

2014 - JCR Evaluation Form

SPECIES: Pronghorn

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

HERD: PR745 - RATTLESNAKE

HUNT AREAS: 70-72

PREPARED BY: HEATHER O'BRIEN

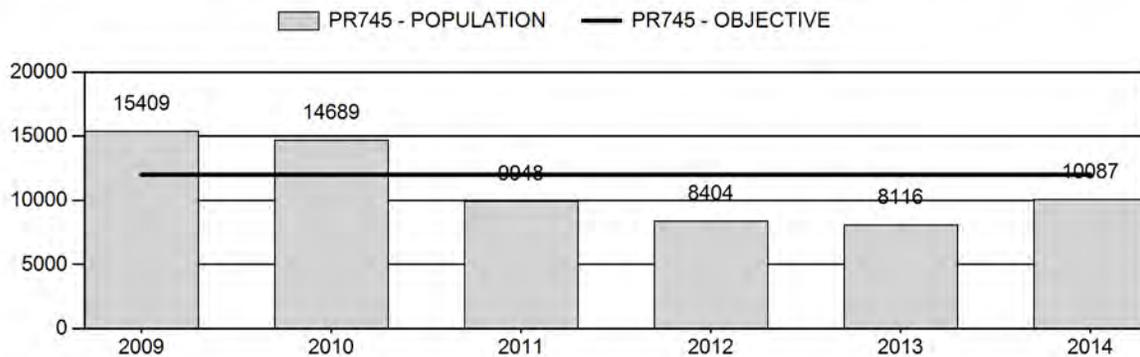
	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Population:	11,313	10,087	11,017
Harvest:	2,227	588	410
Hunters:	2,335	647	450
Hunter Success:	95%	91%	91%
Active Licenses:	2,546	757	475
Active License Success:	87%	78%	86 %
Recreation Days:	7,516	2,356	1,700
Days Per Animal:	3.4	4.0	4.1
Males per 100 Females	61	48	
Juveniles per 100 Females	53	66	

Population Objective (± 20%) : 12000 (9600 - 14400)
 Management Strategy: Special
 Percent population is above (+) or below (-) objective: -15.9%
 Number of years population has been + or - objective in recent trend: 4
 Model Date: 02/02/2015

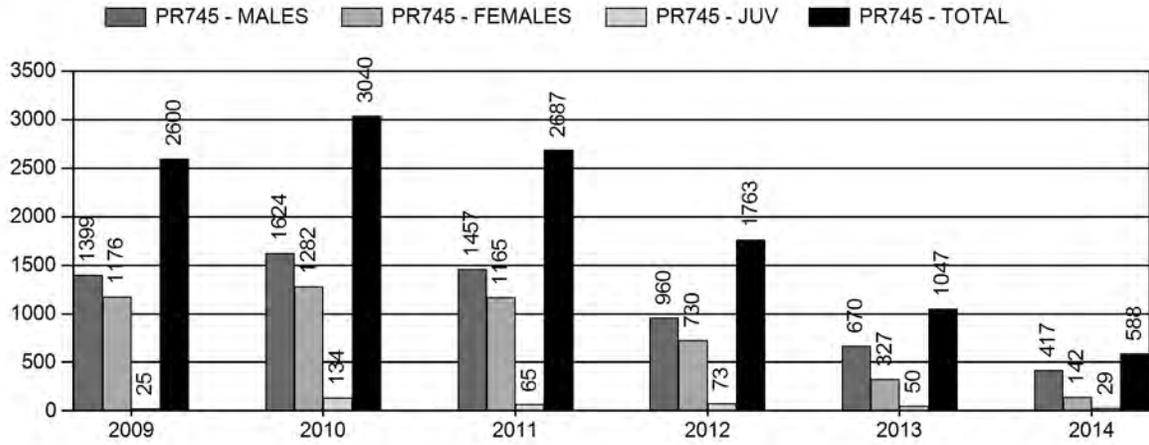
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	2.73%	1.10%
Males ≥ 1 year old:	25.6%	13.0%
Juveniles (< 1 year old):	0.85%	0.30%
Total:	6.68%	3.72%
Proposed change in post-season population:	+13.2%	+9.2%

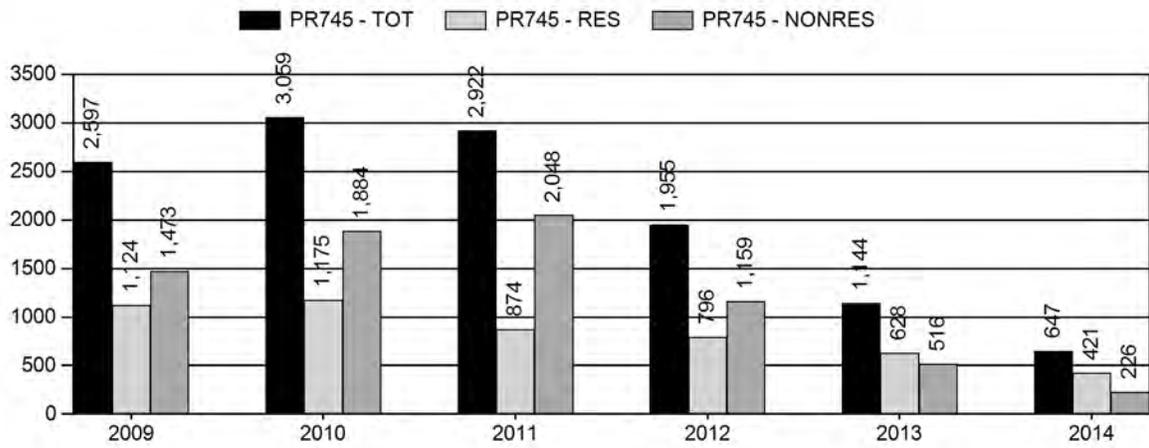
Population Size - Postseason



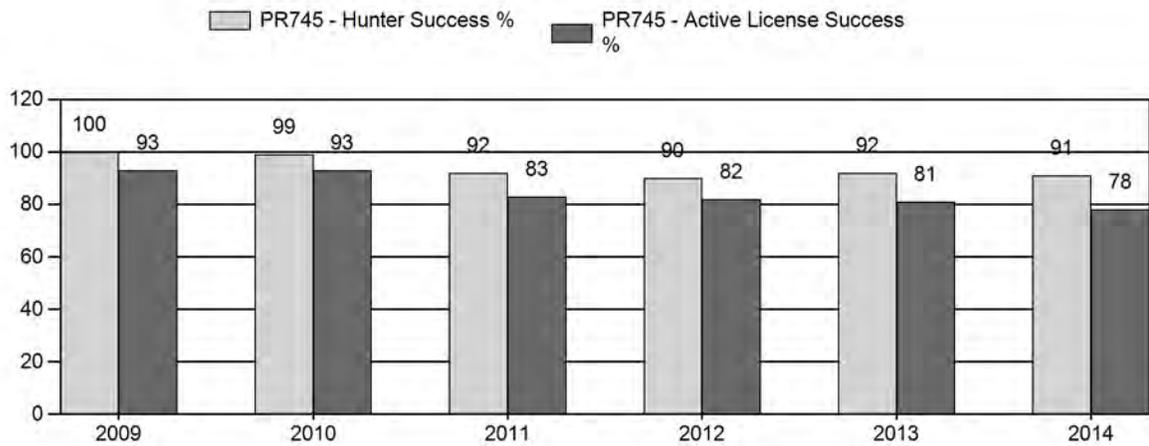
Harvest



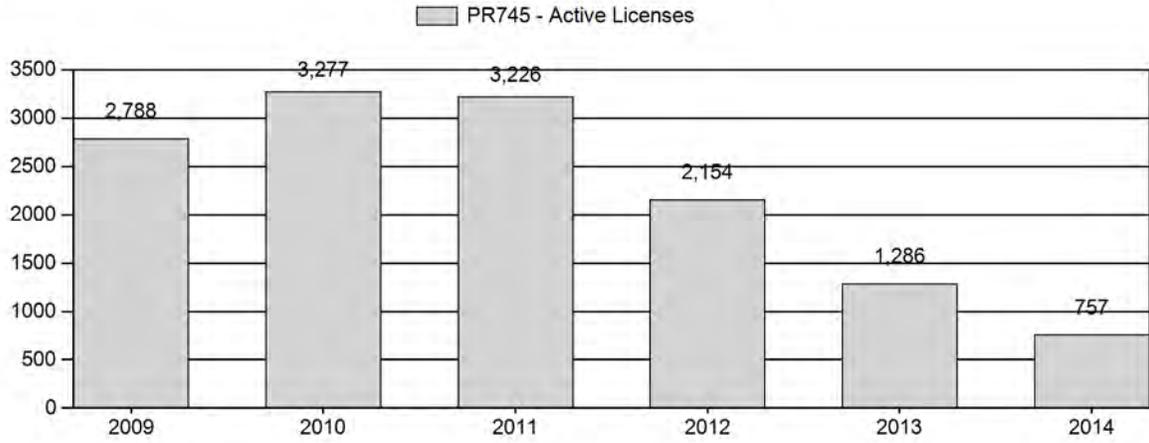
Number of Hunters



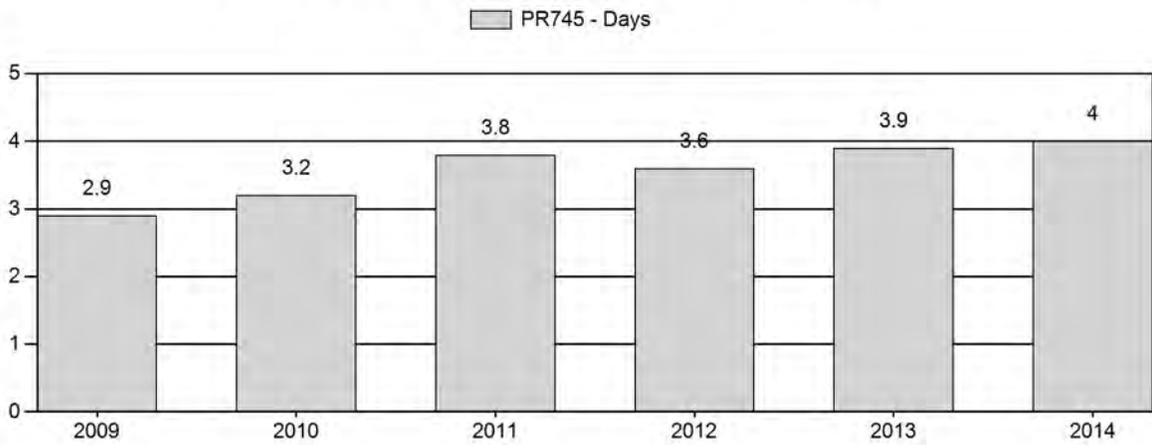
Harvest Success



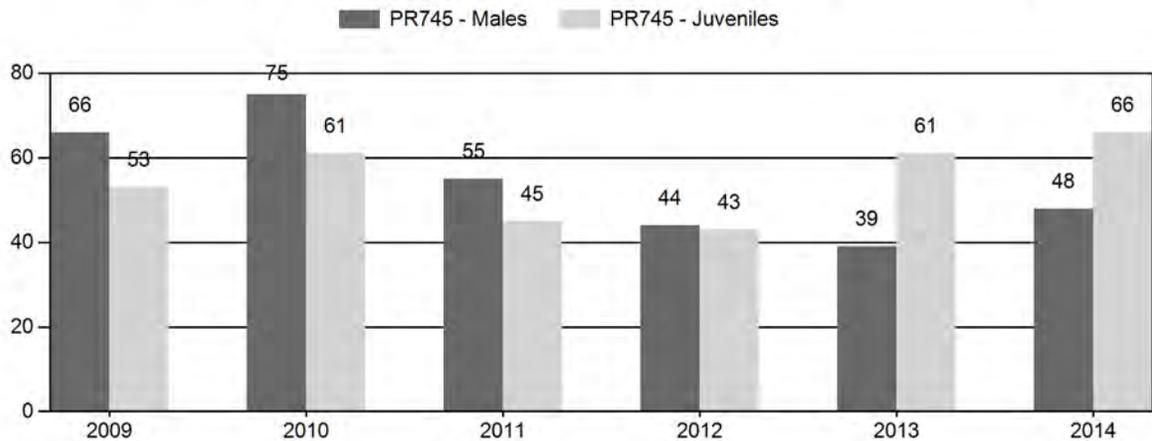
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 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	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
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	10,919	111	191	302	22%	634	47%	416	31%	1,352	1,734	18	30	48	± 5	66	± 6	44

**2015 HUNTING SEASONS
RATTLESNAKE PRONGHORN HERD (PR745)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
70	1	Sep. 15	Oct. 31	50	Limited quota	Any antelope
	6	Sep. 15	Oct. 31	25	Limited quota	Doe or fawn antelope
71	1	Sep. 15	Oct. 31	75	Limited quota	Any antelope
	6	Sep. 15	Oct. 31	25	Limited quota	Doe or fawn antelope
72	1	Sep. 15	Oct. 31	250	Limited quota	Any antelope
	6	Sep. 15	Oct. 31	25	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 2014
70	1	-50
	6	-75
71	1	-25
	6	-25
72	1	-150
	6	-75
Total	1	-225
	6	-175

Management Evaluation

Current Management Objective: 12,000

Management Strategy: Special

2014 Postseason Population Estimate: ~10,100

2015 Proposed Postseason Population Estimate: ~11,000

2014 Hunter Satisfaction: 68% Satisfied, 18% Neutral, 14% Dissatisfied

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 was conducted in May 2014 to be used in conjunction with the formal objective review.

Herd Unit Issues

Hunting access within the herd unit is moderate, having 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. However, there were no reported or confirmed cases of disease outbreak in pronghorn within the Rattlesnake Herd during 2014.

Weather

The winter of 2010-2011 was severe throughout the herd unit, resulting in very high 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 were below average for the winter of 2011-2012 which likely had a negative impact 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. The spring of 2013 was cool with significant precipitation, and average rainfall over the summer as well. Still, habitat conditions appeared to be poor for much of the growing season. Heavy precipitation during the fall of 2013 caused a beneficial late green-up, but also made travel very difficult for hunters. The 2013-2014 winter brought temperature and precipitation conditions near the recent 30-year average, and the growing season of 2014 brought a much-needed break in drought conditions. Grass and forb growth was excellent, making 2014 the best growing season the region had seen in years. The spring and summer of 2014 undeniably produced improved range conditions that benefitted pronghorn. For detailed weather data see <http://www.ncdc.noaa.gov/gac/time-series/us>.

Habitat

This herd unit has no established habitat transects to measure production and/or utilization on shrub species that are preferred browse for pronghorn. Anecdotal observations and discussions with landowners in the region indicate that summer and winter forage availability for pronghorn was very good in 2014. Herbaceous forage species were observed to be in very good condition in 2014 compared to previous years, and pronghorn appeared to be more widely distributed across suitable habitat.

Field Data

Fawn production was 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 production was 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 rapidly reduced this herd below objective. Harsh winter conditions in 2010-11 combined with severe drought have since dropped this herd unit below management objective, and license issuance has become much more conservative. Improved moisture and favorable weather conditions appeared to have helped fawn production and survival in the past two years, as the fawn ratio improved from 43:100 does in 2012 to 61:100 and 66:100 in 2013 and 2014, respectively. Still, the fawn ratio for the Rattlesnake Herd did not improve as much as in adjacent herds, nor did it achieve pre-2005 era fawn ratios. This suggests the carrying capacity for the herd unit is currently suppressed. Native habitats may still be recovering from the very high pronghorn numbers of 2004 to 2011 and prolonged drought conditions.

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. Buck ratios improved to 48:100 does in 2014 as a result of reduced harvest pressure and improved overwinter survival. 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. This population with thus be managed to improve and maintain a buck ratio within special management parameters, while increasing the overall population toward objective.

The 2014 post-season population estimate was approximately 10,000 and trending upward from 2013 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, 2003, 2007, and 2014 to provide end-of-year population estimates. The 2007 survey was deemed inaccurate and therefore was discarded, but the 2014 survey yielded good results with a reasonable standard error which aligns well with the population model (see Appendix A). The

current population model is considered to be of fair quality, as personnel believe there is significant interchange with the adjacent Beaver Rim Herd Unit. Managers evaluated a merged dataset of the Rattlesnake and Beaver Rim Herds in 2015. However, the combined model did not show adequate enough improvements in predicting population size or trend to merit combining the two herds.

Harvest Data

License success in this herd unit is typically in the 90th percentile. Success declined the last four years to near the 80th percentile while hunter days increased, indicating pronghorn were more difficult for hunters to find and harvest. Despite drastic reductions in license numbers in 2012-2014, 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 in 2013 can be attributed to poor access due to muddy and/or snowy conditions, hunting conditions in 2014 were ideal for most of the season, yet license success remained poor at 77. Average hunter days on Type 1 licenses increased to 4.4, and was the highest on record. In addition, reported hunter satisfaction for the Rattlesnake Herd Unit was the lowest in the state in 2014. Thus, managers will recommend further license reductions in 2015 with the goal of increasing buck ratios, hunter satisfaction, harvest success, 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 models track very well with the three early line transect estimates, but all three models align very well with the 2013 line transect estimate. 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. 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 15th through October 31st, and through November 30th for Area 70 Type 6 licenses. We recommend the same season dates for all but Area 70 in 2015, with a reduction of licenses in all hunt areas to promote population growth and improved buck ratios. Area 70 Type 6 licenses will be valid through October 31st to coincide with all other season dates in the herd unit, since license numbers are low and November seasons are not currently warranted. The 2015 season includes a total of 375 Type 1 and 75 Type 6 licenses. Goals for 2015 are to increase pronghorn numbers towards objective, improve buck ratios consistent with special management strategy, and increase hunter success.

If the projected harvest of 410 pronghorn is achieved with fawn production/survival similar to the last few years, this herd will increase significantly in number. The predicted 2015 post-season population size for the Rattlesnake Pronghorn Herd is approximately 10,900 animals, which is 9% below objective.

INPUT
 Species: Pronghorn
 Biologist: Heather O'Brien
 Herd Unit & No.: Rattlesnake PR745
 Model date: 02/02/15

MODELS SUMMARY			Notes
	Relative AICc	Fit	
CJ,CA	Constant Juvenile & Adult Survival	141	
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	136	
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival	71	

Clear form

Check best model to create report

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

Year	Predicted Prehunt Population (year <i>t</i>)		Total	Predicted Posthunt Population (year <i>t</i>)		Total	Predicted adult End-of-bio-year Pop (year <i>t</i>)		LT Population Estimate Field Est	Trend Count	Objective
	Juveniles	Total Males		Females	Juveniles		Total Males	Females			
1993	2302	2200	4128	2167	1361	3336	6864	2078	3829	5907	12000
1994	2853	2036	3752	2823	1541	3554	7918	1891	3711	5602	12000
1995	2471	1853	3637	2454	1346	3481	7280	2246	4181	6428	12000
1996	3620	2201	4098	3607	1789	3915	9312	3155	5066	8220	12000
1997	3993	3092	4964	3963	2553	4768	11283	3893	5897	9790	12000
1998	4080	3815	5779	4044	2981	5478	12503	3336	5616	8952	12000
1999	3628	3269	5504	3575	2080	5114	10770	2898	5689	8588	12000
2000	3816	2840	5766	3771	1988	5308	11067	3370	6385	9755	12000
2001	4556	3303	6258	4534	2869	6166	13569	3396	6357	9753	12000
2002	4095	3328	6230	4081	2766	6072	12919	3197	6175	9372	12000
2003	4587	3133	6051	4553	2445	5789	12787	4156	7171	11327	12000
2004	6664	4073	7027	6641	3307	6630	16579	5036	8024	13059	12000
2005	6403	4935	7863	6357	4106	7504	17967	4799	7868	12868	12000
2006	5094	4703	7711	5028	3716	7176	15920	5267	8388	13654	12000
2007	4701	5161	8220	4557	3834	7476	15867	5293	8593	13886	12000
2008	4712	5187	8421	4662	3899	7434	15995	5409	8575	13984	12000
2009	4424	5301	8404	4396	3762	7110	15269	5133	8126	13259	12000
2010	4831	5030	7964	4684	3244	6554	14481	3535	6512	10047	12000
2011	2863	3464	6382	2790	1865	5065	9719	2569	5406	7975	12000
2012	2281	2518	5298	2201	1462	4495	8158	1951	4794	6746	12000
2013	2869	1912	4699	2814	1175	4339	8328	2348	5311	7659	12000
2014	3415	2301	5205	3384	1654	5049	10087	2707	6741	1207	12000
2015	3338	2653	5477	3327	2279	5411	11017		5589	8296	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

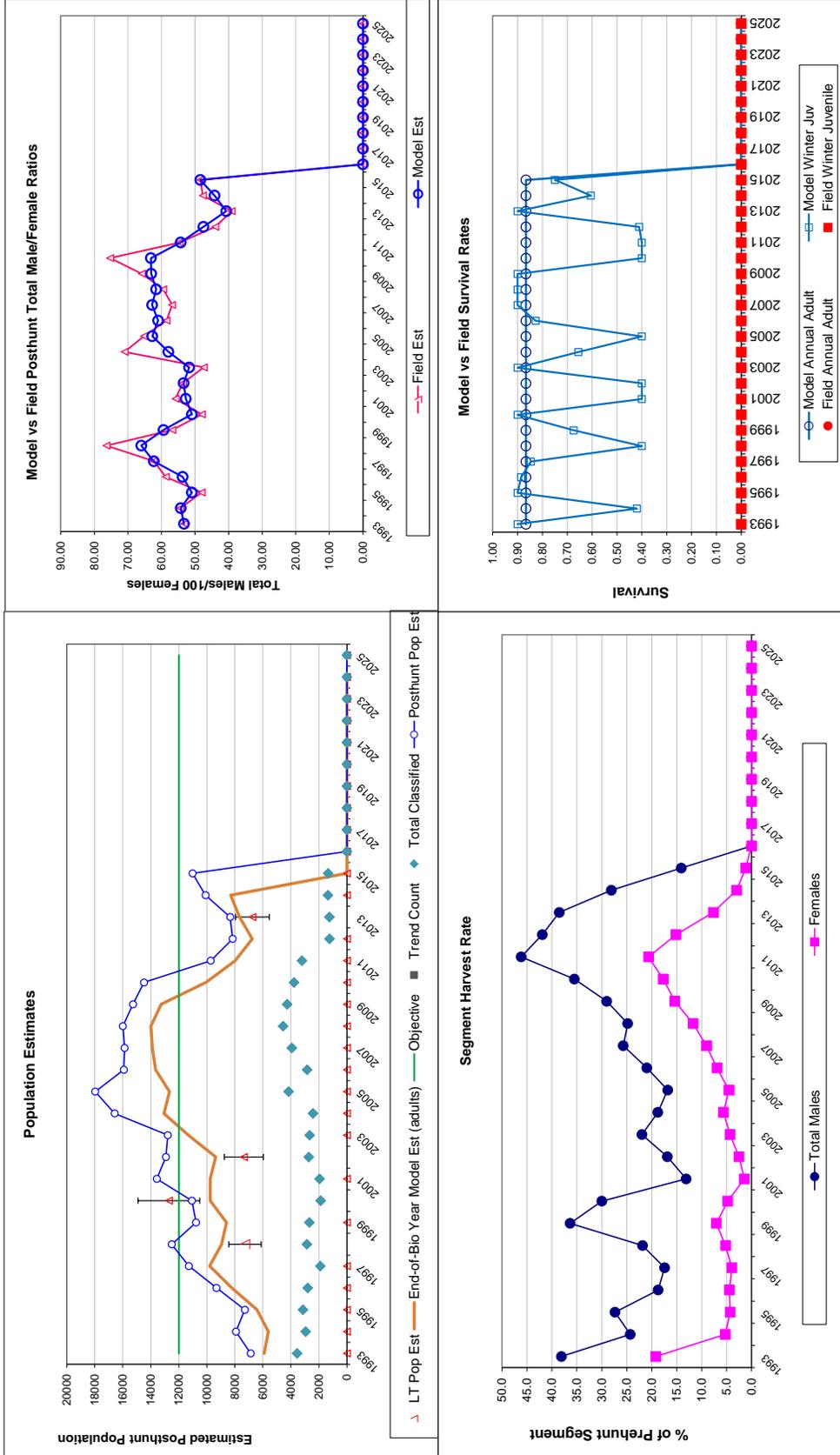
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est.	Field Est. SE	Model Est.	Field Est. SE
1993	0.90		0.87	
1994	0.42		0.87	
1995	0.90		0.87	
1996	0.89		0.87	
1997	0.85		0.87	
1998	0.40		0.87	
1999	0.67		0.87	
2000	0.90		0.87	
2001	0.40		0.87	
2002	0.40		0.87	
2003	0.90		0.87	
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	0.41		0.87	
2013	0.90		0.87	
2014	0.61		0.87	
2015	0.75		0.87	
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Adult Survival =		0.866
Initial Total Male Pop/10,000 =		0.220
Initial Female Pop/10,000 =		0.413

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			Segment Harvest Rate (% of Total Harvest)		
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles	Total Harvest	Total Males	Females
1993		55.76	2.26	53.29	53.18	2.19	762	720	122	1604				38.1	19.2
1994		76.02	3.24	54.26	54.39	2.57	450	180	27	657				24.3	5.3
1995		67.95	2.80	50.95	48.04	2.21	461	142	16	619				27.4	4.3
1996		88.33	3.84	53.72	58.71	2.87	375	166	11	562				18.7	4.5
1997		80.43	4.31	62.27	62.28	3.59	490	179	27	696				17.4	4.0
1998		70.59	3.23	66.01	76.38	3.41	758	274	32	1064				21.9	5.2
1999		65.92	3.02	59.40	56.77	2.72	1081	354	48	1483				36.4	7.1
2000		68.44	3.65	50.94	47.98	2.86	775	243	41	1059				30.0	4.8
2001		72.60	3.84	52.78	55.80	3.19	394	83	20	497				13.1	1.5
2002		65.73	2.96	53.42	53.63	2.58	511	144	12	667				16.9	2.5
2003		75.80	3.35	51.78	47.39	2.42	626	238	31	895				22.0	4.3
2004		94.84	4.51	57.96	70.99	3.65	696	361	21	1078				18.8	5.7
2005		81.44	2.96	62.76	65.18	2.53	754	326	42	1122				16.8	4.6
2006		66.06	2.95	61.00	58.47	2.71	898	486	60	1444				21.0	6.9
2007		57.19	2.21	62.79	56.86	2.20	1207	676	131	2014				25.7	9.0
2008		55.96	2.03	61.60	59.46	2.12	1171	897	46	2114				24.8	11.7
2009		52.64	2.03	63.08	65.81	2.37	1399	1176	25	2600				29.0	15.4
2010		60.66	2.47	63.16	75.30	2.87	1624	1282	134	3040				35.5	17.7
2011		44.87	2.01	54.28	54.64	2.29	1454	1197	67	2718				46.2	20.6
2012		43.05	3.05	47.52	43.96	3.09	960	730	73	1763				41.9	15.2
2013		61.06	3.97	40.70	39.10	2.95	670	327	50	1047				38.5	7.7
2014		65.62	4.14	44.20	47.63	3.33	615	180	15	759				28.1	3.0
2015		60.94	3.91	48.44	48.44	3.35			60	410				14.1	1.2
2016															
2017															
2018															
2019															
2020															
2021															
2022															
2023															
2024															
2025															

FIGURES



Comments:

**Appendix A:
Rattlesnake Pronghorn Line Transect Survey
Bio-Year 2013 - Results and Histogram**

Effort: 471.5700
 # samples: 42
 Width: 209.0000
 Left: 0.0000000
 # observations: 266

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	4.5805	0.80308	17.53	3.2496	6.4566
E(S)	1.5674	0.56614E-01	3.61	1.4598	1.6829
D	7.17	1.2852	17.90	5.0583	10.190
N	6741.0	1206.7	17.90	4750.0	9568.0

Measurement Units

 Density: Numbers/Sq. miles
 ESW: meters

Component Percentages of Var(D)

 Detection probability: 70.4
 Encounter rate: 25.5
 Cluster size: 4.1

Estimation Summary: Encounter Rates

	Estimate	% CV	DF	95% Confidence Interval	
n	266.00				
k	42.000				
L	471.57				
n/L	0.56407	9.04	21.00	0.46757	0.68050
Left	0.0000				
Width	209.00				

Estimation Summary: Detection Probability

Hazard/Polynomial

	Estimate	% CV	DF	95% Confidence Interval	
m	2.0000				
LnL	-427.21				
AIC	858.42				
AICc	858.46				
BIC	865.58				
Chi-p	0.46230				
f(0)	0.10092E-01	15.02	264.00	0.75202E-02	0.13542E-01
p	0.47412	15.02	264.00	0.35331	0.63625
ESW	99.092	15.02	264.00	73.842	132.98

Estimation Summary – Expected Cluster Size

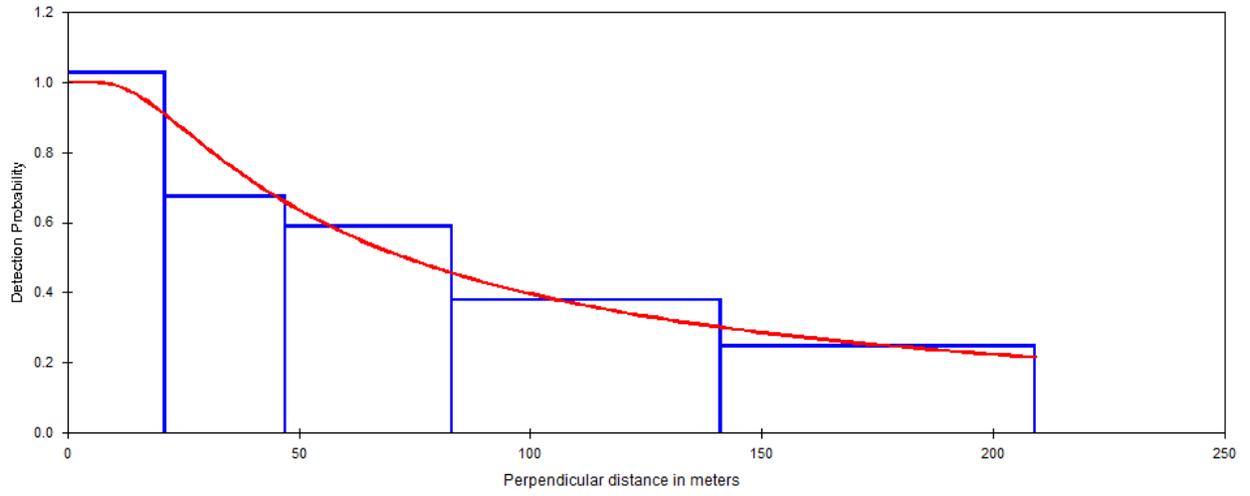
Estimate	%CV	df	95% Confidence Interval
Average cluster size			
1.7105	6.03	1.5191	1.9261

Hazard/Cosine

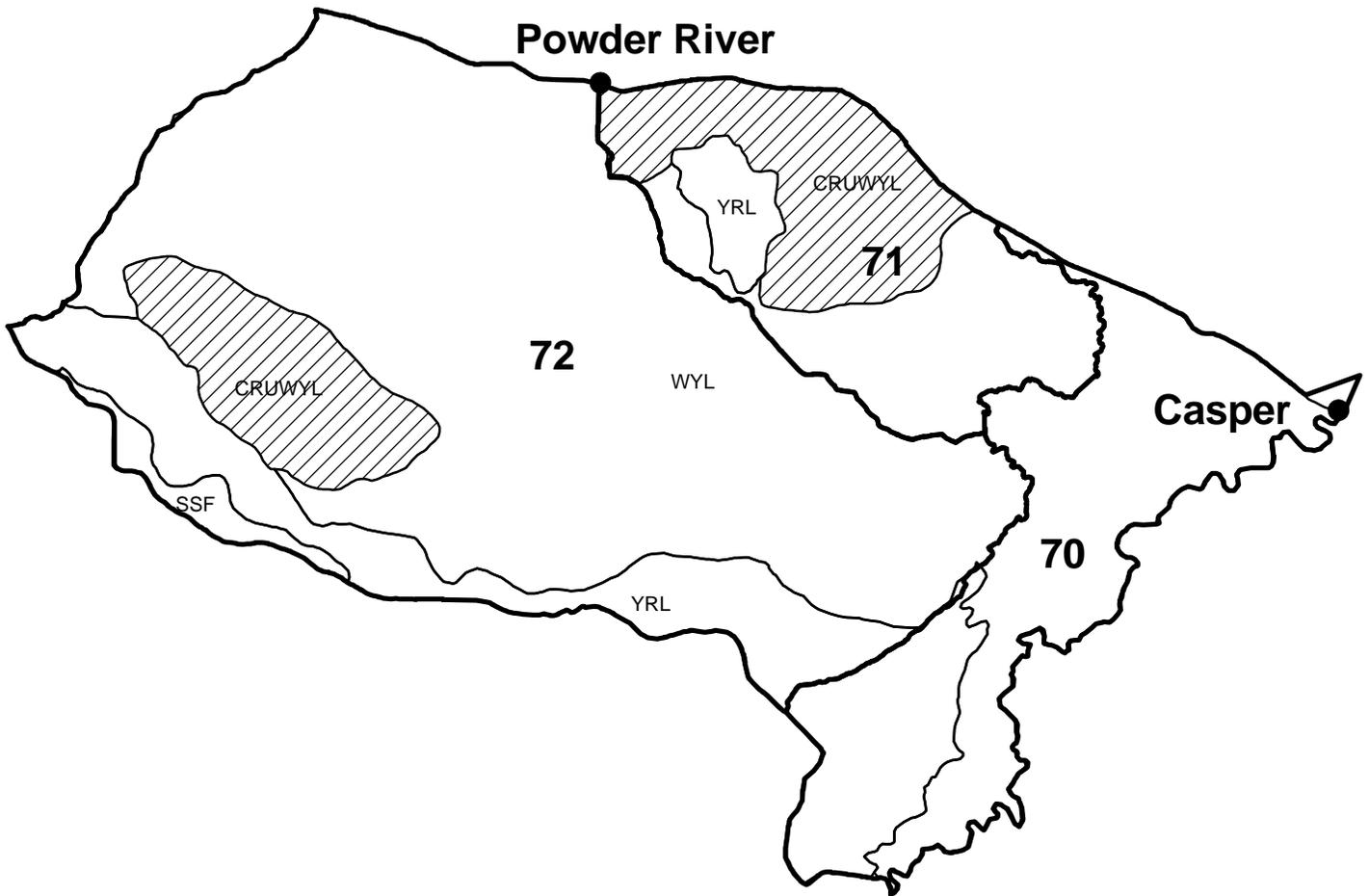
	Estimate	% CV	DF	95% Confidence Interval	
r	-0.43212E-01				
r-p	0.24141				
E(S)	1.5674	3.61	264.00	1.4598	1.6829

Estimation Summary – Density & Abundance

	Estimate	% CV	DF	95% Confidence Interval	
D	4.5805	17.53	184.88	3.2496	6.466
DS	7.1794	17.90	200.66	5.0583	10.190
N	6741.0	17.90	200.66	4750.0	9568.0



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



2014 - JCR Evaluation Form

SPECIES: Pronghorn

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

HERD: PR746 - NORTH NATRONA

HUNT AREAS: 73

PREPARED BY: HEATHER O'BRIEN

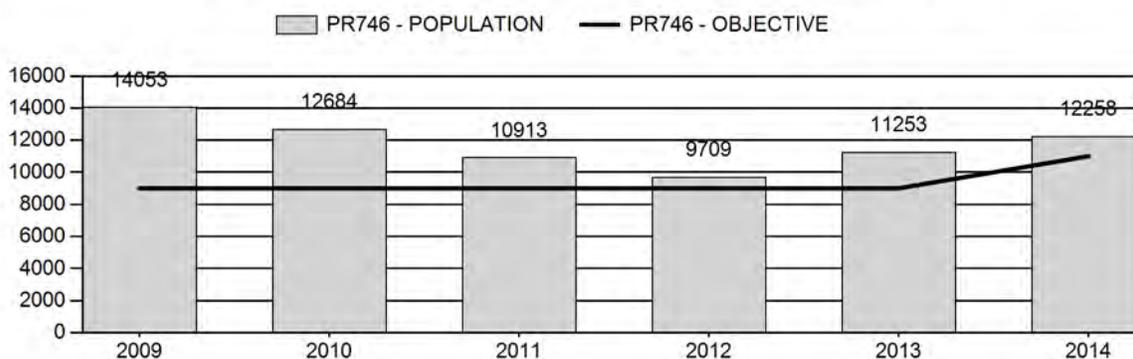
	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Population:	11,722	12,258	11,459
Harvest:	968	664	815
Hunters:	1,122	684	820
Hunter Success:	86%	97%	99 %
Active Licenses:	1,187	709	900
Active License Success:	82%	94%	91 %
Recreation Days:	3,728	1,798	2,200
Days Per Animal:	3.9	2.7	2.7
Males per 100 Females	55	45	
Juveniles per 100 Females	58	80	

Population Objective (± 20%) :	11000 (8800 - 13200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	11%
Number of years population has been + or - objective in recent trend:	2
Model Date:	02/18/2015

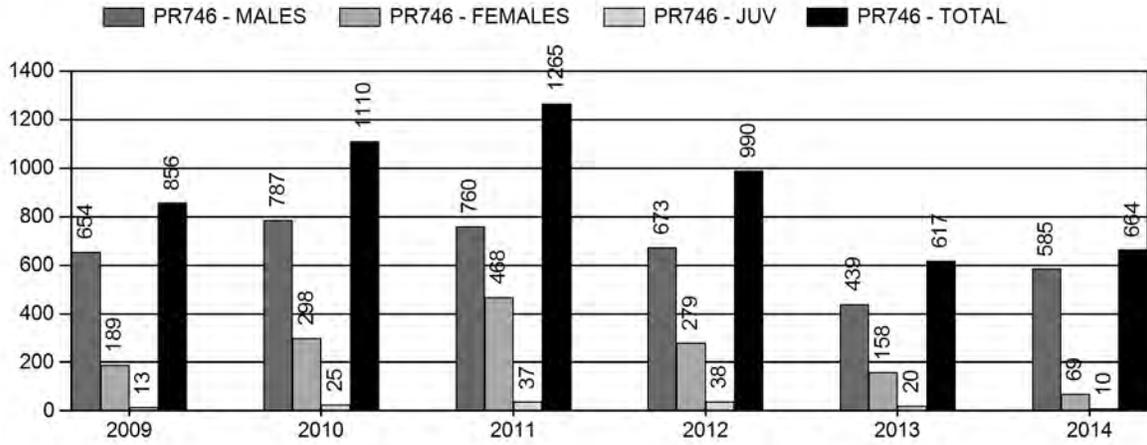
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	1.20%	3.87%
Males ≥ 1 year old:	22.3%	21.6%
Juveniles (< 1 year old):	0.22%	0.01%
Total:	.05%	.39%
Proposed change in post-season population:	8.21%	-6.52%

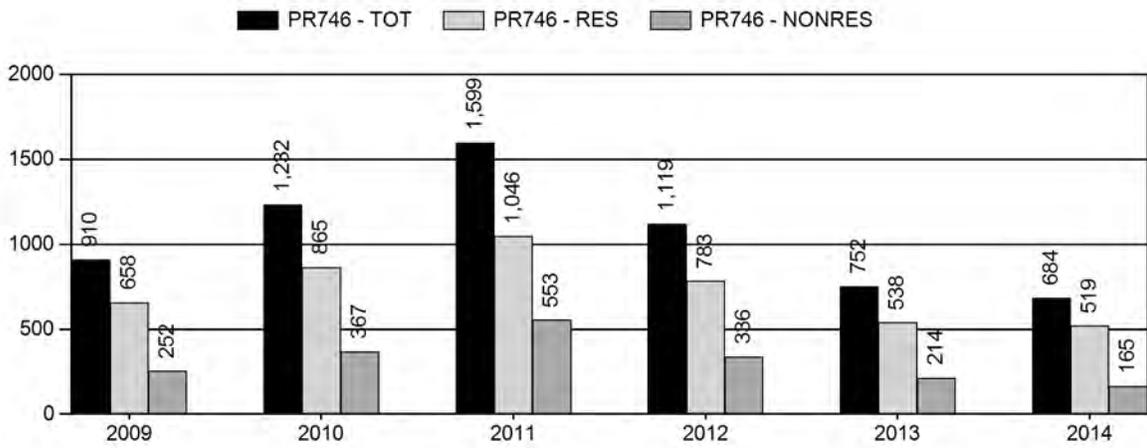
Population Size - Postseason



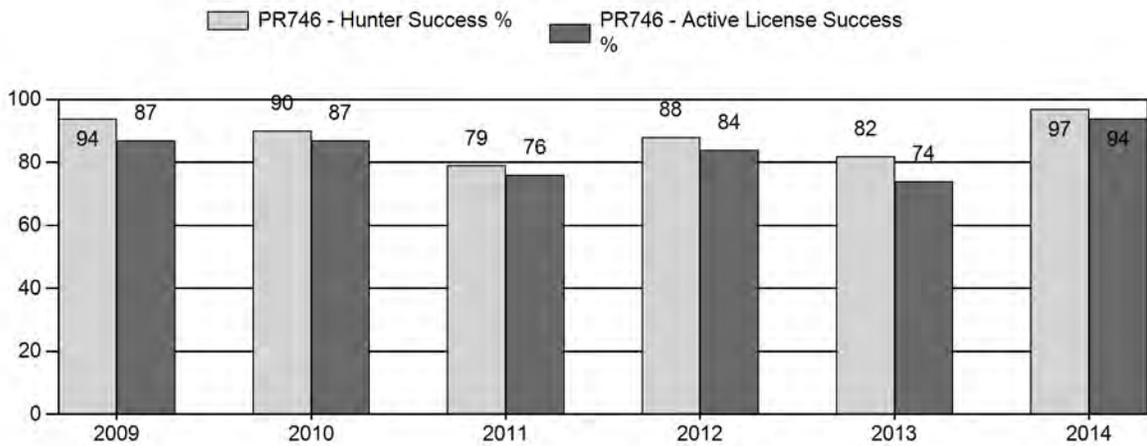
Harvest



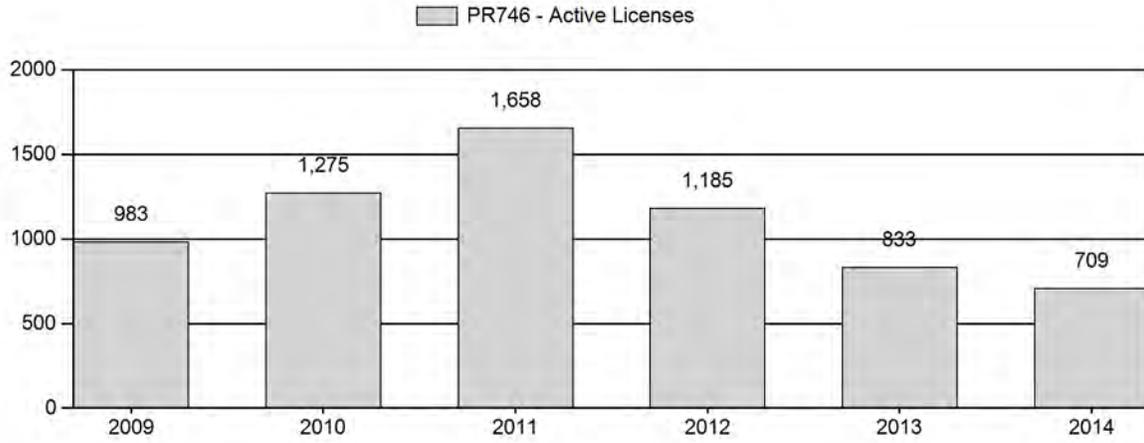
Number of Hunters



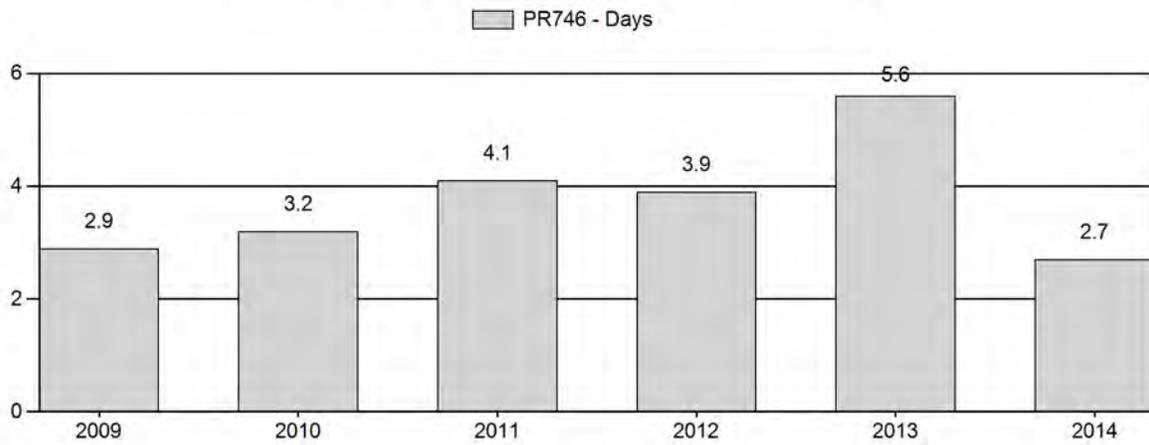
Harvest Success



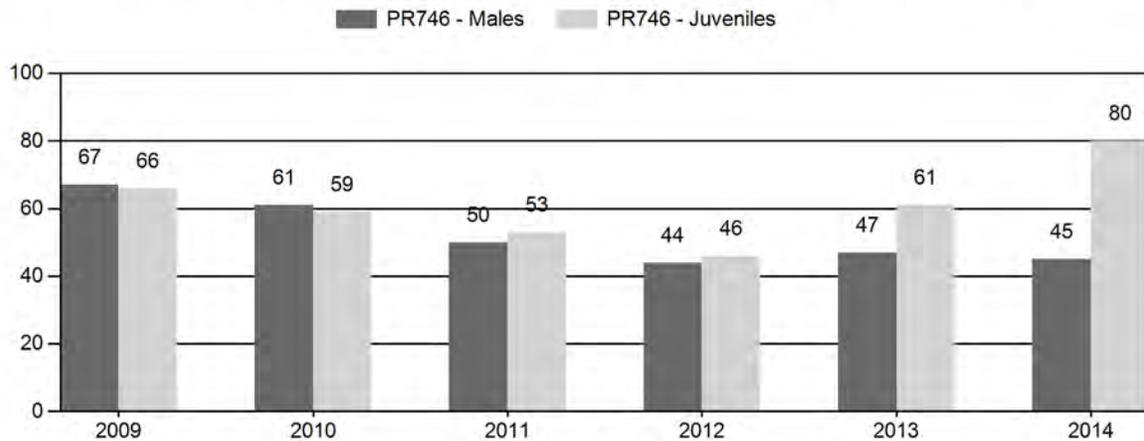
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 Preseason Classification Summary

for Pronghorn Herd PR746 - NORTH NATRONA

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	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	12,988	85	210	295	20%	650	44%	520	35%	1,465	1,915	13	32	45	± 5	80	± 7	55

**2015 HUNTING SEASONS
NORTH NATRONA PRONGHORN HERD (PR746)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
73	1	Sep. 15	Oct. 31	800	Limited quota	Any antelope
	6	Sep. 15	Oct. 31	250	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 2014
73	1	No change
	6	+150

Management Evaluation

Current Postseason Population Management Objective: 11,000

Management Strategy: Recreational

2014 Postseason Population Estimate: ~12,300

2015 Proposed Postseason Population Estimate: ~11,500

2014 Hunter Satisfaction: 91% Satisfied, 8% Neutral, 1% Dissatisfied

The North Natrona Pronghorn Herd Unit has a post-season population management objective of 11,000 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 formally reviewed and updated in 2014. Prior to 2014, the herd objective was set at 9,000 pronghorn.

Herd Unit Issues

Hunting access within the herd unit is very good, with large tracts of public land 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, though there were no reported or confirmed cases of disease outbreak within the North Natrona Herd in 2014.

Weather

The winter of 2010-2011 was severe throughout the herd unit, resulting in high 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. The spring of 2013 was cool with significant precipitation, with average rains over the summer as well. Still, habitat conditions remained poor in portions of the herd that received less spring and summer rain. Heavy precipitation during the fall of 2013 caused a beneficial late green-up, but also made travel difficult to impossible for hunters. The 2013-2014 winter brought temperature and precipitation conditions near the recent 30-year average, and the growing season of 2014 brought a much-needed break in drought conditions. Grass and forb growth were excellent, making 2014 the best growing season the region had seen in years. The spring and summer of 2014 undeniably produced improved range conditions that benefitted pronghorn. For detailed weather data see <http://www.ncdc.noaa.gov/gac/time-series/us>.

Habitat

Eight sagebrush transects were established within this herd in 2014 as part of the population objective review. These transects were measured for utilization and will be measured again in spring 2015. Utilization was light to moderate on all eight transects in 2014. This suggests current pronghorn population size and the revised objective are sustainable given available habitat. Anecdotal observations and discussions with landowners in the region confirm summer and winter forage availability for pronghorn was very good. Herbaceous forage species were observed to be in very good condition in 2014 compared to the previous years, and pronghorn appeared to be widely distributed across suitable habitat.

Field Data

Fawn production was high in this herd from 2002-2005, and the population grew markedly during this time period. Fawn production was 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, prior to our knowledge of high winter mortality. 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, poor fawn production/survival, and severe drought subsequently reduced this herd. Fawn production improved markedly in 2013, and reached a 13-year high of 80 per 100 does in 2014. Mild winter weather followed by excellent growing season conditions helped to improve conditions for fawns and lactating does in 2014. Overwinter survival of fawns appeared to improve from 2013 to 2014 as well, as evidenced by higher yearling buck ratios.

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. Buck ratios dropped markedly in 2011 and reached a 15-year low of 44 bucks per 100 does in 2012. The buck ratio held steady in the mid-40s per 100 does for 2013 and 2014 - well within the target range for recreational management. Ultimate management goals are to maintain buck ratios within this range 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 80-90th percentile. Harvest success was lower from 2011-2013 as population size dropped markedly. License issuance was also reduced during the same time period, but may not have kept pace with declining pronghorn numbers. 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 2014, license issuance was at a 10-year low, but pronghorn numbers also began to recover. Weather and access conditions were also very good; thus, hunters enjoyed much improved harvest success in the 90th percentile, and significantly lower average hunter days compared to the previous four years. As a result, North Natrona hunters expressed the highest percentage of satisfaction in the state for pronghorn in 2014.

Population

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 2012 line transect had a wide standard error, and is considered to be an overestimate of population size for that year. However, its addition in the model only changes the current population estimate by about 100 animals. Thus, it was left in the model as it provides an additional estimation point for the model to utilize. While the model does select upper and lower constraints for juvenile survival for several years of simulation, The TSJ,CA model still appears to be the best representation relative to the perceptions of managers on the ground while following 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 15th through October 31st. Season dates will remain the same for 2015, as will Type 1 license issuance. The 2015 season includes 800 Type 1 licenses and 250 Type 6 licenses. The Type 7 licenses specific to private agricultural lands are still unnecessary in 2015, as damage has not been an issue and access on private lands in the southeast portion 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. Population growth rates improved in 2014, and managers need to maintain the herd near the new objective of 11,000 rather than allowing further growth. Goals for 2015 are to hold the pronghorn population near objective, increase opportunity for doe/fawn harvest, and to maintain current buck ratios, hunter success, and hunter satisfaction.

If we attain the projected harvest of 815 with average fawn production, this herd will remain stable at slightly above objective. The predicted 2015 post-season population size of the North Natrona Pronghorn Herd is approximately 11,500 animals, which is 4% above objective.

Species: Pronghorn
 Biologist: Heather O'Brien
 Herd Unit & No.: North Natrona PR746
 Model date: 02/18/15

MODELS SUMMARY

	Fit	Relative AICc	Notes
CJ,CA	104	113	
SC,J,SCA	98	112	<input type="checkbox"/> CJ,CA Model
TS,J,CA	40	153	<input type="checkbox"/> SC,J,SCA Mod <input checked="" type="checkbox"/> TS,J,CA Model

Clear form

Check best model to create report

Year	Predicted Prehunt Population (year t)		Total	Predicted Posthunt Population (year t)		Total	Predicted adult End-of-bio-year Pop (year t)		LT Population Estimate Field Est	Trend Count	Objective
	Juveniles	Total Males		Females	Juveniles		Total Males	Females			
1993	2441	2122	3862	2374	1409	3331	7114	2253	3993	6246	9000
1994	3145	2208	3913	3124	1779	3805	8709	2373	4223	6596	9000
1995	2982	2326	4139	2970	1916	4049	8935	2260	4206	6466	9000
1996	4083	2215	4122	4072	1812	3965	9849	2394	4347	6742	9000
1997	2375	2346	4260	2351	1921	4125	8396	2467	4472	6939	9000
1998	4106	2418	4362	4080	1960	4243	10283	2516	4594	7111	9000
1999	3052	2466	4503	3041	2046	4376	9462	2553	4698	7230	9000
2000	3442	2504	4580	3429	2050	4431	9910	2488	4603	7091	9000
2001	3030	2482	4604	2993	2161	4499	9653	2381	4501	6882	9000
2002	3226	2438	4411	3217	1998	4334	9549	2871	5004	7875	9000
2003	3322	2334	4411	3310	1873	4224	9406	3048	5285	8332	9000
2004	4115	2813	4904	4063	2248	4702	11013	3525	5902	9427	9000
2005	4398	2987	5179	4366	2343	4947	11656	3785	6170	9954	9000
2006	3043	3454	5784	3024	2781	5410	11215	4105	6237	10030	9000
2007	2594	3709	6046	2557	3032	5719	11309	3744	6237	10030	9000
2008	3194	3717	6112	3173	3061	5931	12165	3155	6168	9323	9000
2009	4379	4023	6593	4365	3303	6385	14053	2655	5734	8389	9000
2010	3808	3669	6429	3780	2803	6101	12684	2812	5821	8633	9000
2011	3187	3092	6045	3146	2240	5527	10913	2669	5880	8549	9000
2012	2577	2602	5619	2535	1862	5312	9709	2716	5919	8635	9000
2013	3470	2756	5705	3448	2273	5631	11252	2716	5919	8635	9000
2014	4610	2615	5763	4599	1972	5687	12258	2716	5919	8635	11000
2015	3893	2662	5800	3877	2029	5553	11459				11000
2016											11000
2017											11000
2018											11000
2019											11000
2020											11000
2021											11000
2022											11000
2023											11000
2024											11000
2025											11000

Survival and Initial Population Estimates

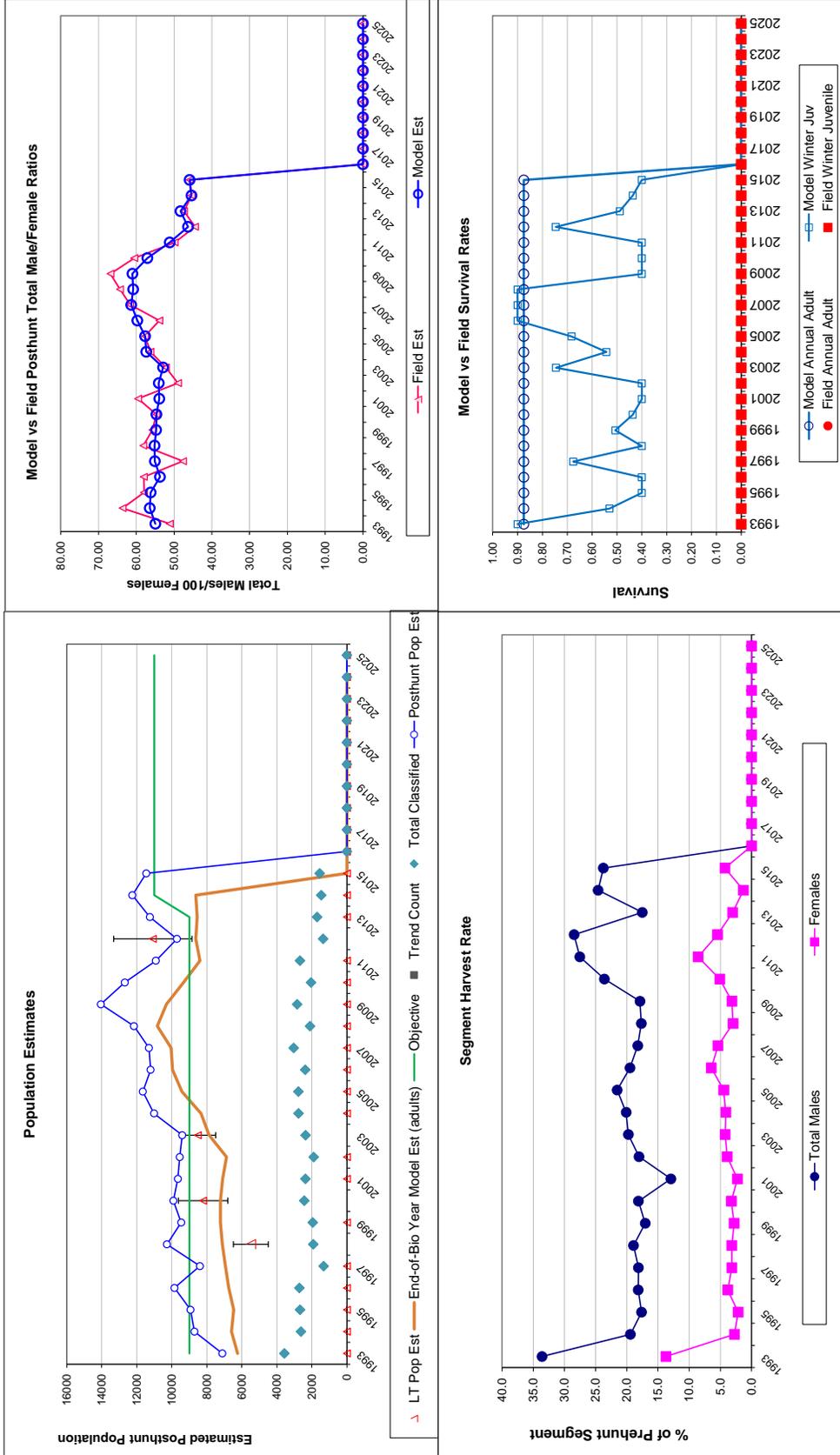
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est SE	Model Est	Field Est SE
1993	0.90		0.87	
1994	0.53		0.87	
1995	0.40		0.87	
1996	0.40		0.87	
1997	0.68		0.87	
1998	0.40		0.87	
1999	0.51		0.87	
2000	0.44		0.87	
2001	0.40		0.87	
2002	0.40		0.87	
2003	0.75		0.87	
2004	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	0.49		0.87	
2014	0.44		0.87	
2015	0.40		0.87	
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:	Optim cells
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%

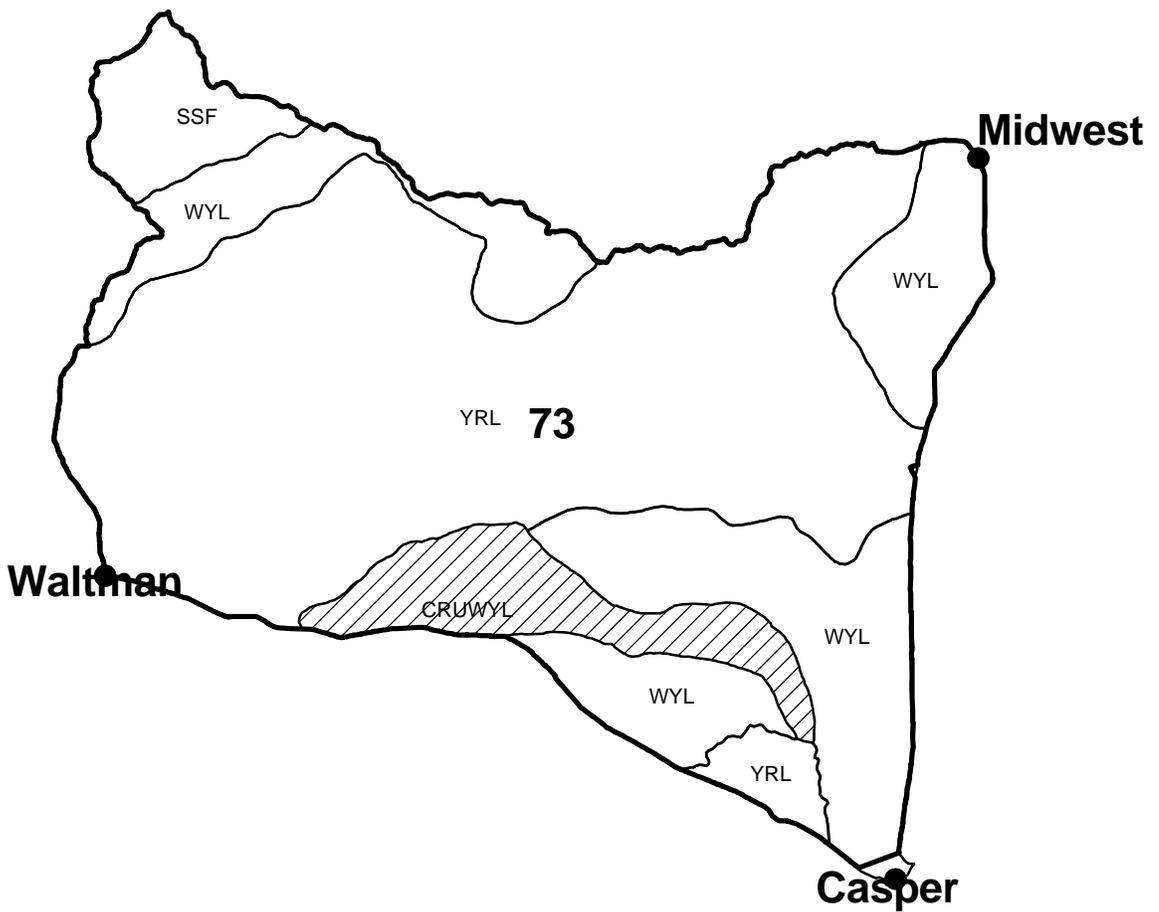
Year	Classification Counts				Total Male/Female Ratio				Harvest									
	Juvenile/Female Ratio		Field SE		Derived Est		Field Est		Field SE		Males		Females		Total Harvest		Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles	Total Harvest	Total Males	Females	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	589	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		80.00	4.71	45.38	45.38	3.19	520	150	25	664	24.6	1.3						
2015		67.12	3.92	45.89	45.89	3.03			225	815	23.8	4.3						
2016																		
2017																		
2018																		
2019																		
2020																		
2021																		
2022																		
2023																		
2024																		
2025																		

FIGURES



Comments:

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



2014 - JCR Evaluation Form

SPECIES: Pronghorn

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

HERD: PR748 - NORTH CONVERSE

HUNT AREAS: 25-26

PREPARED BY: WILLOW HIBBS

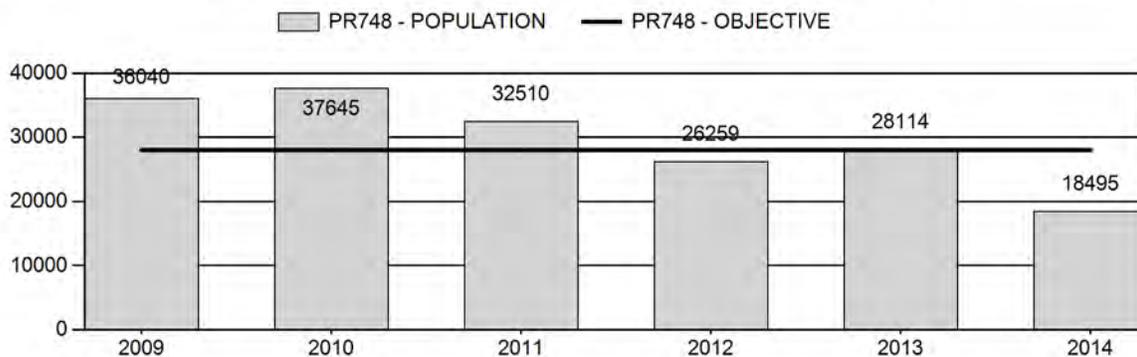
	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Population:	32,114	18,495	19,761
Harvest:	2,930	1,520	1,600
Hunters:	3,299	1,721	1,700
Hunter Success:	89%	88%	94%
Active Licenses:	3,460	1,842	1,800
Active License Success:	85%	83%	89%
Recreation Days:	10,937	5,202	5,100
Days Per Animal:	3.7	3.4	3.2
Males per 100 Females	68	55	
Juveniles per 100 Females	71	83	

Population Objective (\pm 20%) :	28000 (22400 - 33600)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-33.9%
Number of years population has been + or - objective in recent trend:	4
Model Date:	2/25/2015

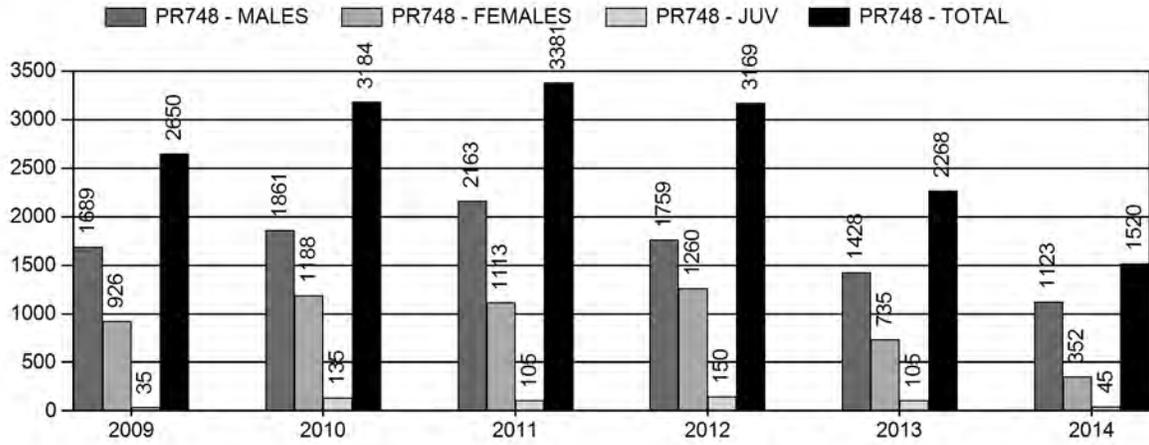
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females \geq 1 year old:	4.2%	3.7%
Males \geq 1 year old:	23.9%	21.8%
Juveniles (< 1 year old):	0.6%	0.8%
Total:	7.5%	7.4%
Proposed change in post-season population:	-8.3%	-8.2%

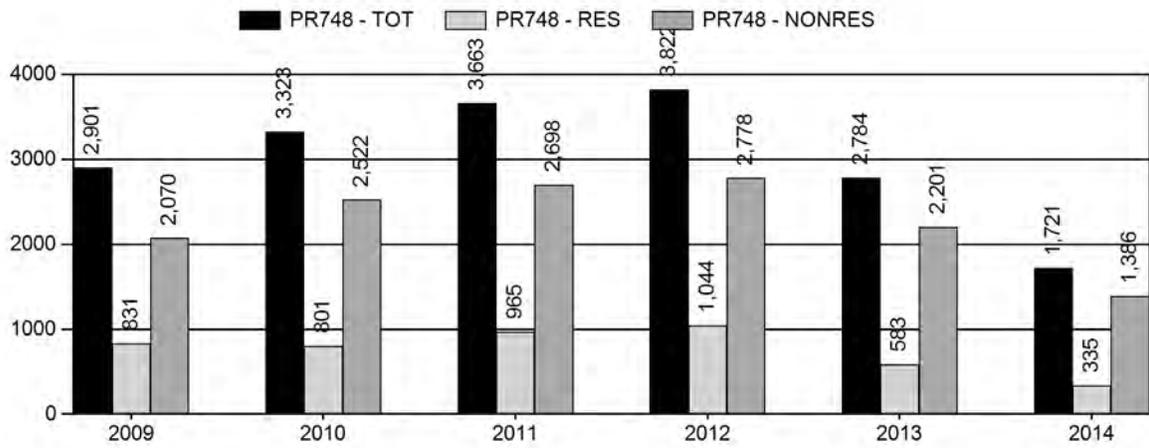
Population Size - Postseason



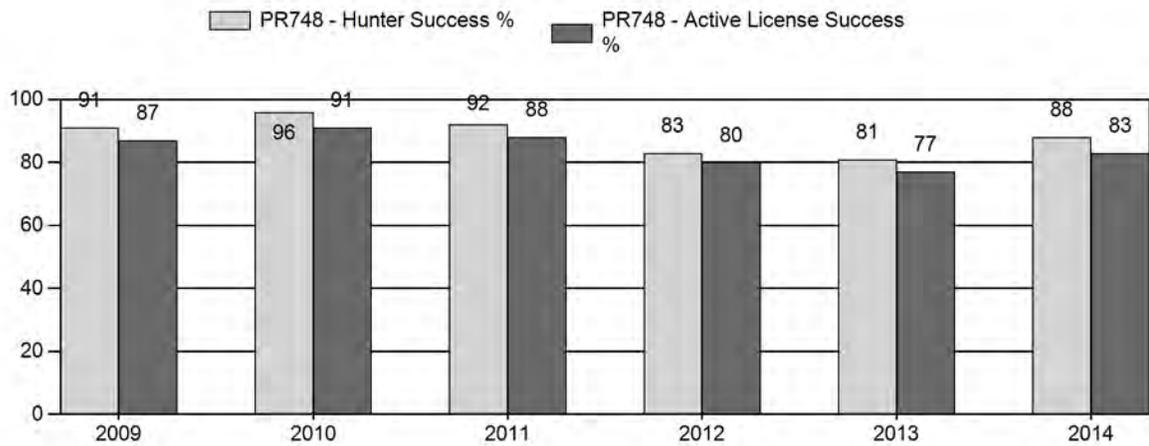
Harvest



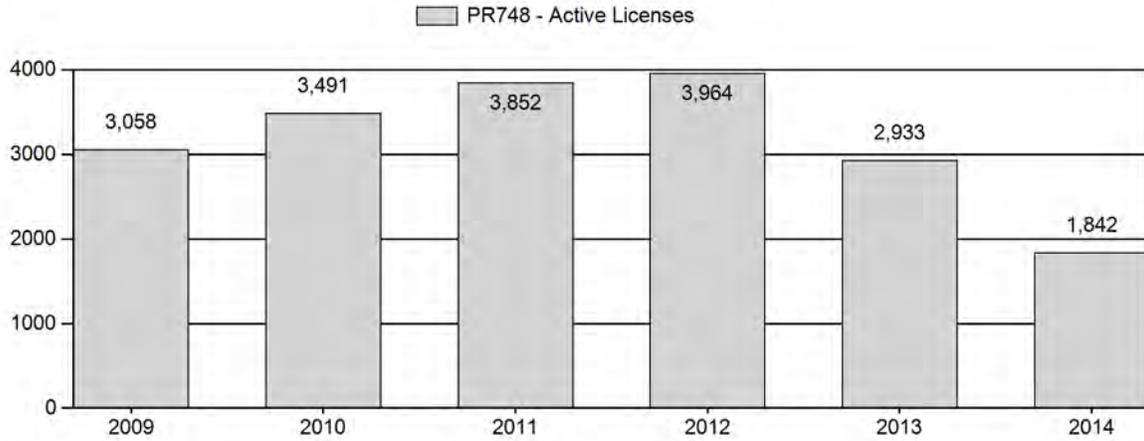
Number of Hunters



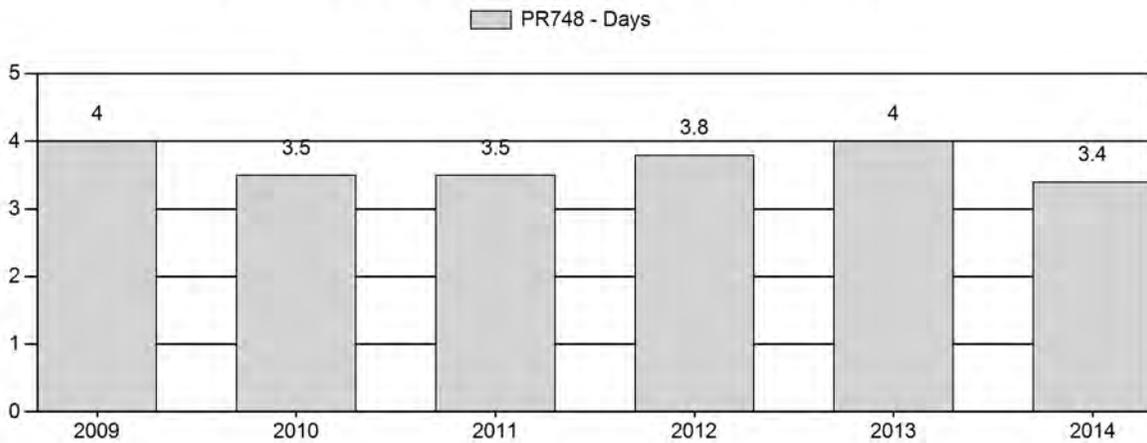
Harvest Success



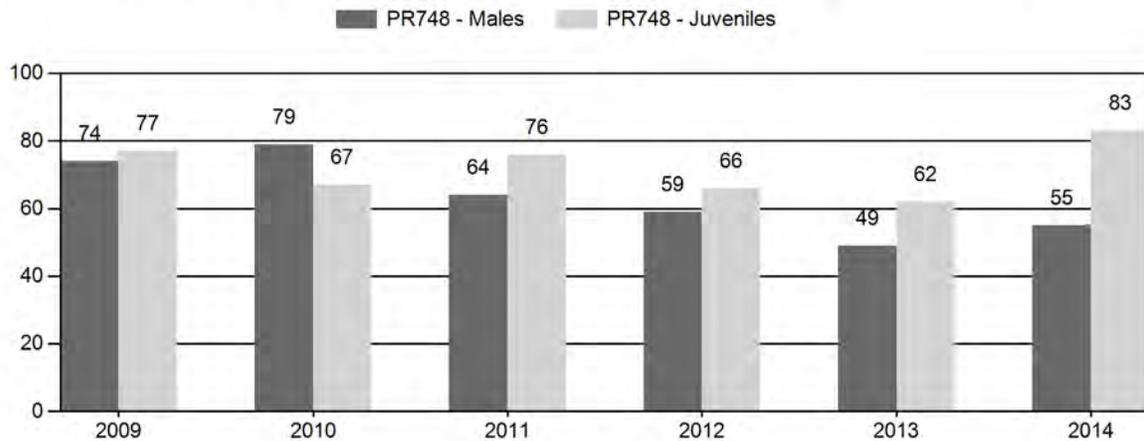
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 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	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	38,955	312	740	1,052	29%	1,430	40%	1,101	31%	3,583	3,287	22	52	74	± 5	77	± 5	44
2010	41,148	373	807	1,180	32%	1,490	41%	999	27%	3,669	3,160	25	54	79	± 5	67	± 4	37
2011	36,229	93	480	573	27%	895	42%	683	32%	2,151	3,105	10	54	64	± 5	76	± 6	47
2012	29,745	82	253	335	26%	567	44%	376	29%	1,278	3,040	14	45	59	± 7	66	± 7	42
2013	30,608	101	294	395	23%	803	47%	498	29%	1,696	2,059	13	37	49	± 5	62	± 6	42
2014	20,167	121	249	370	23%	669	42%	554	35%	1,593	3,415	18	37	55	± 6	83	± 8	53

**2015 HUNTING SEASONS
NORTH CONVERSE PRONGHORN HERD (PR748)**

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
25	1	Oct. 1	Oct. 14	600	Limited quota	Any antelope
	6	Oct. 1	Oct. 14	200	Limited quota	Doe or fawn
26	1	Sep. 24	Oct. 14	900	Limited quota	Any antelope
	6	Sep. 24	Oct. 14	300	Limited quota	Doe or fawn
Archery		Aug. 15	Sep. 30			Refer to license type and limitations in Section 2

SUMMARY OF CHANGES IN LICENSE NUMBER

Hunt Area	Type	Quota change from 2014
26	6	-100

Management Evaluation

Current Postseason Population Management Objective: 28,000

Management Strategy: Recreational

2014 Postseason Population Estimate: ~18,500

2015 Proposed Postseason Population Estimate: ~19,800

2014 Hunter Satisfaction: 76% Satisfied, 11% Neutral, 13% Dissatisfied

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. In addition to current development, the Converse County Oil and Gas EIS is being evaluated. This project proposes to develop up to 5,000 wells on 1,500 pads over the next 10 years. The cumulative impacts on pronghorn in this herd from the present and planned natural resource development are potentially significant.

Weather

Weather conditions throughout 2014 produced above average precipitation, especially during the growing season. These conditions yielded high fawn production and should have also contributed to good body condition of pronghorn going into winter and therefore good over-winter survival. The 2014-2015 winter has been moderate to date with several sub-zero cold snaps and precipitation events occurring earlier in the season, and warmer conditions with mild precipitation realized later in the season. Following more substantial precipitation earlier in the year, warm conditions often occurred in between cold snaps which served to melt out lowlands and expose forage for wintering pronghorn. Therefore, winter survival was thought to be normal over this bio-year.

Habitat

Although there are no habitat transects in this herd unit, habitat conditions were generally excellent throughout 2014 due to above average precipitation and good residual rangeland conditions from 2013. Given the extreme drought in 2012, additional 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. Given the relatively low density of pronghorn currently in this herd unit, there may be reduced herbivory pressure, which should also assist in yielding desirable range conditions.

Field Data

It has been increasingly difficult to meet classification sample sizes in this herd unit as aerial surveys have been abandoned for safety reasons and budgetary constraints. The total number of animals classified has markedly decreased since aerial surveys were eliminated in 2011. In 2014, the adequate sample size was 3,400 animals, yet only 1,600 pronghorn were classified despite intensive ground coverage.

Fawn production was significantly improved in 2014 with a ratio of 83, which is well above the 5-year average of 70. It should be noted that preseason 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 preseason 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. Several consecutive years of average to above average fawn production and survival will be needed for this population to increase toward objective.

Preseason buck ratios increased in 2014 (55 per 100 does), compared to 2013 (49 per 100 does) but still remain in line with management strategy criteria. Reductions in buck ratios in 2013 were likely due to consecutive years of population decline, with increases realized in 2014 due to a slight upward trend in population growth. The 5-year average preseason buck ratio is 65. Historically high buck ratios exceeding the management strategy maximum in this herd are a function of limited access due to the preponderance of private land and widespread outfitting.

Harvest

Overall harvest has declined in this herd unit as license issuance has decreased in lieu of population decline. The 2014 total harvest of 1,520 was the lowest total pronghorn harvest obtained in this herd unit. However, license success in 2014 (83%) increased from 2013 (77%) and is more comparable to the previous 5-year average of 85%. Additionally, the days required to harvest an animal has been steadily climbing over the last few years, but the trend reversed in 2014. Hunters experienced a decrease in number of days per animal (3.0), which is lower than the previous 5-year average of 3.8. This can most likely be attributed to the stabilization/ slight increase in population beginning in 2013 as well as a reduction in hunting pressure due to decreases in license issuance.

In 2014, 76% 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, or at least be cognizant of the fact that public land availability is extremely limited.

Population

The 2014 post-season population estimate is approximately 18,500, which is 34% below objective. In years past, high fawn productivity coupled with limited access has allowed this herd to exceed the objective very readily. However, this population dropped below objective due to elevated mortality during the relatively severe 2010-2011 winter, and continued to decrease through 2013. Significant reductions in licenses were made in response to population decrease. Poor fawn production in 2012 and 2013 further suppressed this herd, but a significant improvement was realized in 2014. If fawn recruitment is adequate, this should enable this herd to begin to increase toward objective.

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 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 and tracks well with observed preseason buck ratios.

Management Strategy

The traditional season in this herd unit has ran from October 1st to October 14th in Hunt Area 25 and from September 24th to October 14th in Hunt Area 26. These season dates have typically been adequate to meet landowner desires while accommodating a reasonable harvest. For 2015, herd unit-wide Type 1 license issuance was maintained at 1,500 licenses. Type 6 licenses in Hunt

Area 26 were reduced by 100 to accommodate landowner desires while managing this herd toward objective. Hunt Area 25 – Type 6 license issuance was maintained at 200 licenses. Maintaining relatively low harvest pressure on both males and females is warranted given this population is below objective. 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 ~1,600 pronghorn and realize normal fawn recruitment, this population is projected to increase to about 19,800 pronghorn, which is 29% below objective.

INPUT	
Species:	Pronghorn Willow Hilbs
Herd Unit & No.:	PR748
Model date:	01/26/15

MODELS SUMMARY			Notes
	Relative AICc	Fit	
CJ,CA	140	131	
SC,J,SCA	142	127	
TS,J,CA	174	49	

Clear form

Check best model to create report

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

Year	Predicted Prehunt Population (Year <i>t</i>)		Total	Predicted Posthunt Population (Year <i>t</i>)		Total	Predicted adult End-of-bio-year Pop (Year <i>t</i>)		LT Population Estimate Field Est	Trend Count	Objective
	Juveniles	Total Males		Females	Juveniles		Total Males	Females			
1993	7939	10114	15543	7849	8403	14341	9499	14359	23857		28000
1994	12934	9309	14071	12740	7203	12887	7835	12583	20418		28000
1995	10102	7679	12331	9919	5881	11417	8505	13126	21631		28000
1996	13385	8335	12864	13324	6172	12423	10097	15475	25572		28000
1997	11093	9895	15166	11041	8096	14699	11143	16717	27860		28000
1998	15798	10920	16383	15767	9036	16069	10017	15987	26004		28000
1999	13020	9816	15668	12976	8000	15385	8680	14923	23603		28000
2000	12710	8506	14625	12672	6757	14185	7591	13819	21410		28000
2001	9635	7439	13542	9793	6027	13236	7160	13169	20330		28000
2002	11070	7017	12906	11050	5659	12518	6933	12632	19565		28000
2003	9891	6795	12379	9818	5504	12012	6097	11504	17602		28000
2004	9811	5976	11274	9744	4651	10907	7897	13110	21008		28000
2005	9681	7739	12848	9687	6315	12238	6662	11578	18240		28000
2006	9569	6529	11346	9527	5173	10769	8209	12855	21064		28000
2007	10225	8045	12598	10133	6410	11819	9413	13926	23339		28000
2008	9099	9224	13648	8990	7444	12866	9682	14237	23918		28000
2009	10742	9488	13952	10703	7630	12933	10603	15029	25632		28000
2010	9875	10391	14728	9726	8344	13421	8159	12382	20541		28000
2011	9260	7996	12134	9145	5616	10910	6312	10178	16490		28000
2012	6614	6186	9974	6446	4254	8588	4693	8500	13193		28000
2013	5166	4599	8330	5050	3028	7521	4789	8637	13426		28000
2014	7009	4693	8464	6960	3458	8077	5624	9594	15217		28000
2015	6608	5511	9402	6553	4191	9017					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	0.79		0.78	
1994	0.40		0.78	
1995	0.83		0.78	
1996	0.83		0.78	
1997	0.90		0.78	
1998	0.40		0.78	
1999	0.41		0.78	
2000	0.40		0.78	
2001	0.53		0.78	
2002	0.48		0.78	
2003	0.40		0.78	
2004	0.90		0.78	
2005	0.40		0.78	
2006	0.90		0.78	
2007	0.90		0.78	
2008	0.90		0.78	
2009	0.90		0.78	
2010	0.40		0.78	
2011	0.40		0.78	
2012	0.40		0.78	
2013	0.90		0.78	
2014	0.90		0.78	
2015	0.40		0.78	
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:

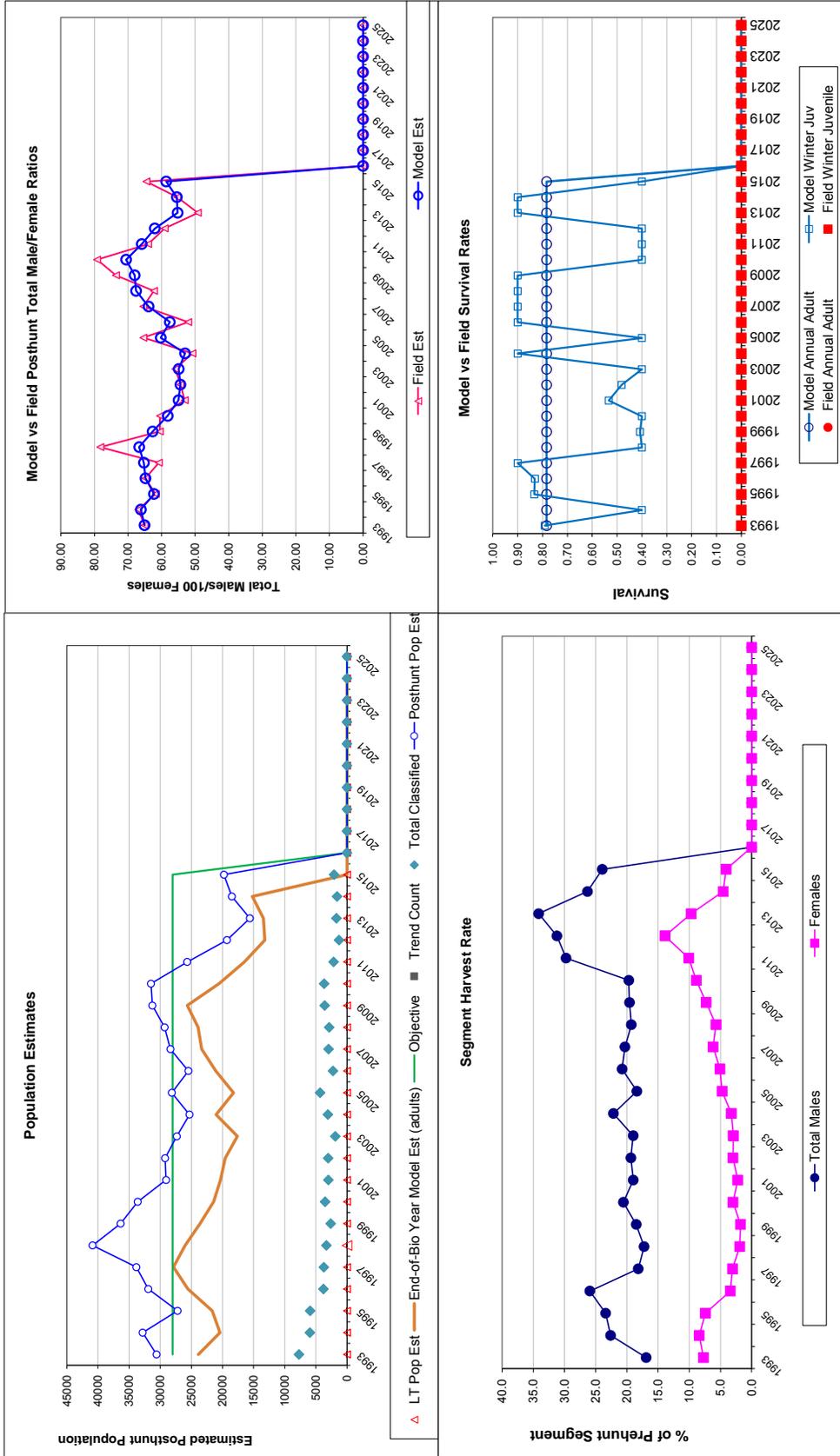
Adult Survival =	Optim cells
Initial Total Male Pop/10,000 =	0.784
Initial Female Pop/10,000 =	1.011
	1.554

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		Segment Harvest Rate (% of			
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles	Total Harvest	Total Males	Females
1993		51.08	1.47	65.07	65.07	1.74	1555	1093	82	2730	16.9	7.7
1994		91.92	2.77	66.15	66.93	2.20	1914	1077	176	3167	22.6	8.4
1995		81.92	2.48	62.27	61.74	2.03	1634	831	166	2631	23.4	7.4
1996		104.05	3.89	64.79	64.79	2.76	1966	401	56	2423	25.9	3.4
1997		73.14	2.82	65.25	60.82	2.48	1636	424	47	2107	18.2	3.1
1998		96.43	3.97	66.66	78.24	3.40	1713	285	28	2026	17.3	1.9
1999		83.10	3.77	62.65	60.50	3.01	1651	257	40	1948	18.5	1.8
2000		86.91	3.38	58.17	60.45	2.61	1590	400	35	2025	20.6	3.0
2001		72.62	3.07	54.93	53.09	2.48	1284	278	38	1600	19.0	2.3
2002		85.77	3.56	54.37	54.37	2.58	1235	353	18	1606	19.4	3.0
2003		79.90	4.25	54.89	55.90	3.31	1173	334	66	1573	19.0	3.0
2004		87.02	3.56	53.00	50.82	2.44	1204	334	61	1599	22.2	3.3
2005		75.35	2.71	60.24	65.42	2.46	1295	555	85	1935	18.4	4.8
2006		84.33	4.04	57.54	52.05	2.88	1233	525	38	1796	20.8	5.1
2007		81.17	3.50	63.86	65.42	3.00	1486	708	84	2278	20.3	6.2
2008		66.67	2.98	67.59	62.26	2.85	1618	711	99	2428	19.3	5.7
2009		76.99	3.09	68.00	73.57	2.99	1689	926	35	2650	19.6	7.3
2010		67.05	2.74	70.55	79.19	3.09	1861	1188	135	3184	19.7	8.9
2011		76.31	3.88	65.89	64.02	3.43	1381	105	105	3381	29.8	10.1
2012		66.31	4.41	62.02	59.08	4.07	1260	1113	1260	3169	31.2	13.9
2013		62.02	3.54	55.21	49.19	3.02	735	735	735	2268	34.2	9.7
2014		82.81	4.76	55.44	55.31	3.58	1520	352	352	1520	26.3	4.6
2015		70.28	3.68	58.62	64.52	3.46	1600	350	350	1600	24.0	4.1
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

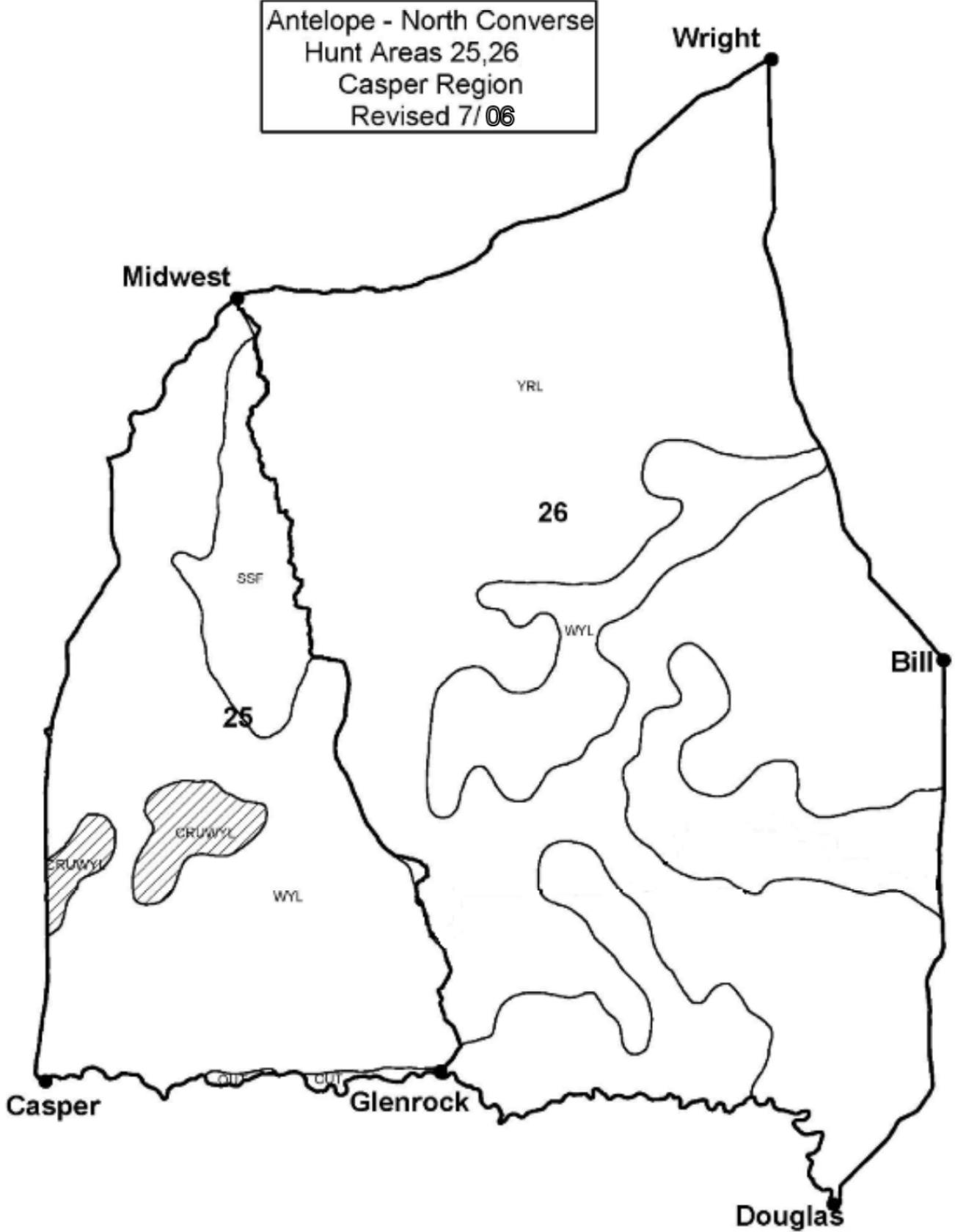
FIGURES



Comments:

END

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



2014 - JCR Evaluation Form

SPECIES: Pronghorn

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

HERD: PR750 - BLACK THUNDER

HUNT AREAS: 4-9, 24, 27, 29

PREPARED BY: JOE SANDRINI

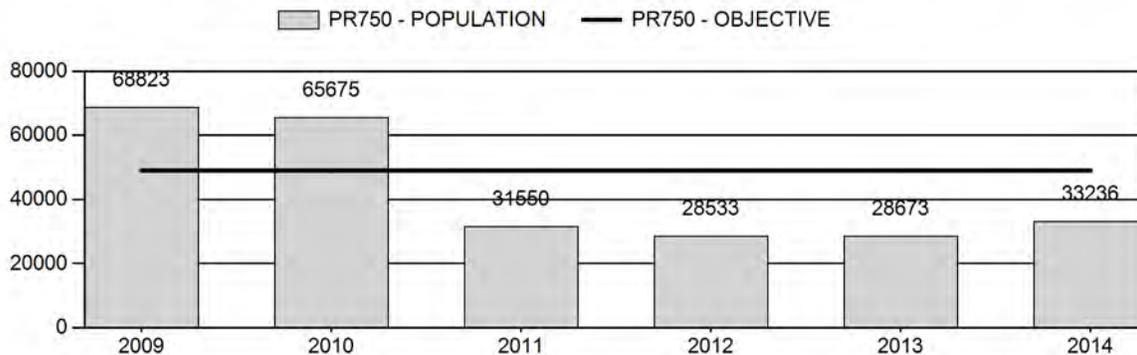
	<u>2009 - 2013 Average</u>	<u>2014</u>	<u>2015 Proposed</u>
Population:	44,651	33,236	34,289
Harvest:	6,247	3,366	3,170
Hunters:	6,907	3,997	3,775
Hunter Success:	90%	84%	84 %
Active Licenses:	7,501	4,310	4,050
Active License Success:	83%	78%	78 %
Recreation Days:	23,775	13,740	12,800
Days Per Animal:	3.8	4.1	4.0
Males per 100 Females	55	40	
Juveniles per 100 Females	63	91	

Population Objective (± 20%) :	49000 (39200 - 58800)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-32.2%
Number of years population has been + or - objective in recent trend:	4
Model Date:	02/20/2015

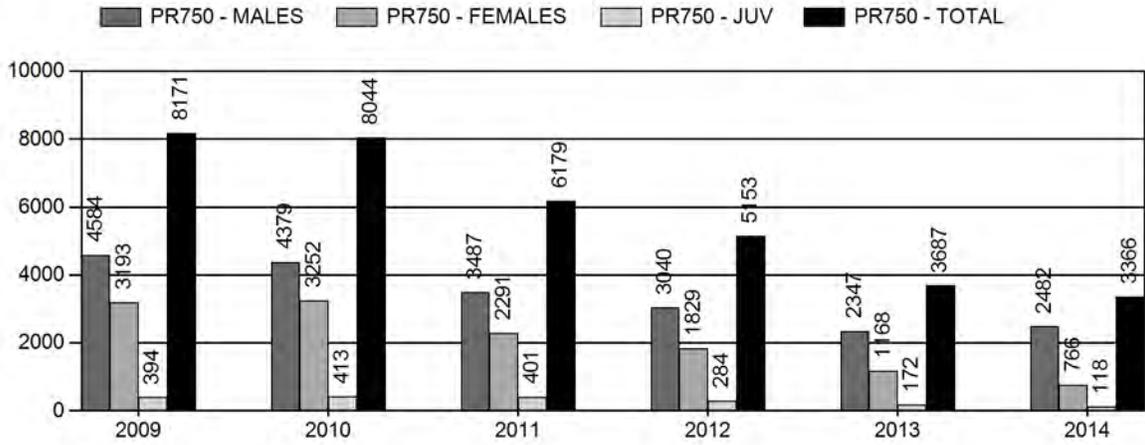
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	5.3%	4.7%
Males ≥ 1 year old:	40.3%	31.5%
Juveniles (< 1 year old):	0.9%	1.0%
Total:	10.0%	9.5%
Proposed change in post-season population:	+15.9%	+2.9%

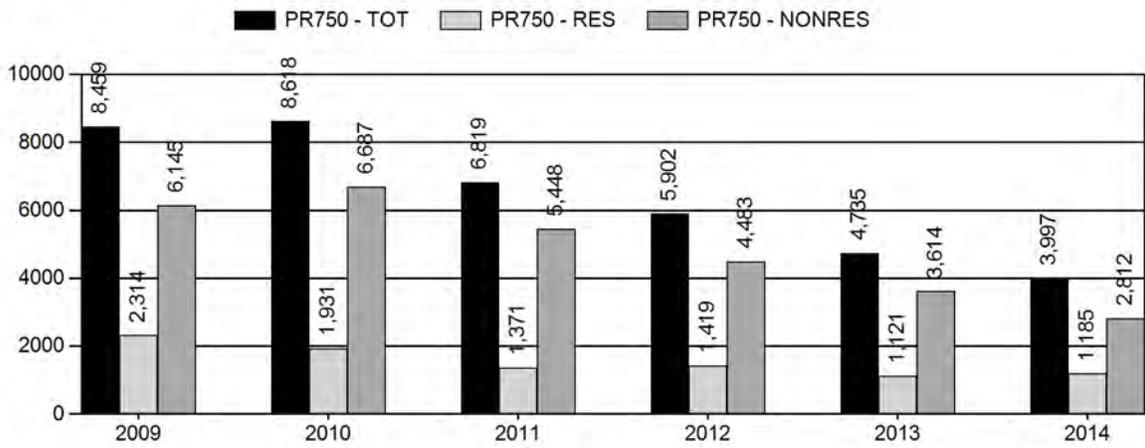
Population Size - Postseason



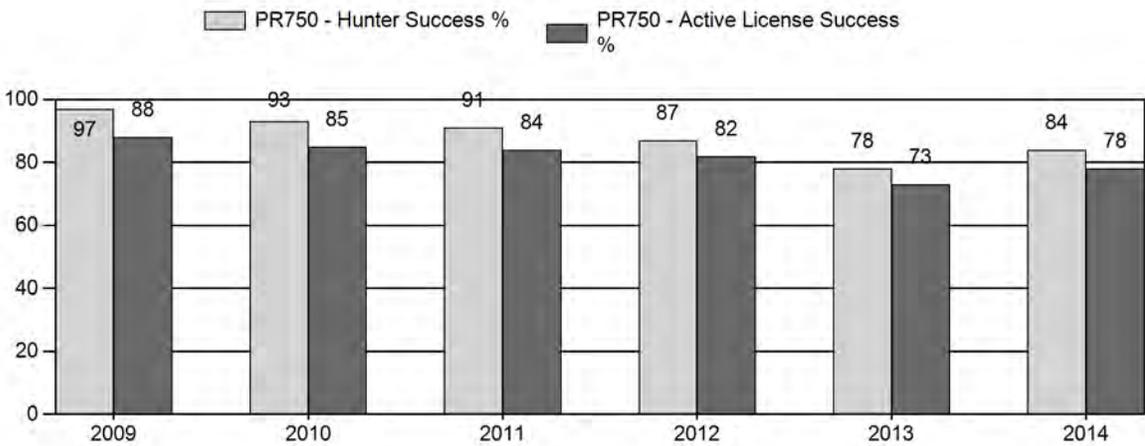
Harvest



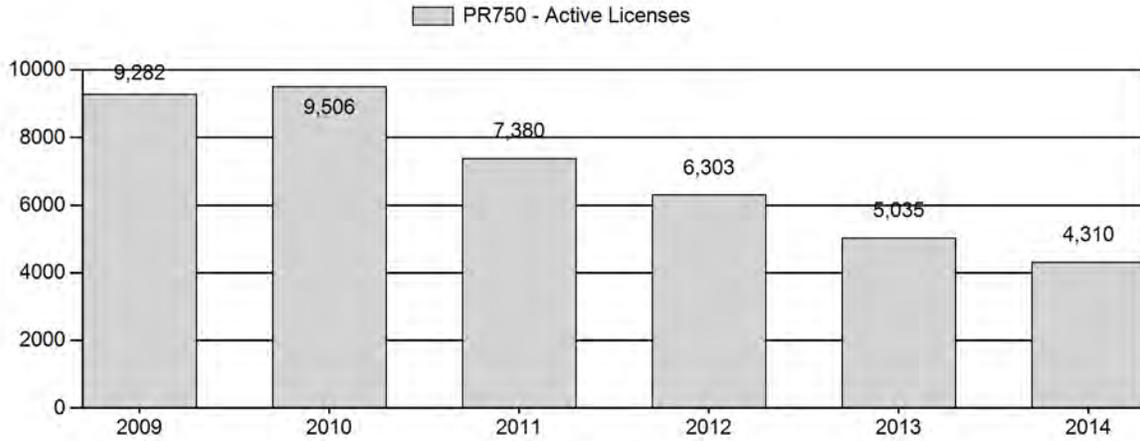
Number of Hunters



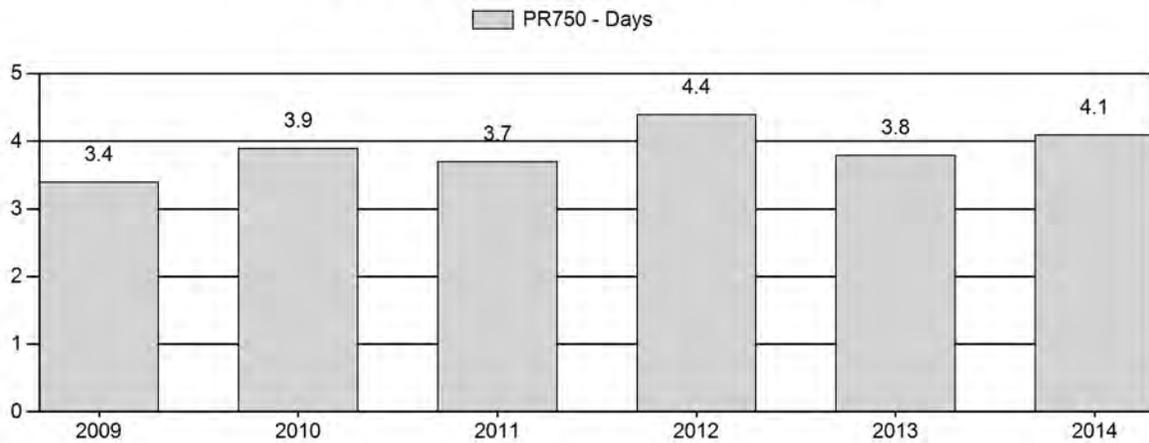
Harvest Success



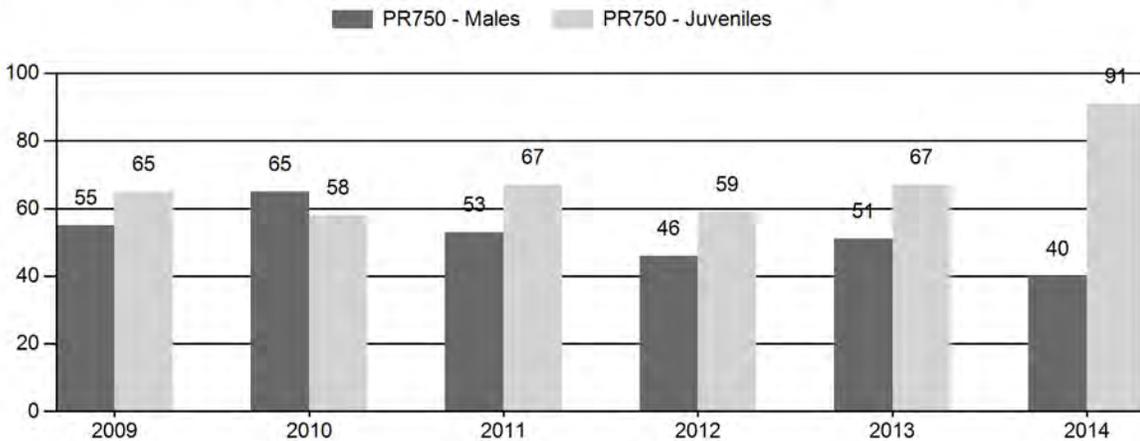
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 Preseason Classification Summary

for Pronghorn Herd PR750 - Black Thunder

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot CIs	CIs Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	77,811	529	1,611	2,140	25%	3,890	45%	2,530	30%	8,560	2,473	14	41	55	± 2	65	± 3	42
2010	74,523	579	1,584	2,163	29%	3,326	45%	1,930	26%	7,419	2,502	17	48	65	± 3	58	± 3	35
2011	38,347	309	1,011	1,320	24%	2,477	45%	1,667	31%	5,464	2,490	12	41	53	± 3	67	± 3	44
2012	34,201	318	617	935	23%	2,022	49%	1,198	29%	4,155	1,962	16	31	46	± 3	59	± 3	41
2013	32,729	315	733	1,048	23%	2,067	46%	1,380	31%	4,495	2,444	15	35	51	± 3	67	± 4	44
2014	36,939	288	582	870	17%	2,197	43%	2,008	40%	5,075	3,888	13	26	40	± 2	91	± 4	65

**2015 HUNTING SEASONS
BLACK THUNDER PRONGHORN HERD (PR750)**

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
4	1	Oct. 1	Nov. 20	150	Limited quota	Any antelope
	6	Oct. 1	Nov. 20	75	Limited quota	Doe or fawn
5	1	Oct. 1	Nov. 20	100	Limited quota	Any antelope
	6	Oct. 1	Nov. 20	50	Limited quota	Doe or fawn valid on private land
6	1	Oct. 1	Oct. 15	300	Limited quota	Any antelope also valid in Area 8
7	1	Oct. 1	Oct. 15	350	Limited quota	Any antelope
8	1	Oct. 1	Oct. 15	300	Limited quota	Any antelope also valid in Area 6
9	1	Oct. 1	Oct. 31	600	Limited quota	Any antelope also valid in that portion of Area 11 in Converse or Niobrara counties
	6	Oct. 1	Oct. 31	650	Limited quota	Doe or fawn also valid in that portion of Area 11 in Converse or Niobrara counties
24	1	Oct. 1	Oct. 31	700	Limited quota	Any antelope
	6	Oct. 1	Oct. 31	350	Limited quota	Doe or fawn
27	1	Oct. 1	Oct. 15	225	Limited quota	Any antelope
	7	Oct. 1	Oct. 15	50	Limited quota	Doe or fawn valid on private land
29	1	Oct. 1	Oct. 15	100	Limited quota	Any antelope
	2	Oct. 1	Oct. 15	400	Limited quota	Any antelope off Thunder Basin National Grasslands
	6	Oct. 1	Oct. 15	100	Limited quota	Doe or fawn valid off Thunder Basin National Grasslands
	7	Oct. 1	Nov. 15	100	Limited quota	Doe or fawn valid south and west of Interstate Highway 25

Hunt Special Archery Season Hunt Areas	Opening Date	Limitations
4, 5	Sep. 1	Refer to Section 2 of this Chapter
6 - 9, 24, 27, 29	Aug. 15	Refer to Section 2 of this Chapter

SUMMARY OF CHANGES IN LICENSE NUMBER

Hunt Area	License Type	Quota change from 2014
4	1	+50
4	6	+50
6	1	-50
7	1	+50
8	1	-150
24	6	-50
27	1	-75
27	7	-25
29	2	-100
Herd Unit	1	-175
	2	-100
Total	6	NO CHANGE
	7	-25

Management Evaluation

Current Postseason Population Management Objective: 49,000

Management Strategy: Recreational

2014 Postseason Population Estimate: ~ 33,200

2015 Postseason Population Estimate: ~ 34,300

2014 Hunter Satisfaction: 76% Satisfied, 12% Neutral, 12% Dissatisfied

HERD UNIT ISSUES: The management objective of the Black Thunder Pronghorn Herd Unit is for an estimated, post-season population of 49,000 pronghorn. This herd is managed under the recreational management strategy. The population objective and management strategy were reviewed and adopted in 2014 when this herd was created by combining the Cheyenne River (PR740) and Highlight (PR316) pronghorn herd units. The post-season population objectives of the parent herds were combined to create the current objective for the Black Thunder herd.

The Black Thunder 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 approximately 8,315 mi², of which slightly less than 7,300 mi² are 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 occupied USFS lands that are publically accessible to hunters are part of the Thunder Basin National Grassland (TBNG) located in HA's 5, 6, 7, 27, and 29, with HA 27 containing the largest amount followed by HA's 7 and 29. The State of Wyoming owns a large parcel of land in HA 9. Remaining public lands are scattered throughout the herd unit, and many 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, 24 and 29, and development pressure has increased in recent years in HA's 8 and 29. Several large surface coal mines represent a substantial land use within HA's 24 & 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, Upton, and Gillette. When pronghorn numbers are high, damage to growing alfalfa can become an issue, especially near Lusk.

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 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 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. Ambient temperatures and precipitation were close to long-term averages during the remainder of 2013-14 winter. The following spring and summer saw a growing season with slightly above normal temps and above normal moisture. This yielded excellent forage production. The early winter months of bio-year 2014 have brought temperature and precipitation conditions close to 30-year averages, with a trend towards milder than normal conditions. For detailed weather data see: <http://www.ncdc.noaa.gov/cag/time-series/us>.

HABITAT: This large 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 head waters of the Belle Fourche River, the Cheyenne River, Black Thunder Creek, Antelope Creek, Old Woman Creek, Hat Creek, Lance Creek, and Lightning Creek. Steep canyons dominate the southern Black Hills portion of the herd unit, where vegetation consists of ponderosa pine (*Pinus ponderosa*) and its

associated savannah. Other areas are dominated by agricultural croplands, notably near the towns of Douglas, Lusk, Gillette, 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 favorable for pronghorn. The west-central portions of the herd unit represent the largest 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 areas dominated by irrigated and dry land farming, historic sagebrush control projects have decreased the amount of sagebrush available for wintering pronghorn. In addition to sagebrush control, livestock grazing practices and wildfires have converted areas once thought to be dominated by Wyoming big sagebrush to more grass, prickly pear and silver sage dominated communities. Yet, pronghorn still winter in some of these locations. 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, 24, 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. These transects were monitored for both production and use through 2010. Only winter use was estimated in 2011. Based on these transects, forage conditions were good as this population peaked in 2006, but in 2007 winter use of sagebrush leaders was excessive.¹ 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 what appeared to be very poor forage production and elevated use during and after the growing season. During 2013 and 2014 wet spring and summer conditions were experienced, and there were low numbers of pronghorn on the range. Consequently, casual observations of range conditions showed excellent leader growth and reduced winter use both of these years.

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 marginal for allowing herd growth at 67:100. In 2014, fawn production and survival increased substantially with an observed, pre-season fawn:doe ratio of 91:100, a value of magnitude not seen in a decade. In recent years, classification sample sizes have been above those required for 90% confidence intervals. The 2014 fawn:doe ratio was 44% above the previous five-year average (63:100), and 25% above the previous 20-year average (73:100).

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

Over the last 20⁺ years, annual productivity of this herd, as measured by preseason fawn:doe ratios, while experiencing cyclic fluctuations, 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 by both domestic livestock and wildlife. Between 2008 and 2013 the herd's preseason fawn:doe ratio trended upwards slightly, but averaged only 62 fawns per 100 does (*std. dev* 5.0). This resulted in a continued population decline, even as hunting seasons became more conservative. Thanks to excellent fawn production in 2014, this population has begun to increase once again.

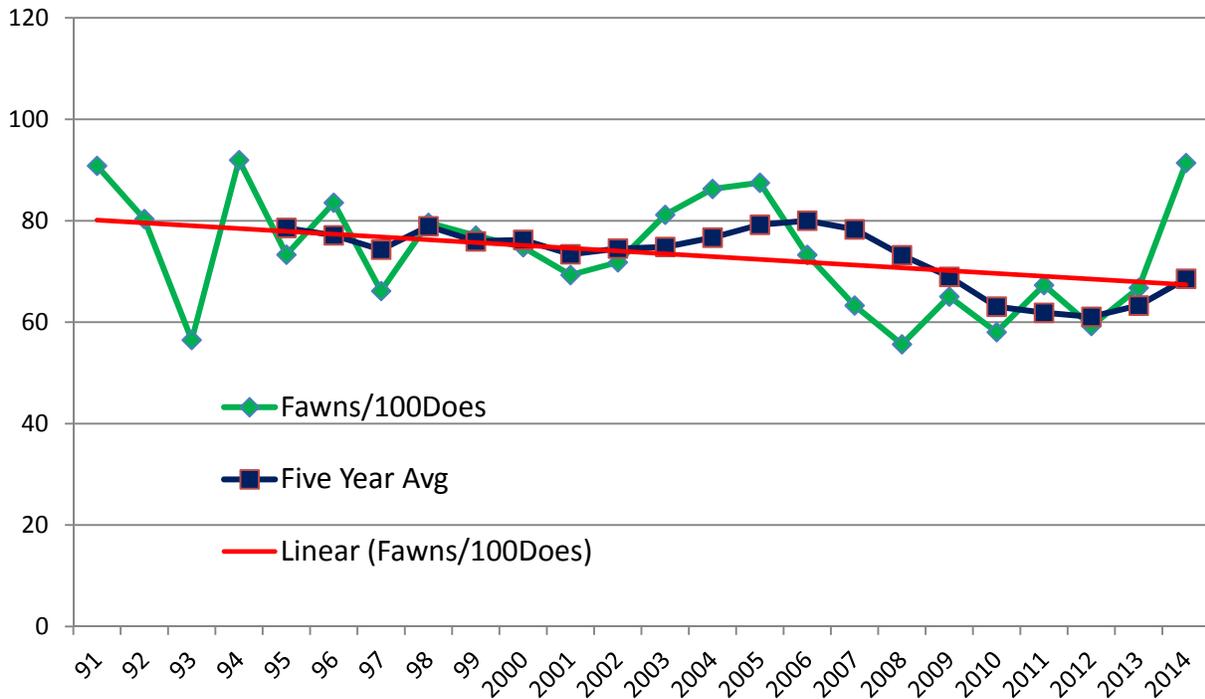


Figure 1: Observed Annual, and Five-Year Average Fawn:Doe Ratios (1991-2014).

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 each year. The population model simulates an increase in buck ratios from 48:100 in 1999 to a peak of 62:100 in 2007. Observed preseason buck:doe ratios then declined to 46:100 in 2012, before rising to 51:100 in 2013 and then dropping to 40:100 in 2014. Given estimated preseason classification ratios for 2015, the population model suggests the preseason buck:doe ratio will rise to about 44:100, a value well within 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. This is also an important consideration for managers given the spreadsheet models we rely upon are influenced so heavily by observed buck:doe ratios.

HARVEST DATA: Hunter success dropped and effort generally increased between 2008 and 2012 as this population declined. During the 2014 hunting season, hunter success improved on a herd wide basis, but effort increased a similar, relative amount. Overall, most hunt areas continued to exhibit success below what is normally observed for pronghorn within the state and this herd unit. Hunter success on doe/fawn licenses ranged from 68% in HA 9 to 92% in HA 4. Type 1 active license success varied from 70% in HA 29 to 90% in HA 4.

Although hunter success dropped steadily before improving slightly this past year, the hunter satisfaction survey revealed herd unit-wide 39% of hunters were very satisfied, and 37% satisfied with their hunt in 2014; and values almost identical to these were reported in both 2012 & 2013. The vast majority of hunters in this herd unit are non-residents from states without pronghorn who, despite what we consider low pronghorn numbers, are still amazed at the numbers of pronghorn they see and level of success they experience compared to hunting other big game species in their home states.

POPULATION: Following approval of the herd unit combination that created this herd, an official population model was constructed in February, 2015 after several initial and experimental models were tested. The final model used consisted of:

- Combined classification and harvest data collected between 1998 and 2013 from the parent herds.
- 2014 classification and harvest data, which were collected based upon the new herd unit.
- End of bio-year 2000 and 2002 population estimates generated by combining line transect surveys (LT) completed those years in both the Cheyenne River and Highlight herds, and using an estimated variance of the combined results.
- An end of bio-year 2012 LT designed to specifically sample this new herd unit.
- A model fitted and solved through 2014, with 2015 projected classification and harvest data used to estimate the 2015 population.

The “Semi Constant Juvenile & Semi Constant Adult” (SCJ SCA) spreadsheet model was chosen to estimate this herd’s population. All three competing models generally simulate a population rise between 2000 and 2006, followed by a decline through 2012 or 2013 and a slight increase into 2014. All three competing models produced post-season population estimates for 2012 within about 5% of each other, and within 10% this past year. The SCJ SCA model exhibited the lowest AICc value, and good fit compared to competing models, with modeled buck:doe ratios not appearing to be over parameterized. As a result, the SCJ SCA model was selected as the preferred model. The magnitude of population trends produced by SCJ SCA model also dovetail fairly well with general trends in harvest statistics and the perceptions of local game managers, landowners, and hunters. Amongst competing models the SCJ SCA model

more substantially fits LT estimates. The model seems to function well because it allows for modeling the increased mortality observed during the severe winter of 2010-2011; and although it lacks herd specific survival data, estimated juvenile and adult survival rates are reasonable. Consequently, the model is considered fair to good overall because it has 15-20 years of data; ratio data available for all years in the model; at least one sample-based population estimate with standard error; aligns fairly well with observed data; and is biologically defensible.

After final model selection, pre and post season population estimates beginning with bio-year 1998 were entered into the JCR database, and adequate and required classification sample sizes calculated for all bio-years using observed fawn:doe and buck:doe ratios.

The Black Thunder pronghorn population is projected to have increased steadily from the late 1990's through 2006, when it peaked about 60% above objective at ~72,000 pronghorn. During this timeframe, fawn survival was very good with above average fawn:doe ratios being observed, while doe/fawn harvest was limited by our inability to sell all available licenses. After its peak in 2006 & 2007, the postseason population declined steadily through 2012 to 42% below objective, where it remained in 2013. Some of this decline was due to increased harvest following regulatory and license issuance changes that increased doe/fawn licenses sales and acted in concert with enrollment of private lands in our walk-in hunting program to increase hunter access. But, more ostensibly, the drop resulted from reduced fawn recruitment due to drought, significant mortality during and following the 2010-11 winter; and increased summer mortality of all age classes due to Epizootic Hemorrhagic Disease (EHDV) during most summers since 2009. The line transect survey conducted in June 2013 resulted in an end of 2012 bio-year population estimate of about 23,890 (Appendix 1). This was a notable reduction from the 2011 line transect estimate of 30,900 for the former Cheyenne River herd alone.

MANAGEMENT SUMMARY: Hunting seasons since 2012 have been conservative in this herd unit, and the 2015 season entails continuing this strategy. Doe/fawn harvest remains significantly reduced or eliminated in all hunt areas, except HA 9. Additionally, issuance of any antelope licenses has been curtailed somewhat to maintain or enhance buck:doe ratios (especially in where there is relatively more public land and hunting pressure has intensified) and in hunt areas where landowners have reduced the number hunters they are willing to host and requested a reduction in license issuance. While the total harvest for 2015 should be similar to that of 2014, reductions in harvest will occur in HA's 6, 8, 27 and 29, while harvest is being increased somewhat in HA's 4 & 7 where pronghorn buck numbers have rebounded more and hunter success has been better. In HA 9, claims for damage from pronghorn are no longer being submitted, and landowners have noted a drop in pronghorn numbers. However, in an effort to continue to limit damage we are maintaining harvest pressure here, despite being well below objective. In HA 29, as a response to complaints from landowners and hunters about low pronghorn numbers and very low hunter success on public lands, we are continuing to issue the bulk of any antelope licenses as a Type 2 license, which are valid off Thunder Basin National Grasslands (TBNG) this year instead of on private land, and the number issued reduced by 100. The changes made in this hunt area the past several years (including reduced numbers of Type 6 licenses restricted to private land, and off TBNG this year) have been well received by many

landowners and have significantly reduced harvest pressure on public lands in the northern part of HA 29 where pronghorn numbers have plummeted.

Concerns continue about low pronghorn numbers on public lands, notably on the TBNG in both HA's 29 & 27. In addition, expansion of the coal mines in HA 27 has recently blocked hunters from being able to access a significant amount of public land in this unit. To help address the situation, we have cut issuance of reduced priced doe/fawn licenses valid in HA 27 by a third and continue to limit their use to private lands via a Type 7 license. In addition, issuance of Type 1 (any antelope) licenses has been reduced 25%. In this hunt area, residents hold 80% of the licenses and draw odds for non-residents are some of the most difficult in the state. Active Type 1 license success in HA 27 has remained near 75% for three 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 has remained near 70% since.

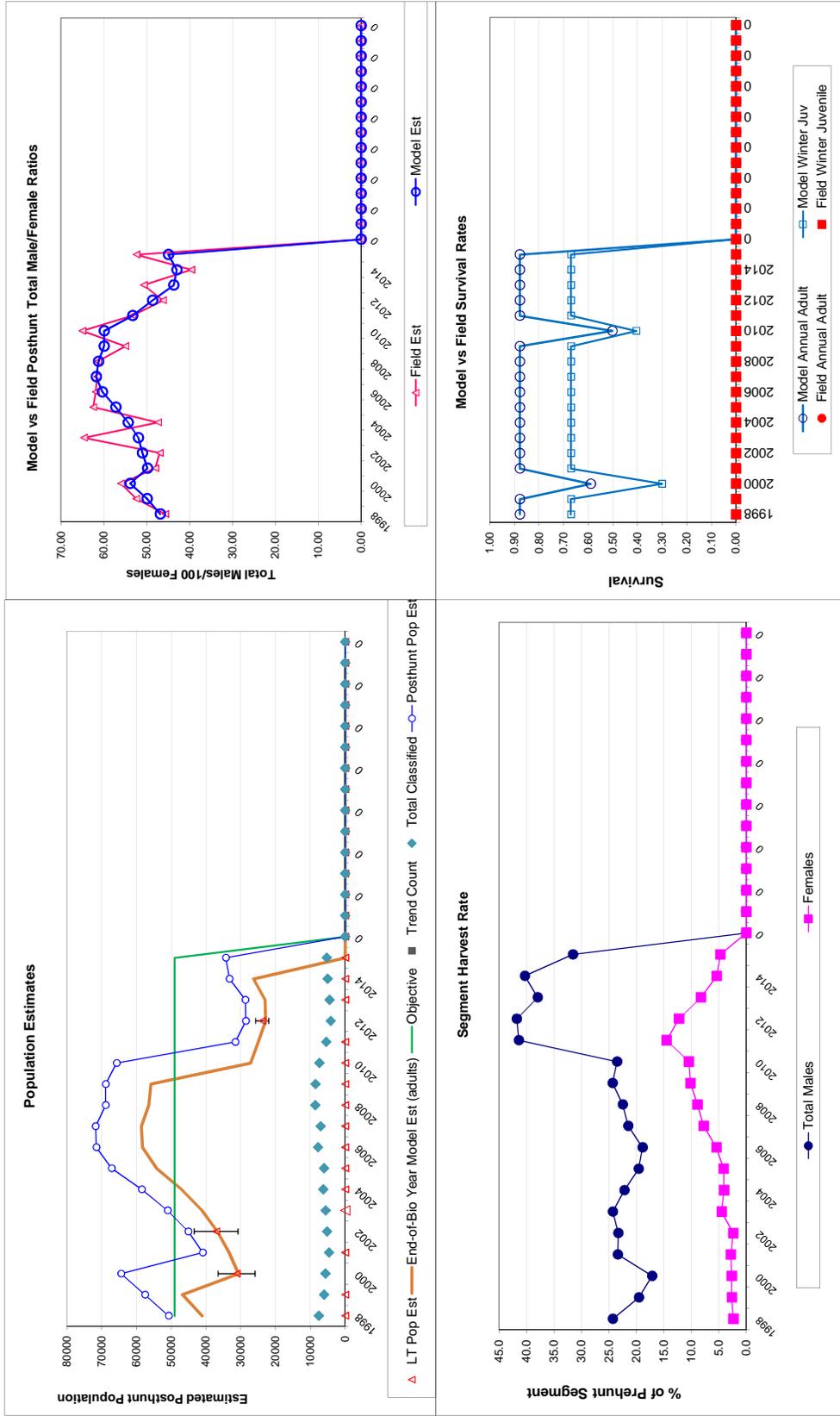
Finally, in order to address landowner concerns along the boundary of HA's 6 and 8, last year a change in license limitations allowing hunters with HA 6 licenses to hunt in HA 8 and vice versa was enacted. The boundary between these hunt areas consists of county roads, which antelope frequently cross. Some landowners whose properties straddle this boundary requested ability for hunters to hunt both sides of these roads. Because landownership patterns are similar in both hunt areas, the Department agreed to try this approach for a couple years, which if successful could lead to a combining of hunt areas. During the 2014 hunting season, a few landowners in HA 6, who live closer to Newcastle, expressed concern that hunter crowding (or at least hunter traffic) was increased due to this change. In order to continue to provide opportunity to hunt both hunt areas on one license, address concerns of landowners, and improve the relatively low hunter success in HA 8 the past two years, we have cut license issuance to near license draw demand levels for HA 6 & HA 8. This should allow most hunters wishing to hunt here the opportunity to draw a license, while limiting the number of individuals who purchase left-over licenses – something that increases hunter crowding on public lands, road hunting activity, and the amount of hunter traffic on county roads.

Given average fawn:doe and buck:doe ratios observed the past 5-years and consistent survival rates, combined with a predicted harvest of 3,170 pronghorn, the 2015 hunting season should allow the post-season population of this herd to grow around 3%, to ~34,300 pronghorn, which is 30% below objective.

LITERATURE CITED:

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

FIGURES



Comments:

END

Appendix 1
PR 750 Line Transect Results
End of Bio-Year 2012

Effort: 3,360.010
 No. samples: 116
 Width: 215.2000
 Left : 0.0000000
 Observations: 438

Model

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

Simple polynomial adjustments of order(s): 2

Parameter	Point Estimate	Standard Error	Percent Coef. of Variation	95% Confidence Interval	
DS	2.0283	0.14989	7.39	1.7523	2.3478
E(S)	1.6123	0.49495E-01	3.07	1.5179	1.7125
D	3.2701	0.26168	8.00	2.7925	3.8294
N	23,872	1910.3	8.00	20,385	27,955

MEASUREMENT UNITS:

Density: Numbers/Sq. miles

ESW: Meters

COMPONENT PERCENTAGES OF VAR(D):

Detection probability: 23.5

Encounter rate: 61.8

Cluster size: 14.7

ESTIMATION SUMMARY - ENCOUNTER RATES

	Estimate	% CV	df	95% Confidence Interval	
n	438.00				
k	116.00				
L	3360.0				
n/L	0.13036	6.29	58.00	0.11495	0.14783
Left	0.0000				
Width	215.20				

ESTIMATION SUMMARY – DETECTION RATES

Uniform/Polynomial	Estimate	% CV	df	95% Confidence Interval	
m	1.0000				
LnL	-680.71				
AIC	1363.4				
AICc	1363.4				
BIC	1367.5				
CHI-p	0.18952				
f(0)	0.60075E-02	3.88	437.00	0.55669E-02	0.64830E-02
p	0.77351	3.88	437.00	0.71677	0.83473
ESW	166.46	3.88	437.00	154.25	179.63

ESTIMATION SUMMARY - EXPECTED CLUSTER SIZE

Average Cluster Size	% CV	df	95% Confidence Interval	
1.8037	5.01	437.00	1.6347	1.9901

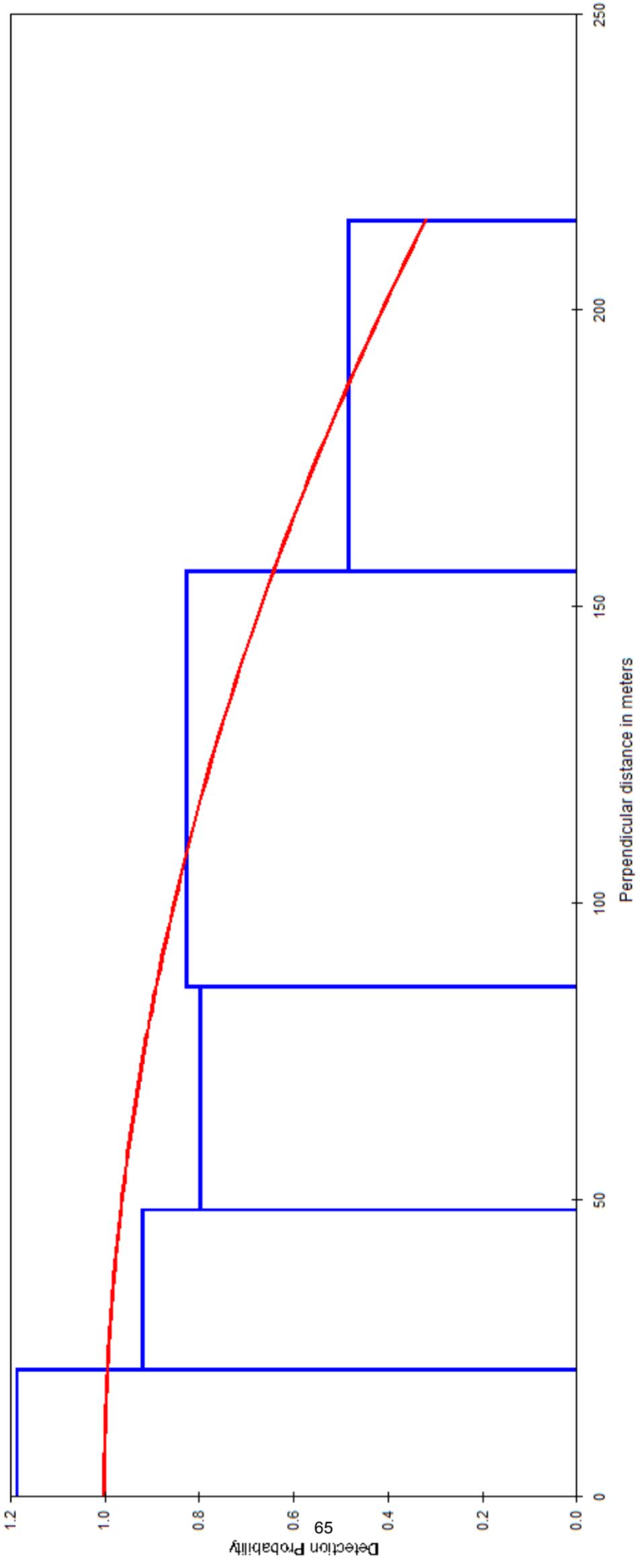
UNIFORM/POLYNOMIAL

	Estimate	% CV	df	95% Confidence Interval	
r	-0.71954E-01				
r-p	0.66352E-01				
E(S)	1.6123	3.07	436.00	1.5179	1.7125

ESTIMATION SUMMARY – DENSITY & ABUNDANCE

Uniform/Polynomial

	Estimate	% CV	df	95% Confidence Interval	
D	2.0283	7.39	108.35	1.7523	2.3478
DS	3.2701	8.00	147.88	2.7925	3.8294
N	23,872	8.00	147.88	20,385	27,955



Black Thunder Pronghorn PR750

