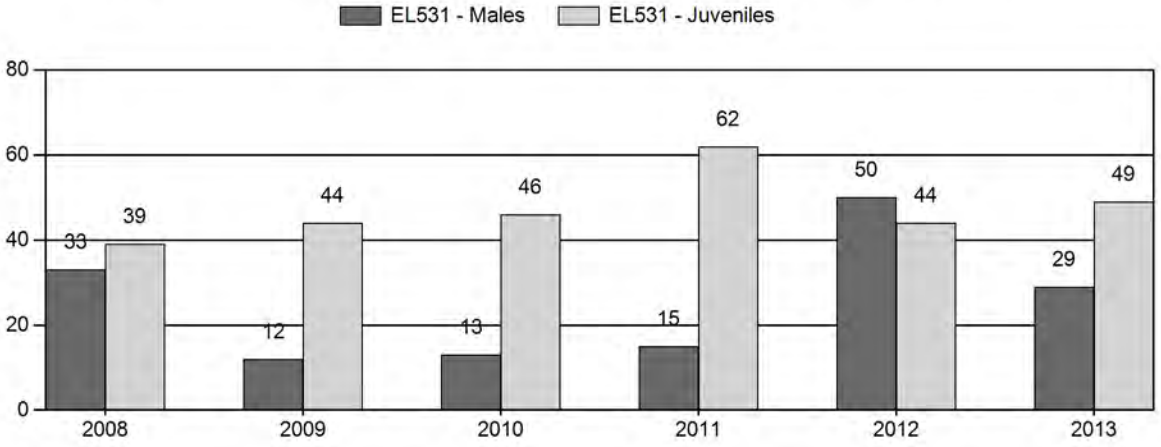
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Elk Herd EL531 - IRON MOUNTAIN

		MALES				FEMALES		S				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
2008	3,024	36	19	55	19%	168	58%	66	23%	289	469	21	11	33	± 6	39	± 7	30
2009	3,012	70	21	91	8%	741	64%	325	28%	1,157	533	9	3	12	± 1	44	± 3	39
2010	3,168	53	26	79	8%	604	63%	278	29%	961	617	9	4	13	± 2	46	± 4	41
2011	3,377	20	16	36	9%	235	56%	145	35%	416	0	9	7	15	± 3	62	± 8	54
2012	2,636	52	46	98	26%	196	51%	87	23%	381	0	27	23	50	± 7	44	± 7	30
2013	2,420	75	86	161	16%	557	56%	273	28%	991	644	13	15	29	± 3	49	± 4	38

2014 HUNTING SEASONS
IRON MOUNTAIN ELK (EL531)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
6		Oct. 1	Oct. 31		General license; any elk valid off national forest,
		Nov. 1	Jan. 31		General license; antlerless elk valid off national forest
	1	Oct.15	Oct. 31	75	limited quota licenses; Any elk
		Nov. 1	Jan. 31		Unused Area 6 Type 1 licenses valid for antlerless elk
	4	Nov. 1	Jan. 31	100	Limited quota licenses; antlerless elk
	6	Aug. 15	Jan. 31	1100	Limited quota licenses; cow or calf off national forest;
Archery					Refer to Section 3 of this Chapter

Area	Type	Quota change from 2014
6	1 6	-25 -400
Herd Totals	**1** **6**	-25 -400

MANAGEMENT EVALUATION

Current Postseason Population Management Objective: 1800
Management Strategy: Recreational
2013 Postseason population Estimate: ~ 2,400
2014 Proposed Postseason Population Estimate: 2,000

The management objective for the Iron Mountain Elk Herd Unit is a post-season population objective of 1,800 elk. The management strategy is recreational management which requires maintaining a post hunt bull ratio of 15 to 29:100 cows. The objective and management strategy were last revised in 2013.

Herd Unit Issues

The Iron Mountain Elk Herd Unit includes Hunt Areas 5 and 6 (combined into Hunt Area 6 for 2014) which are composed of mostly private lands except for the Pole Mountain National Forest which is managed under a limited quota license to maintain hunt quality. Urban sprawl and nontraditional landowners are increasing in the herd unit as well as growing stone quarries in parts of Rogers canyon and between I-80 and Wyoming Highway 287. With the second year of a Hunter Management and Access Program (HMAP) (Figure 1) and a liberal season structure,

we maintained the harvest needed to continue to decrease this population. The 2013 post-season population estimate was 2,400 with the population trending downward.

Weather

Weather during the spring and summer of 2013 remained extremely dry. The Palmer Drought Severity Index (PDSI) ranked drought conditions in SE Wyoming as extreme through the month of August. However the fall of 2013 was extremely wet with September 2013 being the wettest September recorded in Laramie. For specific weather information please refer to the following link: http://www.ncdc.noaa.gov/.

Habitat

Turnover in personnel, changes in individual job responsibilities of employees, and evolving WGFD agency priorities have resulted in some issues with consistent habitat data collection and interpretation of data. Some transects, years after their initial establishment, have been identified as being in "non-representative" locations. Site selection was often influenced by terrain and/or land ownership status (i.e public access). Changing land uses (wind turbines, roads, fence construction, other developments, etc.) have influenced habitat use by wildlife in some locations, and in some instances have resulted in major shifts in animal usage of the area being monitored. Department personnel are currently evaluating shrub transects and the types of information being collected, and will be looking for ways to improve efficiency of data collection, types of data being collected, and refining criteria for site selection for future transects. The reader is referred to the Strategic Habitat Plan Annual Report for further background information on shrub transects.

Field Data

A total of 991 elk were classified which exceeded the estimated classification objective of 644. Calf ratios increased from 44:100 cows in 2012 to 49: 100 cows which may have been more of a factor of an increase in classification sampling effort than improved range conditions. Bull ratios are at the high end of recreational management at 29:100 cows which is typical of private land dominated herd units. With the decrease in access, hunter success decreased by 10% and hunter effort increased by 7 days. The number of active licenses decreased from 2,487 in 2012 to 1,889 in 201. We expect this trend to continue for a few more years as the public realizes how difficult it is to find access. From the hunter satisfaction survey the number of hunters that stated they were satisfied or very satisfied with their hunt decreased from 87% in 2012 to 65% 2013. This is likely a factor of hunters not realizing the there is little hunter access.

Harvest Data

The Iron Mountain HMAP was implemented for the second year during the 2013 season, but at a reduced capacity. Department personal and landowners agreed to a more conservative program than the previous year and concentrated the harvest on the northern portion of the herd unit. We provided access to 334 hunters on to the Iron Mountain HMAP this year, harvesting 71 elk. The Sherman Hill HMA, located near the Colorado boarder, was added in 2013 but had minimal harvest. Over all cow harvest during the 2013 season was the second highest on record for this herd unit and was more than the estimated calf crop, and should result in a decrease in the elk population.

Population

This is the first year that we have had enough data to get a model to run. The Time-Specific Juv, Constant Adult Survival, male survival coefficient model was chosen for having the lowest AIC value of 320 and Best Fit of 210. This model predicts the population declining from a high of 3,400 in 2011 to the current population estimate of 2,400. This Model is ranked Poor for a variety of reasons including: little data available; ratio data, if available, considered highly biased because of poor sample sizes or an inability to survey the entire area; herd unit closure issues apparent; results not biologically defensible.

Management Summary

The 2014 season structure will result in a minimum harvest of 650 elk, and will continue to reduce the population towards the objective. We will be combining Hunt Areas 5 and 6 in 2014 to allow landowners and hunters more flexibility, and to simplify regulations. With the 31 day any elk season ending Oct. 31st, landowners will provide cow harvest opportunities earlier in the season before weather conditions prevent access. We are decreasing the Type 6s from 1,500 to 1,100 for multiple reasons: we do not plan to have the Iron Mountain HMAP in 2014, and we never sold more than 900 of the 1,500 licenses. Area 6 Type 1's will be decreased to 75 licenses to address the decline in hunter success and bull harvest on the forest. Once again, 100 Area 6 type 4s will be valid on forest to maintain antlerless harvest on Pole Mountain.

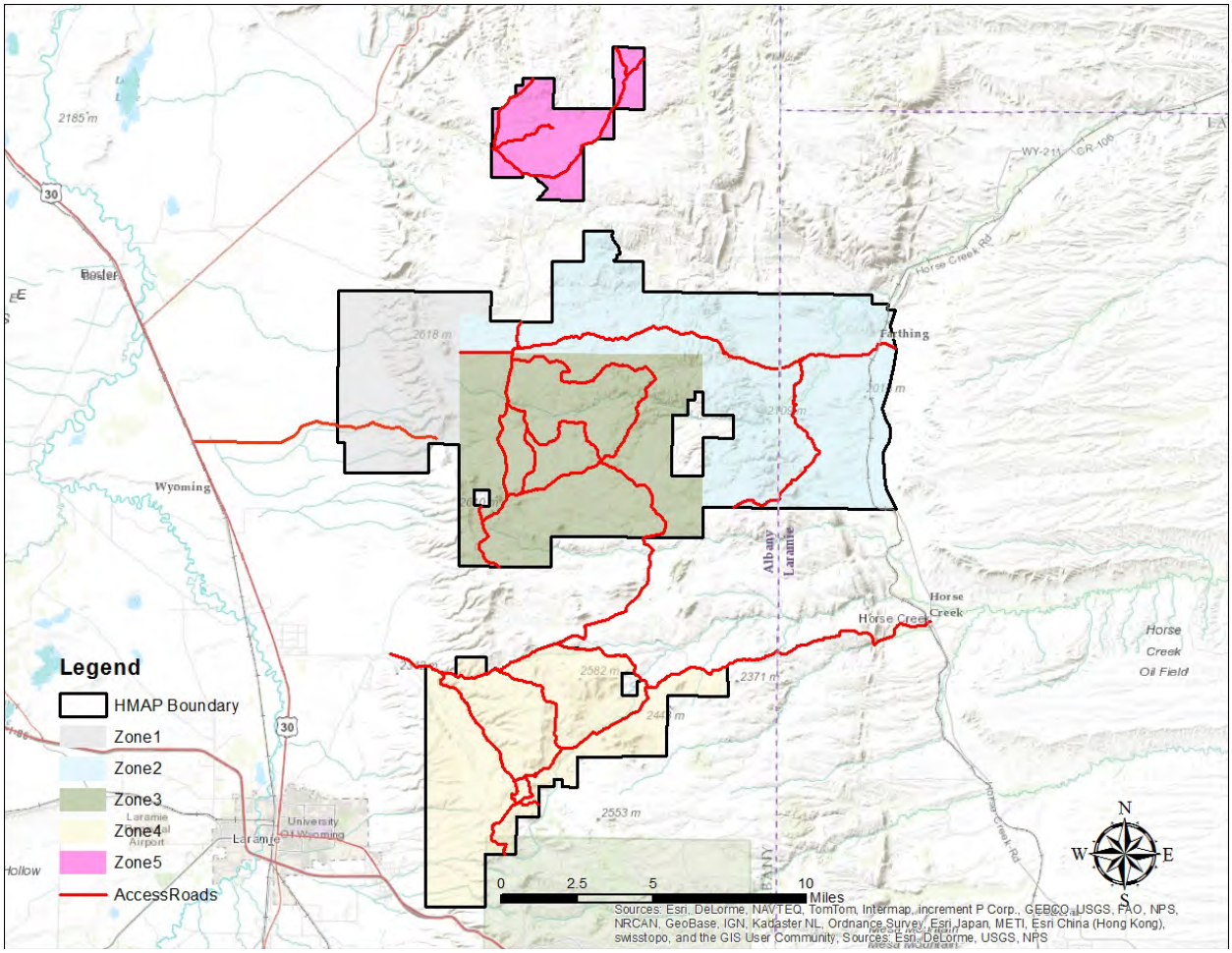


Figure 1. Map of the 2013 Hunter Management and Access Program located between Laramie and Cheyenne.

INPUT	
Species:	Elk
Biologist:	Lee Knox
Herd Unit & No.:	Iron Moutnain
Model date:	02/26/14

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	375	385	☐ CJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	375	385	☐ SCJ,SCA M	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	1827	1902	☐ TSJ,CA Model	
TSJ,CA,MSC	Time-Specific Juv, Constant Adult Survival, Male survival coefficient	210	320	☑ TSJ,CA,MSC Mode	

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population				Predicted Posthunt Population				Objective
	Field Est	Field SE		Juveniles	Total Males	Females	Total	Juveniles	Total Males	Females	Total	
2003				839	681	1783	3304	822	503	1677	3001	1800
2004				670	715	1890	3274	652	553	1755	2960	1800
2005				784	710	1916	3410	750	521	1763	3034	1800
2006				779	710	1953	3442	754	502	1798	3054	1800
2007				874	694	1988	3555	860	514	1771	3145	1800
2008				731	737	1994	3462	703	532	1789	3024	1800
2009				807	706	1964	3477	790	420	1801	3012	1800
2010				896	767	2141	3803	861	436	1871	3168	1800
2011				1175	815	2243	4232	1139	391	1847	3377	1800
2012				783	905	2351	4039	670	459	1508	2636	1800
2013				686	745	1796	3228	652	437	1331	2420	1800
2014				508	676	1573	2758	475	373	1188	2037	1800
2015												
2016												
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2034												
2035												

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
2003	0.60			0.98		
2004	0.60			0.98		
2005	0.60			0.98		
2006	0.60			0.98		
2007	0.60			0.98		
2008	0.60			0.98		
2009	0.95			0.98		
2010	0.95			0.98		
2011	0.95			0.98		
2012	0.95			0.98		
2013	0.83			0.98		
2014	0.60			0.98		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
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2026						
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Parameters:	Optim cells
Male Survival Coefficient	0.950
Adult Survival =	0.980
Initial Total Male Pop/10,000 =	0.050
Initial Female Pop/10,000 =	0.168

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						
	Juvenile/Female Ratio			Total Male/Female Ratio									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	Field SE	Juv	Yrl males	2+ Males	Females	Total Harvest	Total Males	Females
2003		49.01	4.90	29.99	31.58	23.68	3.10	16	6	156	97	275	26.2	6.0
2004		37.14	8.53	31.50	152.38	114.29	18.70	16	16	131	122	285	22.6	7.1
2005		42.52	6.91	29.56	60.89	45.67	7.24	31	7	165	139	342	26.6	8.0
2006		41.95	5.02	27.94	36.72	27.54	3.86	23	32	157	141	353	29.3	7.9
2007		48.53	5.15	29.05	46.57	34.93	4.16	13	14	149	197	373	25.8	10.9
2008		39.29	5.71	29.75	43.65	32.74	5.09	26	17	169	186	398	27.8	10.3
2009		43.86	2.92	23.34	16.37	12.28	1.36	15	20	240	148	423	40.5	8.3
2010		46.03	3.34	23.28	17.44	13.08	1.56	32	31	270	245	578	43.2	12.6
2011		61.70	6.52	21.17	20.43	15.32	2.74	22	18	367	360	767	52.0	17.7
2012		44.39	5.72	30.41	102.04	76.53	8.30	103	30	376	766	1275	49.3	35.8
2013		49.01	3.62	32.84	38.54	28.90	2.59	31	22	258	423	734	41.3	25.9
2014		40.00	2.83	31.43	31.43	23.57	2.04	30	25	250	350	655	44.7	24.5
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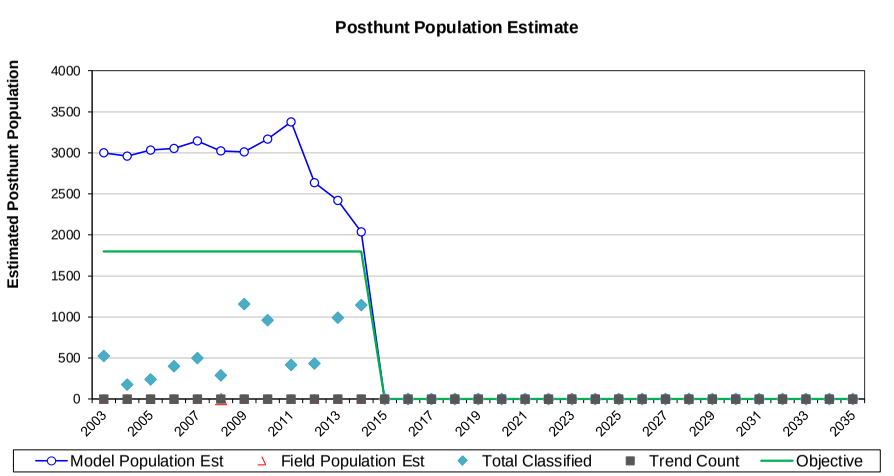
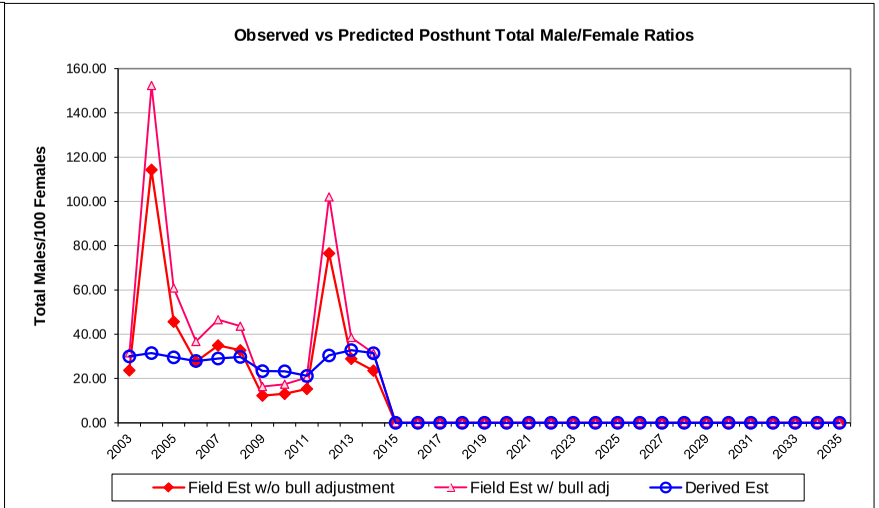
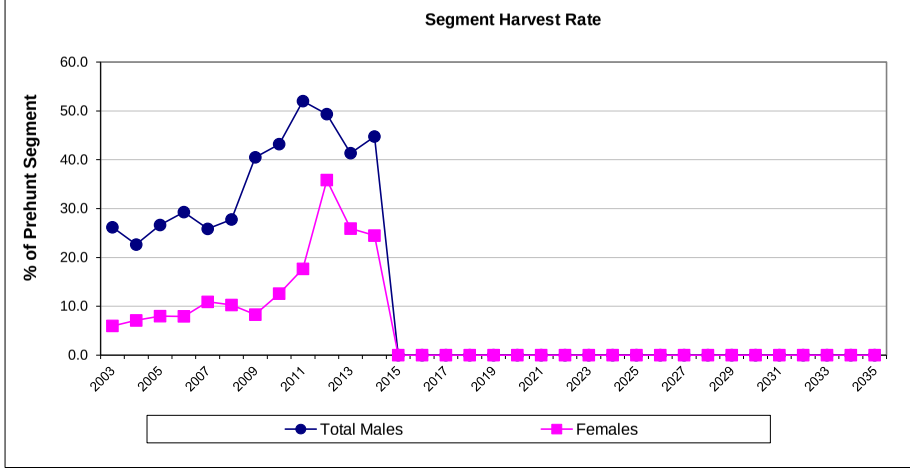
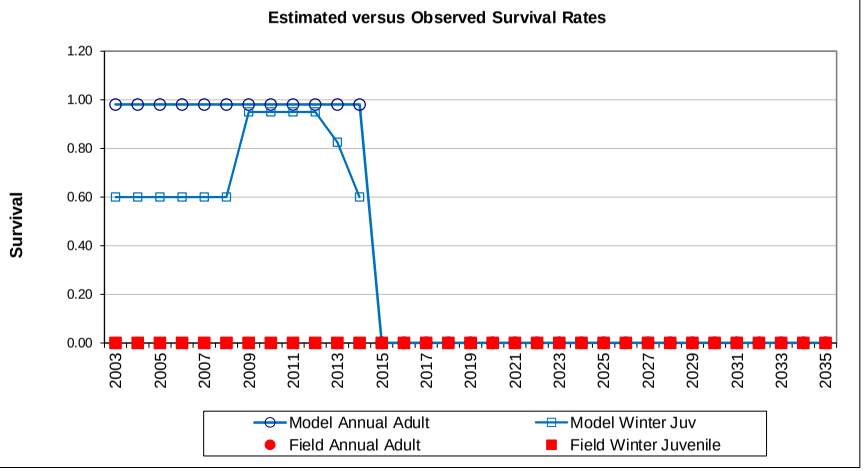
FIGURES









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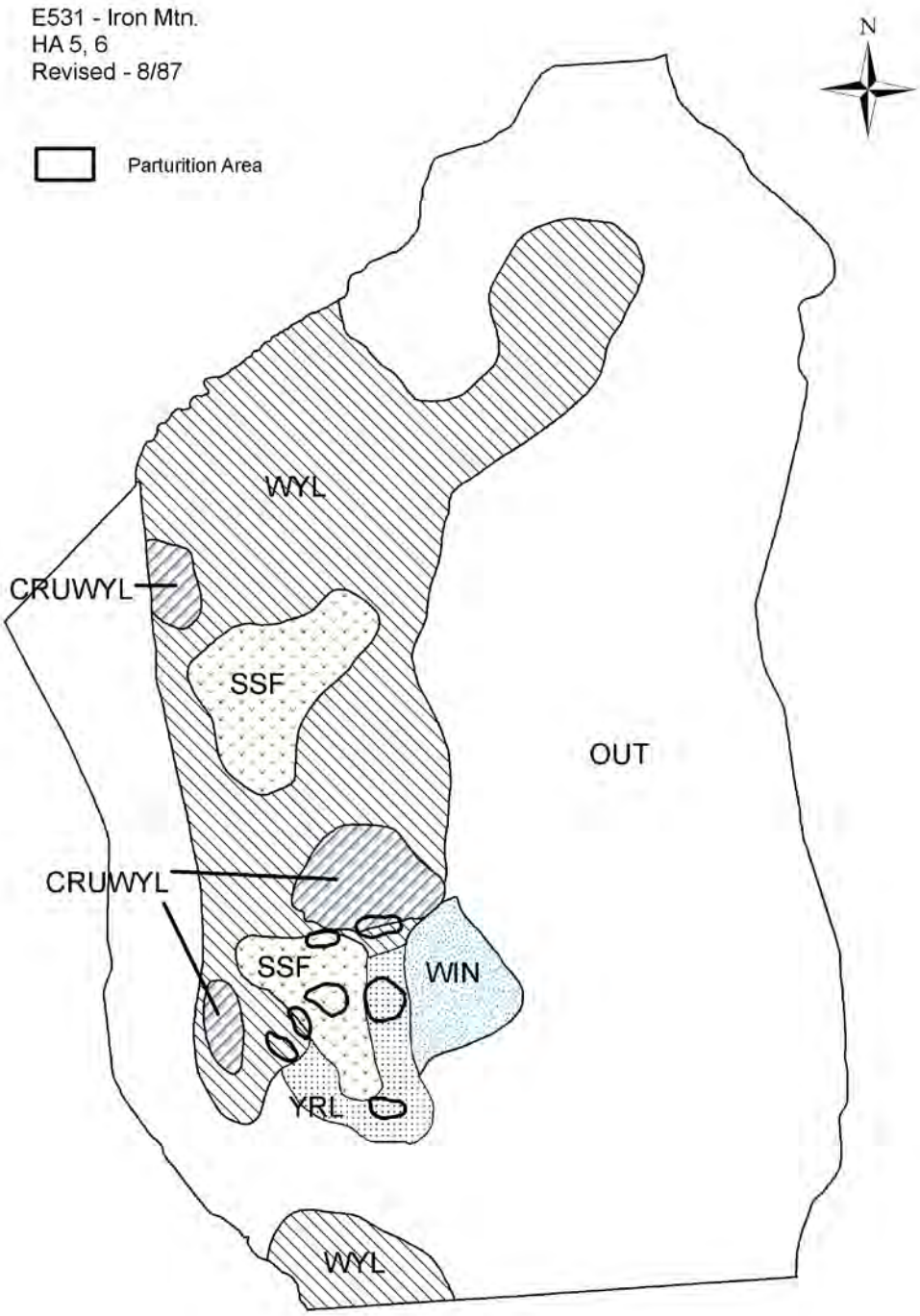
E531 - Iron Mtn.
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Revised - 8/87
Parturition Area
N
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WYL

2013 - JCR Evaluation Form

SPECIES: Elk | PERIOD: 6/1/2013 - 5/31/2014

HERD: EL533 - SNOWY RANGE

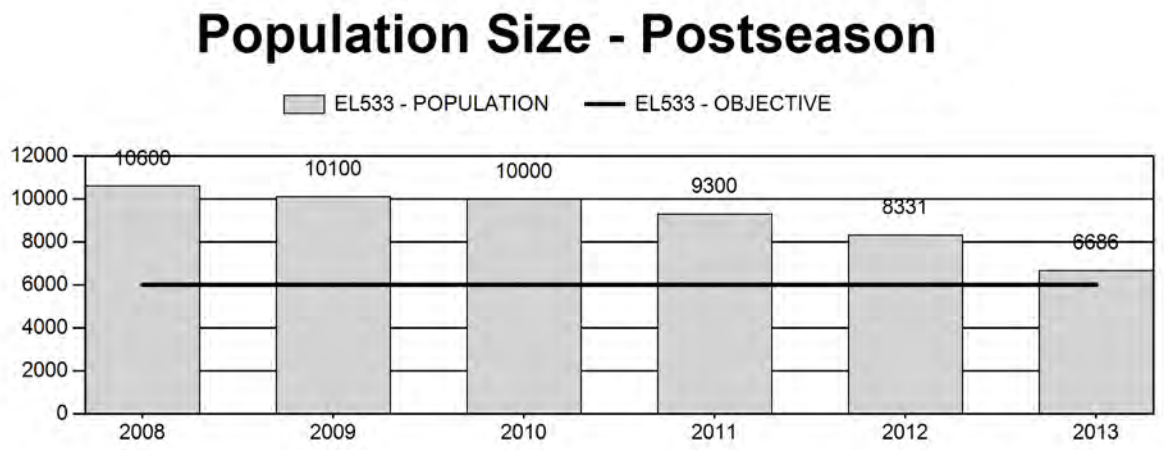
HUNT AREAS: 8-12, 110, 114, 125 | PREPARED BY: WILL SCHULTZ

	2008 - 2012 Average	2013	2014 Proposed
Population:	9,666	6,686	6,000
Harvest:	1,698	2,263	1,650
Hunters:	5,539	5,902	5,000
Hunter Success:	31%	38%	33 %
Active Licenses:	5,690	6,178	5,200
Active License Percent:	30%	37%	32 %
Recreation Days:	40,610	45,044	35,000
Days Per Animal:	23.9	19.9	21.2
Males per 100 Females	22	29	
Juveniles per 100 Females	45	40	

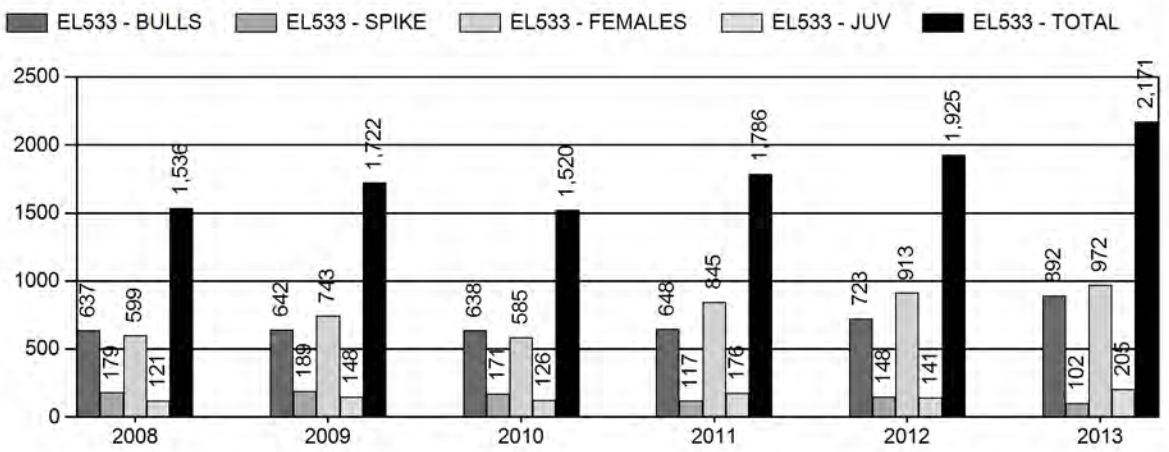
Population Objective:	6,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	11%
Number of years population has been + or - objective in recent trend:	10
Model Date:	03/04/2014

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

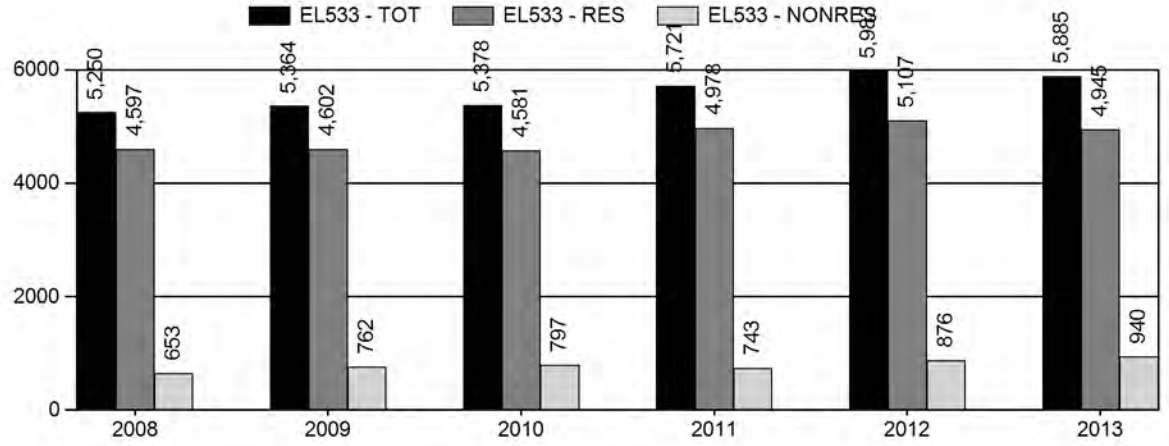
	JCR Year	Proposed
Females ≥ 1 year old:	21.9%	17.2%
Males ≥ 1 year old:	55.5%	63.0%
Juveniles (< 1 year old):	10.9%	7.8%
Total:	24.7%	21.2%
Proposed change in post-season population:	-27.1%	-23.4%



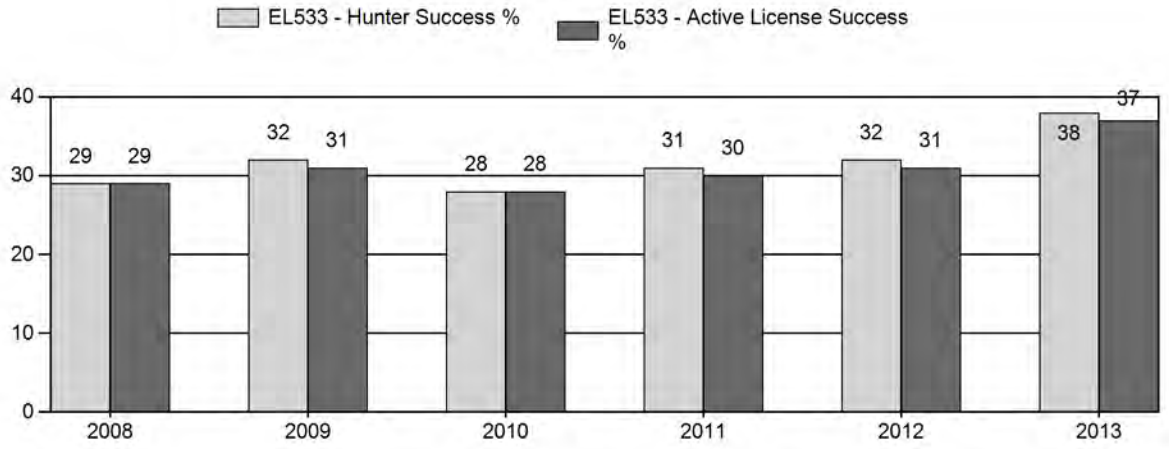
Harvest



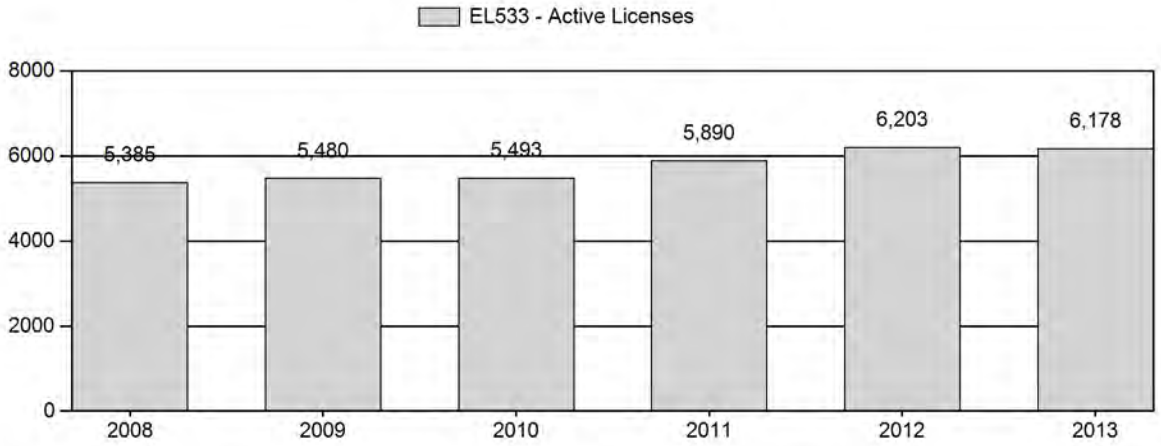
Number of Hunters



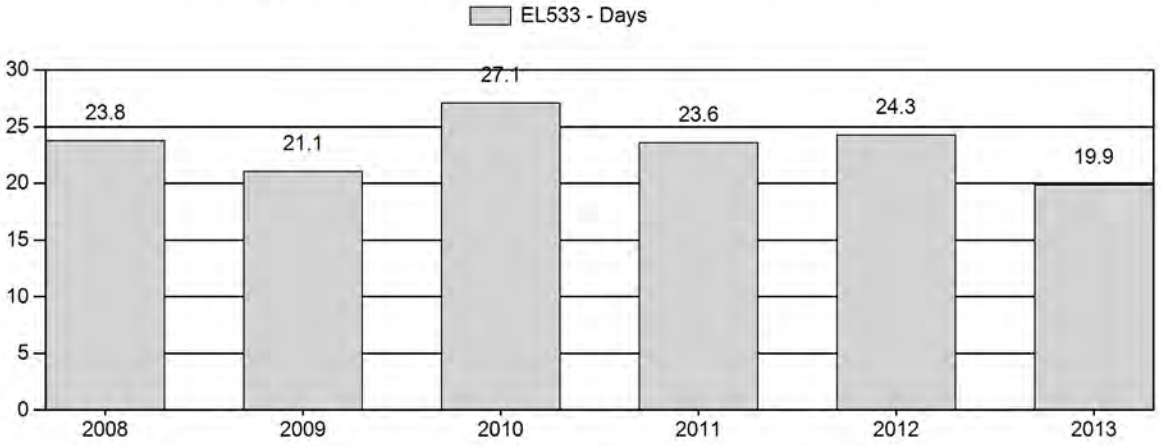
Harvest Success



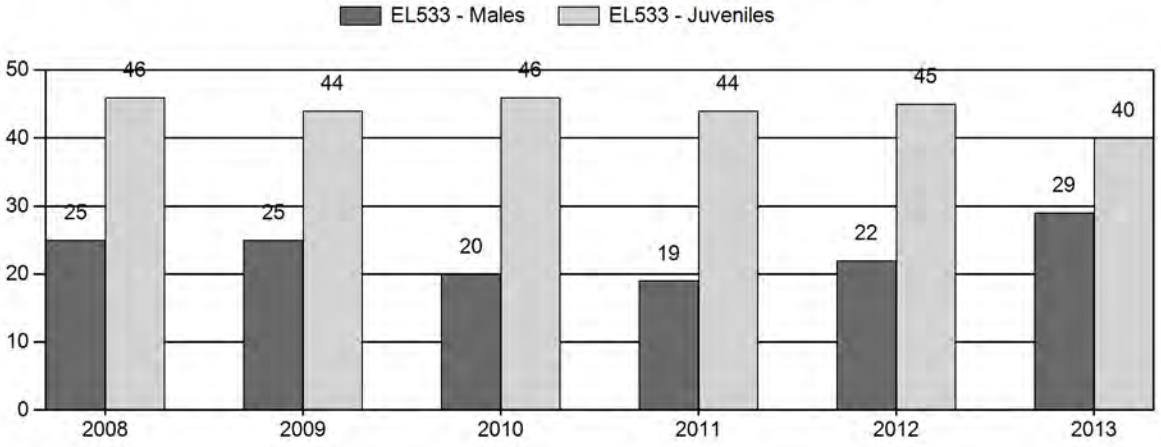
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Elk Herd EL533 - SNOWY RANGE

		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
2008	10,600	215	271	486	14%	1,980	59%	909	27%	3,375	690	11	14	25	± 1	46	± 2	37
2009	10,100	279	179	458	15%	1,816	59%	802	26%	3,076	679	15	10	25	± 1	44	± 2	35
2010	10,000	318	200	518	12%	2,633	60%	1,211	28%	4,362	650	12	8	20	± 1	46	± 2	38
2011	9,300	145	109	254	12%	1,308	61%	576	27%	2,138	639	11	8	19	± 1	44	± 2	37
2012	8,331	252	218	470	13%	2,181	60%	990	27%	3,641	664	12	10	22	± 1	45	± 2	37
2013	6,686	292	456	748	17%	2,539	59%	1,023	24%	4,310	646	12	18	29	± 1	40	± 1	31

Snowy Range Elk (EL533)
Hunt Areas 8, 9, 10, 11, 12, 110, 114 and 125
2014 Hunting Seasons

Hunt Area	Type	Dates of Seasons Opens	Dates of Seasons Closes	Limited Quota	Limitations
8	1	Oct. 1	Oct. 31	150	Limited quota licenses; any elk
		Nov. 1	Jan. 31		Unused Area 8 Type 1 licenses valid for any elk west of Sand Creek Road (Albany County Road 34) and antlerless elk east of Sand Creek Road (Albany County Road 34)
	6	Aug. 15	Jan. 31	100	Limited quota licenses; cow or calf
9		Oct. 1	Oct. 14		General license; any elk
		Oct. 15	Oct. 31		General license; antlerless elk
	6	Aug. 15	Sep. 30	150	Limited quota licenses; cow or calf valid on private land
		Oct. 1	Dec. 31		Unused Area 9 Type 6 licenses valid in the entire area
10		Oct. 1	Oct. 14		General license; any elk
		Oct. 15	Oct. 31		General license; antlerless elk
	6	Aug. 15	Sep. 30	400	Limited quota licenses; cow or calf valid on private land
		Oct. 1	Dec. 31		Unused Area 10 Type 6 licenses valid in the entire area
11	1	Oct. 1	Oct. 31	150	Limited quota licenses; any elk
	4	Oct. 1	Oct. 31	300	Limited quota licenses; antlerless elk
	6	Aug. 15	Jan. 31	50	Limited quota licenses; cow or calf valid off national forest and off the Wyoming Game and Fish Commission's Wick Wildlife Habitat Management Area
12		Oct. 15	Oct. 31		General license; any elk; spikes excluded
	6	Oct. 1	Nov. 14	150	Limited quota licenses; cow or calf
12, 13, 15, 110	7	Aug. 15	Jan. 31	75	Limited quota licenses; cow or calf valid on private land
110		Oct. 15	Oct. 31		General license; any elk, spikes excluded
	6	Oct. 1	Nov. 14	50	Limited quota licenses; cow or calf

Hunt Area	Type	Dates of Seasons Opens	Closes	Limited Quota	Limitations
114	1	Oct. 1	Jan. 31	50	Limited quota licenses; any elk
	6	Aug. 15	Jan. 31	150	Limited quota licenses; cow or calf
125	1	Oct. 1	Dec. 31	200	Limited quota licenses; any elk
		Jan. 1	Jan. 31		Unused Area 125 Type 1 licenses valid for antlerless elk
	6	Oct. 1	Jan. 31	200	Limited quota licenses; cow or calf

Hunt Area	Type	Quota change from 2013
8	6	-50
10	6	-400
12	6	+50
110	6	-50
114	6	-50
125	1	+25
Herd Unit Total	**1**	**+25**
	6	**-500**

Management Evaluation
Current Management Objective: 6,000
Management Strategy: Recreational
2013 Postseason Population Estimate: 6,700
2014 Proposed Postseason Population Estimate: 6,000

Elk in The Snowy Range herd unit are managed toward a numeric objective of 6,000. The population was estimated using a spreadsheet models developed in 2012 and updated in 2014. The herd is managed for recreation opportunity. The management was last reviewed in 2013 (Appendix A).

Herd Unit Issues
The Snowy Range herd unit occupies a large portion of south central Wyoming. Elk management issues here include development in the form of energy, agricultural, and residential; invasive and noxious plants; forestry and range management; and human disturbance in important elk habitat.

Weather
Weather in this herd unit was relatively normal during the past bio-year. This weather pattern most likely had a neutral to positive influence on elk. For specific meteorological information for the Snowy Range herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat
Habitat conditions improved in 2013 with an increase in timely spring and fall precipitation. However, much of the transition and winter ranges were severely impacted by the drought conditions experienced in bio-year 2012. No elk habitat production/utilization data was available for this herd unit. However, annual production rates should have improved from the previous year, while utilization rates on winter ranges likely continued to be high.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality and consequently heavily influence population management for any particular big game specie.

Shrub communities within the Laramie Region that are annually assessed by game wardens, wildlife biologists, and terrestrial habitat biologists, include: true mountain mahogany, antelope bitterbrush, skunkbrush sumac, big sagebrush, and four-wing saltbush. A majority of these transects were established approximately 12–13 years ago. Transects were established for several different reasons, including: measuring habitat response prior to or following treatments (i.e. prescribed fire, wildfire, mowing), concern over historic or current domestic livestock or wild ungulate utilization levels, selection of "representative habitats" utilized by wildlife on identified winter ranges, and to compare present results with historic data sets.

Field Data
An adequate postseason classification sample of 4,300 elk produced ratios of 29 bulls and 40 calves per 100 cows in this herd unit (Figure 1). We classified elk from a helicopter in conjunction with local mule deer classifications. A comparison of the trend in bull ratios between general season hunt areas and limited quota hunt areas in the Snowy Range herd unit demonstrated the difference in ratios between the 2 hunting season strategies (Figure 2). Limited quota area bull ratios were generally higher in trend than in general hunt areas, the trend in general hunt area ratios has become stable to increasing in recent years.

Figure 1. 2004-2013 Bull and calf ratios from the Snowy Range Elk Herd Unit, Wyoming.

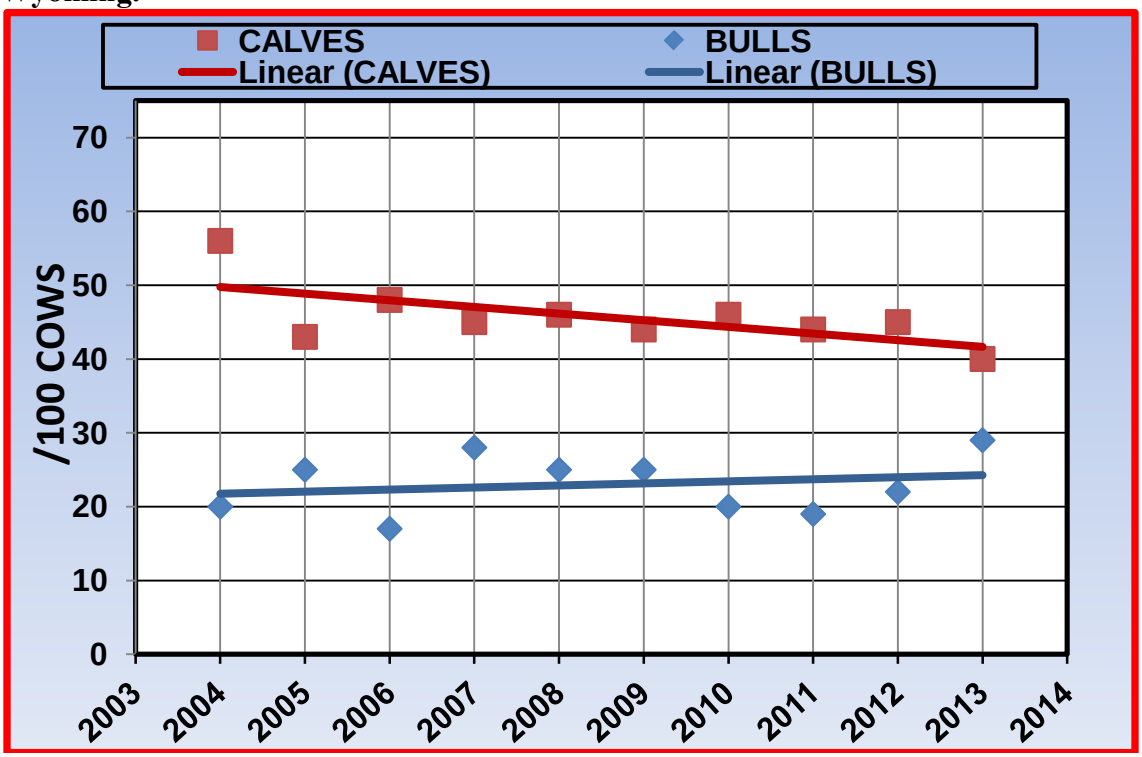
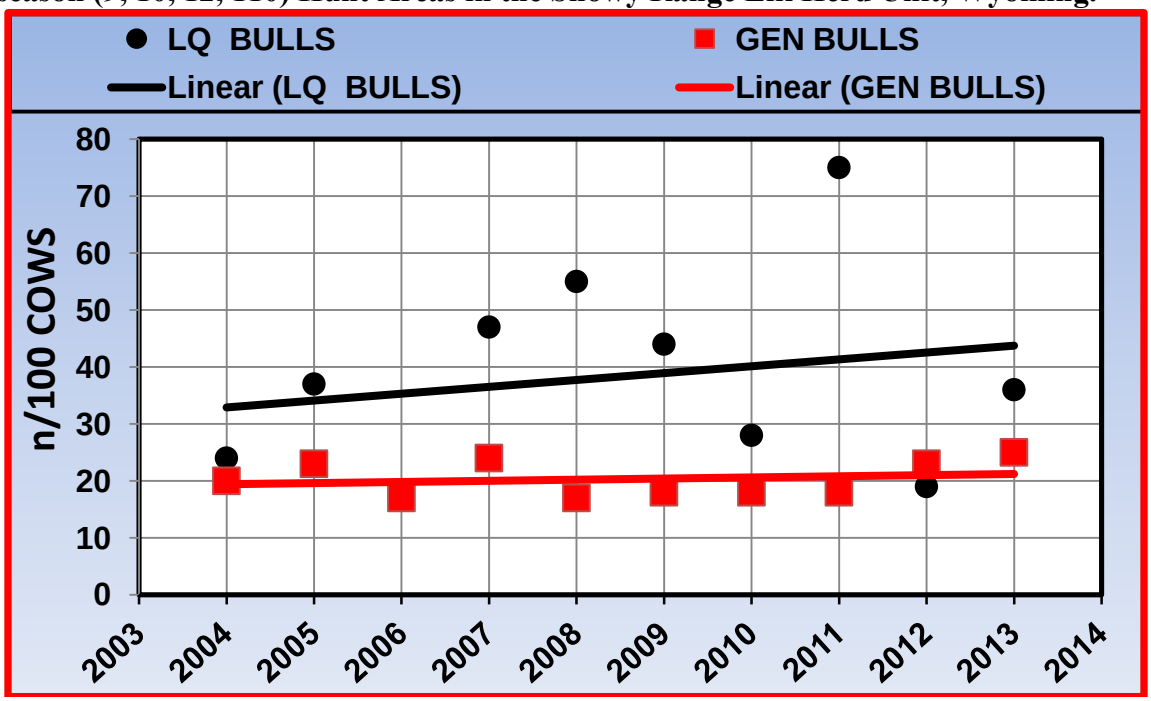


Figure 2. 2004-2013 Bull ratios from limited quota (8, 11, 114, 125) and general season (9, 10, 12, 110) Hunt Areas in the Snowy Range Elk Herd Unit, Wyoming.



Harvest Data

The 2013 preliminary harvest survey data indicated 6,200 (.05% decrease from 2012) active licensed hunters harvested 2,300 (15% increase from 2012), with a total harvest success rate of 38% (6% increase from 2012). Branch antlered bulls accounted for 91% of the male harvest in 2013 and 40% of the overall harvest. The spikes excluded seasons in areas 12 and 110 did result in lower spike harvest in those hunts compared to previous years. The proportion of yearlings in the male harvest for the entire herd unit also declined from 17% in 2012 to 9% in 2013. However, yearling male ratios in hunt areas 12 and 110 did not improve in 2013. Antlerless elk accounted for 56% of the total 2013 elk harvest, which was similar in the Snowy Range Herd Unit.

Population

We continued to use the SCJ,SCA spreadsheet model to simulate Snowy Range herd unit population dynamics because it produced the lowest AICc score of the plausible models. Scores and postseason estimates were very similar between the CJ,CA model and SCJ, SCA models. Without other information (e.g. an independent population estimate or survival data) to incorporate into the model, accuracy of estimates will continue to be unknown. We considered the 2013 postseason estimate produced by the SCJ,SCA spreadsheet model to be plausible.

We rated this model as fair, and biologically defensible in our evaluation. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model (Morrison 2012).

Management Summary

The hunting seasons in the Snowy Range Herd Unit continue to provide opportunities to reduce the overall elk population. Elk numbers appear to be declining towards the management objective and we may need to consider reducing antlerless harvest rates in the distant future. Continued spikes excluded limitations in general Hunt Areas 12 and 110 remained in an attempt to stabilize or improve future branch antlered bull ratios, which have been in decline. Future harvest opportunity for antlered elk may need to be further reduced in all general hunt areas to insure ratios do not continue to decline beyond the recreational management strategy threshold.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet Model for Ungulate Population data Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 41 pp.

Bibliography of Herd Specific Studies

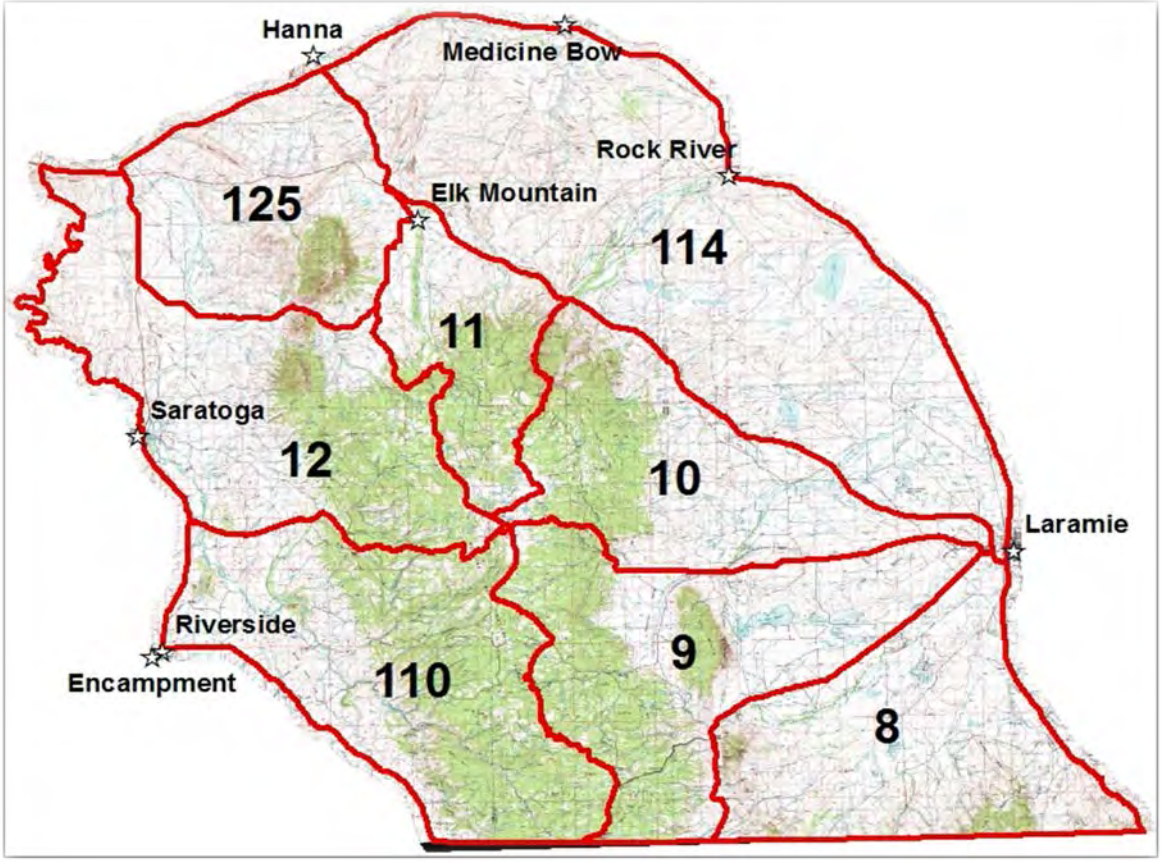
Reeve, A.F., F.G. Lindzey, and S.H. Anderson. 2003. Elk population in Wyoming: 1978-2001. Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie, Wyoming. USA. 138pp.

2013 SNOWY RANGE ELK HERD UNIT AND POPULATION OBJECTIVE REVIEW

Prepared by: Will Schultz, Saratoga Wildlife Biologist

The Snowy Range Elk Herd Unit includes elk Hunt Areas 8, 9, 10, 11, 12, 110, 114, and 125 in south central Wyoming (Figure 1). The herd unit contains 1,922 mi^2 of delineated elk range which includes the Snowy Range of the Medicine Bow Mountains and the peripheral sagebrush grasslands located in the North Platte, Medicine Bow and Laramie River watersheds. Land ownership of the delineated elk range consists of 42% US Forest Service (USFS), 27% private, 18% Wyoming Game and Fish Department (WGFD), 8% Bureau of Land Management, and 5% other ownership.

Figure 1. A map of the Snowy Range Elk Herd Unit and Hunt Areas located in south central Wyoming.



POPULATION OBJECTIVE REVIEW

Historically, WGFD has managed elk using post-season population objectives as a guide for harvest management. The post-season population objective is the desired number of elk remaining in the herd unit after the annual hunting season has been completed. However, an

actual count of all elk in a herd unit would be, for all practical purposes, impossible to complete. Therefore, WGFD develops herd unit population estimates based on data collected annually through hunter-harvest surveys and post-season elk sex and age composition surveys. The population estimate is used to determine where the herd unit's elk population is at in relation to the established population objective. Generally, if the population estimate is above the population objective, WGFD will propose changes to the herd unit's next hunting seasons which will increase harvest and reduce the number of elk toward the population objective. Conversely, if the population estimate is below the population objective, WGFD will propose changes to the herd unit's next hunting seasons which will decrease harvest and increase the number of elk toward the population objective.

Post-season elk population objectives for the Snowy Range Herd Unit have been adopted and subsequently changed following periodic reviews of both biological and social considerations. These considerations have included, but were not limited to, a realized increase in the number of elk being observed the herd unit; assumed carrying capacity of the habitat; sportsmen desires; and landowner desires/tolerance.

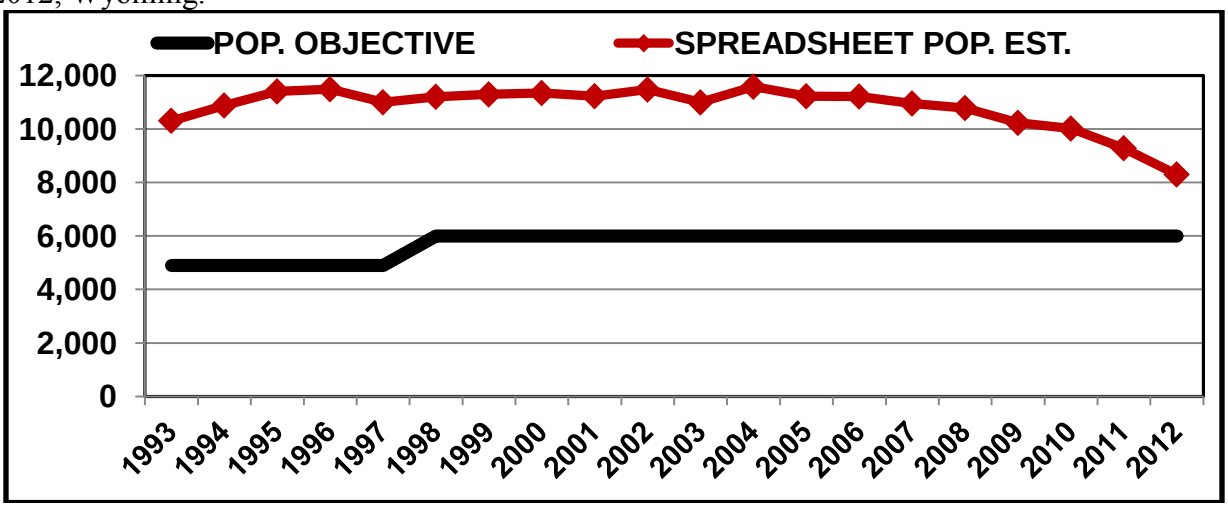
A post-season population objective of 3,000 elk was first established for the Snowy Range Herd Unit in the late 1970s. In 1982, the population objective was increased to 4,000 elk and subsequently increased again in 1993 to 5,000 elk. These increases to the population objective were primarily adopted to better align the population objective with the actual number of elk being observed in the herd unit during those periods. In 1997, the Snowy Range Herd Unit population objective was again increased to 6,000 elk. Since 1997, no formal review of the Snowy Range Herd Unit population objective has occurred and the population objective has remained at 6,000 elk.

Annual population estimates for the Snowy Range Herd Unit are currently produced using a computer-based, spreadsheet population model. As described previously, estimates are derived from data collected annually through hunter-harvest surveys and post-season elk sex and age composition surveys. Survey sample sizes have been considered to be adequate for this herd unit and typically exceed the minimums required to produce estimates with acceptable 80% confidence intervals. Since 2004, the annual population estimates have declined in trend (Figure 2). This trend is plausible given the significant increase in antlerless harvest which has occurred during this same period. The 2012 post-season population estimate was 8,300 elk. Reducing the herd unit's elk population estimate to the current population objective of 6,000 elk is considered achievable.

CURRENT MANAGEMENT STRATIGIES BY HUNT AREA

A recreational management strategy has been historically prescribed for the Snowy Range Elk Herd Unit. The recreational strategy directs WGFD to manage harvest rates which will result in annual post-season bull:cow ratios being maintained within the parameters of 15 to 29 bulls per 100 cows, at the herd unit level. The Snowy Range Herd Unit consists of 8 hunt areas and several different hunting season strategies are employed across the herd unit.

Figure 2. Snowy Range Elk Herd Unit population objectives and population estimates, 1993 – 2012, Wyoming.



Hunt Areas 8, 114, and 125 employ limited quota hunting seasons. These hunt areas have relatively higher post-season bull:cow ratios, and although WGFD provides very liberal opportunities for both bull and antlerless elk harvest, there is relatively little harvest realized. Land ownership in these hunt areas is predominately private and the lack of public access is the ultimate factor in producing high post-season bull:cow ratios and low antlerless harvest rates. Many of the landowners in these hunt areas are either directly engaged in outfitting elk hunts or lease their property to outfitters. Consequently, these landowners exhibit a high tolerance for large herds of elk on their property. Landowners who do allow public hunting access in these hunt areas generally are experiencing significant damage to growing or stored hay crops and view the elk as competing directly with them for their agricultural income.

Hunt Area 11 is also a limited quota hunting season area. However, unlike other limited quota hunt areas in the Snowy Range Herd Unit, Hunt Area 11 contains a substantial amount of accessible public land, including the Wyoming Game and Fish Commission's Wick Wildlife Habitat Management Area and USFS lands. The management strategy is to provide a limited opportunity for the public to experience a quality elk hunt on public land in the Snowy Range. Relatively high numbers of mature bulls and low hunters numbers make this a sought after elk hunting destination.

Hunt Areas 9, 10, 12, and 110 employ a general license hunting season strategy. Currently, limited quota, reduced-price cow or calf licenses are also available in each of these hunt areas as an additional effort to increase antlerless harvest. The majority of the Snowy Range Herd Unit's annual elk harvest occurs in these 4 hunt areas. These hunt areas have relatively lower post-season bull:cow ratios than the limited quota hunt areas in the Snowy Range Herd Unit. Most of the occupied elk range in these hunt areas is public land and hunter access is very good. Additionally, many of the landowners do allow elk hunting, typically antlerless elk, in an effort to reduce the impacts from elk on their agricultural-based livelihoods.

RECOMMENDED HERD UNIT OBJECTIVE AND MANAGEMENT STRATIGIES BY HUNT AREA

WGFD recommends continued use of the current post-season population objective of 6,000 elk for the Snowy Range Herd Unit. Continuation of a recreational management strategy is also recommended for this herd unit. The goal for WGFD under the recommended population objective and management strategy will be to continue to reduce elk numbers toward the population objective, and optimize recreational hunting opportunities where possible, in all hunt areas throughout the Snowy Range Herd Unit.

LANDOWNER, AGENCY, AND PUBLIC INVOLVEMENT

As part of the population objective review WGFD completed an extensive outreach process. Questionnaires and public meeting invitations were mailed to landowners, elk hunters were surveyed in the field, and news releases advertising public meetings were sent to media sources statewide. This was done in an attempt to insure all stakeholders were given an opportunity to be informed about the population objective review. Written comments received from stakeholders through the survey mailings and public meetings were complied for WGFD review. Stakeholder comments were analyzed as a component of the internal WGFD review of the Snowy Range Herd Unit population objective. The decision to recommend the continued use of a post-season population objective of 6,000 elk was strongly supported by stakeholder comments.

Once WGFD developed this recommendation, news releases advertising public meetings to discuss the population objective recommendations were sent to media sources statewide. Additionally, landowners were mailed public meeting invitations containing a brief description of the population objective. The following information is provided in an effort to describe for the reader the outreach process for the Snowy Range Elk Herd Unit population objective review.

Landowner Involvement

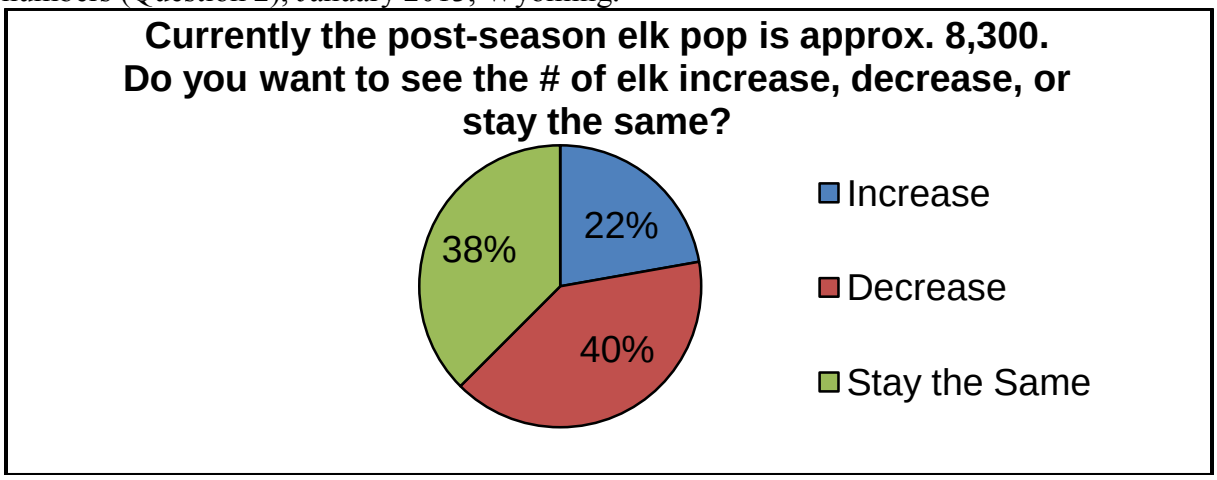
In January of 2013, a landowner questionnaire was developed by WGFD to collect information about attitudes of landowners towards current elk numbers and elk management (APPENDIX A). A mailing list for all landowners in the Snowy Range Herd Unit, who owned more than 160 acres, was developed using billing addresses received from the Albany County and Carbon County Assessor's offices. Questionnaires were mailed to these landowners, along with an invitation to attend one of the upcoming public meetings, and a postage paid return envelope was also included for completed questionnaires. A return rate of 31% was obtained for the landowner questionnaires and completion results are described in Table 1.

Table 1. Snowy Range Elk Herd Unit landowner survey completion results, January 2013, Wyoming.

Questionnaires mailed to landowners of $\geq$ 160 acres	= 283
Envelopes returned marked "Return to Sender"	= 16
Completed questionnaires received	= 84 (31% return rate)

A summary of the landowner questionnaire responses are attached (APPENDIX B). A very important statistic derived from the survey was a measure of landowner tolerance regarding the current number of elk in the Snowy Range Herd Unit. A majority (78%) of landowner responses indicated they would like to see the current number of elk either stay the same or decreased (Figure 3). Additionally, the landowner questionnaire also included 2 questions to gauge landowner attitudes about moose numbers. These questions were included to gather preliminary information for a future review of the Snowy Range Moose Herd Unit population objective.

Figure 3. Snowy Range Elk Herd Unit landowner questionnaire responses regarding current elk numbers (Question 2), January 2013, Wyoming.



Agency Involvement

In January of 2013, WGFD provided public meeting notices to the USFS Laramie and Brush Creek/Hayden Ranger District Offices located in Laramie and Saratoga, respectfully. USFS range and wildlife personnel attended the public meeting held in Saratoga. The Saratoga, Encampment, Rawlins Conservation District (SERCD) and Natural Resource Conservation Service offices in Saratoga were also provided with public meeting notices. Several SERCD employees and board members attended the Saratoga public meeting.

Public Involvement

Meetings to review the Snowy Range Elk Herd Unit population objective were held in Saratoga, Laramie, Cheyenne, and Medicine Bow. News releases advertising public meetings were sent by WGFD to media services statewide (APPENDIX C). Saratoga radio station, KKGA 99.3 FM, interviewed the WGFD Saratoga Game Warden as a means of promoting the Saratoga meeting. At the meetings other local herd unit population objectives, currently being presented for public review, were also discussed at these meetings (e.g. Cooper Lake Pronghorn and Sierra Madre Elk Herd Units). Table 2 describes meeting attendance rates and the sign-in sheets are compiled in APPENDIX D.

Many of the attendees at the population objective review meeting were landowners who had already completed and returned the landowner questionnaire they had received earlier in January. Surveys designed to gauge the attitudes of sportsmen and other stakeholders were distributed to non-landowners who attended these public meetings (APPENDIX E). In response to a question

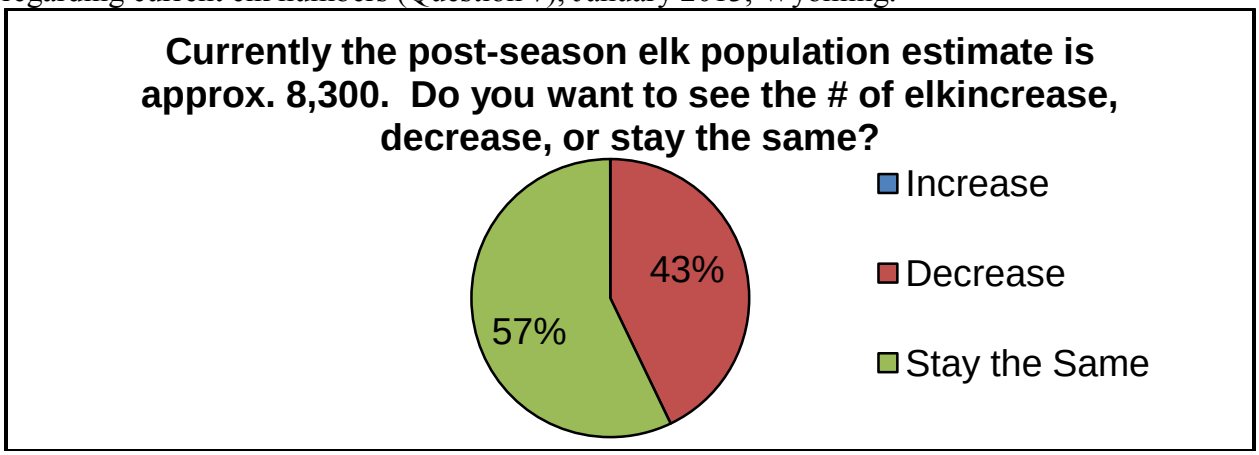
similar to one included in the landowner survey, all (n=26) of the non-landowners who attended these meetings indicated they would like to see the current number of elk either stay the same or

Table 2. Snowy Range Elk Herd Unit population objective review public meeting attendance results, January and February 2013, Wyoming.

Location	Date	Attendance
Saratoga Meeting	January 28	11
Laramie Meeting	January 29	12
Cheyenne Meeting	January 29	8
Medicine Bow Meeting	February 6	4

decreased (Figure 4). Many of the concerns expressed by non-landowners at these public meetings were in regard to perceived impacts by current elk numbers on declining local mule deer populations.

Figure 4. Snowy Range Elk Herd Unit public meeting non-landowner survey responses regarding current elk numbers (Question 7), January 2013, Wyoming.



Notification of the Proposed Population Objective

In May of 2013, WGFD once again completed an extensive outreach process to inform stake holders of the proposal to continue managing the Snowy Range Herd Unit toward a population objective of 6,000 elk. Landowners previously identified during the questionnaire process were mailed a postcard invitation to attend upcoming population objective proposal meetings. The postcard also contained a brief description of the proposed population objective.

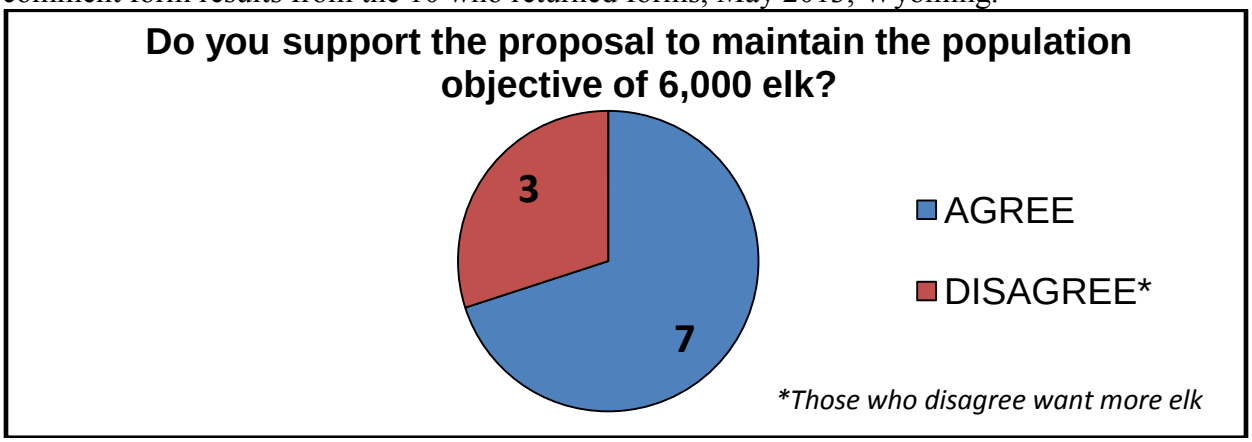
News releases advertising this round of public meetings were sent by WGFD to media services statewide (APPENDIX F). Meetings to present the Snowy Range Elk Herd Unit population objective proposal were held again in Cheyenne, Laramie, Saratoga, and Medicine Bow. Other local herd unit population objective proposals were also presented to the public at these meetings (e.g. Cooper Lake Pronghorn and Sierra Madre Elk Herd Units). Table 3 describes meeting attendance rates for the presentation of the proposed population objective. Sign-in sheets for these meetings are compiled in APPENDIX G. After the herd unit presentations, attendees were

given an opportunity to fill out a comment form explaining whether they agreed or disagreed with the proposal as presented and to provide any additional comments (APPENDIX H). Figure 5 describes the results from the 10 proposal meeting comment forms which meeting attendees submitted. After a review of the comments received during the proposal meeting process, WGFD decided to continue forward with the proposed population objective. This concluded the population objective review and proposal development process for the Snowy Range Elk Herd Unit.

Table 3. Snowy Range Elk Herd Unit population objective proposal presentation meeting attendance results, May 2013, Wyoming.

Location	**Date**	**Attendance**
Cheyenne Meeting	May 8	4
Laramie Meeting	May 15	4
Saratoga Meeting	May 20	10
Medicine Bow Meeting	May 21	0

Figure 5. Snowy Range Elk Herd Unit population objective proposal presentation meeting comment form results from the 10 who returned forms, May 2013, Wyoming.



SNOWY RANGE ELK & MOOSE MANAGEMENT LANDOWNER QUESTIONNAIRE

1. Please circle the elk hunt area number where the majority of your property is located:

HUNT AREA: 8 9 10 11 12 110 114 125

2. Currently the post-hunt elk population estimate for the Snowy Range Herd Unit is approximately 8,200 (2.5 elk/mi^2). Do you want to see the number of elk:

INCREASE_____ DECREASE_____ STAY THE SAME_____

3. If you want to see the number of elk **INCREASE** or **DECREASE**, what percentage change to the current population size would you prefer? *(Skip if you answered "STAY THE SAME" above)*

20%_____ 30%_____ 40%_____ 50%_____ OTHER (specify) _____

4. Indicate your satisfaction level with the current Snowy Range Herd Unit elk population *(circle the number that corresponds to your satisfaction level)*:

1	**2**	**3**	**4**	**5**
Very dissatisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Very satisfied

5. If there were a negative impact to mule deer because of the current number of elk in the Snowy Range Herd Unit, would you want to see the number of elk?

INCREASE_____ DECREASE_____ STAY THE SAME_____

6. Do you allow antlerless elk harvest on your property?

YES_____ NO_____

- If you answered **YES**, how many antlerless elk were harvested on your property during the 2012 hunting season? *(circle your response)* **0 1-10 11-25 26+**

7. Do you want to see the number of moose in the Snowy Range Herd Unit:

INCREASE_____ DECREASE_____ STAY THE SAME_____

8. Indicate your satisfaction level with the current Snowy Range Herd Unit moose population *(circle the number that corresponds to your satisfaction level):*

1	**2**	**3**	**4**	**5**
Very dissatisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Very satisfied

9. Additional comments:

_____

_____

_____

_____

SNOWY RANGE ELK

Hunt Area where property is located

Hunt Area	8	9	10	11	12	110	114	125
Tallies	9	12	15	3	7	6	10	7

Currently the post-hunt elk pop is approx. 8,200- do you want to see the # of elk:

	Increase		Decrease		Stay the Same
Tallies	16		29		27

If you want to see the number of elk Increase or Decrease what % change do you want to see

Decrease		20%	30%	40%	50%	Other (specify)
	Tallies	10	7	1	10	75%- 1
Increase		**20%**	**30%**	**40%**	**50%**	**Other (specify)**
	Tallies	7	3	2	2	10%-1

Indicate your satisfaction with the current elk population

	1	2	3	4	5
Tallies	14	15	15	21	6

If there were negative impacts to MD because of the # of elk would you want to see the # of elk:

	Increase		Decrease		Stay the Same
Tallies	8		47		16

Do you want to see the number of moose in the Snowy Range Unit:

	Increase		Decrease		Stay the Same
Tallies	36		8		27

Indicate your satisfaction level with the current Snowy Range moose population

	1	2	3	4	5
Tallies	3	16	21	17	13

Do you allow antlerless elk harvest on your property?

	Yes	No		If Yes, how many elk were harvested in 2012 season				
Tallies	52	18		0	1 to 10	11 to 25	26+	
			Tallies	14	27	7	1	

ADDITIONAL COMMENTS
The problem is that all the elk in the Centennial Valley during hunting season are on the 91 Ranch. They need to be hunted and dispersed. The elk won't go back up on the mountain so increasing the herd only puts more in that area or on the 91 Ranch.
If hunters can't get to areas to hunt what good are your seasons and areas???
I think there is much to be learned about "carrying capacity" in regards to these decisions. In the past we have had more trouble with elk coming onto the cattle feed grounds than we do now. I think the antlerless harvest has helped, but I realize there are many other factors as well.
Too long of a season- kill more cows harvest the junk bulls with cows somehow. Very little deeded land in 114 so lets get together with Tyler Sims/G&F/ Landowners and work it out.
G&F should re-imburse ranchers for the damage to their hay crop (while the hay is growing and after harvest). We know that amount would need to be quantified but hopefully without too many hoops to jump.
NO ELK ON PROPERY
Would like to have map of areas included in survey. Hunted 4 times and did not see 1 elk!!!
Wyoming Central hand Improvement Co. Sold this land to the State Board of Lands and Investments on March 29, 2012 - from Amy King
Elk herd has too few bulls and too many cows. Mule deer will come back strong when the number of mountain lions is reduced.
Horn restrictions on mule deer and elk and more law enforcement on road hunters as well as four-wheelers on closed roads!
To many outfitters controlling the population and access to some hunting areas in our region.
I honestly do not understand the reason for these repetitive questionnaires.
I love to see and hunt elk but the numbers are out of control. It is very difficult to control numbers when land owners do not allow hunting. In a drought as we are in now it is very difficult to provide forage and maintain good rangeland health when there are too many elk and antelope competeing for forage. Elk do a lot of damage that is difficult to document.
I can't add much input on the Snowy Range herd as I am spending all my hunting time in 125.
I know nothing about this area!!
We have too many elk in the Centennial valley. During hunting season the elk hang out on the 91 Ranch to avoid being shot at. A lot of hunters leave empty- that would really appreciate taking home a cow elk.
Mule deer are being pushed out by whitetail, but even whitetail numbers are down. We only have a small number of elk on our property so we rarely allow hunting. I prefer deer and moose over elk because they do not compete for the same type of feed my cows like. I also cut and ___? hay, feeding it on the ground all winter rather than bailing. This low cost type of operation does not work very well with alot of elk around. I think the flood two years ago may have taken a toll on the deer population (fawns) on our ranch.
My address is 12706 HWY 230. I'm not sure what hunting area that is. I am a summer time resident and my property is leased by Big Creek Ranch and is posted because of damage to gates by hunters. I would like to see the mule deer population come back. - Sue Breeden
Make the elk hunters take or harvest three cow or calf elk before they can harvest a bull elk. Give the cow tags a lesser cost than the trophy bull tags.
We have no elk or moose to hunt on our property- Biddick Ranch.
#6. The outfitter encourages people to hunt trophy elkl and charges so much most people won't hunt antlerless or small bulls. We now have a herd in 114 that has lots of small junk bulls with twisted and uneven antlers. The bulls number 40-45 in one group of 75-80. They number 75-80 in a group of 15-175. If they are running 50%. This is WAY out of line and needs corrected.

Concerned about mule deer population. Would be in favor of decreasing elk population if that would help deer herds.
If reducing elk herd would help mule deer population, would be for reducing elk.
There aren't very many moose.
Decrease antlerless elk only! The bull/cow ratio in the Snowy Range elk herd is way below 25% or even 15% in some herds. The solution is to make the area limited quota. The next best solution is to kill more cow/calves. Don't blame the mule deer decline on too many elk; is one factor in a complicated issue, mild drought, predators and habitat loss and energy development and subdivision housing being important causes too. Obviously we should manage for more moose, that is a no brainer.
I'm clueless, I don't hunt. And, there are too few deer in the area so I don't allow hunting.
No mule deer shot on my land since 1997. Mule deer populations are bad. To many cats and bear and coyotes. (More bear licenses and maybe only bucks during hunting season) or maybe a quota system on mule deer. Bear licenses and Moose licenses shoulbe be available to landowners first as area 8 is almost entirely private. (Landowners either resident or nonresident should have this respect)
I had several people with type 6 in area 9 we didn't fill because the elk stayed high- but that means they arent in the hay meadows so it is working. Too many elk still but with Hamakers buying property east of Bald Mountain I would expect to see those elk moved around more and available for harvest (Area 10) and in Area 9 I think the hunt is helping also.
TOO DAMN MANY!! When you government bosses introduce a species in an area you should be responsible for all the damage they do when you FAIL to manage them. There are so many damn moose on the Big Laramie River now that they are killing our trees and willows. In the Spring they eat our grass that we hay in the fall. you should drastically reduce their numbers and be responsible for keeping them off our property or pay for all the damage they do. (Norma Thompson)
I am in favor of a very limited quota for mule deer bucks of four points or better on each side. I feel our mule deer population is dangerously low.
I think the elk herd on our property are way too many. The number of elk that show up in the winter is staggering. The elk herd shows up in big numbers. Setting themselves up for a disease outbreak. Not to mention the property damage they do and the amount of forage they eat. They are taking a big toll on our ranching business. Particularly in our drought conditions.
With the antler/antlerless season running Oct 1-Oct 31, general license hunters hold out for antlered elk until too late and don't get any elk. Starting hunting Aug 15 (rifle) is a risk if there are bow hunters in area (with no orange) and rifle hunters in the area.
Need more moose!

PUBLIC MEETINGS UPCOMING ON FUTURE MANAGEMENT OF BIG GAME IN SOUTHEAST WYOMING

LARAMIE – Over the next few weeks, the Wyoming Game and Fish Department will hold a series of public meetings to receive input on the future management of big game species in southeast Wyoming.

Game and Fish is reviewing herd unit objectives for several big game herds, Including the following hunt units: Snowy Range Elk (Hunt Areas 8, 9, 10, 11, 12, 110, 114, and 125); Snowy Range Moose (Hunt Areas 38 and 41); Sierra Madre Elk (Hunt Areas 13, 15, 21, 108, and 130); Centennial Pronghorn (Hunt Areas 45, 44, and 37); and Cooper Lake Pronghorn (Hunt Area 43).

The meetings will be held at the following locations:

• **Saratoga - Saratoga Town Hall, 6 p.m., Jan. 28**
Snowy Range Elk
Snowy Range Moose
Sierra Madre Elk
• **Laramie - Laramie Fire Hall #3, 6 p.m., Jan. 29**
Snowy Range Elk
Snowy Range Moose
Sierra Madre Elk
Centennial Pronghorn
Cooper Lake Pronghorn
• **Cheyenne - Wyoming Game and Fish Headquarters, 6 p.m., Jan. 30**
Snowy Range Elk
Snowy Range Moose
Centennial Pronghorn
Cooper Lake Pronghorn
• **Medicine Bow - Medicine Bow Community Center, 6 p.m., Feb. 6**
Snowy Range Elk
Snowy Range Moose
Cooper Lake Pronghorn

Game and Fish will be welcoming any comments from the public on management of big game in southeast Wyoming. Contact Laramie Game and Fish biologist Lee Knox at (307) 745-4046 or Saratoga wildlife biologist Will Schultz at (307) 326-3020 with additional questions.

The Wyoming Game and Fish Department supports the Americans with Disabilities Act. Every effort will be made for reasonable accommodations. Contact the Laramie Game and Fish office at (307) 745-4046.

-WGFD-

20 Jan Saratoga

APPENDIX D

NAME	CITY	EMAIL
Brad Weatherd	Saratoga	bweatherd@fs.fed.us
PAT ROLLISON	SARATOGA	dsturm@spuroutfitters.com
DAVE STURM	SARATOGA	
Cindy Bloomquist	Saratoga	cbloom006@aol.com
Leonard Johnson	Saratoga	landljohnson@union-tel.com
Steve Loose	Saratoga	sloose@fs.fed.us
Gerald Newmeyer	CASPER	JNewmeyer@BRESNAN.net
Phil Hills	Casper	phills@bresnan.net
Addie Fletcher	Saratoga	adelaidemyers@yahoo.com
Jim States	Saratoga	jcstates@union-tel.com
Ron Platt	Encampment	

APPENDIX D

1/29/13 Laramie Objective

Name	Town	Email
Chris Wood	Laramie Wy	ccbwood at yahoo.com
Clay Rouse	Cheyenne Wy	llrcar@bresnan.net
Jim Listen	Laramie Wy	jimlisten@comcast.net
Dave Whitman	Laramie, Wy	dwhitman@wyoming.com
Tyler Sims	McFadden, Wy	tyler@tylersims.com
Kelly Namie	Laramie Wy	wesnamies@bresnan.net
Mark Cummerow	Laramie Wy	Mgcummer66@bresnan.net
Jim Rogers	Laramie Wy	JGR1680@carbonpower.net
Tom Page	Laramie Wy	Page@QuarterHorsesofPants@yahoo
Bill Hepworth	Laramie Wy	[illegible]@yahoo.com
Clynn Phillips	Laramie, Wy	clynn@uwyo.edu
[illegible]	" "	

APPENDIX D

Cheyenne 1/30/2013

Name	City	EMAIL
Bill Cushing	Cheyenne,	billcushing10@gmail.com
Jim Fisher	Cheyenne	jfisher278@yahoo.com
Rob Arey	Cheyenne	RWAREY@Gmail.com
Mike Bailey	Cheyenne	mkbailliee@millect.com
Susan Shaffer	"	sas@bailyranch.com
John Monte	Cheyenne	Monite5000@yahoo.com
Dennis Magnusson	Iron Mountain	imohunting@gmail.com
Jim Decheve		Mobileratt@Gmail.com

SNOWY RANGE ELK HUNTER SURVEY

1. If you are a **RESIDENT**, please indicate the county in which you live. If you are nonresident, please indicate which state you live:

County of residence_____

2. How many years have you been hunting elk in the Snowy Range Elk Herd?

This is my 1st year____ 2 to 3____ 4 to 7____ 8 to 10____ More than 10___

3. What hunt area do you primarily hunt within the Snowy Range Elk Herd (circle the area you hunt the most)?

8 9 10 11 12 110 114 125

4. When hunting in the hunt area indicated above, which hunting methods do you participate in?

Archery_____ Firearm____

5. How many days do you spend hunting in the hunt area indicated above?

1 to 3_____ 4 to 7____ 8 or more____

6. Why do you choose to hunt the Snowy Range Elk Herd (mark all that apply)?

Close to home____ High number of elk____ Public land access____ Road access____
No grizzlies____ Tradition_____ Other (list why) _____

7. Currently the post-hunt population estimate for the Snowy Range Elk Herd is approximately 8,200 elk (2.5 elk/mi^2). Do you want to see the number of elk:

DECREASE_____ INCREASE_____ STAY THE SAME_____

8. Do you hunt mule deer in any of the mule deer hunt areas listed below (mark all that apply)?

74___ 75___ 76____ 77____ 78____ 79____

9. If there were a negative impact to the mule deer herd because of the current Snowy Range Elk herd population size, would you want to see the number of elk:

DECREASE_____ INCREASE_____ STAY THE SAME_____

10. Do you want to see the number of moose in the Snowy Range Herd Unit:

INCREASE_____ DECREASE_____ STAY THE SAME_____

11. Indicate your satisfaction level with the current Snowy Range Herd Unit moose population *(circle the number that corresponds to your satisfaction level):*

1	**2**	**3**	**4**	**5**
Very dissatisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Very satisfied

Additional comments:

_____

_____

_____

_____

_____

PUBLIC MEETINGS TO DISCUS POPULATION OBJECTIVES FOR PRONGHORN/ELK/MOOSE IN SARATOGA, LARAMIE, CHEYENNE AREAS

CHEYENNE – The Wyoming Game and Fish Department will be holding a series of public meetings to discuss the review of herd unit population objectives for pronghorn, elk and moose in the Saratoga, Laramie and Cheyenne areas. Lee Knox, Game and Fish wildlife biologist in Laramie said proposals will include the following herd units:

Cooper Lake Pronghorn (Hunt Area 43)
Centennial Pronghorn (Hunt Areas 45,44,37)
Snowy Range Elk (Hunt Areas 8,9,10,11,12,110,114,125)
Snowy Range Moose (Hunt Areas 38,41)

Meetings will be held at 6 p.m. at the following locations:
Cheyenne, May 8, WGFD Office Building, Elk Room
Laramie, May 15, Fire Hall #2
Saratoga, May 20, Town Hall
Medicine Bow, May 21, Community Center

Contact: Lee Knox (307)-745-4046 or Will Shultz (307)-326-3020

.

WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006

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

wgfd.wyo.gov

GOVERNOR
MATTHEW H. MEAD

DIRECTOR
SCOTT TALBOTT

COMMISSIONERS
MIKE HEALY – President
RICHARD KLOUDA – Vice President
MARK ANSELMI
AARON CLARK
KEITH CULVER
T. CARRIE LITTLE
CHARLES PRICE

Cheyenne Public Meeting- Sign-In Sheet
May 8, 2013

	Name	Address	Phone Number
1.	DAVE CRESPO	1888 CADILLAC RD Chey	638-6540
2.	TOM WAGONER	1131 W JEFFERSON	635 7452
3.	Jess Fish	453 [illegible]	632-3366
4.	Tom Hushbeck	1506 Andover Dr Chey	514-4289
5.	Jon Hinze	4500 Carmel Dr.	421-3418
6.			
7.			
8.			
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WYOMING GAME AND FISH DEPARTMENT

5400 Bishop Blvd. Cheyenne, WY 82006

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

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GOVERNOR
MATTHEW H. MEAD

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COMMISSIONERS
FRED LINDZEY – President
AARON CLARK – Vice President
MIKE HEALY
RICHARD KLOUDA
T. CARRIE LITTLE
ED MIGNERY
CHARLES PRICE

May 15, 2012
Laramie
Objective Review

Please take the time to fill out the survey- THANK YOU *for your participation!*

	Name	Address	Phone	email
1	JD Hamaker	Box 327 Centennial wy	745 3591	
2	Susan Weaver	3000 West Co. Rd. 70	Ft. Collins, CO 80524	
3	MAXINE WEAVER	"	970-568-3898	
4	Tyler Sims	958 State Hwy 13	McFadden, wy 82083	tyler@tylersims.com
5				
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23				
24				

20 May 2013 Saratoga Town Hall
Snowy Range & Sierra Madre Elk

Name	Email or Address	Town
Pat Malone	malone@union-tel.com	Saratoga
Leonard Johnson	landljohnson@union-tel.com	Saratoga
TOM CHECK	W345 53702 MORAINE DOUSMAN, WI. 53118	LARAMIE 130
BOB JOHNSTON	BOX 321	SARATOGA
PAT Rollison	PO # 1281	SARATOGA
Jack Berger	Box 245	Saratoga
Michael Crimmins	mcrimmins@carbonpower.net	Saratoga
Roger Cox	cox@netcommander.com	Saratoga
Rick & Jody Kalinay	RKALINAY@UWYO.edu	Laramie

2013 SNOWY RANGE ELK HERD UNIT MANAGEMENT OBJECTIVE REVIEW

Please provide us with your input – THANK YOU for your participation!

1. Do you support the proposal to maintain the current Management Objective of a postseason population estimate of 6,000 elk?

AGREE **DISARGEE**

Additional comments:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Please return by 27 May 2013 to:

WGFD
PO Box 1432
Saratoga, WY 82331

INPUT	
Species:	ELK
Biologist:	WILL SCHULTZ
Herd Unit & No.:	SNOWY RANGE 533
Model date:	03/04/14

MODEL EVALUATION: **FAIR**

☐ Clear form

MODELS SUMMARY

		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	308	317	☐ CJ,CA Model	*Constrained CJ @ <0.95 & >0.8 and CA @ <0.98 & .0.85*
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	304	314	☑ SCJ,SCA Mod	*Constrained SCJ @ <0.95 & >0.5 and SCA @ <0.98 & .0.8*
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	232	347	☐ TSJ,CA Model	Highest
TSJ,CA,MSC	**Time-Specific Juv, Constant Adult Survival, Male survival coefficient**	123	254	☐ TSJ,CA,MSC Model	Population estimate not biologically plausible

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population				Predicted Posthunt Population				Objective
	Field Est	Field SE		Juveniles	Total Males	Females	Total	Juveniles	Total Males	Females	Total	
1993				2762	2239	6998	11998	2531	1293	6007	9830	6000
1994				3127	2077	6529	11733	3003	1336	6043	10382	6000
1995				3209	2278	6722	12209	3079	1587	6246	10912	6000
1996				3113	2540	6940	12592	2986	1939	6076	11002	6000
1997				3114	2841	6748	12704	2937	1795	5788	10520	6000
1998				3094	2688	6460	12242	2972	1920	5841	10734	6000
1999				3181	2819	6522	12521	2970	1994	5870	10834	6000
2000				3004	2887	6548	12439	2836	2244	5824	10905	6000
2001				3078	3079	6460	12616	2871	2204	5728	10803	6000
2002				3040	3052	6381	12473	2922	2257	5891	11070	6000
2003				2519	3120	6552	12191	2410	2264	5962	10636	6000
2004				3460	2953	6446	12858	3325	1973	5926	11225	6000
2005				2788	2988	6722	12497	2667	2112	6150	10929	6000
2006				3042	2896	6710	12649	2903	1945	6107	10955	6000
2007				2892	2818	6749	12459	2745	1894	6108	10747	6000
2008				2905	2717	6696	12318	2772	1819	6037	10628	6000
2009				2734	2655	6639	12028	2571	1741	5822	10134	6000
2010				2771	2514	6367	11652	2633	1624	5724	9980	6000
2011				2557	2424	6296	11276	2363	1582	5366	9312	6000
2012				2344	2293	5867	10505	2189	1319	4823	8331	6000
2013				1894	1986	5295	9175	1666	884	4136	**6686**	6000
2014				1904	1398	4470	7771	1739	518	3700	5956	6000
2015												6000
2016												6000
2017												6000
2018												6000
2019												6000
2020												6000
2021												6000
2022												6000
2023												6000
2024												6000
2025												6000

Survival and Initial Population Estimates

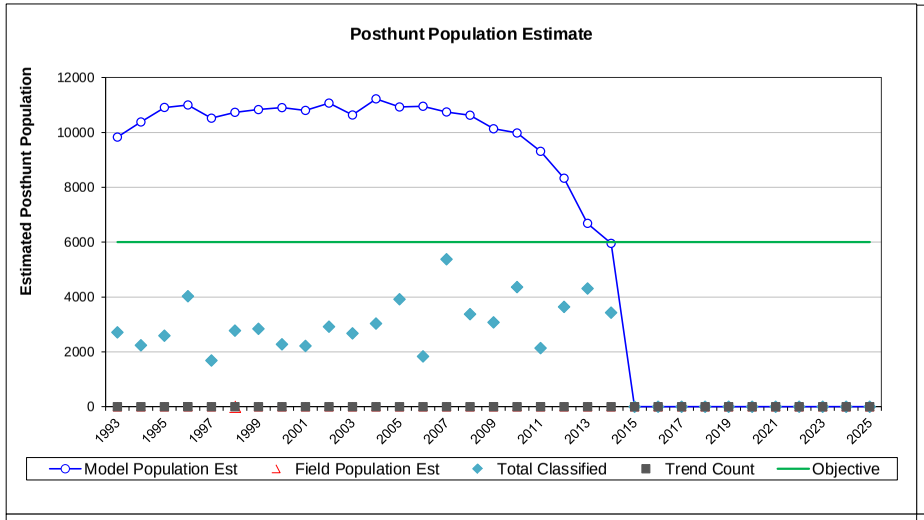
Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.68			0.94		
1994	0.68			0.94		
1995	0.68			0.94		
1996	0.68			0.94		
1997	0.68			0.94		
1998	0.68			0.94		
1999	0.68			0.94		
2000	0.68			0.94		
2001	0.68			0.94		
2002	0.68			0.94		
2003	0.68			0.94		
2004	0.68			0.94		
2005	0.68			0.94		
2006	0.68			0.94		
2007	0.68			0.94		
2008	0.68			0.94		
2009	0.68			0.94		
2010	0.68			0.94		
2011	0.68			0.94		
2012	0.68			0.94		
2013	0.68			0.94		
2014	0.68			0.94		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

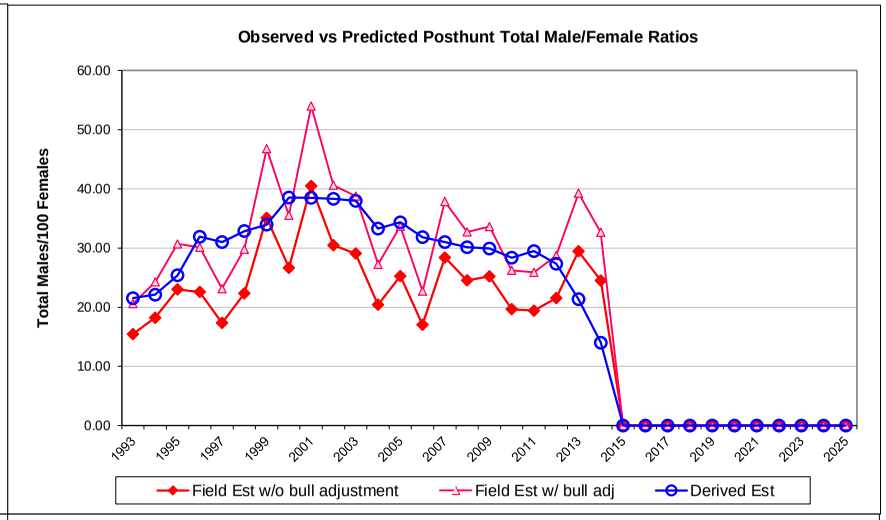
Parameters:	Optim cells
Juvenile Survival =	0.676
Adult Survival =	0.944
Initial Total Male Pop/10,000 =	0.129
Initial Female Pop/10,000 =	0.601

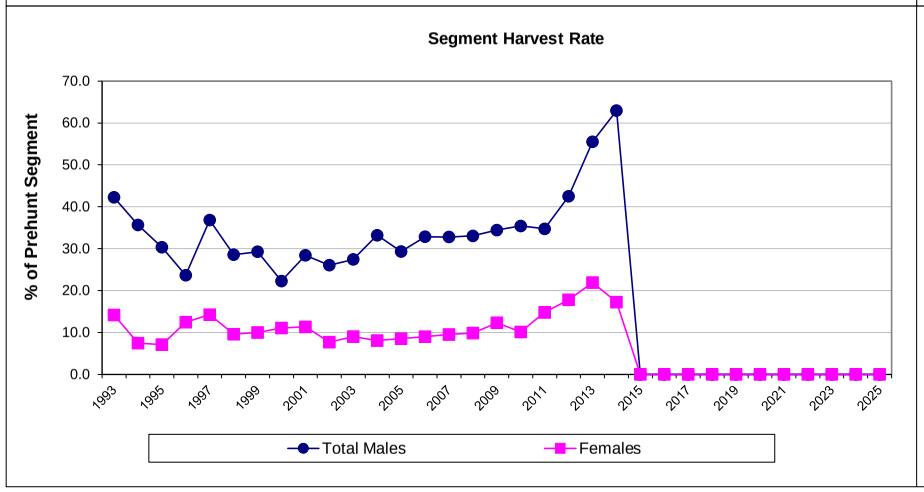
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Total Bulls Adjustment Factor	75%

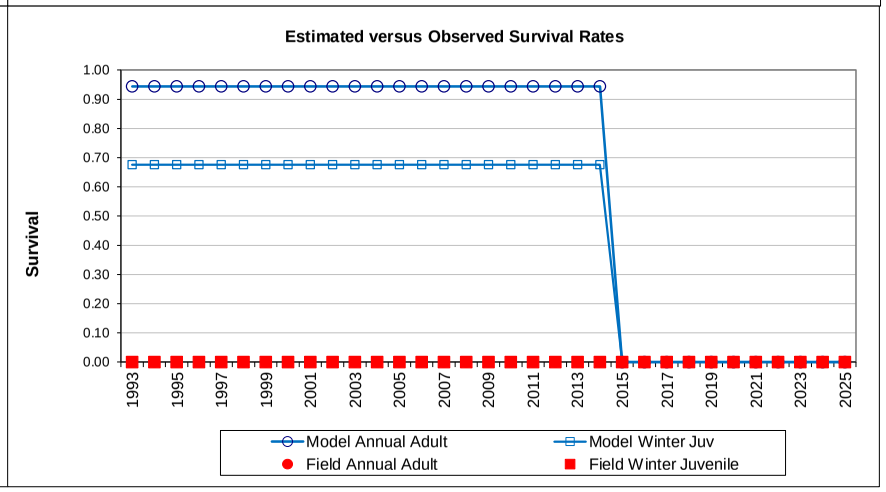
	Classification Counts							Harvest						
Year	Juvenile/Female Ratio			Total Male/Female Ratio									Segment Harvest Rate (% of Prehunt Segment)	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/ bull adj	Field Est w/o bull adj	Field SE	Juv	Yrl males	2+ Males	Females	Total Harvest	Total Males	Females
1993		42.13	1.87	21.52	20.61	15.46	1.02	210	249	611	901	1971	42.3	14.2
1994		49.70	2.36	22.12	24.29	18.22	1.27	113	199	474	442	1228	35.6	7.4
1995		49.30	2.21	25.40	30.69	23.02	1.37	118	206	422	433	1179	30.3	7.1
1996		49.15	1.77	31.91	30.12	22.59	1.09	115	118	428	785	1446	23.6	12.4
1997		50.75	2.76	31.01	23.13	17.35	1.42	161	266	685	873	1985	36.8	14.2
1998		50.87	2.19	32.88	29.80	22.35	1.31	111	158	540	562	1371	28.6	9.6
1999		50.59	2.23	33.96	46.80	35.10	1.76	192	203	547	592	1534	29.3	10.0
2000		48.69	2.36	38.54	35.54	26.66	1.61	153	117	467	658	1395	22.3	11.1
2001		50.13	2.54	38.48	54.00	40.50	2.21	188	165	630	665	1648	28.4	11.3
2002		49.60	2.14	38.31	40.63	30.48	1.57	107	97	626	445	1275	26.1	7.7
2003		40.43	1.90	37.97	38.78	29.09	1.54	99	149	629	536	1413	27.4	9.0
2004		56.11	2.26	33.29	27.24	20.43	1.20	122	113	778	472	1485	33.2	8.1
2005		43.37	1.64	34.34	33.68	25.26	1.17	110	190	606	520	1426	29.3	8.5
2006		47.53	2.51	31.85	22.72	17.04	1.34	127	160	705	548	1540	32.9	9.0
2007		44.94	1.45	31.02	37.87	28.40	1.08	134	157	683	583	1557	32.8	9.5
2008		45.91	1.84	30.14	32.73	24.55	1.24	121	179	637	599	1536	33.0	9.8
2009		44.16	1.87	29.91	33.63	25.22	1.32	148	189	642	743	1722	34.4	12.3
2010		45.99	1.60	28.37	26.23	19.67	0.95	126	171	638	585	1520	35.4	10.1
2011		44.04	2.20	29.49	25.89	19.42	1.33	176	117	648	845	1786	34.7	14.8
2012		45.39	1.74	27.34	28.73	21.55	1.10	141	153	733	949	1976	42.5	17.8
2013		40.29	1.49	21.36	39.28	29.46	1.23	205	102	892	972	2171	55.5	21.9
2014		47.00	1.86	14.00	32.67	24.50	1.23	150	100	700	700	1650	63.0	17.2
2015														
2016														
2017														
2018														
2019														
2020														
2021														
2022														
2023														
2024														
2025														

FIGURES



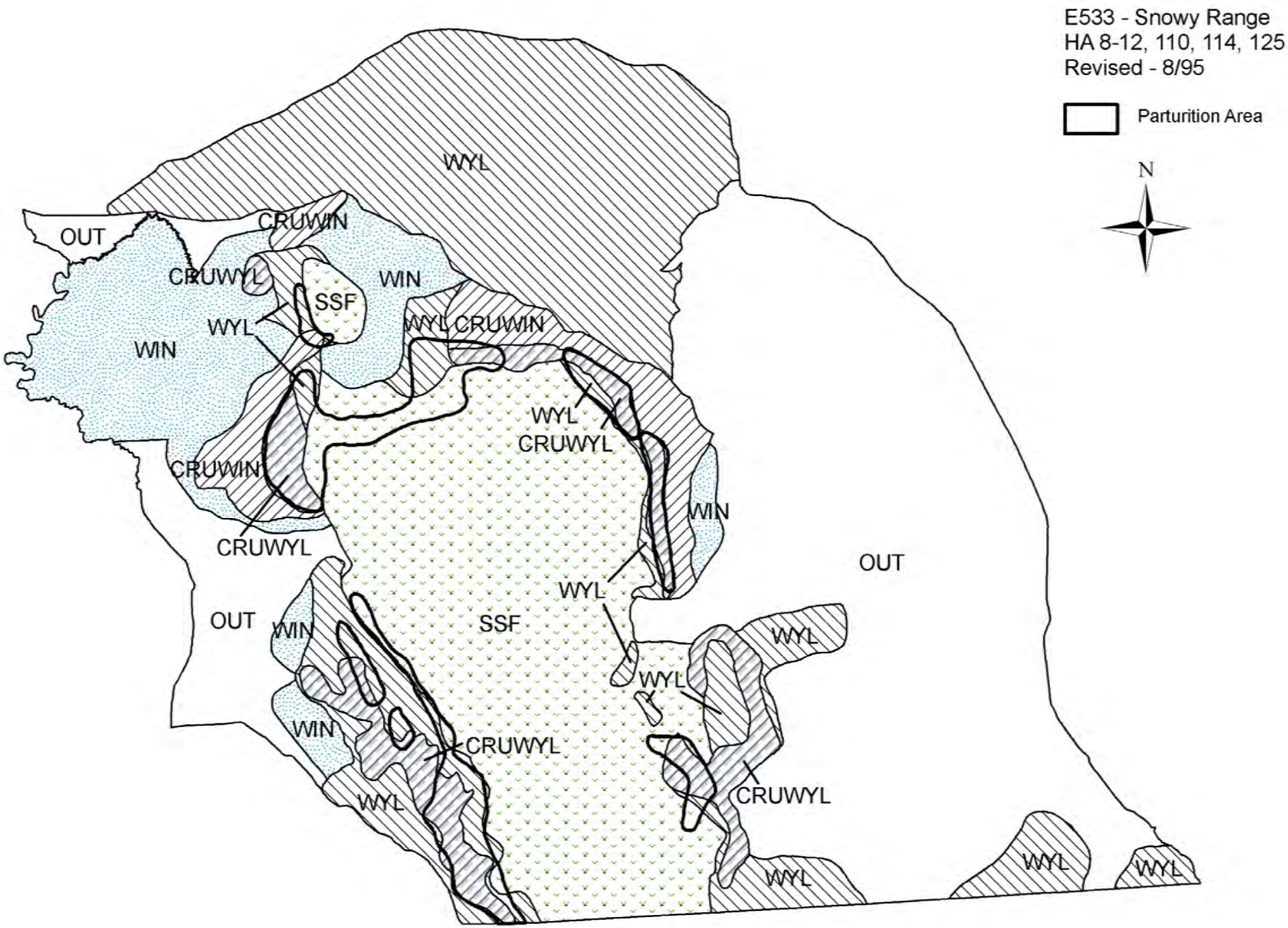






Comments:
The SCJ,SCA model was selected because it produced the lowest Fit and AICc scores. Scores and postseason estimates were similar between this model and the CJ,CA and TSJ,CA models. Without other information (e.g. an independent population estimate or survival data) for comparison it is difficult to determine which of these 3 models produced the most accurate estimate. WS 4 Mar '14

END


E533 - Snowy Range
HA 8-12, 110, 114, 125
Revised - 8/95
Parturition Area
N
WYL
OUT
CRUWIN
CRUWYL
WIN
SSF
WYL
WIN
WYL CRUWIN
WYL
CRUWYL
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WYL

2013 - JCR Evaluation Form

SPECIES: Elk | PERIOD: 6/1/2013 - 5/31/2014

HERD: EL534 - SHIRLEY MOUNTAIN

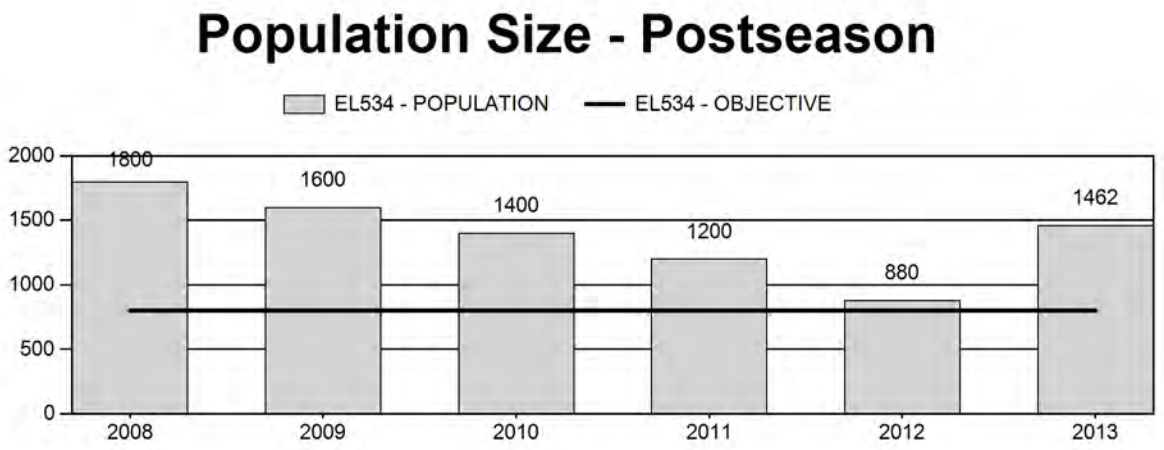
HUNT AREAS: 16 | PREPARED BY: WILL SCHULTZ

	2008 - 2012 Average	2013	2014 Proposed
Population:	1,376	1,462	1,204
Harvest:	311	378	351
Hunters:	580	581	700
Hunter Success:	54%	65%	50%
Active Licenses:	603	607	634
Active License Percent:	52%	62%	55%
Recreation Days:	4,434	3,765	4,200
Days Per Animal:	14.3	10.0	12.0
Males per 100 Females	35	39	
Juveniles per 100 Females	45	45	

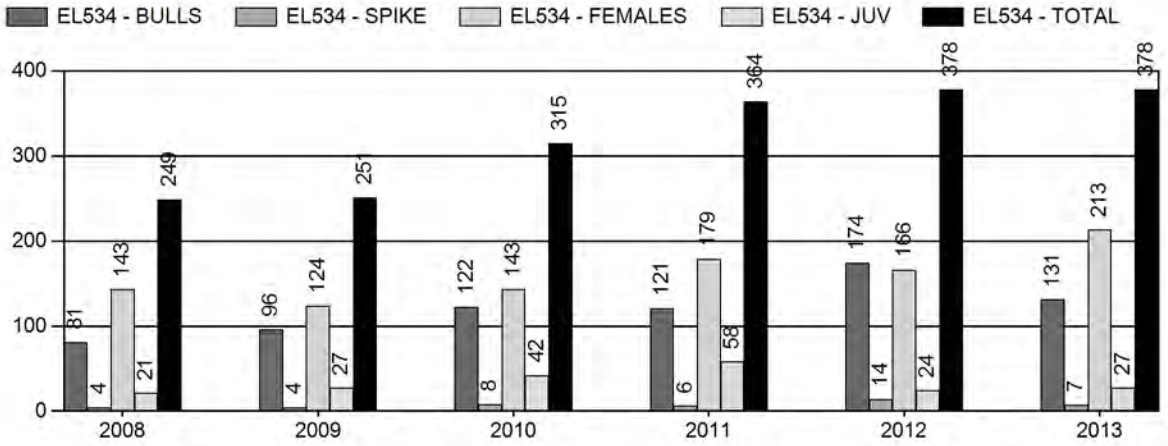
Population Objective:	800
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	83%
Number of years population has been + or - objective in recent trend:	20
Model Date:	3/17/2014

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

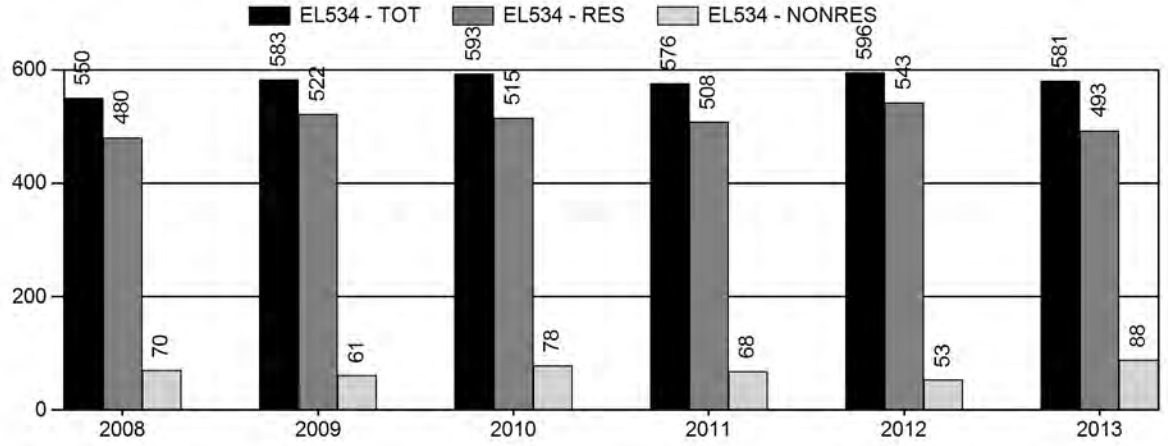
	JCR Year	Proposed
Females ≥ 1 year old:	40.9%	29%
Males ≥ 1 year old:	49.3%	41%
Juveniles (< 1 year old):	11.6%	11%
Total:	33.4%	27%
Proposed change in post-season population:	-36.6%	-29%



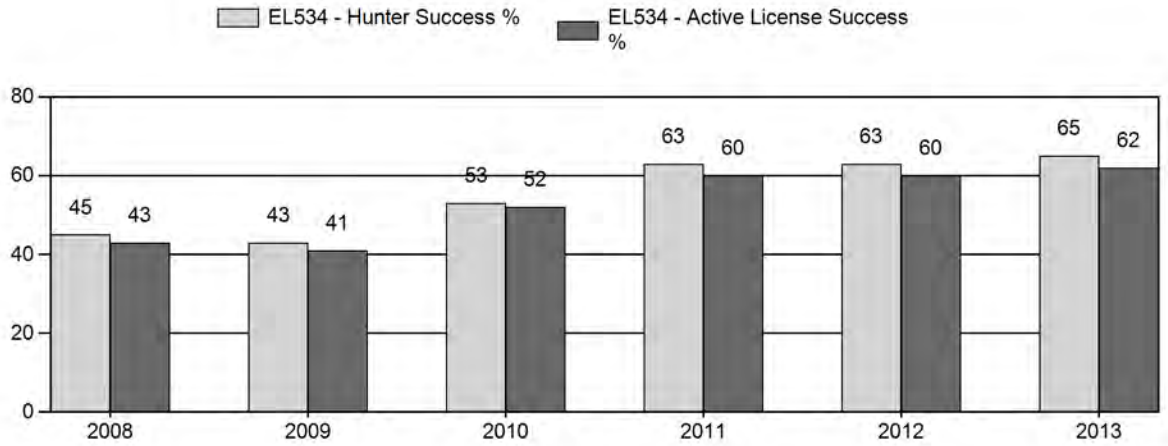
Harvest



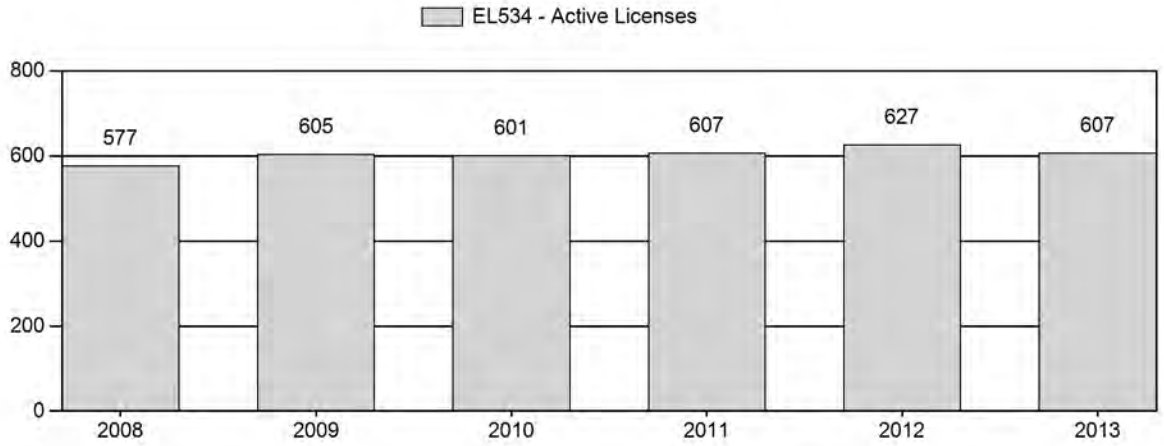
Number of Hunters



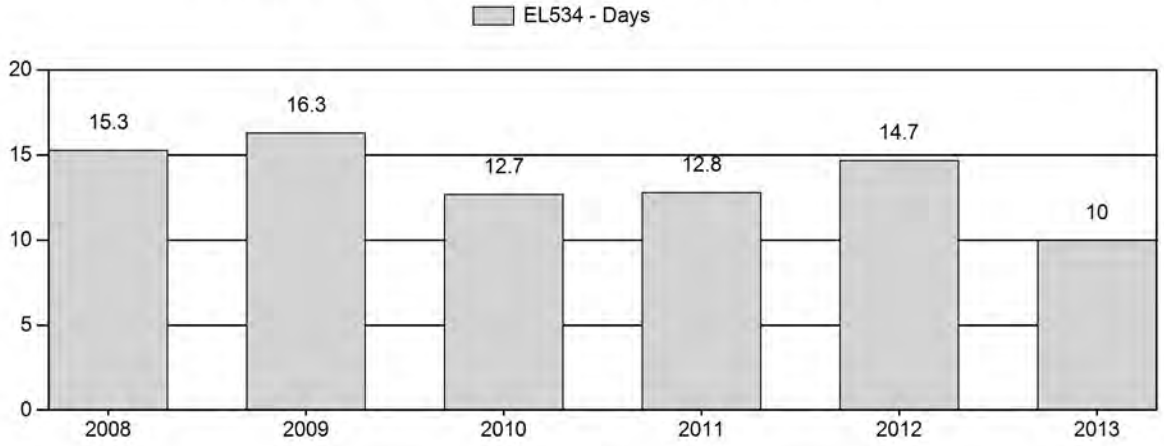
Harvest Success



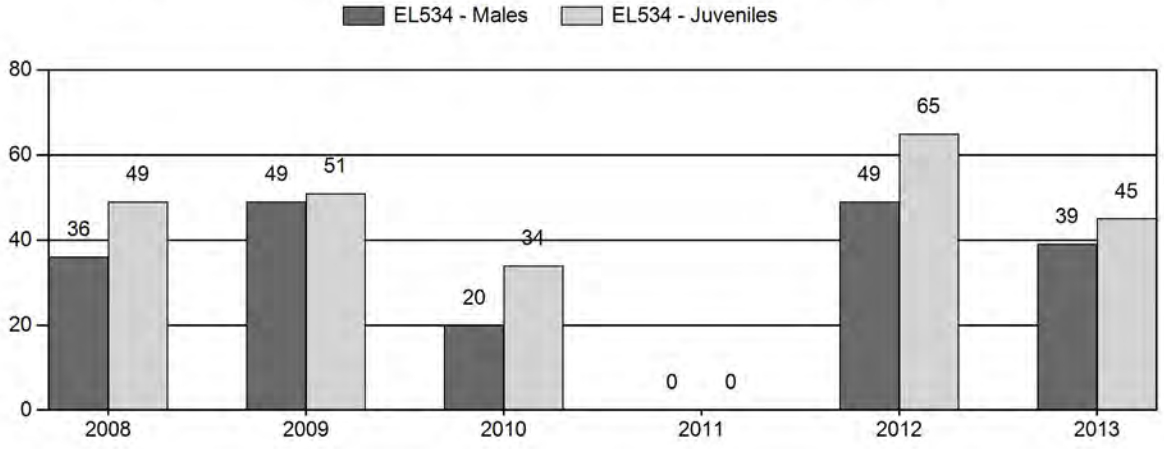
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Elk Herd EL534 - SHIRLEY MOUNTAIN

		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
2008	1,800	71	91	162	20%	444	54%	216	26%	822	440	16	20	36	± 3	49	± 4	36
2009	1,600	37	108	145	25%	295	50%	151	26%	591	463	13	37	49	± 5	51	± 5	34
2010	1,400	49	42	91	13%	449	65%	151	22%	691	469	11	9	20	± 2	34	± 3	28
2011	1,200	0	0	0	0%	0	0%	0	0%	0	500	0	0	0	± 0	0	± 0	0
2012	880	8	32	40	23%	81	47%	53	30%	174	420	10	40	49	± 11	65	± 13	44
2013	1,462	52	90	142	21%	365	54%	165	25%	672	568	14	25	39	± 4	45	± 4	33

Shirley Mountain Elk (EL534)
Hunt Areas 16
2014 Hunting Seasons

Hunt Area	Type	Dates of Seasons Opens	Dates of Seasons Closes	Limited Quota	Limitations
16	1	Oct. 1	Oct. 31	150	Limited quota licenses; any elk
	2	Nov. 1	Nov. 30	50	Limited quota licenses; any elk
		Dec. 1	Dec. 15		Unused Area 16 Type 1 and Type 2 licenses valid on the Beer Mug Hunter Management Area (HMA permission slip required)
		Jan. 15	Jan. 31		Unused Area 16 Type 1 and Type 2 licenses valid on the Beer Mug Hunter Management Area (HMA permission slip required)
	4	Oct. 1	Jan. 31	300	Limited quota licenses; antlerless elk
	6	Aug. 15	Sep. 30	200	Limited quota licenses; cow or calf valid on private land
		Oct. 1	Jan. 31		Unused Area 16 Type 6 licenses valid in the entire area

Hunt Area	Type	Quota change from 2013
16	**1, 2, 4, 6**	**NONE**

Management Evaluation
Current Management Objective: 800
Management Strategy: Recreational
2013 Postseason Population Estimate: 1,500
2014 Proposed Postseason Population Estimate: 1,200

Elk in the Shirley Mountain herd unit are managed toward a numeric objective of 800. The population was estimated using a spreadsheet model developed in 2012 and updated in 2014. The herd is managed for recreation opportunity. The objective was last reviewed in 1997 and planned for review in 2015.

Herd Unit Issues
The University of Wyoming continues to monitor elk on the Dunlap Wind Farm on the east side of this herd unit. This wind farm is proposed to expand into more crucial winter range in the future. In 2013, elk radio-collar data from the Dunlap Wind Farm research project was used to refine the eastern boundary of the herd unit. Our ability to manage elk numbers through harvest is difficult because a large portion of the elk habitat in this

herd unit is owned by one landowner who provides limited access. Most elk damage in this herd unit occurs on hay meadows in the northern portion during summer months.

Weather

Weather in this herd unit was relatively normal during the past bio-year. This weather pattern most likely had a neutral to positive influence on elk. For specific meteorological information for the Shirley Mountain herd unit the reviewer is referred to the following link:
http://www.ncdc.noaa.gov/cag/

Habitat

Habitat conditions improved in 2013 with an increase in timely spring and fall precipitation. However, much of the transition and winter ranges were severely impacted by the drought conditions experienced in bio-year 2012. No elk habitat production/utilization data was available for this herd unit. However, annual production rates should have improved from the previous year, while utilization rates on winter ranges likely continued to be high.

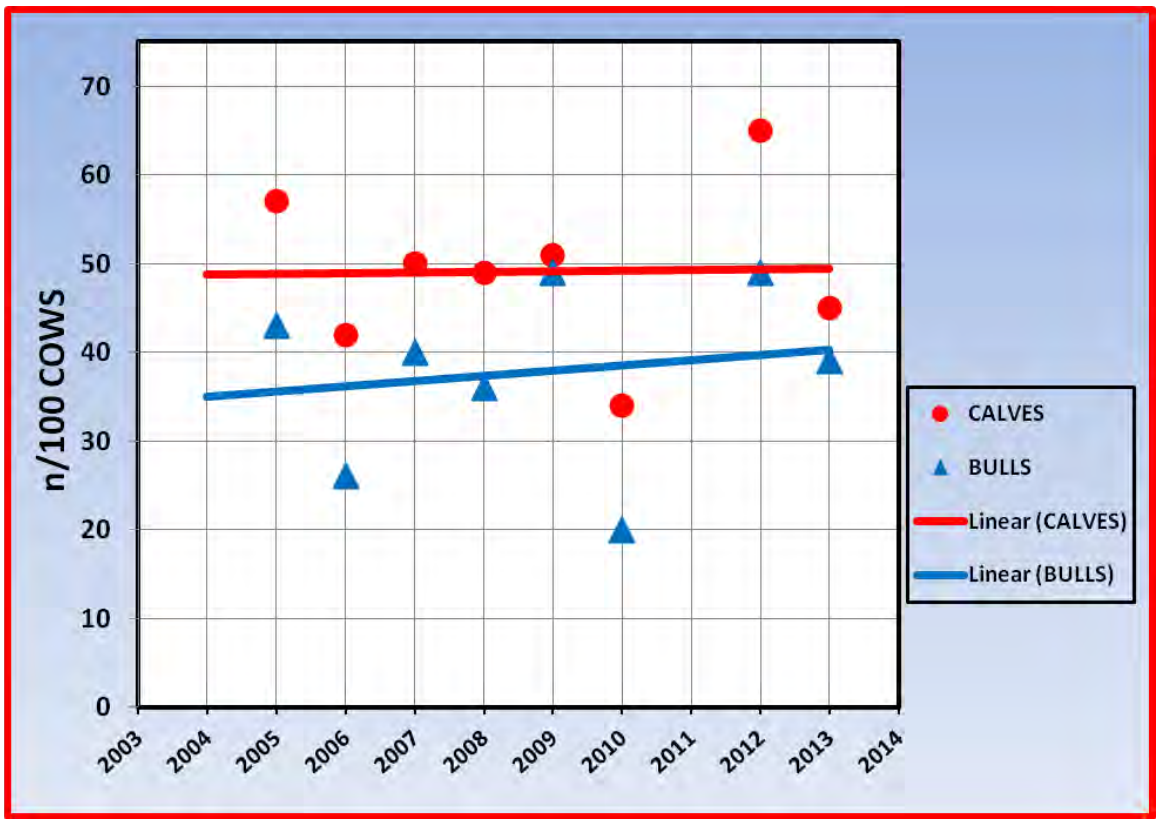
The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality and consequently heavily influence population management for any particular big game specie.

Shrub communities within the Laramie Region that are annually assessed by game wardens, wildlife biologists, and terrestrial habitat biologists, include: true mountain mahogany, antelope bitterbrush, skunkbrush sumac, big sagebrush, and four-wing saltbush. A majority of these transects were established approximately 12–13 years ago. Transects were established for several different reasons, including: measuring habitat response prior to or following treatments (i.e. prescribed fire, wildfire, mowing), concern over historic or current domestic livestock or wild ungulate utilization levels, selection of "representative habitats" utilized by wildlife on identified winter ranges, and to compare present results with historic data sets.

Field Data

A postseason classification survey was conducted by helicopter in March of 2014. The 2013 postseason ratios were 39 bulls and 45 claves/100 cows, from an dequate sample size of 672 elk. Trend from past classifications infer this herd unit was still above the recreational management strategy maximum for bull ratios (Figure 1). The collection of classification data has varied in methodology primarily due to no dedicated flight funding for this herd. Managers considered the 2013 postseason survey to representative of the elk within this herd unit.

Figure 1. Wyoming 2004-2013 Shirley Mountain Elk Herd Unit bull and calf ratio trend.



Harvest Data

Preliminary elk harvest survey data indicated 630 active licensed hunters harvested 430 elk in 2013, with an overall success rate of 70%. The 2013 harvest success increased 8% from the 2012 harvest. The 2013 bull harvest (n=130) was a 26% decrease from 2012. The cause for the decrease in bull harvest was unknown, as all factors were similar across the years. Antlerless harvest (n=290) increased 33% in 2013; with only an additional allocation of 50 Type 6 licenses.

Population

In 2012 a CJ,CA model was selected to model the Shirley Mountain Herd Unit's population dynamics due to the low AIC score, simplicity, and plausible population estimate. In 2013 this model ceased to function due to harvest rates exceeding the population estimate. Classification data for this herd has accuracy issues from less than adequate sampling efforts; and most likely the assumption of this herd unit being a closed population has been violated also. These factors make it difficult to develop reliable annual population estimates.

In 2013 the TSJ,CA,MSC was selected to simulate elk population dynamics in the Shirley Mountain herd unit. This model was the only model in the 2013 suite of models

which did not cease to function by 2015 due to the continued harvest rates exceeding the predicted population estimate. The TSJ,CA,MSC model also produced the best fit and AICc score. Selecting the TSJ,CA,MSC model resulted in a retroactive increase of the 2012 postseason population estimate that was previously reported in the Job Completion Report database. The 2013 postseason population estimate was plausible; however it was likely to be a significant over estimate. Without other information (e.g. an independent population estimate or survival data) to incorporate into the model, accuracy of estimates will continue to be unknown.

We rated this model as poor, and not biologically defensible in our evaluation. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model (Morrison 2012). The poor rating was primarily due to inadequate sample sizes for postseason classification surveys and the likely violation of the assumption that this is a closed population.

Management Summary

Shirley Mountain Herd Unit hunting seasons are similar to last year and will continue to provide opportunities to reduce the overall elk population and reduce bull ratios towards recreational parameters. Elk numbers appear to be trending towards the management objective. Given recent drought conditions, competition with other ungulates, and some damage issues, we consider it prudent to continue to provide opportunities to harvest elk in this herd unit. The continued operation of the Beer Mug Mountain Hunter Management Area has provided additional harvest opportunities for many elk hunters in this herd unit.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet Model for Ungulate Population data Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 41 pp.

Bibliography of Herd Specific Studies

None at present time.

INPUT	
Species:	ELK
Biologist:	SCHULTZ
Herd Unit & No.:	SHIRLEY EL534
Model date:	03/17/14

☐ Clear form

MODEL EVALUATION: **POOR**

MODELS SUMMARY

		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	120	129	☐ CJ,CA Model	Harvest will exceed population estimate in 2015
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	120	129	☐ SCJ,SCA Mod	same as above
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	213	301	☐ TSJ,CA Model	Harvest will exceed population estimate in 2014
TSJ,CA,MSC	**Time-Specific Juv, Constant Adult Survival, Male survival coefficient**	56	171	☑ TSJ,CA,MSC Model	Plausible but most likely over estimating abundance.

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population				Predicted Posthunt Population				Objective
	Field Est	Field SE		Juveniles	Total Males	Females	Total	Juveniles	Total Males	Females	Total	
1993				243	315	827	1386	228	237	740	1205	800
1994				283	302	804	1389	275	217	745	1238	800
1995				245	332	857	1434	230	265	773	1268	800
1996				425	355	863	1642	416	273	744	1433	800
1997				377	450	923	1750	377	359	838	1574	800
1998				342	445	929	1716	327	367	863	1557	800
1999				375	495	997	1866	349	402	879	1630	800
2000				656	538	1023	2217	640	465	970	2075	800
2001				546	642	1156	2344	529	565	1098	2192	800
2002				658	655	1202	2516	633	566	1113	2312	800
2003				625	682	1243	2550	596	583	1112	2292	800
2004				549	689	1233	2471	525	578	1116	2219	800
2005				642	666	1219	2528	621	528	1095	2244	800
2006				476	644	1222	2343	463	518	1115	2096	800
2007				579	630	1236	2445	527	514	1060	2102	800
2008				513	608	1165	2287	490	515	1008	2013	800
2009				582	709	1215	2506	552	599	1079	2230	800
2010				531	693	1189	2414	485	550	1032	2067	800
2011				499	628	1122	2249	435	488	926	1849	800
2012				588	629	1049	2266	558	423	853	1834	800
2013				365	537	976	1878	335	385	742	**1462**	800
2014				322	451	818	1590	292	290	622	1204	800
2015												800
2016												800
2017												800
2018												800
2019												800
2020												800
2021												800
2022												800
2023												800
2024												800
2025												800

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.73			0.97		
1994	0.95			0.97		
1995	0.95			0.97		
1996	0.95			0.97		
1997	0.60			0.97		
1998	0.95			0.97		
1999	0.95			0.97		
2000	0.66			0.97		
2001	0.50			0.97		
2002	0.50			0.97		
2003	0.50			0.97		
2004	0.50			0.97		
2005	0.50			0.97		
2006	0.65			0.97		
2007	0.50			0.97		
2008	0.95			0.97		
2009	0.50			0.97		
2010	0.50			0.97	0.97	0.03
2011	0.95			0.91	0.91	0.08
2012	0.52			0.97		
2013	0.56			0.97		
2014	0.70			0.97		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

Parameters:	Optim cells
Male Survival Coefficient	0.950
Adult Survival =	0.975
Initial Total Male Pop/10,000 =	0.024
Initial Female Pop/10,000 =	0.074

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

	Classification Counts							Harvest						
Year	Juvenile/Female Ratio			Total Male/Female Ratio									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	Field SE	Juv	Yrl males	2+ Males	Females	Total Harvest	Total Males	Females
1993		30.77	3.52	32.00	32.00	24.00	3.03	14	23	48	79	164	24.8	10.5
1994		36.92	3.83	29.19	28.29	21.22	2.73	7	21	56	54	138	28.0	7.4
1995		29.75	5.65	34.26	30.85	23.14	4.85	14	9	52	76	151	20.2	9.8
1996		55.87	4.77	36.71	35.86	26.89	2.98	8	11	63	108	190	23.0	13.8
1997		45.00	4.26	42.85	48.89	36.67	3.73	0	18	65	77	160	20.3	9.2
1998		37.94	4.55	42.49	34.78	26.09	3.61	13	12	59	60	144	17.6	7.1
1999		39.73	3.85	45.69	54.76	41.07	3.93	23	22	63	107	215	18.9	11.8
2000		65.98	5.29	47.96	49.10	36.83	3.59	15	11	55	48	129	13.5	5.2
2001		48.19	4.15	51.44	58.80	44.10	3.91	6	9	61	53	129	12.0	5.0
2002		56.84	6.85	50.85	68.77	51.58	6.41	23	3	78	81	185	13.6	7.4
2003		53.59	6.74	52.44	45.67	34.25	5.04	26	0	90	119	235	14.5	10.5
2004		47.00	5.88	51.77	46.67	35.00	4.86	22	16	85	106	229	16.1	9.5
2005		56.72	4.70	48.19	57.71	43.28	3.93	19	10	116	113	258	20.8	10.2
2006		41.54	4.76	46.51	34.87	26.15	3.56	12	8	106	98	224	19.5	8.8
2007		49.72	6.45	48.52	53.63	40.22	5.61	47	10	95	160	312	18.3	14.2
2008		48.65	4.04	51.06	48.65	36.49	3.35	21	4	81	143	249	15.4	13.5
2009		51.19	5.12	55.56	65.54	49.15	4.99	27	4	96	124	251	15.5	11.2
2010		47.00	5.88	53.29	46.67	35.00	4.86	42	8	122	143	315	20.6	13.2
2011		47.00	5.88	52.77	46.67	35.00	4.86	58	6	121	179	364	22.2	17.5
2012		65.43	11.56	49.60	65.84	49.38	9.54	27	14	173	178	392	32.7	18.7
2013		45.21	4.24	51.87	51.87	38.90	3.85	27	7	131	213	378	28.3	24.0
2014		47.00	5.88	46.67	46.67	35.00	4.86	27	14	132	178	351	35.6	23.9
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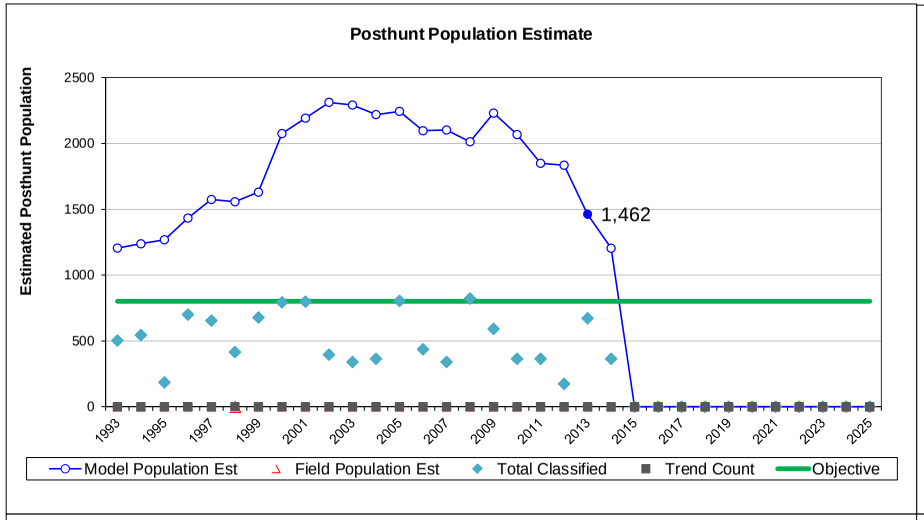
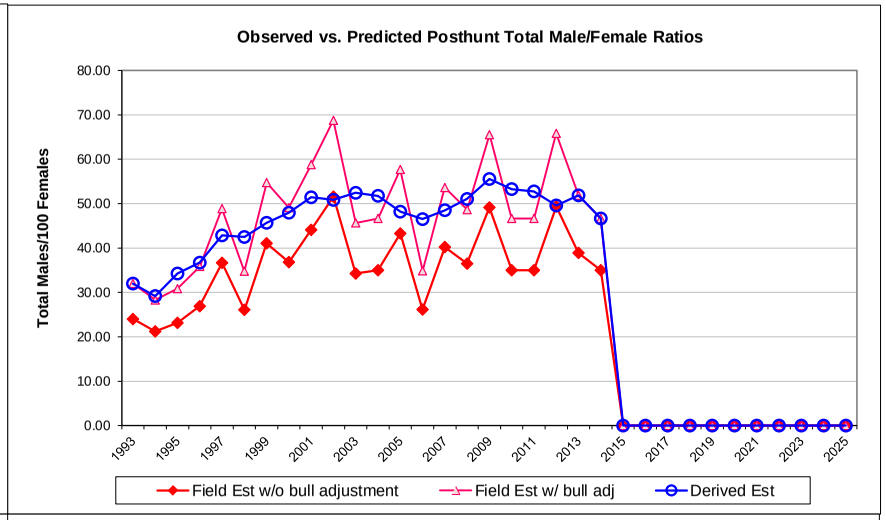
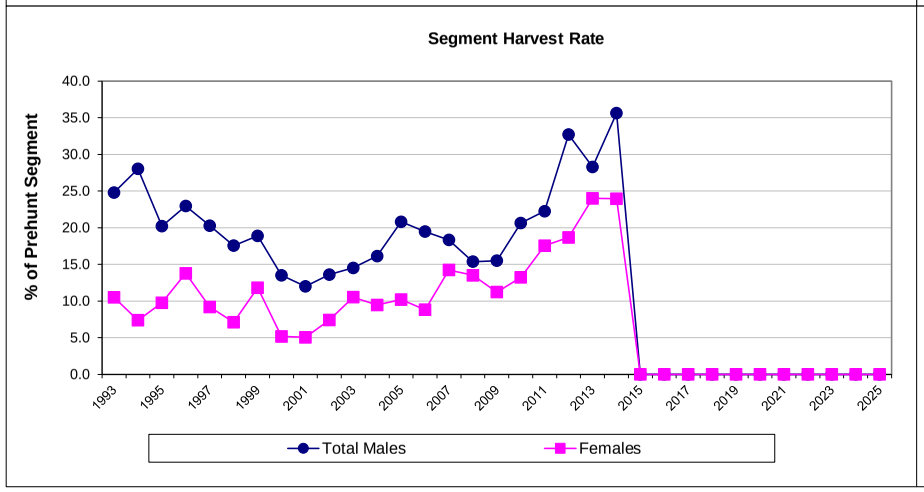
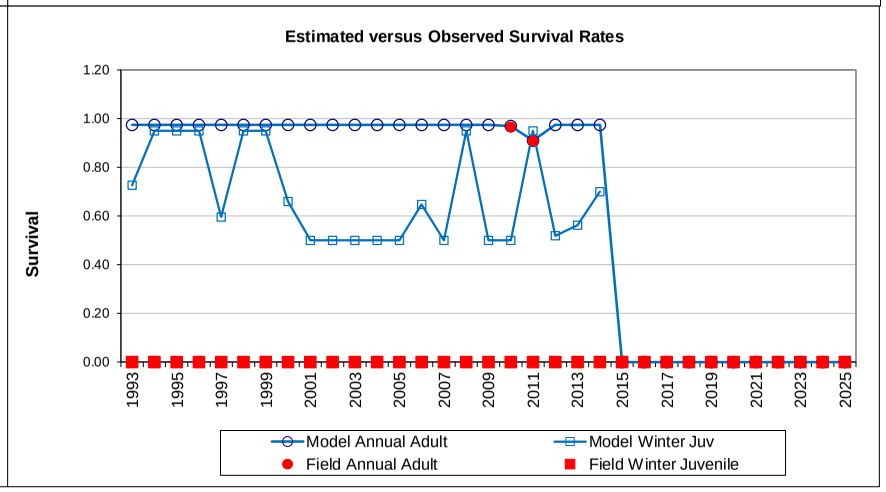
FIGURES





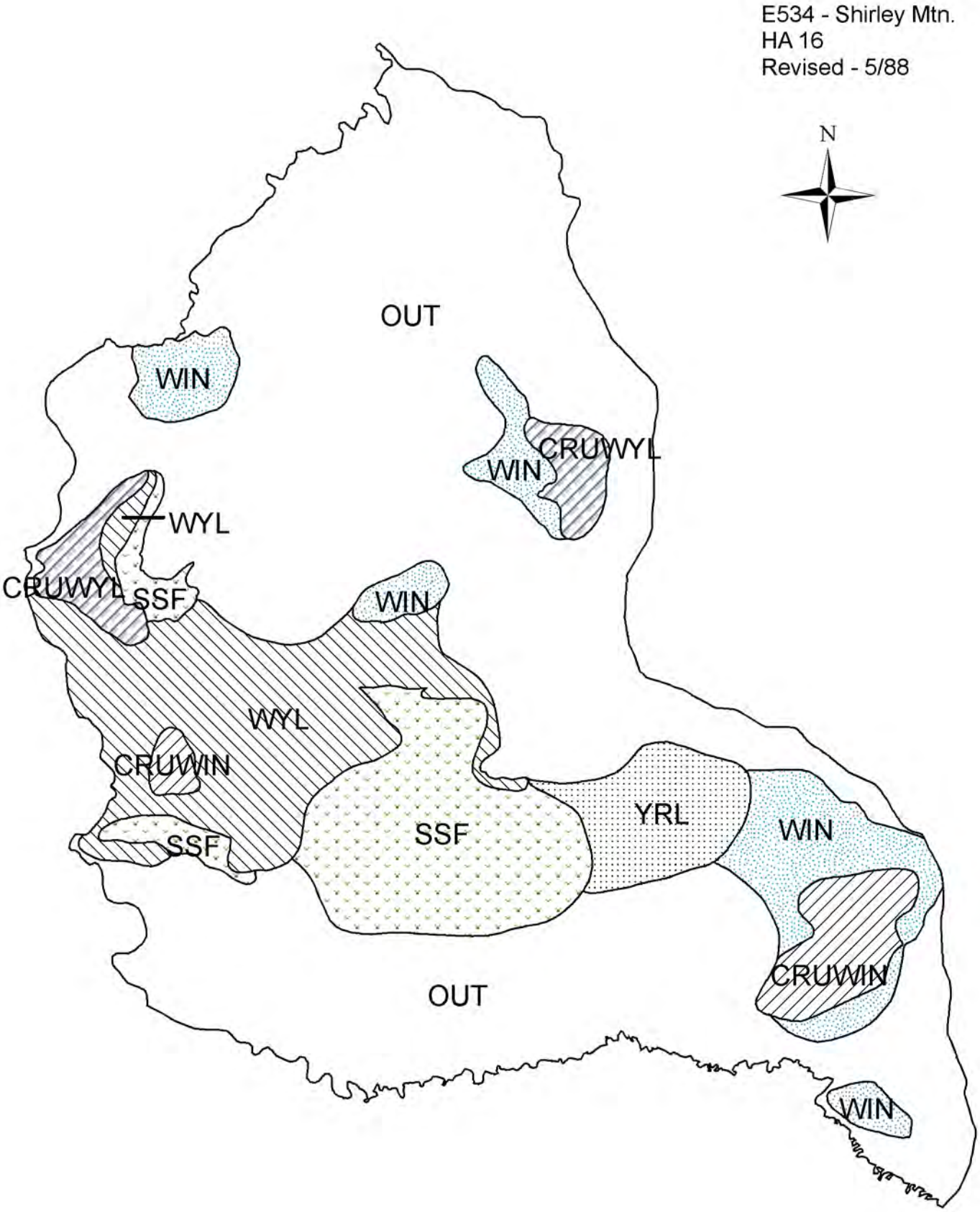




Comments:

For postseason 2013, the TSJ,CA,MSC model was selected due to the most plausible population estimate. However, this model is considered to over estimate the current population. The data set for this herd has accuracy issues related to survey sample sizes for classifcation data. Interchange of elk with surrounding herd units has been documented, leading to the question of whether this is a closed population.

END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2013 - JCR Evaluation Form

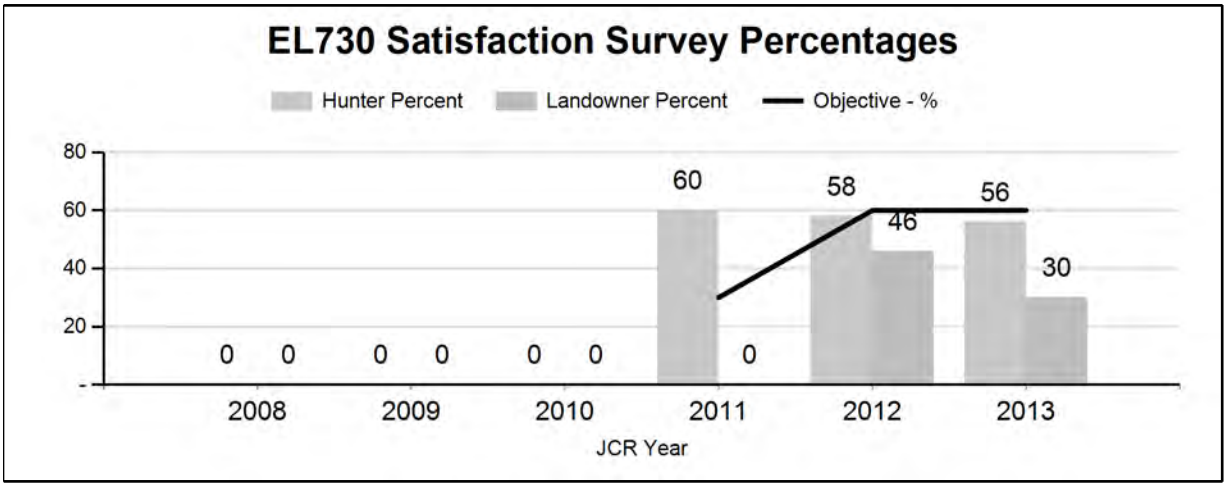
SPECIES: Elk
HERD: EL730 - RAWHIDE
HUNT AREAS: 3

PERIOD: 6/1/2013 - 5/31/2014

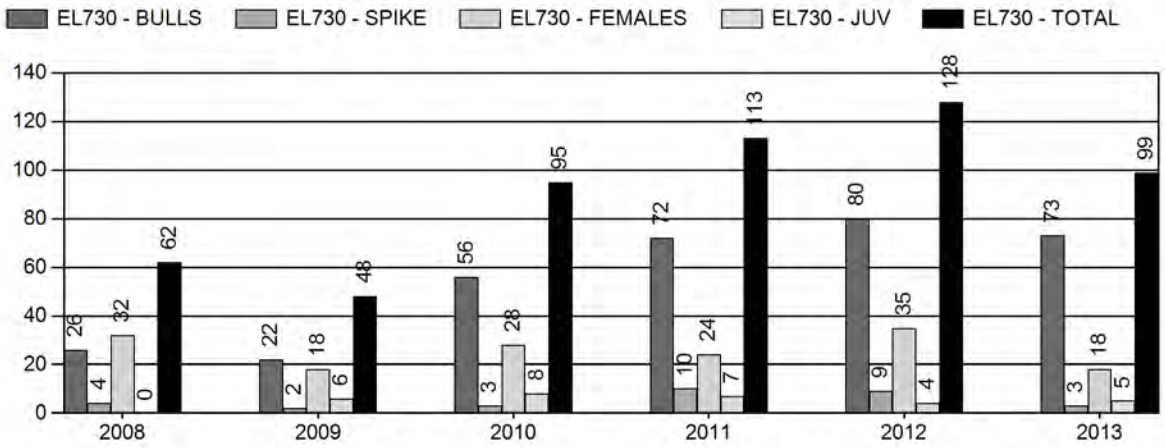
PREPARED BY: MARTIN HICKS

	2008 - 2012 Average	2013	2014 Proposed
Hunter Satisfaction Percent	59%	59%	60%
Landowner Satisfaction Percent	46%	46%	60%
Harvest:	89	94	125
Hunters:	206	231	250
Hunter Success:	43%	41%	50 %
Active Licenses:	219	248	275
Active License Percentage:	41%	38%	45 %
Recreation Days:	1,669	1,576	1,600
Days Per Animal:	18.8	16.8	12.8
Males per 100 Females:	70	0	
Juveniles per 100 Females	58	0	

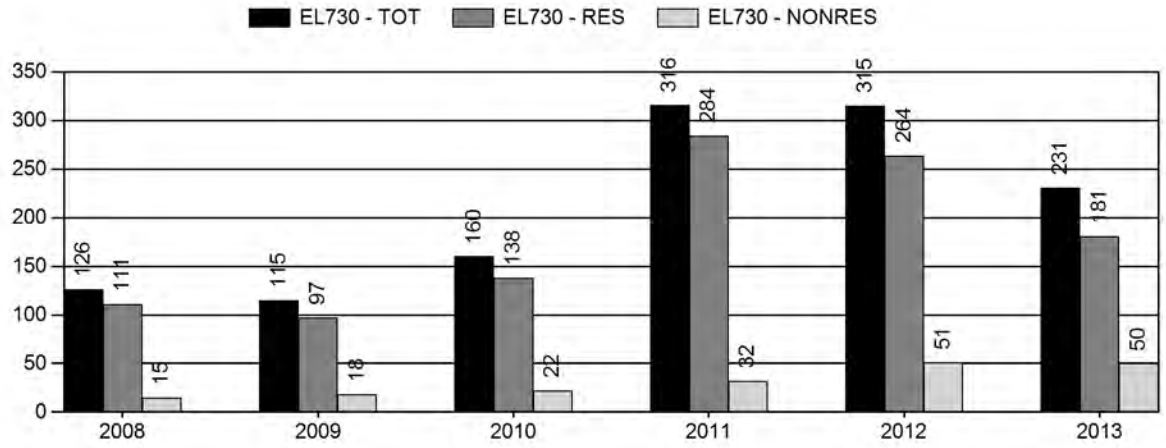
Satisifaction Based Objective	60%
Management Strategy:	Special
Percent population is above (+) or (-) objective:	-17%
Number of years population has been + or - objective in recent trend:	2



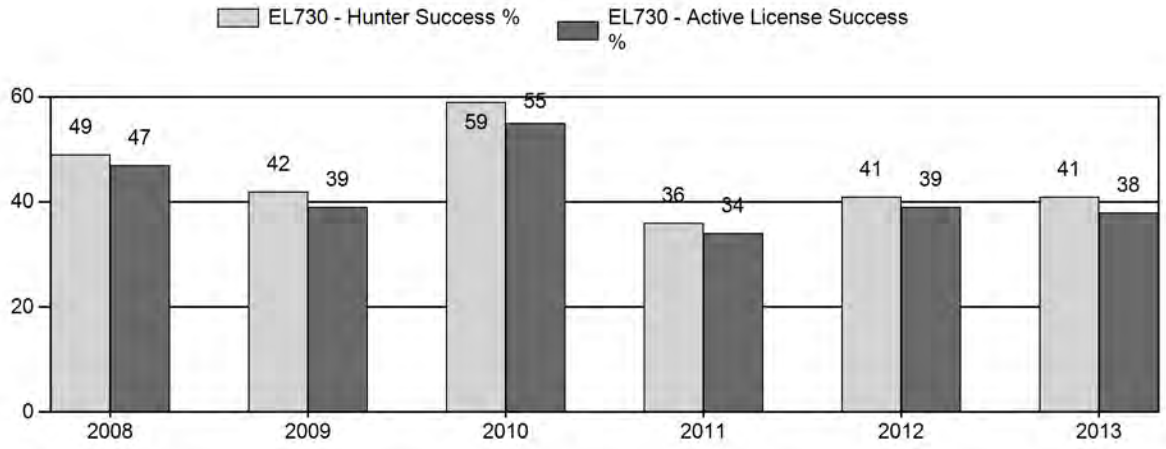
Harvest



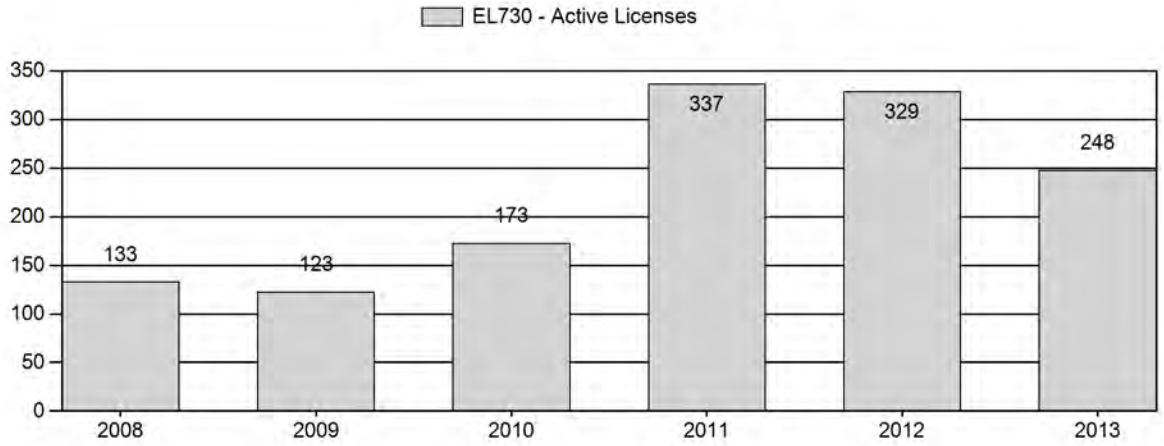
Number of Hunters



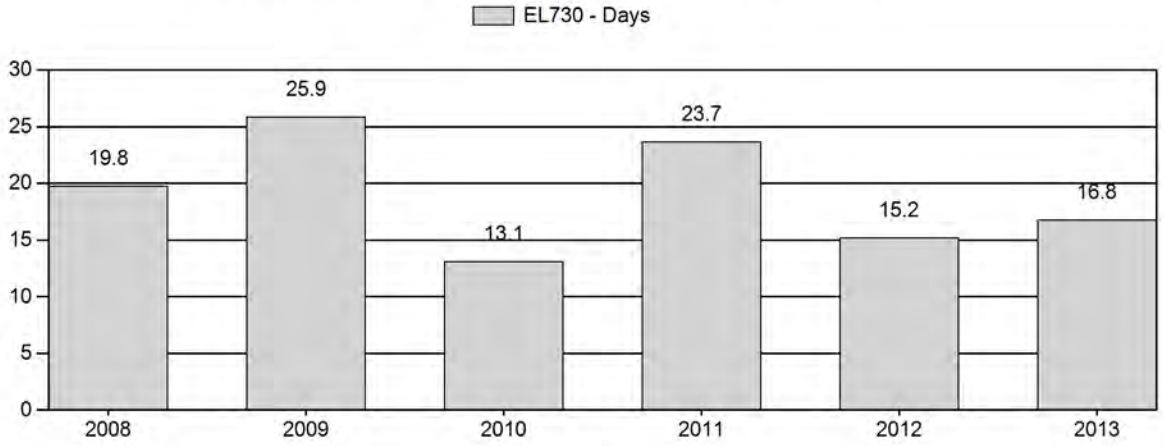
Harvest Success



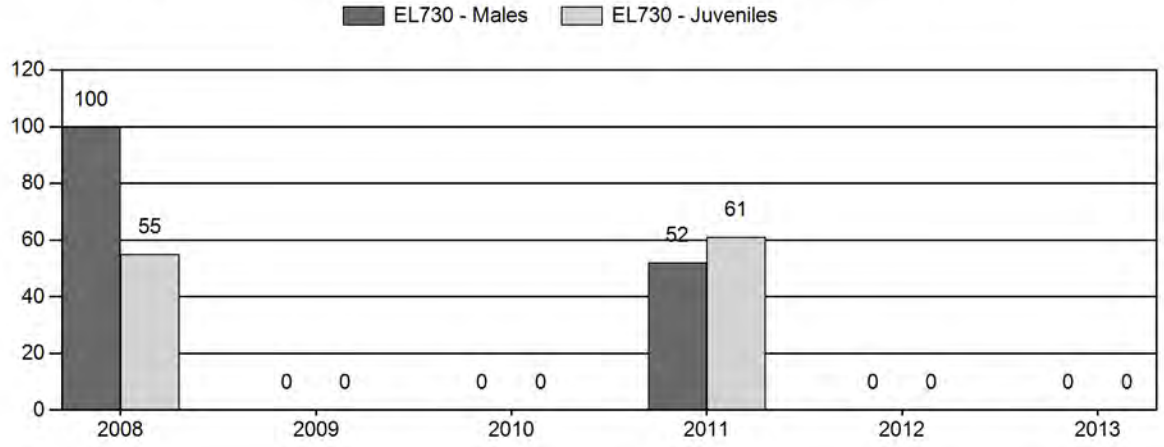
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2014 HUNTING SEASONS
RAWHIDE ELK HERD (730)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
3	Gen	Sept. 15	-Oct. 14		Any elk General License; any elk south of U.S. Hwy 26
		Oct. 15	Jan. 31		
	6	Aug. 15	Jan. 31	200	Limited quota; cow or calf
Archery		Sept. 1	Sept. 14		Refer to Section 3 of this Chapter

Hunt Area	Type	Quota change from 2013
3	1	-75
	4	-50
	6	+125

Management Evaluation

Current Management Objective: 1) Landowner and hunter satisfaction; Target goal: ≥ 60%
2) Male "quality"; Target goal: ≥ 61% branch antlered bulls in harvest survey
Management Strategy: Special
2013 Hunter Satisfaction Estimate: 1) 56% satisfied, 2) 26% neutral, 3) 18% dissatisfied
2013 Landowner Satisfaction Estimate: 1) 30% satisfied, 2) 33% neutral, 3) 37% dissatisfied
Male Quality: 96% branch antlered bulls
Most Recent 3-year Running Average Hunter Satisfaction Estimate: 57%
Most Recent 3-year Running Average Landowner Satisfaction Estimate: 38%

Management Issues

The management objective for this herd was changed in 2012 from a post-season population objective of 40 elk to a nonnumeric population objective based on landowner and hunter satisfaction and the percentage of branch antlered bulls in the harvest. The management strategy was also changed from recreational to special. We will follow trends over time to make management decisions based on constituent satisfaction and bull harvest parameters. There is not a working model for this herd unit due to our inability to collect adequate population data.

This herd unit has been difficult to manage based on our inability to collect adequate herd composition data along with field harvest data. Based on field personnel and landowner observations we estimate there are over 400 elk in the Rawhide Elk Herd, with the population expanding south of the North Platte River into Goshen, Platte and Laramie Counties. There have been several public meetings to address the increasing population, and as a result the herd boundary was expanded south to the Colorado border for the 2012 season. Additionally the portion of Area 3 north of U.S. Highway 26 was changed to a general season for the 2014 season (the southern portion was changed to a general in 2011). The general season will open September 15 and the Type 6 license will start on August 15 to address damage.

Weather
Weather during 2013 and into 2014 was wetter and colder than normal. Ungulates went into the winter in good body condition as a result of the fall moisture. Winter conditions were somewhat mild with low snowpack but with periods of extreme cold temperatures, followed up with above freezing periods. Refer to the following websites for weather data:
http://www.ncdc.noaa.gov/temp-and-precip/time-series/ and
http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html.

Habitat
There are no established habitat transects for this herd unit. Recent fire activity in 2012 and 2010 burned over 20,000 acres will likely improve elk habitat by reducing competition from encroaching conifers on perennial grasses and forbs, which provide key elk forage.

Field/Harvest Data
Harvest success and effort has fluctuated the past five years, and when the 2013 harvest data is compared to the five-year average success decreased and effort increased. Harvest is driven by access and if hunters are limited to public land, success decreases and effort increases. Finding elk in this herd unit can be difficult due to landownership patterns. Access is restricted to the Broom Creek HMA north of US Hwy 26 and is dependent on crop damage south of US Hwy 26. A majority of landowners do not want elk south of the highway and are willing to allow access. In 2011 elk were plentiful and hunters were successful. In 2012 the severe drought displaced elk and they were not found in traditional places (i.e. alfalfa fields). In 2013 above average late summer/fall precipitation re-distributed elk which increased forage production and as a result elk were not dependent upon irrigated crops. The high percentage of branch antlered elk is indicative of the quality of bulls and the amount of private land that provides sanctuaries to allow bulls to reach maturity.

Licenses numbers have fluctuated from 50 to 200 over the years. Starting in 2011 that portion of Hunt Areas 3 south of U.S. Highway 26 became a general season. After several public meetings over the past three years coupled with a landowner survey it was decided to convert that portion of Area 3 north of US Hwy 26 from a limited quota area to a general hunt area. This will simplify the management by allowing hunters with a general license the opportunity to hunt in other general areas if they are not successful in hunt area 3. Population and damage issues will be easier to address with this type of season structure as well.

Since this herd unit changed to a satisfaction management evaluation and the percent of branch antlered bulls in the harvest we no longer collect classification data.

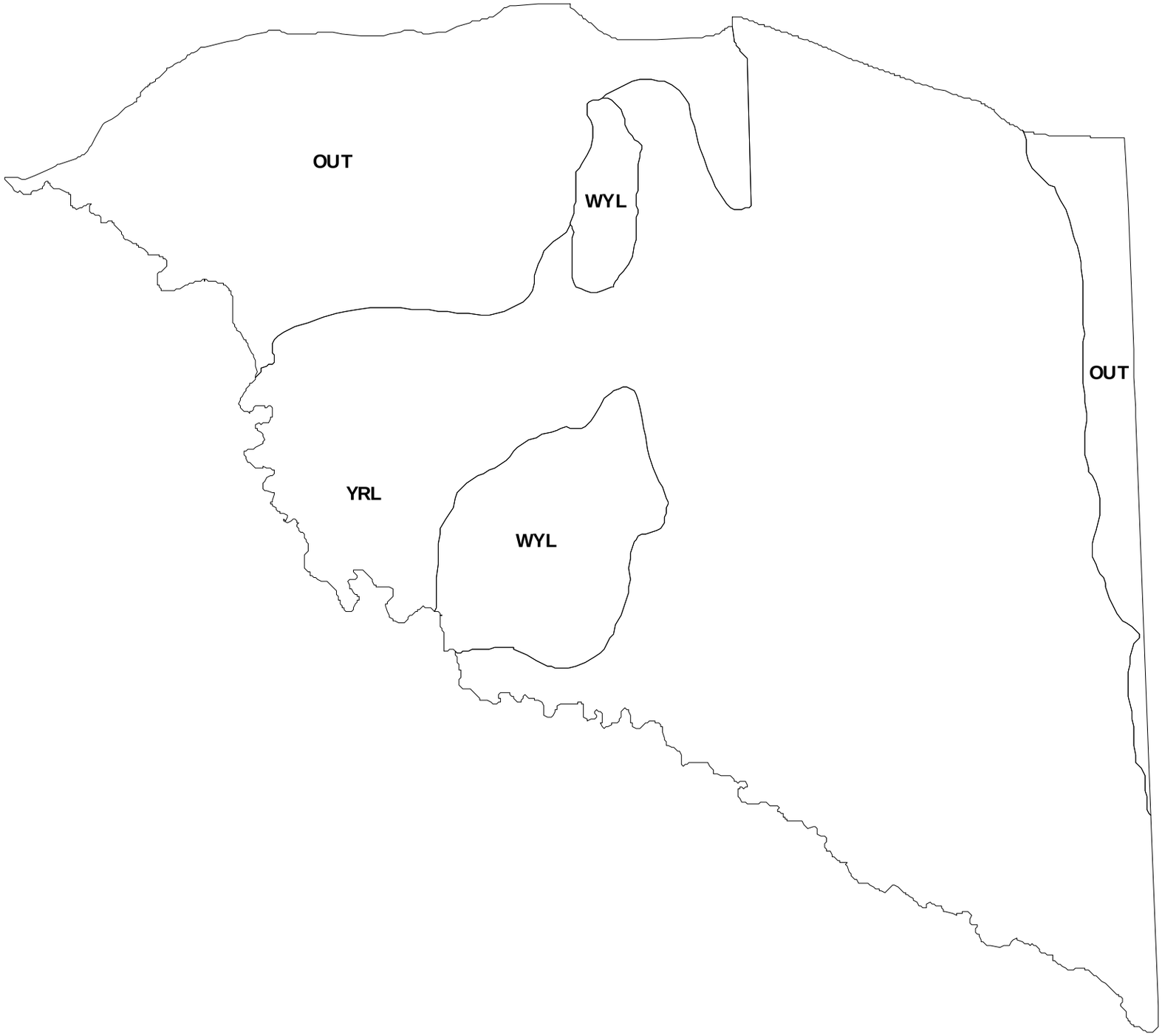
Landowner/Hunter Satisfaction Survey Results
The hunter satisfaction survey showed that 56% of the hunters were satisfied and 26% were neutral. Only 18% were dissatisfied with their quality of hunt. Based on limited conversations from hunters in the field there was concern over finding elk. However, the majority of the complaints came from hunters that were trying to hunt the limited public land. Hunters need to secure private land to hunt prior to the season or realize they will have to pay a trophy or outfitters fee. The landowner satisfaction survey showed that 30% of the landowners were satisfied, 33% were neutral and 37% were dissatisfied. There were 27 surveys returned, slightly lower than 2013, which had a return rate of 73%. Sample size was adequate to provide confidence in the survey. Hunters satisfaction was just slightly below the target range of 60%

but it is obvious landowners are not satisfied with the elk herd with the same target range of 60%. Based on return comments there were numerous reasons for their dissatisfaction: 1) damage, 2) no elk during the hunting season, 3) fires displaced elk and 4) landowners do not want elk south of Highway 26, 5) uncooperative neighbors and 6) not if favor of the general season north of Hwy 26. The percent of branched antlered bulls in the survey was 96%. Our ability to manage this segment of the population is limited due to access and adult bulls within the harvest will likely remain high.

Management Summary

In summary the 2014 season is designed to reduce elk numbers throughout the entire hunt area by having both portions (north and south of US Hwy 26) a general firearm season from Sept 15-Oct 14, and the 109 days of an any season elk south of US Hwy 26. The Type 6 licenses increased by 125 license and will run from August 15 through January 31. Given the new season structure we hope to attain a harvest of around 125 elk.

Rawhide Elk Herd Unit(E730)



2013 - JCR Evaluation Form

SPECIES: Moose | PERIOD: 6/1/2013 - 5/31/2014

HERD: MO545 - SNOWY RANGE

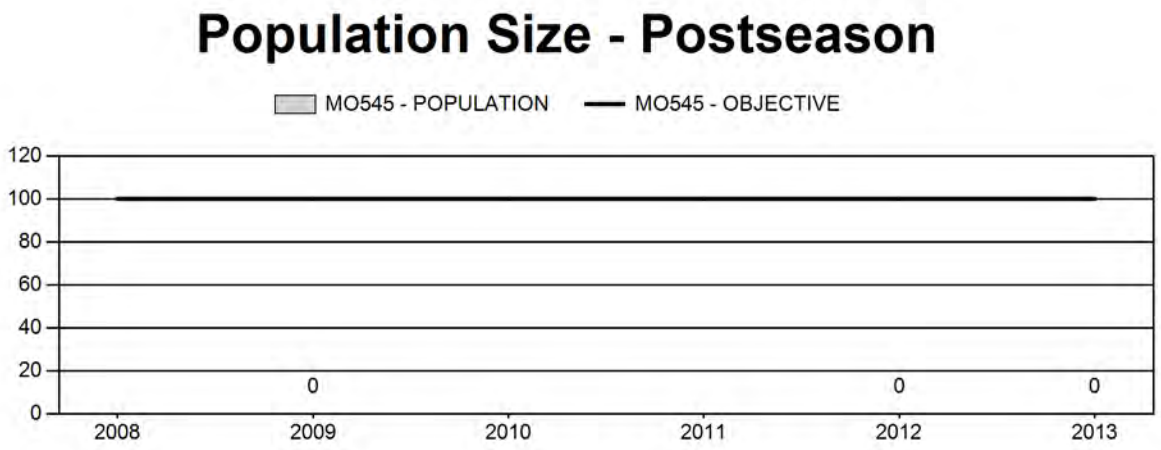
HUNT AREAS: 38, 41 | PREPARED BY: WILL SCHULTZ

	2008 - 2012 Average	2013	2014 Proposed
Population:	0	N/A	N/A
Harvest:	46	55	45
Hunters:	50	58	48
Hunter Success:	92%	95%	94 %
Active Licenses:	50	58	48
Active License Percent:	92%	95%	94 %
Recreation Days:	367	599	420
Days Per Animal:	8.0	10.9	9.3
Males per 100 Females	107	119	
Juveniles per 100 Females	47	67	

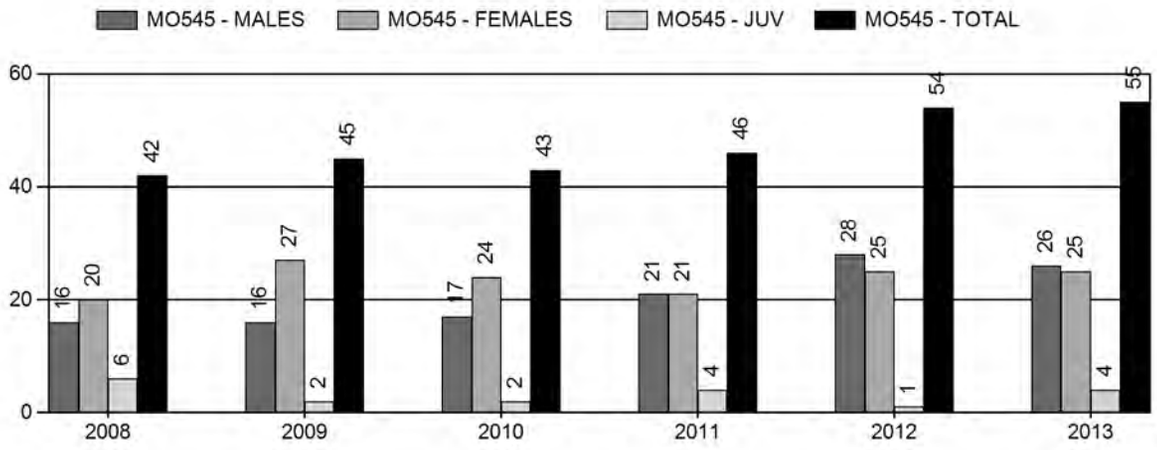
Population Objective:	100
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

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

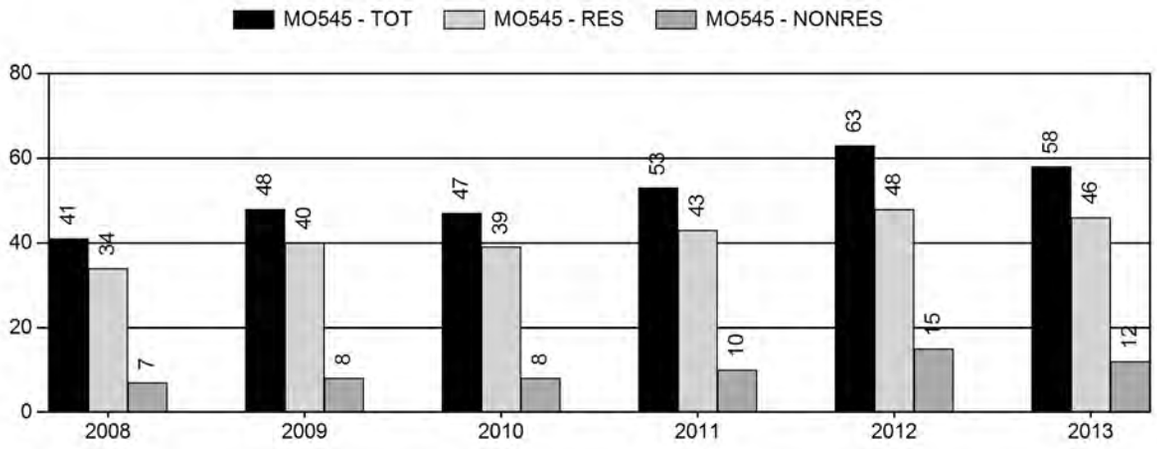
	JCR Year	Proposed
Females ≥ 1 year old:	NA%	NA%
Males ≥ 1 year old:	NA%	NA%
Juveniles (< 1 year old):	NA%	NA%
Total:	NA%	NA%
Proposed change in post-season population:	NA%	NA%



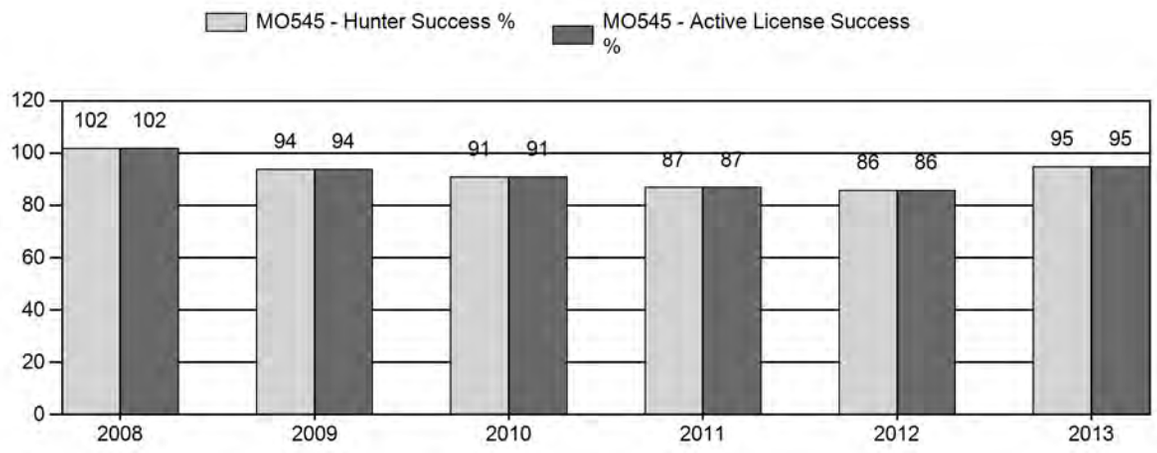
Harvest



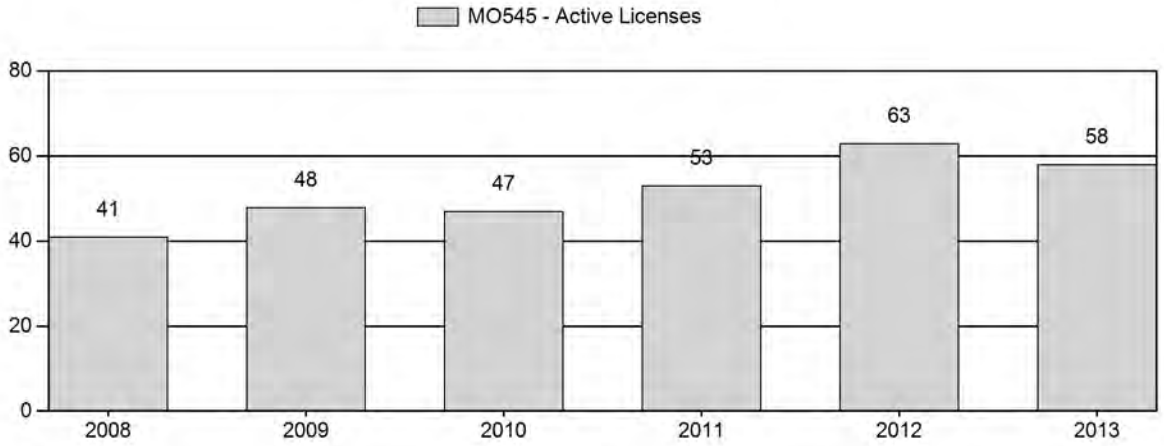
Number of Hunters



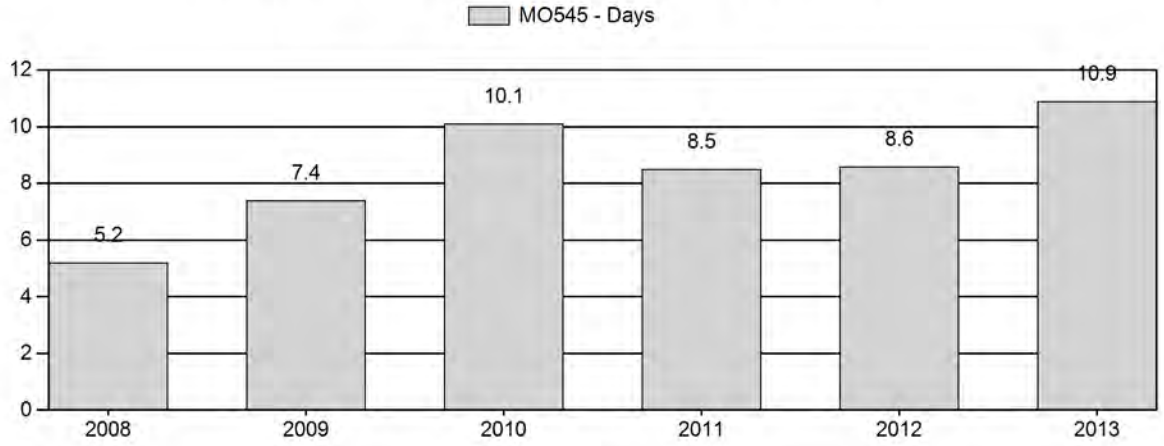
Harvest Success



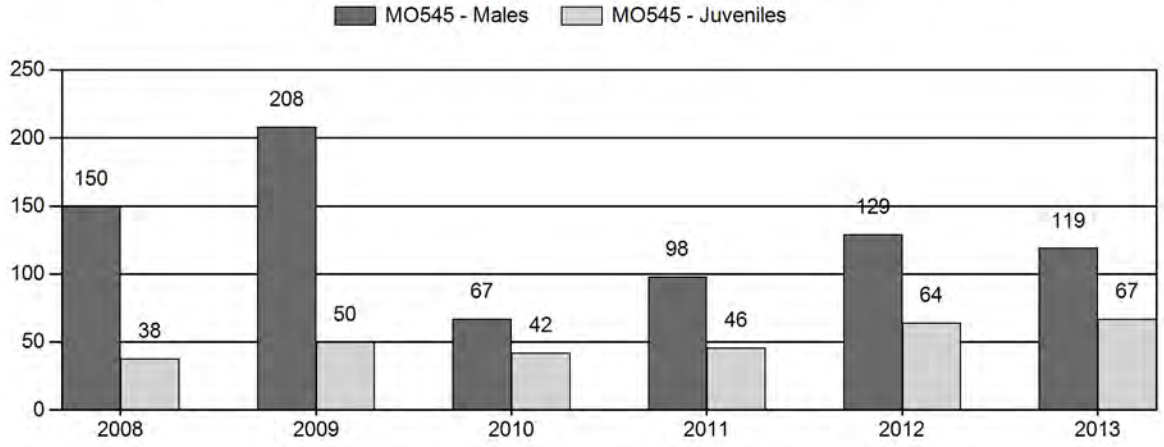
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Moose Herd MO545 - SNOWY RANGE

		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
2008	0	1	11	12	52%	8	35%	3	13%	23	144	12	138	150	± 0	38	± 0	15
2009	0	4	21	25	58%	12	28%	6	14%	43	0	33	175	208	± 0	50	± 0	16
2010	0	7	17	24	32%	36	48%	15	20%	75	0	19	47	67	± 0	42	± 0	25
2011	0	3	46	49	40%	50	41%	23	19%	122	0	6	92	98	± 0	46	± 0	23
2012	0	4	14	18	44%	14	34%	9	22%	41	0	29	100	129	± 0	64	± 0	28
2013	0	5	27	32	42%	27	35%	18	23%	77	0	19	100	119	± 0	67	± 0	31

Snowy Range Moose (MO545)
Hunt Areas 38, 41
2014 Hunting Seasons

Hunt Area	Type	Dates of Seasons Opens	Dates of Seasons Closes	Limited Quota	Limitations
38, 41	1	Oct. 1	Nov. 14	20	Limited quota licenses; any moose, except cow moose with calf at side
	4	Oct. 1	Nov. 14	25	Limited quota licenses; antlerless moose, except cow moose with calf at side

Hunt Area	Type	Quota change from 2013
Herd Unit Total	**1**	**-5**
	4	**-10**

Management Evaluation
Current Management Objective: 100
Management Strategy: Special
2013 Postseason Population Estimate: NA
2014 Proposed Postseason Population Estimate: NA

Moose in the Snowy Range herd unit are managed toward a numeric objective of 100. A moose population model has not been developed for this herd unit. The herd is managed under a special management strategy. The objective was last reviewed in 1997.

Herd Unit Issues
The Snowy Range herd unit stretches across southern Wyoming, along the Colorado border, from Baggs to Cheyenne. Moose are found year-round in areas on Pole Mountain, Sierra Madre Mountains, and most notably, the Snowy Range Mountains. These moose descended from moose transplanted in Colorado and were not native to this area historically. Challenges for managing moose in this herd unit include a rapidly changing forest ecosystem, high infestation rates for parasites, and human conflict/safety. Limited population monitoring for moose has been an issue in this herd unit also.

Weather
Weather in this herd unit was relatively normal during the past bio-year. This weather pattern most likely had a neutral to positive influence on moose. For specific meteorological information for the Snowy Range herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat
Moose habitat conditions are currently being monitored across Wyoming and in the North Park, Colorado area through a University of Wyoming project. Preliminary results published in a recent annual report for this project indicated the Snowy Range's willow habitat quality and moose fitness were relatively low when compared to the other areas (Appendix A).

Habitat conditions improved in 2013 with an increase in timely spring and fall precipitation. However, much of the transition and winter ranges were severely impacted by the drought conditions experienced in bio-year 2012. No WGFD moose habitat production/utilization data was available for this herd unit. However, annual production rates were assumed to have improved from the previous year, while utilization rates on winter ranges were assumed to have continued to be high.

Field Data
Traditionally there has been little allocation of funding in this herd unit to collect moose classification data. Moose classification data has been collected incidentally during annual mule deer and elk classification surveys. In 2011 and 2013, approximately 8 additional hours of helicopter flight time was allocated to collect moose classification data in the Snowy Range herd unit resulting in samples of 122 and 77 moose, respectively. Twenty (20) of the 77 moose observed during the 2013 survey were located in Hunt Area 41. The 2013 classification ratios were 119 bulls:100 cows and 67 calves:100 cows. Although the moose population size was unknown during the 2011 and 2013 surveys, managers thought the observed ratios were plausible.

Harvest Data
In 2013, the weighted harvest estimates indicated 63 hunters harvested 28 bulls, 25 cows and 1 calf (lab data indicated 2 calves). A total of 3 illegally harvested moose were documented in 2013. Male lab-aged tooth samples (n=24) indicated this year's median age and percentage of the bull harvest ≥ 5 years of age, were within the "prime-age bull" class (Figures 1, 2 and 3) (Thomas 2008). Age class distribution from female lab-aged tooth samples (n=19) indicated 47% of the antlerless moose harvest were ≤ 2 years old (Figure 4).

Median age for tooth samples from harvested bulls declined in 2013 and is a statistic of concern for managers. The 2013 median bull age decreased, it was at 4 years of age which was the lower parameter for the "prime-age bull" class. The Snowy Range has a reputation for producing trophy quality bulls. An objective for managers is to sustain both quantity and quality for the bull segment of this moose population. The reported ages for harvested antlerless moose were another statistic of concern for the Snowy Range moose managers. Since hunters were limited to harvesting either cows without calves at their side, or calves, managers anticipated a majority of the antlerless harvest would have consisted of antlerless moose 2 years of age or less. Perhaps in 2013, there were more cow moose of prime breeding age without a calf at side due to drought

conditions experienced in 2012. This may contributed to an increased proportion of prime breeding age cow moose being harvested. As stated earlier in this report, making inferences from small or incomplete data sets has hampered the ability of managers to make management decisions of significant consequence for this herd unit.

Population

A Wyoming Spreadsheet model has not been developed for this herd unit. A population model would only be of value if better annual herd abundance/composition data and, or, survival data were consistently collected. We assume from observations and harvest data, overall moose numbers are stable to slightly decreasing in trend.

Management Summary

For the first time since we began hunting moose in this herd unit back in 2000, we decreased license numbers for the 2014 hunting season. This decrease was in part an effort to become more conservative with harvest rates, as a precaution, in case moose numbers were approaching our postseason management objective of 100 moose.

Figure 1. Median age of bulls harvested for the Snowy Range Moose herd unit, from lab aged teeth (n=24), Wyoming, 2013.

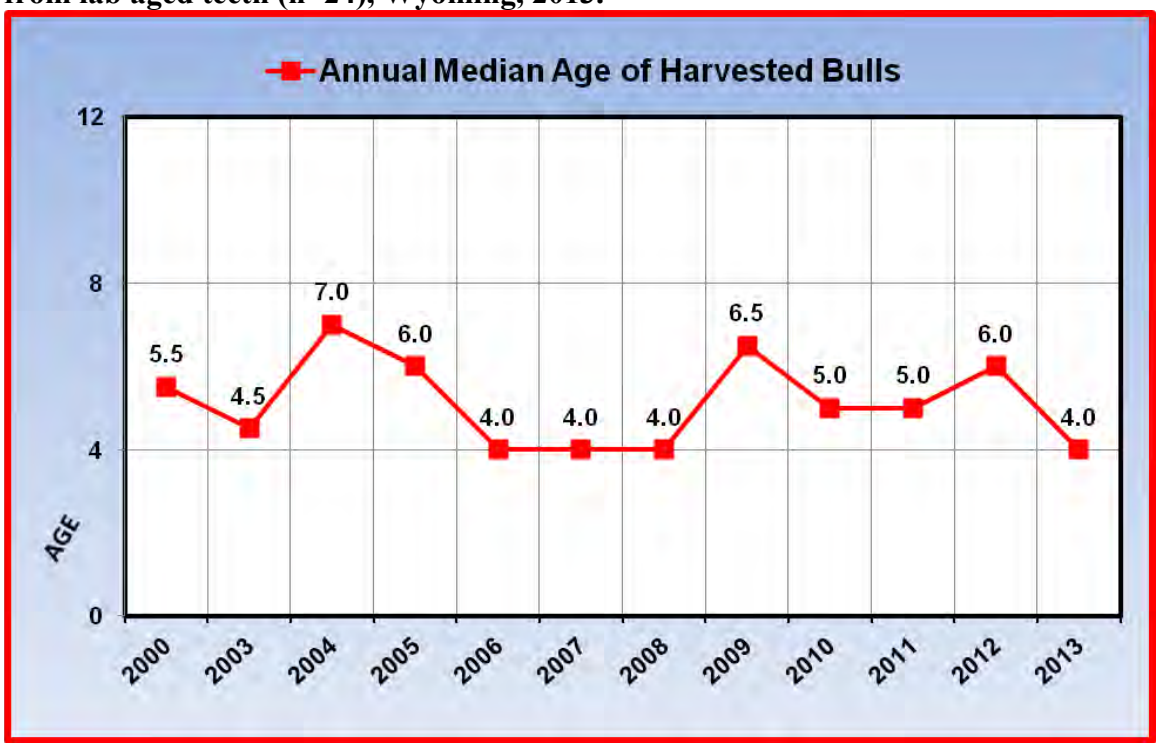


Figure 2. Average (3-year running) median age of bulls harvested for the Snowy Range Moose Herd Unit, from lab aged teeth (n=24), Wyoming, 2013.

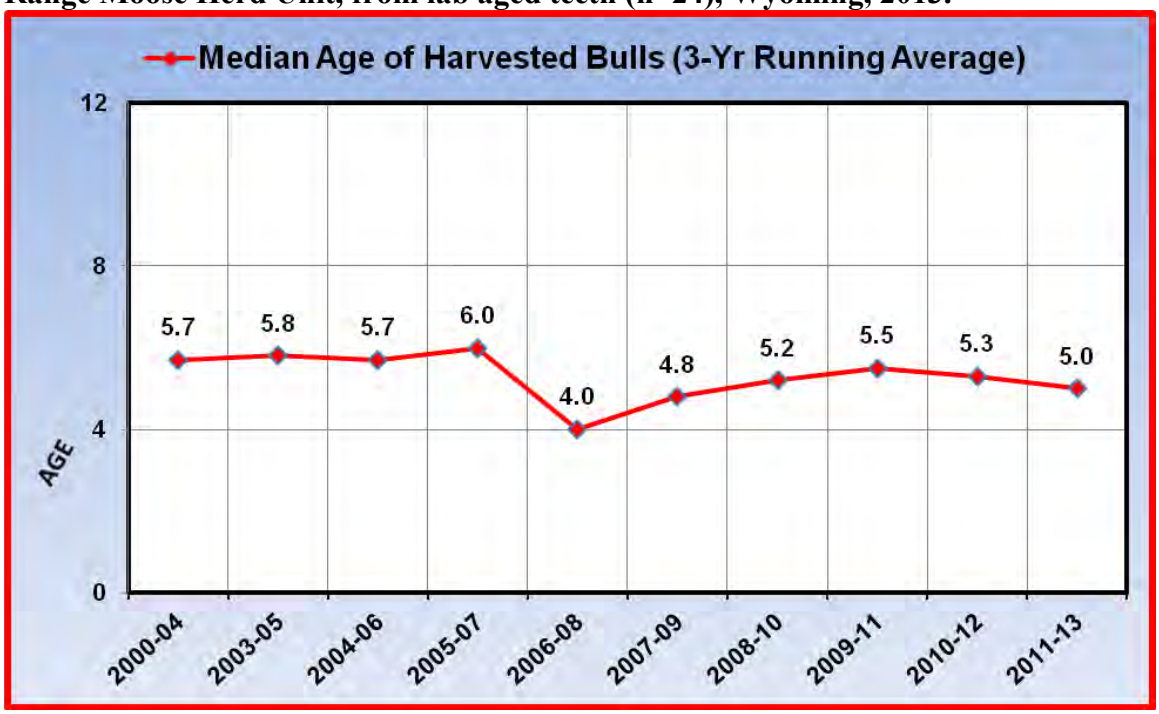


Figure 3. Annual Percentages of the bull harvest ≥ 5-years in age from Snowy Range Moose Herd Unit, from lab aged teeth (n=24), Wyoming, 2013.

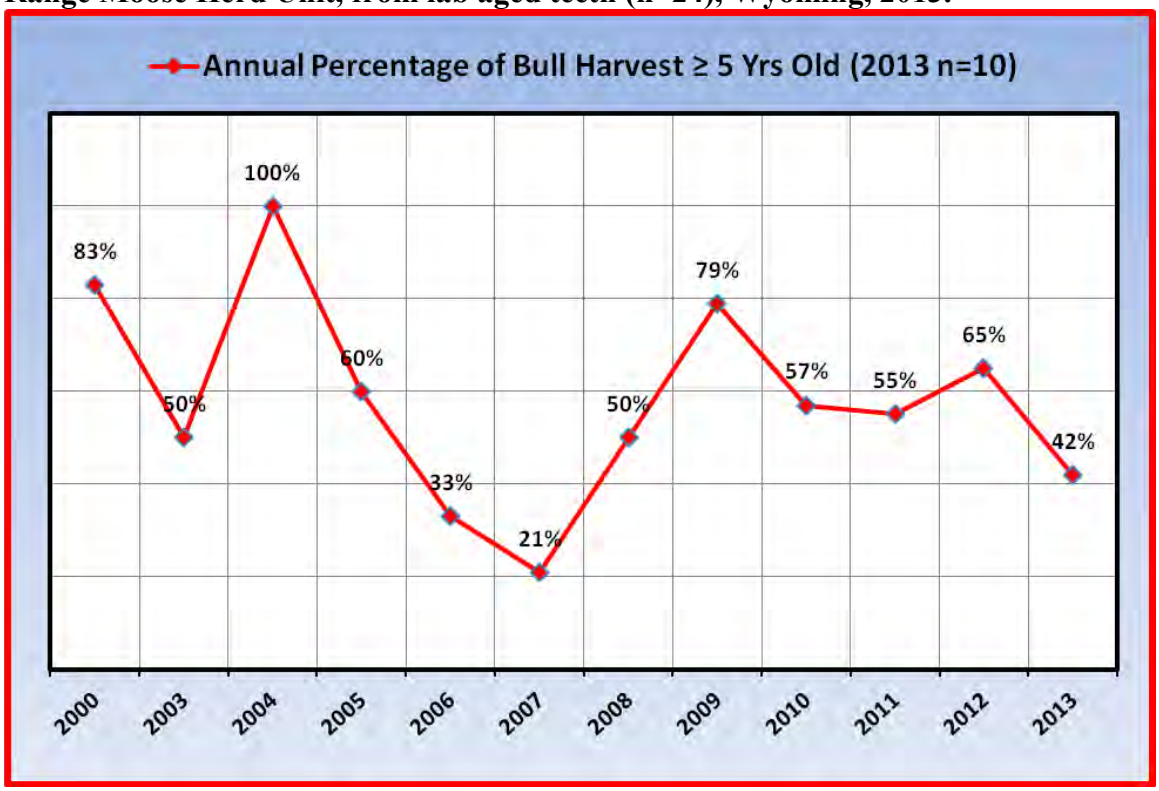
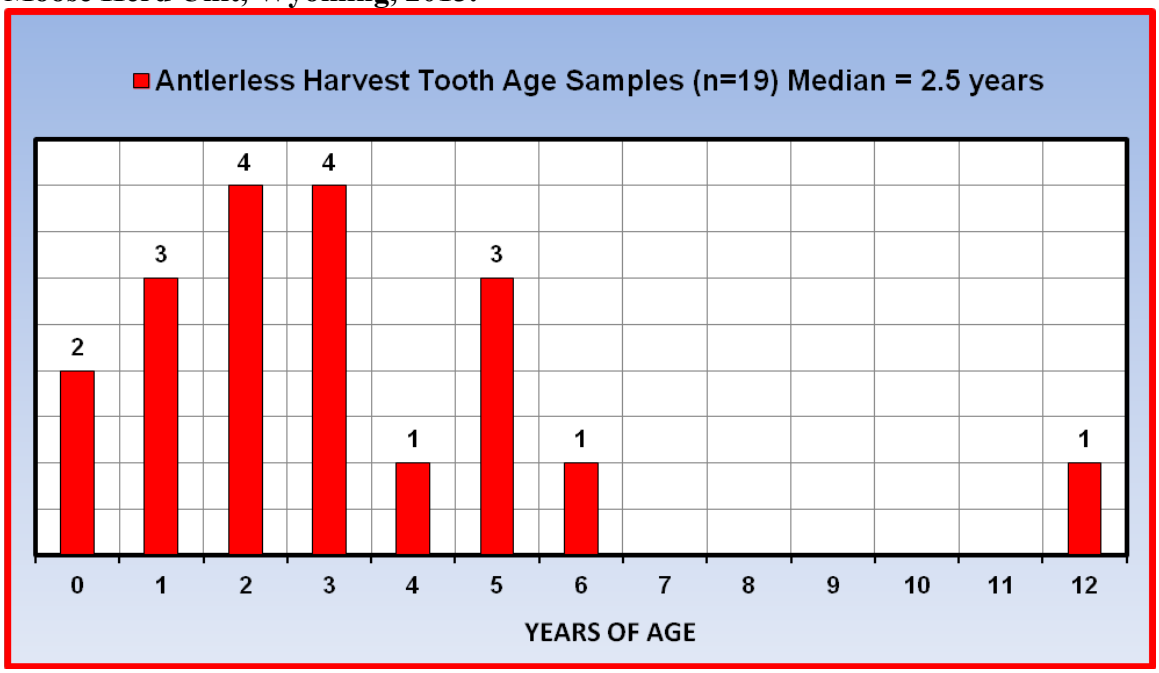


Figure 4. Age class distribution for antlerless moose harvested from Snowy Range Moose Herd Unit, Wyoming, 2013.



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Statewide Moose Habitat Project:

Linking Habitat and Nutrition with Population Performance in Wyoming Moose

Annual Report 2013

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[2]Wyoming Cooperative Fish and Wildlife Research Unit
[3]USGS, Wyoming Cooperative Fish and Wildlife Research Unit
[4]Wyoming Game and Fish Department

Background & Objectives

The Wyoming Game & Fish Department (WGFD), Wyoming Cooperative Fish and Wildlife Research Unit, and the University of Wyoming initiated the Statewide Moose Habitat Project in June 2011. Currently, Shiras moose (*Alces alces shirasi*) herds in the state (Fig. 1) are exhibiting a wide range of population performance, with some declining and some relatively stable or even increasing despite historic declines (Fig. 2). For the declining herds, potential mechanisms that may affect carrying capacity are habitat deterioration due to current and historic overbrowsing (Boertje *et al.* 2007; McArt *et al.* 2009), and regional variation in forage quality due to climatic warming and drying (Monteith *et al.* in review) or other disturbances, such as large, intense wildfire (Vartanian 2011) or bark beetle (*Dendroctonus* spp.) outbreaks. Additionally, a new and growing predator community is present in the northwest corner of the state and may prevent higher recruitment rates from being achieved, but these predators can not account for declines elsewhere in Wyoming, Colorado, and Utah. Further, a newly emergent disease, the carotid artery worm (*Elaeophora schneideri*), appears to be prevalent in Wyoming (Henningsen *et al.* 2012). Unfortunately we do not yet understand the impacts of this disease on the nutritional condition and survival of moose.

In combination with the observed range in population performance, variability of moose habitat (see Vartanian 2011, Monteith *et al.* in review) in the state represents a timely opportunity to evaluate habitat-performance relationships (i.e. local carrying capacities). Such a statewide habitat evaluation could serve as a benchmark to understand the relationship between moose habitat and population performance and would provide the WGFD with "early warning" metrics to predict where and when declines are likely to occur, and would improve the scientific basis of moose population objectives.

This project aims to both understand the role of habitat and nutrition in recent declines in population performance as well as provide managers with tools from which they can assess a populations proximity to carrying capacity and adapt management strategies accordingly. Therefore, we have developed the following objectives:

1. Understand the relationship between resource limitation and herd productivity.
2. Establish meaningful browse condition indices for monitoring and management purposes.
3. Explore alternative 'early warning' metrics to preempt declines in herd productivity.

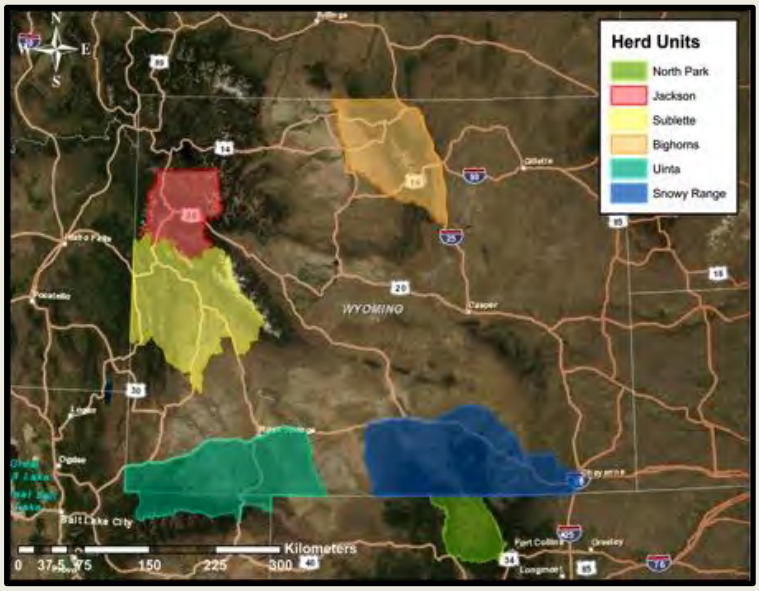


Fig. 1- Map depicting the project study areas.

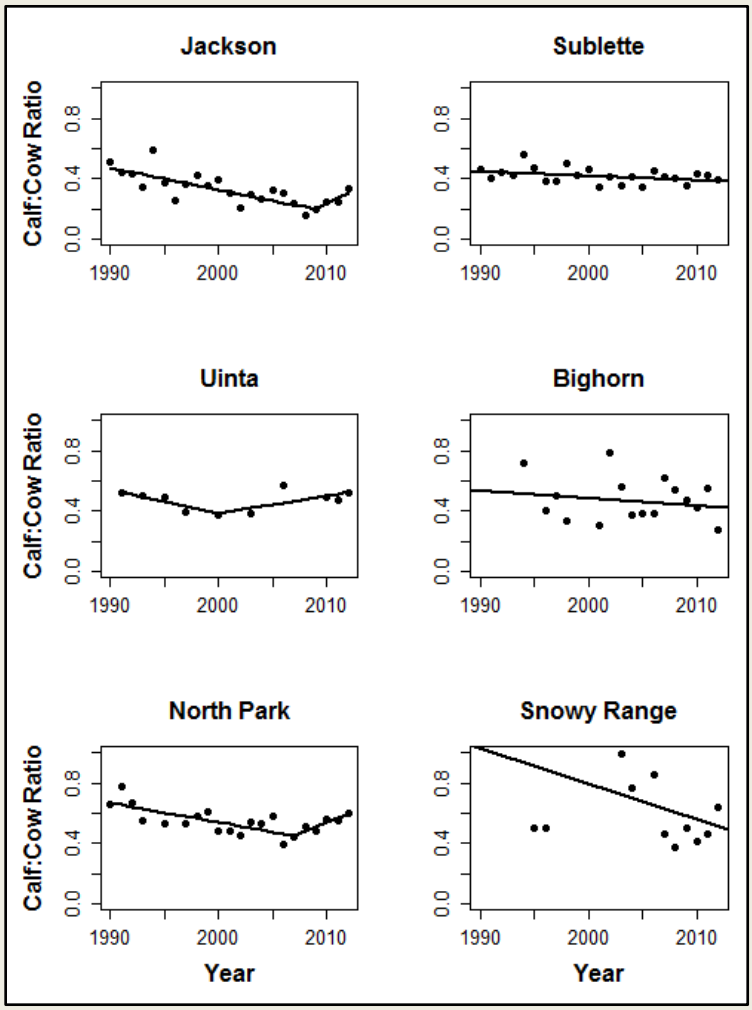


Fig. 2 – Trends in calf-cow ratios from 1990-2012 across our six areas. Trend lines established through piecewise regression. Piecewise regression quantifies multiple differing trends in a single data set. Note that the trend lines represented for the Snowy Range and Bighorn herd units are not statistically significant (P>0.05), meaning slopes are not different than zero.

Research Design & Methods

Vartanian (2011) concluded that **winter-range** was non-limiting to the Jackson moose population because of the underutilization of 'peripheral' winter-ranges that were previously described as heavily used by Houston (1967). Therefore, we used stratified random sampling across core (red) and peripheral (blue) winter ranges (both ranges defined as areas available to overwintering moose) to characterize the extent of willow browse utilization in each of six study areas. To quantify **winter habitat condition**, we used the WGFD Wildlife Observation System (WOS) moose location dataset and a local convex hull (LoCoH) home-range estimator to calculate core (%50 herd-range; red) and peripheral (%95 herd-range; blue) herd-ranges (Figs. 3, 4 and 5). Only WOS location data collected post-hunt from 2000 through 2012 were used in herd-range analyses.

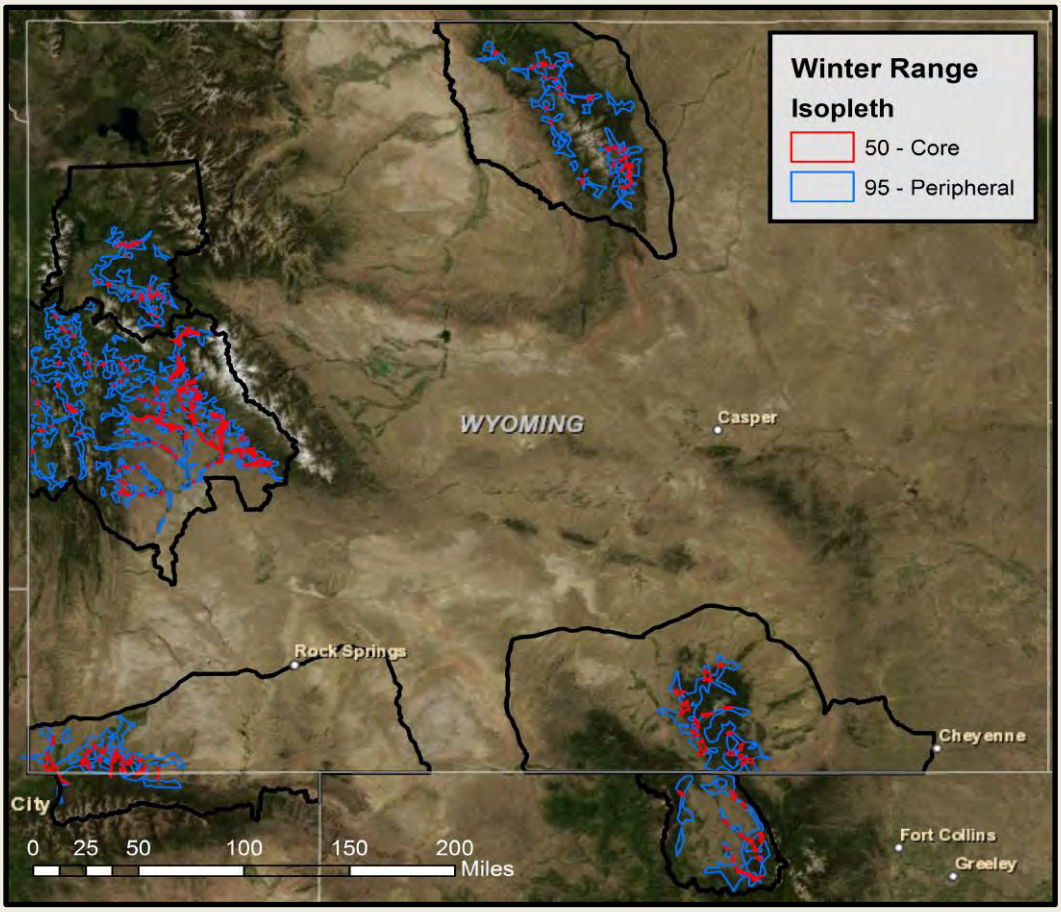


Fig. 3- Distribution of core (50%; red) and peripheral (95%; blue) moose winter ranges across the six study areas. Note- not all core and peripheral areas displayed here were sampled (see pg. 4 for details).

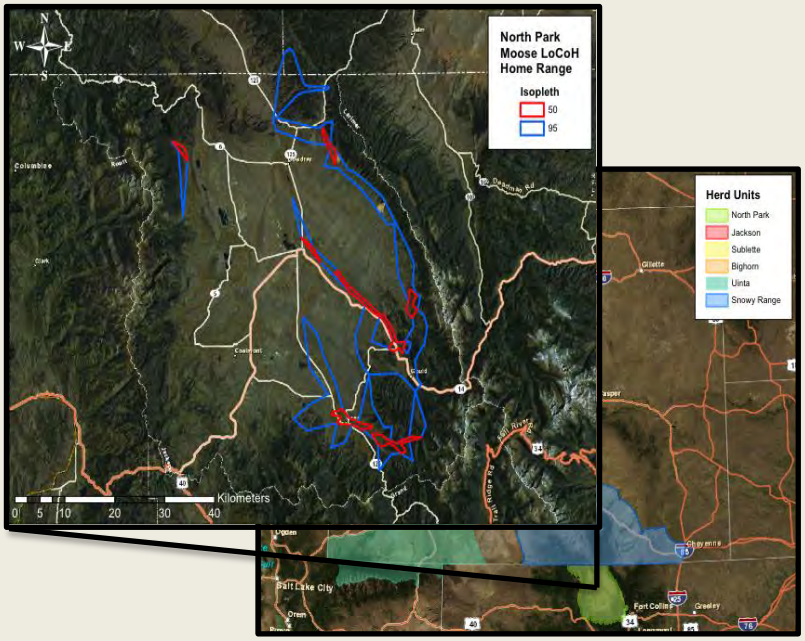


Fig. 4- In each herd unit, such as North Park (shown here), core (red) and peripheral (blue) moose habitat was identified to guide sampling of willow browse conditions and scat (see pg. 5 for details).

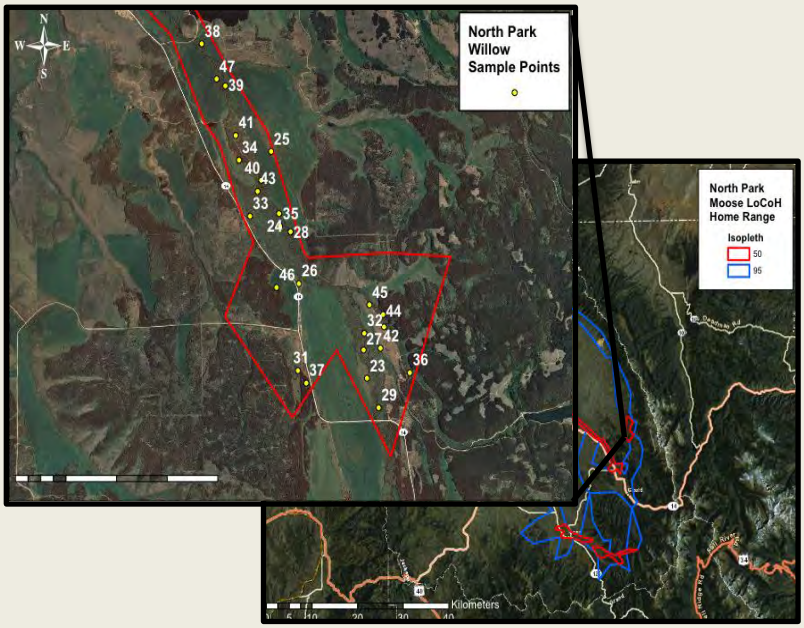


Fig. 5- Within each core and peripheral range, such as North Park's Michigan River (shown here), randomly generated points were drawn in willow habitat to prevent observer bias (see pg. 5 for details).

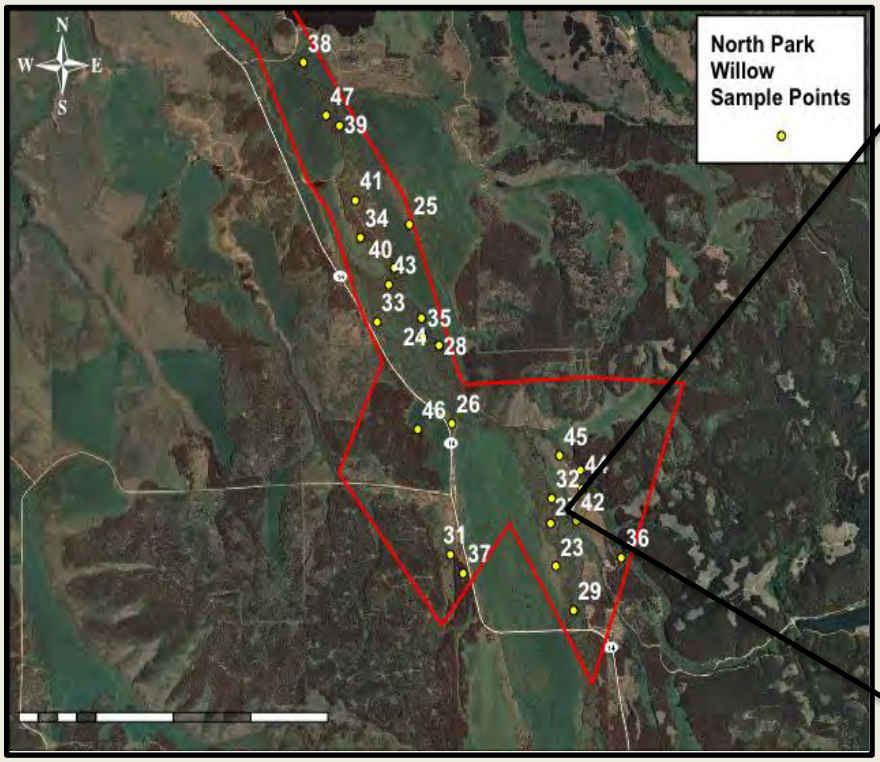


Fig. 6- Map depicting randomly generated sample sites in willow habitat along the Michigan River, Jackson County, CO.

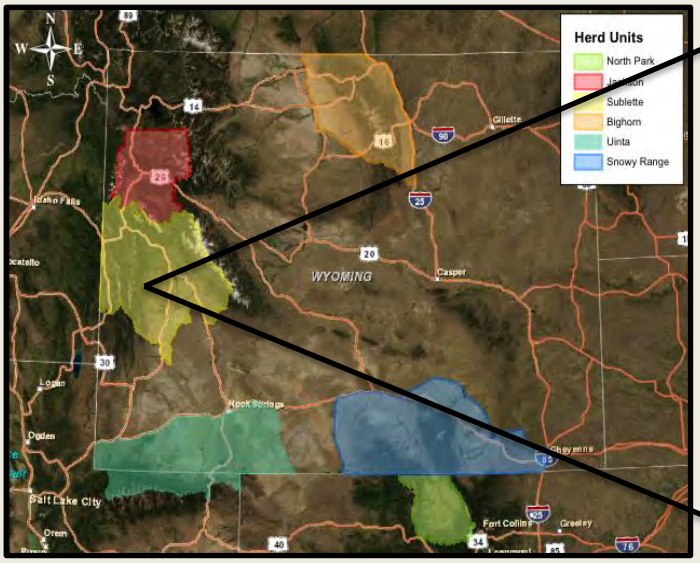
Fig. 7- Technician**,** Allie Hunter, takes an LD reading along Spread Creek, Teton County, WY.

Within core and peripheral ranges we plotted random points with a minimum of 200m spacing between points using a generalized random tessellation stratified (GRTS; Stevens and Olsen 2004) sample generator (R; Sdraw package) to develop a spatially-balanced random sample across the two strata. Using the NLCD we calculated sampling weights by determining the proportional amount of willow habitat in each polygon (i.e. drainage) per herd unit using the tabulate area tool in ArcGIS (ESRI 2011; spatial analyst tools); meaning drainages with relatively greater amounts of willow received greater number of sampling points. In 2012 financial and logistical constraints determined that 30 live-dead (LD; measure of willow condition; Keigley and Fager 2006) transects could be accomplished per herd unit. Therefore, we multiplied the proportion of willow (i.e. sampling weight) in each of the six drainages per herd unit by 30 to calculated the final number of transects per drainage. In 2013 we increased our sample by adding 5-10 transects per herd unit as time permitted. Final sample sites were chosen in the sequential order that they were generated in GIS. However, in some cases a lack of land owner permissions or accessibility inhibited us from sampling in exact sequential order.

We completed LD transects at each randomly selected sampling point across the six study areas (Fig. 6 and 7). According to previously established protocols (see Keigley and Fager 2006; Vartanian 2011; Smith et al. 2011), 20 willow plants of the most preferred species (planeleaf willow (*Salix planifolia)* in the eastern herds, Booth's willow (*Salix boothii*) in the western herds) were measured along a random bearing every 10m starting at each sampling point. LD, leader length of the dominant apical meristem, percent browse, percent decadence, and plant height were recorded at each plant.

To assess **winter diet** (i.e. foraging behaviors) and identify important **winter forages**, we collected scat samples opportunistically and along LD transects (Fig. 8) according to a sterile protocol developed to eliminate cross contamination. We only collected scats that appeared to be fresh and were determined to have originated from an adult moose according to morphometrics (i.e. size). Using molecular techniques we will group scat piles by individual and determine sex prior to diet and **pregnancy** analyses (via progestagen analysis; Monfort et al.1993), and potentially assess nutritional state via additional hormone (triiodothyronine (T3) and glucocorticoid (GC)) assays (Wasser et al. 2000, 2010). Progestagen, T3 and GC thresholds will be validated using scats, blood samples and ultrasonography data collected during captures associated with the Sublette and Uinta moose studies.

Fig. 8- Scats found along North Horse Creek, Sublette County, WY.



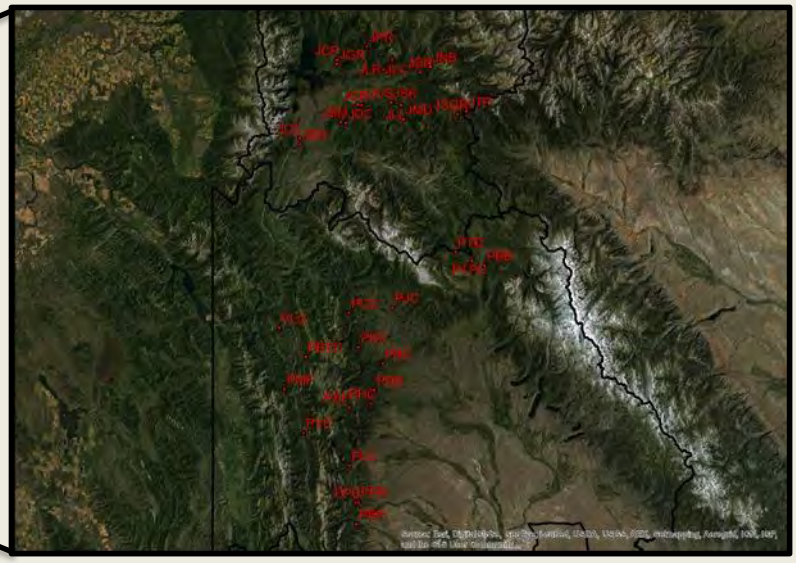


Fig. 9- Map depicting randomly generated sample sites across different habitats where summer scats were sampled in Sublette and Teton Counties, WY.

To characterize the range of **diets** (i.e. foraging behavior) and the **quality of forages** used by moose on **summer ranges**, we once again employed a stratified random sampling design. Due to the widely-reported preference for riparian and upland shrub forage amongst moose inhabiting montane regions of North America (e.g., Renecker and Schwartz 2007), we chose two strata consisting of: (1) willow habitat, and (2) all other upland habitat types (i.e. deciduous forest, coniferous forest, mixed deciduous and coniferous forest, shrub-scrub, grassland-herbaceous, and emergent herbaceous wetlands) as defined by the NLCD. We again used a generalized random tessellation stratified sample generator to develop a spatially-balanced random sample across the two strata (Fig. 9). To ensure that our scat-dog teams found as many fecal samples as possible, we restricted our search effort across strata to the top 25% quantile (summer core area) of the Baigas *et al*. (2010) summer RSF model. Logistical and financial constraints determined that 20 transects (10 willow, 10 upland) per herd unit (i.e. statewide n=120) could be completed within a single season. We chose sampling points in sequential order from which they were drawn until 10 samples from each strata were established using the following criteria: (1) < 1500m from a drivable road due to the limited distance in which a working dog can travel on any given day, (2) the willow patch must have been $\geq$ 2000m in Euclidean length, and (3) the patches were within a logistically feasible proximity (daily travel distance) to another sampling point whereby we could complete two transects per day. Each transect started at, or intersected with, the sampling point.

We collected moose scats along each transect when present (see figs. 10 and 11) using a sterile protocol. Currently, we are extracting DNA from scats (see pg. 6) to determine individuality and sex prior to diet (microhistology or qPCR) and forage quality (fecal nitrogen) analyses.

Fig. 10- Map illustrating a scat transect (5-6 km each) in willow habitat. Kilgore Creek, Sublette County, WY.

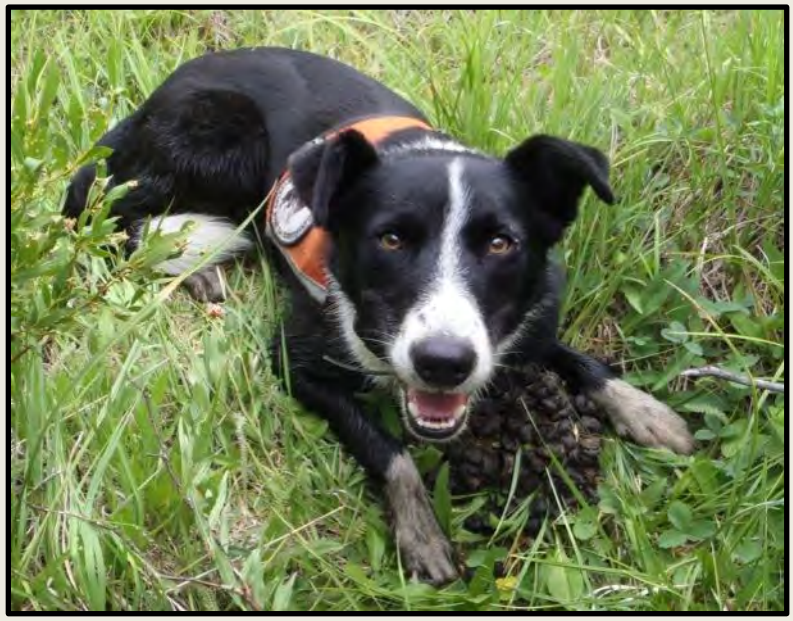
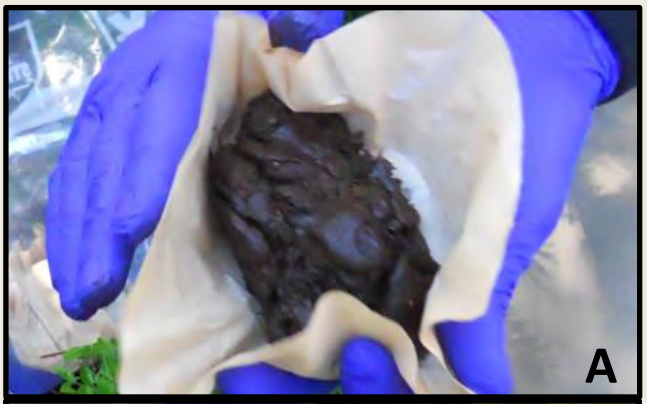


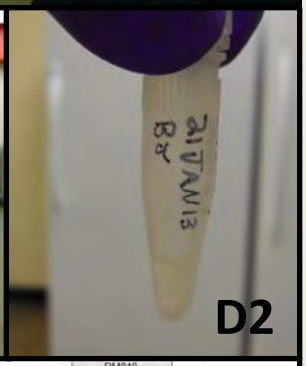
Fig. 11- Orbee the detection dog is very proud of his find (mostly he just wants his reward; a short game of fetch with a ball).

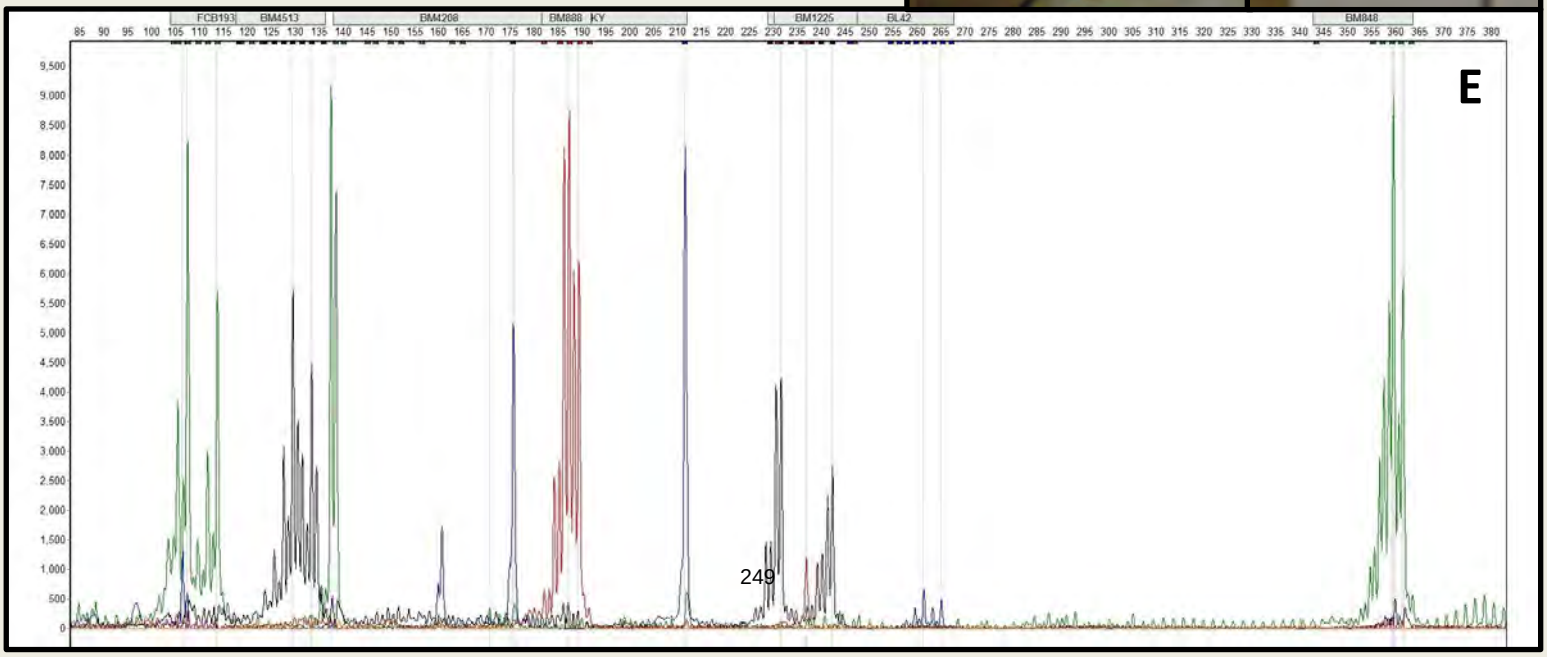
Only ‘fresh’ (i.e. typically <1 week old) scats were collected along each transect. When a fresh scat was identified, approximate age, GPS location, and habitat information was collected. The scat was then wrapped in non-bleached filter paper (coffee filters) and placed inside a plastic freezer bag on a bed of silica desiccant (photo A). The desiccant removed moisture from the scat during the day while we were in the field to help reduce bacterial action which degrades genetic material. Scats were placed in a portable battery/propane-powered freezer immediately upon returning to the campsite; followed by a cryofreezer once returning to the University of Wyoming.

Most of the DNA in moose feces is found in a ‘mucusy membrane’ on the outside of the ‘pellets’ where intestinal cells are sloughed off as the pellets move through the intestinal track. We collect portions of this ‘mucusy membrane’ (photo B) and place in vials with a substance that breaks down cell walls to release the genetic material (photo D1). We used a modified ‘ungulate’ DNA extraction protocol tailored specifically for moose scat in combination with Qiagen- QIAamp DNA stool mini kits© to obtain purified DNA products (photo D2).

Through a series of chemical reactions (photo C) we duplicate the DNA many times over and characterize nine specific portions of the genome that allow us to ‘fingerprint’ the sample so that we can identify which individual the scat came from and its sex (photo E). For example, photo E depicts nine microsatellite loci, represented by black, green, red and blue ‘peaks’, amplified from one individual moose tissue sample. The two tall blue peaks near the middle of the graph represent genetic products associated with the X and Y chromosomes; meaning this individual is a male. This process is extremely similar to that used by criminal forensic scientists and has been streamlined so that individual and sex identifications can be assessed simultaneously. We repeat this process 2-3 times for each of 1022 fecal samples we have collected and use computer software to match the samples to individual moose.



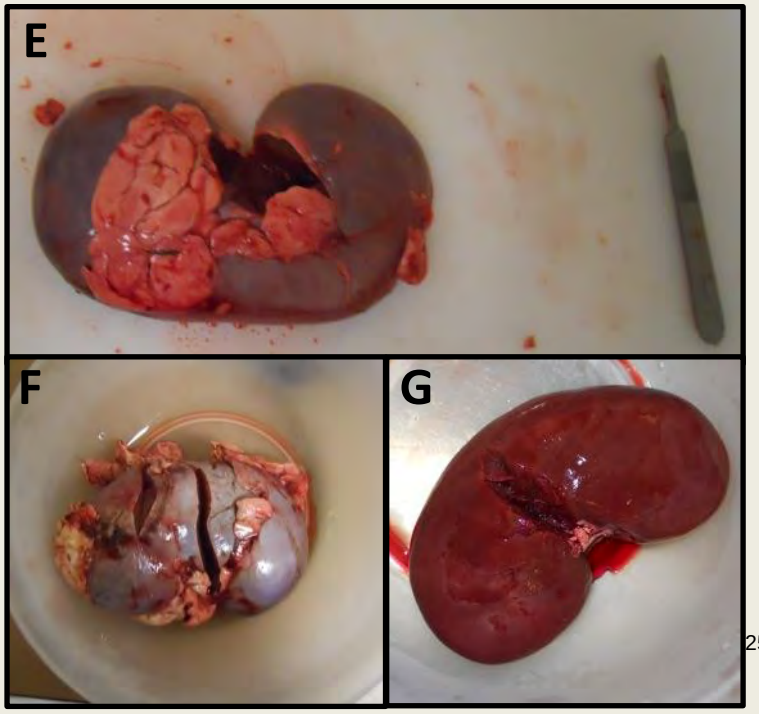


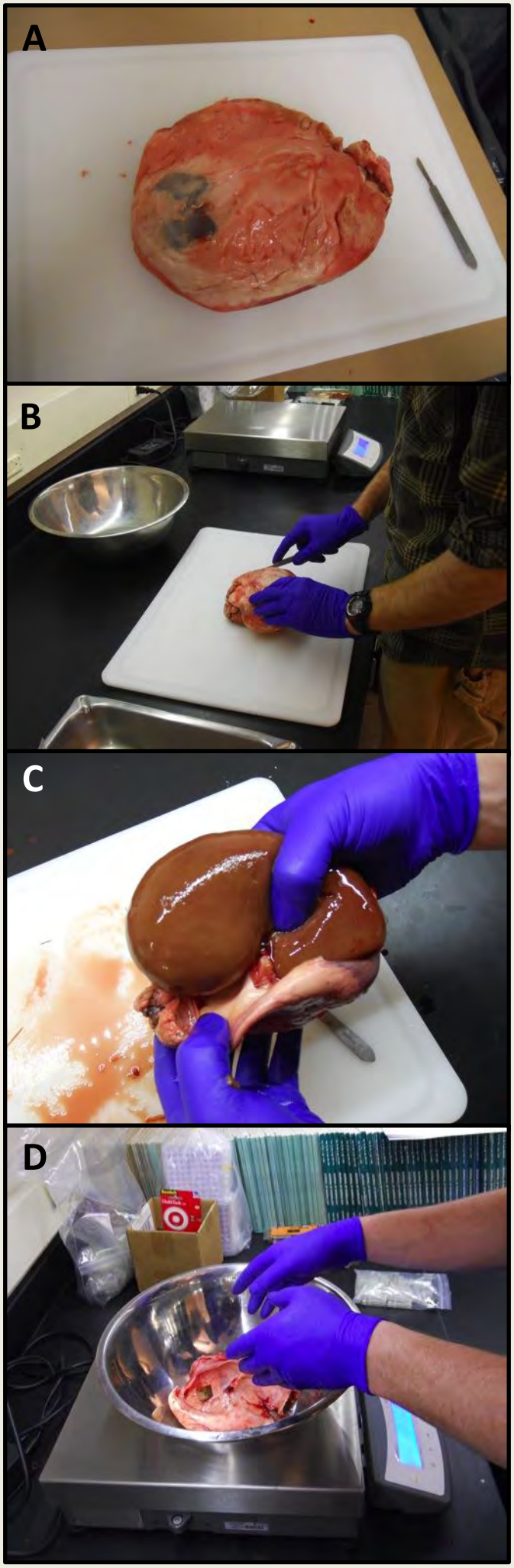


To understand how winter habitat condition and quality, and summer diet and forage quality affect the **nutritional condition** of moose, we are measuring autumn kidney fat. The amount of fat found attached to the kidney is a good predictor of total body fat in moose (Stephenson *et al*. 1998). We collaborated with the WGFD, Colorado Division of Parks and Wildlife (CDPW) and the Utah Division of Wildlife Resources (UDWR) to solicit hunters to collect kidneys from harvested moose. With each kidney, hunters and WGFD, CDPW and UDWR biologists noted sex, age, location of harvest (hunt area and drainage or GPS location), antler size (if any), and parasite information.

Kidneys were gathered by regional WGFD, CDPW and UDWR personnel and delivered to the University of Wyoming where we measured kidney fat levels according to the long-standing method of Riney (1955). Briefly, the kidney fat method requires an undisturbed kidney (photo A; identification of disturbed kidneys described below), trimming of excess fat to standardize the area of fat measured (photo B), removal of the fat and perirenal membrane (photo C), and a weight measurement of both the kidney and the kidney fat (photo D).

While processing each kidney, we noted whether or not the kidney and its fat appeared to be disturbed. Because some hunters are unfamiliar with moose anatomy and the exact location of the kidneys, they sometimes cut through visceral fat or the visceral cavity too quickly and end up cutting into the kidney fat (photo E) and even the kidney itself (photo F); and sometimes hunters even mistakenly removed all of the kidney fat (photo G). We omitted all samples from the final dataset that showed evidence of the fat being disturbed.





Preliminary Results

All results constitute preliminary summaries, not final statistical analyses, and should be interpreted with caution. Additionally, the data presented here only reflects autumn nutrition of moose and winter habitat condition (i.e. quantity of forage). Because winter habitat condition is only one of many factors that may influence autumn nutritional condition in moose (Parker *et al*. 2009), these trends may be strengthened or weakened once winter and summer diet and forage quality are included in the dataset. In fact, due to metabolic demands, summer forage quantity and quality is often considered to be more important to overall nutritional condition and pregnancy rates than winter forage condition or quality (Cook *et al*. 2004). It is also important to note that we only present nutritional condition data associated with male moose. The current and past (i.e. 1-2 years prior) reproductive history of all harvested female moose from which we received kidneys was unknown. The energetic demands associated with gestation, lactation, and calf rearing are important factors in determining autumn nutritional condition, and therefore likelihood of pregnancy, in ungulates (Parker *et al.* 2009). Consequently, we chose to use males as our indicator of nutritional condition at the population level because they are not influenced by as many factors as females. Even though males do not represent the reproductive portion of the population, and therefore have less influence of population performance, their nutritional condition remains an excellent indicator of habitat quality (Parker *et al*. 2009).

We completed 349 LD transects, representing 6980 individual willow plants measured, during 2012-2013. During 2011-2012 we analyzed 346 undisturbed kidneys for nutritional condition assessment. In 2013 we collected an additional 190 kidneys to supplement our sample. Nutritional condition was significantly different between the six herd units (Fig. 12; ANCOVA: P=0.02; note small sample size in Jackson). Willow condition according to the LD index was also significantly different amongst herd units (Fig. 13; ANOVA: P=<0.001). Interestingly, Baigas (2008) reported to the WGFD even poorer LD values for planeleaf willow. Also, we found that LD values for planeleaf willow and Booth's willow differed (T-test: P=<0.001). It is important to note that, although LD measures for all herd units dominated by planeleaf are statistically similar, the herd units exhibiting greater overall variation in willow condition (i.e. more patches in relatively good condition) are those herd units which are exhibiting better population performance (see figs. 14 and 15). Planeleaf is highly preferred by all large herbivores and consistently

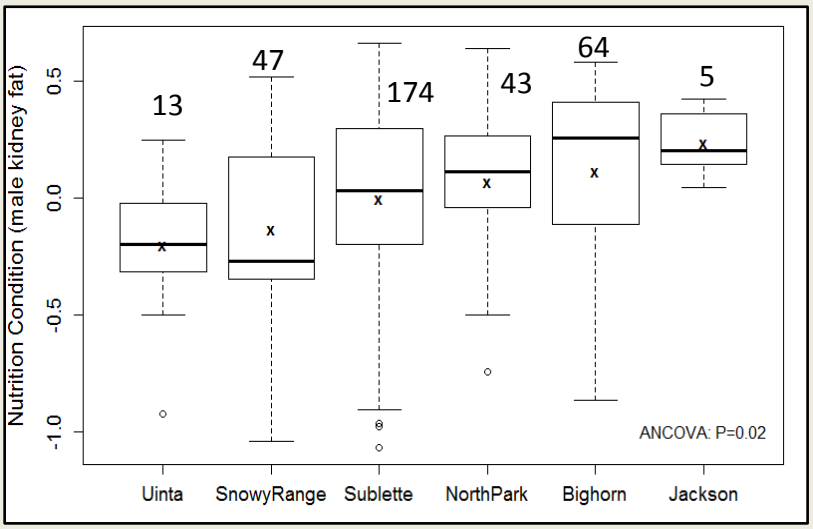


Fig. 12- Variation in male nutritional condition. X's represent means, bars represent medians, vertical lines represent the data range, circles represent outliers, and numbers represent sample sizes.

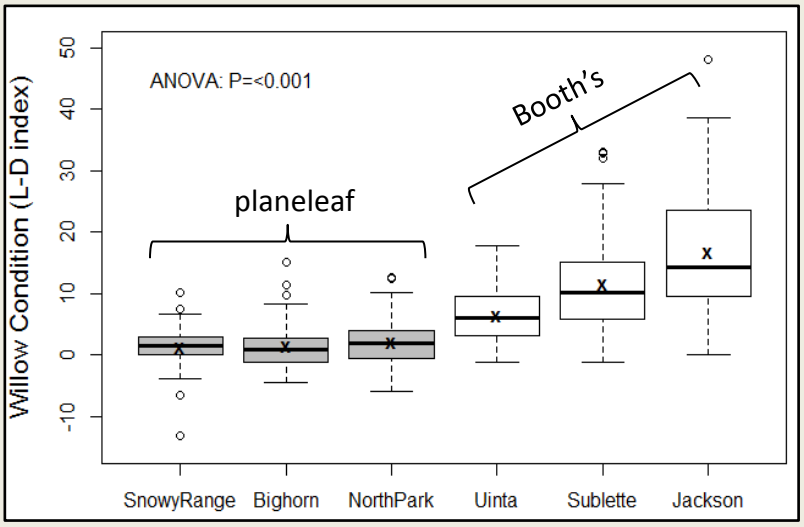
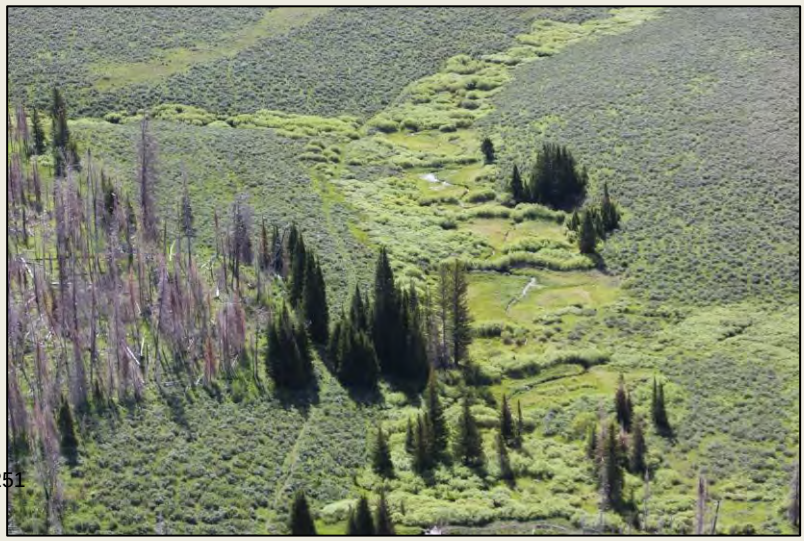


Fig. 13- Variation in willow condition. X's represent means, bars represent medians, vertical lines represent the data range, circles represent outliers, and numbers represent sample sizes.



browsed heavily. We further summarize the data using the means (x's) from figures 14 and 15 to assess the general relationships between winter forage condition, nutritional condition, and population performance (i.e. recruitment rates). Figure 14 suggests a positive relationship between winter willow condition and population performance. Figure 15 reveals that male nutritional condition in autumn is likely a good indicator of local population performance. Being able to observe relationships between winter-range willow condition and population performance, and autumn nutritional condition and population performance using simple summary statistics is an encouraging result. We suspect that we will be able to make strong linkages between habitat, nutritional condition and population performance once we assess summer and winter forage selection and quality.

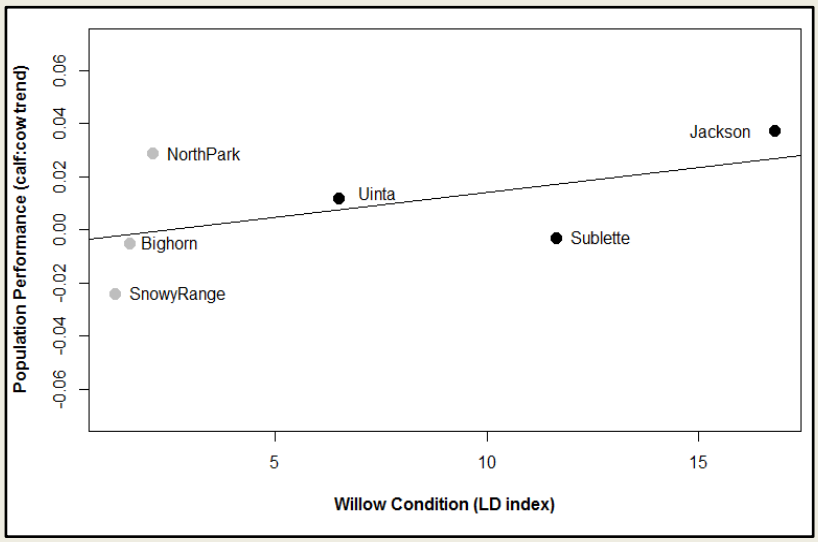


Fig. 14- General relationship between willow condition and nutritional condition of moose. Herd units dominated by the highly preferred planeleaf willow (grey circles) decline in performance as variation in willow declines, whereas herd units dominated by Booth's will decline in performance as overall willow condition declines (see fig. 13 and page 8 for details).

Current and Future Work

We continue to work towards achieving our objective of linking habitat and nutrition to population performance (Fig. 16), and suspect to complete the project during the fall of 2014. We are making daily progress with DNA extractions and genotype analysis. In 2013 we completed and a second round of winter scat collections willow condition transects. Additionally, we completed a third round of kidney collections, which represents the finalization of our field efforts. During spring 2014 we plan complete genetic analyses of 1022 fecal samples and obtain finalized diet composition, diet quality, pregnancy and spring nutritional condition data sets. Once data production is completed, we will produce comprehensive reports for state and federal agencies, provide presentations and materials for the general public, and publish our results in peer-reviewed scientific journals during summer and fall 2014.

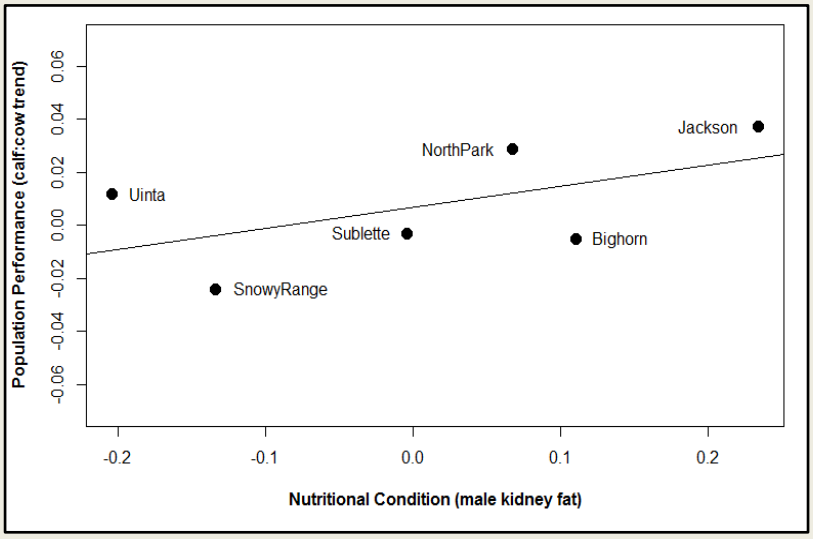


Fig. 15- General relationship between moose nutritional condition and population performance.

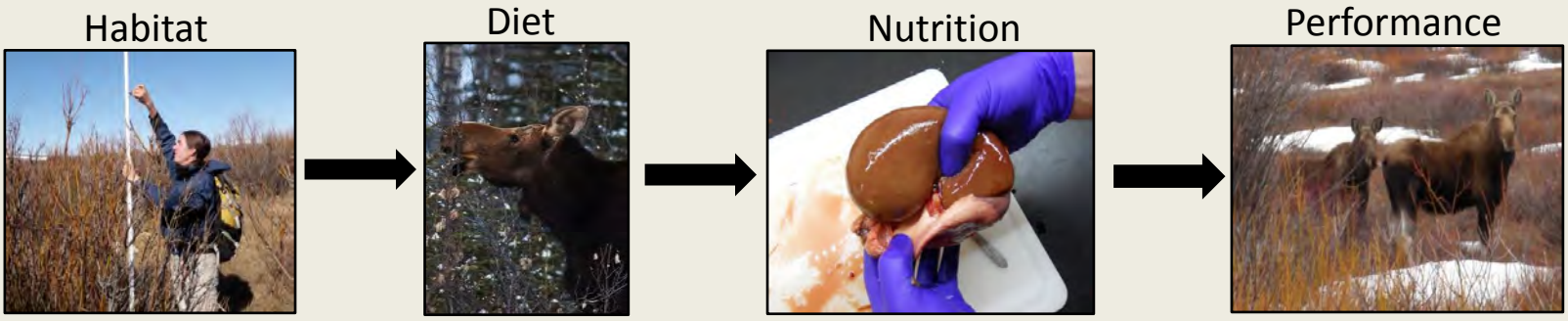


Fig. 16- General conceptual model depicting the linkages between habitat condition, diet quality and composition, and nutritional condition to population performance in Shiras moose. Once we able to quantify how these factors influence population performance, we will be able to provide managers with tools that will allow them to understand the proximity in which their population is to carrying capacity, and hence adapt management strategies accordingly.

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Phillip Damm
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Lizza Protas
Lyn Snoddy
Clint Atkinson
Thomas Day
Tina Helseth
Mark Baran
Caitlin Danies
Daniel Greenwood

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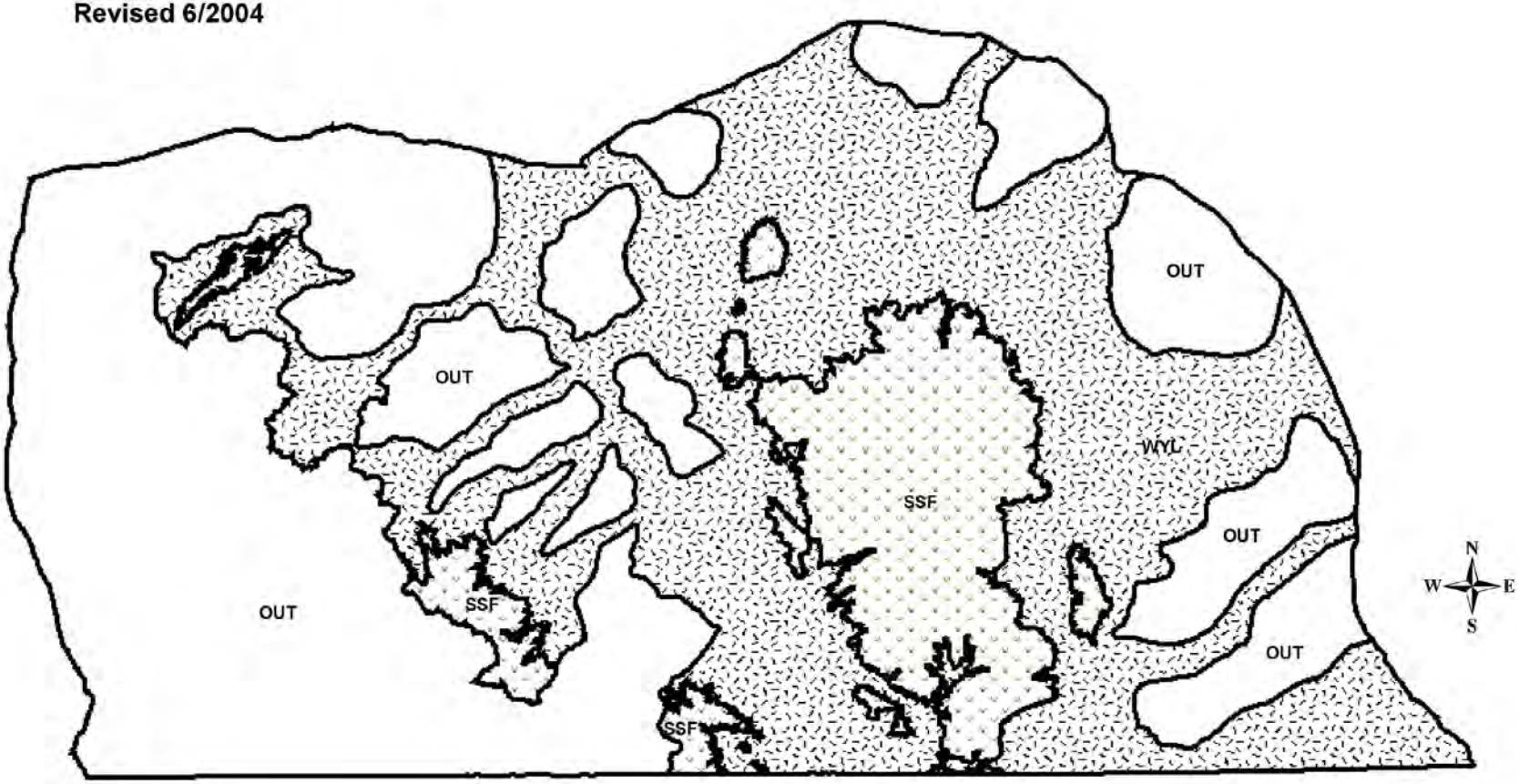
Moose (M545) -- Snowy Range/Sierra Madre
HA 38, 41
Revised 6/2004



2013 - JCR Evaluation Form

SPECIES: Mule Deer | PERIOD: 6/1/2013 - 5/31/2014

HERD: MD534 - GOSHEN RIM

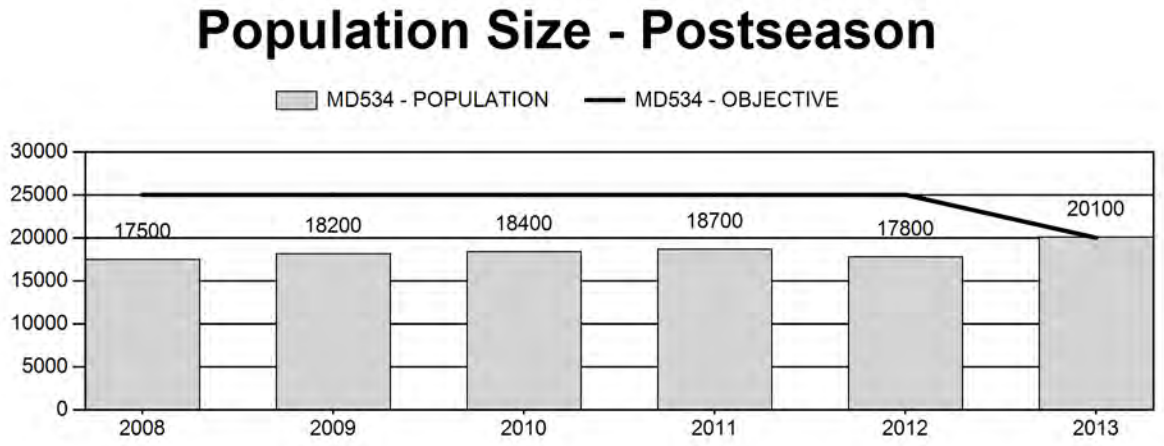
HUNT AREAS: 15-16, 55, 57 | PREPARED BY: MARTIN HICKS

	2008 - 2012 Average	2013	2014 Proposed
Population:	18,120	20,100	19,800
Harvest:	772	678	1,035
Hunters:	1,655	1,463	1,435
Hunter Success:	47%	46%	72 %
Active Licenses:	1,712	1,542	1,465
Active License Percent:	45%	44%	71 %
Recreation Days:	6,189	5,858	7,000
Days Per Animal:	8.0	8.6	6.8
Males per 100 Females	33	28	
Juveniles per 100 Females	62	58	

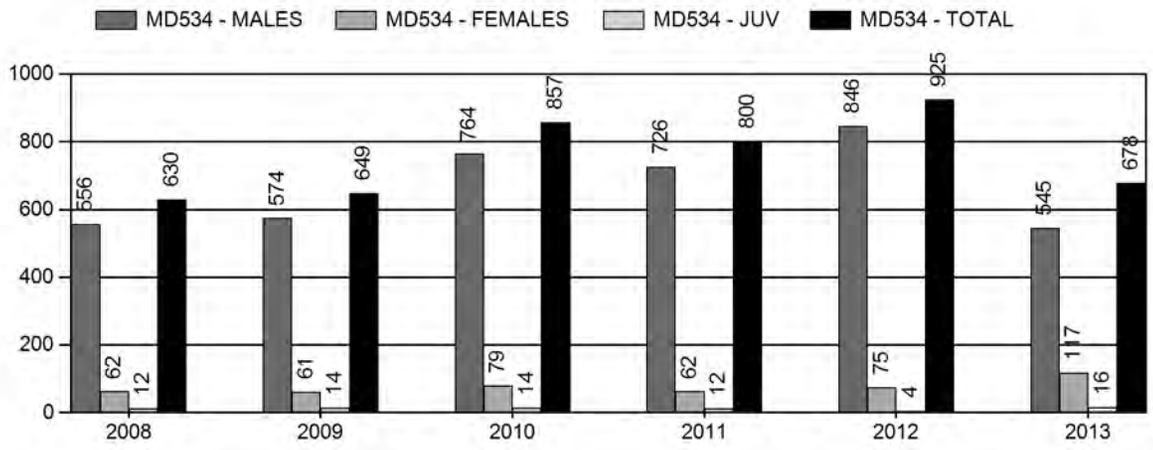
Population Objective:	20,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	0%
Number of years population has been + or - objective in recent trend:	7
Model Date:	03/04/2014

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

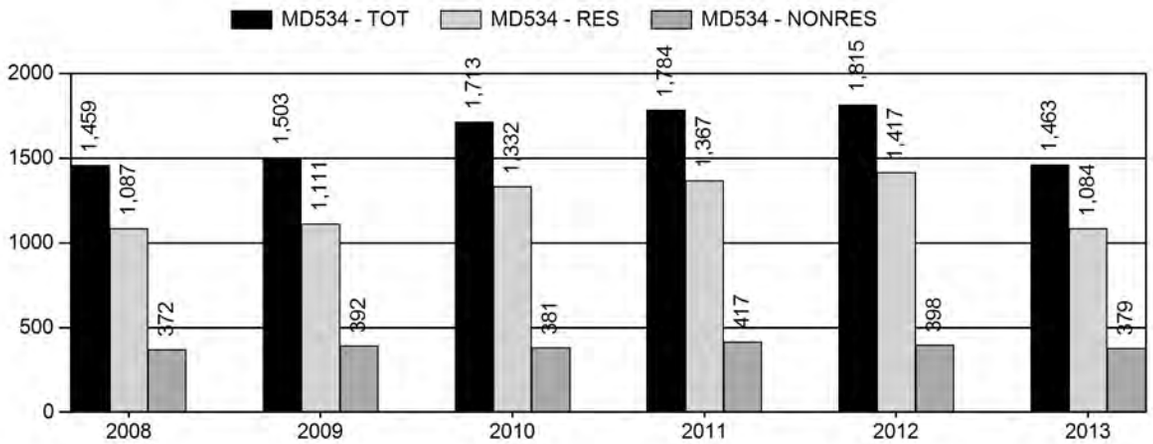
	JCR Year	Proposed
Females ≥ 1 year old:	1%	1%
Males ≥ 1 year old:	10%	12%
Juveniles (< 1 year old):	.2%	0%
Total:	3%	3%
Proposed change in post-season population:	+12%	0%



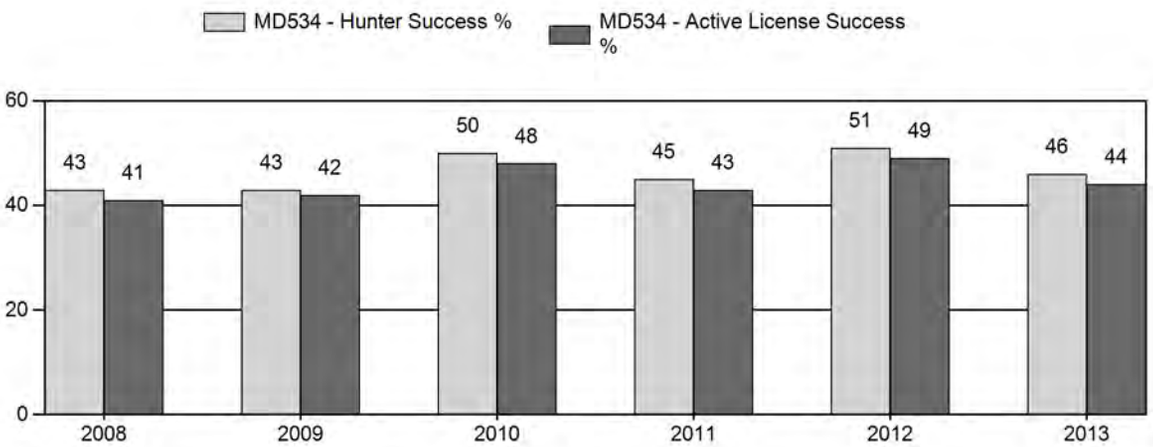
Harvest



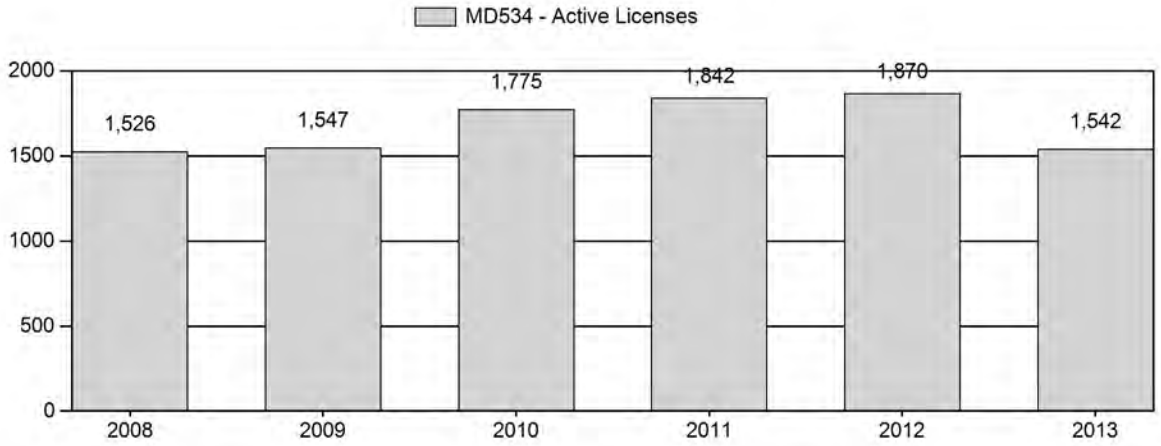
Number of Hunters



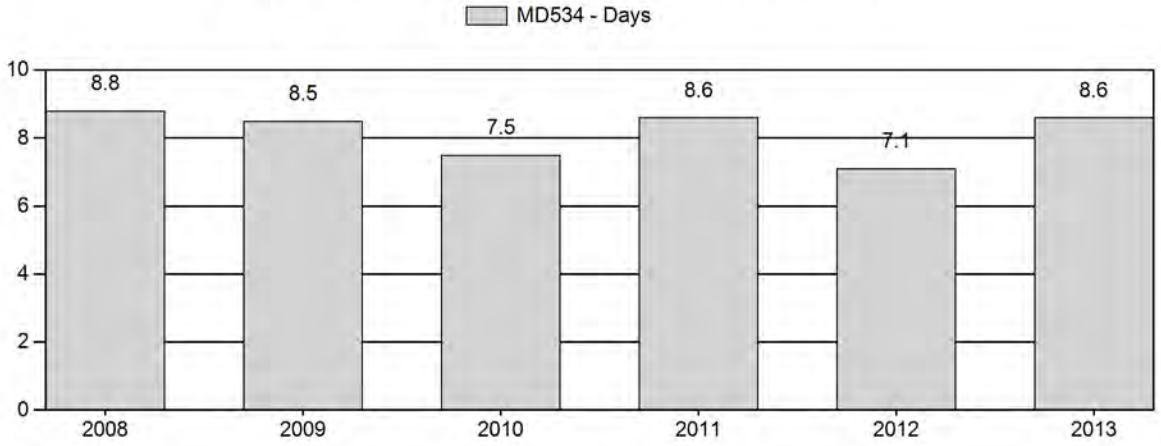
Harvest Success



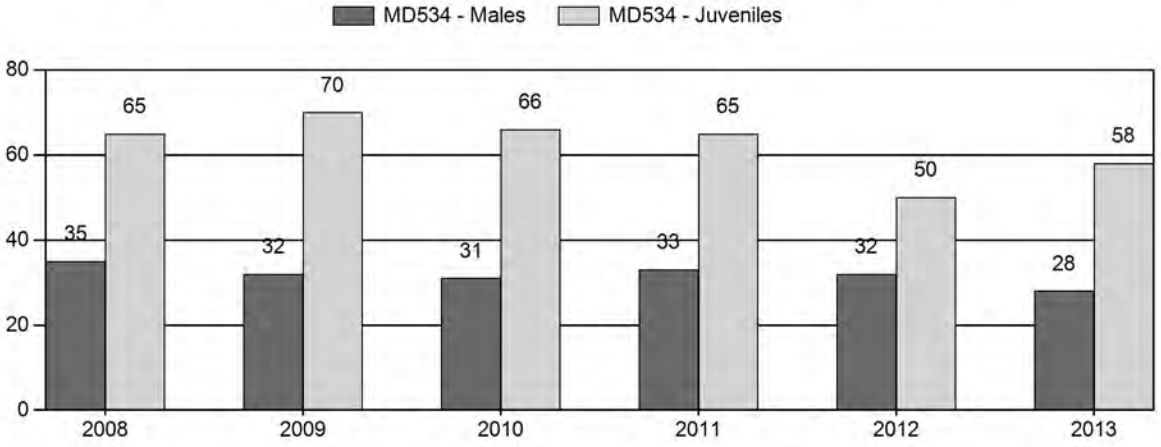
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Mule Deer Herd MD534 - GOSHEN RIM

		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
2008	17,500	57	106	163	18%	462	50%	299	32%	924	1,143	12	23	35	± 4	65	± 6	48
2009	18,200	44	98	142	16%	442	49%	311	35%	895	1,210	10	22	32	± 4	70	± 7	53
2010	18,400	80	125	205	16%	668	51%	440	34%	1,313	1,123	12	19	31	± 3	66	± 5	50
2011	18,700	116	226	342	17%	1,031	51%	665	33%	2,038	1,364	11	22	33	± 3	65	± 4	48
2012	17,800	121	192	313	18%	977	55%	487	27%	1,777	1,076	12	20	32	± 3	50	± 3	38
2013	20,100	39	176	215	15%	776	54%	451	31%	1,442	1,235	5	23	28	± 3	58	± 4	46

2014 HUNTING SEASONS
GOSHEN RIM MULE DEER HERD UNIT (MD534)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
15	Gen	Oct. 1	Oct. 14		General license; antlered mule deer or any white-tailed deer.
	6	Oct. 1	Dec. 31	350	Limited quota; doe or fawn
Region T				400	
Archery		Sept. 1	Sept. 30		Refer to Section 3 of this Chapter

Hunt Area	Type	Quota change from 2013
15	6	+325
16	2	-50(deleted)
16	6	-100(deleted)
55	6	-100(deleted)
57	6	-75(deleted)
Total	2	-50
	6	+50

Management Evaluation
Current Management Objective: 20,000
Management Strategy: Recreational
2013 Post-season Population Estimate: ~20,100
2014 Post-season Population Estimate: ~19,800

Herd Unit Issues
The management objective for the Goshen Rim Mule Deer Herd Unit was changed from 25,000 to 20,000 and Hunt Areas 15,16,55,57 were combined into Hunt Area 15 as a result of internal recommendations and public input during the 2013 herd objective review process. The management strategy is recreational management with a post-season buck ratio range of 20-29 bucks:100 does.

The 2013 post-season population estimate was approximately 20,100 mule deer with the population stable to slowly trending up. Restricted access makes it difficult to manage this herd. Access is provided by; isolated private land experiencing damage, small parcels of state, BLM lands, and private lands enrolled into the Department's PLPW program. Without paying a trespass/trophy fee or hiring an outfitter hunters have a difficult time harvesting a mature mule deer buck. Landowners and hunters would like to see an increase in mule deer, but without major habitat revitalization (for part of the year mule deer are dependent on irrigated and dryland agriculture fields) this herd unit will most likely remain between 15,000 and 20,000 mule deer. Buck ratios are anticipated to remain on the higher end of the recreational management strategy due to private land (92% of the occupied habitat). However, public land hunters will continue to

have a difficult time finding a mature buck due to the majority of land being held in private ownership.
Major landscape changes have been occurring in the southern portion of the herd unit. Urban sprawl continues to increase north and east of Cheyenne as well as industrial (methane production) development in Laramie County. The USDA's Conservation Reserve Program (CRP) has experienced a decline in productivity and quality of perennial forage throughout the herd unit. The conversion of dryland (wheat fields) cropland to CRP in the past provided favorable fawning and winter cover for mule deer. These stands are now monotypic stands of unfavorable perennial grass (i.e. smooth brome and crested wheatgrass) and no legume component that provide little if any habitat benefits.

Weather

Weather during 2013 and into 2014 was wetter and colder than normal. Post-season fawn ratios of 58:100 were 14% higher than 2012 and were slightly higher than the ten-year average of 45:100. The increase is most likely a result of mild winter conditions and above average summer/fall moisture. Ungulates went into the winter in good body condition as a result of the fall moisture. Winter conditions were somewhat mild with low snowpack but with periods of extreme cold temperatures followed by periods above freezing. A high winter mortality rate is not expected. Refer to the following websites for weather data: http://www.ncdc.noaa.gov/temp-and-precip/time-series/ and http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html.

Habitat

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality to heavily influence population management for any particular big game species. Shrub communities within the Laramie Region that are annually assessed by terrestrial habitat biologist, wildlife biologist and game wardens include: True mountain mahogany, Antelope bitterbrush, Skunkbrush sumac, Big sagebrush, and Fourwing saltbush. The majority of the transects were established approximately 12 – 13 years ago. Transects were established for several different primary reasons, but may have included: measuring habitat response prior to or following treatments (i.e. prescribed fire, wildfire, mowing), concern over historic or current domestic livestock or wild ungulate utilization levels, selection of "representative habitats" utilized by wildlife on identified winter ranges, or other. Turnover in personnel, changes in individual job responsibilities of employees, and evolving WGFD agency priorities have resulted in some issues with consistent habitat data collection and interpretation of data. Some transects, years after their initial establishment, have been identified as being in "non-representative" locations. Site selection was often influenced by terrain and/or land ownership status (i.e public access). Changing land uses (wind turbines, roads, fence construction, other developments, etc.) have influenced habitat use by wildlife in some locations, and in some instances have resulted in major shifts in animal usage of the area being monitored. Department personnel are currently evaluating shrub transects and the types of information being collected, and will be looking for ways to improve efficiency of data collection, types of data being collected, and refining criteria for site selection for future transects. Habitat monitoring protocols to improve the quality and quantity of data is being gathered. These planned changes will hopefully result in improved validity of habitat information being gathered, and may prove to be a useful tool in population management of wild ungulates.

Field Data

This herd has been stable to slightly increasing since 2006 and is now within the new objective of 20,000 mule deer. General licenses have focused harvest on the male segment of the population with little effort to remove females. Typically there have been around 200 Type 6

licenses available between the 4 hunt areas. To address damage issues they were increased to 300 for the 2013 season. On average less than 1 percent of the harvest is comprised of females. Chronic wasting disease (CWD) is not as prevalent in this herd when compared to the Laramie Mountains Mule Deer and the South Converse Mule Deer Herd Units, but the long-term prevalence rate average of 10% is likely affecting population performance but to what extent is unknown.

Four out of the past five years the sample size has been met, lending credibility to composition data. Fawn ratios in 2013 (58 Fawns:100 Does) continue to remain below levels to maintain a population. According to Unsworth et al. populations did not increase unless fawn ratios exceeding 66 fawns:100 does. 1999). Buck ratios remain well within the recreational management range (28 Bucks:100 Does in 2013). However, based on personnel and hunter observation the buck ratios on accessible lands are more likely on the lower end of the management strategy. With 92% of the occupied habitat under private land ownership male mule deer have an easier time surveying to 4-5 years old. The majority of bucks harvested on public land are 1-3 years old. There were few yearling mule deer in the composition survey (n=39). The five-year average is 84. The small sample size is most likely a result of poor fawn production in 2012 (50 fawns: 100does). Field harvest of 0 yearling bucks checked in the field also supports fewer yearling bucks in the population. The reduction in yearling male mule deer will correlate to fewer mature bucks 2-3 years from now. Hunters will be informed in future PIGMs so they can plan their hunt if they are looking to harvest a trophy buck.
Antler class data was collected for the first time in 2012. There were 30 deer sampled with 50% Class I, 40% Class II and 10% Class III. In 2013 there were 20 male deer sampled and again it broke down as: 50% Class I, 40% Class II and 10% Class III with the average antler width of 19". Class I and II deer are typically 1-3 years old, which is consistent with observed public land male deer harvested.

The hunter satisfaction survey showed that 64% of the hunters were satisfied with their hunt, slightly down from 66% in 2012. This level of satisfaction is somewhat surprising given the negative comments received from hunters by field personnel. Hunters continue to comment on lack of mature bucks and overall lack of deer.

Harvest Data

Hunter success (46%) decreased compared to the ten-year average of 60% and hunter effort (8.6 days) was nearly one day more than the ten-year average of 7.7 days per harvest. Access continues to be an issue in this herd unit with 92% of the occupied habitat consisting of private land. The only major access is the PLPW's Hunter Management Program on the Guernsey Guard Camp, walk-in areas and the various Wildlife Habitat Management Areas. Access for the most part is driven by damage, which is the reason for the Type 6 license. Access for male harvest is extremely difficult unless a hunter is willing to pay a trespass fee or hire an outfitter. Private land ratios inflate overall buck ratios to the higher end of the recreational management strategy.

Population

The "Time-Specific Juvenile and Constant Adult Survival" (TSJ,CA) spreadsheet model was chosen to use for the post-season population estimate of this herd. The AIC value for this model was 163 which was higher than the AIC value (134) of the SCJ,SCA model. The TSJ,CA was chosen over the SCJ,SCA model for several reasons: 1) both models fit actual data with simulated data fairly well. However, based on fawn production it survival is more variable year to year, which is indicative of the TSJ, CA model, 2) Adult survival remains fairly consistent, again indicative of the TSJ, CA model, 3) There is not a field estimate of survival from a collaring or mark-recapture study, a requirement of the SCJ,SCA model, 4) The population trend

of both models indicates a increase in the populations. However, field observations of department personnel, landowners and hunters perceived perception of the population is likely closer to the estimate the TSJ, CA model (~20,000 mule deer). The SCJ,SCA simulates a population at 27,000 mule deer. Past estimations that directed herd management and were also presented to the public were around 17,000 mule deer. A 45% increase in the population is unrealistic given poor fawn production. For these reasons the model is rated as fair. Juvenile survival was adjusted to the range of .6-.9, which allowed for a better model fit based on long-term population observation trends. The larger range of juvenile survival of .4-.9 drove the population well below perceived estimations. Hunters and landowners would like to see a continued increase in the herd, but given poor fawn production, which is below the level of 66 fawns:100 does (Unsworth et al. 1999) needed for population growth combined with CWD, poor shrub conditions an increase is not likely in the near future.

Management Summary

Hunting seasons in this herd unit have traditionally started on October 1 and run for 11 to 14 days for the general season. Limited doe fawn hunting opportunities exist in some hunt areas during November and December. Starting in 2014 there will be one hunt area (Hunt Area 15) with a general season date of October 1-14. There will be 350 doe/fawn licenses available area wide with no limitation on the license. Department personnel will work with landowners and hunters to distribute hunter access as damage issues arise. The Region T licenses are proposed to decrease from 500 to 400. There is limited access on public lands and the reduction is warranted to decrease hunter congestion and improve success. In addition this decrease will bring license sales within the five-year average of 380 Region T licenses sold. If we attain the projected harvest of 1,035 deer and observe normal fawn production the mule deer population should remain within the objective of 19,800 mule deer.

Literature cited:

Unsworth, JW, Pac DF, White GC, and Bartmann BC: Mule deer survival in Colorado, Montana, and Idaho. J. Wildl. Manage. 63(1):315-326, 1999

INPUT	
Species:	Deer
Biologist:	Martin Hicks
Herd Unit & No.:	Goshen Rim MD534
Model date:	02/25/13

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	162	171	☐ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	105	132	☐ SCJ,SCA Mod	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	41	163	☑ TSJ,CA Model	

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population			Total	Predicted Posthunt Population			Total	Objective
	Field Est	Field SE		Juveniles	Total Males	Females		Juveniles	Total Males	Females		
1993				4385	2988	7527	14901	4301	1510	6623	12434	14500
1994				3806	2553	6777	13137	3727	1247	5849	10822	14500
1995				4177	2187	5989	12352	4124	1127	5537	10788	14500
1996				4319	2307	5950	12576	4319	1401	5833	11553	14500
1997				4268	2453	6115	12835	4263	1667	5939	11870	14500
1998				4082	2657	6185	12924	4080	1678	6005	11762	14500
1999				5163	3222	6797	15181	5131	1697	6571	13399	25000
2000				4598	3024	7051	14673	4579	1737	6723	13039	25000
2001				3285	2809	6928	13021	3253	1694	6649	11597	25000
2002				3708	2861	6954	13523	3698	1839	6763	12300	25000
2003				5023	3183	7251	15458	4982	2081	7013	14076	25000
2004				4429	3961	8036	16426	4404	2850	7767	15022	25000
2005				6195	4149	8211	18556	6178	2930	8084	17192	25000
2006				4076	4363	8621	17060	4063	3006	8524	15593	25000
2007				4127	4311	8871	17309	4107	2769	8707	15583	25000
2008				5820	4136	9041	18998	5807	2690	8973	17470	25000
2009				6410	3964	9155	19529	6395	2669	9088	18152	25000
2010				6167	4124	9426	19717	6152	2866	9339	18358	25000
2011				6136	4214	9561	19911	6123	3064	9493	18680	25000
2012				4788	4368	9680	18836	4784	3438	9597	17818	25000
2013				5802	4993	10081	20876	5784	4393	9952	20130	25000
2014				5606	5365	9957	20928	5595	4468	9726	19790	20000
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

Survival and Initial Population Estimates

Year	Winter Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.61			0.83		
1994	0.62			0.83		
1995	0.67			0.83		
1996	0.60			0.83		
1997	0.60			0.83		
1998	0.90			0.83		
1999	0.63			0.83		
2000	0.60			0.83		
2001	0.90			0.83		
2002	0.90			0.83		
2003	0.90			0.83		
2004	0.81			0.83		
2005	0.63			0.83		
2006	0.90			0.83		
2007	0.90			0.83		
2008	0.60			0.83		
2009	0.60			0.83		
2010	0.60			0.83		
2011	0.60			0.83		
2012	0.90			0.83		
2013	0.60			0.83		
2014	0.60			0.83		
2015						
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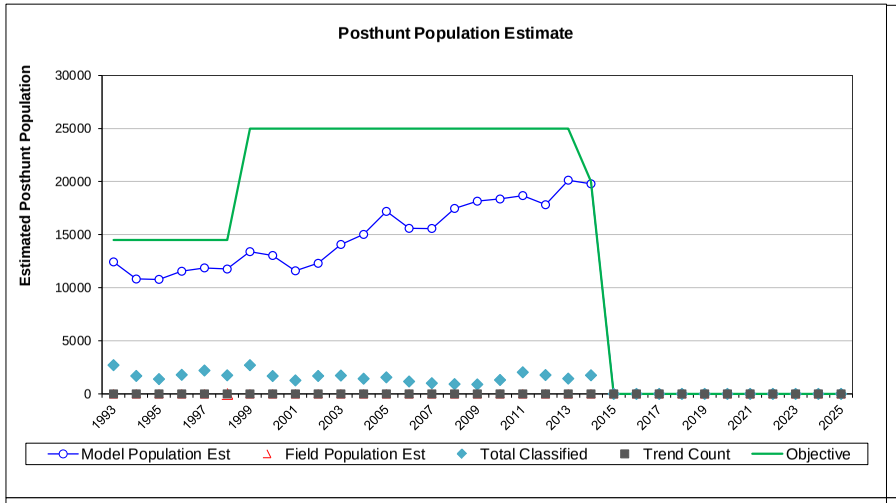
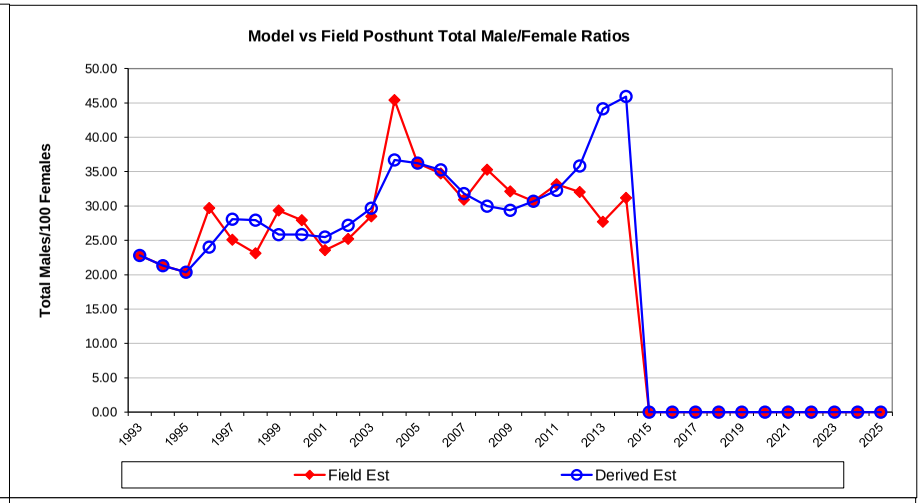
Parameters:	Optim cells
Adult Survival =	0.826
Initial Total Male Pop/10,000 =	0.151
Initial Female Pop/10,000 =	0.662

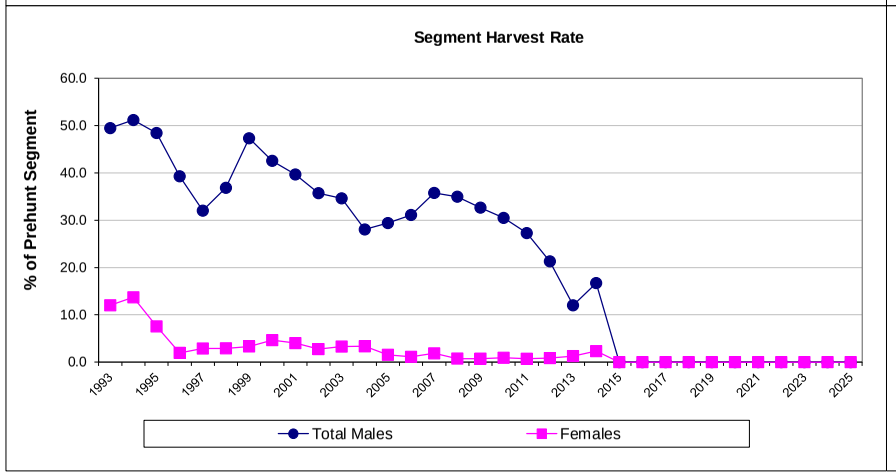
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

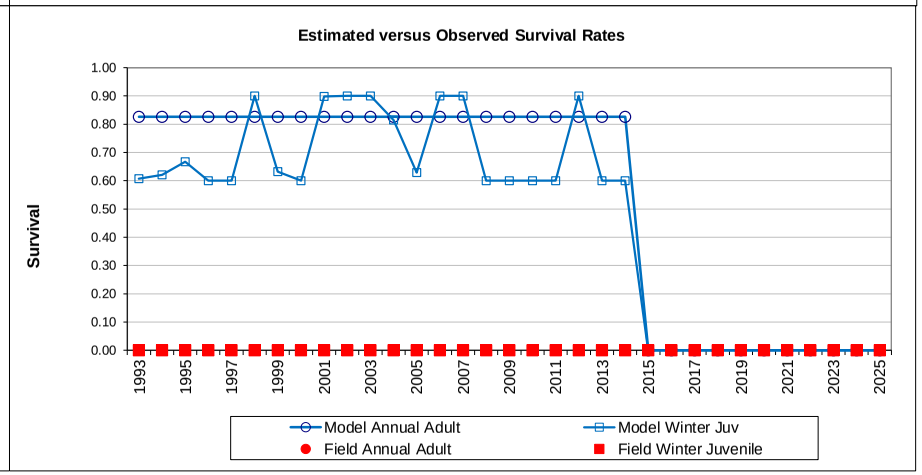
	Classification Counts						Harvest						
Year	Juvenile/Female Ratio			Total Male/Female Ratio								Segment Harvest Rate (% of Prehunt Segment)	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Yrl males	2+ Males	Females	Total Harvest	Total Males	Females
1993		64.93	2.72	22.80	22.80	1.39	77	0	1344	822	2243	49.5	12.0
1994		63.72	3.38	21.31	21.31	1.68	72	0	1188	844	2104	51.2	13.7
1995		74.48	4.26	20.36	20.36	1.85	48	0	963	411	1422	48.4	7.5
1996		74.04	3.82	24.01	29.71	2.09	0	0	824	106	930	39.3	2.0
1997		71.79	3.32	28.08	25.09	1.67	4	0	714	160	878	32.0	2.9
1998		67.94	3.53	27.94	23.12	1.76	2	0	890	164	1056	36.9	2.9
1999		78.08	3.26	25.83	29.35	1.71	29	0	1386	205	1620	47.3	3.3
2000		68.10	3.65	25.84	27.94	2.04	18	0	1170	298	1486	42.6	4.6
2001		48.92	3.14	25.48	23.58	1.99	29	0	1013	253	1295	39.7	4.0
2002		54.68	3.00	27.19	25.21	1.83	9	0	929	174	1112	35.7	2.8
2003		71.05	3.74	29.68	28.49	2.05	37	0	1002	217	1256	34.6	3.3
2004		56.70	3.54	36.70	45.42	3.05	23	0	1010	244	1277	28.0	3.3
2005		76.43	4.29	36.24	36.24	2.59	15	0	1109	116	1240	29.4	1.6
2006		47.66	3.31	35.26	34.74	2.70	12	0	1234	88	1334	31.1	1.1
2007		47.17	3.50	31.81	30.92	2.67	18	0	1402	149	1569	35.8	1.8
2008		64.72	4.80	29.97	35.28	3.21	12	0	1315	62	1389	35.0	0.8
2009		70.36	5.21	29.37	32.13	3.10	14	0	1177	61	1252	32.7	0.7
2010		65.87	4.04	30.69	30.69	2.45	14	0	1143	79	1236	30.5	0.9
2011		64.50	3.21	32.28	33.17	2.07	12	0	1045	62	1119	27.3	0.7
2012		49.85	2.76	35.82	32.04	2.08	4	0	846	75	925	21.3	0.9
2013		58.12	3.44	44.14	27.71	2.14	16	0	545	117	678	12.0	1.3
2014		57.53	3.12	45.94	31.18	2.10	10	0	815	210	1035	16.7	2.3
2015													
2016													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													

FIGURES









Comments:

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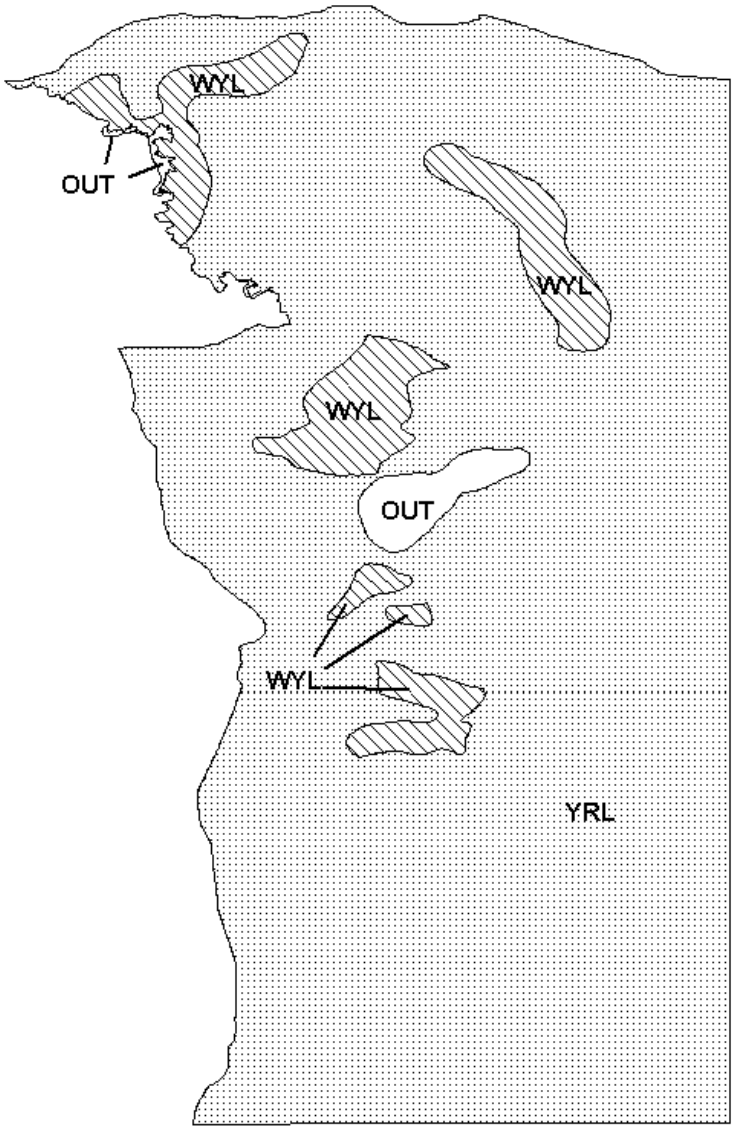


Mule Deer (MD534) - Goshen Rim
HA 15, 16, 55, 57
Revised - 97

2013 - JCR Evaluation Form

SPECIES: Mule Deer | PERIOD: 6/1/2013 - 5/31/2014

HERD: MD537 - LARAMIE MOUNTAINS

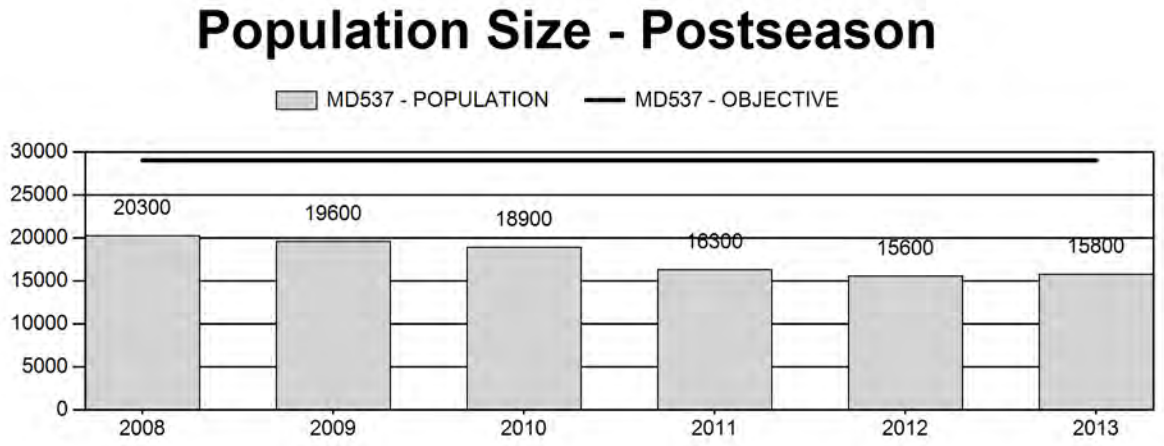
HUNT AREAS: 59-60, 62-64, 73 | PREPARED BY: MARTIN HICKS

	2008 - 2012 Average	2013	2014 Proposed
Population:	18,140	15,800	14,700
Harvest:	1,280	1,013	935
Hunters:	2,279	1,914	1,750
Hunter Success:	56%	53%	53 %
Active Licenses:	2,373	1,989	1,850
Active License Percent:	54%	51%	51 %
Recreation Days:	10,303	8,401	8,000
Days Per Animal:	8.0	8.3	8.6
Males per 100 Females	38	37	
Juveniles per 100 Females	60	61	

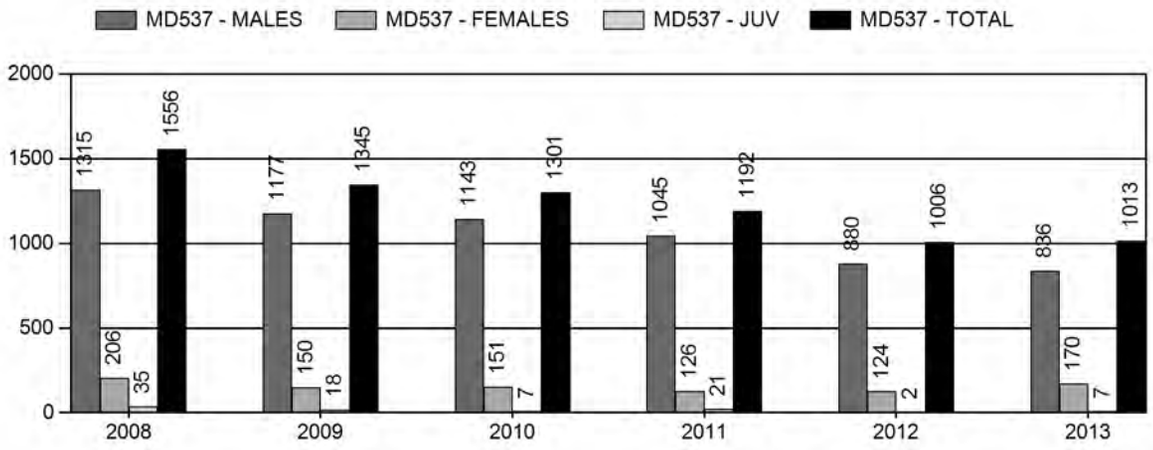
Population Objective:	29,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-45.5%
Number of years population has been + or - objective in recent trend:	22
Model Date:	03/03/2014

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

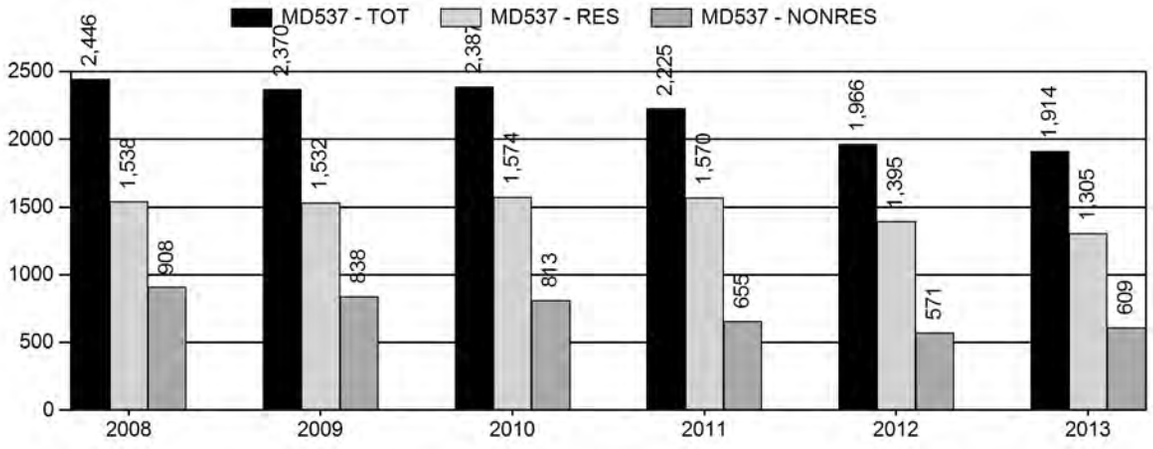
	JCR Year	Proposed
Females ≥ 1 year old:	2%	1%
Males ≥ 1 year old:	21%	23%
Juveniles (< 1 year old):	0%	0%
Total:	5%	6%
Proposed change in post-season population:	0%	-8%



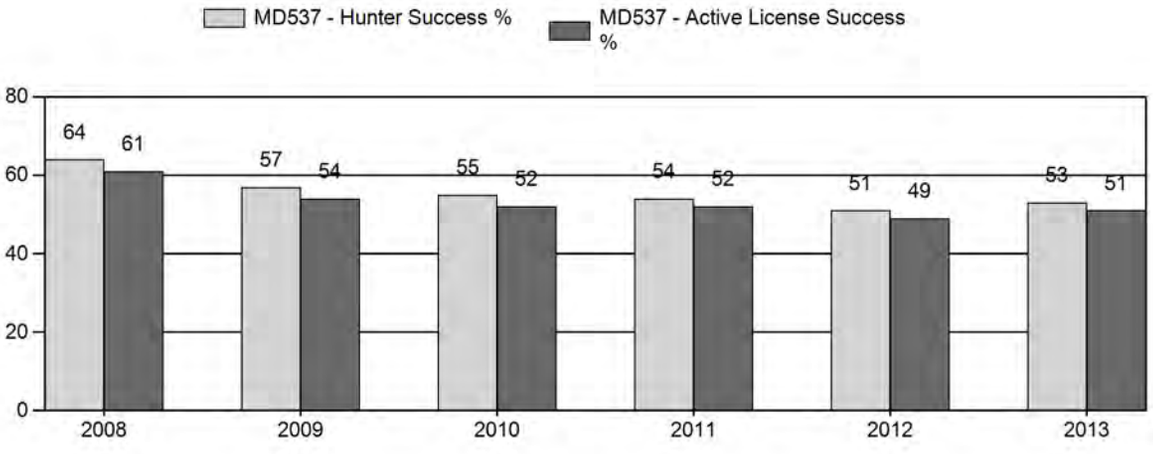
Harvest



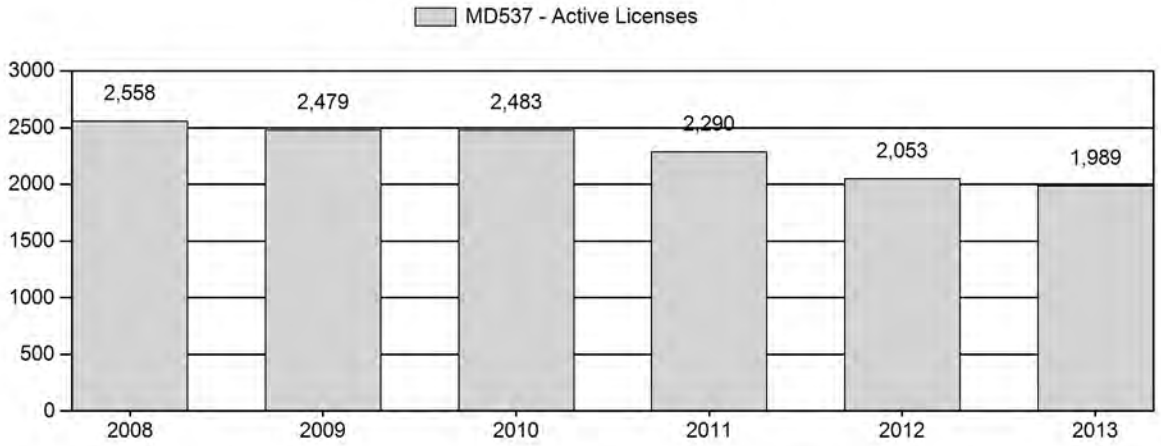
Number of Hunters



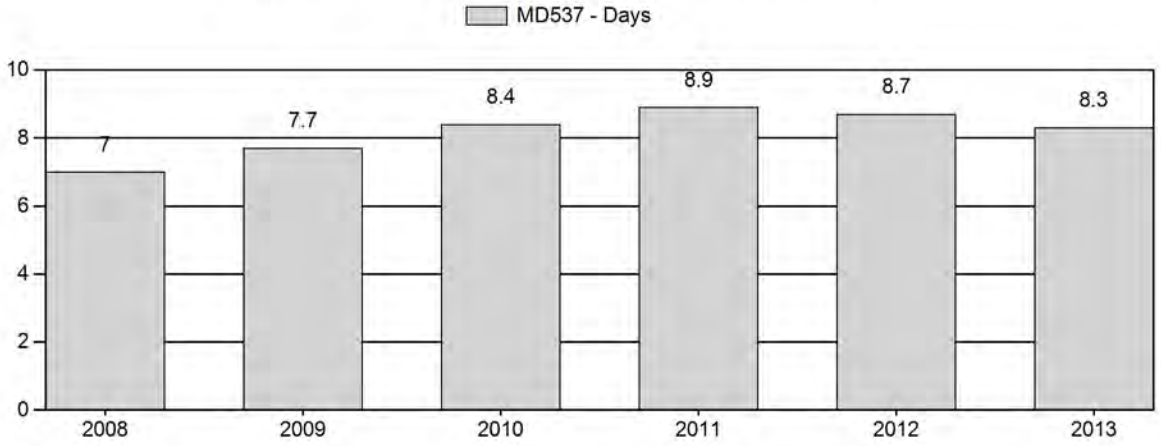
Harvest Success



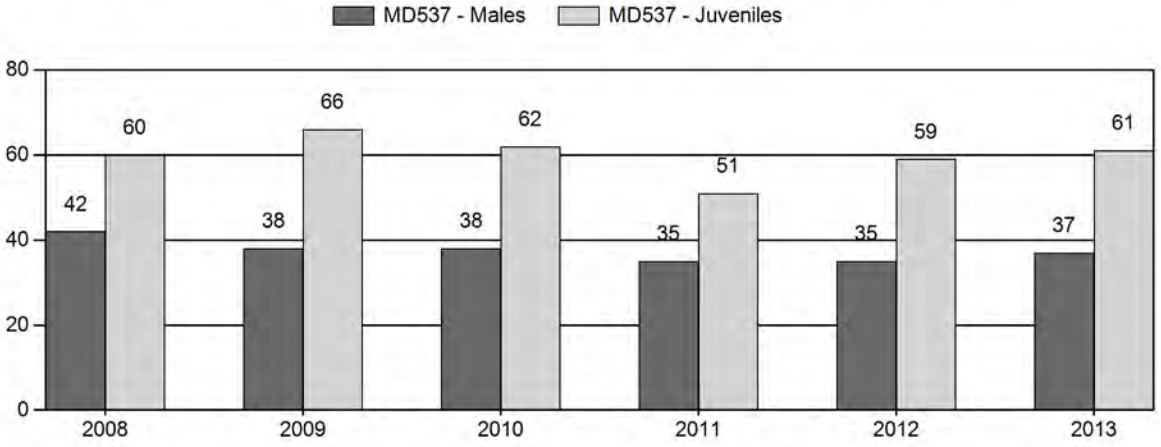
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Mule Deer Herd MD537 - LARAMIE MOUNTAINS

		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
2008	20,300	101	335	436	21%	1,034	49%	623	30%	2,093	1,180	10	32	42	± 3	60	± 4	42
2009	19,600	155	395	550	19%	1,433	49%	952	32%	2,935	1,245	11	28	38	± 2	66	± 3	48
2010	18,900	205	425	630	19%	1,639	50%	1,015	31%	3,284	1,202	13	26	38	± 2	62	± 3	45
2011	16,300	102	296	398	19%	1,122	54%	570	27%	2,090	1,263	9	26	35	± 2	51	± 3	38
2012	15,600	83	162	245	18%	699	51%	415	31%	1,359	1,218	12	23	35	± 3	59	± 5	44
2013	15,800	23	173	196	19%	528	50%	324	31%	1,048	1,161	4	33	37	± 4	61	± 5	45

2014 HUNTING SEASONS
LARAMIE MOUNTAINS MULE DEER HERD (MD537)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
59,62,63	General	Oct. 15	Oct.25		General license; antlered mule deer or any white-tailed deer, except the Wyoming Game and Fish Commission's Tom Thorne/Beth Williams Wildlife Research Center at Sybille shall be closed
62,63, 64	6	Oct. 15	Oct. 31	100	Limited quota; doe or fawn, valid on private land
		Nov. 1	Dec. 31		Unused Area 62, 63, 64 Type 6 licenses valid for doe or fawn white-tailed deer
60	1	Oct. 20	Nov. 5	100	Limited quota; antlered deer on national forest, any deer valid off national forest; All lands within Curt Gowdy State Park, archery only
	2	Oct. 20	Nov. 5	150	Limited quota; any deer valid off national forest; all lands within Curt Gowdy State Park, archery only
		Nov. 6	Nov. 30		Unused Area 60 Type 1 and Type 2 licenses valid for doe or fawn white-tailed deer valid off national forest; all lands within Curt Gowdy State Park, archery only
	6	Oct. 20	Nov. 30	50	Limited quota; doe or; all lands within Curt Gowdy State Park, archery only
64	General	Oct. 15	Oct. 25		General license; antlered mule deer or any white-tailed deer, except the Wyoming Game and Fish Commission's Tom Thorne/Beth Williams Wildlife Habitat Management Area and the Laramie Peak Wildlife Habitat Management Area north of the Tunnel Road (Albany County Rd 727), shall be closed
	2	Oct. 15	Oct. 25	100	Limited quota; antlered mule deer or any white-tailed deer
73	General	Oct. 15	Oct. 25		General license; antlered mule deer or any white-tailed deer
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3

Region J Nonresident Quota: 900

Hunt Area	Type	Quota change from 2013
62,63,64	6	-50
60	1	0
60	2	0
60	6	0
64	2	0
59,60,62-65,73	Region J	-200
Total	**1**	**0**
	2	**0**
	6	**-50**
	Region J	**-200**

Management Evaluation

Current Post-season Population Objective: 29,000
Management Strategy: Recreational
2013 Post-season Population Estimate: ~15,800
2014 Post-season Population Estimate: ~14,700

Herd Unit Issues

The management objective for the Laramie Mountains Mule Deer Herd Unit is a post-season population objective of 29,000 mule deer. The management strategy is a recreational management with a post-season buck ratio range of 20-29 Bucks:100 Does. The herd objective and management strategy was last revised in 2003. During the herd objective review process this winter/spring the department will recommend to the WGFD Commission a reduction of the numeric objective from 29,000 to 20,000, which will be more in line with the current population estimate and biologically achievable within 5 years.

The 2013 post-season population estimate was about 15,800 with the population trending downward. Chronic Wasting Disease has been detected in this herd for well over two decades. The average prevalence rate since 1997 is 22%, contributing towards the suppression of this herd. Management strategy has been very conservative with little doe harvest to try and increase the herd. Approximately 50% of the herd unit is private lands which affects our ability to provide opportunity.

The Arapahoe wild fire in 2012 will have habitat effects for years to come. In some areas perennial vegetation is responding. In other places the ground appears sterile with little to no vegetation growth. Mule deer have been harvested in the burned area in 2012 and 2013. Mule deer occupation in burned areas was also documented during the winter of 2013. In the long run this major fire will be a positive for ungulate habitat. It will take time to see the major re-vegetation events.

Landowners and sportsmen would like to see more mule deer. To try and address this situation the Type 6 license was reduced from 250 to 100

Weather

Weather during 2013 and into 2014 was wetter and colder than normal. Post-season fawn ratios of 61 Juveniles:100 Females were similar to 2012 (59J:100F) and the ten-year average (62J:100F). The mild winter conditions and above average summer/fall moisture most likely prevented a significant decrease given ungulates just came out of the worst drought observed since the 1930s. Winter conditions were somewhat mild with low snowpack but with periods of extreme cold temperatures, followed by above freezing periods. High winter mortality rates are not expected. Refer to the following websites for weather data: http://www.ncdc.noaa.gov/temp-and-precip/time-series/ and http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html.

Habitat

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality to heavily influence population management for any particular big game species.

Shrub communities within the Laramie Region that are annually assessed by game wardens, wildlife biologists, and terrestrial habitat biologists, include: True mountain mahogany, Antelope bitterbrush, Skunkbrush sumac, Big sagebrush, and Fourwing saltbush. The majority of the transects were established approximately 12 – 13 years ago. Transects were established for several different primary reasons, but may have included: measuring habitat response prior to or following treatments (i.e.

prescribed fire, wildfire, mowing), concern over historic or current domestic livestock or wild ungulate utilization levels, selection of "representative habitats" utilized by wildlife on identified winter ranges, or other.

Turnover in personnel, changes in individual job responsibilities of employees, and evolving WGFD agency priorities have resulted in some issues with consistent habitat data collection and interpretation of data. Some transects, years after their initial establishment, have been identified as being in "non-representative" locations. Site selection was often influenced by terrain and/or land ownership status (i.e public access). Changing land uses (wind turbines, roads, fence construction, other developments, etc.) have influenced habitat use by wildlife in some locations, and in some instances have resulted in major shifts in animal usage of the area being monitored. Department personnel are currently evaluating shrub transects and the types of information being collected, and will be looking for ways to improve efficiency of data collection, types of data being collected, and refining criteria for site selection for future transects. Habitat monitoring protocols to improve the quality and quantity of data are being gathered. These planned changes will hopefully result in improved validity of habitat information being gathered, and may prove to be a useful tool in population management of wild ungulates.

Field Data

Fawn ratios of 61 Fawns:100 Does in 2013 were not at level to sustain a population. According to Unsworth et al. (1999) populations do not increase if fawn ratios are below 66 fawn: 100 does. The 2013 fawn classification data was similar to the ten-year average; a major cause contributing to the decline in population. Buck ratios of 37 Bucks:100 Does were well within the recreational management strategy. However, finding a mature buck on public land is often difficult.

Based on the 2013 herd classification survey yearling bucks observed were significantly lower (4 yearling males: 100 females) compared to the five-year average (11 yearling males:100 females). Fawn production in 2012 was 59 juveniles:100 females so a decline in yearling males was expected in 2013. Classification sample size was met four out of the past five years. It was not met in 2013 (C.I.=1,161, n=1,048), but given the majority of samples met lends credibility to composition data. Examining other field data it is interesting to find that field harvest data contradicts composition survey data. In 2013, 28% of the male harvest was comprised yearling bucks. Compared to the five-year average (2007-2012, with 2010 thrown out because there was not a Wheatland Wildlife Biologist working at that time) of 13% this is significantly higher. It is hard to infer what the explanation is for the conflicting data. Perhaps the smaller sample size of 64 compared to the five-year average (again 2010 was thrown out) of 90 might have affected the ratio. The 2013 classification survey technique (air and ground) did not change compared to the past five years but the sample size was not met. The data will t likely provide clarity next year through field harvest data, antler classification, and the herd classification survey.

Buck antler classification data was collected for the first time in 2012. There were 51 deer sampled with 75% Class I, 14% Class II and 12% Class III. In 2013 there were 68 deer sampled with 58% Class I, 38% Class II and 4% Class III and an average antler spread of 16". This supports sportsmen's comments that older age class deer were hard to find. The majority of the sampled deer were on public land where there are lower buck densities. Deer appeared to be going into the winter in good condition with a body condition score of 17 out of 20. Increased fall moisture likely increased vital fat reserves for mule deer prior to winter. The satisfaction survey showed that 61 % of the hunters were satisfied, which was somewhat surprising based on negative comments received from the field that hunters were having difficulty finding mature buck.

Harvest Data

Hunter success in 2013 (53%) was slightly lower than the ten-year average of 57% and hunter effort was 8.3 days per harvest which was higher than the ten-year average of 7.5 days per harvest. These data support a decreasing trend in population, which also supports personnel, landowner and sportsmen observations. As a result the Type 6 licenses were decreased to try and address the decreasing population. However, given poor fawn production, CWD, and poor habitat conditions a reduction in doe/fawn licenses will not improve herd performance.

Population

The "Time-Specific Juvenile and Constant Adult Survival" (TSJ,CA) spreadsheet model was chosen to use for the post-season population estimate of this herd. The AIC value for the TSJ, CA model is 113, which is slightly higher than the AIC value (134) for the SCJ, SCA. This model was chosen for the following reasons: 1) The model tracks juvenile variability in survival, which is more consistent with this herd unit based on the fluctuations in juvenile composition data, 2) There is a large number of of years of classification and harvest data, indicative of the TSJ, CA model, 3) Simulated population trends mimic perceived trends observed by local personnel, landowners and hunters. This model is rated as fair. There is not a annual population estimate, with a standard error available to anchor the model to, but enough data to give the model a fair fit and results are biologically defensible. Adult survival was adjusted to .7-.8 instead of the recommended range of .7-.95 to account for chronic wasting disease prevalence rates. This herd has the second highest prevalence rate (24%) in the state and adult survival rates were adjusted based on initial study results from the South Converse Mule Deer Herd Unit, which has the highest prevalence rate of 46% in 2013. Hunters and landowners would like to see an increase in mule deer, but given poor recruitment, CWD and poor habitat conditions an increase in the population does not seem likely in the near future.

Management Summary

Hunting seasons in this herd unit have started on the 15th of October and run between 10-15 days. Late doe/fawn seasons have been used to address damage situations in lower elevations onprivate land, but the public has overwhelmingly indicated they would like to see more mule deer. To address this concern there will be a decrease of Type 6 licenses from 250 to 100. Area 60 remains a sought after license for hunters since it gives them a chance to hunt into November when male deer are more susceptible to harvest. Region J licenses are proposed to decrease from 1,100 to 900 to address low deer densities, especially on public lands. This is a major change and was not made without careful consideration for the herd and the nonresident hunter. The reduction will be consistent with recent license sales (2012=949 and 2013=779)and should improve harvest statistics and reduce hunting pressure.. In addition increased hunter densit is an issue on public land for both residents and nonresident hunters. Field personnel are receiving more and more negative comments regarding the lack of access. There has also been a decreasing trend in harvest success and satisfaction for nonresidents. It is our hope that the reduction in Region J licenses will improve harvest success and overall satisfaction of the hunt for nonresidents.

If we attain the projected harvest of 935 mule deer (860 bucks, 75 does) and average fawn recruitment, the mule deer population will slightly decline and still remain well below the management objective. We predict a 2014 post-season population of about 14,700.

Literature Cited:

Unsworth, JW, Pac DF, White GC, and Bartmann BC: Mule deer survival in Colorado, Montana, and Idaho. J. Wildl. Manage. 63(1):315-326, 1999

INPUT	
Species:	Mule Deer
Biologist:	Martin Hicks
Herd Unit & No.:	Laramie Mts Herd
Model date:	02/08/13

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	111	120	☐ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	103	113	☐ SCJ,SCA Mod	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	12	134	☑ TSJ,CA Model	

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population			Total	Predicted Posthunt Population			Total	Objective
	Field Est	Field SE		Juveniles	Total Males	Females		Juveniles	Total Males	Females		
1993				4684	4678	10479	19841	4637	3200	9645	17481	29000
1994				4087	3759	8916	16762	4087	2452	8702	15242	29000
1995				4979	3250	8250	16479	4973	2191	8209	15373	29000
1996				4525	3318	8132	15975	4518	2412	8110	15039	29000
1997				5429	2976	7535	15939	5425	2190	7515	15131	29000
1998				5373	3336	7596	16305	5373	2357	7576	15306	29000
1999				5678	4304	8479	18460	5678	2779	8465	16922	29000
2000				4772	3359	7908	16039	4770	2072	7888	14730	29000
2001				4517	3646	8299	16462	4517	2531	8258	15307	29000
2002				4802	4058	8639	17499	4802	3036	8609	16447	29000
2003				5922	3389	7848	17159	5922	2287	7816	16025	29000
2004				5072	3550	7974	16595	5057	2439	7860	15357	29000
2005				5834	4227	8564	18625	5831	3007	8510	17348	29000
2006				5749	5030	9432	20211	5734	3672	9382	18788	29000
2007				5560	5436	10004	21000	5539	3894	9830	19262	29000
2008				6142	5608	10356	22105	6103	4161	10129	20394	29000
2009				6385	4972	9746	21103	6365	3677	9581	19623	29000
2010				5858	4889	9612	20359	5850	3632	9446	18928	29000
2011				4481	4263	8914	17659	4458	3113	8776	16347	29000
2012				4642	3859	8389	16889	4640	2891	8252	15783	29000
2013				4910	3887	8176	16973	4903	2967	7989	15859	29000
2014				4454	3664	7681	15799	4448	2718	7599	14765	20000
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

Survival and Initial Population Estimates

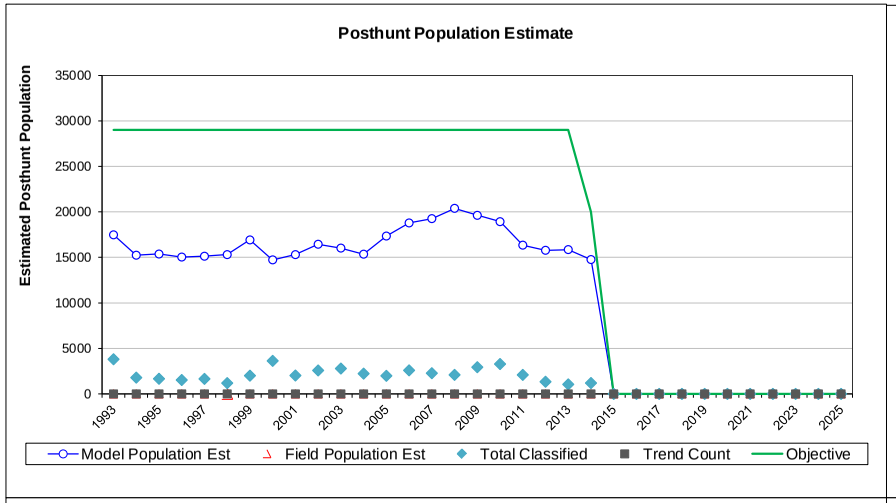
Year	Winter Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.52			0.80		
1994	0.63			0.80		
1995	0.63			0.80		
1996	0.46			0.80		
1997	0.58			0.80		
1998	0.90			0.80		
1999	0.40			0.80		
2000	0.83			0.80		
2001	0.90			0.80		
2002	0.40			0.80		
2003	0.58			0.80		
2004	0.90			0.80		
2005	0.90			0.80		
2006	0.87			0.80		
2007	0.90			0.80		
2008	0.54			0.80		
2009	0.61			0.80		
2010	0.46			0.80		
2011	0.61			0.80		
2012	0.68			0.80		
2013	0.53			0.80		
2014	0.00			0.80		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

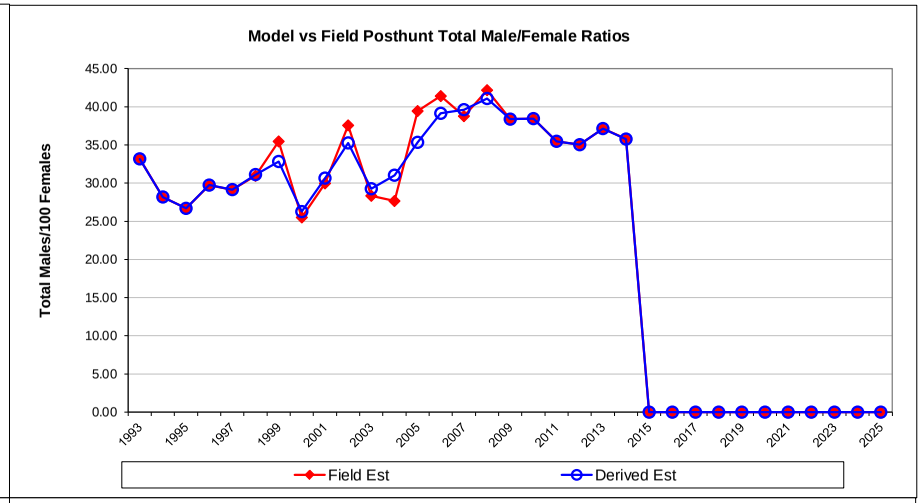
Parameters:	Optim cells
Adult Survival =	0.800
Initial Total Male Pop/10,000 =	0.320
Initial Female Pop/10,000 =	0.965

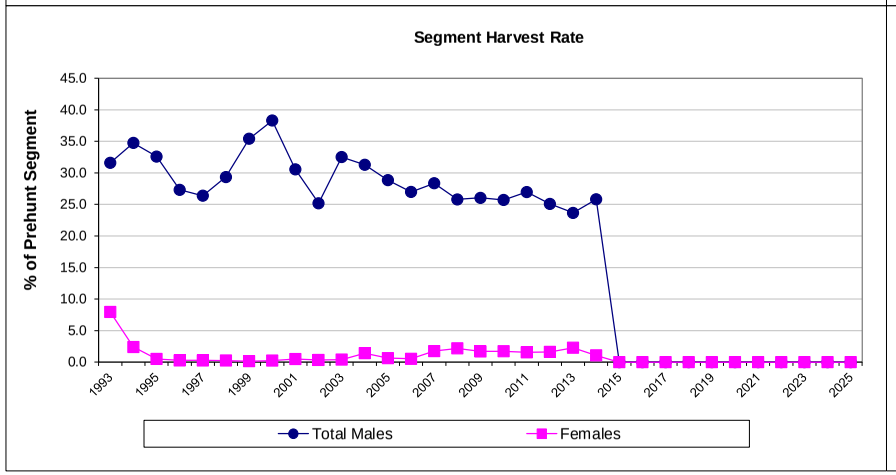
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

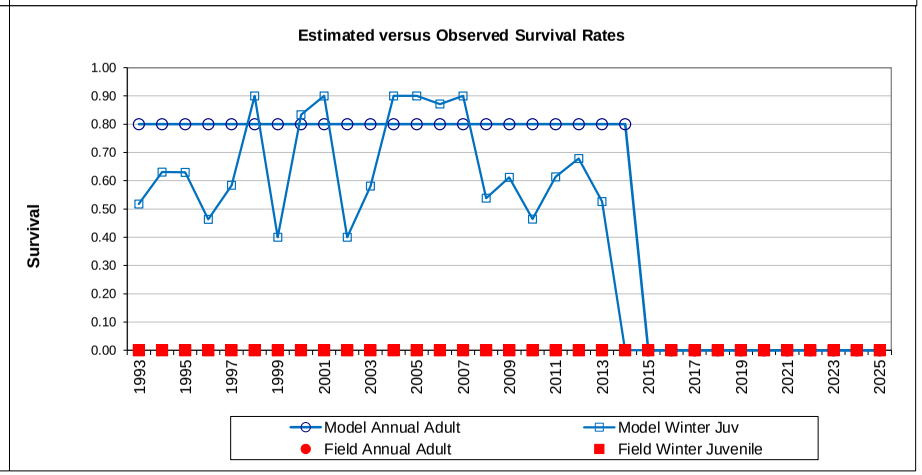
	Classification Counts						Harvest						
Year	Juvenile/Female Ratio			Total Male/Female Ratio								Segment Harvest Rate (% of Prehunt Segment)	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Yrl males	2+ Males	Females	Total Harvest	Total Males	Females
1993		48.07	1.84	33.17	33.17	1.45	43	0	1344	758	2145	31.6	8.0
1994		46.97	2.60	28.18	28.18	1.88	0	0	1188	194	1382	34.8	2.4
1995		60.59	3.31	26.69	26.69	1.95	5	0	963	38	1006	32.6	0.5
1996		55.70	3.24	29.74	29.73	2.16	7	0	824	20	851	27.3	0.3
1997		72.20	3.89	29.15	29.15	2.14	3	0	714	18	735	26.4	0.3
1998		70.92	4.54	31.12	30.95	2.63	0	0	890	18	908	29.3	0.3
1999		67.07	3.36	32.83	35.45	2.20	0	0	1386	12	1398	35.4	0.2
2000		60.47	2.23	26.27	25.50	1.28	2	0	1170	18	1190	38.3	0.3
2001		54.70	2.78	30.65	29.95	1.89	0	0	1013	37	1050	30.6	0.5
2002		55.77	2.55	35.26	37.56	1.97	0	0	929	27	956	25.2	0.3
2003		75.77	3.12	29.26	28.33	1.63	0	0	1002	29	1031	32.5	0.4
2004		64.34	3.02	31.03	27.65	1.74	13	0	1010	103	1126	31.3	1.4
2005		68.51	3.48	35.34	39.44	2.40	3	0	1109	49	1161	28.9	0.6
2006		61.11	2.78	39.14	41.39	2.14	14	0	1234	45	1293	27.0	0.5
2007		56.35	2.75	39.62	38.77	2.15	19	0	1402	159	1580	28.4	1.7
2008		60.25	3.06	41.08	42.17	2.41	35	0	1315	206	1556	25.8	2.2
2009		66.43	2.78	38.38	38.38	1.93	18	0	1177	150	1345	26.0	1.7
2010		61.93	2.47	38.45	38.44	1.80	7	0	1143	151	1301	25.7	1.7
2011		50.80	2.61	35.48	35.47	2.07	21	0	1045	126	1192	27.0	1.6
2012		56.22	3.54	35.03	35.05	2.60	2	0	880	124	1006	25.1	1.6
2013		61.36	4.33	37.14	37.12	3.10	7	0	836	170	1013	23.7	2.3
2014		58.54	3.88	35.77	35.77	2.81	5	0	860	75	940	25.8	1.1
2015													
2016													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													

FIGURES









Comments:

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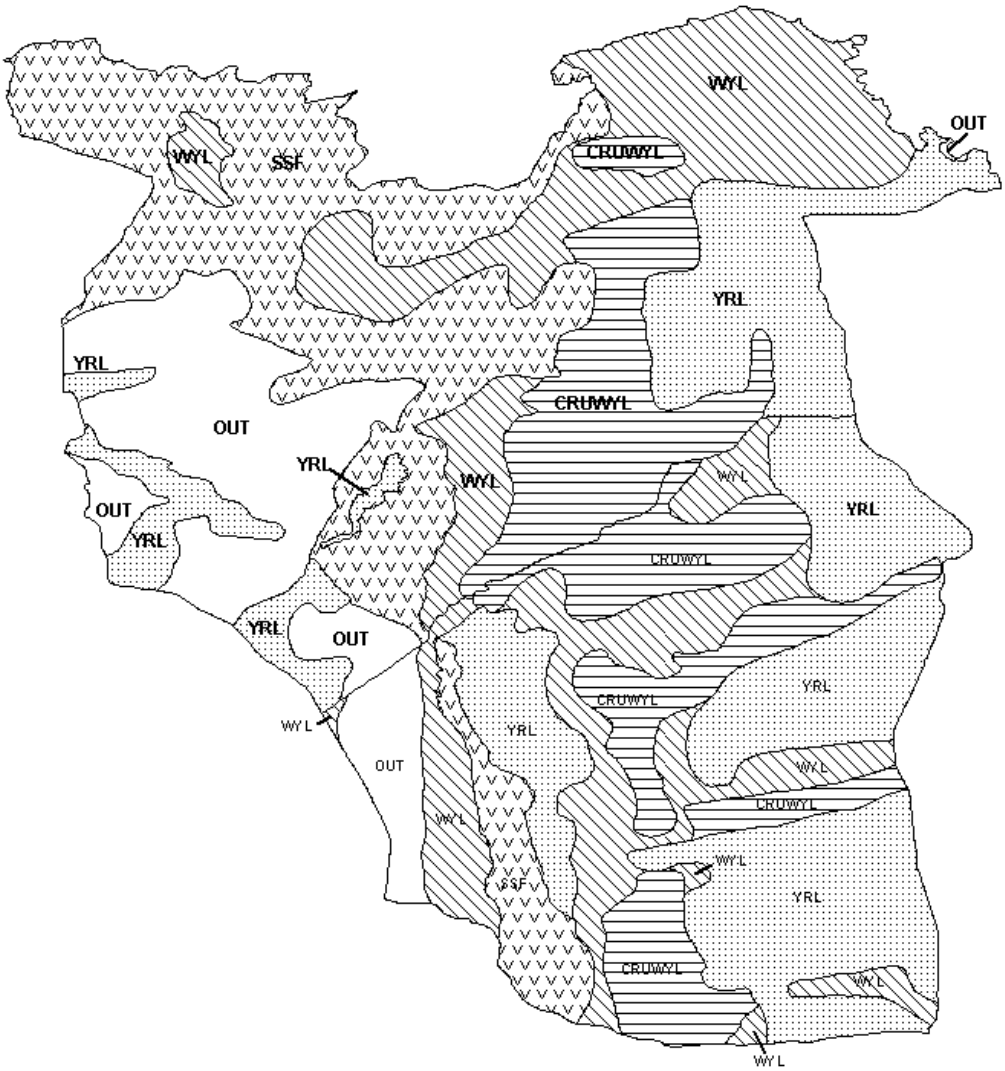


Mule Deer (MD537) - Laramie Mountains
HA 59, 60, 62-64, 73
Revised - 3/04

2013 - JCR Evaluation Form

SPECIES: Mule Deer | PERIOD: 6/1/2013 - 5/31/2014

HERD: MD539 - SHEEP MOUNTAIN

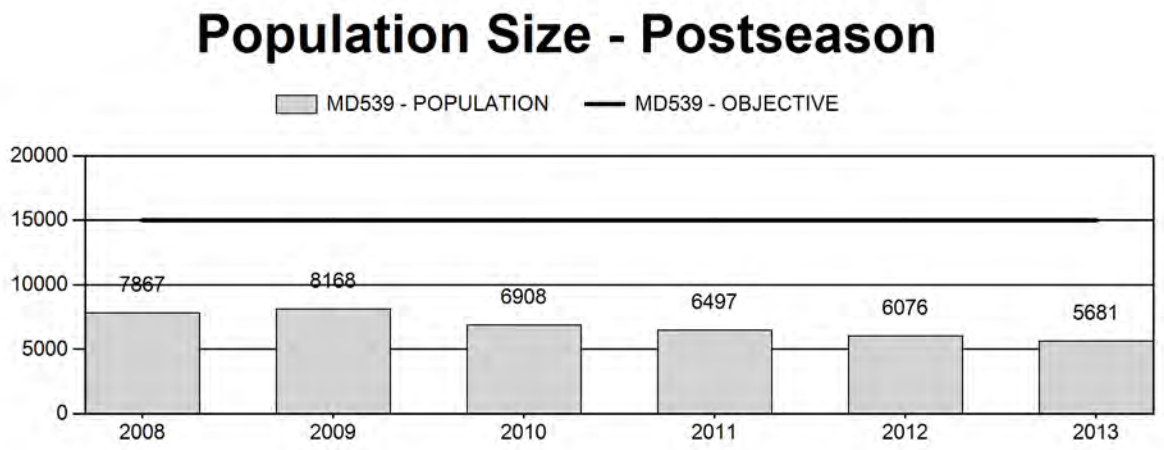
HUNT AREAS: 61, 74-77 | PREPARED BY: LEE KNOX

	2008 - 2012 Average	2013	2014 Proposed
Population:	7,103	5,681	5,611
Harvest:	485	197	250
Hunters:	1,844	1,345	1,300
Hunter Success:	26%	15%	19%
Active Licenses:	1,844	1,345	1,300
Active License Percent:	26%	15%	19%
Recreation Days:	9,043	6,816	5,500
Days Per Animal:	18.6	34.6	22
Males per 100 Females	27	26	
Juveniles per 100 Females	60	55	

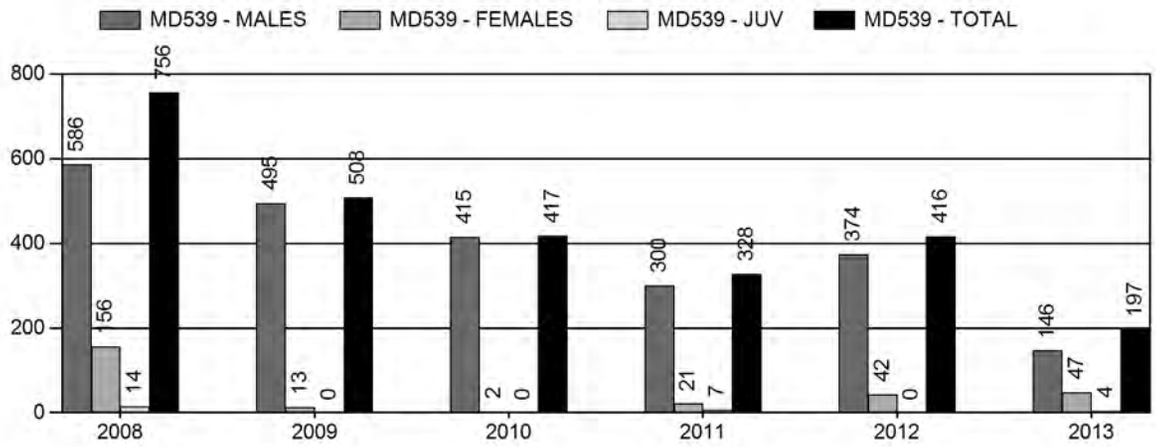
Population Objective:	15,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-62.1%
Number of years population has been + or - objective in recent trend:	15
Model Date:	5/12/2014

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

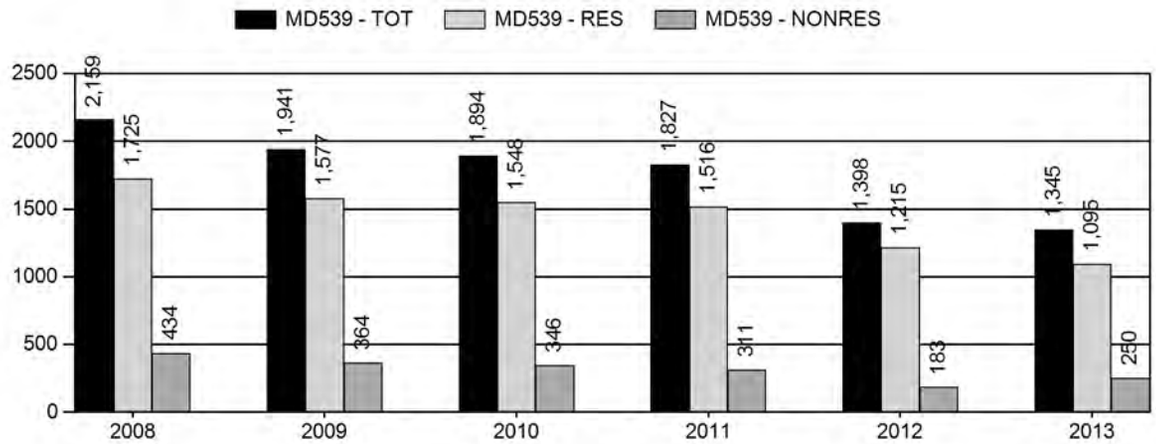
	JCR Year	Proposed
Females ≥ 1 year old:	0.1%	.1%
Males ≥ 1 year old:	6%	6%
Juveniles (< 1 year old):	0.0%	0.0%
Total:	1.32%	1.32%
Proposed change in post-season population:	5.3%	0%



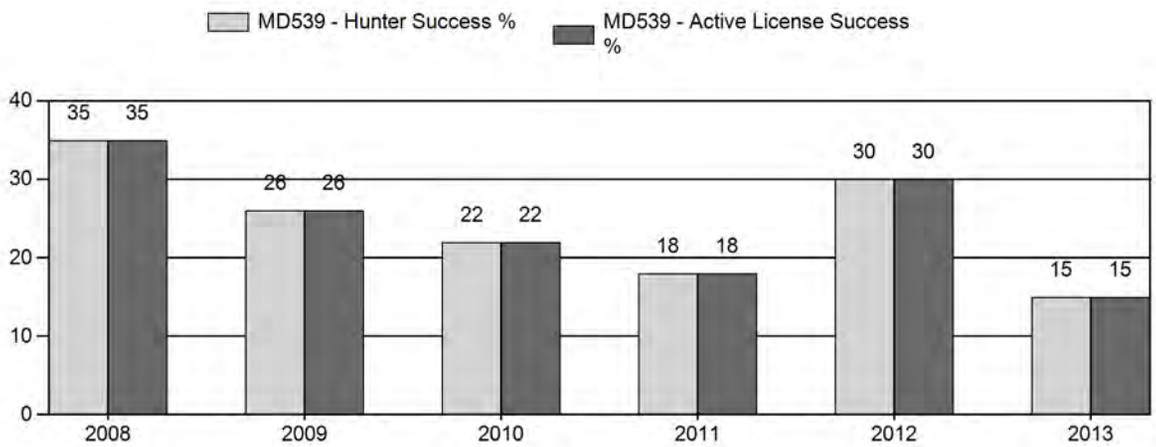
Harvest



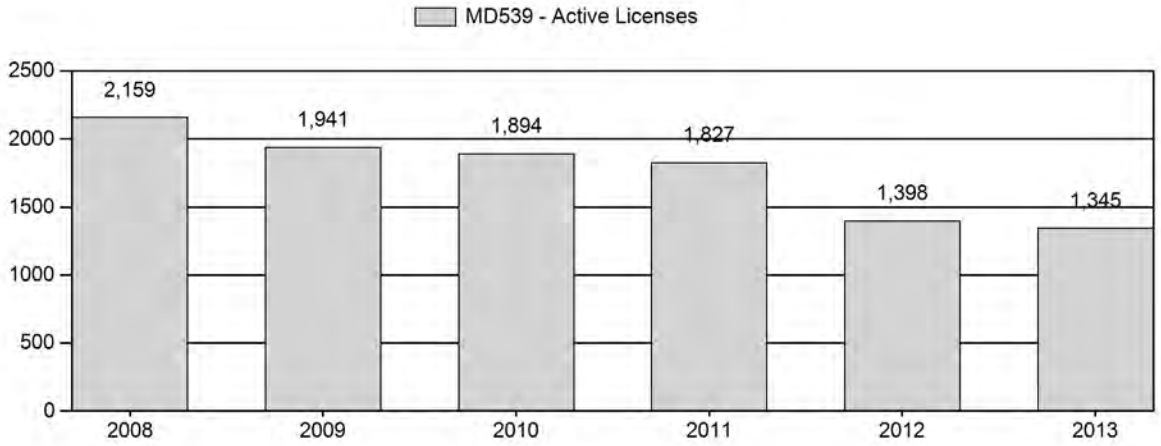
Number of Hunters



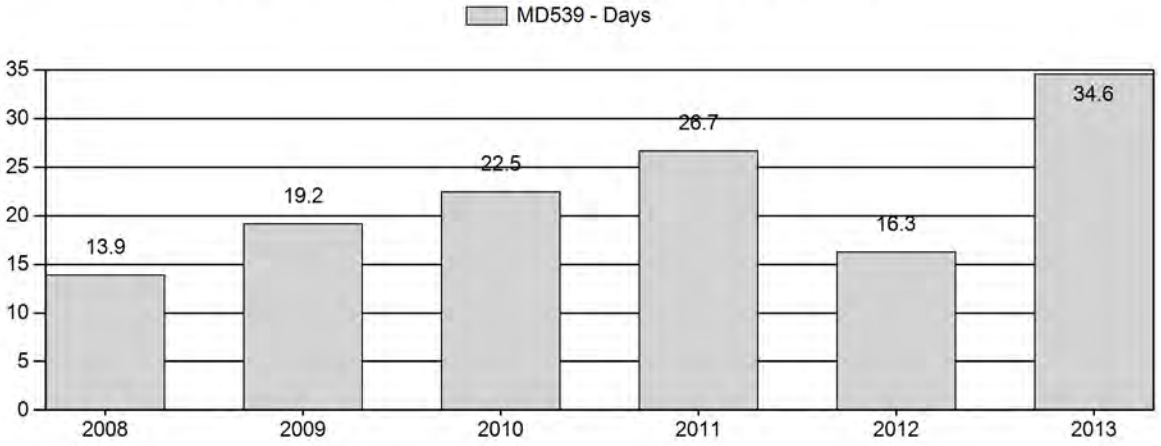
Harvest Success



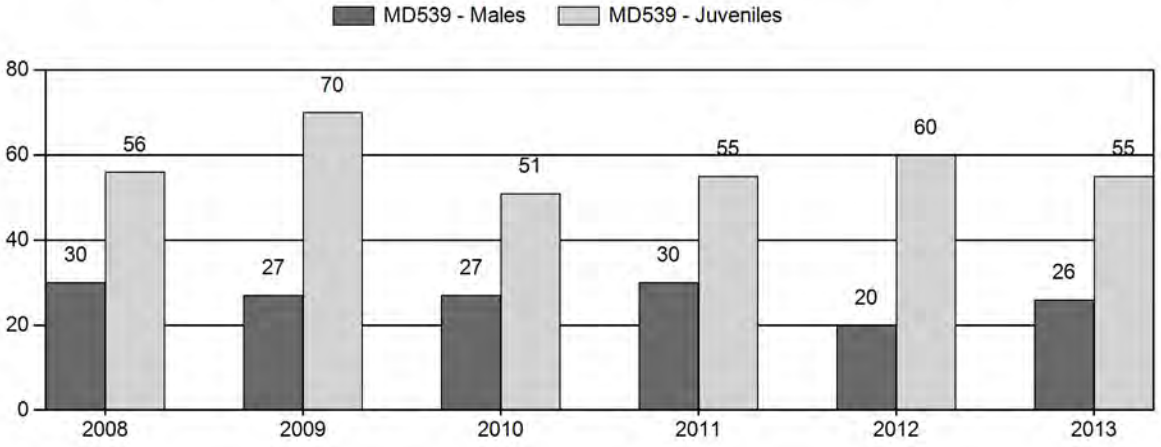
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Mule Deer Herd MD539 - SHEEP MOUNTAIN

		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
2008	7,867	38	93	131	16%	441	54%	247	30%	819	993	9	21	30	± 4	56	± 5	43
2009	8,168	91	134	225	14%	843	51%	593	36%	1,661	1,391	11	16	27	± 2	70	± 4	56
2010	6,908	63	63	126	15%	474	56%	243	29%	843	840	13	13	27	± 3	51	± 5	40
2011	6,497	48	98	146	16%	480	54%	263	30%	889	1,087	10	20	30	± 3	55	± 5	42
2012	6,076	33	52	85	11%	416	55%	249	33%	750	1,047	8	12	20	± 3	60	± 6	50
2013	5,681	82	106	188	14%	721	55%	395	30%	1,304	984	11	15	26	± 2	55	± 4	43

2014 HUNTING SEASONS
Sheep Mountain Mule Deer (MD539)

Hunt Area	Type	Date of Seasons Opens	Closes	Quota	Limitations
61		Oct. 1	Oct. 7		General license; antlered mule deer three (3) points or more on either antler or any white-tailed deer
74		Oct.1	Oct. 7		General license; antlered mule deer three (3) points or more on either antler or any white-tailed deer
75		Oct.1	Oct. 7		General license; antlered mule deer three (3) points or more on either antler or any white-tailed deer
76		Oct.1	Oct. 7		General license; antlered mule deer three (3) points or more on either antler or any white-tailed deer
77		Oct.1	Oct. 7		General license; antlered mule deer three (3) points or more on either antler or any white-tailed deer
Archery		Sep. 1	Sep. 30		Refer to Section 4 of this Chapter

Region D Nonresident Quota: 400

Management Evaluation
Current Postseason Population Management Objective: 15,000
Management Strategy: Recreational
2013 Postseason population Estimate: ~ 5,700
2014 Proposed Postseason Population Estimate: ~ 5,600

The management objective for the Sheep Mountain Mule Deer Herd Unit is a post-season population objective of 15,000 mule deer. The management strategy is recreational management with guidelines to maintain a post hunt buck ratio of 20 to 29:100 does. The objective and management strategy were last revised in 1987 and will be reviewed again in 2015.

Herd Unit Issues
The Sheep Mountain Herd Unit encompasses Hunt Areas 61, 74, 75, 76 and 77. Landownership varies from mostly private lands with limited public access, to large portions of public lands. The 2013 post-season population estimate is approximately 5,700 with the population trending

slowly downward from a high of 8,000 in 2009. The Sheep Mountain Herd Unit historically has one of the lowest hunter success rates in the state. There are many contributing factors including: low population, inaccessible private lands, and a restrictive season structure. Poor habitat conditions continue to be a limiting factor for this herd as well as an increase in rural subdivisions, and wind energy development in transition and winter ranges.

Weather

Weather during the spring and summer of 2013 remained extremely dry. The Palmer Drought Severity Index (PDSI) ranked drought conditions in SE Wyoming as extreme through the month of August. The lack of spring moisture may have caused fawn ratios to decline from 60:100 does in 2012 to 55:100 does in 2013. We received a lot of precipitation during the fall, with September 2013 being the wettest September ever recorded in Laramie. With the second green up in September, deer were in good condition going in to the winter. For specific weather information please refer to the following link: http://www.ncdc.noaa.gov/.

Habitat

Turnover in personnel, changes in individual job responsibilities of employees, and evolving WGFD agency priorities have resulted in some issues with consistent habitat data collection and interpretation of data. Some transects, years after their initial establishment, have been identified as being in "non-representative" locations. Site selection was often influenced by terrain and/or land ownership status (i.e public access). Changing land uses (wind turbines, roads, fence construction, other developments, etc.) have influenced habitat use by wildlife in some locations, and in some instances have resulted in major shifts in animal usage of the area being monitored. Department personnel are currently evaluating shrub transects and the types of information being collected, and will be looking for ways to improve efficiency of data collection, types of data being collected, and refining criteria for site selection for future transects. The reader is referred to the Strategic Habitat Plan Annual Report for further background information on shrub transects.

The Squirrel Creek Fire (Figure 1.) started on June 30th 2012 and burned about 11,000 acres of transitional and crucial mule deer winter range within this Herd Unit. Habitat conditions were old and decadent and we expect this fire to greatly benefit range conditions in future years. During the summer of 2013 field personal observed a high success of re-sprouting from true mountain mahogany and antelope bitterbrush. However, on steep slopes and areas that burned at higher temperatures there is substantial cheatgrass encroachment. The USFS has not finished the EIS to allow aerial application of herbicide, and until they do there is little that can be done.

Field Data

We classified 1,304 deer within the herd unit, exciding the estimated sample size of 984. Fawn ratios decreased from 60:100 does in 2012 to 55:100 does in 2013 which was expected with the drought conditions during the summer of 2012 through the spring of 2013. Past research shows that higher fawn ratios are needed to maintain the population. At the current 55:100 we expect the population will continue to be stable to decreasing. Antlerless harvest has been eliminated except for youth and archery hunters, who harvested 51 does and fawns in 2013, less than 1% of the total female population. Under the antler point restriction the buck ratio increased from 20:100 does in 2012 to 26:100 does in 2013, reaching the high side of recreational management.

We implemented a new ranking system in our classification that places bucks into 3 classes based on antler spread: class I is less than 19 inches, class II is 20-25 inches, and class III is greater than 25 inches. Of the total number of bucks classified, class I was made up 70%, class II was 22%, and class III was 9%. Total active licenses decreased by 100 residents, which has been the trend with a 1,000 less resident hunters in the last decade. Nonresident hunters increased by 100 from 2012, but we hypothesize that some hunters did not realize the Platte Valley was limited quota, and the only nearby general season in early October was in the Sheep Mountain Herd Unit. With the short season and implementation of an antler point limitation, hunter effort increased by 16 days, and hunter success decreased to 15%, the lowest in 10 years. This is far below the state wide average of 64% and is the lowest herd unit success rate in the state. The hunter satisfaction survey indicated that 40% of hunters were satisfied or very satisfied with their hunt with 26% remaining neutral in the survey.

Harvest Data

2013 was the second year of a shortened season and the first year we implemented a 3 point or better antler point restriction in this herd unit. Harvest has been on a steady decline over the last decade. The 2013 harvest estimate of 200 deer is half of the harvest from 2012. The percentage of yearlings from the total number of bucks harvested decreased from 33% in 2012 to 11% in 2013, indicating that the antler point restriction saved a portion of the younger age classes. We also saw the percentage of yearling bucks compared to the total number of bucks classified increase from 38% to 45% during our post season aerial classifications. Of the estimated 197 mule deer harvested, 51 were does and fawns. Of the 51 does and fawns 43 were harvested with archery and the remaining 8 were harvested by youth. Even though the female harvest makes up 25% of the total harvest, it is less than 1% of the total female population and is not substantial enough to affect the population, but it is perceived poorly by some of the public. The 2013 season structure was mostly well received; hunters and landowners perceived it as the Department was addressing their concerns with this herd unit.

Population

Time-Specific Juvenile & Constant Adult Survival (TSJ, CA) spreadsheet model was chosen for this Herd Unit. This model has the lowest AIC score of 146 and a Fit of 42 and shows the population declining from a high of 8,000 in 2009 to the current estimate of 5,700. This model is ranked as fair; there is 15-20 years of data; ratio data available for all years in model; juvenile and adult survival estimate with standard errors obtained from adjacent or other similar herds; model aligns fairly well. From our coordination meeting with Colorado we were able to get several years of fawn and adult survival rates from radio collared studies that took place near the Wyoming border. With this information the model provides a more believable estimate considering the classification samples and fawn ratios. Field staff, landowners, and hunters all agree we are well below the objective of 15,000 deer and the herd should be managed conservatively.

Management summary

If we attain the projected harvest of 250 deer and maintain a fawn ratio of 65:100 does or higher, the herd should remain stable. Using the five year average for the fawn ratio, we predict a 2014 post-season population of about 5,600. The 2014 season will be 7 days with a 3 point or better antler restriction to maintain higher buck ratios and address public concerns. We feel the 3 point

or better limitation is restrictive enough without a short season, but the majority of the public did not want more than a week long season. The nonresident quota for region D was decreased to 400 licenses to address the declining populations in the region D herd units and the platte valley limited quota hunt areas.

Figure. 1 Squirrel Creek Fire Perimeter with Sheep Mountain Mule Deer crucial winter range.

INPUT	
Species:	Deer
Biologist:	Lee Knox
Herd Unit & No.:	MD539 Sheep Mountain
Model date:	02/21/14

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	376	385	☐ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	402	411	☐ SCJ,SCA M	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	42	146	☑ TSJ,CA Model	

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population				Predicted Posthunt Population				Objective
	Field Est	Field SE		Juveniles	Total Males	Females	Total	Juveniles	Total Males	Females	Total	
1993				1181	1083	2730	4994	1137	457	2275	3869	15000
1994				1254	891	2398	4543	1254	396	2390	4040	15000
1995				1611	874	2528	5013	1611	463	2528	4602	15000
1996				1463	773	2485	4721	1463	390	2477	4329	15000
1997				1546	899	2630	5076	1546	578	2630	4754	15000
1998				1933	1039	2741	5713	1933	680	2741	5353	15000
1999				1972	1324	3033	6329	1972	799	3033	5804	15000
2000				2354	1514	3366	7233	2341	860	3354	6556	15000
2001				2047	1683	3751	7480	2047	1062	3739	6847	15000
2002				2382	1582	3802	7766	2382	873	3793	7048	15000
2003				2295	1505	3927	7727	2259	846	3631	6736	15000
2004				1947	1718	4027	7693	1879	1015	3716	6610	15000
2005				1563	1687	3927	7178	1545	955	3673	6172	15000
2006				2391	1487	3741	7619	2391	844	3737	6973	15000
2007				2612	1776	4175	8563	2607	1208	4165	7980	15000
2008				2346	1881	4333	8560	2331	1236	4162	7729	15000
2009				2834	1617	4043	8494	2834	1073	4029	7935	15000
2010				2002	1456	3908	7366	2002	1000	3906	6908	15000
2011				1989	1230	3639	6858	1981	900	3616	6497	15000
2012				1996	1142	3395	6534	1996	731	3349	6076	15000
2013				1716	1005	3176	5898	1712	845	3125	5681	15000
2014				1884	1043	2934	5861	1882	823	2906	5611	15000
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.90			0.83		
1994	0.87			0.83		
1995	0.48			0.83		
1996	0.79			0.83		
1997	0.72	0.80	0.07	0.83		
1998	0.79	0.85	0.06	0.83		
1999	0.86	0.87	0.05	0.83		
2000	0.83	0.86	0.05	0.83		
2001	0.69			0.83		
2002	0.66			0.83	0.79	0.04
2003	0.90			0.83	0.67	0.09
2004	0.90			0.83		
2005	0.90			0.83		
2006	0.90			0.83		
2007	0.67			0.83		
2008	0.51			0.83		
2009	0.40			0.83		
2010	0.40			0.83		
2011	0.40			0.83		
2012	0.40			0.83		
2013	0.40			0.83		
2014	0.40			0.83		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

Parameters:	Optim cells
Adult Survival =	0.829
Initial Total Male Pop/10,000 =	0.046
Initial Female Pop/10,000 =	0.227

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

	Classification Counts										Harvest	
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		50.00	2.84	20.11	19.14	1.57	40	569	414	1023	57.8	16.7
1994		52.46	4.05	16.57	18.24	2.10	0	450	7	457	55.6	0.3
1995		63.73	5.95	18.30	18.31	2.71	0	374	0	374	47.1	0.0
1996		59.06	6.08	15.75	15.75	2.68	0	348	8	356	49.5	0.4
1997		58.81	5.15	21.99	30.40	3.36	0	292	0	292	35.7	0.0
1998		70.54	10.36	24.80	26.79	5.51	0	327	0	327	34.6	0.0
1999		65.01	3.30	26.35	24.01	1.74	0	477	0	477	39.6	0.0
2000		69.81	4.99	25.65	29.14	2.81	11	594	11	616	43.2	0.4
2001		54.74	4.27	28.41	24.78	2.58	0	564	11	575	36.9	0.3
2002		62.81	3.85	23.01	23.01	2.02	0	645	8	653	44.8	0.2
2003		62.21	4.08	23.31	22.28	2.12	33	599	269	901	43.8	7.5
2004		50.55	3.25	27.32	22.58	1.96	62	639	283	984	40.9	7.7
2005		42.05	3.82	25.99	25.67	2.81	17	666	231	914	43.4	6.5
2006		64.00	4.27	22.60	31.30	2.67	0	584	4	588	43.2	0.1
2007		62.60	3.67	29.00	29.58	2.25	4	517	9	530	32.0	0.2
2008		56.01	4.45	29.71	29.71	2.96	14	586	156	756	34.3	4.0
2009		70.34	3.77	26.62	26.69	2.00	0	495	13	508	33.7	0.4
2010		51.27	4.04	25.60	26.58	2.66	0	415	2	417	31.3	0.1
2011		54.79	4.20	24.88	30.42	2.87	7	300	21	328	26.8	0.6
2012		59.62	4.78	21.82	20.43	2.43	0	374	42	416	36.0	1.4
2013		54.79	3.43	27.03	26.07	2.14	4	146	47	197	16.0	1.6
2014		64.76	4.26	28.32	26.24	2.38	2	200	25	227	21.1	0.9
2015												
2016												
2017												
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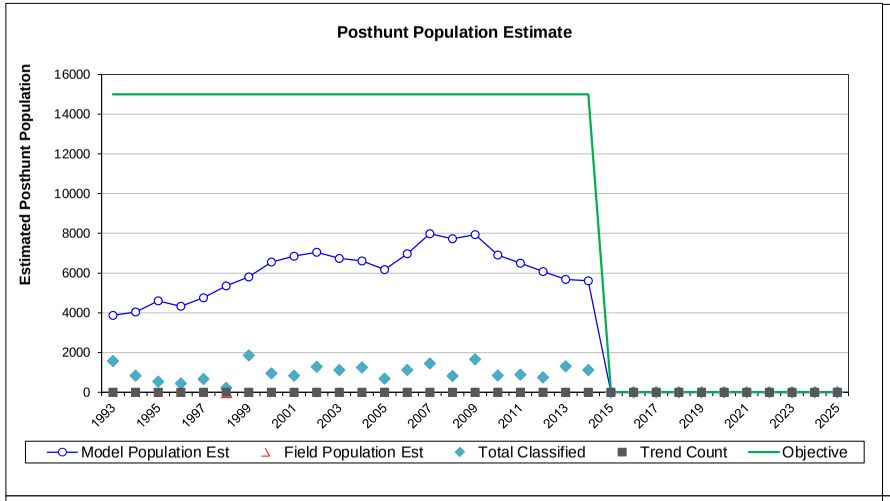
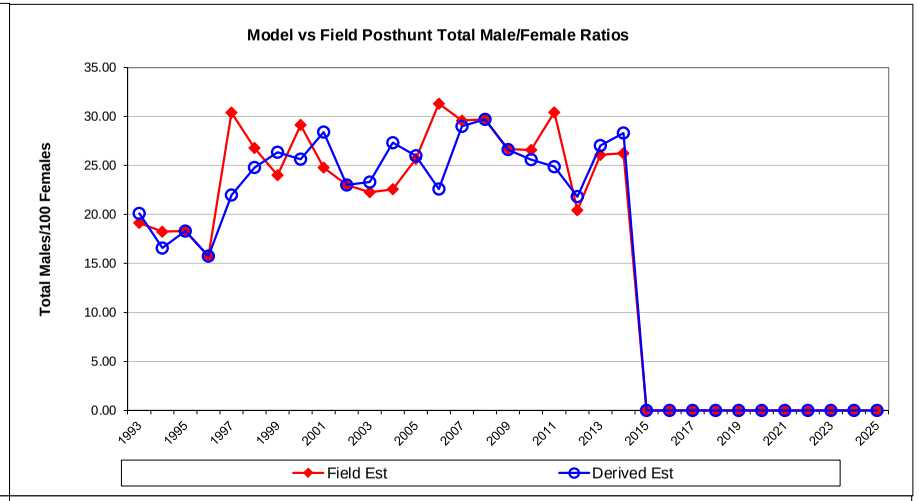
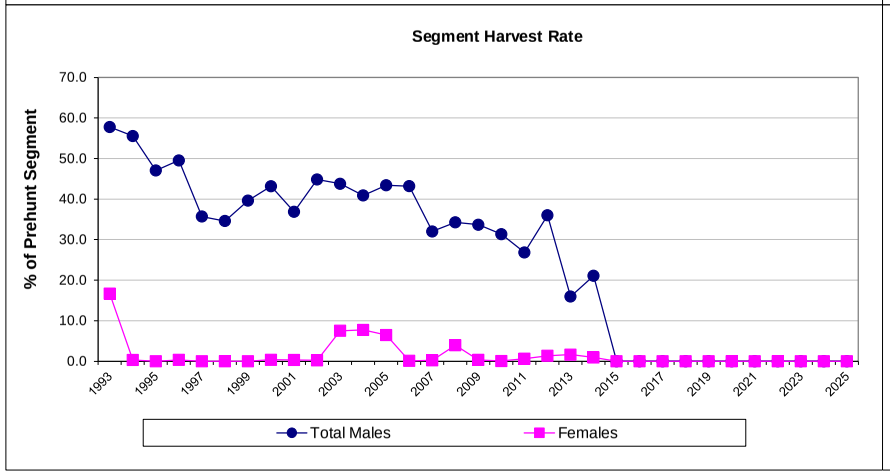
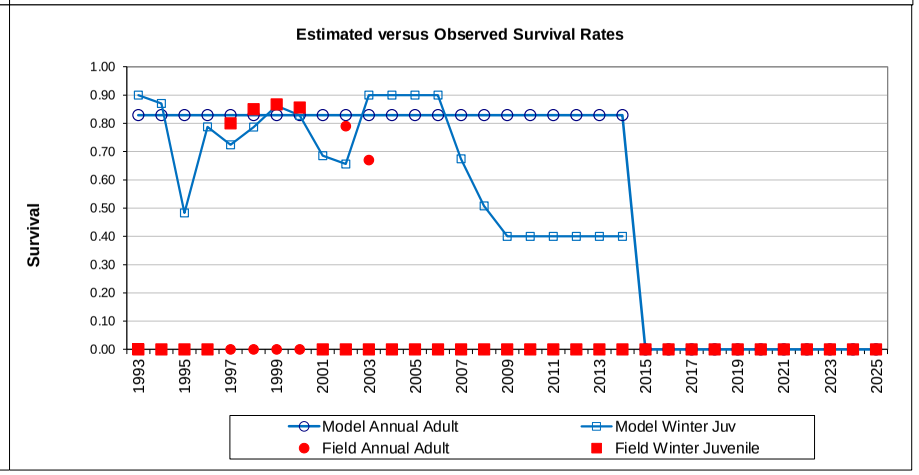
2020												
2021												
2022												
2023												
2024												
2025												

FIGURES









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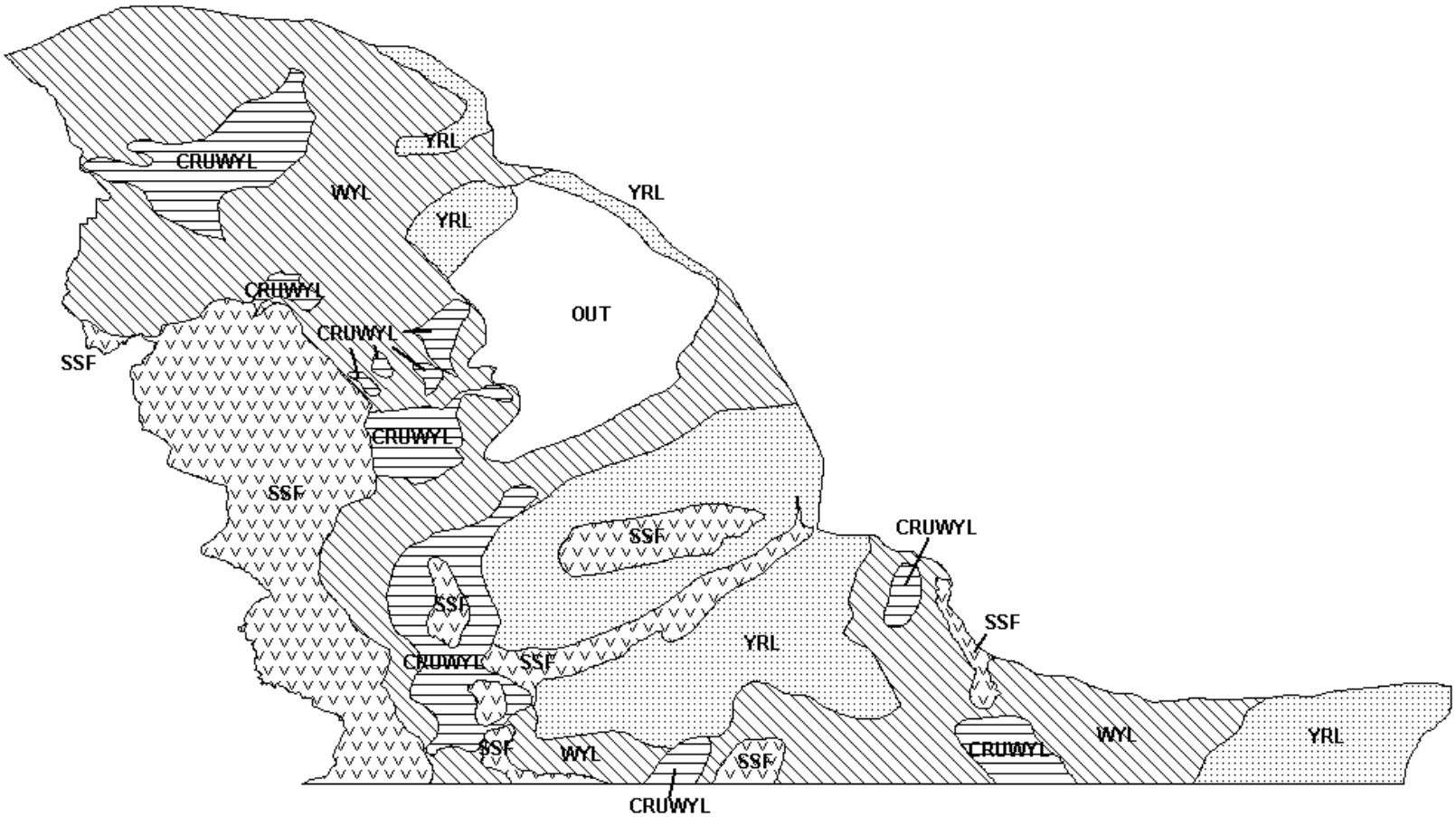


Mule Deer (MD539) - Sheep Mountain
HA 61, 74-77
Revised - 8/88

2013 - JCR Evaluation Form

SPECIES: Mule Deer | PERIOD: 6/1/2013 - 5/31/2014

HERD: MD540 - SHIRLEY MOUNTAIN

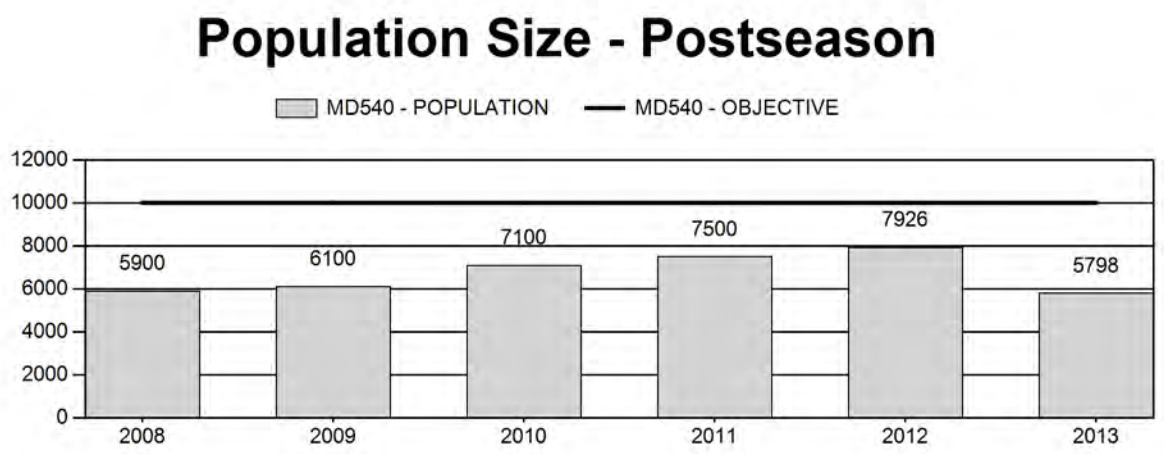
HUNT AREAS: 70 | PREPARED BY: WILL SCHULTZ

	2008 - 2012 Average	2013	2014 Proposed
Population:	6,905	5,798	6,049
Harvest:	395	159	280
Hunters:	809	508	650
Hunter Success:	49%	31%	43 %
Active Licenses:	827	516	660
Active License Percent:	48%	31%	42 %
Recreation Days:	3,289	1,851	2,800
Days Per Animal:	8.3	11.6	10
Males per 100 Females	30	24	
Juveniles per 100 Females	61	42	

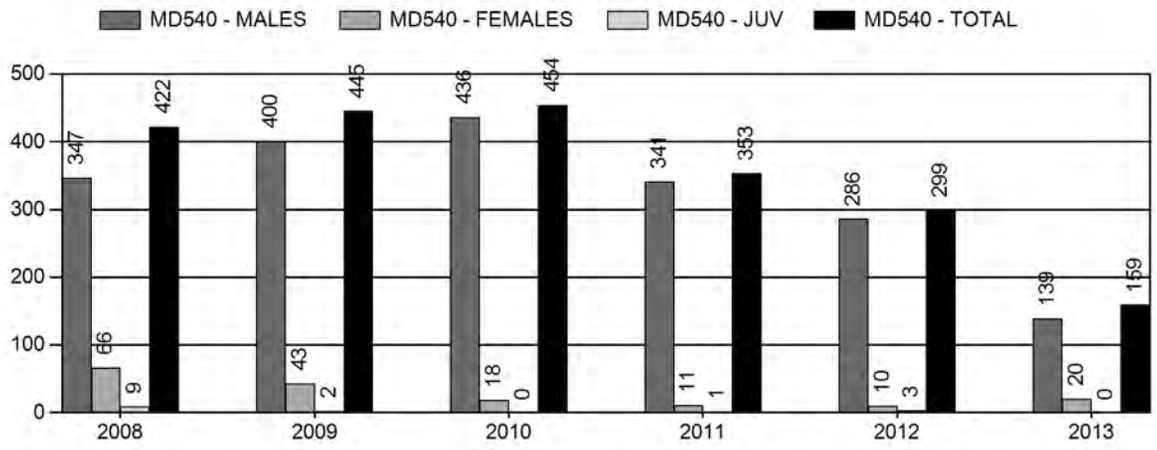
Population Objective:	10,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-42.0%
Number of years population has been + or - objective in recent trend:	20
Model Date:	03/04/2014

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

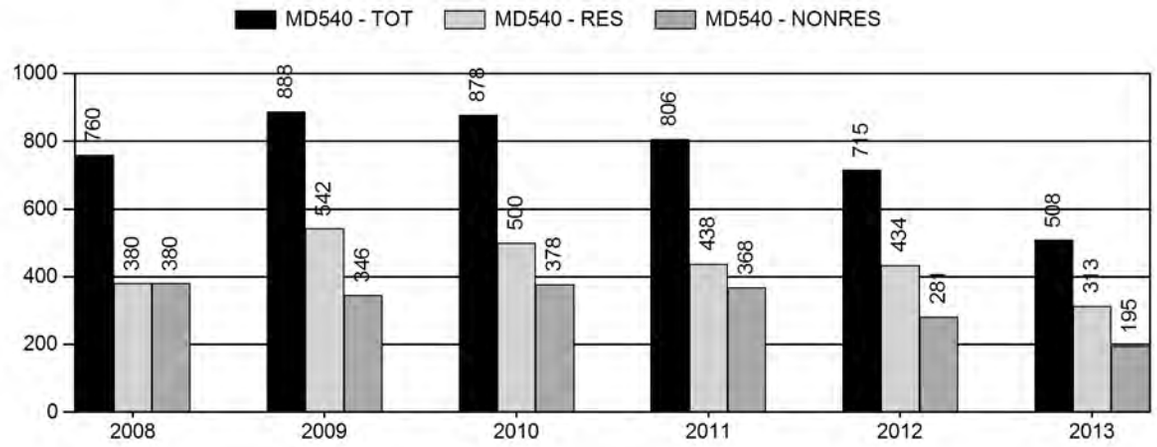
	JCR Year	Proposed
Females ≥ 1 year old:	0.7%	0.8%
Males ≥ 1 year old:	15.0%	22.7%
Juveniles (< 1 year old):	0.02%	0.2%
Total:	3.4%	4.4%
Proposed change in post-season population:	-3.7%	-4.9%



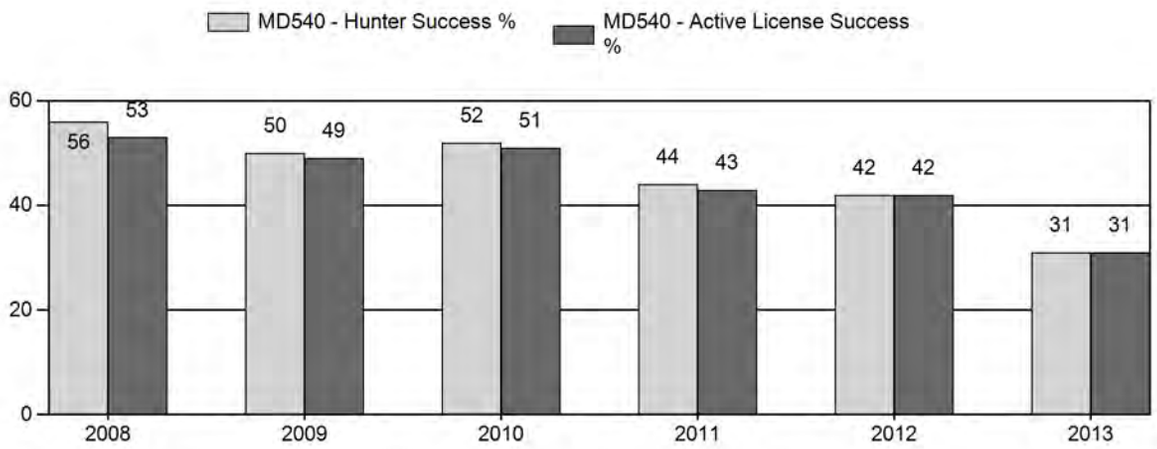
Harvest



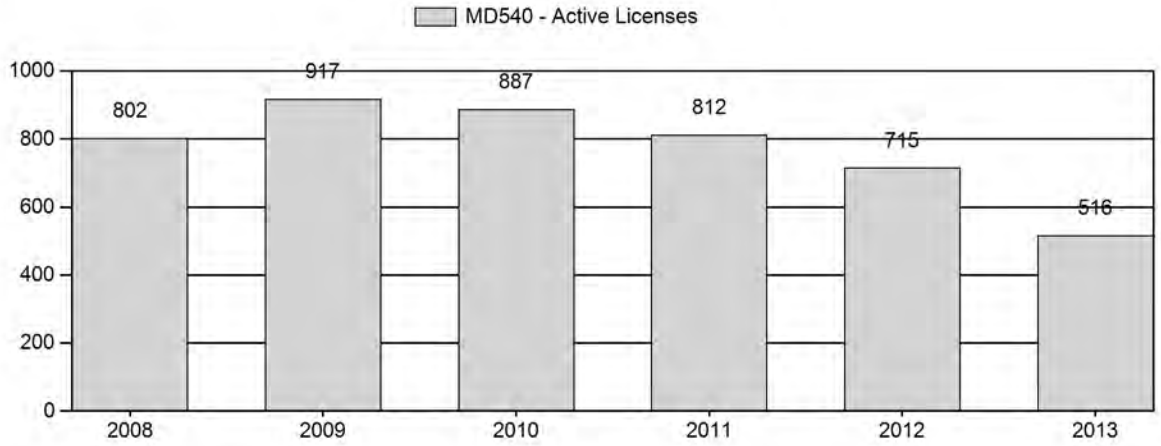
Number of Hunters



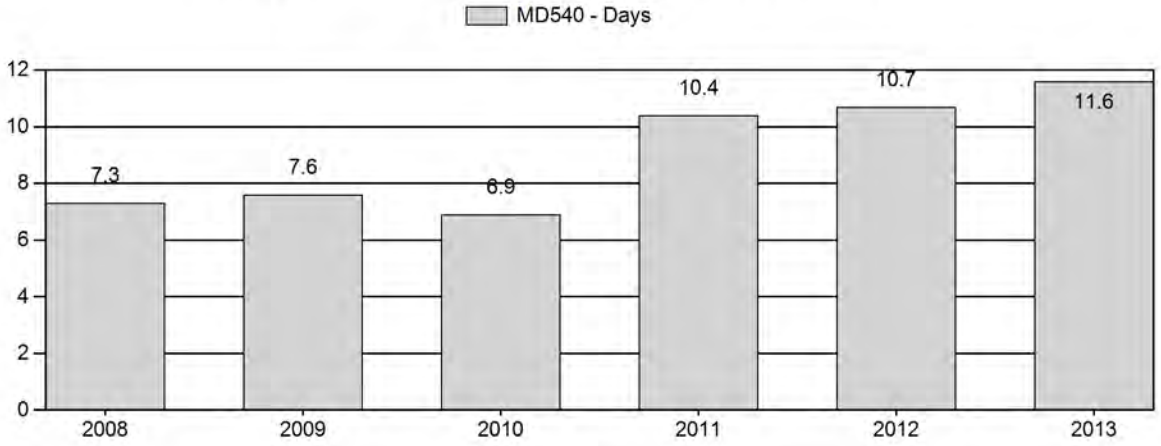
Harvest Success



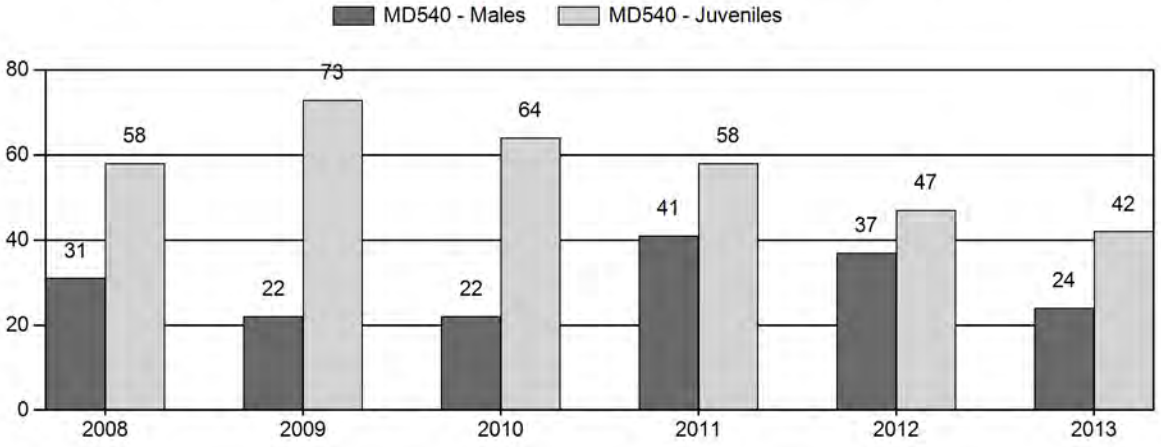
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Mule Deer Herd MD540 - SHIRLEY MOUNTAIN

		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
2008	5,900	26	60	86	17%	276	53%	159	31%	521	963	9	22	31	± 5	58	± 7	44
2009	6,100	10	38	48	11%	216	51%	157	37%	421	913	5	18	22	± 4	73	± 9	59
2010	7,100	24	18	42	12%	190	54%	122	34%	354	958	13	9	22	± 5	64	± 9	53
2011	7,500	29	37	66	20%	162	50%	94	29%	322	1,079	18	23	41	± 7	58	± 9	41
2012	7,926	16	39	55	20%	149	54%	70	26%	274	1,033	11	26	37	± 7	47	± 9	34
2013	5,798	26	32	58	14%	246	60%	103	25%	407	997	11	13	24	± 4	42	± 6	34

Shirley Mountain Mule Deer (MD540)
Hunt Area 70
2014 Hunting Seasons

Hunt Area	Type	Dates of Seasons Opens	Dates of Seasons Closes	Limited Quota	Limitations
70		Oct. 15	Oct. 21		General license; antlered mule deer three (3) points or more on either antler or any white-tailed deer
	6	Oct. 15	Nov. 30	25	Limited quota licenses; doe or fawn valid on private land

Hunt Area	Type	Quota change from 2013
Herd Unit Total		**none**

Management Evaluation
Current Management Objective: 10,000
Management Strategy: Recreational
2013 Postseason Population Estimate: 5,800
2014 Proposed Postseason Population Estimate: 6,000

Mule deer in the Shirley Mountain herd unit are managed toward a numeric objective of 10,000. The population was estimated using a spreadsheet model developed in 2012 and update in 2014. The herd is managed for recreation opportunity. The objective was last reviewed in 1987.

Herd Unit Issues
The Shirley Mountain herd unit is comprised of a mixture of habitat and landownership types. Hunter access to public lands containing mule deer habitat is considered good. Small groups of mule deer are considered nuisances and create damage in a localized area on the west side of Shirley Mountain, along Lost and Sage Creeks. Trends in mule deer numbers are in decline while interest from both residents and nonresidents in hunting in this herd unit have increased over the past 5 years. Expansion of wind farms in the eastern half of this herd unit is imminent.

Weather
Weather in this herd unit was relatively normal during the past bio-year. This weather pattern most likely had a neutral to positive influence on mule deer. For specific meteorological information for the Shirley Mountain herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat

Habitat conditions improved in 2013 with an increase in timely spring and fall precipitation. However, much of the transition and winter ranges were severely impacted by the drought conditions experienced in bio-year 2012. No mule deer habitat production/utilization data was available for this herd unit. However, annual production rates should have improved from the previous year, while utilization rates on winter ranges likely continued to be high.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality and consequently heavily influence population management for any particular big game specie.

Shrub communities within the Laramie Region that are annually assessed by game wardens, wildlife biologists, and terrestrial habitat biologists, include: true mountain mahogany, antelope bitterbrush, skunkbrush sumac, big sagebrush, and four-wing saltbush. A majority of these transects were established approximately 12–13 years ago. Transects were established for several different reasons, including: measuring habitat response prior to or following treatments (i.e. prescribed fire, wildfire, mowing), concern over historic or current domestic livestock or wild ungulate utilization levels, selection of "representative habitats" utilized by wildlife on identified winter ranges, and to compare present results with historic data sets.

Field Data

The 2013 postseason classification ground survey was completed in late November. An adequate classification sample size of 407 mule deer was required to achieve an 80% confidence interval for the ratio estimates. The sample size (n=407) was the greatest recorded since 2009, yet fell below the adequate sample size goal. Yearling ratios were the same as in 2012 at 11 yearling bucks:100 does. This was lower than was anticipated given the implementation of the 3-point or more on either antler limitation in 2013. However, 2012 fawn ratios were poor and thus may have contributed to no increase in the observed yearling ratio. Adult bucks ratios declined from 26 in 2012 to 13 in 2013, indicating harvest pressure was greatly shifted to this segment of the deer population. Fawn ratios once again declined as they had done in 2012, reaching 42 fawns:100 does, which was lower than any ratio observed during the past 25 years.

Harvest Data

A significant change for the 2013 season was the addition of a 3-points or better limitation for the herd unit. Season lengths had been incrementally reduced over the past several years to protect overall buck numbers. The antler point restriction was implemented as an additional protection specifically for yearling bucks. The final 2013 WGFD deer harvest survey report indicated 500 general licensed hunters' harvested 150 mule deer for an overall success rate of 30%. General license buck harvest decreased 51% and general license hunter numbers decreased 29%, compared to the 2012 season.

In addition to decreasing total buck harvest rates, the antler point restriction likely contributed to the decrease in hunter numbers. An increase in the number of unsuccessful hunter corresponded with an increase in the portion of hunters who were dissatisfied with their overall hunting experience. The harvest survey reported satisfaction ratings of satisfied or very satisfied dropping from 58% in 2012, to 41% in 2013.

Population

In 2013 we selected to use the SCJ,SCA model. Although the SCJ,SCA model can be made into a more complicated model than the other 2 models in the Wyoming Spreadsheet Model suite, we limited the optimizing cells to 9 cells. Cell optimization for fawn and adult survival rates was allowed in order to assist in simulating the likely lower than normal survival rates due to severe winter weather during those particular years selected in the model. It produced the lowest AICc score but the population estimate was still considered suspect by managers.

Given the openness of the landscape, and well defined herd unit boundaries, we believed observed harvest rates and classification sample sizes were not representative for an estimated population of this size. We believe the true population size to be lower than the estimate produced by the spreadsheet model. The observed trend in mule deer abundance and harvest does not support population dynamics depicted in the models. Without other information (e.g. an independent population estimate or survival data) to incorporate into the model, accuracy of estimates will continue to be unknown.

We rated this model as poor, and not biologically defensible. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model, and primarily due to less than adequate sample sizes for postseason classification counts (Morrison 2012).

Management Summary

The 2014 hunting season will include 7-days of General licensed antlered mule deer, 3 points or more on either antler, or any white-tailed deer hunting. The point restriction will provide protection for yearling mule deer bucks. Type 6, private land doe or fawn licenses were prescribed to reduce damage and nuisance deer issues in the Lost and Sage Creek area.

The Region D quota was reduced to bring hunter opportunity in line with the current mule deer resource. This will also improve hunter satisfaction for both nonresidents and resident hunters alike.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet Model for Ungulate Population data. Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 41 pp.

Bibliography of Herd Specific Studies

McDaniel G. W., F. G. Lindzey. 1991. Seasonal Movements, Population Characteristics and Habitat Use of Mule Deer in the Shirley Mountain Area, Central Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming, Laramie. 64 pp.

Strickland, D., L.L. McDonald, G. Johnson, and J. Kern. 1992. An Evaluation of Mule Deer Classifications From Helicopter and Ground Surveys. Western Ecosystems Technology, Inc. Cheyenne. 37pp.

INPUT	
Species:	MULE DEER
Biologist:	SCHULTZ
Herd Unit & No.:	SHIRLEY MTN 540
Model date:	03/04/14

MODEL EVALUATION: POOR

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	89	98	☐ CJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	68	91	☑ SCJ,SCA Mod	K=9
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	37	148	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population			Total	Predicted Posthunt Population			Total	Objective
	Field Est	Field SE		Juveniles	Total Males	Females		Juveniles	Total Males	Females		
1993				603	1078	2437	4118	552	518	1838	2908	10000
1994				950	613	1788	3351	950	288	1788	3027	10000
1995				1401	518	1854	3773	1401	292	1854	3547	10000
1996				1421	645	2036	4102	1421	395	2036	3853	10000
1997				1287	743	2204	4234	1287	569	2204	4060	10000
1998				1515	861	2317	4692	1515	655	2317	4487	10000
1999				1480	1000	2480	4959	1480	619	2480	4578	10000
2000				1603	958	2615	5177	1603	628	2615	4847	10000
2001				1411	1000	2770	5181	1411	632	2770	4813	10000
2002				1942	951	2855	5748	1942	636	2855	5433	10000
2003				2015	1101	3076	6192	2015	753	3076	5845	10000
2004				2206	1225	3294	6725	2206	926	3294	6425	10000
2005				1644	1431	3540	6615	1642	1058	3511	6211	10000
2006				1931	1394	3578	6904	1928	989	3530	6447	10000
2007				2116	1413	3682	7211	2111	851	3622	6585	10000
2008				1860	1207	3285	6352	1851	825	3212	5888	10000
2009				2417	1244	3370	7030	2415	804	3322	6541	10000
2010				2313	1380	3623	7316	2313	900	3603	6816	10000
2011				1834	1143	3171	6148	1833	768	3158	5759	10000
2012				1556	1188	3317	6061	1553	868	3306	5727	10000
2013				1402	1200	3371	5973	1402	1047	3349	**5798**	10000
2014				1882	1213	3263	6357	1876	938	3235	6049	10000
2015												10000
2016												10000
2017												10000
2018												10000
2019												10000
2020												10000
2021												10000
2022												10000
2023												10000
2024												10000
2025												10000

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.55			0.89		
1994	0.55			0.89		
1995	0.55			0.89		
1996	0.55			0.89		
1997	0.55			0.89		
1998	0.55			0.89		
1999	0.55			0.89		
2000	0.55			0.89		
2001	0.55			0.89		
2002	0.55			0.89		
2003	0.55			0.89		
2004	0.55			0.89		
2005	0.55			0.89		
2006	0.55			0.89		
2007	0.54			0.75		
2008	0.55			0.89		
2009	0.55			0.89		
2010	0.40			0.75		
2011	0.55			0.89		
2012	0.55			0.89		
2013	0.40			0.89		
2014	0.55			0.89		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

Parameters:	Optim cells
Juvenile Survival =	0.550
Adult Survival =	0.891
Initial Total Male Pop/10,000 =	0.104
Initial Female Pop/10,000 =	0.368

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

	Classification Counts										Harvest	
	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
Year	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		30.05	2.47	28.18	23.79	2.15	46	509	545	1100	52.0	24.6
1994		53.13	4.42	16.13	28.37	2.96	0	295	0	295	52.9	0.0
1995		75.60	8.89	15.73	23.81	4.19	0	206	0	206	43.7	0.0
1996		69.80	7.66	19.41	12.38	2.62	0	227	0	227	38.7	0.0
1997		58.40	8.60	25.82	28.00	5.35	0	158	0	158	23.4	0.0
1998		65.38	8.33	28.27	27.56	4.75	0	187	0	187	23.9	0.0
1999		59.67	7.26	24.97	20.44	3.69	0	346	0	346	38.1	0.0
2000		61.31	7.05	24.03	34.17	4.80	0	300	0	300	34.4	0.0
2001		50.96	7.00	22.82	18.47	3.73	0	335	0	335	36.8	0.0
2002		68.05	8.23	22.29	24.85	4.28	0	286	0	286	33.1	0.0
2003		65.52	11.16	24.48	22.99	5.70	0	316	0	316	31.6	0.0
2004		66.98	10.27	28.11	18.87	4.60	0	272	0	272	24.4	0.0
2005		46.76	4.97	30.14	32.01	3.90	2	339	26	367	26.1	0.8
2006		54.63	4.31	28.02	25.55	2.66	3	368	44	415	29.0	1.4
2007		58.29	4.74	23.50	29.02	3.02	4	511	54	569	39.8	1.6
2008		57.61	5.74	25.68	31.16	3.85	9	347	66	422	31.6	2.2
2009		72.69	7.62	24.19	22.22	3.55	2	400	43	445	35.4	1.4
2010		64.21	7.45	24.98	22.11	3.77	0	436	18	454	34.8	0.5
2011		58.02	7.52	24.33	40.74	5.95	1	341	11	353	32.8	0.4
2012		46.98	6.81	26.26	36.91	5.82	3	291	10	304	26.9	0.3
2013		41.87	4.91	31.27	23.58	3.44	0	139	20	159	12.7	0.7
2014		58.00	6.77	29.00	26.00	4.05	5	250	25	280	22.7	0.8
2015												
2016												
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2018												
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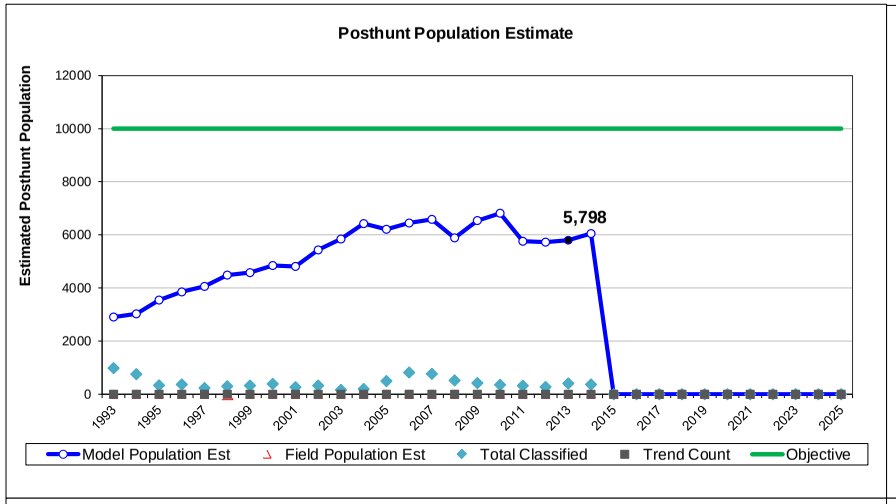
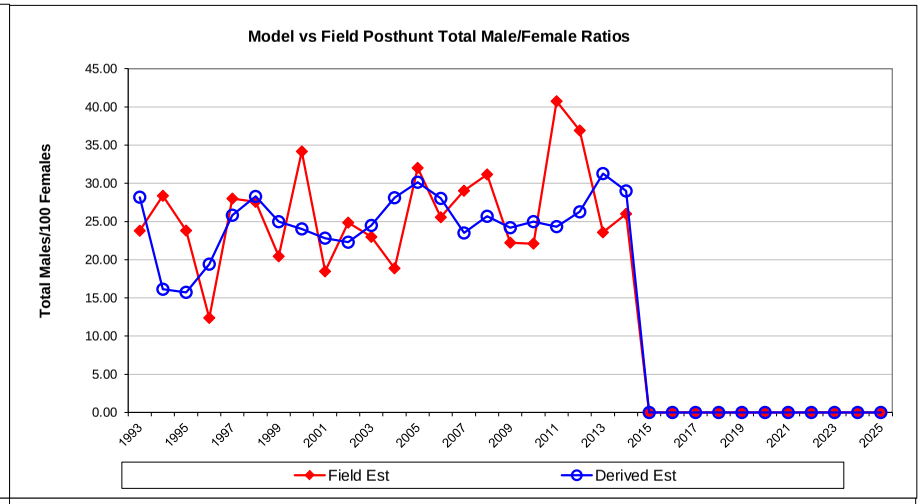
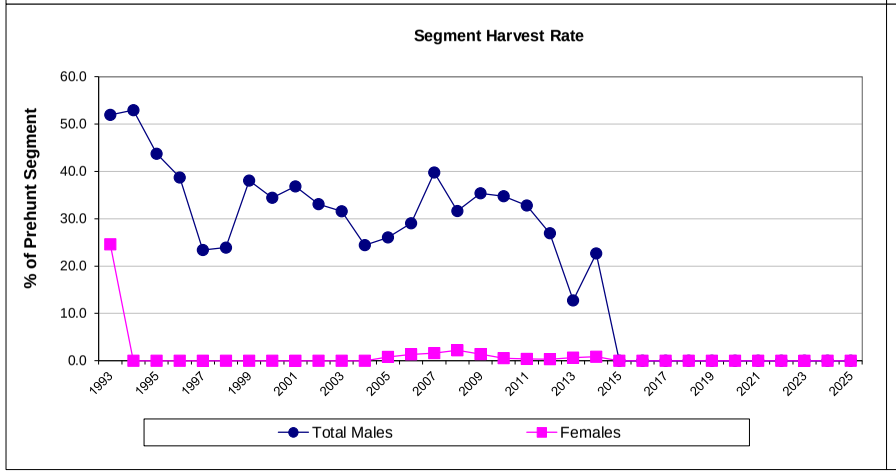
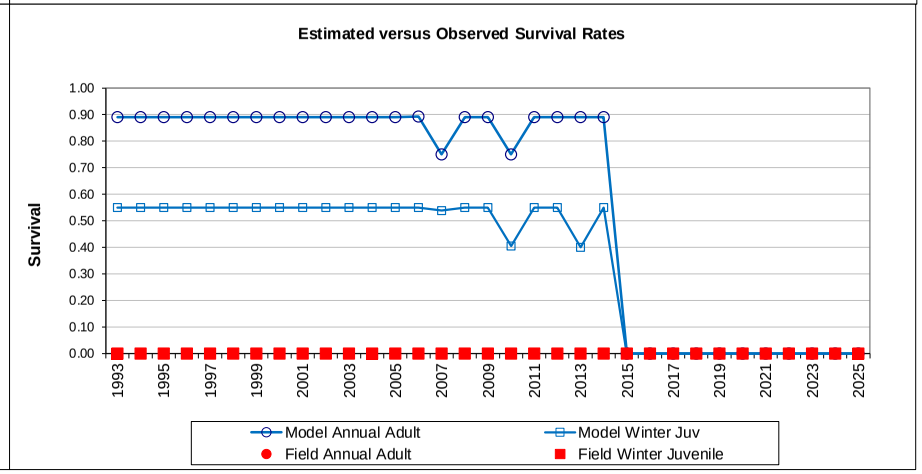
2020												
2021												
2022												
2023												
2024												
2025												

FIGURES





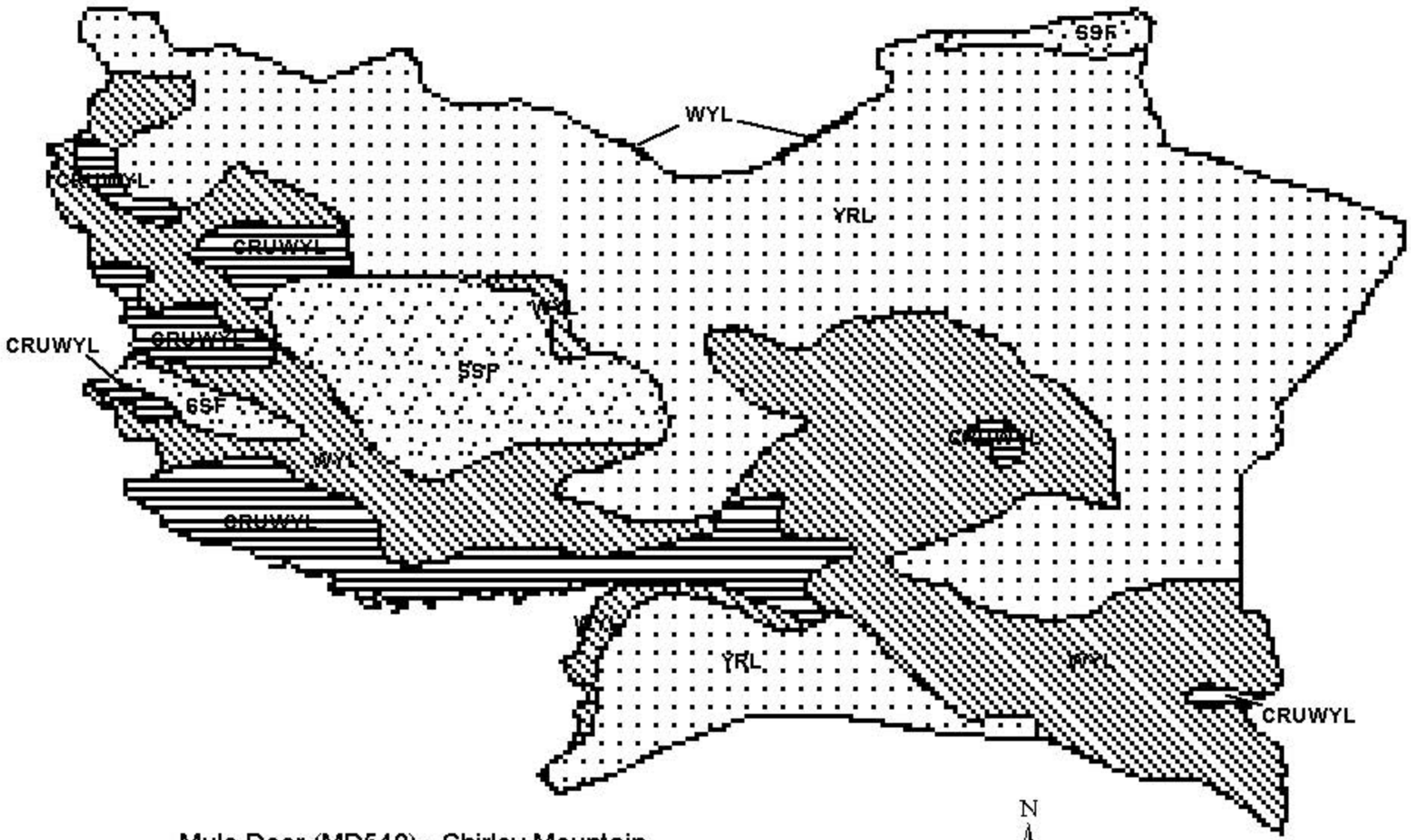




Comments:

The SCJ,SCA model produced the lowest AICc score. We assume the true population size to be lower than those produced by these models.

END



Mule Deer (MD540) - Shirley Mountain
HA 70
Revised - 12/87

2013 - JCR Evaluation Form

SPECIES: Mule Deer | PERIOD: 6/1/2013 - 5/31/2014

HERD: MD541 - PLATTE VALLEY

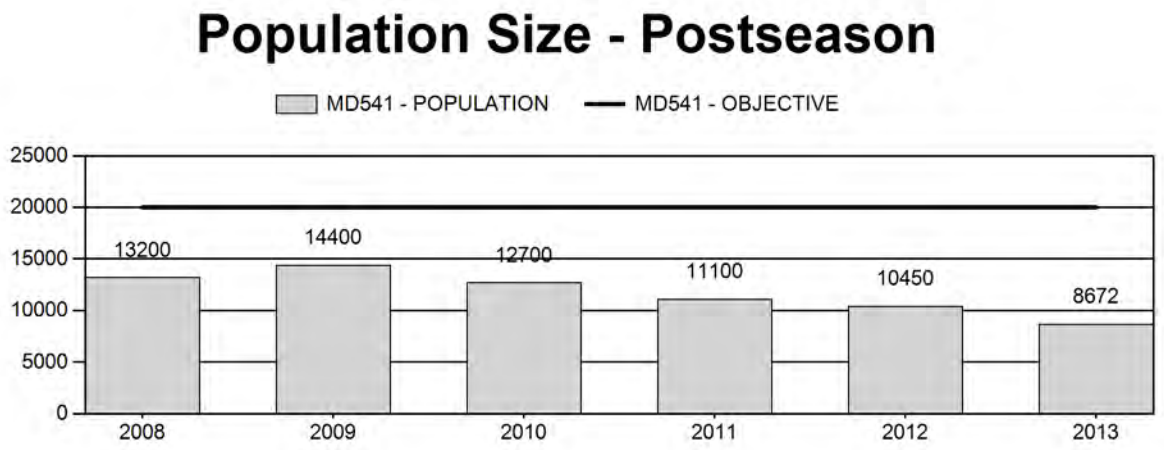
HUNT AREAS: 78-81, 83, 161 | PREPARED BY: WILL SCHULTZ

	2008 - 2012 Average	2013	2014 Proposed
Population:	12,370	8,672	7,989
Harvest:	861	391	391
Hunters:	2,936	879	850
Hunter Success:	29%	44%	46%
Active Licenses:	2,998	879	850
Active License Percent:	29%	44%	46%
Recreation Days:	15,921	4,931	4,900
Days Per Animal:	18.5	12.6	12.5
Males per 100 Females	27	32	
Juveniles per 100 Females	55	52	

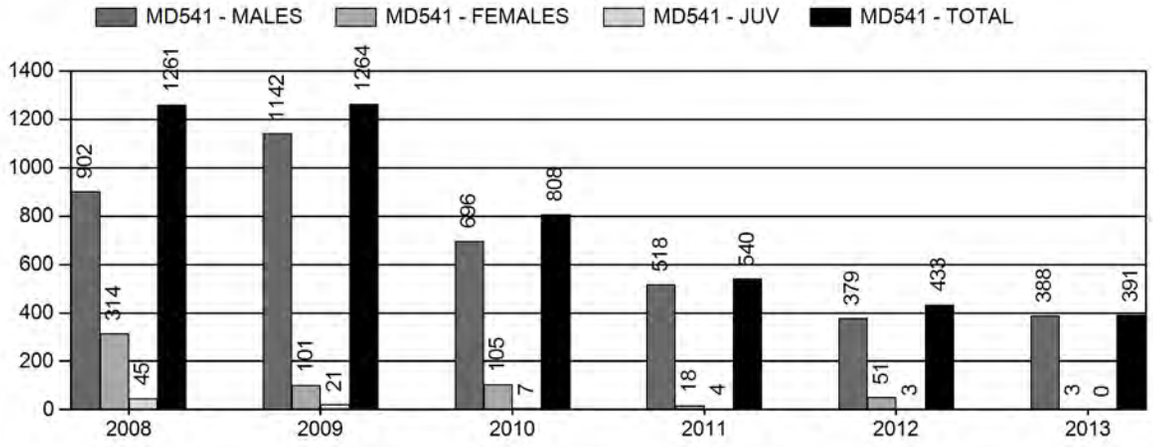
Population Objective:	20,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-56.6%
Number of years population has been + or - objective in recent trend:	19
Model Date:	05/22/2014

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

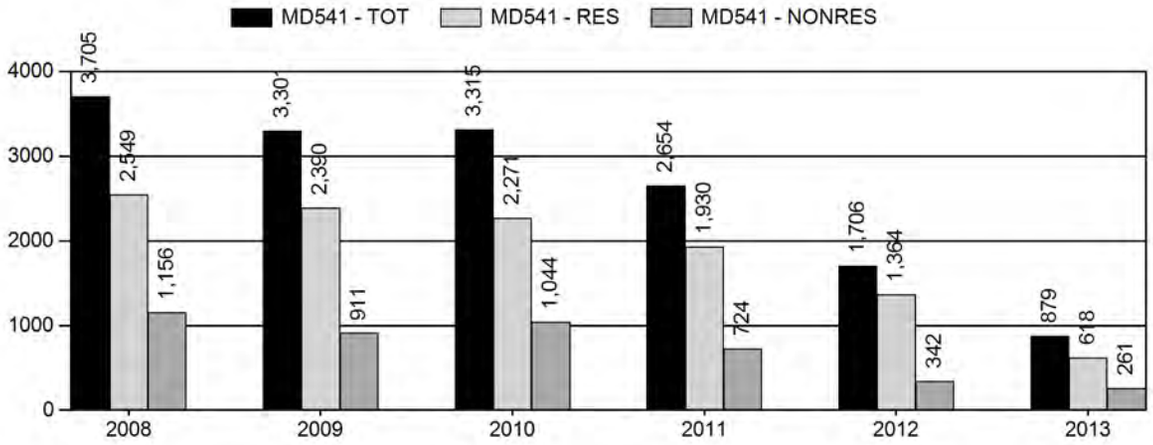
	JCR Year	Proposed
Females ≥ 1 year old:	0.7%	0.1%
Males ≥ 1 year old:	23.1%	26.4%
Juveniles (< 1 year old):	0.2%	0%
Total:	4.3%	4.6%
Proposed change in post-season population:	-4.8%	-5.1%



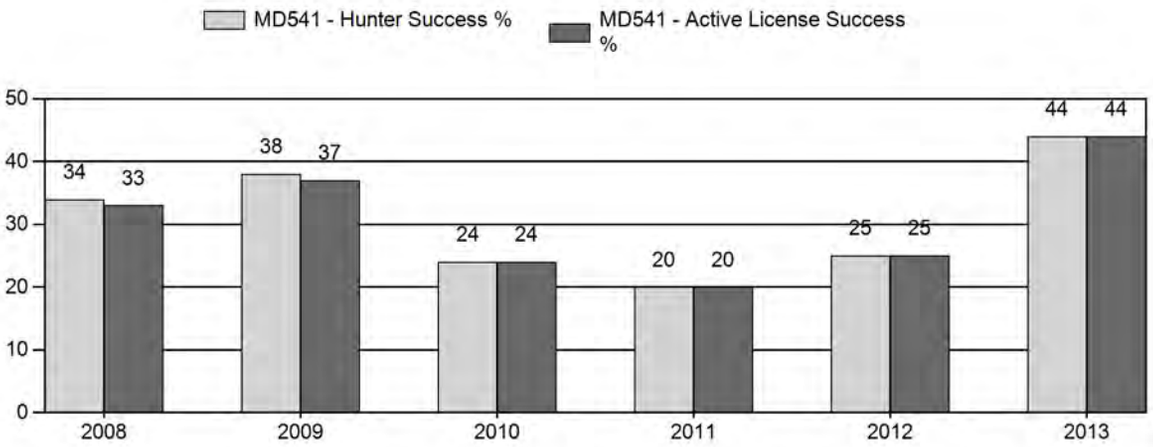
Harvest



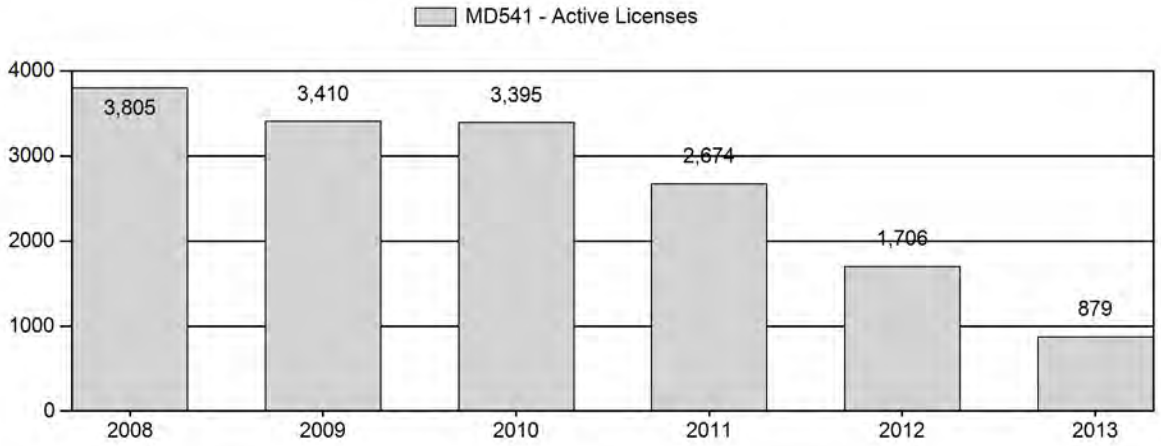
Number of Hunters



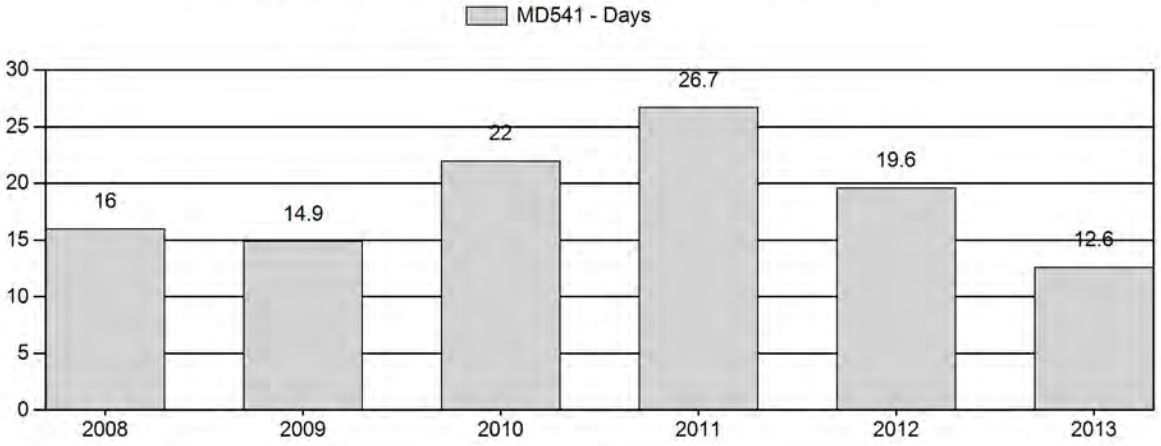
Harvest Success



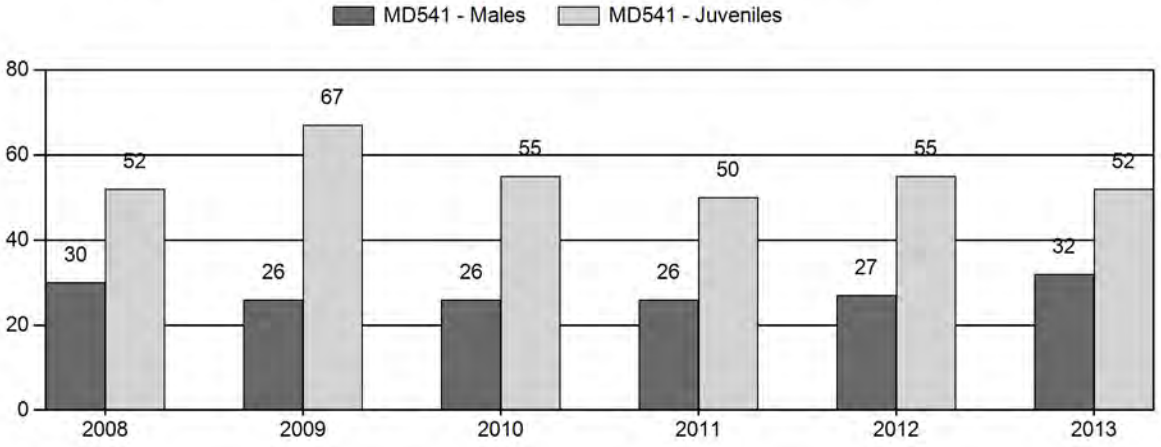
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for Mule Deer Herd MD541 - PLATTE VALLEY

		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
2008	13,200	199	386	585	17%	1,928	55%	1,003	29%	3,516	1,020	10	20	30	± 2	52	± 2	40
2009	14,400	65	207	272	13%	1,047	52%	700	35%	2,019	1,053	6	20	26	± 2	67	± 4	53
2010	12,700	111	222	333	14%	1,265	55%	701	30%	2,299	1,094	9	18	26	± 2	55	± 3	44
2011	11,100	114	340	454	15%	1,738	57%	865	28%	3,057	999	7	20	26	± 2	50	± 2	39
2012	10,450	70	143	213	15%	794	55%	438	30%	1,445	980	9	18	27	± 2	55	± 4	43
2013	8,672	136	209	345	17%	1,092	55%	565	28%	2,002	937	12	19	32	± 2	52	± 3	39

Platte Valley Mule Deer (MD541)
Hunt Areas 78-81, 83 & 161
2014 Hunting Seasons

Hunt Area	Type	Dates of Seasons Opens	Dates of Seasons Closes	Limited Quota	Limitations
78	1	Oct. 1	Oct. 14	300	Limited quota licenses; antlered mule deer or any white-tailed deer
79	1	Oct. 1	Oct. 14	300	Limited quota licenses; antlered mule deer or any white-tailed deer
80, 83	1	Oct. 1	Oct. 14	200	Limited quota licenses; antlered mule deer or any white-tailed deer
81	1	Oct. 1	Oct. 14	200	Limited quota licenses; antlered mule deer or any white-tailed deer
161	1	Oct. 1	Oct. 14	25	Limited quota licenses; antlered mule deer or any white-tailed deer

Hunt Area	Type	Quota change from 2013
161	1	-25
Herd Unit Total	**1**	**-25**

Management Evaluation
Current Management Objective: 20,000
Management Strategy: Recreational
2013 Postseason Population Estimate: 8,700
2014 Proposed Postseason Population Estimate: 8,000

Mule deer in the Platte Valley herd unit are managed toward a numeric objective of 20,000. The population was estimated using a spreadsheet model developed in 2013 and updated in 2014. The herd is managed for recreational opportunity. The objective was last reviewed in 1987 and will be reviewed in 2014.

Herd Unit Issues
Fieldwork for several projects initiated under the Platte Valley Mule Deer Initiative (PVMDI) was completed during this past year. The monitoring of 70 radio-collared mule deer ended with the last radio-collars being retrieved for downloading in February of 2014. The University of Wyoming Cooperative Unit began analyzing data from the

Platte Valley sightability survey evaluation trials. A March meeting was held in Saratoga to update the public regarding PVMDI Mule Deer Plan progress and accomplishments.

In the June of 2013, Wyoming Game and Fish Department and the Platte Valley Habitat Partnership finalized their Mule Deer Habitat Management Plan. This multi-stakeholder partnership was tasked with identifying mule deer habitat improvement needs in the herd unit and collectively developing projects to address those needs. In November, the Wyoming Game and Fish Commission (WGFC) allocated $95K from the $500K Platte Valley Habitat Partnership budget to be used as matching funds toward these mule deer habitat improvement projects.

Efforts to reduce predators of mule deer in the Platte Valley were implemented during this period. Carbon County Predator Management District began a 3-year coyote removal project (Appendix A). The WGFC approved increases to both mountain lion and black bear seasons mortality limits and season lengths.

Weather

Weather in this herd unit was relatively normal during the past bio-year. This weather pattern most likely had a neutral to positive influence on mule deer. For specific meteorological information for the Platte Valley herd unit the reviewer is referred to the following link:
http://www.ncdc.noaa.gov/cag/

Habitat

Habitat conditions improved in 2013 with an increase in timely spring and fall precipitation. However, much of the transition and winter ranges were severely impacted by the drought conditions experienced in bio-year 2012. No mule deer habitat production/utilization data was available for this herd unit. However, annual production rates should have improved from the previous year, while utilization rates on winter ranges likely continued to be high.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality and consequently heavily influence population management for any particular big game specie.

Shrub communities within the Laramie Region that are annually assessed by game wardens, wildlife biologists, and terrestrial habitat biologists, include: true mountain mahogany, antelope bitterbrush, skunkbrush sumac, big sagebrush, and four-wing saltbush. A majority of these transects were established approximately 12–13 years ago. Transects were established for several different reasons, including: measuring habitat response prior to or following treatments (i.e. prescribed fire, wildfire, mowing), concern over historic or current domestic livestock or wild ungulate utilization levels, selection of "representative habitats" utilized by wildlife on identified winter ranges, and to compare present results with historic data sets.

Field Data

The 2013 Platte Valley Herd Unit postseason classification ratios were 32 bucks and 52 fawns/100 does; based on an adequate sample of 2,002 mule deer. The buck ratio increased 16% in 2013. The observed fawn ratio at 52 fawns/100 does was 7% lower than the previous year. It was hypothesized that does went into the 2012-2013 winter in very poor body condition following the 2012 drought, resulting in decreased birth rates and decreased fawn survival in 2013.

Harvest Data

Mule deer hunting seasons in the Platte Valley were administered entirely by limited quota licenses in 2013. Each hunt area was prescribed an area specific license quota. These quotas were formulated based on past harvest success and a PVMDI Mule Deer Plan goal of attaining a 40% harvest success rate for the herd unit in 2013. A total of 1,050 licenses were issued (Table 1). Total harvest success increased to 44% in 2013 with 388 bucks being harvested. This harvest rate was attributed to an increased season length, removal of the 2012 3-point or more antler point limitation, and perhaps most important, alignment of hunter numbers with the current mule deer resource. An increase in the harvest success rate resulted in an increase in the number hunters who were either satisfied, or very satisfied. Hunter satisfaction increased from 46% in 2012, to 57% in 2013.

2013 Harvest of yearling bucks did not increase significantly with the removal of the 2012 antler point restriction (Figure 1). Field checked harvest data from past years indicated on average greater than 25% of the buck harvest consisted of yearling bucks. The 2012 antler point restrictions resulted in lowering the yearling percentage to 5% of the total buck harvest. The 2013 limited quoted seasons, with no antler point restrictions, resulted in an additional 7% increase to 12% of yearling bucks in the buck harvest. Only 3 antlerless mule deer were reported harvested in the Platte Valley.

Table 1. 2013 Platte Valley mule deer herd unit harvest information form the WGFD harvest survey, Wyoming.

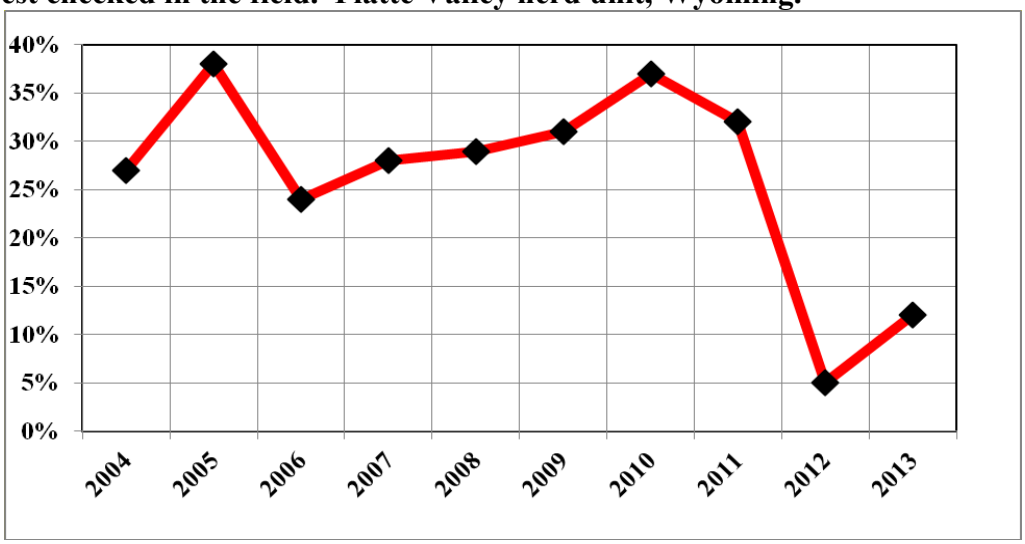
MULE DEER 2013 HARVEST, HUNTING PRESSURE, HUNTER SUCCESS BY HUNT AREA

AREA	TYPE	ACTIVE LICS/HTRS	HARVEST BUCK	HARVEST DOE	HARVEST FAWN	HARVEST TOTAL	HUNTER SUCCESS	DAYS/ HARVEST	HUNTER DAYS	LICENSES SOLD
78 French Creek	Type 1	244	108	0	0	108	44.3%	10.1	1096	298
Pooled Total		**244**	**108**	**0**	**0**	**108**	**44.3%**	**10.1**	**1096**	
Pooled Resident		201	81	0	0	81	40.3%	11.1	901	
Pooled Nonresident		43	27	0	0	27	62.8%	7.2	195	
79 Kennaday Peak	Type 1	247	107	0	0	107	43.3%	13.7	1466	299
Pooled Total		**247**	**107**	**0**	**0**	**107**	**43.3%**	**13.7**	**1466**	
Pooled Resident		146	49	0	0	49	33.6%	19.6	960	
Pooled Nonresident		101	58	0	0	58	57.4%	8.7	506	
80 Spring Creek	Type 1	172	69	0	0	69	40.1%	15.7	1083	197
Pooled Total		**172**	**69**	**0**	**0**	**69**	**40.1%**	**15.7**	**1083**	
Pooled Resident		101	33	0	0	33	32.7%	23.0	759	
Pooled Nonresident		71	36	0	0	36	50.7%	9.0	324	
81 Blackhall	Type 1	176	73	3	0	76	43.2%	14.8	1128	199
Pooled Total		**176**	**73**	**3**	**0**	**76**	**43.2%**	**14.8**	**1128**	
Pooled Resident		138	52	3	0	55	39.9%	17.6	967	
Pooled Nonresident		38	21	0	0	21	55.3%	7.7	161	
83 Bolten Rim	Type 1	16	2	0	0	2	12.5%	21.5	43	197
Pooled Total		**16**	**2**	**0**	**0**	**2**	**12.5%**	**21.5**	**43**	
Pooled Resident		3	0	0	0	0	0.0%	0.0	16	
Pooled Nonresident		13	2	0	0	2	15.4%	13.5	27	
161 St. Mary's Creek	Type 1	39	29	0	0	29	74.4%	4.0	115	50
Pooled Total		**39**	**29**	**0**	**0**	**29**	**74.4%**	**4.0**	**115**	
Pooled Resident		33	23	0	0	23	69.7%	4.3	100	
Pooled Nonresident		6	6	0	0	6	100.0%	2.5	15	

MULE DEER 2013 HARVEST BY HERD UNIT

HERD	TYPE	ACTIVE LICS/HTRS	HARVEST BUCK	HARVEST DOE	HARVEST FAWN	HARVEST TOTAL	HUNTER SUCCESS	DAYS/ HARVEST	HUNTER DAYS	LICENSES SOLD
541 Platte Valley	Type 1	879	388	3	0	391	44.5%	12.6	4931	1,043
Total Hunters		**879**	**388**	**3**	**0**	**391**	**44.5%**	**12.6**	**4931**	
Resident		618	238	3	0	241	39.0%	15.4	3703	
Nonresident		261	150	0	0	150	57.5%	8.2	1228	

Figure 1. 2004-2013 Percentage of yearling bucks in the total mule deer buck harvest checked in the field. Platte Valley herd unit, Wyoming.



Population

We continued to use the TSJ,CA spreadsheet model in 2013. This model provided the balance of allowing juvenile survival rates to be optimized for alignment with observed population dynamics, while maintaining a constant survival rate for adult mule deer in model simulations. The TSJ,CA model also offered the best AICc score of the suite of spreadsheet models. TSJ,CA model aligned very well with 3 abundance estimates for this herd unit and will provide for an excellent "anchor" for future model development. Adult survival rates for 2011 and 2012 were developed from a sample of 70 radio-collared mule deer in this herd unit and included in the model.

We rated this model as fair, and biologically defensible in our evaluation. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model (Morrison 2012).

Management Summary

In 2014, the limited quota licenses numbers will remain similar to the 2013 quotas. A small reduction in licenses was prescribed for Hunt Area 161 due to decreasing public access. We believe limited quota hunting seasons will continue to gain support from the public in 2014. Predator management and habitat improvement projects will continue as means to improve and sustain mule deer and their habitat in the Platte Valley herd unit.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet Model for Ungulate Population data Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 41 pp.

Bibliography of Herd Specific Studies

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Strickland, M. D. 1975. An investigation of the factors affecting the management of a migratory mule deer herd in southeastern Wyoming – the Snowy Range. Ph.D. Dissertation, University of Wyoming, Laramie. 171 pp.

Yost, J. 2009. North Park Deer Movement and Distribution Study Update - March, 2009. Colorado Division of Wildlife, Steamboat Springs. 4 pp.

Wyoming Game and Fish Dept. 2012. 2012 v.110512 Platte Valley Mule Deer Plan. Wyoming Game and Fish Department, Cheyenne. 90 pp.

Wyoming Game and Fish Dept. 2013. Platte Valley Habitat Partnership's (PVHP) Mule Deer Habitat Plan, May 22, 2013. Wyoming Game and Fish Department, Cheyenne. 99 pp.

INPUT	
Species:	MULE DEER
Biologist:	WILL SCHULTZ
Herd Unit & No.:	PLATTE MD541
Model date:	05/22/14

MODEL EVALUATION: FAIR

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	567	576	☐ CJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	261	287	☐ SCJ,SCA Mod	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	179	277	☑ TSJ,CA Model	*Best fit & AICc score, juvenile survival constrained to* ≥0.40 - ≤0.70

Population Estimates from Top Model

Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population			Total	Predicted Posthunt Population			Total	Objective
	Field Est	Field SE		Juveniles	Total Males	Females		Juveniles	Total Males	Females		
1993				5951	3415	14094	23460	5923	2276	13375	21573	20000
1994				7248	3018	11959	22225	7248	2118	11959	21326	20000
1995				6674	3156	11084	20914	6674	2523	11084	20282	20000
1996				6378	3368	10265	20011	6378	2489	10265	19132	20000
1997				5152	3281	9545	17977	5152	2722	9545	17419	20000
1998				5588	3996	9493	19077	5588	3226	9493	18307	20000
1999				6931	4555	9604	21089	6931	3257	9604	19791	20000
2000				7027	5050	10163	22240	7027	2997	10163	20187	20000
2001				5935	4792	10565	21291	5935	3072	10565	19571	20000
2002				6742	4552	10588	21882	6703	2564	10164	19431	20000
2003				6583	4412	10534	21529	6515	2889	10100	19504	20000
2004				5960	4608	10417	20984	5941	2664	9955	18560	20000
2005				6123	4226	10099	20448	6098	2471	9794	18363	20000
2006				5416	4125	10025	19566	5354	2511	9343	17209	20000
2007				4763	3772	9275	17810	4704	2441	8666	15811	20000
2008	12955	163		3991	2907	7922	14821	3942	1915	7577	13434	20000
2009				4952	2922	7484	15358	4929	1666	7373	13968	20000
2010	16892	790		3958	2648	7245	13851	3951	1882	7129	12962	20000
2011	11120	905		3246	2306	6534	12087	3242	1737	6514	11493	20000
2012				2993	1916	5404	10313	2990	1496	5353	9839	20000
2013				2496	1780	4827	9102	2496	1353	4824	**8672**	20000
2014				2445	1589	4385	8419	2445	1162	4382	7989	20000
2015												20000
2016												20000
2017												20000
2018												20000
2019												20000
2020												20000
2021												20000
2022												20000
2023												20000
2024												20000
2025												20000

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.40			0.81		
1994	0.40			0.81		
1995	0.40			0.81		
1996	0.40			0.81		
1997	0.70			0.81		
1998	0.70			0.81		
1999	0.70			0.81		
2000	0.68			0.81		
2001	0.70			0.81		
2002	0.70			0.81		
2003	0.70			0.81		
2004	0.70			0.81		
2005	0.70			0.81		
2006	0.65			0.81		
2007	0.40			0.81		
2008	0.70			0.81		
2009	0.53			0.81		
2010	0.40			0.81		
2011	0.40			0.73	0.73	0.06
2012	0.40			0.79	0.79	0.05
2013	0.40			0.81		
2014	0.50			0.81		
2015						
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

Parameters:	Optim cells
Adult Survival =	0.806
Initial Total Male Pop/10,000 =	0.228
Initial Female Pop/10,000 =	1.337

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

	Classification Counts										Harvest	
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		44.29	1.71	17.01	19.06	1.02	25	1036	654	1715	33.4	5.1
1994		60.61	2.36	17.71	20.93	1.20	0	818	0	818	29.8	0.0
1995		60.21	2.70	22.77	16.35	1.20	0	575	0	575	20.0	0.0
1996		62.14	2.60	24.25	25.55	1.46	0	799	0	799	26.1	0.0
1997		53.97	2.60	28.52	26.66	1.65	0	508	0	508	17.0	0.0
1998		58.87	2.62	33.98	30.72	1.72	0	700	0	700	19.3	0.0
1999		72.17	3.20	33.91	31.54	1.85	0	1180	0	1180	28.5	0.0
2000		69.15	3.36	29.49	38.20	2.26	0	1866	0	1866	40.6	0.0
2001		56.17	2.03	29.07	27.17	1.27	0	1564	0	1564	35.9	0.0
2002		65.95	2.71	25.23	25.89	1.48	35	1807	386	2228	43.7	4.0
2003		64.50	2.47	28.61	25.22	1.35	62	1384	395	1841	34.5	4.1
2004		59.68	2.57	26.76	21.78	1.35	17	1767	420	2204	42.2	4.4
2005		62.26	2.58	25.23	33.38	1.72	23	1595	277	1895	41.5	3.0
2006		57.31	2.66	26.88	34.28	1.90	56	1467	620	2143	39.1	6.8
2007		54.28	1.77	28.17	29.78	1.20	53	1210	554	1817	35.3	6.6
2008		52.02	2.03	25.27	30.34	1.43	45	902	314	1261	34.1	4.4
2009		66.86	3.26	22.60	25.98	1.77	21	1142	101	1264	43.0	1.5
2010		55.42	2.61	26.40	26.32	1.62	7	696	105	808	28.9	1.6
2011		49.77	2.07	26.66	26.12	1.38	4	518	18	540	24.7	0.3
2012		55.86	3.37	27.95	23.57	1.95	3	382	46	431	21.9	0.9
2013		51.74	2.68	28.05	31.59	1.95	0	388	3	391	24.0	0.1
2014		55.80	2.95	26.53	28.00	1.89	0	388	3	391	26.9	0.1
2015												
2016												
2017												
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2020												
2021												
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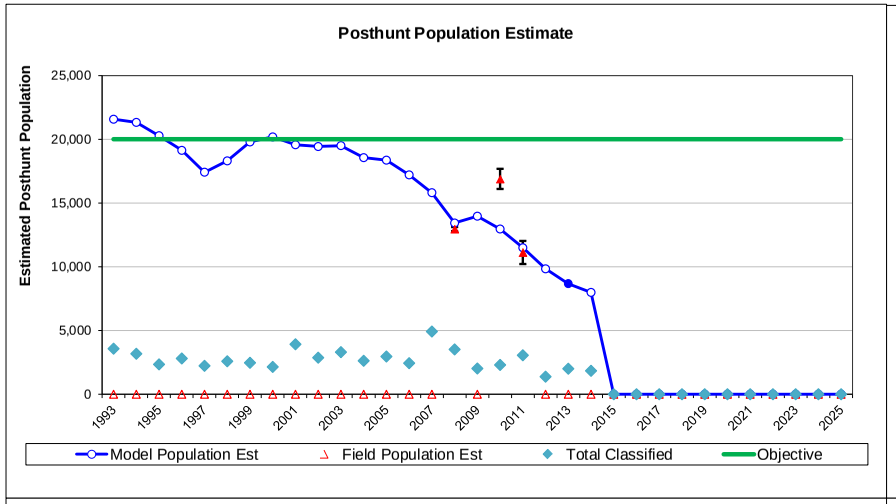
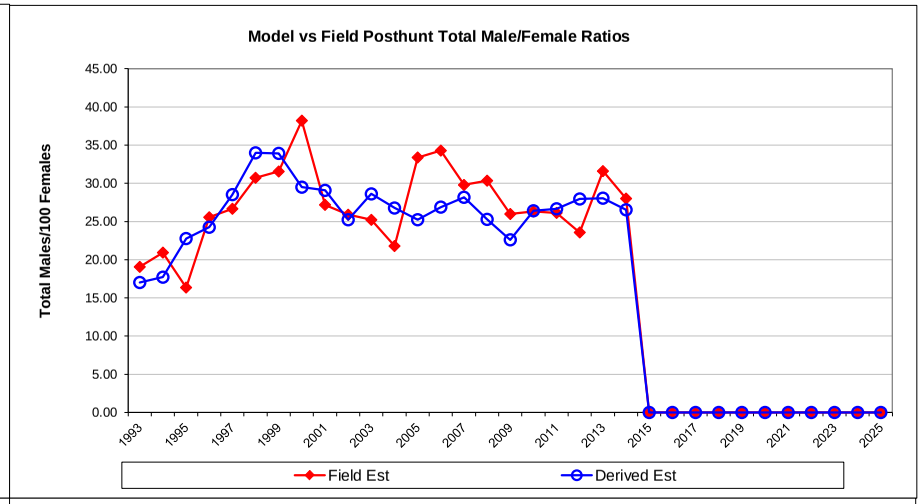
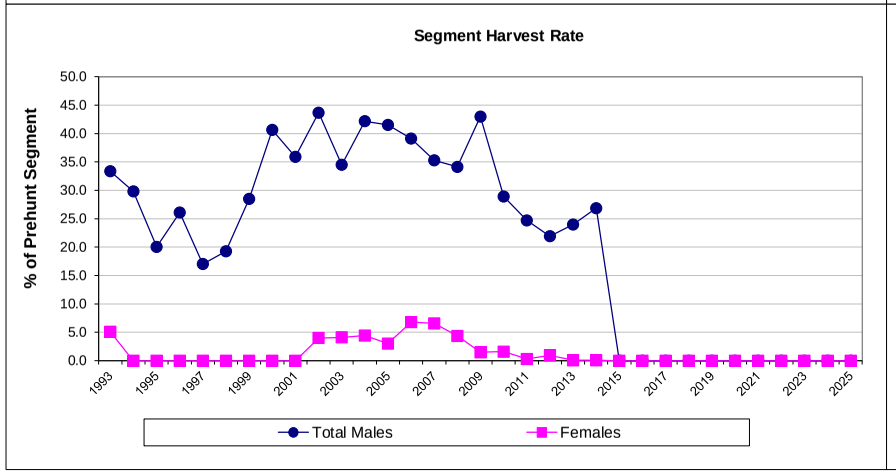
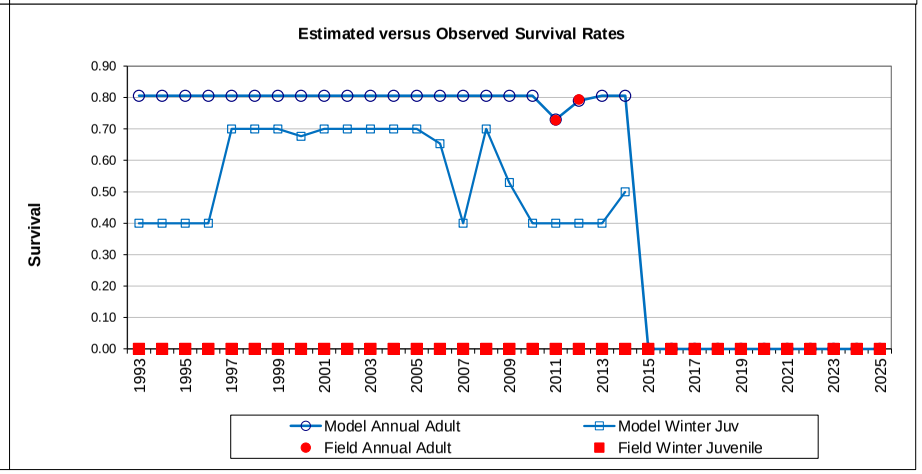
2023												
2024												
2025												

FIGURES





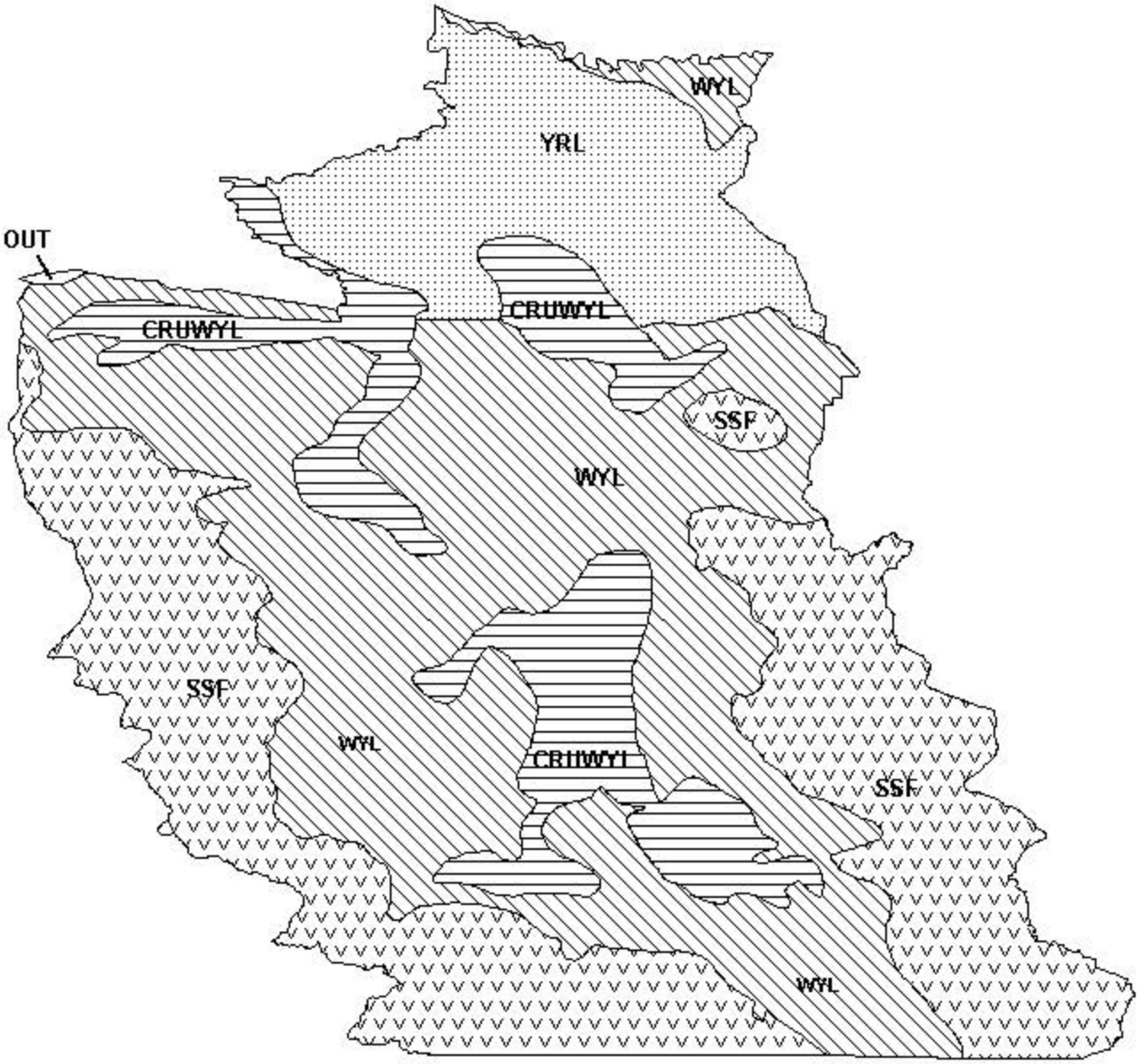




Comments:

The TSJ,CA model was selected to produce the 2013 postseason population estimate. TSJ,SC model aligns very well with 3 abundance estimates for this herd unit and provides for an excellent "anchor" for future model development.

END



Mule Deer (MD541) - Platte Valley
HA 78-81, 83, 161
Revised - 12/87

2013 - JCR Evaluation Form

SPECIES: White tailed Deer | PERIOD: 6/1/2013 - 5/31/2014

HERD: WD504 - SOUTHEAST WYOMING

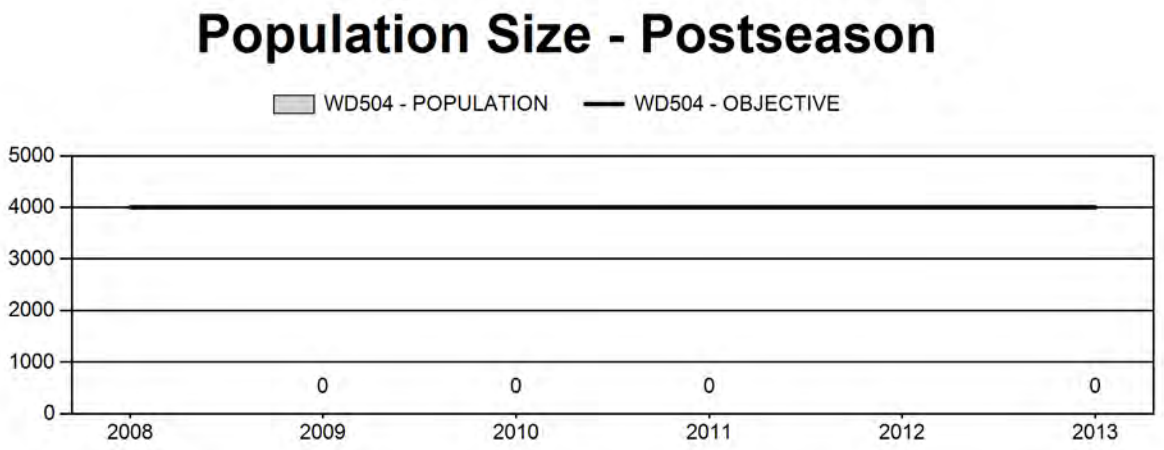
HUNT AREAS: 16, 55, 57, 59-64, 70, 73-81, 83, 161 | PREPARED BY: MARTIN HICKS

	2008 - 2012 Average	2013	2014 Proposed
Population:	0	N/A	N/A
Harvest:	708	722	800
Hunters:	1,962	1,792	1,925
Hunter Success:	36%	40%	42 %
Active Licenses:	2,102	2,014	2,125
Active License Percent:	34%	36%	38 %
Recreation Days:	7,575	7,711	7,900
Days Per Animal:	10.7	10.7	9.9
Males per 100 Females	42	32	
Juveniles per 100 Females	67	62	

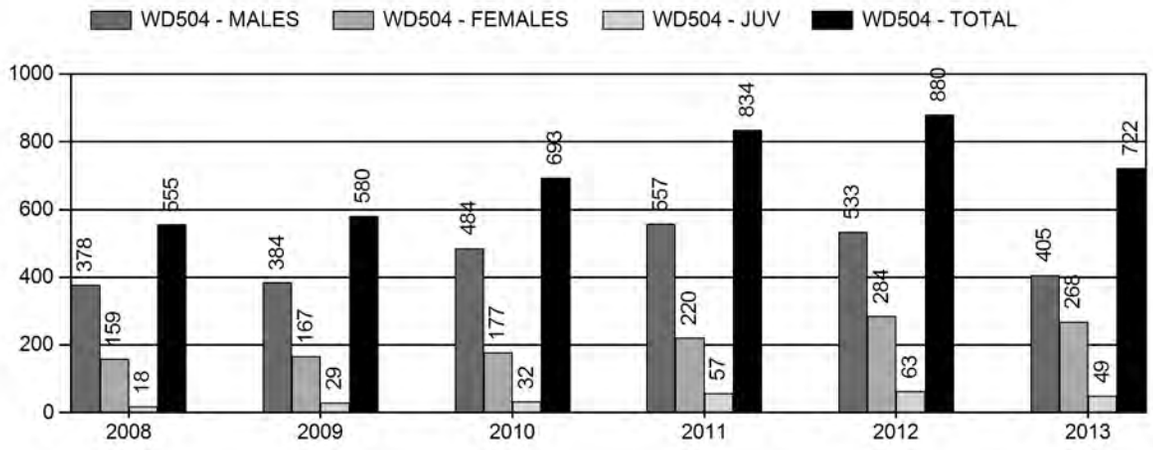
Population Objective:	4,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

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

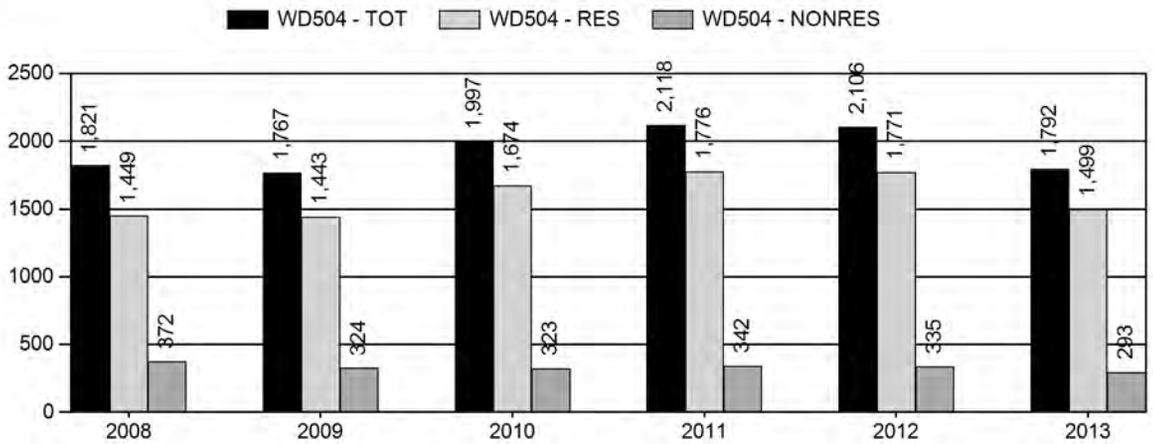
	JCR Year	Proposed
Females ≥ 1 year old:	NA%	NA%
Males ≥ 1 year old:	NA%	NA%
Juveniles (< 1 year old):	NA%	NA%
Total:	NA%	NA%
Proposed change in post-season population:	NA%	NA%



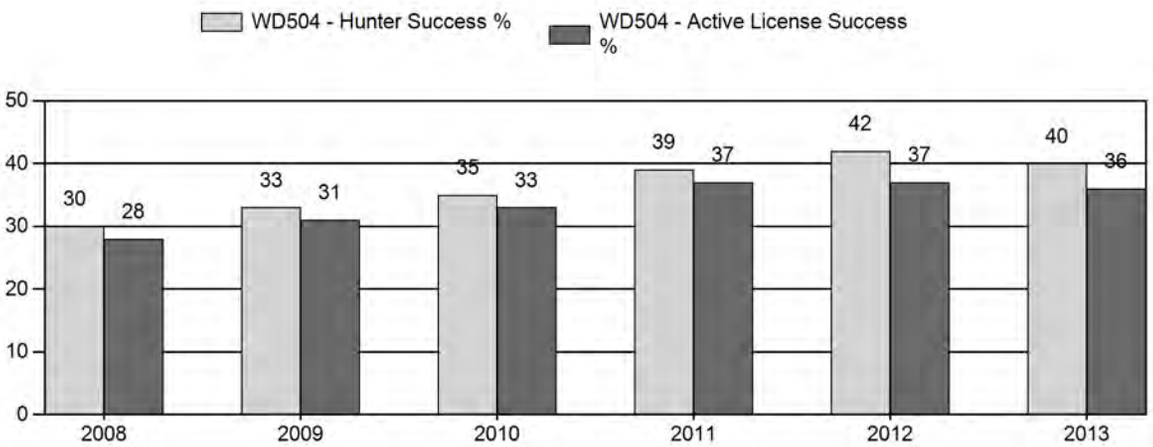
Harvest



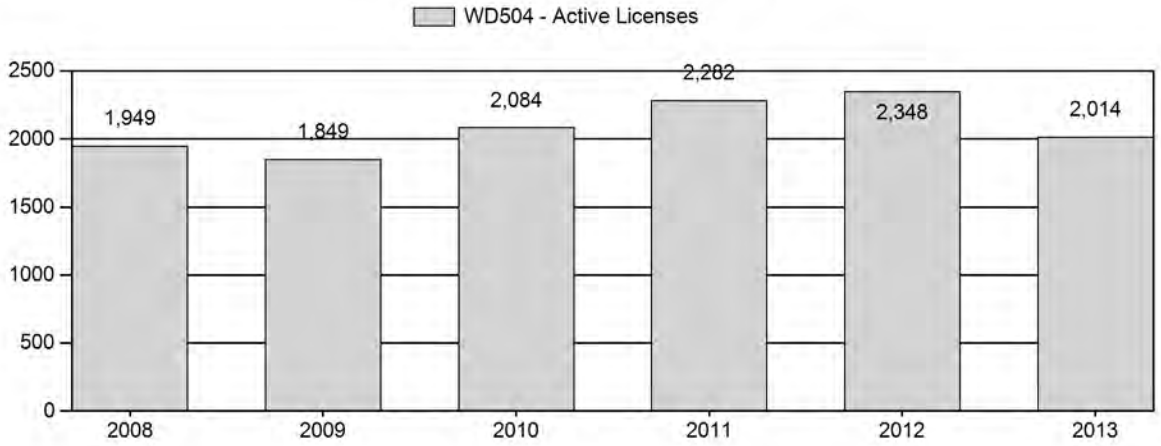
Number of Hunters



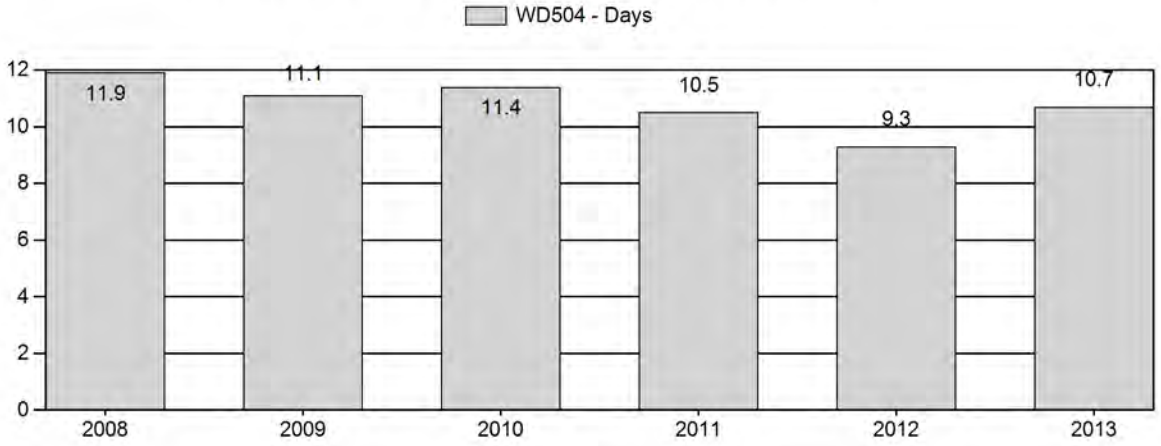
Harvest Success



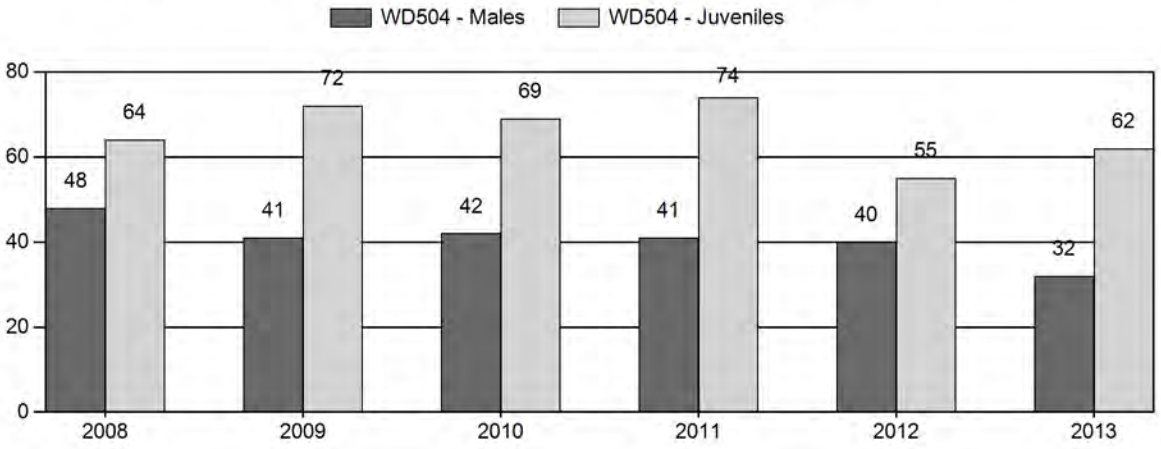
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2008 - 2013 Postseason Classification Summary

for White tailed Deer Herd WD504 - SOUTHEAST WYOMING

		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
2008	0	65	105	170	23%	351	47%	224	30%	745	0	19	30	48	± 0	64	± 0	43
2009	0	50	96	146	19%	358	47%	257	34%	761	0	14	27	41	± 0	72	± 0	51
2010	0	38	72	110	20%	265	47%	183	33%	558	1,165	14	27	42	± 0	69	± 0	49
2011	0	54	148	202	19%	497	47%	367	34%	1,066	1,070	11	30	41	± 0	74	± 0	53
2012	0	38	93	131	21%	324	51%	179	28%	634	1,088	12	29	40	± 0	55	± 0	39
2013	0	34	75	109	17%	336	51%	208	32%	653	0	10	22	32	± 0	62	± 0	47

2014 HUNTING SEASONS
SOUTHEAST WYOMING WHITE-TAILED DEER HERD (WTD504)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
15	3	Nov. 1	Nov. 30	275	Limited quota; any white-tailed deer
		Dec. 1	Dec. 31		Unused Type 3 licenses valid for doe or fawn white-tailed deer
	8	-Oct. 1	Dec. 31	250	Limited quota; doe or fawn white-tailed deer
59,60,62,63 64	3	Nov. 1	Nov. 30	150	Limited quota; any white-tailed deer, all lands within Curt Gowdy State Park, archery only; the Wyoming Game and Fish Commission's Tom Thorne/Beth Williams Wildlife Research Center at Sybille (Sybille Wildlife Research Unit) south of Wyoming Highway 34 shall be closed
		Dec. 1	Dec.-31		Unused Area 59, 60, 62, 63, 64 Type 3 licenses valid for doe or fawn white-tailed deer in Area 63 and Area 64
59,60,62,63, 64	8	Nov. 1	Dec. 31	125	Limited quota; doe or fawn white-tailed deer, except the Wyoming Game and Fish Commission's Tom Thorne/Beth Williams Wildlife Research Center at Sybille (Sybille Wildlife Research Unit) south of Wyoming Highway 34 shall be closed; all lands within Curt Gowdy State Park, archery only
70, 74	3	Oct. 1	Nov. 30	25	Limited quota; any white-tailed deer
75,76,77	3	Oct. 1	Nov. 30	25	Limited quota; any white-tailed deer
78,79,80, 81, 161	3	Nov. 1	Nov. 30	25	Limited quota; any white-tailed deer
	8	Sept. 1	Dec. 15	25	Limited quota; doe or fawn white-tailed deer
Archery		Sept. 1	Sept. 30		Refer to Section 3 of this Chapter.

Hunt Area	Type	Quota change from 2013
~~16,55~~15	3	+125
~~16,55~~15	8	+100
57	3	-75
57	8	-75
59,60,62-64	3	0
59,60,62-64	8	+50
70, 74	3	+25
75,76,77	3	0
78-81,161	3	0
78-81, 161	8	0
Total	**3**	**+75**
	8	**+75**

Management Evaluation
Current Management Objective: 4,000
Management Strategy: Recreational
2013 Post-season Population Estimate: Unknown
2014 Post-season Population Estimate: Unknown

The management objective for the Southeast Wyoming Herd Unit is a post-season population objective of 4,000 white-tailed deer. The management strategy is recreational management. The objective and management strategy were last revisited in 1999 and is planned to be reviewed in 2015.

There is not a reliable post-season population estimate for white-tailed deer in the Laramie region. This is an open herd with Colorado and Nebraska so trying to model this herd would violate the assumption that this herd has less than 10% interchange. Given nature of watersheds for movement this does not seem plausible with more than 10% exchange within southeast Wyoming. Seasons are designed to provide opportunity during the mating period when male deer are more vulnerable to harvest. Management is driven primarily by local Department personnel field observations of population trend, harvest data, and landowner tolerance for this species.

Weather
Weather during 2013 and into 2014 was wetter and colder than normal. Post-season fawn ratios of 62 Juveniles:100 Females were higher than 2012 (55J:100F) but lower than the ten-year average (69J:100F). The mild winter conditions and above average summer/fall moisture likely contributed to the increase in fawn production. Winter conditions were somewhat mild with low snowpack but with periods of extreme cold temperatures, followed up with above freezing periods. Refer to the following websites for weather data: http://www.ncdc.noaa.gov/temp-and-precip/time-series/ and http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html.

Habitat
There are no established habitat transects developed for this herd since their main source of diet comes from native rangelands that have been converted to croplands.

Field/Harvest Data
This herd will grow rapidly until densities become too high, then seasons are adjusted to try and bring the population down or an EHD outbreak occurs that reduces densities. Hunter success is typically around 30% with hunter effort running about 12 days per harvest. Hunting opportunity is limited to private land. Low success rates and increased hunter effort are likely a result of hunters trying to find a white-tailed deer on public land, or trying to harvest a deer during the general season when they are less vulnerable to harvest. Chronic wasting disease is found throughout the herd unit but how it impacts this herd unit is unknown. The long-term prevalence rate average is around 20%, but with a small sample size. Results from a study in Hunt Area 65 evaluating CWD impacts on white-tailed deer are scheduled to be published in the near future. There are a limited number of tooth samples so a reliable inference into population performance is not available.

The hunter satisfaction survey showed that 59% of the hunters were either satisfied or very satisfied, which is plausible given the late season opportunity for male deer.

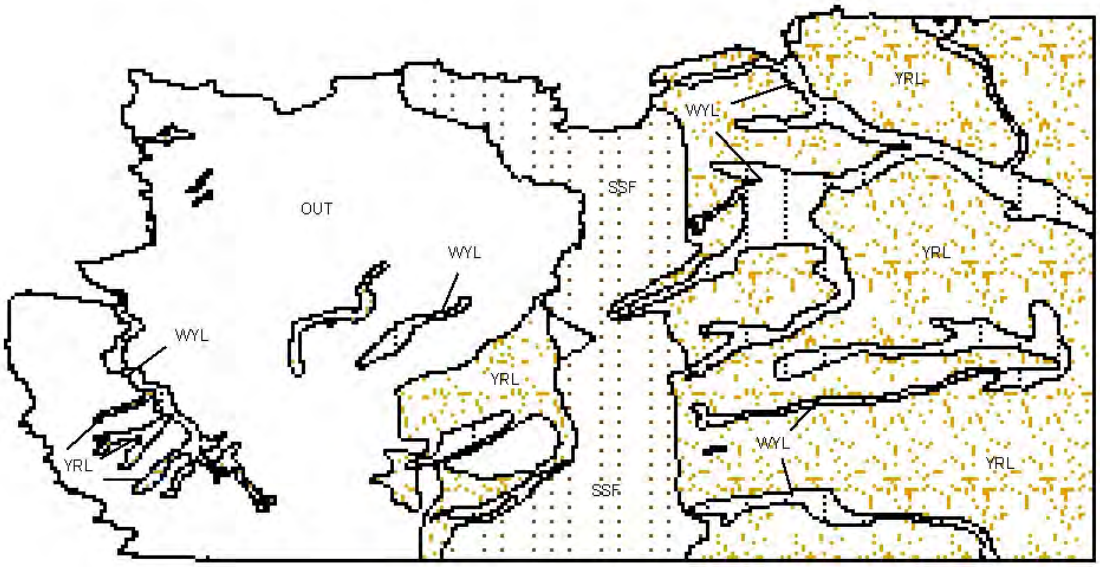
Population
There is not a reliable post-season population estimate. This is an open herd with Colorado and Nebraska so trying to model this herd would violate the assumption that it is closed. Seasons are

designed to provide opportunity during the mating period when male deer are more vulnerable to harvest.
Management is driven primarily by local Department personnel field observations of population trend, harvest data, and landowner tolerance for this species.
There are not enough tooth samples collected in the field to infer any population dynamics.

Management Summary

Population trend varies on weather conditions and disease outbreaks. As densities become too high, the population will typically crash from an EHD outbreak. Severe winter conditions will also reduce white-tailed deer numbers if they go into the winter in poor condition. There have been no reports of winter mortalities. There was an EHD outbreak in 2012 that prompted a decrease in Type 8 licenses. However, given the ability of white-tailed deer to rebound quickly from an EHD outbreak the Type 3 licenses in Hunt Area 15 increased by 50. The Type 8 licenses in Hunt Areas 15 increased by 25 and the season length increased one month on the front end (Oct. 1). The Type 8 licenses in Hunt Areas 59, 60,62,63,64 increased by 50. Hunt areas 70,74 are split off from hunt areas 75-77 and added 25 Type 3 licenses.

For the 2014 season we will try to attain a harvest of approximately 800 white-tailed deer. Our objective is to provide opportunity and minimize damage.



White-tailed Deer (WT504) - Southeast Wyoming
HA 16, 55, 57, 59-64, 70, 73-81, 83, 161
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