

## 2013 - JCR Evaluation Form

SPECIES: Pronghorn

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

HERD: PR740 - CHEYENNE RIVER

HUNT AREAS: 4-9, 27, 29

PREPARED BY: JOE SANDRINI

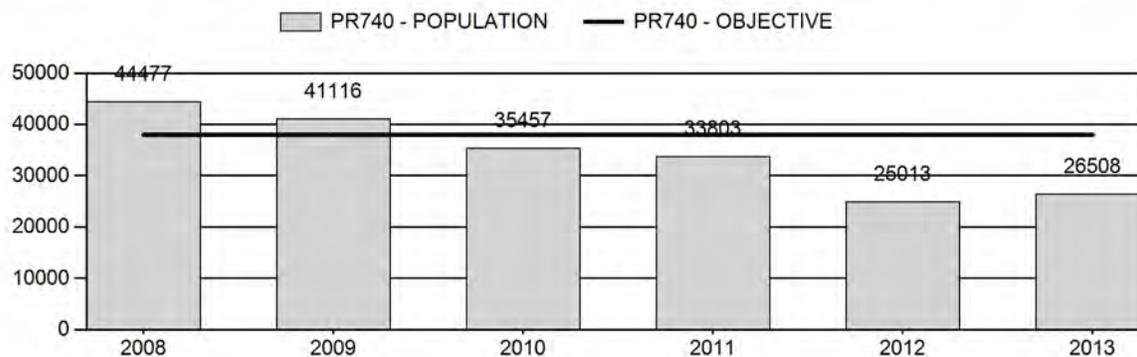
	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Population:	35,973	26,508	26,979
Harvest:	5,961	3,055	2,780
Hunters:	6,305	3,927	2,950
Hunter Success:	95%	78%	94%
Active Licenses:	6,921	4,166	3,230
Active License Percent:	86%	73%	86%
Recreation Days:	22,331	11,445	10,285
Days Per Animal:	3.7	3.7	3.7
Males per 100 Females	55	47	
Juveniles per 100 Females	61	67	

Population Objective:	38,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-30.2%
Number of years population has been + or - objective in recent trend:	4
Model Date:	01/27/2014

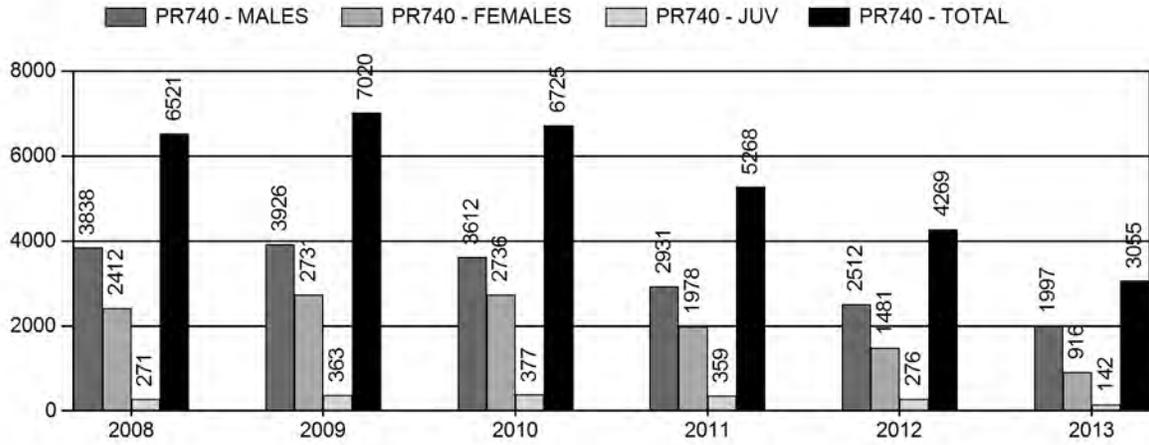
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	7.3%	5.3%
Males ≥ 1 year old:	32.5%	32.0%
Juveniles (< 1 year old):	1.7%	1.3%
Total:	11.3%	10.2%
Proposed change in post-season population:	+5.6%	+1.8%

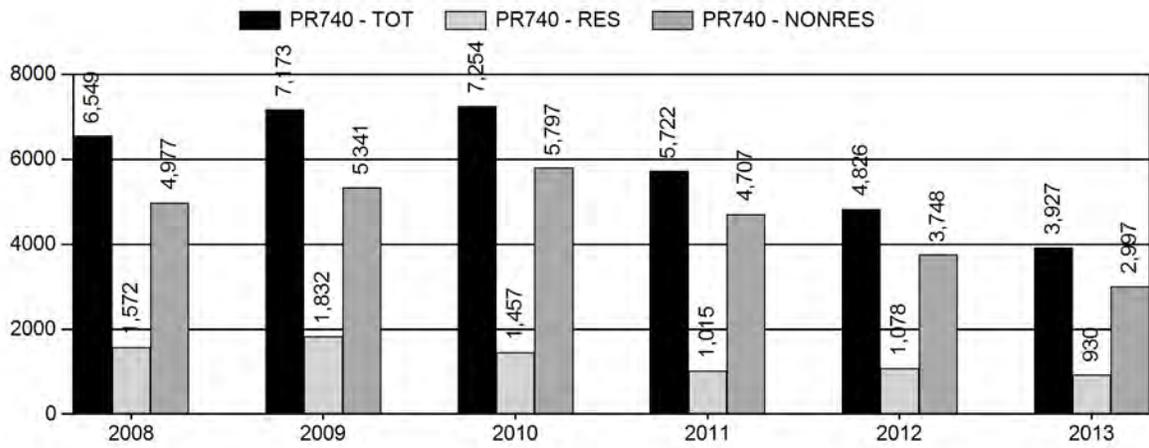
## Population Size - Postseason



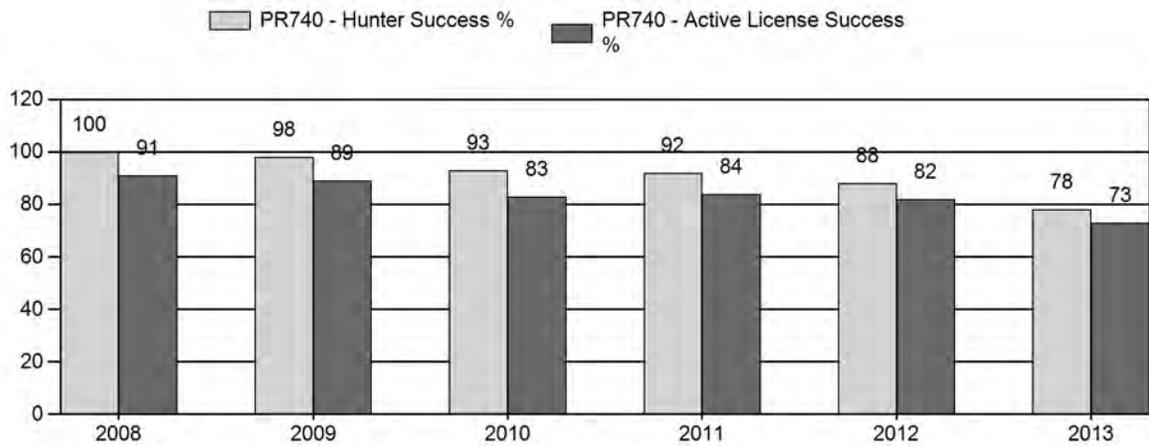
# Harvest



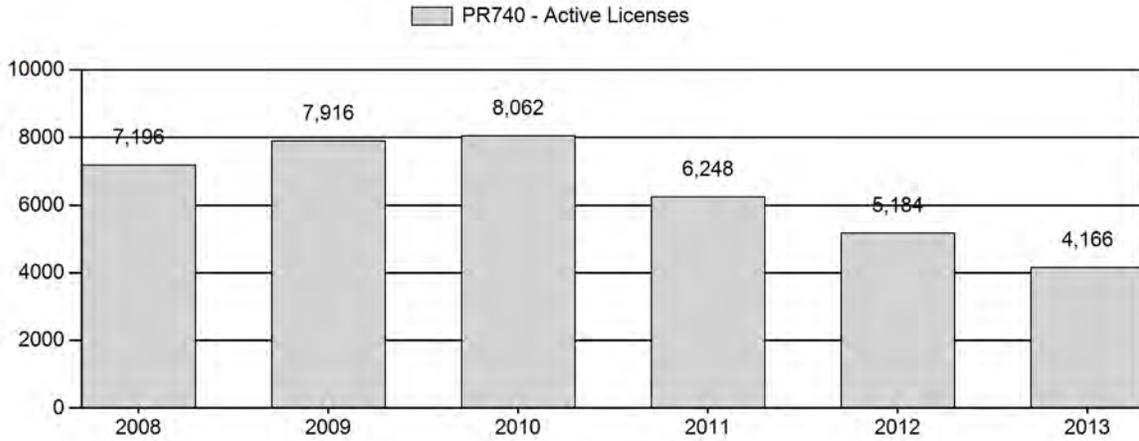
# Number of Hunters



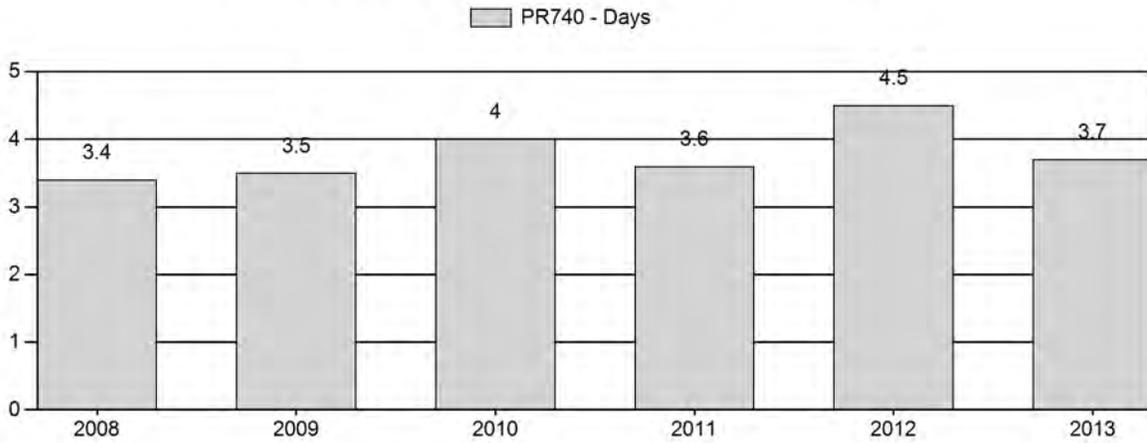
# Harvest Success



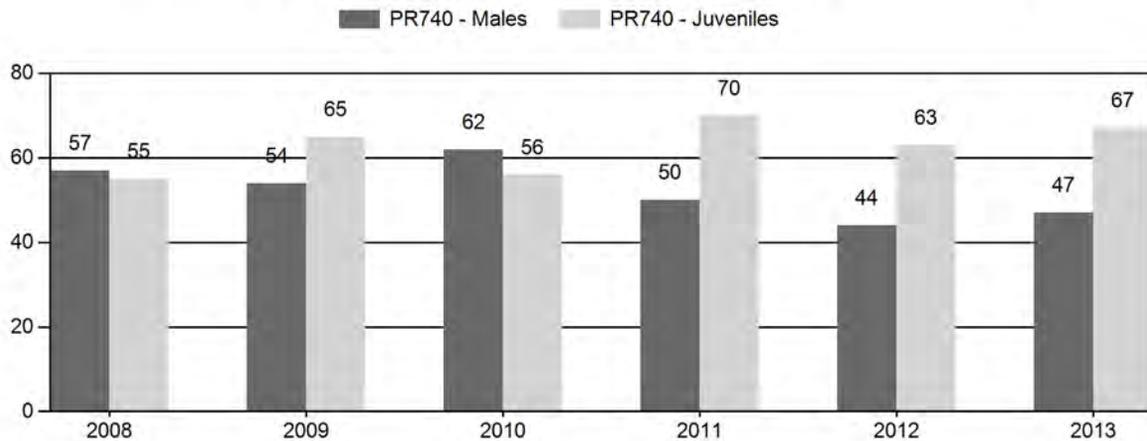
# Active Licenses



# Days Per Animal Harvested



# Preseason Animals per 100 Females



## 2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR740 - CHEYENNE RIVER

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	51,650	601	1,081	1,682	27%	2,950	47%	1,630	26%	6,262	1,982	20	37	57	± 3	55	± 3	35
2009	48,838	395	1,101	1,496	25%	2,757	46%	1,802	30%	6,055	2,429	14	40	54	± 3	65	± 3	42
2010	42,854	411	1,054	1,465	29%	2,345	46%	1,309	26%	5,119	2,261	18	45	62	± 3	56	± 3	34
2011	39,597	208	695	903	23%	1,796	45%	1,258	32%	3,957	2,624	12	39	50	± 3	70	± 4	47
2012	29,709	202	462	664	21%	1,513	48%	960	31%	3,137	2,156	13	31	44	± 3	63	± 4	44
2013	29,868	169	542	711	22%	1,510	47%	1,006	31%	3,227	2,384	11	36	47	± 3	67	± 4	45

**2014 HUNTING SEASONS  
CHEYENNE RIVER PRONGHORN HERD (PR740)**

Hunt Area	Type	Season Dates		Quota	Limitations
		Opens	Closes		
4	1	Oct. 1	Nov. 20	100	Limited quota licenses; any antelope
	6	Oct. 1	Nov. 20	25	Limited quota licenses; doe or fawn
5	1	Oct. 1	Nov. 20	100	Limited quota licenses; any antelope
	6	Oct. 1	Nov. 20	50	Limited quota licenses; doe or fawn valid on private land
6	1	Oct. 1	Oct. 15	350	Limited quota licenses; any antelope also valid in Area 8
7	1	Oct. 1	Oct. 15	300	Limited quota licenses; any antelope
8	1	Oct. 1	Oct. 15	450	Limited quota licenses; any antelope also valid in Area 6
9	1	Oct. 1	Oct. 31	600	Limited quota licenses; any antelope also valid in that portion of Area 11 in Converse or Niobrara counties
	6	Oct. 1	Oct. 31	650	Limited quota licenses; doe or fawn also valid in that portion of Area 11 in Converse or Niobrara counties
27	1	Oct. 1	Oct. 15	300	Limited quota licenses; any antelope
	7	Oct. 1	Oct. 15	75	Limited quota licenses; doe or fawn valid on private land

- continued -

Hunt Area	Type	Season Dates		Quota	Limitations
		Opens	Closes		
29	1	Oct. 1	Oct. 15	100	Limited quota licenses; any antelope
	2	Oct. 1	Oct. 15	500	Limited quota licenses; any antelope valid on private land
	6	Oct. 1	Oct. 15	100	Limited quota licenses; doe or fawn valid on private land
	7	Oct. 1	Nov. 15	100	Limited quota licenses; doe or fawn valid south and west of Interstate Highway 25
Archery 4 & 5		Sep. 1	Sep. 30		Refer to license type and limitations in Section 2.
Archery 6 - 9, 27 & 29		Aug. 15	Sep. 30		Refer to license type and limitations in Section 2.

### SUMMARY OF CHANGES IN LICENSE NUMBER

Hunt Area	License Type	Quota change from 2013
7	1	-50
7	6	-25
9	1	-100
9	6	-600
27	1	-100
27	6	-150
27	7	+75
29	1	-50
29	2	-50
29	6	-100
29	7	-100
<b>Herd Unit Total</b>	<b>1</b>	<b>-300</b>
	<b>2</b>	<b>-50</b>
	<b>6</b>	<b>-875</b>
	<b>7</b>	<b>-25</b>

## **Management Evaluation**

**Current Postseason Population Management Objective: 38,000**

**Management Strategy: Recreational**

**2013 Postseason Population Estimate: ~ 26,500**

**2014 Proposed Postseason Population Estimate: ~ 27,000**

**HERD UNIT ISSUES:** The management objective of the Cheyenne River Pronghorn Herd Unit is for an estimated post-season population of 38,000 pronghorn. This herd is managed under the recreational management strategy. The population objective and management strategy were set in 1999 when this herd was created by combining the South Black Hills and Thunder Basin Pronghorn Herd Units. This objective is currently under review, and consideration is being given to combining this herd with the Highlight Pronghorn Herd Unit (PR316).

The Cheyenne River Pronghorn herd unit encompasses much of northeastern Wyoming. Because of the disparity of habitats across the herd unit and the preponderance of private land, this herd unit is managed for recreational hunting. The herd unit encompasses 7,466 mi<sup>2</sup>, of which 6,443 mi<sup>2</sup> is considered occupied pronghorn habitat. Most of the unoccupied habitat is found in Hunt Areas (HA's) 4 and 5, which include a portion of the Black Hills having topographical and vegetative features unsuitable for pronghorn. Approximately 77% of this herd unit is private land. The remaining 23% includes lands managed by the United States Forest Service (USFS), the Bureau of Land Management (BLM), and the State of Wyoming. Most of the occupied USFS lands are part of the Thunder Basin National Grassland (TBNG) and located in HA's 5, 6, 7, 27, and 29, with HA 27 containing the largest amount. The State of Wyoming owns a large parcel of land in HA 9. Remaining public lands are scattered throughout the herd unit, and most are not accessible to the public. Access fees for hunting are common on private land, and many landowners have leased their property to outfitters. Therefore, accessible public lands are subjected to disproportionately heavy hunting pressure.

Major land uses in this herd unit include livestock grazing, oil and gas production, timber harvest, and farming. There are several oil and gas fields which occur primarily in HA's 6, 7, 8, and 29, and development pressure has increased in recent years in HA's 8 and 29. Two surface coal mines represent a substantial land use within HA 27. Farming generally occurs in the southern most portion of the herd unit, but there are a number of wheat, oat, and alfalfa fields near Sundance and Upton. When pronghorn numbers are high, damage to growing alfalfa can become an issue.

**WEATHER:** The winter of 2010-11 was very harsh in the northern half of the herd unit. Over-winter mortality was well above average and losses of all ages of pronghorn continued into the spring. During this winter, large scale movements of pronghorn were also observed. Warmer and drier conditions beset the area during the end of bio-year 2011 and continued through the 2012-13 winter, with the 2012 summer being the driest on record in many places. April of 2013 finally saw a break in the drought when temperatures dropped below normal for the entire month, and significant precipitation was again received. This wetter and cooler pattern continued through the summer of 2013. In early October 2013, a winter storm "Atlas" blanketed the herd unit with 12" to nearly 36" of wet snow in some locations and drifts exceeding 6-feet. While no significant level of pronghorn mortality was detected due to this storm, the snow and

resultant muddy conditions forced the cancellation of hunting for some license holders, and made accessing pronghorn difficult in many locations. Towards the end of the hunting seasons, travel conditions improved, but it was apparent winter storm Atlas negatively impacted hunter participation and hampered hunter success. The early winter months of bio-year 2013 brought temperature and precipitation conditions near the recent 30-year average. For detailed weather data see <http://www.ncdc.noaa.gov/cag/time-series/us>.

**HABITAT:** The herd unit is dominated by Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), silver sagebrush (*Artemisia cana*), and mid-prairie grasses such as wheatgrasses (*Agropyron* spp.), grama grasses (*Bouteloua* spp.), and needle grasses (*Stipa* spp.). In addition, there are several major drainages dominated by plains cottonwood (*Populus deltoides*) and greasewood (*Sarcobatus vermiculatus*). These drainages include the Cheyenne River, Antelope Creek, Black Thunder Creek, Beaver Creek, Old Woman Creek, Hat Creek, and Lance Creek. Steep canyons dominate the southern Black Hills portion of the herd unit, and there vegetation consists of ponderosa pine (*Pinus ponderosa*) and its associated savannah. Some areas are dominated by agricultural croplands, notably near the towns of Douglas, Lusk, Upton, and Sundance.

Habitat suitability for pronghorn varies greatly throughout the herd unit. Much of the habitat in the northeast portion of the herd unit is marginal, consisting of topography and vegetation not particularly suitable for pronghorn. The west-central portions of the herd unit represent the best block of contiguous sagebrush habitat. While the eastern and southern sections of the herd unit are dominated more by mid-grass prairie and agricultural lands, but locally do support good numbers of pronghorn. Habitat disturbance throughout the herd unit is generally high. There are a number of developed oil fields and areas impacted by bentonite and coal mining. In the central and southern portions of the herd unit, historic sagebrush control projects have decreased the amount of sagebrush available for wintering pronghorn at many sites. Yet, pronghorn still winter in this region. Habitat loss and fragmentation is expected to continue and negatively impact this herd. Based upon current exploration and leasing trends, the amount of disturbance caused by mining, and oil & gas activities will continue to increase in HA's 8, 27 and 29. In addition, a large wind farm is planned in HA 29.

Beginning in the fall of 2001, Department personnel established Wyoming big sagebrush monitoring transects within the herd unit. Forage conditions away from irrigated fields within this herd unit were poor between 2001 and 2004, improved substantially in 2005, and then declined dramatically during 2006, when severe drought plagued the herd unit. Based on these transects, forage conditions rebounded in 2007, and remained good in 2008 and 2009. Leader production measurements were suspended in 2010, but over-winter estimates of use continued through 2011. As previously mentioned, sagebrush leader growth improved in 2007, however, the post-season population of this herd peaked that year and winter use of sagebrush leaders was excessive.<sup>1</sup> It was apparent the population of pronghorn and other animals (notably cotton-tailed rabbits) browsing sagebrush at that time was not sustainable. Increased harvest along with reduced recruitment and survival began to push this pronghorn population down. As this herd declined, winter use of sagebrush dropped and range conditions improved through 2011. Then, the severe drought of 2012 resulted in very poor forage production and elevated use during and

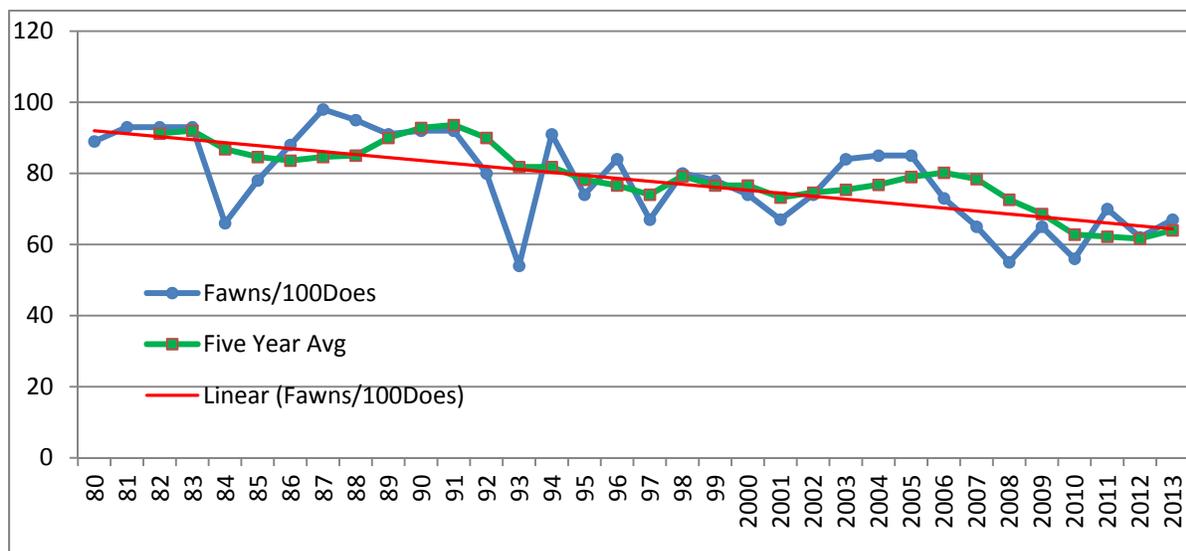
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<sup>1</sup> Different technique applied to measure utilization in 2007. Results may not be directly comparable to previous years.

after the growing season. Neither sagebrush production nor utilization was measured in 2013. However, a very wet spring and summer were experienced during 2013, and there were low numbers of pronghorn on the range. Consequently, casual observations of range conditions showed excellent leader growth and reduced winter use.

**FIELD DATA:** This population’s recent decline was accentuated during the winter of 2010-2011 and subsequent drought of 2012. Drought in 2012 negatively impacted fawn survival, and the fawn:doe ratio decreased to 62:100. During 2013, fawn production and survival again were reduced, and late summer losses to Epizootic Hemorrhagic Disease (EHDV) observed. The 2013 observed fawn:doe ratio was 67:100 and adequate sample sizes for each hunt area were attained. While considered low for pronghorn, this value was 8% above the previous five-year average (62:100), but still 7% below the long-term average of 72:100.

Over the last 30<sup>+</sup> years annual productivity of this herd, as measured by pre-season fawn:doe ratios, has generally declined (Figure 1). This is thought to be the result of a reduction in habitat quantity and quality, intensified by drought, plant succession, aging of sagebrush, and over-browsing from both domestic livestock and wildlife. However, productivity was fairly stable and generally good between 1998 and 2006 (*avg. 78; std. dev. 6.3*). A situation credited to mild winters persisting during intensifying drought, even though this population was estimated to be above objective most years. However, as this population moved more significantly above objective beginning in 2005 and drought continued, fawn:doe ratios began to decline. This trend continued through 2008. During this time frame severe snow storms plagued the herd unit each April and May. In addition, June weather each year was cooler and wetter than normal. While this precipitation provided a much-needed boost for rangeland health, the combination is believed to have increased post-season mortality of adults and reduced survival of fawns. Predation of fawns may have also increased during this time as well, as small animal populations dropped throughout the herd unit. Since 2008 the herd’s pre-season fawn:doe has trended upwards slightly, but has averaged only 63 fawns per 100 does (*std. dev 6.0*). This has translated



**Figure 1: Observed Annual, and Recent Five-Year Average Fawn:Doe Ratios (1980-2013).**

into a continued population decline, even as hunting seasons became more conservative.

As this population rose between 2002 and 2006, preseason buck:doe ratios fluctuated, but generally increased. Between 2007 and 2012, preseason buck:doe ratios generally declined, as this population dropped and the relative percentage of bucks harvested from the population increased annually. The population model simulates an increase in buck ratios from 48:100 in 2002 to a peak of 60:100 in 2007 and a subsequent decline back to 48:100 in both 2012 and 2013, a value projected to continue into 2014. This preseason value of 48 bucks per 100 does is near the midpoint of the Department's recreational management criteria.

Small changes in female mortality rates can greatly affect observed male:female ratios (Bender 2006). Historic fluctuations in observed buck:doe ratios in some hunt areas may have been influenced as much by changes in female survival as by buck harvest, at least in hunt areas where we have no difficulty increasing doe harvest, such as HA 27 and portions of HA's 7, 9, and 29. This may explain the wide variation in observed buck:doe ratios within the herd unit between some years. As Bender (2006) states, managers should consider the significant influence small changes in female mortality rates have on observed male:female ratios when managing male escapement from harvest in ungulate populations.

**HARVEST DATA:** Since 2008 hunter success has dropped and effort has generally continued to increase. In 2013, most hunt areas exhibited low success compared to what is normally observed for pronghorn within the state and this herd unit. Active license success on doe/fawn tags ranged from 60% in HA 29 to 76% in HA's 5 & 27. Type 1 active license success varied from 63% in HA 8 to 89% in HA 6. Herd unit wide, active license success was 67% on doe/fawn tags and 77% on type 1 & 2 licenses. Again, winter storm "Atlas" impacted the entire herd unit during the first week of October, with snow and mud lingering through the hunting season. This resulted in some hunters cancelling planned trips, as the percentage of active licenses fell about ten to fifteen percent from historical values. Additionally, the weather and associated travel conditions likely reduced active license success. Although hunter success has dropped recently, the hunter satisfaction survey revealed herd unit-wide 40% of hunters were very satisfied, and 37% satisfied with their hunt in 2012; and similar values were reported in 2013, with 39% of hunters stating they were very satisfied, and 38% satisfied with their hunt.

**POPULATION:** Following inclusion of line transect and harvest data collected in 2013, the modeled 2013 post-season population estimate was about 26,500. The revised model significantly lowered estimated populations for the previous 5-years. Consequently, pre and post season population estimates in the JCR database were updated for bio-years 2008 through 2013. This population had been trending downwards each year since peaking at about 51,000 pronghorn in 2006<sup>2</sup>. The recent line transect survey was conducted in June 2013, and resulted in an end of 2012 bio-year population estimate of 20,400 (Appendix 1). This was a notable reduction from the 2011 line transect estimate of 30,900. This population was generally stable near objective between 1993 and 2002. The population then increased rapidly through 2006 as fawn survival was very good, with observed preseason fawn:doe ratios averaging 80:100 between 2002 and 2006. This, coupled with our inability to sell all doe/fawn licenses, made controlling the population difficult. Since then, a reduction in price of doe/fawn licenses, the

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<sup>2</sup> 2014 Revised model estimate for 2006 (not recorded in JCR database)

ability for hunters to possess up to four of them, internet license sales, and enrollment of private lands in our PLPW program substantially increased our ability to affect doe/fawn harvest. Between 2007 and 2012 this population dropped significantly in the wake of increased female harvest, reduced fawn recruitment, and increased non-hunting mortality of adults.

As previously mentioned, this population's recent decline, while driven by increased mortality and reduced recruitment, was exasperated by above normal winter and spring mortality in bio-year 2010. In addition to lower fawn production and survival in bio-year 2013, late summer losses of all age classes to Epizootic Hemorrhagic Disease (EHDV) were observed. It is also suspected, although not confirmed, that pronghorn mortality was increased in late summer and early fall both of the previous two bio-years due to EHDV as well.

The "Semi Constant Juvenile & Semi Constant Adult" (SCJ SCA) spreadsheet model was chosen to estimate this herd's population. All three competing models simulate a population rise between 2002 and 2006 or 2007 (TSJ CA), followed by a decline through 2012 and leveling off to slight increase in 2013. However, the SCJ SCA model exhibited the lowest AICc value. The magnitude of trends produced by SCJ SCA model also dovetail well with trends in harvest statistics and the perceptions of local game managers, landowners, and hunters; and amongst competing models it tracks observed data (including recent LT estimates) very well. The SCJ SCA model was also chosen because, along with the lowest AICc, all three competing models produced post-season population estimates for both 2012 and 2013 that were within about 10% of each other. This model functions well because it allows for modeling the increased mortality observed during the severe winters of 2000-2001 and 2010-2011.

**MANAGEMENT SUMMARY:** The 2012 and 2013 hunting seasons were conservative in this herd unit, and changes for the 2014 season entail continuing and augmenting this same strategy. Doe/fawn harvest has been significantly reduced or eliminated in all hunt areas. Additionally, issuance of any antelope tags was curtailed somewhat to maintain buck:doe ratios at their current level. The largest reductions in harvest should occur in HA's 9, 27, and 29, where most doe/fawn harvest has continued to date. In HA 9, claims for damage from pronghorn are no longer being submitted, and landowners have noted a drop in pronghorn numbers. In HA 29, in response to complaints from landowners and hunters on public land about low pronghorn numbers, last year a type 2 (any antelope) license valid on private land only was issued, while type 1 license numbers were greatly reduced. Here, issuance of type 6 tags was also reduced and were restricted to private land in 2013. These changes were well received by many of the landowners and significantly reduced harvest pressure on public lands in the northern part of HA 29 where pronghorn numbers have plummeted.

Concerns remain about low pronghorn numbers on public lands, notably the TBNG in both HA's 29 & 27. To help address this, reduced priced doe/fawn tags available for HA 27 have been confined in validity to private land via a new type 7 tag, while the type 6 tags have been eliminated. In addition, issuance of type 1 (any antelope) licenses was reduced 25% in HA 27, an area where residents hold 80% of the licenses, draw odds for non-residents are some of the most difficult in the state, and most of the hunting occurs on public land. Here, active type 1 license success has remained below 80% for two years in a row, and the percentage of residents

reporting they were satisfied or very satisfied with their hunt fell from 89% in 2011 to 64% in 2012, and remained similar in 2013 at 68%.

Finally, to address landowner concerns along the boundary of HA's 6 and 8, a change in license limitations allowing hunters with HA 6 tags to hunt in HA 8 and vice versa has been enacted. The east-west boundary between these hunt areas consists of county roads, which antelope frequently cross. Landowners whose properties straddle this boundary have over the years requested ability for hunters to hunt both sides of these roads. Because landownership patterns are similar in both hunt areas, the Department felt we could try this approach for a couple years, which if successful could lead to a combining of hunt areas and regulation simplification in the future.

Given average fawn:doe and buck:doe ratios observed the past 5-years and consistent survival rates, combined with a predicted harvest of 2,780 pronghorn, the 2014 hunting season should allow the post-season population of this herd to grow about 2%, to 27,000 pronghorn.

#### **LITERATURE CITED:**

Bender, Louis C. 2006. Uses of herd composition and age ratios in ungulate management. Wildlife Society Bulletin. Vol. 34 (4): 1225-1230.

<b>INPUT</b>	
Species:	Pronghorn
Biologist:	Joe Sandrini
Herd Unit & No.:	Chey. River PR740
Model date:	01/27/14

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MODELS SUMMARY		Relative AICc	Fit	Notes
CJ,CA	Constant Juvenile & Adult Survival	175	166	
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	151	131	
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival	171	64	

Year	Predicted Prehunt Population (Year t)				Predicted Posthunt Population (Year t)				Population Estimates from Top Model				LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females	Total	Juveniles	Total Males	Females	Total	Juveniles	Total Males	Females	Total Adults	Field Est	Field SE		
1993	8278	9460	15284	33022	8114	6800	13988	28902	8329	14617	22945					
1994	13094	8162	14324	35580	12941	4892	13054	30887	8466	15687	24153					
1995	11384	8297	15373	35054	11075	5135	13617	29827	7955	15338	23293					
1996	12608	7796	15031	35436	12522	4674	14023	31219	8157	16397	24554					
1997	10802	7994	16069	34864	10730	5095	15116	30941	7866	16641	24507					
1998	12983	7709	16308	37000	12901	5143	15749	33794	8798	18075	26873					
1999	13815	8622	17714	40151	13703	6165	17022	36889	9979	19424	29403					
2000	13999	9780	19036	42814	13886	7158	18312	39357	7824	16372	24197					
2001	10708	7668	16045	34421	10614	5581	15558	31753	8374	17049	25423		4403	25386		
2002	12307	8207	16708	37222	12238	5947	16365	34550	9276	18378	27654		4595	26285		
2003	15173	9090	18011	42274	15039	6534	17221	38794	10781	20084	30865					
2004	16723	10566	19682	46970	16597	7862	18920	43379	12470	22115	34584					
2005	18374	12220	21673	52267	18217	9583	20768	48568	14546	24261	38806					
2006	17465	14255	23775	55495	17319	11041	22471	50830	15324	25277	40601					
2007	16043	15018	24772	55833	15794	10958	22573	49324	14505	24604	39109					
2008	13323	14215	24112	51650	13025	9993	21459	44477	12597	22519	35116		4139	38196		
2009	14424	12345	22069	48838	14025	8027	19065	41116	11297	20813	32111					
2010	11386	11072	20397	42854	10971	7098	17387	35457	9406	18230	27636		4265	30919		
2011	12514	9218	17865	39597	12119	5994	15690	33803	6957	14291	21248					
2012	8886	6818	14005	29709	8583	4055	12376	25013	6897	14152	21049		1912	20442		
2013	9240	6759	13869	29868	9084	4562	12862	26508	6990	14439	21429					
2014	9036	6850	14150	30037	8915	4661	13402	26979								
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	Model Est	Field Est
1993	0.75		0.82	
1994	0.75		0.82	
1995	0.75		0.82	
1996	0.75		0.82	
1997	0.75		0.82	
1998	0.75		0.82	
1999	0.75		0.82	
2000	0.50		0.70	
2001	0.75		0.82	
2002	0.75		0.82	
2003	0.75		0.82	
2004	0.75		0.82	
2005	0.75		0.82	
2006	0.75		0.82	
2007	0.75		0.82	
2008	0.75		0.82	
2009	0.75		0.82	
2010	0.75		0.82	
2011	0.50		0.70	
2012	0.75		0.82	
2013	0.75		0.82	
2014	0.75		0.82	
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

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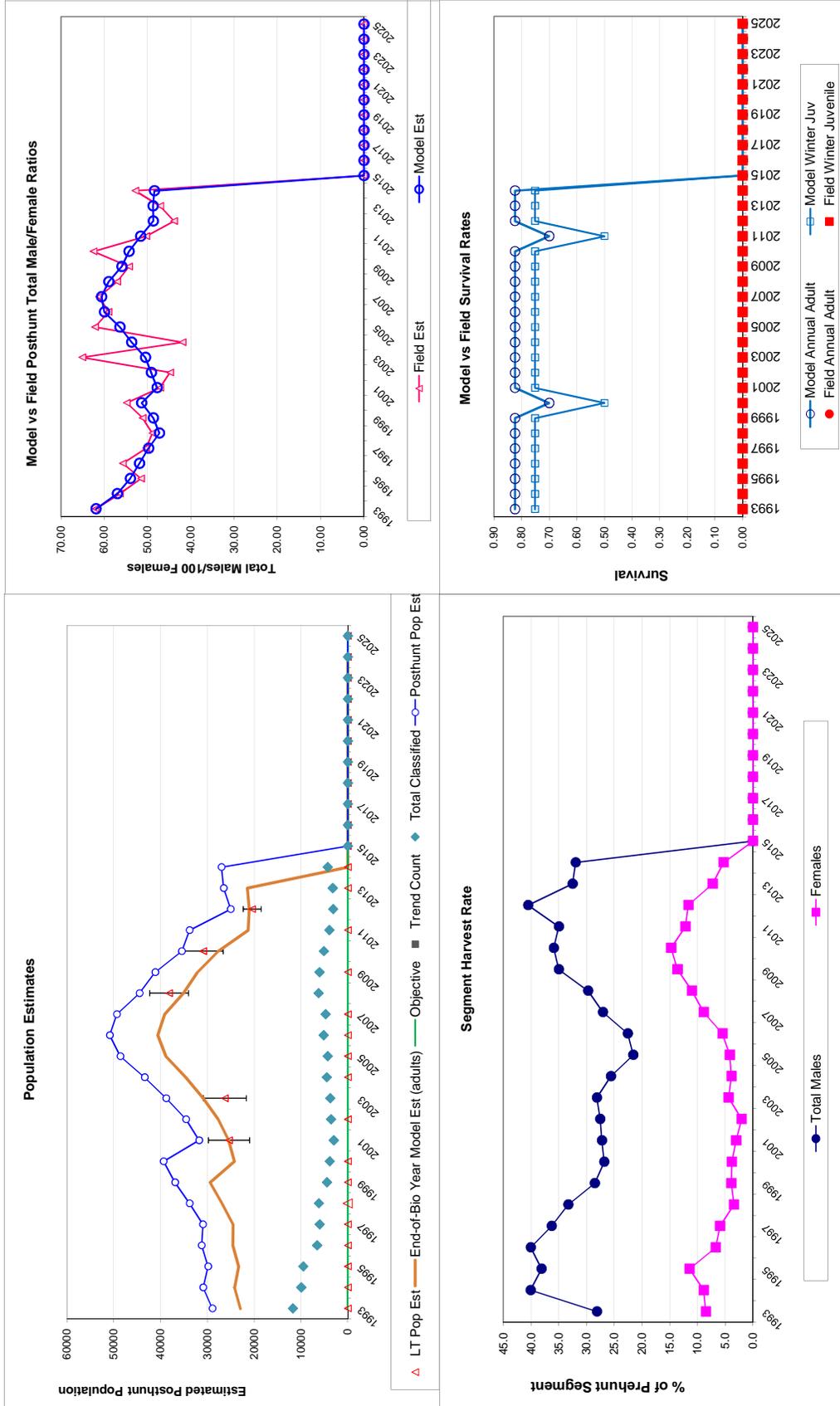
Juvenile Survival =	0.7751
Adult Survival =	0.824
Initial Total Male Pop/10,000 =	0.946
Initial Female Pop/10,000 =	1.528

**MODEL ASSUMPTIONS**

Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
<b>Over-summer adult surviva</b>	<b>98%</b>

Year	Classification Counts						Harvest						
	Juvenile/Female Ratio			Total Male/Female Ratio			Juv	Males	Females	Total Harvest	Segment Harvest Rate (% of		
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE					Total Males	Females	
1993		54.16	1.24	61.90	62.01	1.36	149	2418	1178	3745	28.1	8.5	
1994		91.41	2.09	56.98	56.36	1.48	139	2973	1155	4267	40.1	8.9	
1995		74.05	1.75	53.97	51.52	1.36	281	2874	1597	4752	38.1	11.4	
1996		83.88	2.37	51.87	55.73	1.78	79	2838	917	3834	40.0	6.7	
1997		67.22	2.02	49.75	50.33	1.65	65	2636	866	3567	36.3	5.9	
1998		79.61	2.30	47.27	48.89	1.64	74	2332	508	2914	33.3	3.4	
1999		77.99	2.67	48.67	51.15	1.99	102	2234	629	2965	28.5	3.9	
2000		73.54	2.75	51.37	54.81	2.24	102	2383	658	3143	26.8	3.8	
2001		66.74	2.82	47.79	47.08	2.22	85	1897	443	2425	27.2	3.0	
2002		73.66	2.79	49.12	44.77	1.99	63	2054	312	2429	27.5	2.1	
2003		84.24	3.21	50.47	65.09	2.67	122	2324	718	3164	28.1	4.4	
2004		84.96	2.82	53.68	41.93	1.73	114	2458	693	3265	25.6	3.9	
2005		84.78	3.00	56.38	62.15	2.41	143	2397	822	3362	21.6	4.2	
2006		73.46	2.39	59.96	59.02	2.05	133	2922	1186	4241	22.5	5.5	
2007		64.76	2.25	60.63	61.20	2.17	227	3691	1999	5917	27.0	8.9	
2008		55.25	1.71	58.95	57.02	1.74	271	3838	2412	6521	29.7	11.0	
2009		65.36	1.98	55.94	54.26	1.74	363	3926	2731	7020	35.0	13.6	
2010		55.82	1.93	54.28	62.47	2.08	377	3612	2736	6725	35.9	14.8	
2011		70.04	2.58	51.60	50.28	2.05	359	2931	1978	5268	35.0	12.2	
2012		63.45	2.62	48.68	43.89	2.04	276	2512	1481	4269	40.5	11.6	
2013		66.62	2.71	48.73	47.09	2.14	142	1997	916	3055	32.5	7.3	
2014		63.86	2.30	48.41	52.82	2.02	110	1990	680	2780	32.0	5.3	
2015													
2016													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													

FIGURES



Comments:

Appendix 1  
PR 740 Line Transect Results  
End of Bio-Year 2012

Effort: 2785.763  
# samples: 96  
Width: 213.5000  
Left: 0.0000000  
# observations: 306

Model 1  
Half-normal key,  $k(y) = \text{Exp}(-y^{**2}/(2*A(1)**2))$

Parameter	Point Estimate	Standard Error	Percent Coef. Of variation	95 % Confidence Interval	
DS	1.9853	0.17117	8.62	1.6744	2.3540
E(S)	1.5981	0.57992E-01	3.63	1.4880	1.7164
D	3.1728	0.29679	9.35	2.6389	3.8147
N	20442.	1912.2	9.35	17002.	24578.

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

Component Percentages of Var(D)

-----  
Detection probability: 34.1  
Encounter rate: 50.8  
Cluster size: 15.0

Estimation Summary - Encounter rates

	Estimate	%CV	df	95% Confidence Interval	
n	306.00				
k	96.000				
L	2785.8				
n/L	0.10984	6.67	48.00	0.96076E-01	0.12559
Left	0.0000				
Width	213.50				

Estimation Summary - Detection probability

Half-normal/Cosine

	Estimate	%CV	df	95% Confidence Interval	
m	1.0000				
LnL	-479.57				
AIC	961.13				
AICc	961.15				
BIC	964.86				
Chi-p	0.25585				
f(0)	0.69785E-02	5.47	305.00	0.62674E-02	0.77702E-02
p	0.67119	5.47	305.00	0.60280	0.74733
ESW	143.30	5.47	305.00	128.70	159.56

Estimation Summary - Expected cluster size

Estimate

Average cluster size	%CV	df	95% Confidence Interval	
1.7778	5.87	305.00	1.5840	1.9953

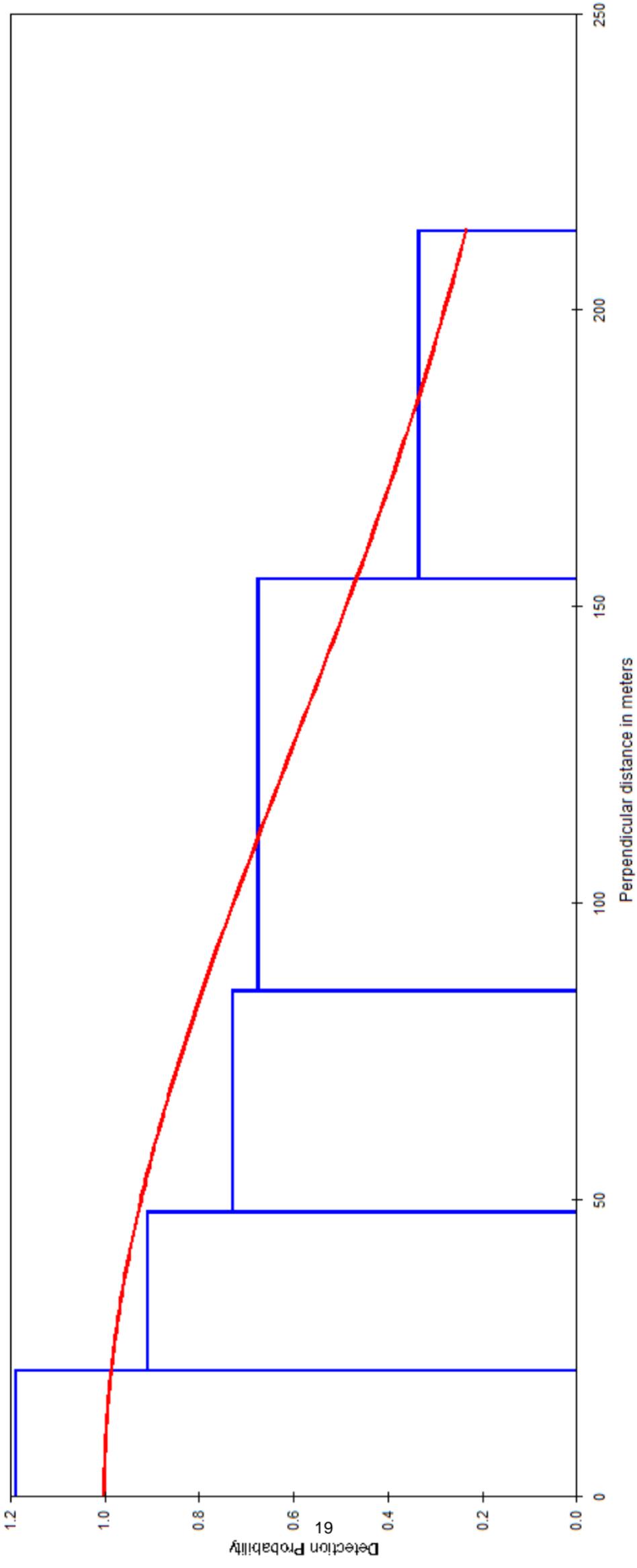
Half-normal/Cosine

	Estimate	%CV	df	95% Confidence Interval	
r	0.60850E-01				
r-p	0.14433				
E(S)	1.5981	3.63	304.00	1.4880	1.7164

Estimation Summary – Density & Abundance

Half-normal/Cosine

	Estimate	%CV	df	95% Confidence Interval	
D	1.9853	8.62	125.25	1.6744	2.3540
DS	3.17828	9.35	171.34	2.6389	3.8147
N	20,442	9.35	171.34	17,002	24,578

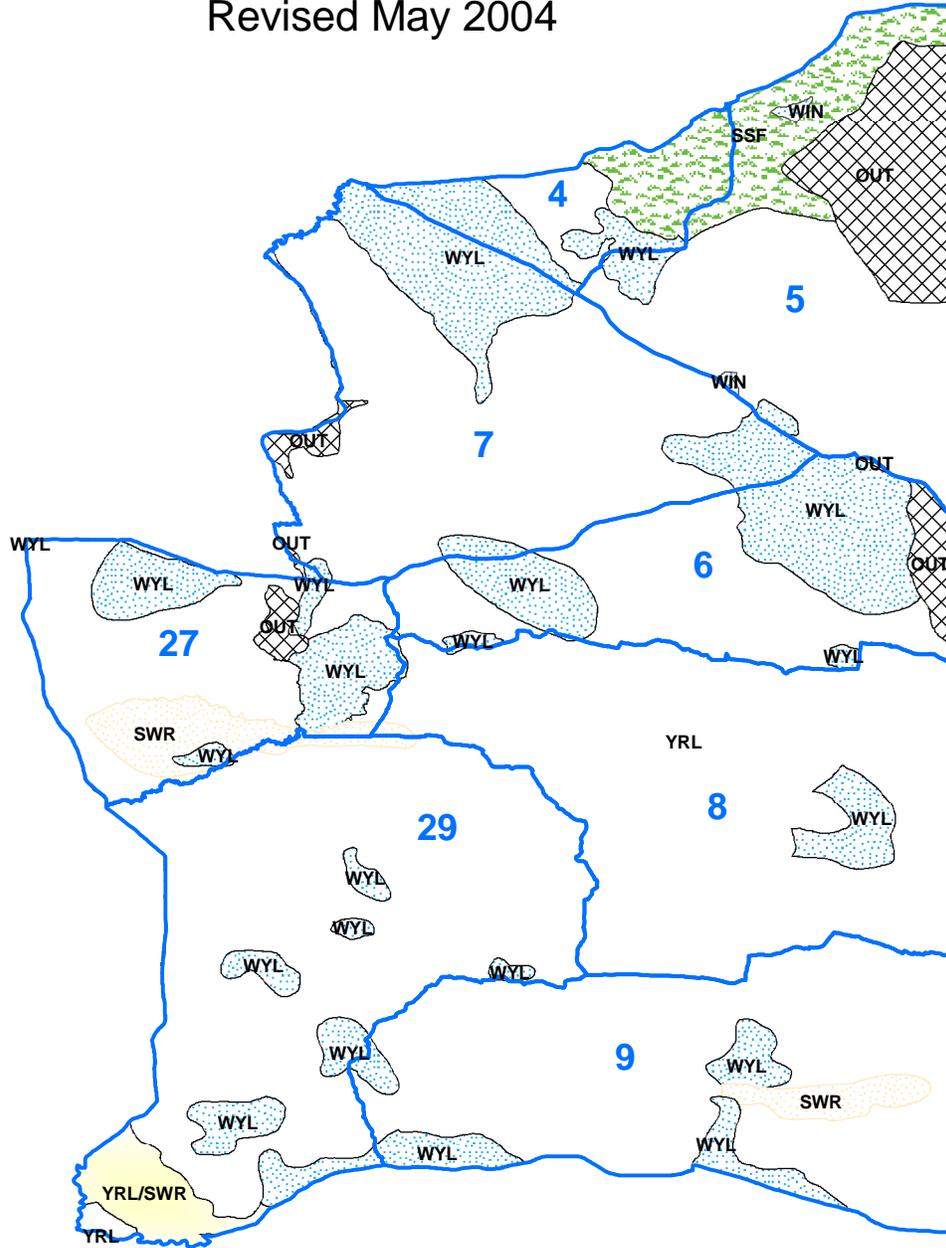


# Pronghorn - Cheyenne River

Hunt Areas 4, 5, 6, 7, 8, 9, 27, & 29

Casper Region

Revised May 2004



## 2013 - JCR Evaluation Form

SPECIES: Pronghorn

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

HERD: PR745 - RATTLESNAKE

HUNT AREAS: 70-72

PREPARED BY: HEATHER O'BRIEN

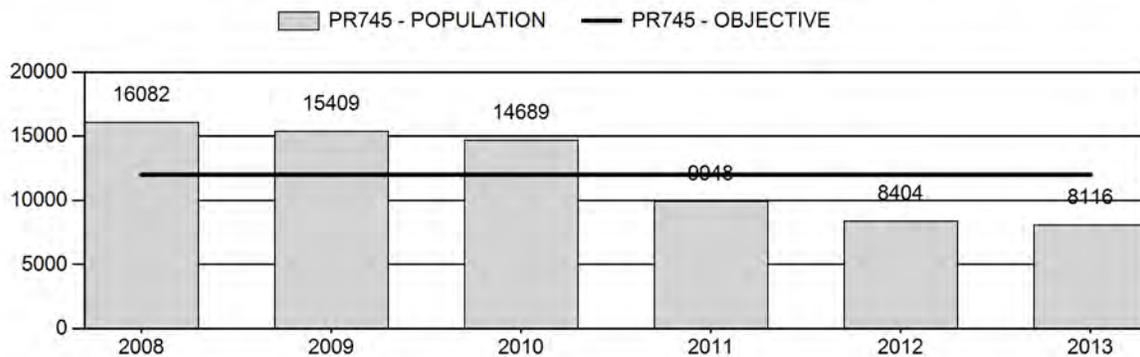
	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Population:	12,906	8,116	8,480
Harvest:	2,441	1,047	800
Hunters:	2,540	1,144	850
Hunter Success:	96%	92%	94 %
Active Licenses:	2,753	1,286	900
Active License Percent:	89%	81%	89 %
Recreation Days:	7,846	4,032	2,800
Days Per Animal:	3.2	3.9	3.5
Males per 100 Females	62	39	
Juveniles per 100 Females	53	61	

Population Objective:	12,000
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-32.4%
Number of years population has been + or - objective in recent trend:	4
Model Date:	2/26/2014

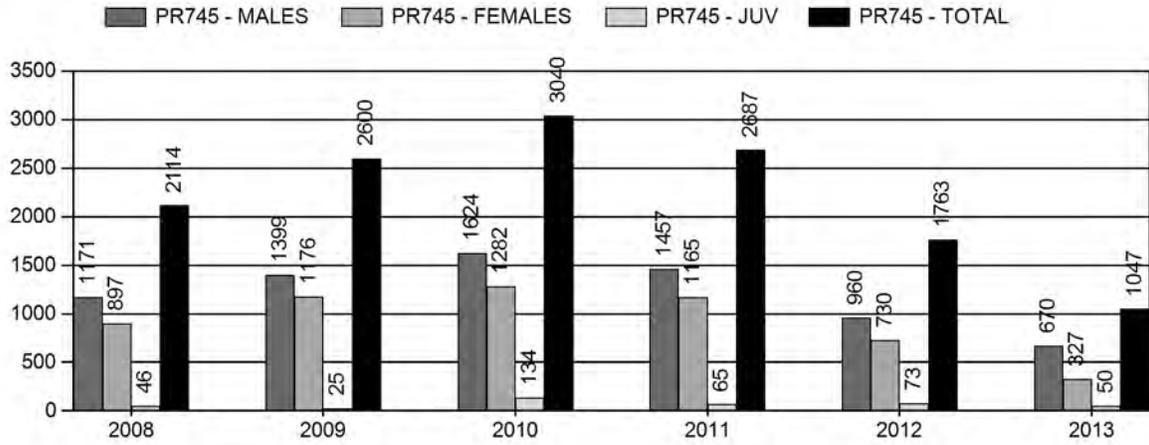
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	7.1%	3.8%
Males ≥ 1 year old:	36.4%	33.3%
Juveniles (< 1 year old):	1.8%	0.5%
Total:	11.3%	8.1%
Proposed change in post-season population:	+1.56%	+4.5%

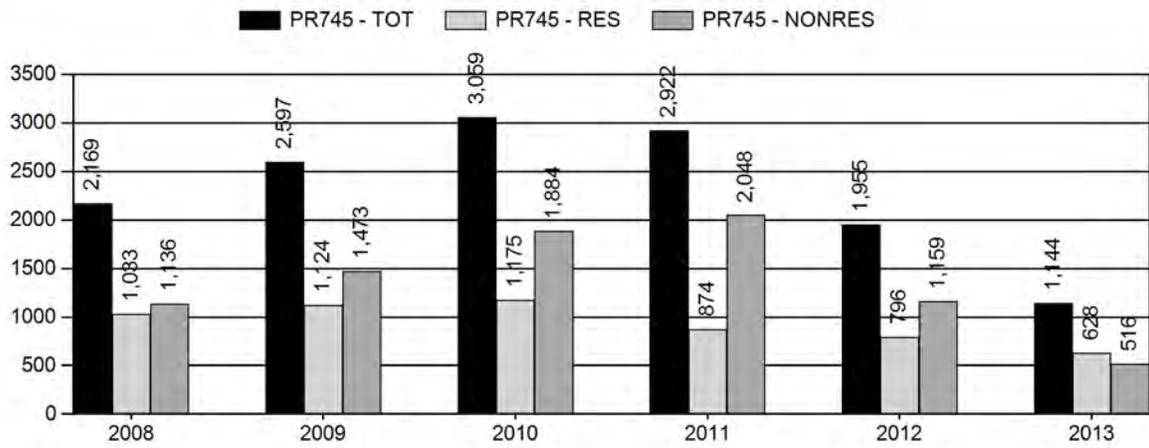
### Population Size - Postseason



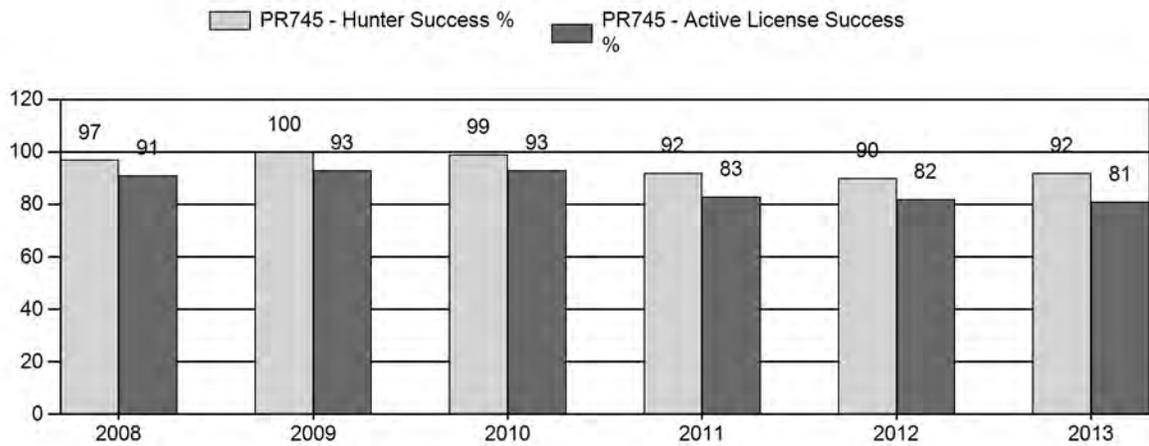
# Harvest



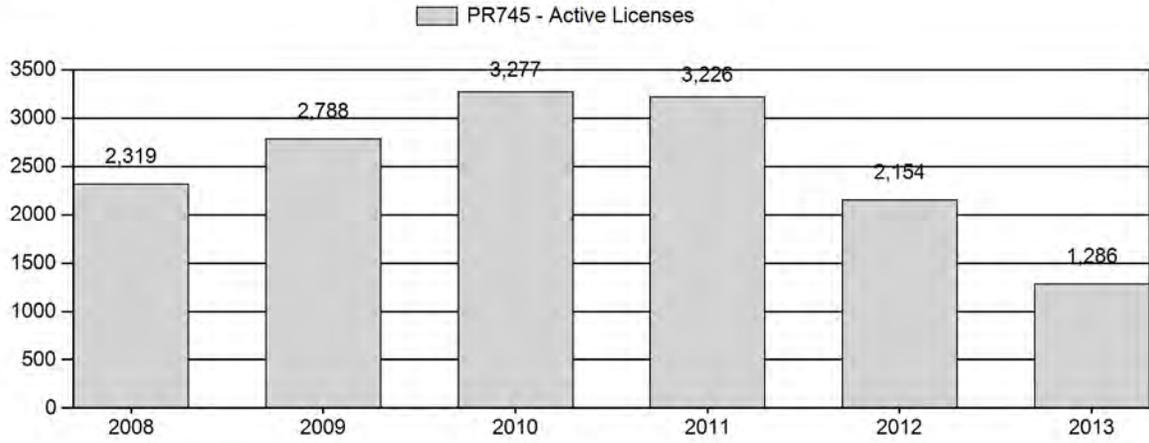
# Number of Hunters



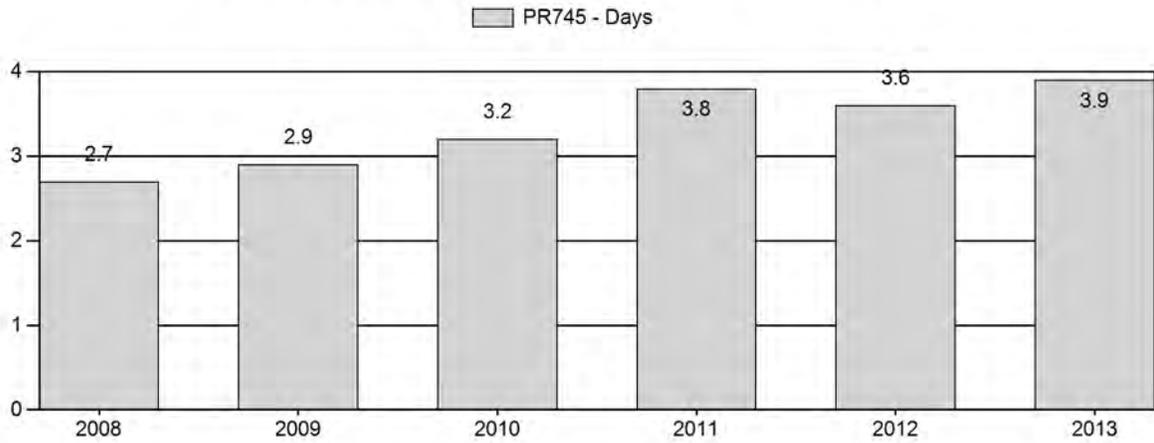
# Harvest Success



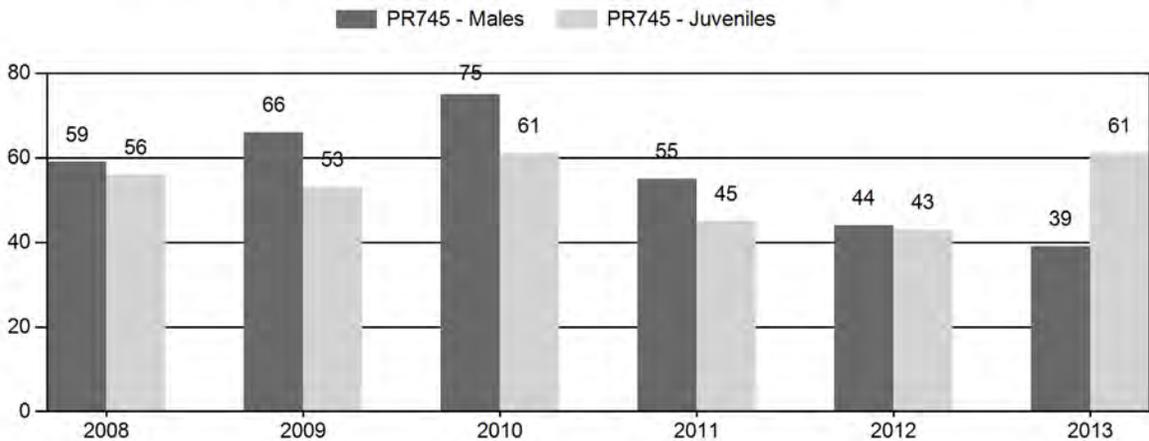
# Active Licenses



# Days Per Animal Harvested



# Preseason Animals per 100 Females



## 2008 - 2013 Preseason Classification Summary

### for Pronghorn Herd PR745 - RATTLESNAKE

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	18,407	434	823	1,257	28%	2,114	46%	1,183	26%	4,554	1,952	21	39	59	± 3	56	± 3	35
2009	18,269	330	954	1,284	30%	1,951	46%	1,027	24%	4,262	2,276	17	49	66	± 3	53	± 3	32
2010	18,033	271	933	1,204	32%	1,599	42%	970	26%	3,773	2,827	17	58	75	± 4	61	± 4	35
2011	12,938	195	683	878	27%	1,607	50%	721	22%	3,206	1,616	12	43	55	± 3	45	± 3	29
2012	10,343	82	209	291	24%	662	53%	285	23%	1,238	1,140	12	32	44	± 5	43	± 5	30
2013	9,268	45	199	244	20%	624	50%	381	31%	1,249	1,901	7	32	39	± 5	61	± 6	44

**2014 HUNTING SEASONS  
RATTLESNAKE PRONGHORN HERD (PR745)**

Hunt Area	Type	Date of Seasons		Quota	Limitations
		Opens	Closes		
70	1	Sep. 15	Oct. 31	100	Limited quota; any antelope
	6	Sep. 15	Nov. 30	100	Limited quota; doe or fawn antelope
71	1	Sep. 15	Oct. 31	100	Limited quota; any antelope
	6	Sep. 15	Oct. 31	50	Limited quota; doe or fawn antelope
72	1	Sep. 15	Oct. 31	400	Limited quota; any antelope
	6	Sep.15	Oct. 31	100	Limited quota; doe or fawn antelope
Archery		Aug. 15	Sep. 14		Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2013
70	1	-100
	6	-100
71	1	-100
	6	-50
72	1	-200
	6	-100
Total	1	-400
	6	-250

**Management Evaluation**

**Current Management Objective:** 12,000

**Management Strategy:** Special

**2013 Postseason Population Estimate:** ~8,100

**2014 Proposed Postseason Population Estimate:** ~8,500

The Rattlesnake Pronghorn Herd Unit has a post-season population management objective of 12,000 pronghorn. The herd is managed using the special management strategy, with a goal of maintaining preseason buck ratios between 60-70 bucks per 100 does. The objective and management strategy were last revised in 1988, and will be formally reviewed in 2015. A line transect survey will be conducted in May 2014 to be used in conjunction with the formal objective review.

## **Herd Unit Issues**

The 2013 post-season population estimate was approximately 8,100 and trending slightly upward from 2012 estimates. This herd unit did not have a functional population model until 2012, when a spreadsheet-based modeling system replaced the program POP-II to simulate herd dynamics. Prior management decisions for this herd were made using a combination of classification data, harvest statistics, observations of field personnel, and comments from hunters and landowners regarding pronghorn numbers. Line transect surveys were also conducted in 1998, 2000, and 2003 to provide end-of-year population estimates. A subsequent line transect surveys conducted in 2007 was deemed unusable and discarded. The current model is considered to be of poor quality, as personnel believe there to be significant interchange between the Rattlesnake and Beaver Rim Herd Units. For this reason, managers will evaluate the utility of combining these two herd units in 2015.

Hunting access within the herd unit is moderate, with some large tracts of public land as well as walk-in areas and a hunter management area. Traditional ranching and grazing are the primary land use over the whole herd unit, with scattered areas of oil and gas development. Hunt Areas 70 & 71 are dominated by private lands. License issuance is typically maintained in Area 70 to address damage issues on irrigated agricultural fields. Periodic disease outbreaks (i.e. hemorrhagic diseases, *Clostridium spp.* infections) are possible in this herd and can contribute to population declines when environmental conditions are suitable. A small number of pronghorn in the herd were reported to have perished from Epizootic Hemorrhagic Disease (EHD) during the late summer of 2013. Samples sent to the Wyoming Vet Lab from neighboring hunt areas confirmed this. The extent to which pronghorn have been impacted by EHD in recent years is unknown, but is potentially more significant than managers realize.

## **Weather**

The winter of 2010-2011 was severe throughout the herd unit, resulting in higher mortality of pronghorn across all age classes. Conditions were warm and dry for the herd unit in 2011 and shrub production was below average, resulting in poor nutrition of pronghorn entering the winter of 2011-2012. Snow pack and resulting spring moisture was below average for the winter of 2011-2012 which likely had a negative impacts on lactating does and their fawns. The summer of 2012 was the driest on record since 1904 in much of Wyoming, and the winter of 2012 continued the trend with very low snow accumulation and snow pack. Fawn survival over the severely dry summer and winter was low, as evidenced by low yearling buck ratios the following year. April of 2013 finally saw a break in the drought, when temperatures dropped below normal for the entire month and significant precipitation was received. This cooler and wetter pattern continued through the summer of 2013 in much of the herd unit. Heavy rains fell during the

second half of September 2013, making travel in much of the herd unit difficult to impossible. In early October 2013, winter storm “Atlas” blanketed the herd unit with 12-36” of wet snow. While no significant pronghorn mortality was detected as a result, the snow and resulting muddy conditions forced the cancellation of hunting for some license holders, and made accessing pronghorn difficult in many locations. Travel conditions improved toward the end of hunting seasons, but by then it was apparent winter storm Atlas had a negative impact on hunter participation and harvest success. The early winter months of 2013-2014 brought temperature and precipitation conditions near the recent 30-year average. For detailed weather data see <http://www.ncdc.noaa.gov/gac/time-series/us>.

## **Habitat**

This herd unit has no established habitat transects that measure production and/or utilization on shrub species that are preferred browse for pronghorn. Additionally, there are no comparable habitat transects in neighboring herd units to reference. Anecdotal observations and discussions with landowners in the region indicate that summer and winter forage availability for pronghorn was average in 2013. Herbaceous forage species were observed to be in better condition in 2013 compared to the severely dry 2012, and pronghorn appeared to more widely distributed across suitable habitat.

## **Field Data**

Fawn ratios were high in this herd from 1998-2005, and the population grew markedly during this time period. However, license issuance was modest and the population grew above management control by harvest. Fawn ratios were moderate from 2006-2010, but pronghorn populations were already high by this time period. License issuance increased significantly every year from 2006-2011 in an attempt to curb high pronghorn numbers and reduce the herd toward objective. By 2011, environmental factors combined with low fawn production/survival and high harvest pressure had rapidly reduced this herd below objective. Harsh winter conditions in 2010-11 combined with severe drought in 2012 have since dropped this herd unit below management objective, and license issuance has become more conservative. Improved moisture and favorable weather conditions appeared to have helped fawn production and survival in 2013, as the fawn ratio improved to 61:100 following a low of 43:100 does in 2012.

Buck ratios for the Rattlesnake herd historically range from the mid 40s to mid 70s per 100 does. Buck ratios are most commonly in the upper 50s, just below the lower limit for special management. In more recent years, buck ratios have dropped to the mid-40s as a result of low fawn recruitment and high harvest pressure on a diminishing population. In 2013, the buck ratio for the Rattlesnake Pronghorn Herd reached a 22-year low of 39:100 does. While it can be difficult to maintain this herd within the range of special management due to differing

management strategies for Area 70 versus Areas 71 and 72, hunters have developed high expectations for buck numbers and quality within this herd. Managers thus plan to manage pronghorn to improve and maintain the buck ratio within special management parameters.

### **Harvest Data**

License success in this herd unit is typically in the 90<sup>th</sup> percentile. Success declined the last three years to the low 80<sup>th</sup> percentile while hunter days increased, indicating pronghorn were more difficult for hunters to find and harvest. Despite drastic reductions in license numbers in 2012 and 2013, license success and hunter days remained mediocre and effort increased significantly as many hunters remarked that bucks were more difficult to find and of lower quality. While some of the low harvest success can be attributed to poor access due to muddy and/or snowy conditions, fawn production and buck ratios remain below average. Thus, managers will recommend further license reductions in 2014 with the goal of increasing buck ratios and population numbers overall.

### **Population**

The “Time-Specific Juvenile Survival – Constant Adult Survival” (TSJ,CA) spreadsheet model was chosen for the post-season population estimate of this herd. This model seemed most representative of the herd, as it selects for low juvenile survival in the years when managers agree that overwinter fawn survival was very poor – particularly in 2010-2012. The simpler models (CJ,CA and SCA,CA) select for higher juvenile survival rates across years, which does not seem feasible for this herd. All three models follow a trend that is plausible; however the CJ,CA model shows an extremely high buck harvest percentage in 2011, and the SCA,CA model shows a 2006 population peak that seems unrealistic. None of the three models track well with the three line transect estimates, but rather track in between them. While the AIC for the TSJ,CA model is the highest of the three, it is only due to year-by-year penalties on juvenile survival and is still well within one level of power in comparison to the AICs of the simpler models. The TSJ,CA model appears to be the best representation relative to the perceptions of managers on the ground and follows trends with license issuance and harvest success. A line-transect survey is scheduled for May 2014 and should help better align the model. Overall the current model is considered fair in quality as a representation of herd dynamics.

### **Management Summary**

Traditional season dates in this herd unit run from September 15<sup>th</sup> through October 31<sup>st</sup>, and through November 30<sup>th</sup> for Area 70 Type 6 licenses. We recommend the same season dates for 2014, with a reduction of licenses in lieu of poor fawn production/survival and declining buck ratios. The 2014 season includes a total of 600 Type 1 and 250 Type 6 licenses. Goals for 2014

are to increase pronghorn numbers back towards objective, improve buck ratios consistent with special management strategy, and increase hunter success.

If the projected harvest of 750 pronghorn is achieved with fawn production/survival similar to the last few years, this herd will increase slightly in number. The predicted 2014 post-season population size for the Rattlesnake Pronghorn Herd is approximately 8,500 animals, which is 32% below objective.

<b>INPUT</b>	
Species:	Pronghorn Heather O'Brien Rattlesnake PR745
Herd Unit & No.:	02/25/14
Model date:	

MODELS SUMMARY			Notes
	Relative AICc	Fit	
CJ,CA	Constant Juvenile & Adult Survival	140	
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	132	
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival	70	

 Clear form

Check best model to create report

- CJ,CA Model  
 SC,J,SCA Mod  
 TS,J,CA Model

Population Estimates from Top Model

Year	Predicted Prehunt Population (year /)		Total	Predicted Posthunt Population (year /)		Total	Predicted adult End-of-bio-year Pop (year /)		Total Adults	LT Population Estimate Field Est	Trend Count	Objective
	Juveniles	Total Males		Females	Juveniles		Total Males	Females				
1993	2309	2206	4140	8654	2174	1367	3348	6890	5924			12000
1994	2861	2043	3763	8667	2831	1548	3565	7944	5608			12000
1995	2474	1855	3641	7970	2457	1348	3485	7290	6432			12000
1996	3622	2203	4100	9925	3610	1791	3918	9318	8217			12000
1997	3992	3090	4962	12044	3962	2551	4766	11279	9786			12000
1998	4077	3814	5776	13667	4042	2980	5475	12497	8940	7272		12000
1999	3623	3265	5496	12385	3570	2076	5107	10753	8583			12000
2000	3813	2840	5571	12225	3768	1988	5304	11060	9743	12708		12000
2001	4549	3299	6248	14097	4527	2866	6157	13550	9732			12000
2002	4086	3321	6216	13623	4072	2759	6058	12889	9343			12000
2003	4573	3123	6033	13728	4538	2435	5771	12744	11281			12000
2004	6639	4055	7000	17695	6616	3290	6603	16509	13018			12000
2005	6382	4920	7837	19140	6336	4090	7479	17905	12613			12000
2006	5073	4682	7679	17434	5007	3695	7144	15845	13597			12000
2007	4681	5139	8186	18007	4537	3811	7442	15791	13808			12000
2008	4688	5155	8377	18219	4637	3867	7390	15894	13884			12000
2009	4394	5258	8348	18001	4367	3719	7054	15141	13135			12000
2010	4790	4976	7896	17662	4643	3190	6486	14318	9912			12000
2011	2830	3405	6309	12545	2757	1806	4992	9555	7838			12000
2012	2249	2458	5224	9930	2169	1402	4421	7991	6583			12000
2013	2816	1840	4612	9268	2761	1103	4252	8116	6701			12000
2014	2804	1845	4722	9371	2787	1168	4524	8480				12000
2015												12000
2016												12000
2017												12000
2018												12000
2019												12000
2020												12000
2021												12000
2022												12000
2023												12000
2024												12000
2025												12000

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.90		0.87	
1994	0.42		0.87	
1995	0.90		0.87	
1996	0.88		0.87	
1997	0.85		0.87	
1998	0.40		0.87	
1999	0.68		0.87	
2000	0.90		0.87	
2001	0.40		0.87	
2002	0.40		0.87	
2003	0.90		0.87	
2004	0.66		0.87	
2005	0.40		0.87	
2006	0.83		0.87	
2007	0.90		0.87	
2008	0.90		0.87	
2009	0.90		0.87	
2010	0.40		0.87	
2011	0.40		0.87	
2012	0.40		0.87	
2013	0.66		0.87	
2014	0.67		0.87	
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

**Parameters:**

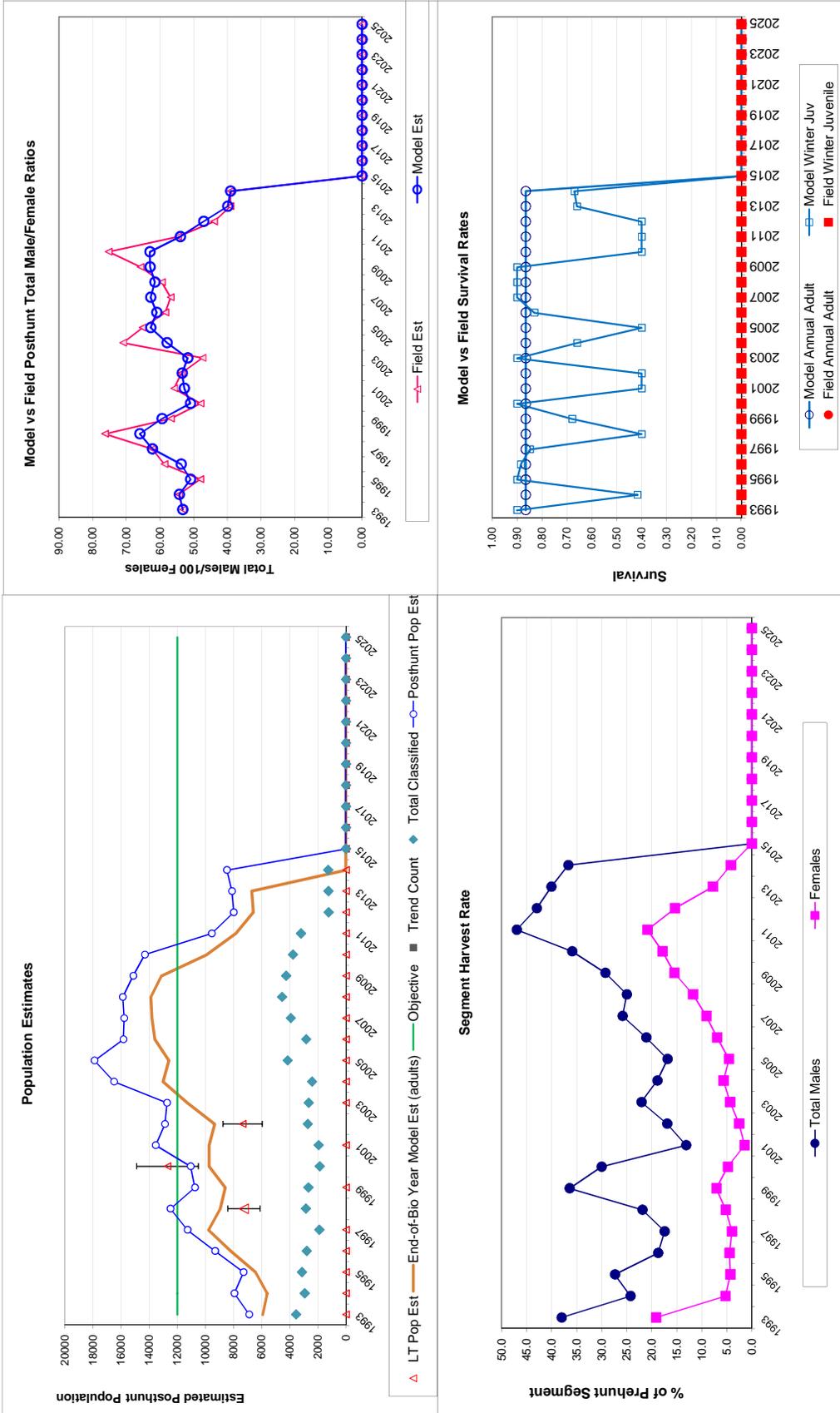
Adult Survival =	0.866
Initial Total Male Pop/10,000 =	0.221
Initial Female Pop/10,000 =	0.414

**MODEL ASSUMPTIONS**

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

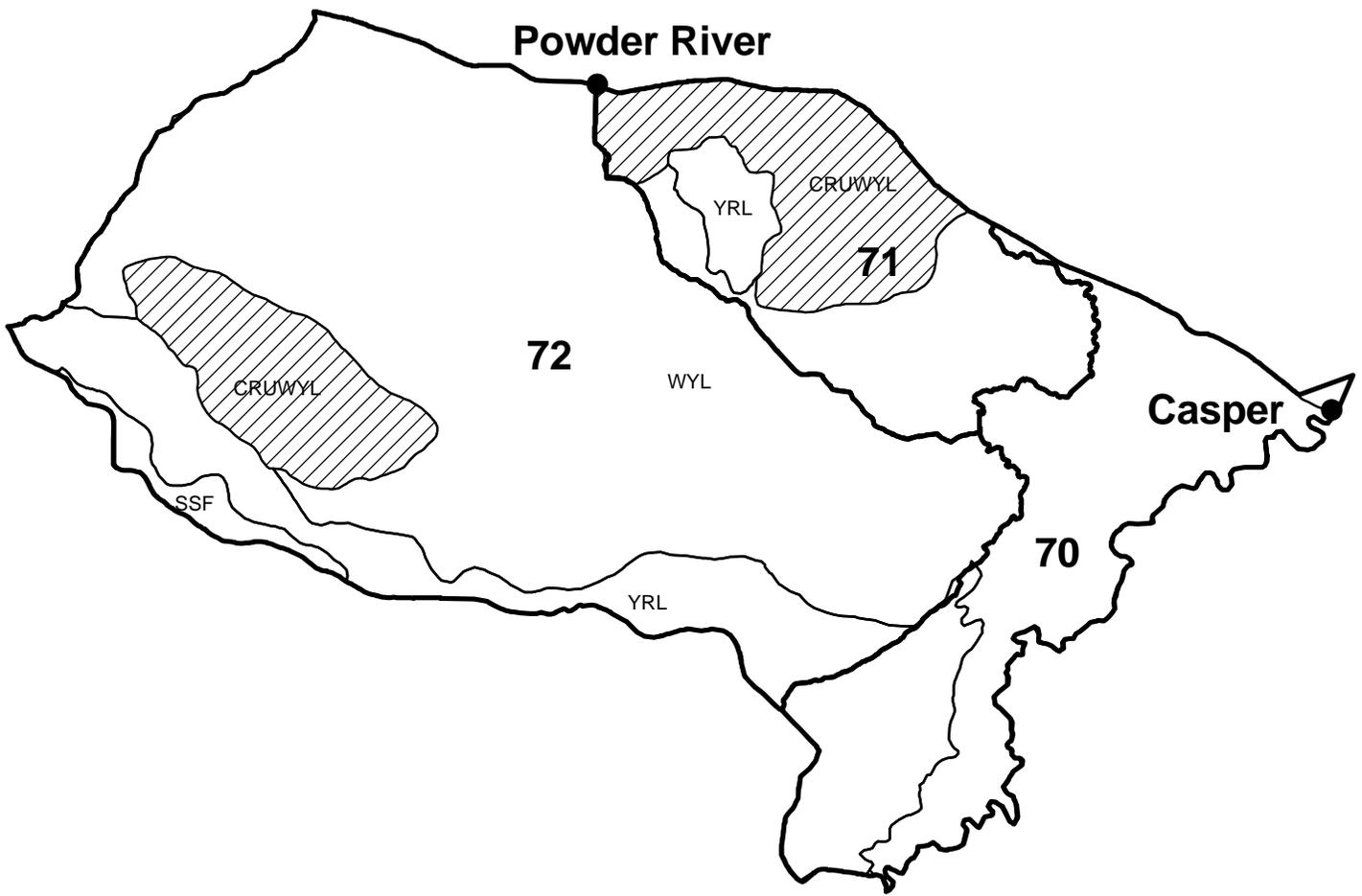
Year	Classification Counts						Harvest						
	Juvenile/Female Ratio			Total Male/Female Ratio			Males	Females	Juveniles	Total Harvest	Segment Harvest Rate (% of		
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE					Total Males	Females	
1993		55.76	2.26	53.27	53.18	2.19	762	720	122	1604	38.0	19.1	
1994		76.02	3.24	54.28	54.39	2.57	450	180	27	657	24.2	5.3	
1995		67.95	2.80	50.94	48.04	2.21	461	142	16	619	27.3	4.3	
1996		88.33	3.84	53.73	58.71	2.87	375	166	11	552	18.7	4.5	
1997		80.43	4.31	62.28	62.28	3.59	490	179	27	696	17.4	4.0	
1998		70.59	3.23	66.02	76.38	3.41	758	274	32	1064	21.9	5.2	
1999		65.92	3.02	59.41	56.77	2.72	1081	354	48	1483	36.4	7.1	
2000		68.44	3.65	50.98	47.98	2.86	775	243	41	1059	30.0	4.8	
2001		72.80	3.84	52.80	55.80	3.19	394	83	20	497	13.1	1.5	
2002		65.73	2.96	53.43	53.63	2.58	511	144	12	667	16.9	2.5	
2003		75.80	3.35	51.77	47.39	2.42	626	238	31	895	22.0	4.3	
2004		94.84	4.51	57.93	70.99	3.65	696	361	21	1078	18.9	5.7	
2005		81.44	2.96	62.77	65.18	2.53	754	326	42	1122	16.9	4.6	
2006		66.06	2.95	60.98	58.47	2.71	898	486	60	1444	21.1	7.0	
2007		57.19	2.21	62.78	56.86	2.20	1207	676	131	2014	25.8	9.1	
2008		55.96	2.03	61.54	59.46	2.12	1171	897	46	2114	25.0	11.8	
2009		52.64	2.03	62.99	65.81	2.37	1399	1176	25	2600	29.3	15.5	
2010		60.66	2.47	63.02	75.30	2.87	1624	1282	134	3040	35.9	17.9	
2011		44.87	2.01	53.98	54.64	2.29	1454	1197	67	2718	47.0	20.9	
2012		43.05	3.05	47.05	43.96	3.09	960	730	73	1763	43.0	15.4	
2013		61.06	3.97	39.90	39.10	2.95	670	327	50	1047	40.1	7.8	
2014		59.38	3.85	39.06	39.06	2.91	615	180	15	760	36.7	4.2	
2015													
2016													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													

FIGURES



Comments:

Antelope - Rattlesnake  
Hunt Areas 70,71,72  
Casper Region  
Revised 4/88



## 2013 - JCR Evaluation Form

SPECIES: Pronghorn

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

HERD: PR746 - NORTH NATRONA

HUNT AREAS: 73

PREPARED BY: HEATHER O'BRIEN

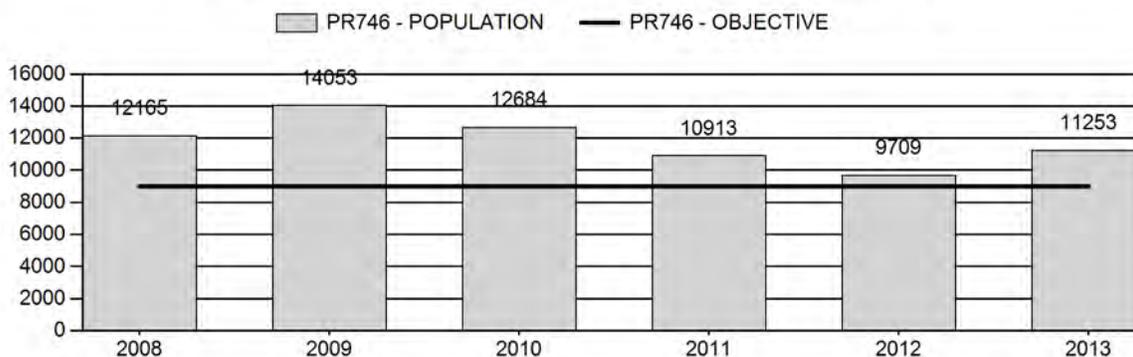
	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Population:	11,905	11,253	11,376
Harvest:	1,000	617	775
Hunters:	1,145	752	900
Hunter Success:	87%	82%	86 %
Active Licenses:	1,204	833	900
Active License Percent:	83%	74%	86 %
Recreation Days:	3,504	3,468	3,100
Days Per Animal:	3.5	5.6	4
Males per 100 Females	58	47	
Juveniles per 100 Females	56	61	

Population Objective:	9,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	25%
Number of years population has been + or - objective in recent trend:	2
Model Date:	3/7/2014

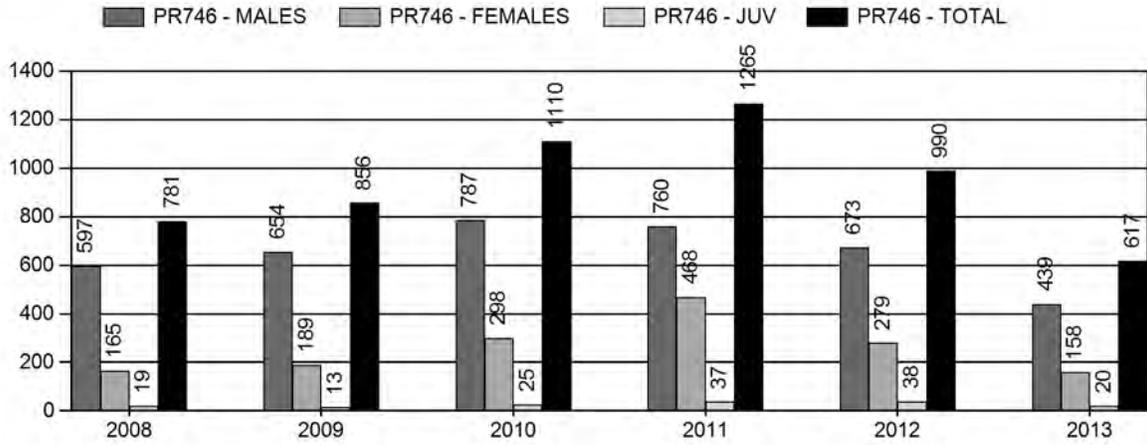
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	2.8%	2.6%
Males ≥ 1 year old:	15.9%	18.6%
Juveniles (< 1 year old):	0.6%	0.7%
Total:	5.2%	6.3%
Proposed change in post-season population:	+15%	+1.1%

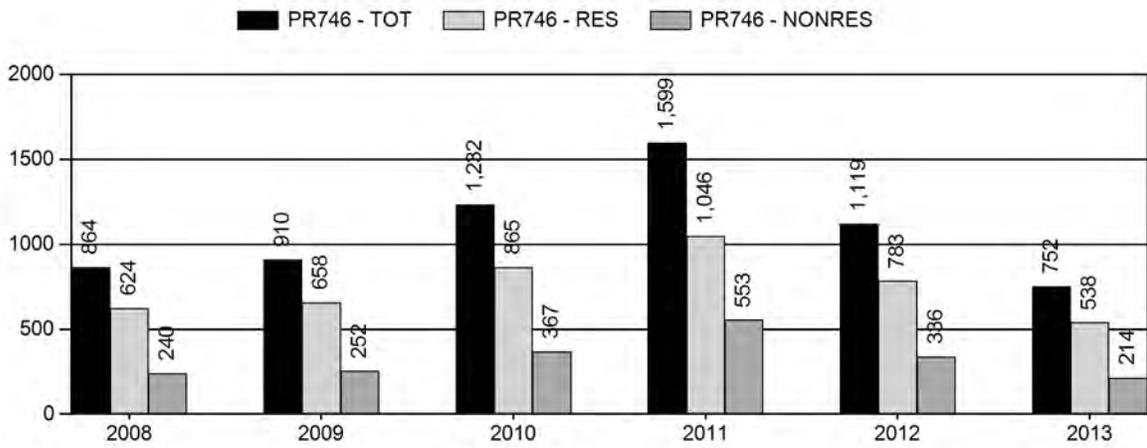
## Population Size - Postseason



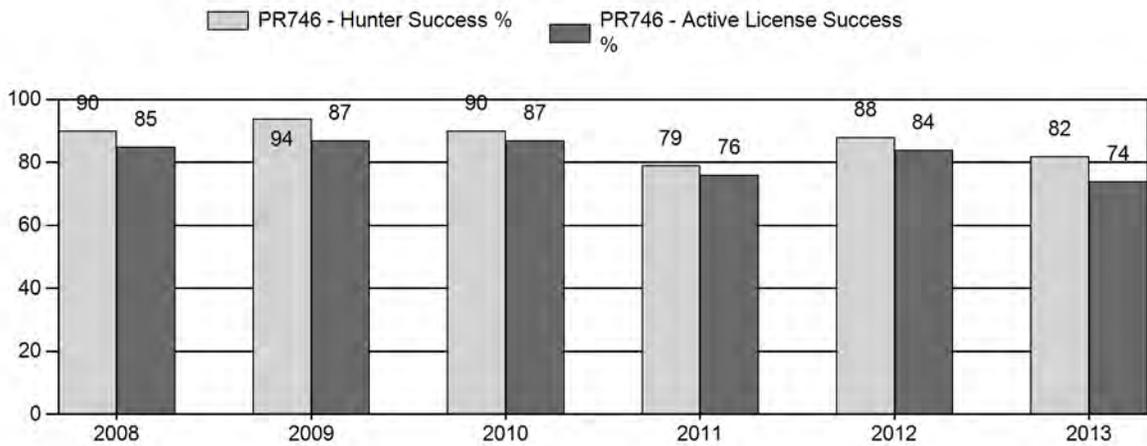
# Harvest



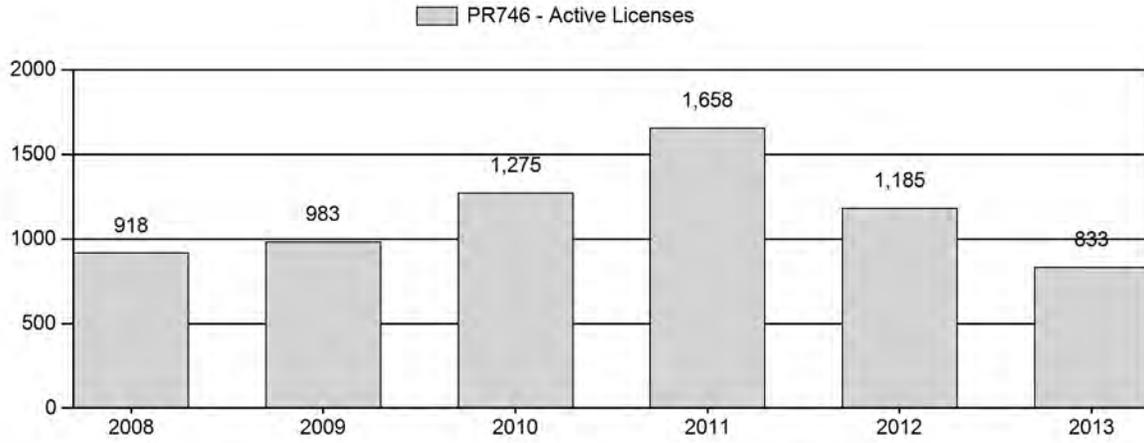
# Number of Hunters



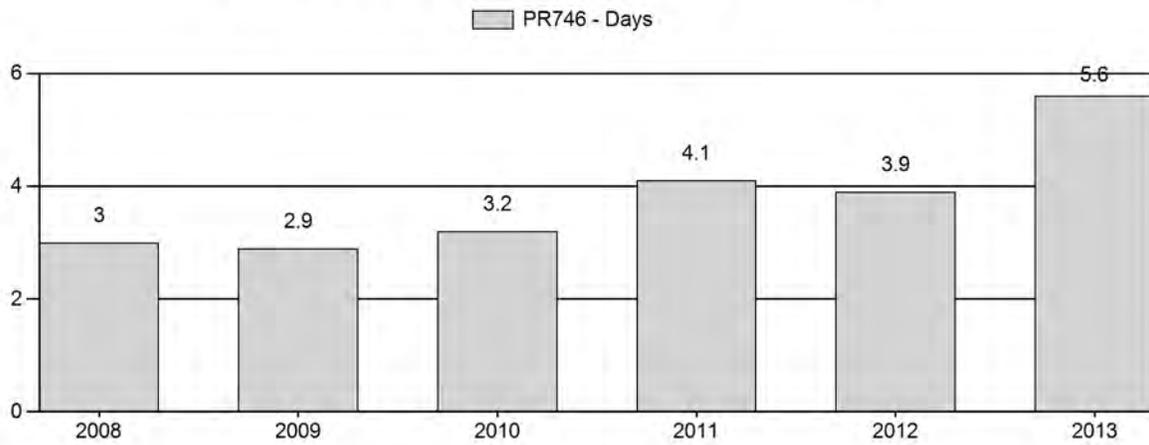
# Harvest Success



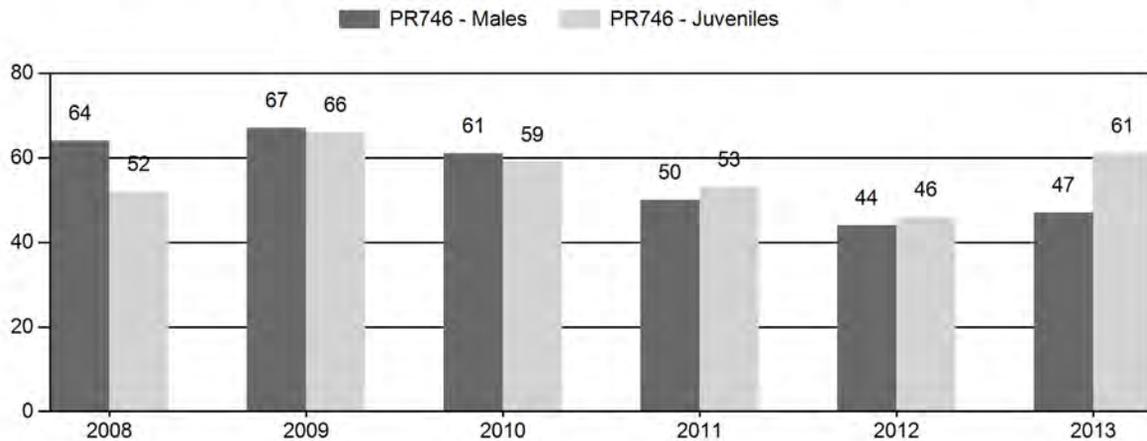
# Active Licenses



# Days Per Animal Harvested



# Preseason Animals per 100 Females



2008 - 2013 Preseason Classification Summary

for Pronghorn Herd PR746 - NORTH NATRONA

Year	Pre Pop	MALES			FEMALES		JUVENILES		Tot		Males to 100 Females			Young to				
		Ylg	Adult	Total	%	Total	%	Total	%	Cls	Obj	Yng	Adult	Total	Conf	Int	100	100
2008	13,024	245	380	625	30%	972	46%	508	24%	2,105	2,056	25	39	64	± 5	52	± 4	32
2009	14,995	273	541	814	29%	1,218	43%	809	28%	2,841	2,361	22	44	67	± 4	66	± 4	40
2010	13,905	172	392	564	28%	932	46%	552	27%	2,048	1,988	18	42	61	± 5	59	± 5	37
2011	12,323	119	540	659	25%	1,322	49%	697	26%	2,678	2,129	9	41	50	± 3	53	± 4	35
2012	10,798	127	190	317	23%	713	53%	327	24%	1,357	1,843	18	27	44	± 5	46	± 5	32
2013	11,932	69	318	387	23%	817	48%	497	29%	1,701	1,832	8	39	47	± 4	61	± 5	41

**2014 HUNTING SEASONS  
NORTH NATRONA PRONGHORN HERD (PR746)**

Hunt Area	Type	Date of Seasons		Quota	Limitations
		Opens	Closes		
73	1	Sep. 15	Oct. 31	800	Limited quota; any antelope
	6	Sep. 15	Oct. 31	100	Limited quota; doe or fawn antelope
Archery		Aug. 15	Sep. 14		Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2013
73	1	No change
	6	No change
	7	-100, removed license type

**Management Evaluation**

**Current Postseason Population Management Objective:** ~ 9,000

**Management Strategy:** Recreational

**2013 Postseason Population Estimate:** ~ 11,250

**2014 Proposed Postseason Population Estimate:** ~ 11,400

The North Natrona Pronghorn Herd Unit has a post-season population management objective of 9,000 pronghorn. The herd is managed using the recreational management strategy, with a goal of maintaining preseason buck ratios between 30-59 bucks per 100 does. The objective and management strategy were last revised in 1987, and will be formally reviewed in 2014.

**Herd Unit Issues**

Hunting access within the herd unit is very good, with large tracts of public lands as well as walk-in areas available for hunting. The southeastern corner of the herd unit is the only area dominated by private lands. In this area, specific doe/fawn licenses have been added to address damage issues on irrigated agricultural fields in years when landowners agree to allow hunting access. The main land use within the herd unit is traditional ranching and grazing of livestock. Industrial scale developments, including oil and gas development, are limited and isolated within this herd unit. Periodic disease outbreaks (i.e. hemorrhagic diseases, *Clostridium spp.* infections)

can impact this herd and contribute to population declines when environmental conditions are suitable.

## **Weather**

The winter of 2010-2011 was severe throughout the herd unit, resulting in higher mortality of pronghorn across all age classes. Conditions were warm and dry for the herd unit in 2011 and shrub production was below average, resulting in poor nutrition of pronghorn entering the winter of 2011-2012. Snow pack and resulting spring moisture was below average for the winter of 2011-2012 which likely had a negative impacts on lactating does and their fawns. The summer of 2012 was the driest on record since 1904 in much of Wyoming, and the winter of 2012 continued the trend with very low snow accumulation and snow pack. Fawn survival over the severely dry summer and winter was low, as evidenced by low yearling buck ratios the following year. April of 2013 finally saw a break in the drought, when temperatures dropped below normal for the entire month and significant precipitation was received. This cooler and wetter pattern continued through the summer of 2013 in much of the herd unit, though the northeastern portion of the unit continued to suffer very dry conditions. In early October 2013, winter storm “Atlas” blanketed the herd unit with 12-36” of wet snow. While no significant pronghorn mortality was detected as a result, the snow and resulting muddy conditions forced the cancellation of hunting for some license holders, and made accessing pronghorn difficult in many locations. Travel conditions improved toward the end of hunting seasons, but by then it was apparent winter storm Atlas had a negative impact on hunter participation and harvest success. The early winter months of 2013-2014 brought temperature and precipitation conditions near the recent 30-year average. For detailed weather data see <http://www.ncdc.noaa.gov/gac/time-series/us>.

## **Habitat**

Currently, this herd unit has no established habitat transects that measure production and/or utilization on shrub species that are preferred browse for pronghorn. Additionally, there are no comparable habitat transects in neighboring herd units to reference. Through anecdotal observations and shrub monitoring for other big game species, it is believed that summer and winter forage availability for pronghorn was average in 2013, with the possible exception of areas in the northeast that remained dry. Several sagebrush transects will be established in April 2014, with the goal of evaluating utilization from pronghorn in time for the formal objective review. If data prove valuable from these transects, they will be maintained and developed permanently to monitor habitat condition and use by big game species.

## **Field Data**

Fawn ratios were high in this herd from 2002-2005, and the population grew markedly during this time period. Fawn ratios were moderate to poor from 2006-2013, but the population continued to grow through 2009 as license issuance did not keep pace with herd growth. In 2010-2011, license issuance increased sharply to address high antelope numbers and reduce the herd toward objective. By 2012, higher license issuance was no longer necessary to control growth of the herd, and licenses were reduced. Hunter harvest, mortality from harsh winter conditions in 2010-2011, extremely poor fawn production/survival, and severe drought in 2012 has subsequently reduced this herd. License issuance was again reduced in 2013 to compensate for a declining population.

Buck ratios for the North Natrona Herd historically average in the mid-50s:100 does, though they exceeded recreational limits from 2007-2010, when ratios were in the 60s. Since then, buck ratios have dropped markedly each year along with the population as a whole, reaching a 15-year low of 44 bucks per hundred does in 2012. The buck ratio improved slightly in 2013, with 47 bucks:100 does. This is still well within the target range for recreational management, and managers would like to keep buck ratios in this range. Ultimate management goals are to sustain high hunter satisfaction while continuing to offer exceptional opportunity and good drawing odds via recreational management.

## **Harvest Data**

License success in this herd unit is typically in the 80-90<sup>th</sup> percentile. However, in 2013 license success dropped to 72% for Type 1 licenses and 83% for Type 6 licenses. This sudden decline in license success was due in large part to limited access resulting from heavy snows and muddy road conditions. Rain and snow were prominent during the first half of the hunting season and greatly reduced access to pronghorn and harvest success within the herd unit. Despite this, hunter satisfaction increased from 82% in 2012 to 89% in 2013, indicating that hunters were pleased with their hunt despite issues of poor weather and road conditions. In addition, there were no negative comments submitted from hunters in the harvest report for the North Natrona Herd Unit.

## **Population**

The 2013 post-season population estimate was approximately 11,250 and trending upward after an estimated low in 2012 of 9,700 pronghorn. A line-transect survey was conducted in this herd unit in May 2013 and resulted in an end-of-bioyear population estimate of 11,083, with a standard error of  $\pm 2,235$  (see Appendix A). The model estimate for end-of-year population size in 2013 is slightly below the confidence intervals for the 2013 line-transect survey.

The “Time-Specific Juvenile Survival - Constant Adult Survival” (TSJ,CA) spreadsheet model was chosen to use for the post-season population estimate of this herd. This model seemed the most representative of the herd, as it selects for higher juvenile survival during the years when field personnel observed more favorable environmental and habitat conditions, particularly from 2003-2008. The simpler models (CJ,CA and SCJ,CA) select for a very low juvenile survival rate across years, which does not seem feasible for this herd. All three models follow a trend that seems representative for this herd unit. The three models each align partially to four line-transect estimates – each model aligning through some but not all line-transect estimates completely. However, the CJ,CA and SCJ,CA models estimate population peaks in 2009 that do not seem realistic compared to the perceptions of field personnel and landowners at that time. While the AIC for the TSJ,CA model is the highest of the three, it is only due to year-by-year penalties and is still well within one level of power in comparison to the AICs of the simpler models. The TSJ, CA model aligns with two of four line transect estimates, and is very close to the confidence intervals for the remaining two. The TSJ,CA model appears to be the best representation relative to the perceptions of managers on the ground, and follows trends with license issuance and harvest success. Overall the model is considered to be fair in representing dynamics of the herd.

### **Management Summary**

Traditional season dates in this herd run from September 15<sup>th</sup> through October 31<sup>st</sup>. Season dates will remain the same for 2014, as will Type 1 license issuance. The 2014 season includes 800 Type 1 licenses, and 100 Type 6 licenses. The Type 7 licenses will be eliminated in 2014, as access on private lands in the southeast corner of the herd unit has been poor. Landowners that normally utilize the Type 7 license can still take hunters with a Type 6 license, should they have a need to control for agricultural damage. While fawn ratios and population growth rates have been below average in recent years, habitat conditions appeared to improve in 2013. Goals for 2014 are to maintain pronghorn numbers near objective, maintain buck ratios, and increase hunter success.

If we attain the projected harvest of 775 with fawn ratios similar to the last few years, this herd will remain stable at slightly above objective. The predicted 2014 post-season population size of the North Natrona Pronghorn Herd is approximately 11,400 animals, which is 27% above objective.

Species: Pronghorn  
 Biologist: Heather O'Brien  
 Herd Unit & No.: North Natrona PR746  
 Model date: 03/07/14

**MODELS SUMMARY**

	Fit	Relative AICc	Notes
CJ,CA	102	111	
SC,J,SCA	99	113	
TS,J,CA	40	149	

Clear form  
 Check best model to create report  
 CJ,CA Model  
 SC,J,SCA Mod  
 TS,J,CA Model

Year	Predicted Prehunt Population (year /)		Total	Predicted Posthunt Population (year /)		Total	Predicted adult End-of-bio-year Pop (year /)		Total Adults	LT Population Estimate	Trend Count	Objective
	Juveniles	Total Males		Females	Juveniles		Total Males	Females				
1993	2441	2122	3861	2373	1409	3331	7113	2253	3993	6246		9000
1994	3145	2208	3913	3124	1779	3805	8708	2373	4223	6596		9000
1995	2982	2326	4138	2970	1916	4049	8935	2260	4206	6466		9000
1996	4083	2215	4122	4072	1812	3965	9849	2394	4347	6741		9000
1997	2375	2346	4260	2351	1921	4125	8396	2467	4472	6939		9000
1998	4106	2418	4382	4080	1960	4243	10283	2516	4595	7111	5485	9000
1999	3052	2466	4503	3041	2046	4376	9462	2555	4673	7228		9000
2000	3442	2504	4580	3429	2050	4431	9910	2533	4698	7231	8211	9000
2001	3030	2482	4604	2994	2161	4499	9654	2488	4603	7091		9000
2002	3226	2438	4511	3217	1998	4334	9550	2382	4501	6882		9000
2003	3322	2334	4411	3310	1873	4224	9407	2871	5004	7875		9000
2004	4115	2813	4904	4064	4702	4947	11013	3048	5285	8332		9000
2005	4398	2987	5179	4366	2343	4947	11657	3525	5902	9427		9000
2006	3043	3454	5784	3024	2781	5410	11215	3785	6170	9954		9000
2007	2594	3709	6046	2557	3032	5720	11309	3793	6237	10030		9000
2008	3194	3717	6112	3174	3061	5931	12165	4105	6728	10833		9000
2009	4379	4023	6593	4365	3303	6385	14054	3744	6561	10304		9000
2010	3808	3669	6429	3780	2803	6102	12685	3155	6169	9324		9000
2011	3187	3092	6045	3147	2241	5527	10914	2656	5734	8390		9000
2012	2577	2603	5620	2536	1862	5313	9710	2812	5821	8634	11083	9000
2013	3471	2756	5705	3449	2273	5531	11253	2846	5984	8829	2235	9000
2014	3576	2789	5864	3548	2129	5699	11376					9000
2015												9000
2016												9000
2017												9000
2018												9000
2019												9000
2020												9000
2021												9000
2022												9000
2023												9000
2024												9000
2025												9000

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.90		0.87	
1994	0.53		0.87	
1995	0.40		0.87	
1996	0.40		0.87	
1997	0.68		0.87	
1998	0.40		0.87	
1999	0.51		0.87	
2000	0.44		0.87	
2001	0.40		0.87	
2002	0.40		0.87	
2003	0.75		0.87	
2004	0.54		0.87	
2005	0.68		0.87	
2006	0.90		0.87	
2007	0.90		0.87	
2008	0.90		0.87	
2009	0.40		0.87	
2010	0.40		0.87	
2011	0.40		0.87	
2012	0.75		0.87	
2013	0.60		0.87	
2014	0.58		0.87	
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

**Parameters:**

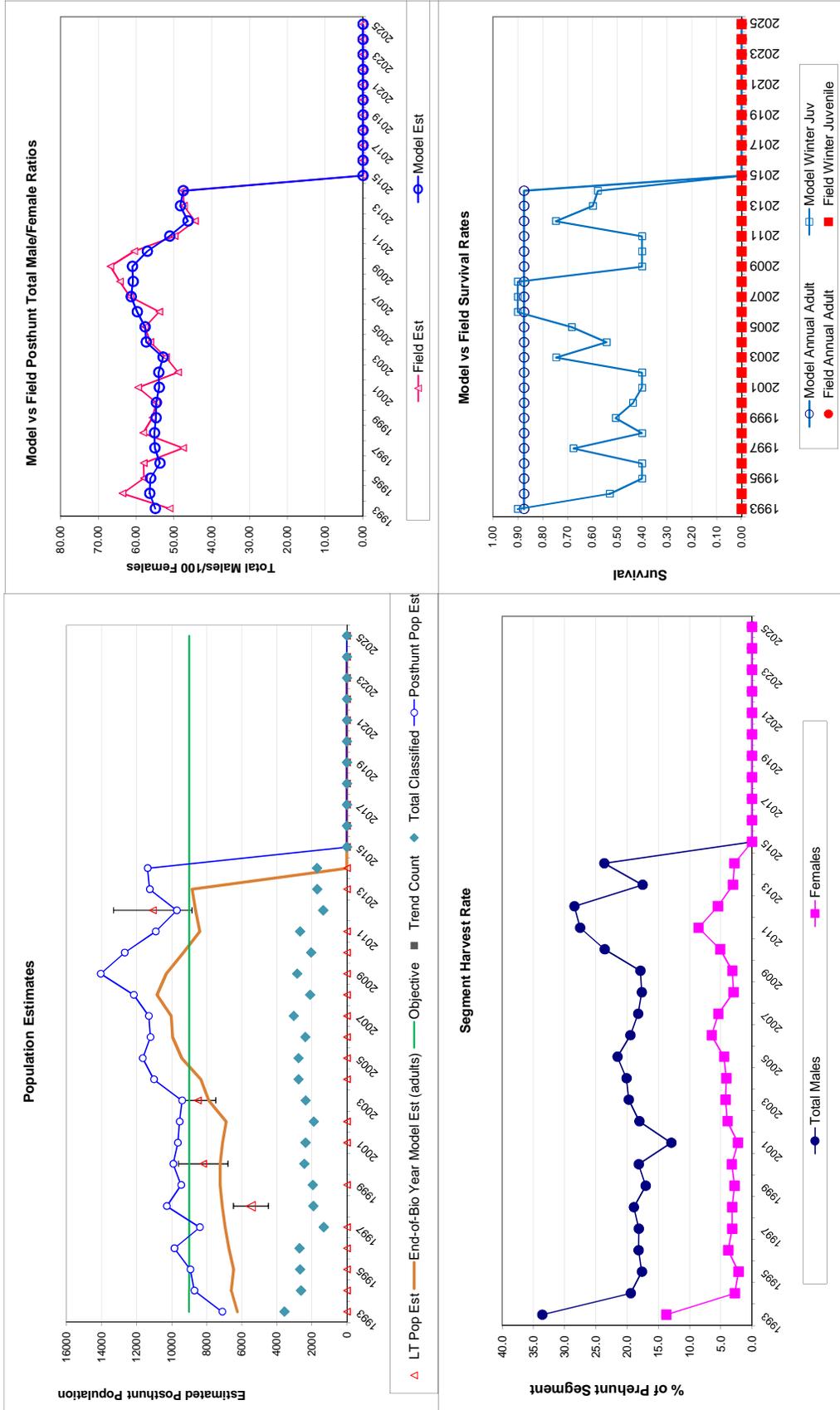
Adult Survival =	0.875
Initial Total Male Pop/10,000 =	0.212
Initial Female Pop/10,000 =	0.386

**MODEL ASSUMPTIONS**

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

Year	Classification Counts						Harvest						
	Juvenile/Female Ratio			Total Male/Female Ratio			Males	Females	Juveniles	Total Harvest	Segment Harvest Rate (% of		
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE					Total Males	Females	
1993		63.21	2.49	54.95	51.14	2.15	648	482	61	1191	33.6	13.7	
1994		80.37	3.67	56.44	63.63	3.11	390	98	19	507	19.4	2.8	
1995		72.06	3.26	56.20	57.95	2.81	373	81	11	465	17.6	2.2	
1996		99.05	4.32	53.74	58.01	2.95	366	143	10	519	18.2	3.8	
1997		55.74	3.65	55.08	47.63	3.28	387	123	22	532	18.1	3.2	
1998		93.70	4.88	55.17	58.14	3.47	416	127	24	567	18.9	3.2	
1999		67.78	3.61	54.76	55.73	3.15	382	115	10	507	17.0	2.8	
2000		75.17	3.53	54.67	54.67	2.83	413	135	12	560	18.1	3.2	
2001		65.81	3.22	53.91	59.52	3.01	292	95	33	420	12.9	2.3	
2002		71.51	3.78	54.04	48.95	2.91	400	161	8	569	18.0	3.9	
2003		75.31	3.57	52.91	52.17	2.77	419	170	11	600	19.7	4.2	
2004		83.91	3.66	57.36	56.26	2.76	514	184	47	745	20.1	4.1	
2005		84.93	3.71	57.67	57.67	2.82	585	211	29	825	21.5	4.5	
2006		52.60	2.64	59.72	53.91	2.68	612	340	17	969	19.5	6.5	
2007		42.90	2.03	61.34	61.62	2.59	615	297	33	945	18.2	5.4	
2008		52.26	2.86	60.82	64.30	3.30	597	165	19	781	17.7	3.0	
2009		66.42	3.01	61.01	66.83	3.03	654	189	13	856	17.9	3.2	
2010		59.23	3.18	57.06	60.52	3.23	787	298	25	1110	23.6	5.1	
2011		52.72	2.47	51.15	49.85	2.38	774	471	37	1282	27.5	8.6	
2012		45.86	3.06	46.31	44.46	3.00	673	279	38	990	28.4	5.5	
2013		60.83	3.46	48.31	47.37	2.92	439	158	20	617	17.5	3.0	
2014		60.98	3.46	47.56	47.56	2.93	520	150	25	775	23.7	2.8	
2015													
2016													
2017													
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2020													
2021													
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2023													
2024													
2025													

FIGURES



Comments:

**Appendix A:  
North Natrona Pronghorn Line Transect Survey  
Bio-Year 2012 - Results and Histogram**

Effort: 483.4900  
 # samples: 38  
 Width: 212.0000  
 Left: 0.0000000  
 # observations: 216

Model 1

Hazard Rate key,  $k(y) = 1 - \text{Exp}(-(y/A(1))^{**}-A(2))$

Parameter	Point Estimate	Standard Error	Percent Coef. of Variation	95% Confidence Interval	
DS	5.6807	1.1247	19.80	3.8594	8.3615
E(S)	1.5659	0.59588E-01	3.81	1.4527	1.6878
D	8.8951	1.7934	20.16	6.0024	13.182
N	11083	2234.5	20.16	7479.0	16425

Measurement Units

-----  
 Density: Numbers/Sq. miles  
 ESW: meters

Component Percentages of Var(D)

-----  
 Detection probability: 79.5  
 Encounter rate: 16.9  
 Cluster size: 3.6

Estimation Summary: Encounter Rates

	Estimate	% CV	DF	95% Confidence Interval	
n	216.00				
k	38.000				
L	483.49				
n/L	0.44675	8.29	19.00	0.37572	0.53122
Left	0.0000				
Width	212.00				

Estimation Summary: Detection Probability

Hazard/Polynomial

	Estimate	% CV	DF	95% Confidence Interval	
m	2.0000				
LnL	-288.94				
AIC	581.88				
AICc	581.94				
BIC	588.63				
Chi-p	0.45571				
f(0)	0.79011E-02	17.98	214.00	0.55588E-02	0.11230E-01
p	0.59701	17.98	214.00	0.42003	0.84855
ESW	126.57	17.98	214.00	89.046	179.89

Estimation Summary – Expected Cluster Size

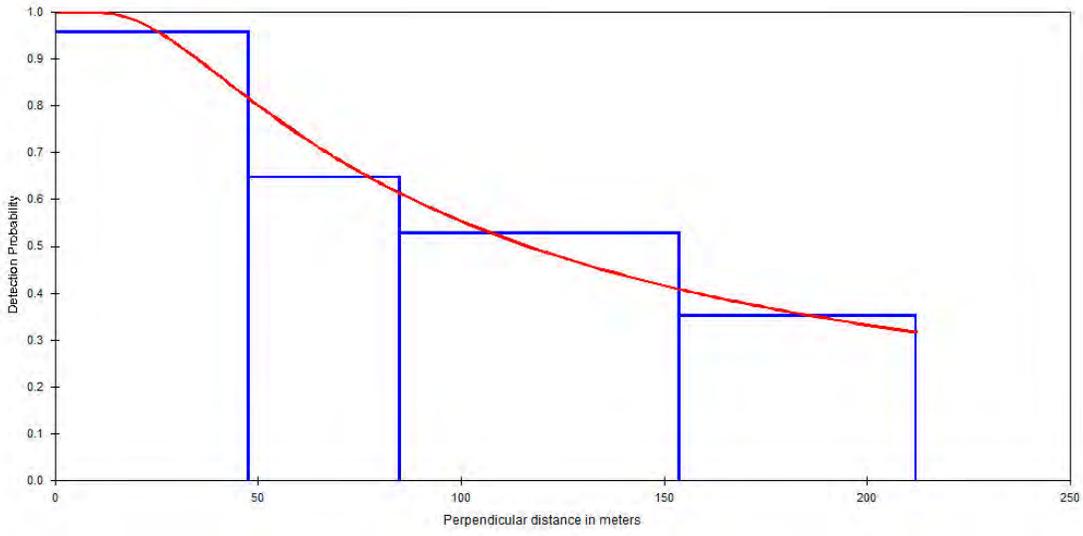
Estimate	% CV	df	95% Confidence Interval	
Average cluster size				
1.6250	5.29	215.00	1.4643	1.8033

Hazard/Polynomial

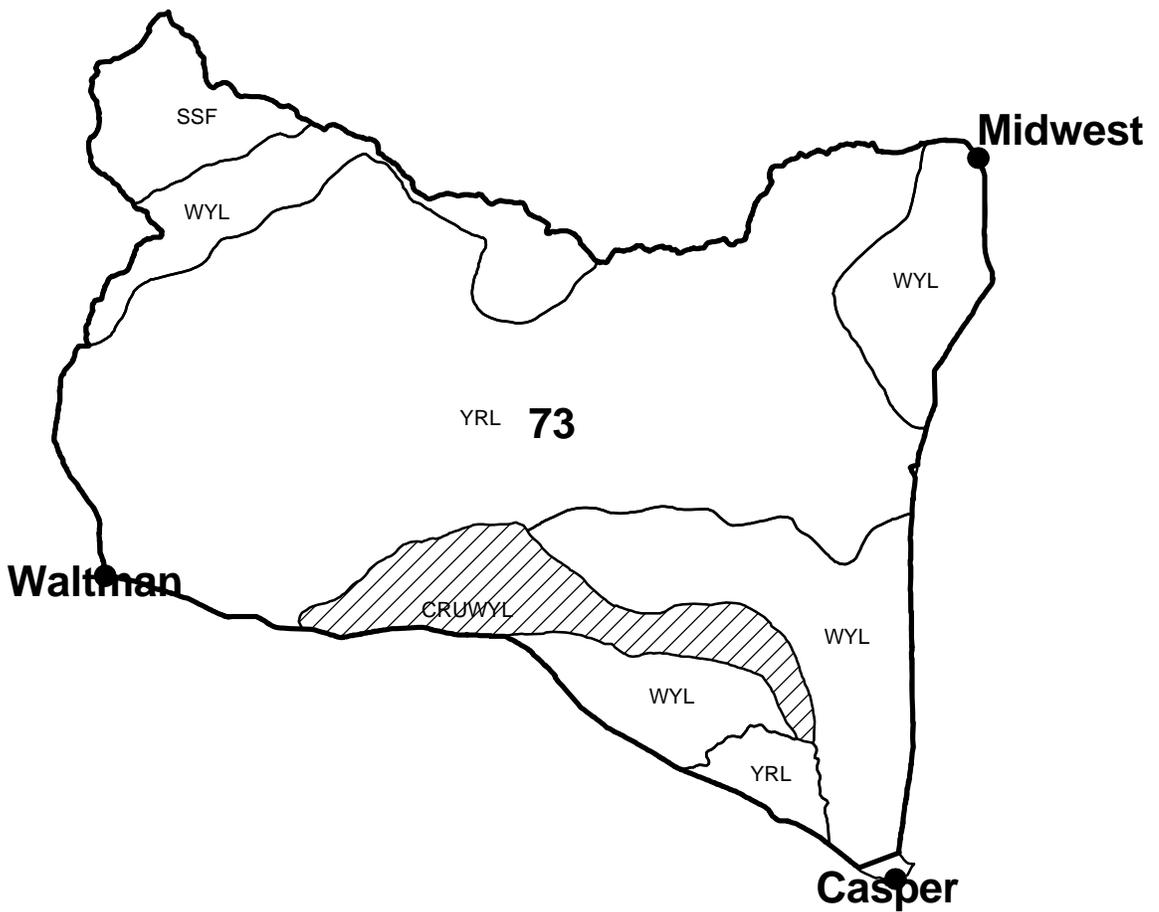
	Estimate	% CV	DF	95% Confidence Interval	
r	-0.34582E-02				
r-p	0.47985				
E(S)	1.5659	3.81	214.00	1.4527	1.6878

Estimation Summary – Density & Abundance

	Estimate	% CV	DF	95% Confidence Interval	
D	.6807	19.80	208.56	3.8594	8.3615
DS	8.8951	20.16	223.96	6.0024	13.182
N	11083	20.16	223.96	7479.0	16425



Antelope - North Natrona  
Hunt Area 73  
Casper Region  
Revised 4/88



## 2013 - JCR Evaluation Form

SPECIES: Pronghorn

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

HERD: PR748 - NORTH CONVERSE

HUNT AREAS: 25-26

PREPARED BY: ERIKA PECKHAM

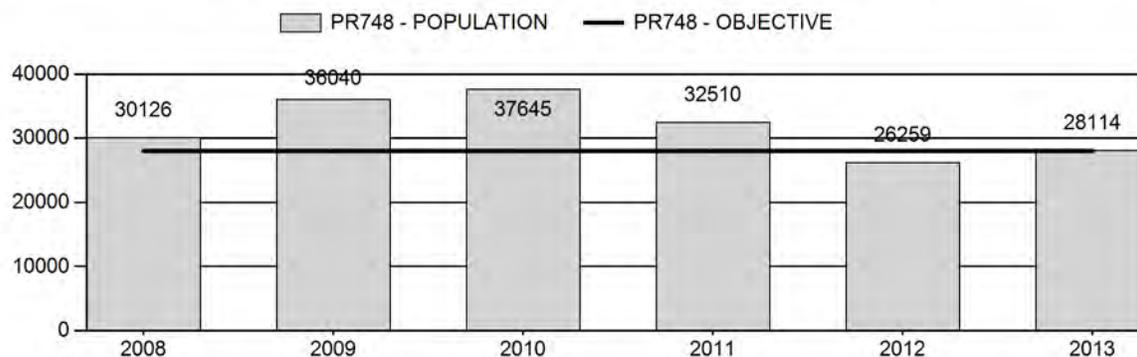
	<u>2008 - 2012 Average</u>	<u>2013</u>	<u>2014 Proposed</u>
Population:	32,516	28,114	24,871
Harvest:	2,962	2,268	1,785
Hunters:	3,224	2,784	2,100
Hunter Success:	92%	81%	85%
Active Licenses:	3,386	2,933	1,900
Active License Percent:	87%	77%	94%
Recreation Days:	10,650	8,988	6,400
Days Per Animal:	3.6	4.0	3.6
Males per 100 Females	70	49	
Juveniles per 100 Females	71	62	

Population Objective:	28,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	0%
Number of years population has been + or - objective in recent trend:	1
Model Date:	3/10/2014

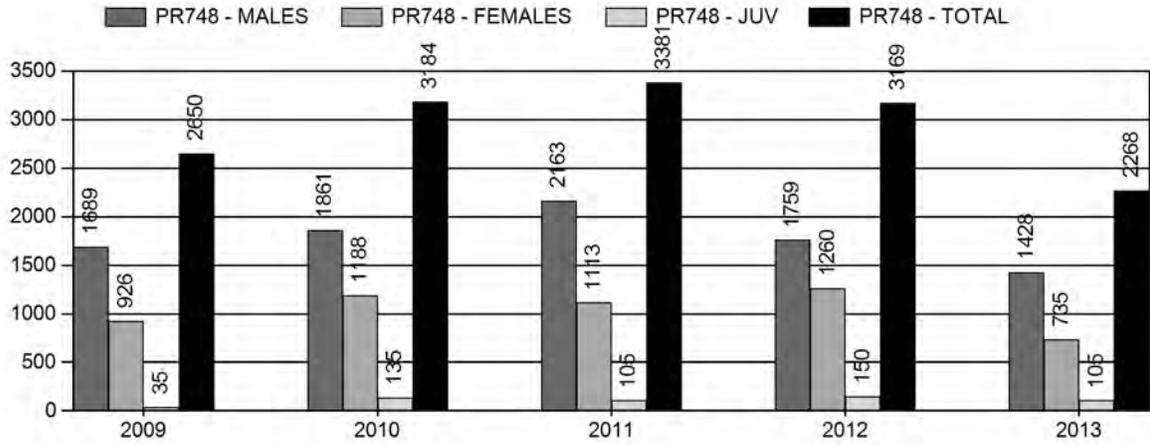
**Proposed harvest rates (percent of pre-season estimate for each sex/age group):**

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	10%	4.0%
Males ≥ 1 year old:	33%	18.6%
Juveniles (< 1 year old):	0%	0%
Total:	12%	6.7%
Proposed change in post-season population:	-15%	-11.5%

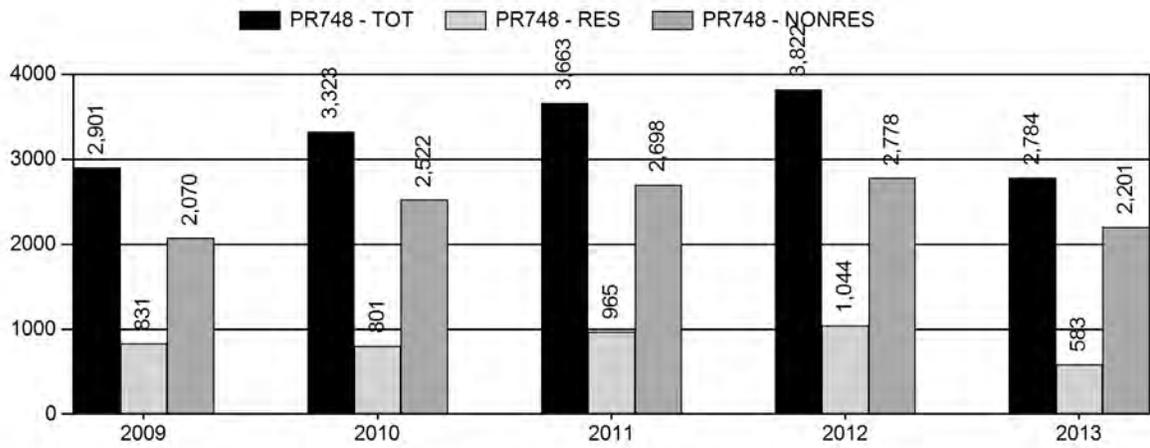
### Population Size - Postseason



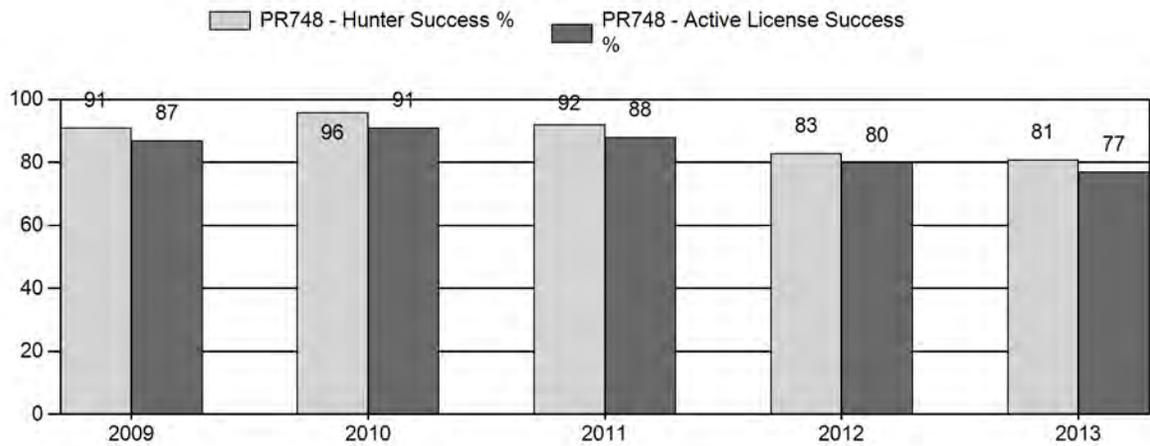
# Harvest



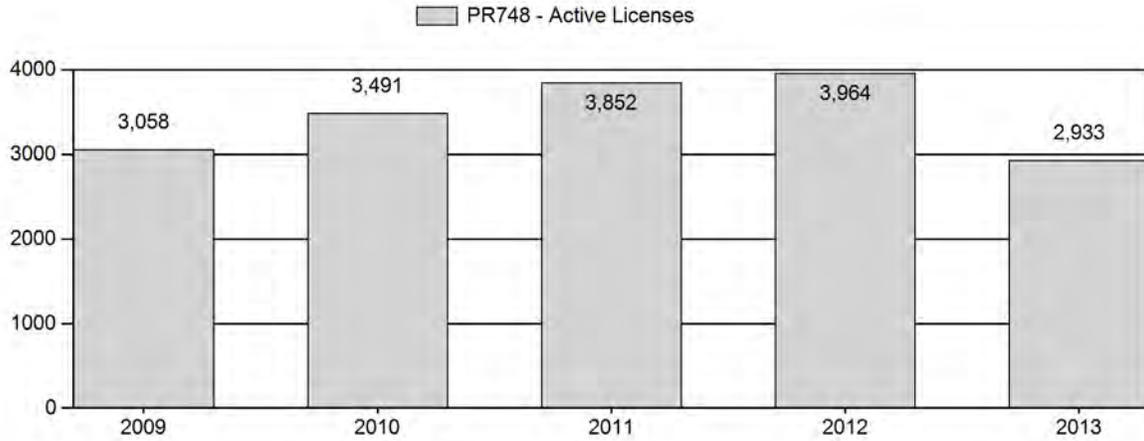
# Number of Hunters



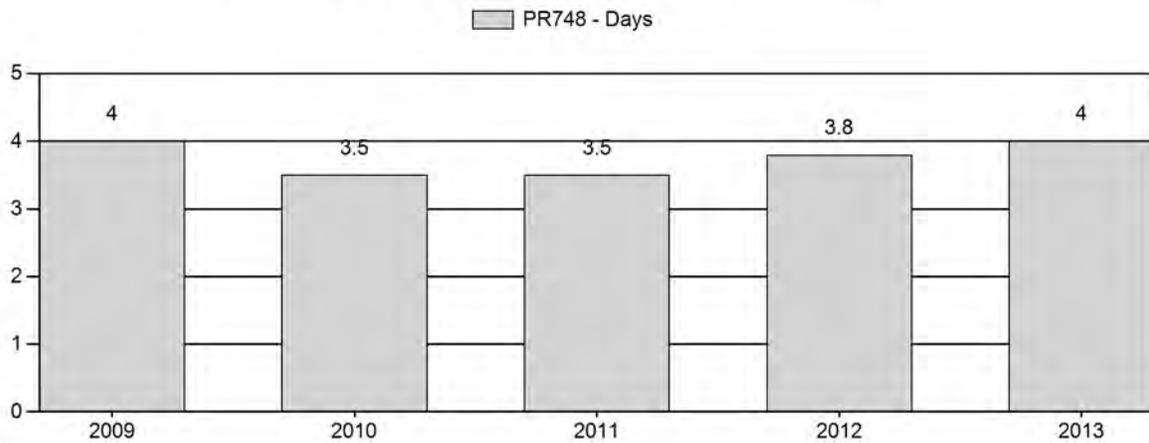
# Harvest Success



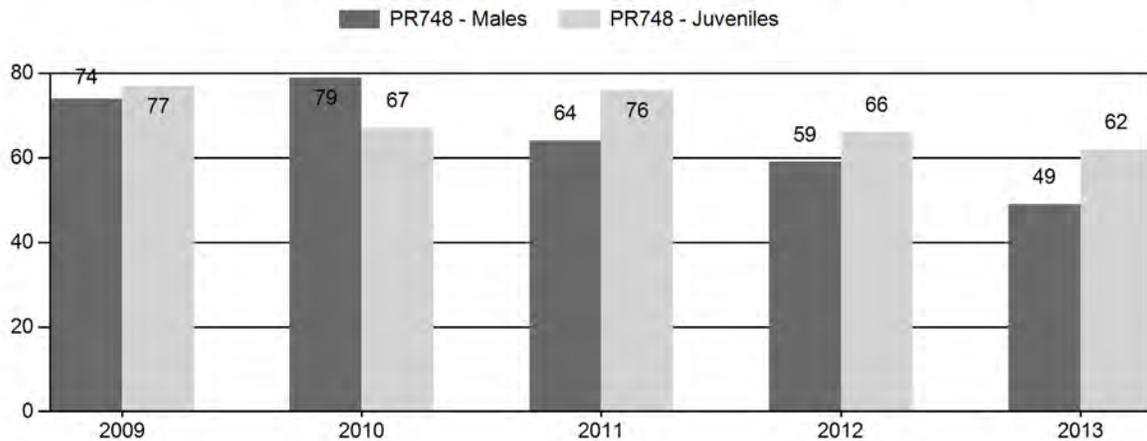
# Active Licenses



# Days Per Animal Harvested



# Preseason Animals per 100 Females



## 2008 - 2013 Preseason Classification Summary

### for Pronghorn Herd PR748 - NORTH CONVERSE

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2008	32,797	289	488	777	27%	1,248	44%	832	29%	2,857	3,496	23	39	62	± 4	67	± 5	41
2009	38,680	312	740	1,052	29%	1,430	40%	1,101	31%	3,583	3,287	22	52	74	± 5	77	± 5	44
2010	35,678	373	807	1,180	32%	1,490	41%	999	27%	3,669	3,160	25	54	79	± 5	67	± 4	37
2011	33,597	93	480	573	27%	895	42%	683	32%	2,151	3,105	10	54	64	± 5	76	± 6	47
2012	29,874	82	253	335	26%	567	44%	376	29%	1,278	3,040	14	45	59	± 7	66	± 7	42
2013	27,293	101	294	395	23%	803	47%	498	29%	1,696	2,059	13	37	49	± 5	62	± 6	42

**2014 HUNTING SEASONS  
NORTH CONVERSE PRONGHORN HERD (PR748)**

Hunt Area	Type	Dates of Seasons		Quota	Limitations
		Opens	Closes		
25	1	Oct. 1	Oct. 14	600	Limited quota licenses; any antelope
	6	Oct. 1	Oct. 14	200	Limited quota licenses; doe or fawn
26	1	Sep. 24	Oct. 14	900	Limited quota licenses; any antelope
	6	Sep. 24	Oct. 14	400	Limited quota licenses; doe or fawn
Archery		Aug. 15	Sep. 30		Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2013
25	1	-300
	6	-300
26	1	-300
	6	-400
<b>Herd Unit Total</b>	<b>1</b>	<b>-600</b>
	<b>6</b>	<b>-700</b>

**Management Evaluation**

**Current Postseason Population Management Objective:** 28,000

**Management Strategy:** Recreational

**2013 Postseason Population Estimate:** ~28,000

**2014 Proposed Postseason Population Estimate:** ~24,900

**Herd Unit Issues**

The North Converse Pronghorn Herd Unit has a post-season population objective of 28,000 pronghorn. This herd is managed under the recreational management strategy, with a goal of maintaining preseason buck ratios between 30-59 bucks per 100 does. The objective and management strategy were last revised in 1989, and are scheduled for revision in 2015.

Public hunting access within the herd unit is poor, with only small tracts of accessible public land interspersed within predominantly private lands. Two Walk-In Areas provide some additional hunting opportunity, although they are relatively small in size. Primary land uses in this herd unit include extensive oil and gas production, large-scale industrial wind generation, In-

Situ uranium production, and traditional cattle and sheep grazing. In recent years, expansion of oil shale development has dramatically escalated anthropogenic disturbance throughout this herd unit. The cumulative impacts on pronghorn from the increased natural resource development in this area are unknown but potentially significant.

### **Weather**

Weather conditions throughout 2012 and into 2013 were extremely dry and warmer than normal. The winter of 2012-2013 was mild, although the 2013-14 winter has been moderate to date with substantial precipitation and multiple sub-zero cold snaps. However, warm conditions often occurred in between the severe cold snaps which served to melt out lowlands and expose forage for wintering pronghorn. An extremely large snowstorm occurred in early October of 2013 and produced two to three feet of snow in most areas. This storm (Winter Storm "Atlas") did not likely impact pronghorn survival as it melted rapidly. However, it may have significantly impeded harvest success in some portions of this herd unit as the storm coincided with the first week of the hunting season in Area 25. In general, winter survival was thought to be normal over the last bio-year. However, the extraordinary drought of 2012 resulted in pregnant females entering the 2012-2013 winter in poor condition, which was perhaps the most significant driver behind the relatively poor fawn production realized in 2013. Fortunately, growing season moisture was markedly improved in 2013, which should benefit pronghorn, especially pregnant females, through the 2013-2014 winter.

### **Habitat**

Although there are no habitat transects in this herd unit, habitat conditions were exceptionally poor through 2012 due to the extreme drought. This was the driest year on record in most of Wyoming. Fortunately, growing season and summer/fall moisture was improved in 2013 which allowed these rangelands to begin recovery. Given the reduced number of pronghorn currently within this herd unit, which will result in reduced herbivory, habitat conditions should begin to improve. However, several consecutive years of improved precipitation will be needed to more completely rejuvenate habitats and provide better conditions for the long-term productivity of this pronghorn herd.

### **Field Data**

It has been increasingly difficult to meet classification sample sizes in this herd unit as it is no longer a budget priority for aerial surveys. Total number of animals classified has markedly decreased since aerial surveys were eliminated in 2011. In 2013, the adequate sample size was 2,100 animals, yet only 1,696 pronghorn were classified with intensive ground coverage.

Overall, fawn production/survival has remained fairly consistent in this herd unit, although the 2013 ratio of 62 was well below the 5-year average of 71. It should be noted that pre-season fawn ratios are typically higher in this herd compared to all other adjacent herd units. This is thought to be attributed to intensive predator control efforts that are sustained throughout much of this herd unit due to widespread domestic sheep production. However, despite relatively higher pre-season fawn ratios being observed in this herd unit, overall population trend has declined in this herd to nearly the same extent as adjacent herds. This suggests that while over-summer

fawn survival seems to be elevated in this herd, over-winter fawn survival is likely poorer compared to surrounding herds.

Preseason buck ratios declined considerably in 2013 (49 per 100 does), although they remain in line with management strategy criteria. The 2013 ratio was 38% lower than the previous 5-year average of 68. However, in most years, preseason buck ratios have been well above the management strategy maximum, which is a function of limited access due to the preponderance of private land and widespread outfitting. The 2013 buck ratio is the lowest on record for this herd since 1991. The noticeable decline in buck ratios further indicate this population has declined significantly in recent years.

## **Harvest**

Overall harvest has declined precipitously in this herd unit as license issuance has decreased in lieu of population decline. The 2013 total harvest of 2,268 was the lowest total pronghorn harvest obtained in this herd unit since 2006. License success in 2013 (77%) also declined significantly compared to the previous 5-year average of 88%. This is the lowest license success this herd has experienced since 1995. In 2013, all license types were sold by the close of the season despite 2,126 (out of 3,400 issued) being available for leftover sales after the drawing. In addition, the days required to harvest an animal has been steadily climbing over the last few years. In 2013, hunters experienced an increased number of days per animal (4.0), which was somewhat higher than the preceding 5 year average of 3.6 days/animal.

In 2013, 79% of hunters reported being either satisfied or very satisfied with their hunt, indicating a remarkably high level of satisfaction given the lack of public access and population decline. It should be noted that most hunters who speak to Game and Fish personnel are advised to secure access on private land before purchasing a license in areas that have limited public access.

## **Population**

The 2013 post-season population estimate is approximately 28,000, which is at objective. This herd has the potential for rapid growth as has been seen in years past. High fawn productivity coupled with limited access has allowed this herd to exceed the objective very readily. However, this population dropped to objective in the last year and is predicted to continue to decline. As such, the reduction in licenses was warranted for 2014 to manage this herd near objective. This herd began to decline following elevated mortality during the relatively severe 2010-2011 winter. Subsequent poor fawn recruitment has further suppressed this herd. The last line transect survey was conducted in this herd unit in May of 2013, which resulted in an estimated end-of-year population of 27,200 pronghorn (Appendix A).

The “Time Specific Juvenile – Constant Adult” (TSJ-CA) spreadsheet model was chosen for the post-season population estimate of this herd. All three models had very similar relative AIC values. The TSJ-CA model most accurately represented population trend based on field personnel and landowner perceptions. This model is considered to be of fair quality as it tracks through a recent Line Transect end-of-year estimate for bio-year 2012 and tracks well with observed preseason buck ratios.

## **Management Strategy**

The traditional season in this herd unit has ran from October 1<sup>st</sup> to October 14<sup>th</sup> in Hunt Area 25 and from September 24<sup>th</sup> to October 14<sup>th</sup> in Hunt Area 26. These season dates have typically been adequate to meet landowner desires while accommodating a reasonable harvest. For 2014, both Type 1 and Type 6 license issuance was decreased by 600 and 700, respectively. These reductions were warranted to decrease harvest pressure on both males and females given this population is predicted to decline below objective over the next year. However, given the current size of this population, managers felt pronghorn numbers were sufficiently high to warrant some level of continued doe/fawn harvest. If we attain the projected harvest of ~1,785 individuals and realize normal fawn recruitment, this pronghorn population is projected to decrease to about 24,800 pronghorn, which is 11% below objective.

<b>INPUT</b>	
Species:	Pronghorn
Biologist:	Erika Peckham
Herd Unit & No.:	North Converse (PR748)
Model date:	02/24/14

 Clear form

MODELS SUMMARY			Notes
	Relative AICc	Fit	
CJ,CA	141	132	<input type="checkbox"/> CJ,CA Model <input type="checkbox"/> SCJ,SCA Mod <input checked="" type="checkbox"/> TSJ,CA Model
SCJ,SCA	146	132	
TSJ,CA	150	50	

### MODELS SUMMARY

### Population Estimates from Top Model

Year	Predicted Prehunt Population (year /)		Total	Predicted Posthunt Population (year /)		Total	Predicted adult End-of-bio-year Pop (year /)		Total Adults	LT Population Estimate Field Est	Trend Count	Objective
	Juveniles	Females		Juveniles	Females		Total Males	Females				
1993	6798	13308	28814	6708	12106	25811	8482	12779	21261		28000	
1994	11511	12523	32347	11317	11339	28863	7142	11540	18682		28000	
1995	9264	11309	27573	9082	10395	24679	8075	12517	20592		28000	
1996	12764	12266	32944	12702	11825	30279	9748	15079	24827		28000	
1997	10809	14777	35139	10757	14311	32821	10946	16598	27545		28000	
1998	15685	16266	42679	15654	15953	40450	10073	16225	26299		28000	
1999	13214	15901	38987	13170	15618	38844	8929	15446	24375		28000	
2000	13155	15137	37043	13117	14697	34815	8068	14648	22716	2901	28000	
2001	10426	14355	32687	10384	14050	30927	7633	14059	21693	18507	28000	
2002	11818	13778	33077	11798	13390	31310	7160	13322	20482	3491	28000	
2003	10431	13056	30503	10359	12688	28773	6538	12440	18978		28000	
2004	10609	12191	29207	10542	11824	27448	8748	14475	23224	4602	28000	
2005	10689	14186	33448	10595	13575	31319	7722	13162	20884	30769	28000	
2006	10878	12899	31344	10836	12321	29368	9787	14960	24747		28000	
2007	11900	14661	36152	11807	13882	33646	10381	15418	25799		28000	
2008	10073	15110	35356	8393	14328	32685	11109	16182	27291		28000	
2009	12210	15858	38955	9029	14840	36040	12633	17573	30205		28000	
2010	11546	17221	41148	10333	15914	37645	10360	15091	25451		28000	
2011	11286	14790	36229	11171	13565	32510	8671	13036	21707		28000	
2012	8472	12775	29745	8304	11389	26259	9267	13558	22825	27242	28000	
2013	8240	13287	30608	8125	12478	28114	7709	12106	19816		28000	
2014	7415	11864	26834	7333	11386	24871					28000	
2015											28000	
2016											28000	
2017											28000	
2018											28000	
2019											28000	
2020											28000	
2021											28000	
2022											28000	
2023											28000	
2024											28000	
2025											28000	

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.90		0.80	
1994	0.44		0.80	
1995	0.90		0.80	
1996	0.84		0.80	
1997	0.90		0.80	
1998	0.40		0.80	
1999	0.40		0.80	
2000	0.40		0.80	
2001	0.49		0.80	
2002	0.40		0.80	
2003	0.40		0.80	
2004	0.90		0.80	
2005	0.40		0.80	
2006	0.90		0.80	
2007	0.69		0.80	
2008	0.90		0.80	
2009	0.90		0.80	
2010	0.40		0.80	
2011	0.40		0.80	
2012	0.90		0.80	
2013	0.40		0.80	
2014	0.62		0.80	
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

**Parameters:**

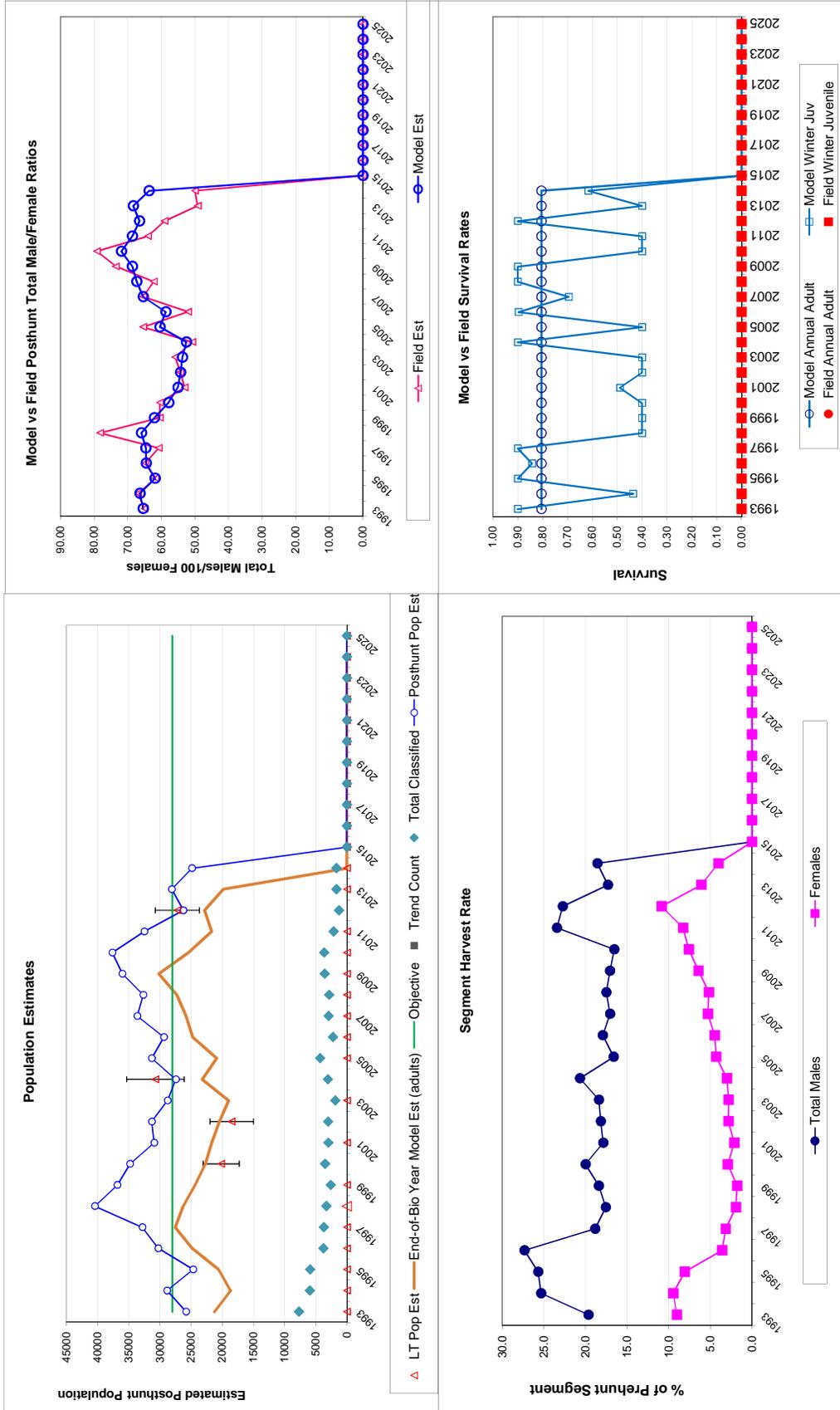
Adult Survival =	Optim cells
Initial Total Male Pop/10,000 =	0.805
Initial Female Pop/10,000 =	0.871
	1.331

**MODEL ASSUMPTIONS**

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

Year	Classification Counts										Harvest		
	Juvenile/Female Ratio					Total Male/Female Ratio					Total Harvest	Total Males	Females
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles				
1993		51.08	1.47	65.43	65.07	1.74	1555	1093	82	2730	19.6	9.0	
1994		91.92	2.77	66.38	66.93	2.20	1914	1077	176	3167	25.3	9.5	
1995		81.92	2.48	61.89	61.74	2.03	1634	831	166	2631	25.7	8.1	
1996		104.05	3.89	64.52	64.79	2.76	1966	401	56	2423	27.3	3.6	
1997		73.14	2.82	64.64	60.82	2.48	1636	424	47	2107	18.8	3.2	
1998		96.43	3.97	65.95	78.24	3.40	1713	285	28	2026	17.6	1.9	
1999		83.10	3.77	62.08	60.50	3.01	1651	257	40	1948	18.4	1.8	
2000		86.91	3.38	57.81	60.45	2.61	1590	400	35	2025	20.0	2.9	
2001		72.62	3.07	55.07	53.09	2.48	1284	278	38	1600	17.9	2.1	
2002		85.77	3.56	54.29	54.37	2.58	1235	353	18	1606	18.2	2.8	
2003		79.90	4.25	53.74	55.90	3.31	1173	334	66	1573	18.4	2.8	
2004		87.02	3.56	52.56	50.82	2.44	1204	334	61	1599	20.7	3.0	
2005		75.35	2.71	60.44	65.42	2.46	1295	555	85	1935	16.6	4.3	
2006		84.33	4.04	58.67	52.05	2.88	1233	525	38	1796	17.9	4.5	
2007		81.17	3.50	65.42	65.42	3.00	1486	708	84	2278	17.0	5.3	
2008		66.67	2.98	67.33	62.26	2.85	1618	711	99	2428	17.5	5.2	
2009		76.99	3.09	68.65	73.57	2.99	1689	926	35	2650	17.1	6.4	
2010		67.05	2.74	71.89	79.19	3.09	1861	1188	135	3184	16.5	7.6	
2011		76.31	3.88	68.65	64.02	3.43	2163	1113	105	3381	23.4	8.3	
2012		66.31	4.41	66.52	59.08	4.07	1756	1260	153	3169	22.7	10.8	
2013		62.02	3.54	68.35	49.19	3.02	1428	735	105	2268	17.3	6.1	
2014		62.50	3.56	63.68	50.00	3.06			435	1785	18.6	4.0	
2015													
2016													
2017													
2018													
2019													
2020													
2021													
2022													
2023													
2024													
2025													

FIGURES



Comments:

**Appendix A:  
North Converse Pronghorn Line Transect Survey  
Bio-Year 2012 - Results and Histogram**

Effort: 906.9438  
 # samples: 57  
 Width: 206.0000  
 Left: 0.0000000  
 # observations: 480

Model 1

Hazard Rate key,  $k(y) = 1 - \text{Exp}(-(y/A(1))^{A(2)})$

Parameter	Point Estimate	Standard Error	Percent Coef. of Variation	95% Confidence Interval	
DS	7.2787	0.93255	12.81	5.6593	9.3615
E(S)	1.4730	0.35594E-01	2.42	1.4047	1.5446
D	10.721	1.3978	13.04	8.3001	13.848
N	27242	3551.8	13.04	21091	35189

Measurement Units

-----  
 Density: Numbers/Sq. miles  
 ESW: meters

Component Percentages of Var(D)

-----  
 Detection probability: 62.6  
 Encounter rate: 33.9  
 Cluster size: 3.4

Estimation Summary: Encounter Rates

	Estimate	% CV	DF	95% Confidence Interval	
n	480.00				
k	57.000				
L	906.94				
n/L	0.52925	7.59	29.00	0.45321	0.61805
Left	0.0000				
Width	206.00				

Estimation Summary: Detection Probability

Hazard/Polynomial

	Estimate	% CV	DF	95% Confidence Interval	
m	2.0000				
LnL	-768.50				
AIC	1541.0				
AICc	1541.0				
BIC	1549.4				
Chi-p	0.70880E-01				
f(0)	0.85456E-02	10.32	478.00	0.69811E-02	0.10461E-01
p	0.56805	10.32	478.00	0.46406	0.69536
ESW	117.02	10.32	478.00	95.596	143.24

Estimation Summary – Expected Cluster Size

Estimate

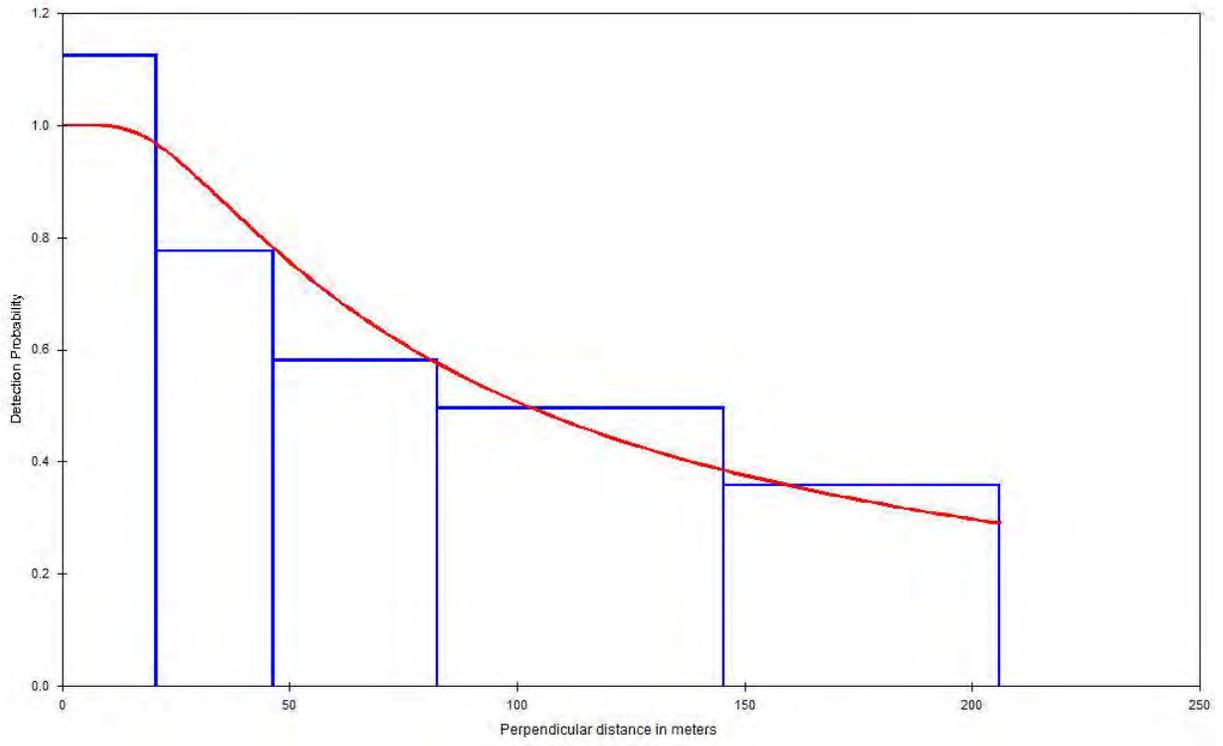
Average cluster size	%CV	df	95% Confidence Interval	
1.5708	3.73	479.00	1.4600	1.6901

Hazard/Cosine

	Estimate	% CV	DF	95% Confidence Interval	
r	-0.34019E-01				
r-p	0.22856				
E(S)	1.4730	2.42	478.00	1.4047	1.5446

Estimation Summary – Density & Abundance

	Estimate	% CV	DF	95% Confidence Interval	
D	7.2787	12.81	194.63	5.6593	9.3615
DS	10.721	13.04	208.62	8.3001	13.848
N	27242	13.04	208.62	21091	35189



Antelope - North Converse  
Hunt Areas 25,26  
Casper Region  
Revised 7/06

