2014 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2014 - 5/31/2015

HERD: PR615 - RED DESERT

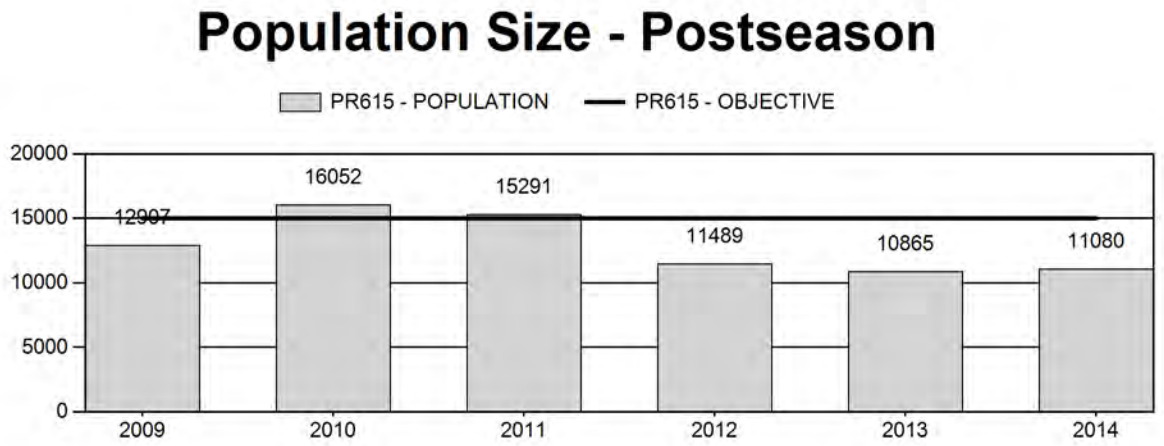
HUNT AREAS: 60-61, 64 | PREPARED BY: GREG HIATT

	2009 - 2013 Average	2014	2015 Proposed
Population:	13,321	11,080	11,800
Harvest:	748	300	240
Hunters:	768	332	280
Hunter Success:	97%	90%	86%
Active Licenses:	838	354	280
Active License Success:	89%	85%	86%
Recreation Days:	2,285	1,321	740
Days Per Animal:	3.1	4.4	3.1
Males per 100 Females	62	49	
Juveniles per 100 Females	54	53	

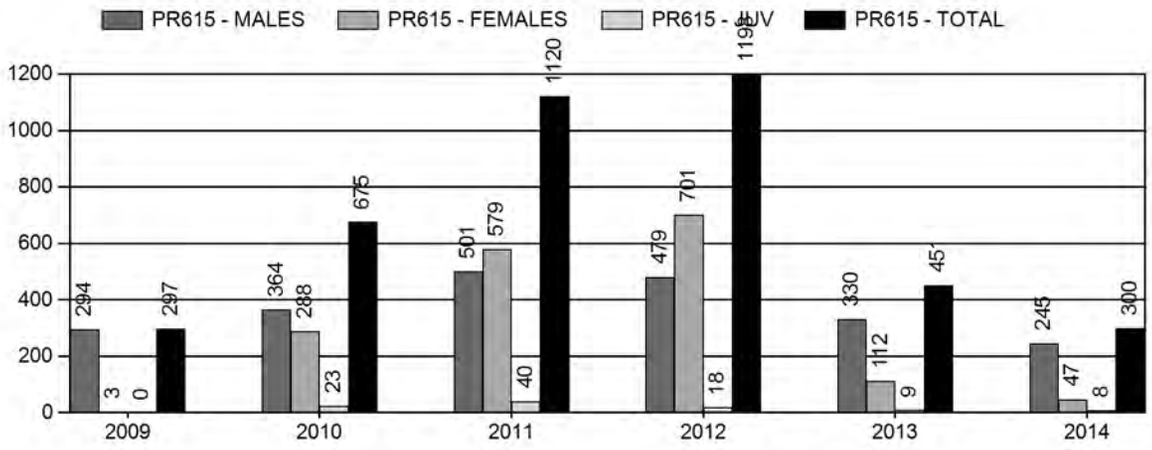
Population Objective (± 20%) :	15000 (12000 - 18000)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-26.1%
Number of years population has been + or - objective in recent trend:	3
Model Date:	3/3/2015

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

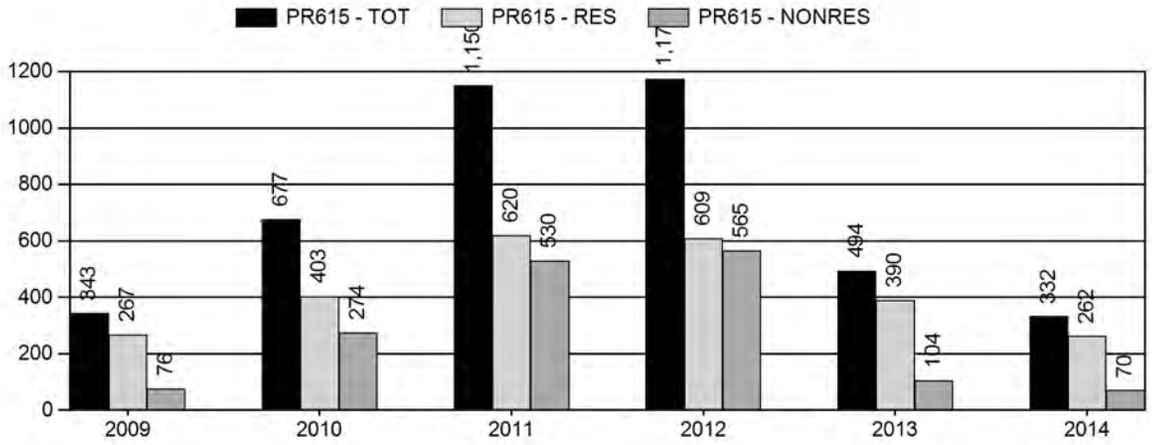
	JCR Year	Proposed
Females ≥ 1 year old:	1.5%	0.6%
Males ≥ 1 year old:	8.7%	6.5%
Juveniles (< 1 year old):	0.2%	0.5%
Total:	3.2%	2.0%
Proposed change in post-season population:	+0.8%	+6.5%



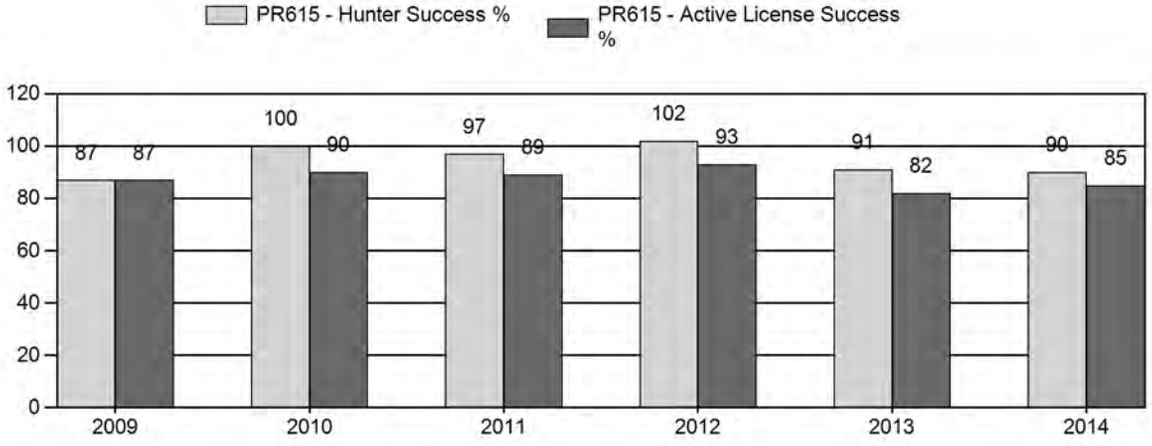
Harvest



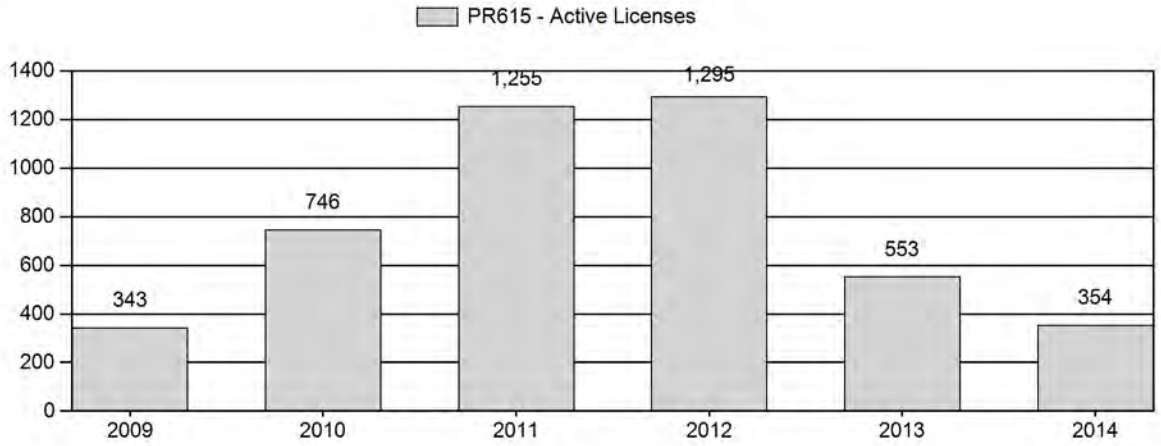
Number of Hunters



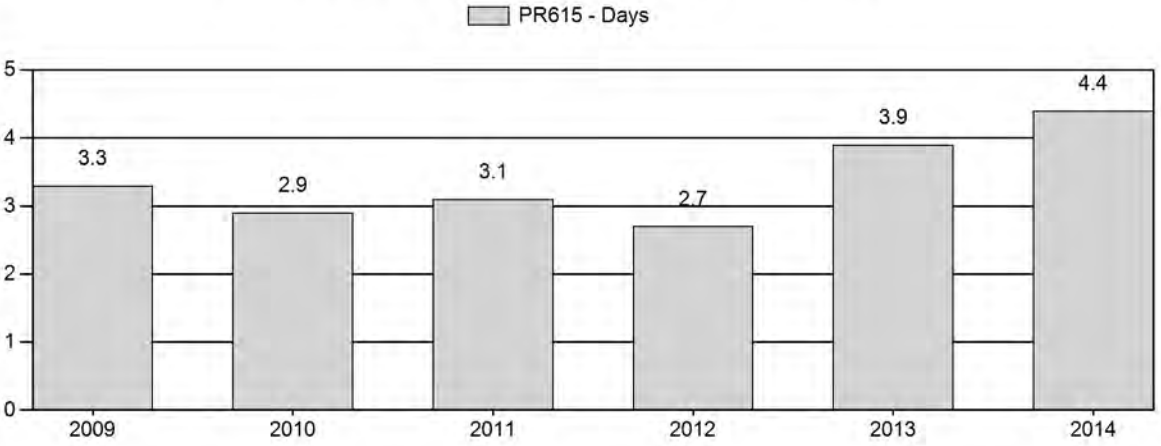
Harvest Success



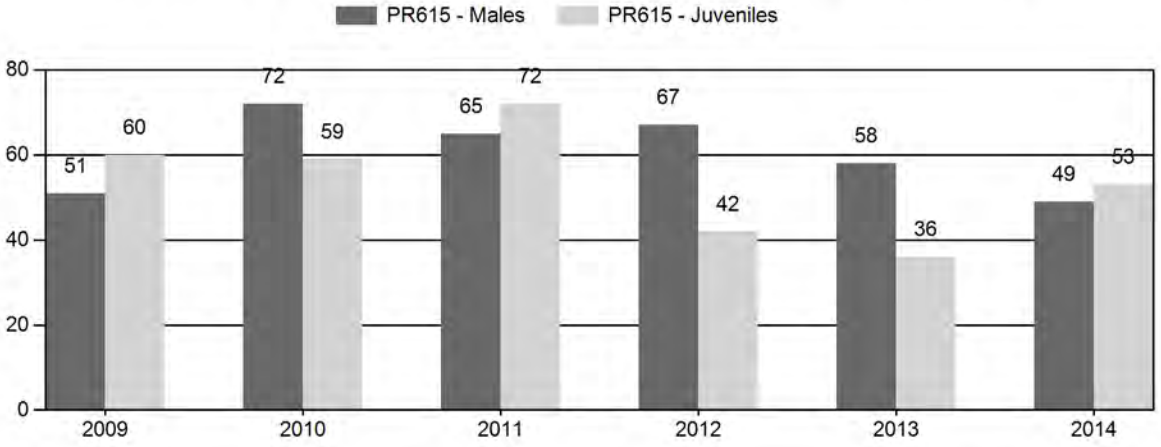
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 Preseason Classification Summary

for Pronghorn Herd PR615 - RED DESERT

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	13,234	268	749	1,017	24%	1,987	47%	1,190	28%	4,194	1,907	13	38	51	± 3	60	± 3	40
2010	16,795	361	951	1,312	31%	1,823	43%	1,077	26%	4,212	2,595	20	52	72	± 4	59	± 3	34
2011	16,523	263	736	999	27%	1,540	42%	1,115	31%	3,654	2,650	17	48	65	± 4	72	± 4	44
2012	12,798	177	888	1,065	32%	1,600	48%	667	20%	3,332	2,103	11	56	67	± 4	42	± 3	25
2013	11,361	66	809	875	30%	1,517	52%	539	18%	2,931	1,629	4	53	58	± 3	36	± 3	23
2014	11,410	110	519	629	24%	1,285	49%	686	26%	2,600	1,535	9	40	49	± 3	53	± 4	36

2015 HUNTING SEASONS
RED DESERT PRONGHORN HERD (PR615)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
60	1	Sep. 19	Oct. 31	50	Limited quota; any antelope
61	1	Sep. 12	Oct. 31	100	Limited quota; any antelope
	6	Sep. 12	Oct. 31	25	Limited quota; doe or fawn
64	1	Sep. 19	Oct. 31	100	Limited quota; any antelope
	6	Sep. 19	Oct. 31	25	Limited quota; doe or fawn
Archery					
60, 64		Aug. 15	Sep. 18		Refer to Section 2 of this Chapter
61		Aug. 15	Sep. 11		Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2014
60	1	0
	6	-25
61	1	-50
	6	0
64	1	0
	6	-25
Total	**1**	**-50**
	6	**-50**

<u>Management Evaluation</u>
Current Management Objective: 15,000
Management Strategy: Special
2014 Postseason Population Estimate: ~11,100
2015 Proposed Postseason Population Estimate: ~11,800

The Red Desert pronghorn herd is managed toward a post-hunt population of 15,000 pronghorn, an objective last reviewed in 1994. Population size is estimated using a spreadsheet model developed in 2012 and updated in 2015. The herd is in special management, with harvest quotas designed to maintain pre-hunt buck:doe ratios above 60:100. Objectives for this herd are currently under public review, with no changes proposed.

Herd Unit Issues

Historically, access in this herd unit has been good. Much of the unit is public land, and hunters have been able to acquire access to most private lands in the checkerboard. The seasonal

distribution map for the herd has not been updated for many years, and it is likely there are crucial winter habitats, particularly in Area 60, that have not yet been delineated.

Habitat issues in this herd unit include continued gas field development, coalbed natural gas development, opening of an *in situ* uranium mine with other mines proposed and possible development of shale oil. Many miles of sheep-tight fences exist in the herd unit, impeding pronghorn movements and migrations, and increasing losses during severe winters.

Weather

Drought conditions in 2012 and 2013 continued into the first half of 2014, with significant precipitation not arriving until the last quarter of July. Precipitation during the following three months produced good vegetative growth, but was probably too late to significantly improve fawn survival. Condition of pronghorn going into the winter is expected to have been good. The 2014-15 winter had numerous bitter cold spells, coupled with unusually warm periods, but little significant snowfall until late February. Losses may still be above average because many animals were dispersed off winter ranges prior to the late blizzards.

Habitat

While no herbaceous habitat transects are established within this herd unit, herbaceous forage production is expected to have improved due to improved precipitation in the latter half of the growing season. Only one shrub transect has been established near this herd unit, on the Chain Lakes WHMA, but was not read in 2014.

Habitat losses to uranium development have increased with opening of the Ur *in situ* uranium mine in Area 61, but is not in or near crucial pronghorn ranges. Habitat losses to gas development have slowed due to low gas prices and demand for drilling rigs in the Bakken fields.

Field Data

Fawn production improved to 53:100, near the five-year average for this herd after record lows in 2012 and 2013. Fawn production improved in all three hunt areas. As usual, production was lowest in Area 60 at 45:100. Production was similar between Areas 61 and 64, at 55:100 and 53:100 respectively.

The herd buck:doe ratio failed to meet the special management criterion of 60:100 for the second consecutive year, a result of poor recruitment from the 2012 and 2013 cohorts. None of the three hunt areas met the 60:100 criterion, ranging from 46:100 in Area 60 to 52:100 in Area 64.

Harvest Data

Hunter success improved slightly, to 85 percent, but was still below the five-year average of 88 percent. Hunter effort increased again, to a record high of 4.4 days per animal. Statistically, the past two years have seen the poorest hunting in this herd since it was delineated in 1976. Hunter success was highest in Area 60 and lowest in Area 64. The average days of effort required to

harvest an animal was a high in Area 61 and a near-record high in Area 64, but near normal levels in Area 60. The effort required to harvest on a Type 1 license in Area 61 was nearly twice that of either Area 60 or Area 64.

Population

The Time-Specific Juvenile & Constant Adult Survival (TSJ,CA) spreadsheet model provided the best fit with observed buck:doe ratios for this herd and behaved predictably when 2014 classification and harvest data were added. The model aligns with three out of five line transect estimates, but underestimates the two most recent. Because of these concerns, it is considered a "Fair" model of the herd. Annual adult survival was predicted at 89 percent, a reasonable level. Juvenile survival rates fluctuated within the allowed range but did hover at maximum or minimum values for many years. The CJ,CA and SCJ,SCA models each had slightly lower AIC values, but both models predicted herd sizes well below line transect estimates and generated roughly stable buck:doe estimates that did not track the dips and rises of observed values. Fawn production in 2015 was projected to be near the five-year average and the model was run with median juvenile survival in 2015.

The model predicts the herd has been roughly 20 percent below objective for the past three years. Even with optimistic assumptions on fawn production and survival, the 2015 pre-hunt population should be less than seen in 2012 and herd growth will be minimal. Without major improvement in fawn production and survival, proposed reductions in harvest quotas for 2015 will provide minimal increase in herd size.

Management Summary

This herd was well below objective size following a record harvest and severe winter losses in 1992. Conservative harvests after that winter combined with improved fawn production and survival beginning in 2007 allowed the herd to reach and be maintained at objective size in 2010 and 2011.

According to the spreadsheet model, the combination of heavy harvests and extremely poor fawn production in 2012 and 2013 significantly reduced herd size, estimated around 11,000.

With the population estimated to be 20 percent below objective and record poor harvest statistics, harvests need to be further reduced to allow the herd to recover. Proposed quotas for Type 6 doe/fawn licenses are eliminated in Area 60 and reduced to a minimal number in Area 64. Recommended quota for Type 1 licenses are also reduced in Area 61, where hunter effort was highest. With the projected harvest of roughly 205 bucks and 35 does and fawns, predicted herd size will increase by about 6 percent to 11,800 pronghorn. The herd is unlikely to reach objective in two or three years unless precipitation improves, raising both fawn production and survival.

INPUT	
Species:	Pronghorn
Biologist:	Greg Hiatt
Herd Unit & No.:	Red Desert
Model date:	02/23/15

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	225	234	☐ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	232	246	☐ SCJ,SCA Mod	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	88	190	☑ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	3802	2953	6267	**13022**	3737	2270	5780	**11787**	3716	6947	**10664**				15000
1994	3449	3642	6808	**13900**	3380	3062	6299	**12741**	3144	6111	**9255**				15000
1995	2806	3081	5989	**11876**	2783	2666	5725	**11174**	3263	6076	**9339**				15000
1996	3416	3198	5955	**12569**	3416	2769	5910	**12095**	2922	5835	**8758**				15000
1997	3122	2864	5719	**11704**	3122	2448	5708	**11278**	2593	5617	**8210**				15000
1998	3206	2541	5504	**11252**	3206	2126	5490	**10823**	3092	6211	**9303**	15906	7414		15000
1999	3609	3030	6086	**12725**	3609	2616	6081	**12305**	4005	7217	**11222**				15000
2000	3774	3925	7073	**14772**	3759	3469	6872	**14099**	3597	6736	**10334**				15000
2001	3271	3525	6602	**13398**	3271	3177	6602	**13049**	3285	6454	**9740**	11222	1700		15000
2002	2993	3219	6325	**12538**	2980	2765	6142	**11887**	3357	6474	**9831**				15000
2003	3402	3290	6344	**13036**	3386	2839	6113	**12338**	2974	5992	**8966**				15000
2004	4241	2915	5872	**13027**	4199	2463	5644	**12306**	4130	7063	**11193**				15000
2005	4324	4048	6922	**15294**	4303	3612	6716	**14631**	3798	6661	**10459**				15000
2006	3788	3722	6528	**14038**	3783	3288	6461	**13532**	3442	6382	**9823**				15000
2007	3166	3373	6254	**12793**	3166	2933	6254	**12353**	3039	6123	**9162**	9826	1859		15000
2008	4026	2979	6001	**13005**	4026	2666	5994	**12686**	3622	6698	**10321**				15000
2009	3931	3550	6564	**14046**	3931	3227	6561	**13719**	4722	7805	**12527**				15000
2010	4519	4627	7649	**16795**	4493	4227	7332	**16052**	4386	7235	**11621**	20222	2911		15000
2011	5134	4299	7090	**16523**	5090	3748	6453	**15291**	4052	6358	**10409**				15000
2012	2597	3971	6230	**12798**	2578	3447	5465	**11489**	3592	5903	**9495**				15000
2013	2056	3520	5785	**11361**	2046	3157	5662	**10865**	3206	5500	**8706**	17742	2621		15000
2014	2877	3142	5390	**11410**	2869	2873	5338	**11080**	3527	5779	**9306**				15000
2015	2945	3456	5663	**12064**	2939	3231	5630	**11800**							15000
2016															
2017															
2018															
2019															
2020															
2021															
2022															
2023															
2024															
2025															

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.90			0.90		
1994	0.25			0.90		
1995	0.62			0.90		
1996	0.25			0.90		
1997	0.25			0.90		
1998	0.73			0.90		
1999	0.90			0.90		
2000	0.25			0.90		
2001	0.25			0.90		
2002	0.58			0.90		
2003	0.25			0.90		
2004	0.90			0.90		
2005	0.25			0.90		
2006	0.25			0.90		
2007	0.25			0.90		
2008	0.59			0.90		
2009	0.90			0.90		
2010	0.25			0.90		
2011	0.25			0.90		
2012	0.25			0.90		
2013	0.25			0.90		
2014	0.60			0.90		
2015	0.60			0.90		
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

Parameters:	Optim cells
Adult Survival =	0.896
Initial Total Male Pop/10,000 =	0.295
Initial Female Pop/10,000 =	0.627

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

	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		60.67	2.93	47.13	45.30	2.40	621	442	59	1122	23.1	7.8
1994		50.66	2.79	53.50	57.00	3.02	527	463	63	1053	15.9	7.5
1995		46.86	2.13	51.44	51.22	2.26	377	240	21	638	13.5	4.4
1996		57.37	2.75	53.70	56.95	2.74	390	41	0	431	13.4	0.8
1997		54.59	2.47	50.08	50.25	2.34	378	10	0	388	14.5	0.2
1998		58.25	2.49	46.17	44.44	2.08	377	13	0	390	16.3	0.3
1999		59.29	2.47	49.79	46.99	2.11	377	5	0	382	13.7	0.1
2000		53.36	2.54	55.49	61.11	2.79	415	183	14	612	11.6	2.8
2001		49.54	2.37	53.40	55.78	2.57	317	0	0	317	9.9	0.0
2002		47.33	2.28	50.90	48.14	2.30	413	167	12	592	14.1	2.9
2003		53.62	2.65	51.86	53.88	2.66	410	210	15	635	13.7	3.6
2004		72.22	2.85	49.64	47.58	2.14	411	207	38	656	15.5	3.9
2005		62.47	2.99	58.47	62.38	2.99	396	187	19	602	10.8	3.0
2006		58.03	2.50	57.01	57.01	2.47	394	61	5	460	11.6	1.0
2007		50.62	2.42	53.93	59.40	2.70	400	0	0	400	13.0	0.0
2008		67.09	2.99	49.64	44.94	2.28	284	6	0	290	10.5	0.1
2009		59.89	2.20	54.08	51.18	1.97	294	3	0	297	9.1	0.1
2010		59.08	2.27	60.50	71.97	2.61	364	288	23	675	8.7	4.1
2011		72.40	2.85	60.63	64.87	2.64	501	579	40	1120	12.8	9.0
2012		41.69	1.92	63.73	66.56	2.63			696	1190	13.2	12.3
2013		35.53	1.78	60.85	57.68	2.45			112	451	10.3	2.1
2014		53.39	2.52	58.30	48.95	2.38			47	300	8.6	1.0
2015		52.00	2.30	61.03	53.33	2.33			30	240	6.5	0.6
2016												
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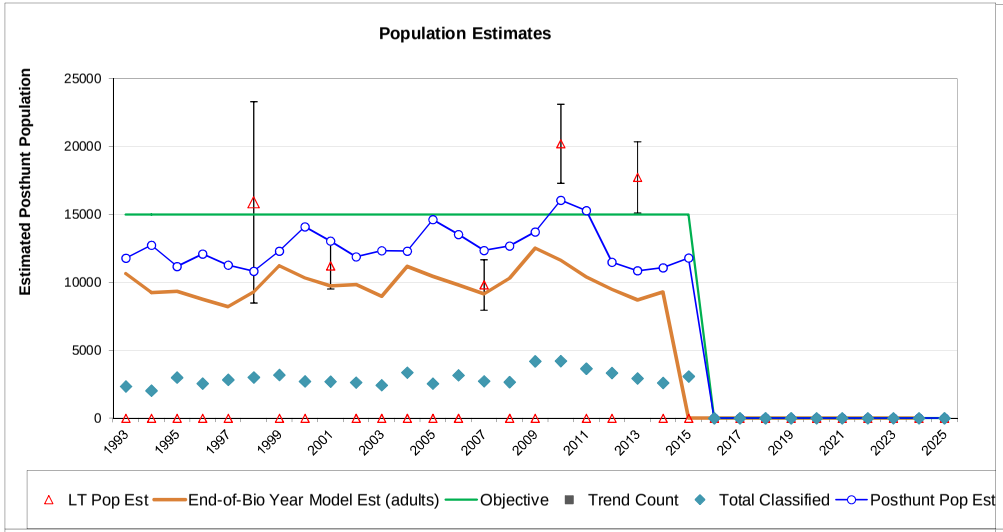
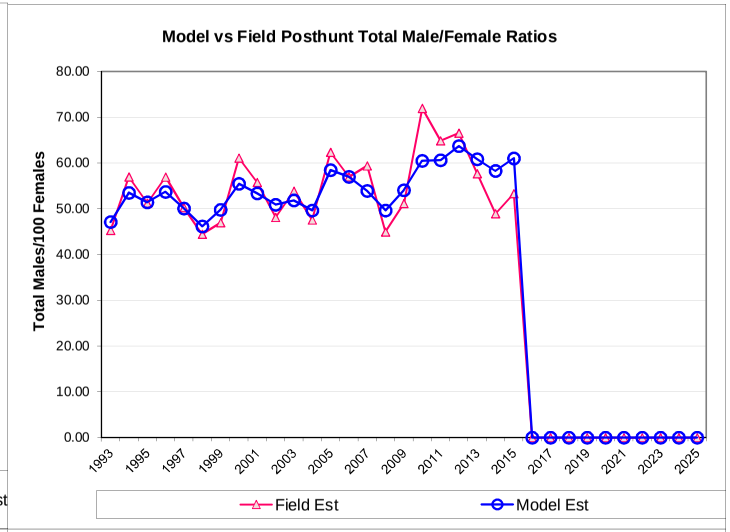
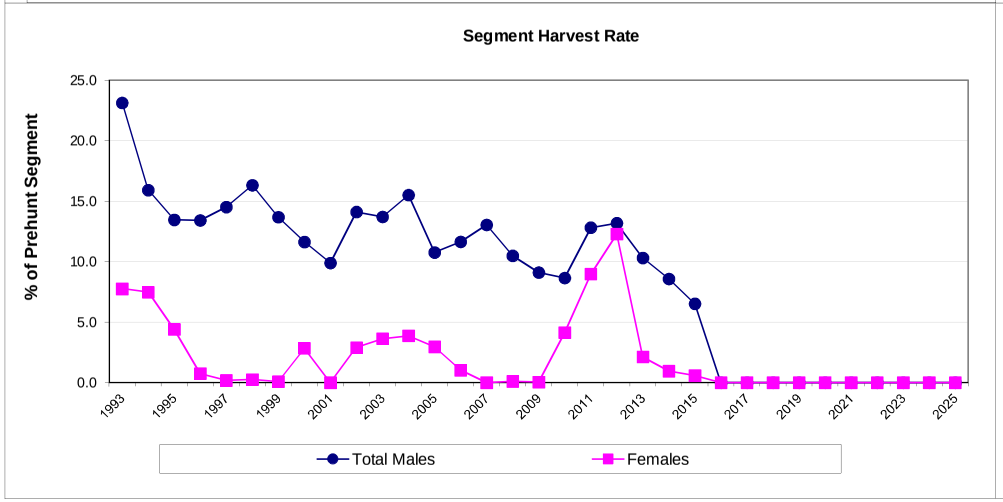
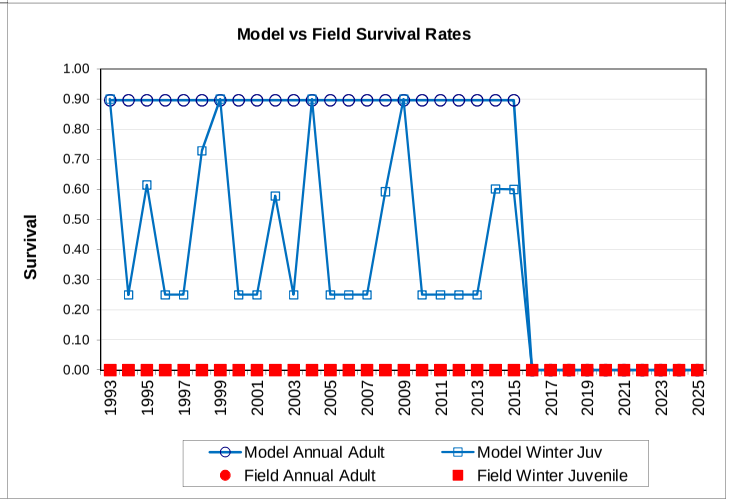
2025												

FIGURES









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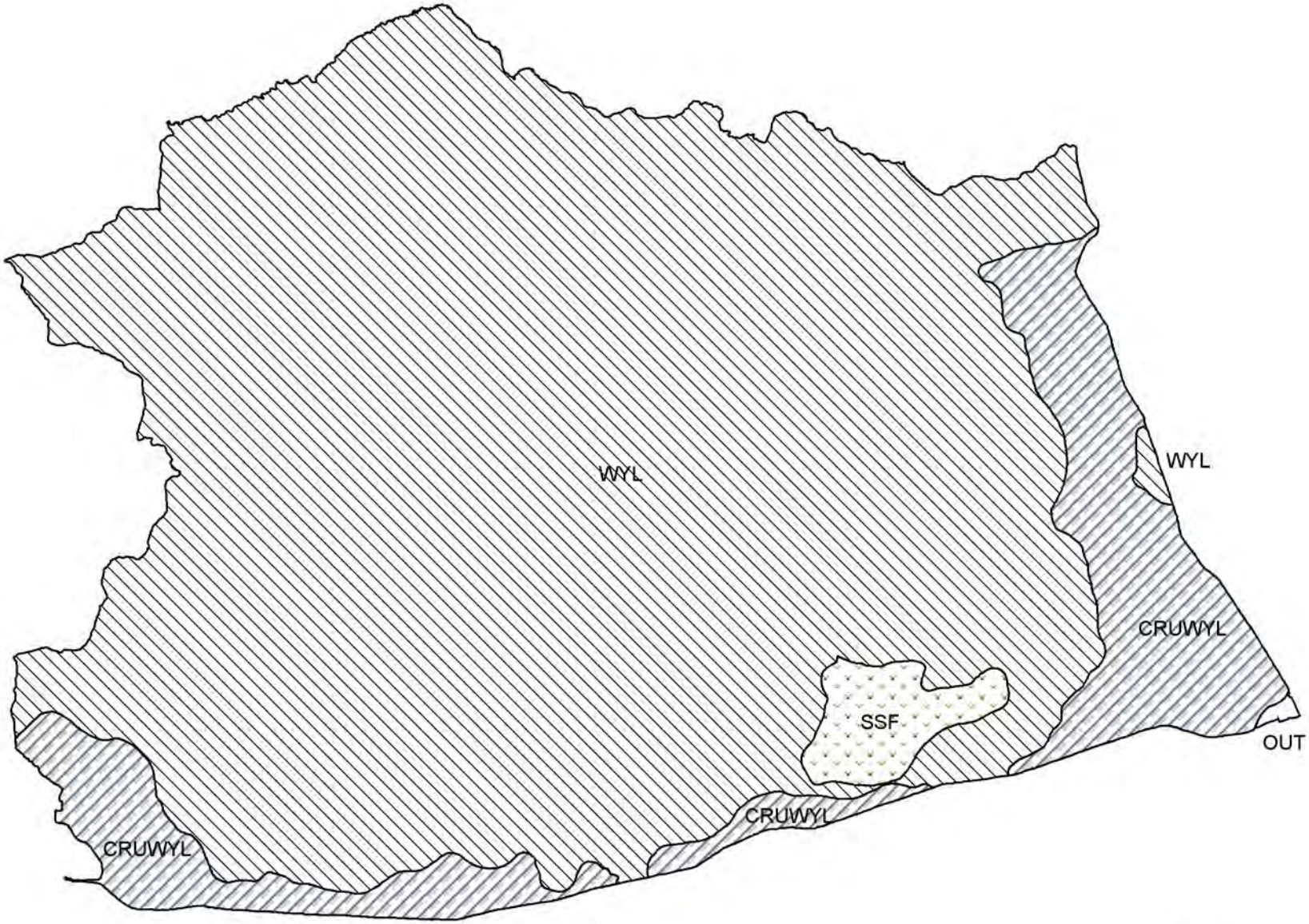


PH615 - Red Desert
HA 60, 61, 64
Revised - 3/94

2014 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2014 - 5/31/2015

HERD: PR630 - IRON SPRINGS

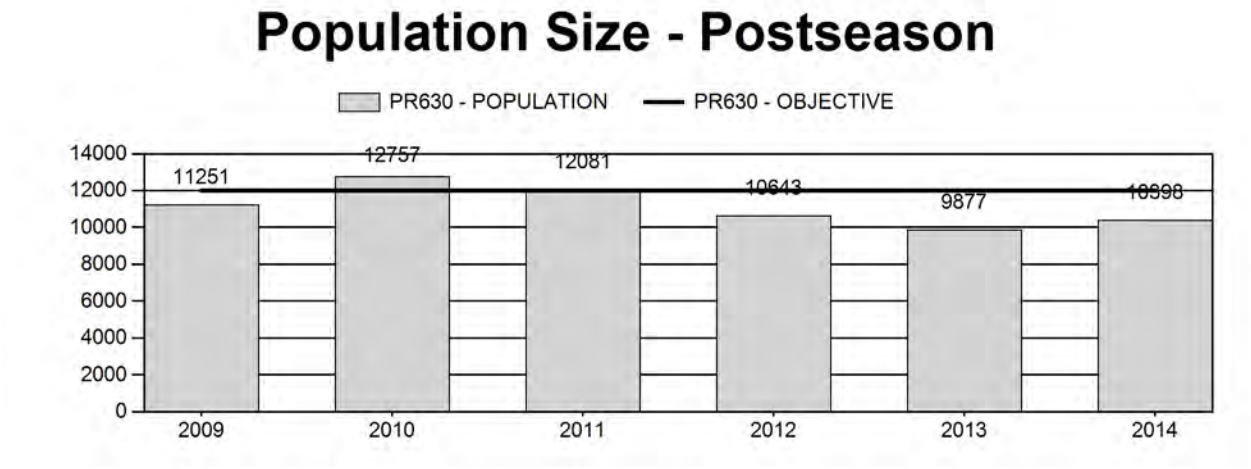
HUNT AREAS: 52, 56, 108 | PREPARED BY: GREG HIATT

	2009 - 2013 Average	2014	2015 Proposed
Population:	11,322	10,398	10,434
Harvest:	823	466	455
Hunters:	852	429	530
Hunter Success:	97%	109%	86 %
Active Licenses:	960	519	530
Active License Success:	86%	90%	86 %
Recreation Days:	2,858	1,424	1,520
Days Per Animal:	3.5	3.1	3.3
Males per 100 Females	44	45	
Juveniles per 100 Females	52	61	

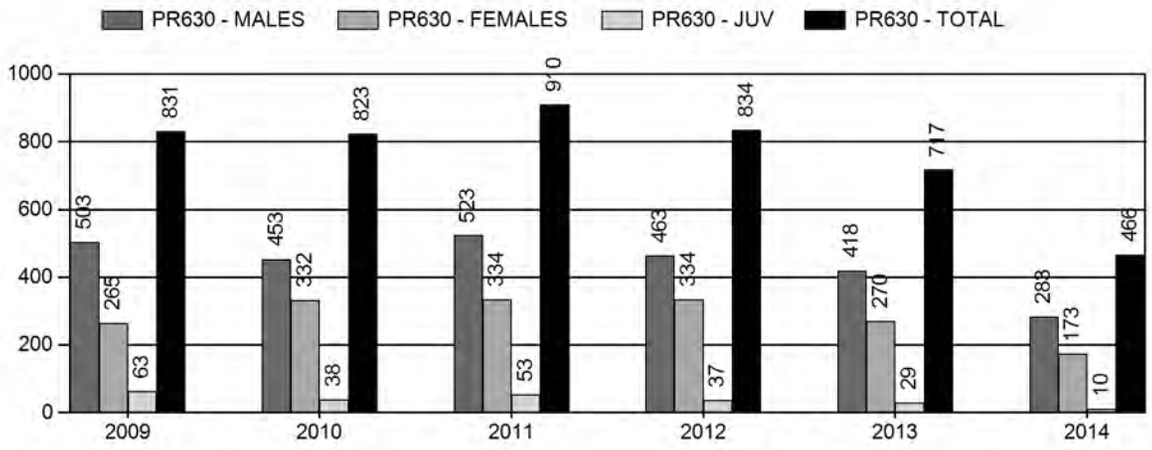
Population Objective (± 20%) :	12000 (9600 - 14400)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-13.4%
Number of years population has been + or - objective in recent trend:	3
Model Date:	3/3/2015

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

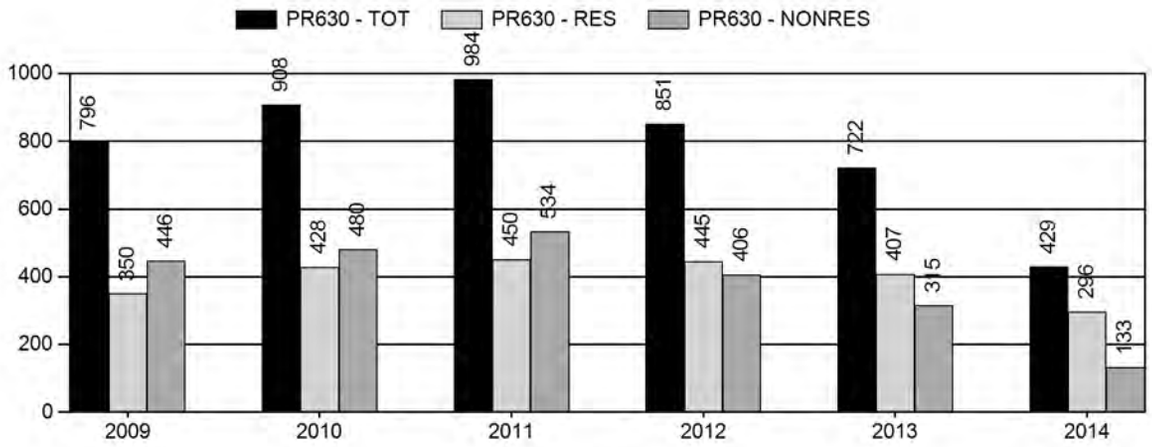
	JCR Year	Proposed
Females ≥ 1 year old:	3.1%	3.4%
Males ≥ 1 year old:	13.9%	9.6%
Juveniles (< 1 year old):	0.7%	0.7%
Total:	4.9%	4.2%
Proposed change in post-season population:	-4.5%	+0.3%



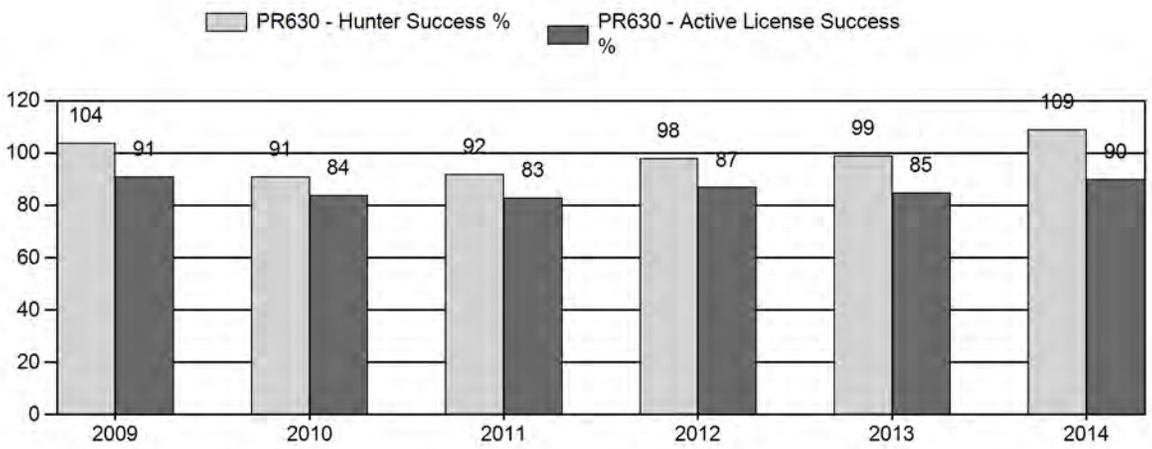
Harvest



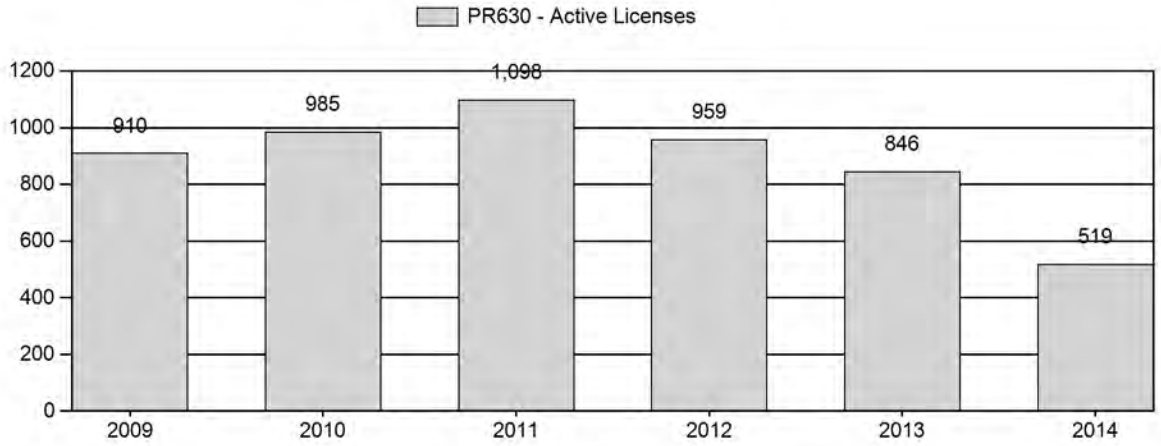
Number of Hunters



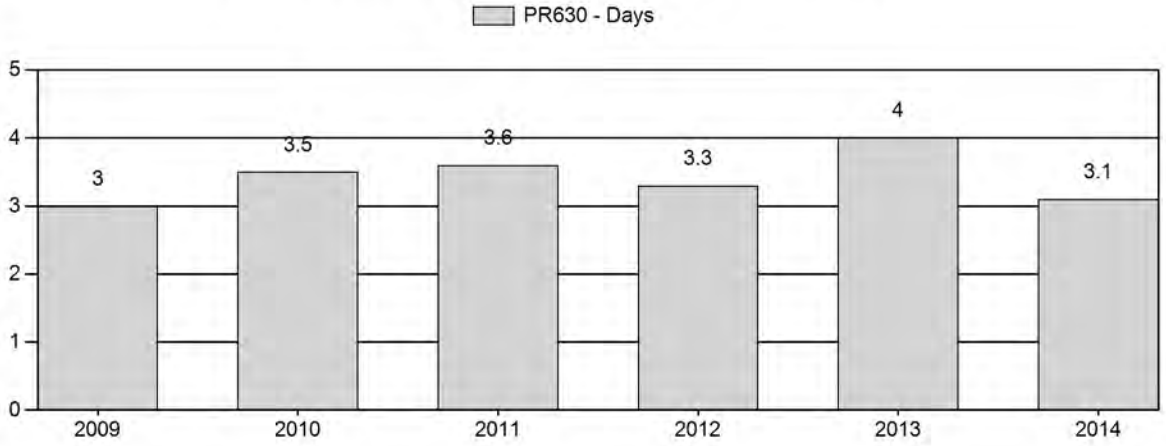
Harvest Success



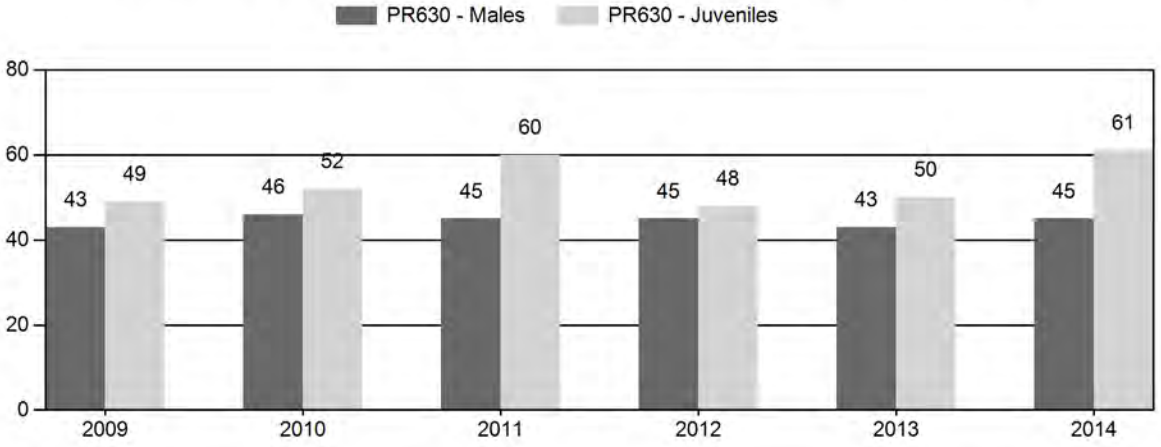
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 Preseason Classification Summary

for Pronghorn Herd PR630 - IRON SPRINGS

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	12,165	225	525	750	22%	1,764	52%	861	26%	3,375	1,343	13	30	43	± 3	49	± 3	34
2010	13,663	159	710	869	23%	1,874	50%	968	26%	3,711	1,477	8	38	46	± 3	52	± 3	35
2011	13,082	150	576	726	22%	1,627	49%	984	29%	3,337	1,791	9	35	45	± 3	60	± 3	42
2012	11,548	212	604	816	23%	1,801	52%	863	25%	3,480	1,295	12	34	45	± 3	48	± 3	33
2013	10,665	131	514	645	22%	1,488	52%	746	26%	2,879	1,336	9	35	43	± 3	50	± 3	35
2014	10,910	209	472	681	22%	1,518	49%	928	30%	3,127	1,823	14	31	45	± 3	61	± 4	42

2015 HUNTING SEASONS
IRON SPRINGS PRONGHORN HERD (PR630)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
52	1	Sep. 16	Oct. 31	100	Limited quota; any antelope
	2	Sep. 16	Nov. 14	100	Limited quota; any antelope valid south of North Spring Creek
	6	Sep. 16	Oct. 31	75	Limited quota; doe or fawn
	7	Sep. 16	Nov. 14	100	Limited quota; doe or fawn valid south of North Spring Creek
56	1	Sep. 20	Oct. 14	50	Limited quota; any antelope
108	1	Sep. 20	Oct. 14	75	Limited quota; any antelope
	6	Sep. 20	Oct. 14	50	Limited quota; doe or fawn
	7	Sep. 20	Nov. 30	50	Limited quota; doe or fawn valid south of the Bridger Pass Road (B. L. M. Road 3301), east of the Continental Divide and north of the Miller Hill Road (Carbon County Road 505W)
Archery					
52		Aug. 15	Sep. 15		Refer to Section 2 of this Chapter
56, 108		Aug. 15	Sep. 19		Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2014
52	1	0
	2	0
	6	0
	7	0
56	1	0
108	1	0
	6	0
	7	+50
Total	**1&2**	**0**
	6&7	**+50**

Management Evaluation

Current Management Objective: 12,000
Management Strategy: Recreation
2014 Postseason Population Estimate: ~10,400
2015 Proposed Postseason Population Estimate: ~10,430

The Iron Springs pronghorn herd is managed toward a post-hunt population size of 12,000 pronghorn, an objective last publicly reviewed in 1994. Population size is estimated using a spreadsheet model developed in 2012 and updated in 2015. The herd is in recreational management, with harvest quotas designed to maintain pre-hunt buck:doe ratios below 60:100. Objectives for this herd are currently under public review, with no changes proposed.

Herd Unit Issues

Construction of the proposed Chokecherry and Sierra Madre wind farms, consisting of roughly 1,000 turbines and the associated road network, could have significant impacts on important habitats in large portions of Areas 56 and 108, as well as the north portion of Area 52. Construction of several large, trans-continental powerlines would cross important winter habitats at the north edge of Area 56.

Access remains an issue in this herd unit, particularly in the checkerboard in association with the proposed Chokecherry and Sierra Madre wind farms. The Walk-In program has opened access to large blocks of private land, primarily in Area 52, which helped address concerns over large numbers of pronghorn residing on irrigated croplands during summer and fall.

The seasonal distribution map was last revised in March 1994 and no changes have been made since that review. Observations during winters since 1994 indicate consideration should be given to delineating crucial winter ranges south of Saratoga, southeast of Chokecherry Knob and near Fort Steele. Fences continue to pose barriers to pronghorn movements throughout much of the herd unit, increasing mortality during tough winters. Sheep-tight fences may also contribute to low fawn survival in pastures with limited water sources during dry summers.

Small acreages of crucial winter range have been lost to subdivision of deeded lands, primarily in the southern portion of the herd, and along Interstate Highway 80 in Area 56. Increased subdivision of these habitats, especially if these tracts are fenced, could seriously degrade the quality and utility of some winter ranges and migration routes. Development, partitioning, and fencing of these lands could have more deleterious effects on pronghorn migrations and habitat than some energy developments. Segregating land ownership among dozens of owners also deters recreational use of those divided lands and inter-mixed public lands.

Losses to EHD were confirmed in the South Ferris herd immediately north of Area 56 in late summer 2013 and the disease probably struck pronghorn in this herd as well. A mule deer fawn died of EHD at the southern tip of Antelope Area 108 so it is likely the disease spanned at least through the northern half of the Iron Springs herd unit.

Weather

Drought conditions in 2012 and 2013 continued into the first half of 2014, with significant precipitation not arriving until the last quarter of July. Precipitation during the following three months produced good vegetative growth, but was probably too late to significantly improve fawn survival for the drier portions of the herd. Condition of pronghorn going into the winter is expected to have been good. The 2014-15 winter had numerous bitter cold spells, coupled with

unusually warm periods, but little significant snowfall until late February. Losses may still be above average because some animals were dispersed off winter ranges prior to the late blizzards.

Habitat

This herd unit overlaps most of the western half of the Platte Valley Mule Deer herd, and habitats for pronghorn suffer the same low productivity due to overuse, decadent shrubs and drought. Treatments designed to improve habitat for mule deer through the Platte Valley Habitat Partnership are likely to improve habitats for pronghorn as well. Recent tebuthiuron treatments on top of Miller Hill in Area 108 and prescribed burns in Area 52 should improve summer ranges for pronghorn, at least in the short term.

Oil and gas drilling activity has tapered off in the herd unit, as most drilling rigs are active in more productive fields elsewhere in the country, but a successful shale oil well a few miles east of the herd unit may lead to increased interest here. Proposed strip mining of coal in Kindt Basin in Area 56 could damage winter habitats, but is unlikely to occur in the near future because of more competitive coal reserves elsewhere in the state and conflict with the Chokecherry wind farm. Increased interest in developing coalbed methane resources in southern Wyoming may lead to proposals to develop well fields to extract the methane from these coal seams.

Construction of the 1,000 turbine Chokecherry and Sierra Madre wind farms is predicted to begin next year. Planned revegetation of the massive road network necessary for this project is likely to improve summer forage for pronghorn, but will permanently remove browse in winter ranges and provide avenues for expansion of noxious weeds, as seen in gas fields to the west. Wind turbines have been shown to reduce soil moisture in their wind shadow and the large number of turbines in already arid habitats may remove the benefits gained from revegetation of roads and pads.

Field Data

Classification sample size increased in 2014 but was still the second smallest sample in 11 years. Area 52 followed this pattern. Classification sample size also increased for Area 56, but the five smallest samples ever collected from that area were in the past five years. Only Area 108 had a sample size that remained relatively stable over the past five years.

With increased precipitation during the latter half of the summer, fawn production improved to 61 fawns:100 does, the highest since 2005. As is typical, fawn production was lowest in Area 56 at 36:100. Production improved in Area 52 to 76:100, the highest recorded for that area since 2001. Fawn production in Area 108 remained stable at 42:100, for the third consecutive year.

The buck:doe ratio improved slightly in 2014 to 45:100, mostly from an increased number of yearling bucks in the sample, but has varied little in the past six years. The yearling buck:doe ratio for this herd was the highest in seven years, suggesting fawn survival through the 2013-14 winter was high. Yearling buck:doe ratios were similar for Areas 52 and 108, and above the recent 5-year averages. But Area 56 had a record low yearling buck:doe ratio, at 5:100, a consequence of the extremely poor 15:100 fawn:doe ratio recorded in that area in 2013. Adult buck:doe ratios declined in all three hunt areas, were highest in Area 52 and lowest in Area 56. If

access continues to be denied after the wind project is constructed, buck:doe ratios will be expected to rise in Area 56 and may exceed the maximum for recreational management. Overall, buck:doe ratios for this herd over the past eight years have been less than would be desired in areas with large blocks of public land.

Harvest Data

With the reduction in license quotas in 2014, hunter success increased to its highest level in five years, and the average number of days hunted for each pronghorn harvest dropped to its lowest level in five years. Hunter success increased for almost all license types in each of the three areas. Success was lowest for the Type 6 licenses in Area 108, at only 81 percent. Type 2 and Type 7 hunters in the southern portion of Area 52 fared better, with 86 and 87 percent respectively.

Surprisingly, the average number of days of effort required to harvest an animal was lowest in Area 56, where access is most difficult. Necessary effort was highest for hunters with Type 2 licenses in the southern portion of Area 52.

Population

This herd was more than 10 percent below objective size following severe losses during the 1992-93 winter and remained below objective size for the rest of that decade due to poor fawn production. Fawn production began to improve in 1999, particularly in Area 52, allowing the herd to quickly reach objective size and then exceed it by ~40 percent by 2002. Most of the population growth was associated with irrigated croplands in the southern portion of Area 52. Harvests were increased, especially with the addition of Type 2 and 7 licenses limited to the southern portion of Area 52. Harvest statistics and landowners' comments about low numbers of pronghorn in their fields indicate that strategy was successful.

Losses in the northern portion of the herd unit were high again during the 2007-08 winter and pronghorn densities in that portion of the herd have not recovered due to repeated poor fawn production in low desert habitats in Areas 56 and 108. Losses were not exceptional in Area 52 during that winter and fawn production remained adequate in that portion of the herd until 2012 and 2013.

Prior to the development of a reasonable spreadsheet model in mid-2012, population estimates suggested this herd was roughly at objective size through 2011. According to the spreadsheet model and a line transect survey flown in spring of 2012, the herd fell below objective in 2012. Continued doe/fawn harvest and poor fawn production have kept the herd at that level, roughly 17 percent below objective.

The Time-Specific Juvenile & Constant Adult Survival (TSJ/CA) spreadsheet model provided the best fit with observed buck:doe ratios for this herd and all three line transect estimates. It behaved predictably when 2014 classification and harvest data were added and is considered a "Fair" model of the herd. Annual adult survival is predicted at 90 percent, a reasonable value. Juvenile survival rates fluctuated within the allowed range and did not hover at maximum or minimum values for most years. The CJ,CA and SCJ,SCA models each had slightly lower AIC

values, but both models predicted herd sizes well below the confidence interval of the most recent line transect estimate and well above a 1993 line transect estimate. Both models generated roughly stable buck:doe estimates that did not track major dips and rises of observed values. Fawn production in 2015 was projected near the 5-year average. The model was run using a median juvenile survival in 2015.

Management Evaluation

With the population estimated to be more than 15 percent below objective, harvests should remain conservative to allow the herd to slowly recover. Recommended quotas were the same as in 2014 for all license types in Areas 52 and 56. To address concerns over high numbers of pronghorn in a localized area, 50 doe/fawn licenses were added for a portion of Area 108 using boundaries employed for the same purpose in 2003.

If fawn production and survival are near predicted levels, the expected harvest of roughly 255 bucks and 200 does and fawns from the 2015 license quotas should allow the herd to increase slightly, nearing 10,500 pronghorn.

Opening dates for licenses in Area 52 are the same as in 2013 and 2014 and coincide with seasons in neighboring Areas 50 and 51. As in the previous two years, the Type 2 and 7 licenses in the southern portion of this area are valid for an additional two weeks into November. The season in Area 52 entirely overlaps local deer and elk general license seasons. Opening dates for Areas 56 and 108 are the same as in the previous 16 years and coincide with neighboring Areas 53 and 55 of the Baggs herd. Closing dates for most license types in Areas 56 and 108 are again extended to the end of October. Closing date for the new Type 7 doe/fawn licenses in a limited portion of Area 108 is extended to the end of November. Archery seasons use standardized opening dates and close the day before the regular season opens for each area.

INPUT	
Species:	Pronghorn
Biologist:	Greg Hiatt
Herd Unit & No.:	630 = Iron Springs
Model date:	03/27/15

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	100	109	☐ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	106	126	☐ SCJ,SCA Mod	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	30	136	☑ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	2698	2925	5750	**11373**	2620	2141	5285	**10045**	3081	5996	**9077**	9382	1581		12000
1994	3423	3019	5877	**12319**	3321	2328	5421	**11070**	2836	5697	**8533**				12000
1995	2285	2780	5583	**10648**	2207	2117	5180	**9505**	2433	5268	**7700**				12000
1996	2950	2384	5162	**10497**	2896	1848	4977	**9722**	2727	5633	**8360**				12000
1997	2325	2673	5520	**10518**	2292	2209	5424	**9925**	2316	5303	**7619**				12000
1998	2977	2270	5197	**10443**	2953	1812	5135	**9900**	2821	5909	**8730**				12000
1999	3773	2765	5791	**12329**	3760	2317	5704	**11781**	3555	6698	**10253**				12000
2000	3976	3484	6564	**14024**	3966	3038	6480	**13484**	3783	6977	**10760**				12000
2001	4217	3707	6837	**14761**	4200	3273	6761	**14234**	4883	8119	**13003**				12000
2002	4878	4786	7957	**17620**	4861	4326	7831	**17017**	4657	7905	**12562**				12000
2003	4242	4564	7747	**16552**	4219	3870	7553	**15641**	4114	7543	**11656**				12000
2004	4812	4031	7392	**16235**	4791	3317	7221	**15329**	3694	7329	**11023**				12000
2005	4687	3620	7183	**15490**	4668	2870	6987	**14525**	4493	8325	**12818**				12000
2006	4658	4403	8159	**17219**	4625	3577	7941	**16143**	3890	7954	**11844**				12000
2007	4644	3812	7795	**16251**	4613	3094	7585	**15292**	3584	7754	**11338**				12000
2008	3699	3512	7599	**14810**	3687	3154	7441	**14282**	3415	7366	**10781**	13621	1158		12000
2009	3523	3347	7219	**14089**	3454	2794	6927	**13175**	3240	7057	**10296**				12000
2010	3572	3175	6916	**13663**	3530	2677	6550	**12757**	2928	6493	**9421**				12000
2011	3849	2869	6364	**13082**	3790	2294	5996	**12081**	2752	6105	**8858**	8736	884		12000
2012	2867	2697	5983	**11548**	2825	2192	5625	**10643**	2443	5622	**8065**				12000
2013	2762	2394	5509	**10665**	2730	1934	5212	**9877**	2424	5404	**7829**				12000
2014	3238	2376	5296	**10910**	3227	2065	5106	**10398**	2718	5480	**8198**				12000
2015	2900	2664	5370	**10934**	2878	2383	5172	**10434**							12000
2016															12000
2017															12000
2018															12000
2019															12000
2020															12000
2021															
2022															
2023															
2024															
2025															

Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.90			0.90		
1994	0.47			0.90		
1995	0.51			0.90		
1996	0.74			0.90		
1997	0.30			0.90		
1998	0.80			0.90		
1999	0.77			0.90		
2000	0.52			0.90		
2001	0.90			0.90		
2002	0.30			0.90		
2003	0.30			0.90		
2004	0.30			0.90		
2005	0.81			0.90		
2006	0.30			0.90		
2007	0.35			0.90		
2008	0.30			0.90		
2009	0.43			0.90		
2010	0.30			0.90		
2011	0.32			0.90		
2012	0.30			0.90		
2013	0.39			0.90		
2014	0.50			0.90		
2015	0.60			0.90		
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

Parameters:	Optim cells
Adult Survival =	0.899
Initial Total Male Pop/10,000 =	0.292
Initial Female Pop/10,000 =	0.575

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

	Classification Counts										Harvest	
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		46.93	2.11	50.87	48.87	2.17	713	423	71	1207	26.8	8.1
1994		58.25	2.90	51.37	54.15	2.76	628	414	93	1135	22.9	7.7
1995		40.93	2.01	49.79	49.79	2.28	602	366	71	1039	23.8	7.2
1996		57.15	2.50	46.18	46.18	2.17	487	168	49	704	22.5	3.6
1997		42.12	2.06	48.42	50.78	2.33	422	87	30	539	17.4	1.7
1998		57.29	2.68	43.68	41.83	2.17	416	56	22	494	20.2	1.2
1999		65.16	2.89	47.74	47.74	2.34	407	79	12	498	16.2	1.5
2000		60.58	2.76	53.08	53.08	2.52	406	76	9	491	12.8	1.3
2001		61.67	2.95	54.22	52.96	2.66	395	69	15	479	11.7	1.1
2002		61.30	2.78	60.14	70.60	3.07	418	115	15	548	9.6	1.6
2003		54.75	2.55	58.91	60.58	2.73	631	176	21	828	15.2	2.5
2004		65.09	2.53	54.54	53.56	2.22	649	155	19	823	17.7	2.3
2005		65.26	2.57	50.40	47.49	2.07	682	178	17	877	20.7	2.7
2006		57.10	2.22	53.96	54.40	2.15	751	198	30	979	18.8	2.7
2007		59.57	2.26	48.90	48.58	1.97	653	191	28	872	18.8	2.7
2008		48.67	2.04	46.22	48.50	2.04	325	144	11	480	10.2	2.1
2009		48.81	2.03	46.37	42.52	1.85	503	265	63	831	16.5	4.0
2010		51.65	2.04	45.91	46.37	1.90	453	332	38	823	15.7	5.3
2011		60.48	2.44	45.09	44.62	1.99	523	334	53	910	20.0	5.8
2012		47.92	1.98	45.08	45.31	1.91			326	823	18.7	6.0
2013		50.13	2.25	43.45	43.35	2.04			270	717	19.2	5.4
2014		61.13	2.55	44.86	44.86	2.07			173	466	13.1	3.6
2015		54.00	2.35	49.60	48.00	2.18			180	455	10.5	3.7
2016												
2017												
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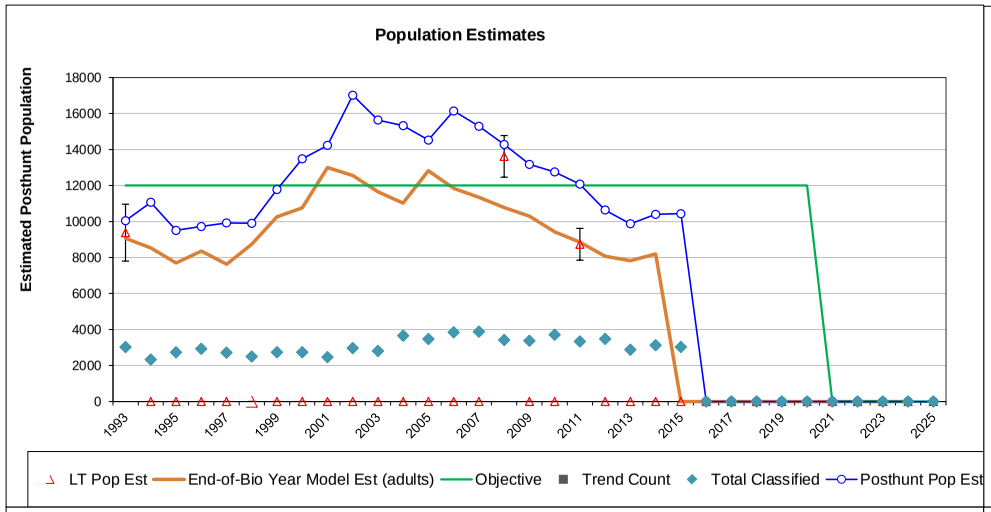
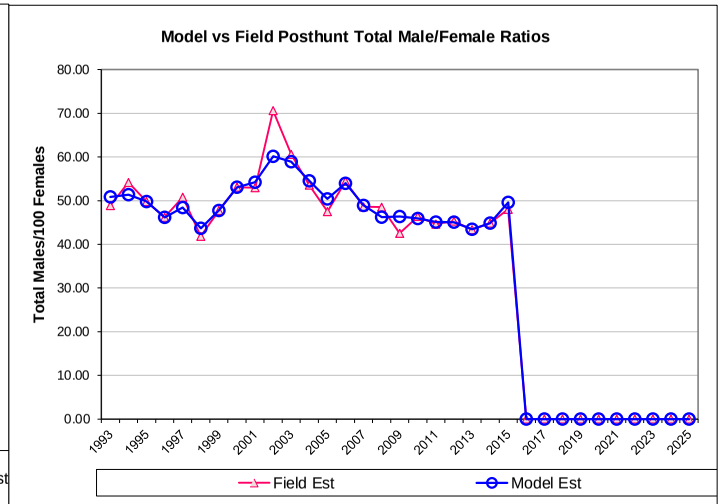
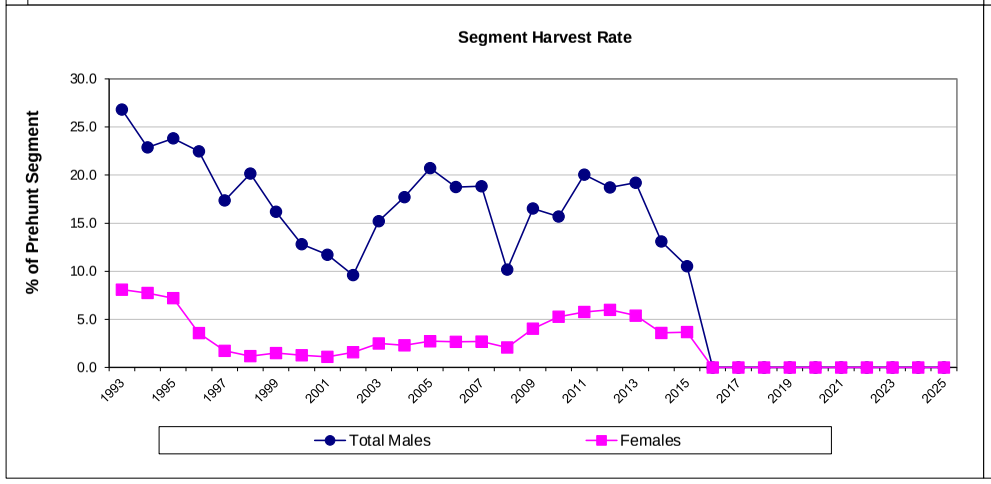
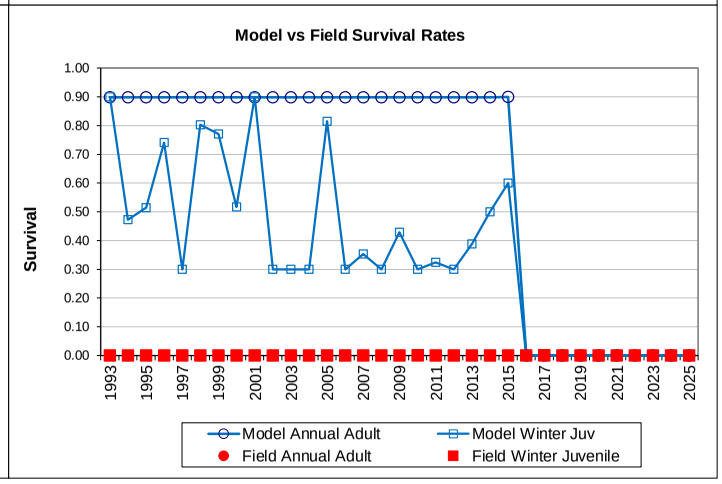
2023												
2024												
2025												

FIGURES









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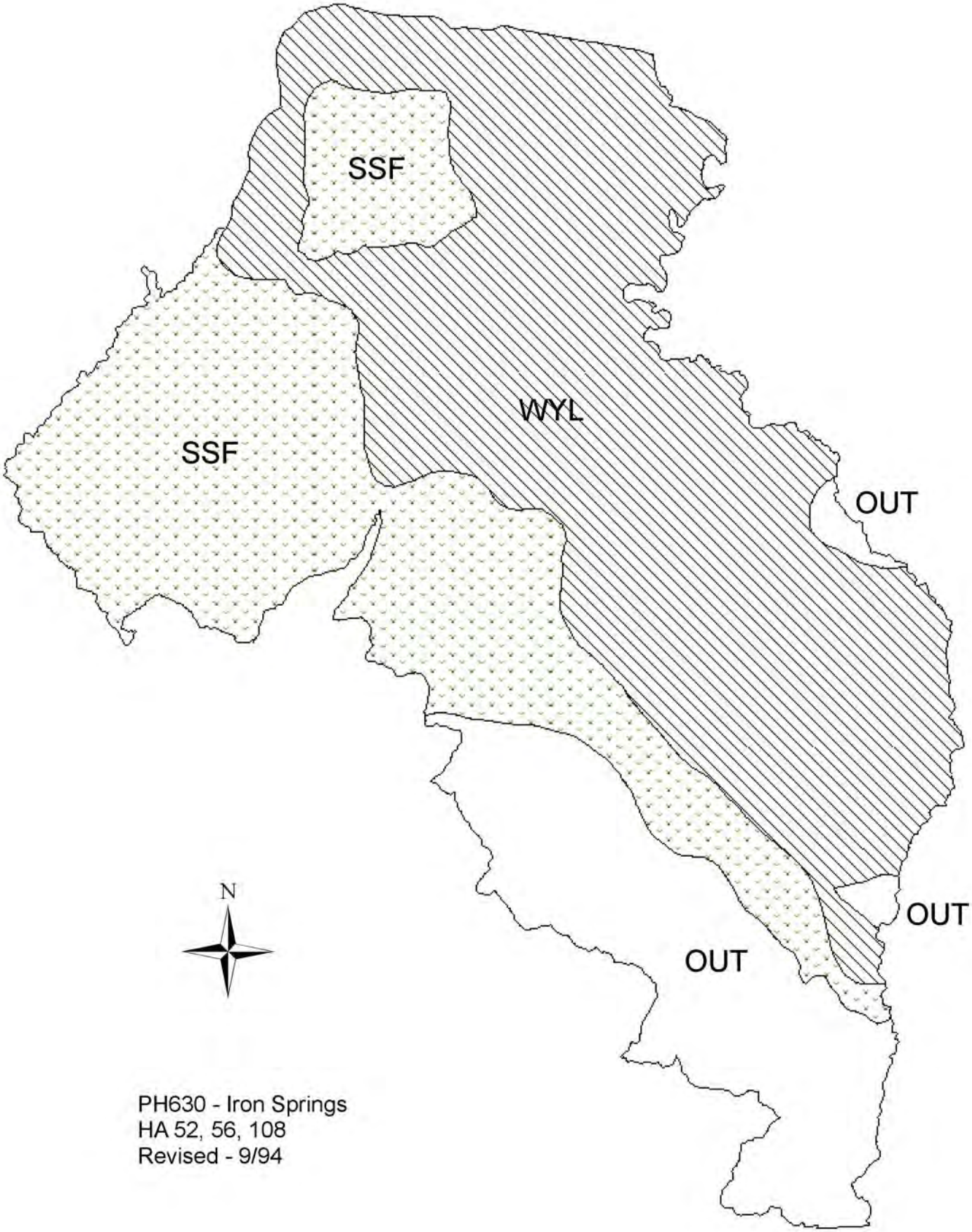
SSF
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PH630 - Iron Springs
HA 52, 56, 108
Revised - 9/94

2014 - JCR Evaluation Form

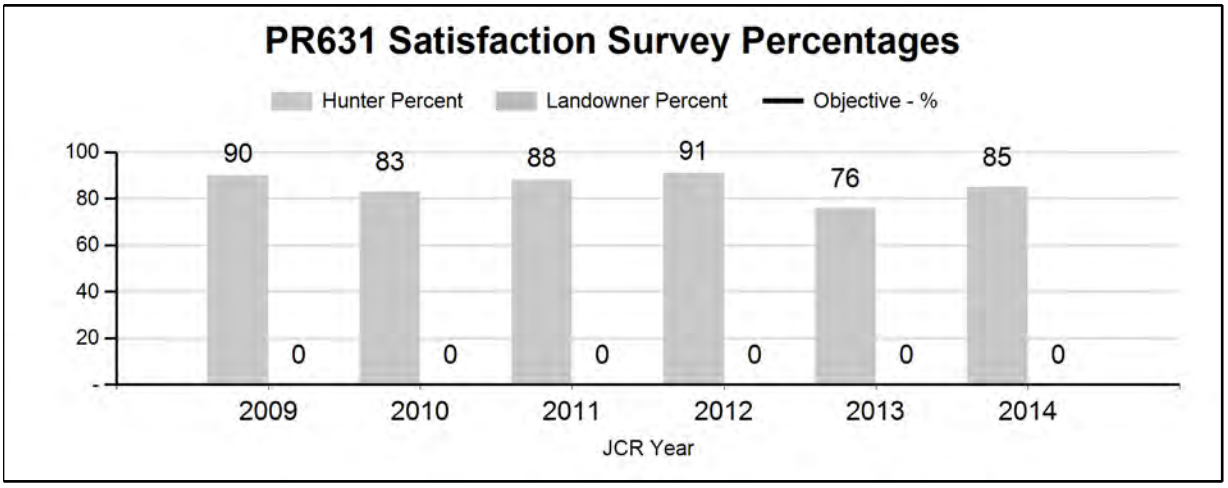
SPECIES: Pronghorn
HERD: PR631 - WIND RIVER
HUNT AREAS: 84

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

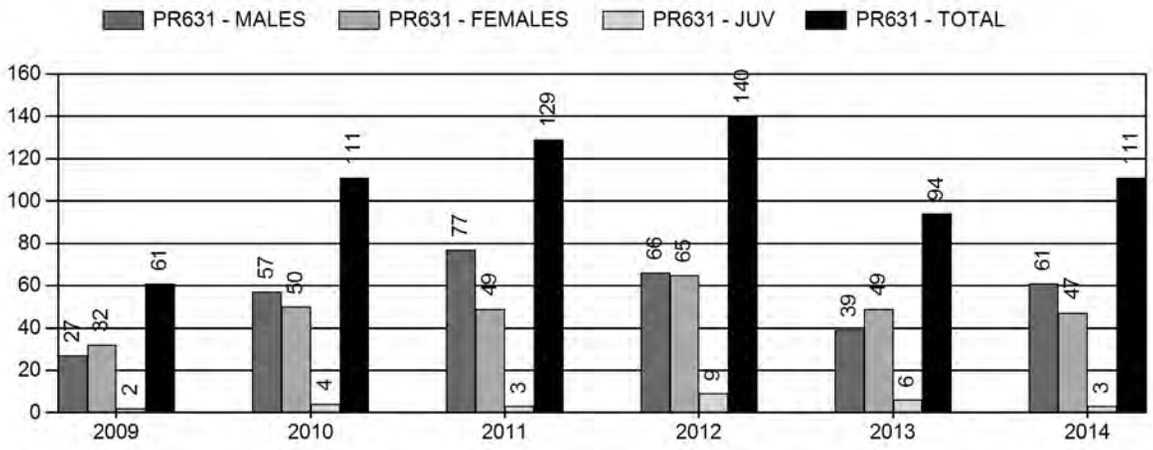
PREPARED BY: GREG ANDERSON

	2009 - 2013 Average	2014	2015 Proposed
Hunter Satisfaction Percent	85%	85%	85%
Landowner Satisfaction Percent	0%	0%	0%
Harvest:	107	111	120
Hunters:	106	101	110
Hunter Success:	101%	110%	109 %
Active Licenses:	132	130	140
Active License Success:	81%	85%	86 %
Recreation Days:	571	522	550
Days Per Animal:	5.3	4.7	4.6
Males per 100 Females:	32	20	
Juveniles per 100 Females	48	24	

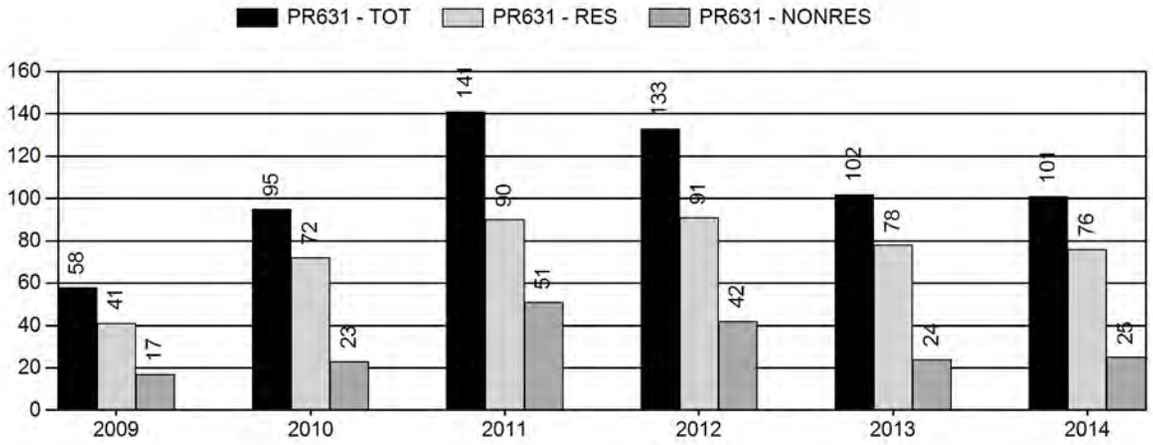
Satisfaction Based Objective	60%
Management Strategy:	Recreational
Percent population is above (+) or (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	1



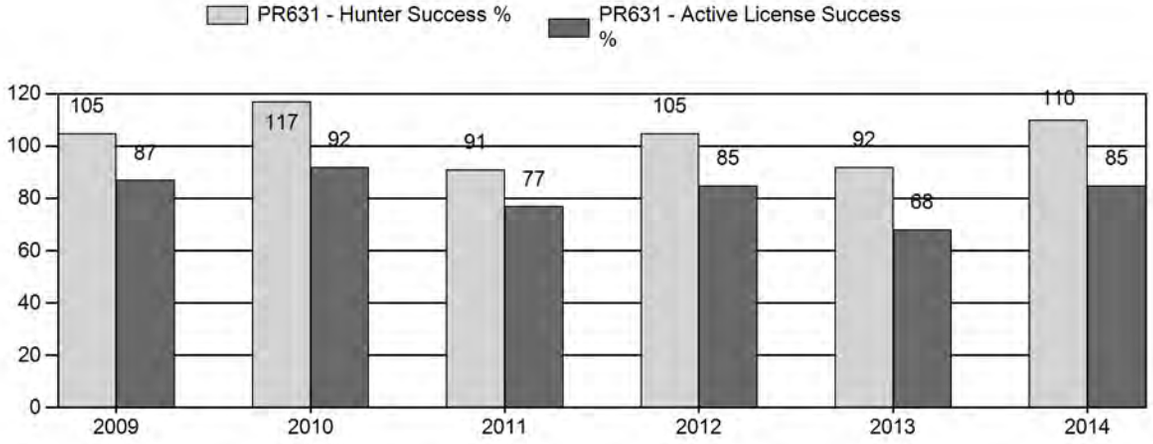
Harvest



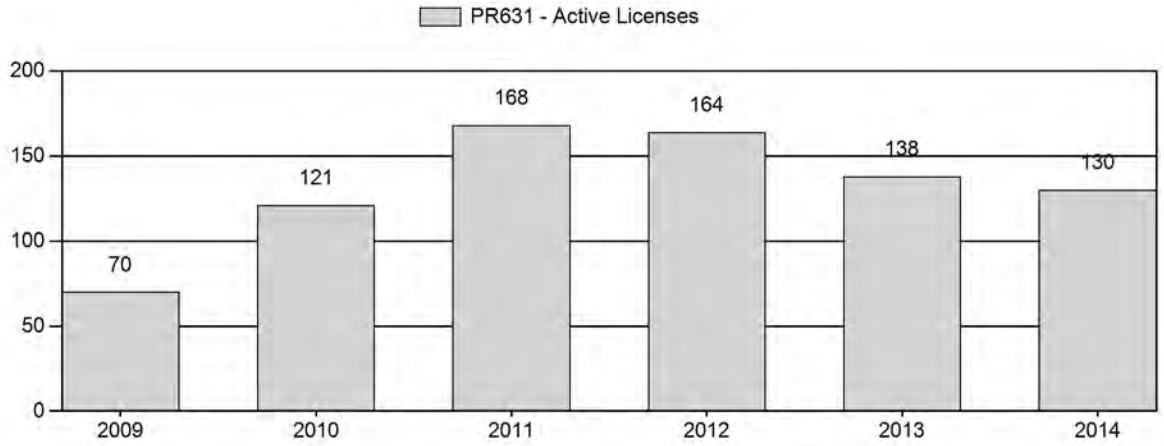
Number of Hunters



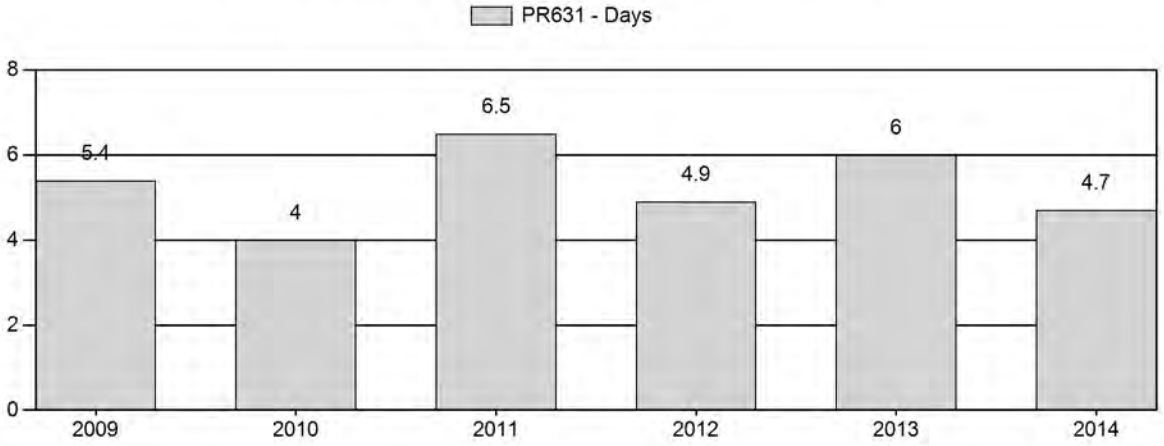
Harvest Success



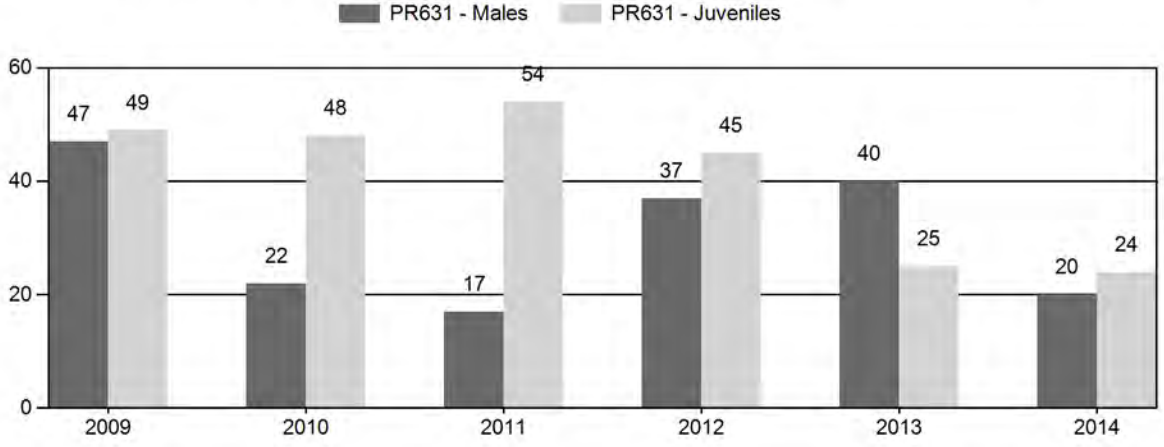
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 Preseason Classification Summary

for Pronghorn Herd PR631 - WIND RIVER

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	790	0	0	123	24%	262	51%	129	25%	514	523	0	0	47	± 0	49	± 0	34
2010	923	0	0	79	13%	352	59%	169	28%	600	541	0	0	22	± 0	48	± 0	39
2011	0	4	17	21	10%	124	58%	67	32%	212	0	3	14	17	± 0	54	± 0	46
2012	0	7	29	36	20%	97	55%	44	25%	177	0	7	30	37	± 0	45	± 0	33
2013	0	7	14	21	24%	52	60%	13	15%	86	0	13	27	40	± 0	25	± 0	18
2014	0	7	15	22	14%	110	70%	26	16%	158	0	6	14	20	± 0	24	± 0	20

2015 HUNTING SEASONS
WIND RIVER PRONGHORN (PR 631)

Hunt Area	Type	Season Dates Opens	Closes	Quota	Limitations
84	1	Sep. 19	Oct. 22	100	Limited quota; any antelope
	6	Sep. 19	Oct. 22	75	Limited quota; doe or fawn
Archery		Aug. 15	Sep. 18		Refer to Section 3 of this Chapter

Hunt Area	Type	Quota change from 2014
84	1	+25
Total	**1**	**+25**

Management Evaluation
Current Management Objective: Hunter Satisfaction 60%
Management Strategy: Recreational
2014 Hunter Satisfaction: 85%
3 year Average Hunter Satisfaction: 84%

Management Issues
The Wind River pronghorn management objective was reviewed and updated in 2014. The previous objective of 400 antelope had been in place since 1994. Due to a number of factors it was never possible to accurately estimate the antelope population in this herd. In response, the Department adopted an objective of maintaining 60% hunter satisfaction. Unlike other herd units with a satisfaction objective, the objective for this herd does not include a landowner satisfaction component for reasons outlined in the objective proposal. In conjunction with hunter satisfaction, this herd is managed for recreational opportunity.

Habitat/Weather
This pronghorn population occupies the upper Wind River basin west of the WRR. Much of the habitat throughout the herd unit is marginal or unsuitable. Pronghorn densities are highest on the east end of the herd unit where they occupy deer and elk winter range throughout the summer months. Some pronghorn winter on bare slopes in the mountain foothills, but many migrate east down the Wind River onto the WRR. Available habitat and climatic conditions seem to be the biggest factors limiting this population.

The past year was characterized by mild conditions and good vegetation growth throughout the herd unit. Vegetation transects monitored to determine the amount of forage available on elk winter range revealed herbaceous vegetation production was well above levels observed over the

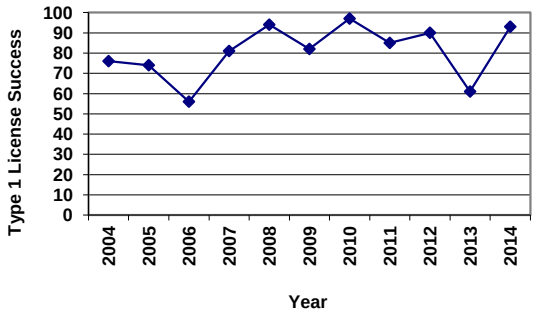
previous 2 years and was higher than the 20 year average for the area. No shrub data is collected in the herd unit, but the good growing conditions undoubtedly resulted in higher browse production then the previous 3 droughty years. Given the good feed resource in 2014, antelope in the herd unit undoubtedly entered winter in good shape. Fall weather was mild followed by significant snow and cold temperatures in December and January. After January, temperatures moderated and snow cover receded. Given mild to average winter conditions and excellent feed availability, antelope survival in 2014/15 is expected to be good.

Field/Harvest Data/Population

Classification samples have been collected from the ground and have been low over the past 4 years. Prior to that, classification data was collected aerially and sample sizes were much higher. In 2014 the classification sample was 158 antelope. Low classification samples are likely to remain the rule as long as ground classifications are conducted. Terrain, topography, and access to antelope summer range in the herd unit create difficulties. That said, the classification sample in 2014 yielded a very low fawn/doe ratio at 24/100. The buck/doe ratio was also extremely low at 20/100. Similar ratios were observed in 2013, but the sample size was even lower with only 86 antelope observed. Recent classification ratios should be viewed very skeptically given the low sample sizes.

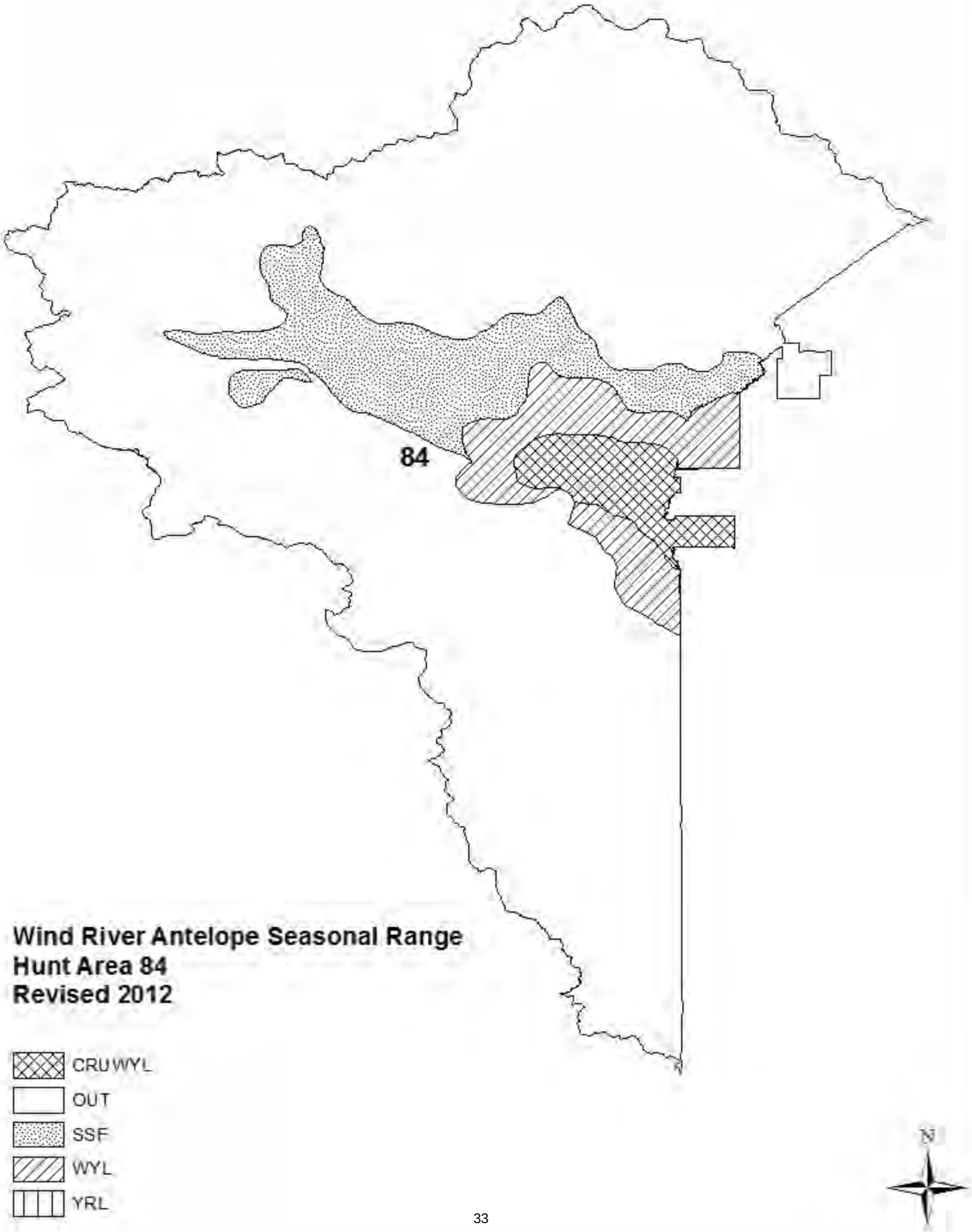
Despite the low buck/doe ratio observed during classification surveys, Type 1 license success was 93% in 2014. This was a significant increase over the 2013 success rate of 61%. It was also well above the 5 year average of 83%. The days/animal declined substantially from 7.1 in 2013 to 4.3 in 2014. Both of these statistics indicate hunters had an easier time harvesting an antelope in 2014. In conjunction with the higher success rate, hunter satisfaction increased from 76% in 2013 to 85% in 2014. The 2014 satisfaction rate was the same as the 5 year average for the herd unit.

Figure 1. Type 1 license success in the Wind River Antelope Herd



Management Summary

Given scarce demographic data it is difficult to determine trends in this herd unit. Anecdotally, based on public and personnel observations, it appears this population grew substantially from the middle to end of the past decade. Following a harsh winter in 2010 and extreme drought in 2012 and 2013 it seems the population declined somewhat, then increase again in 2014. Since hunter success and satisfaction both increased in 2014, additional recreational opportunity can be provided in 2015. In response to the increased satisfaction, Type 1 licenses will be increased by 25 in 2015.


84
Wind River Antelope Seasonal Range
Hunt Area 84
Revised 2012
CRU WYL
OUT
SSF
WYL
YRL
N

2014 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2014 - 5/31/2015

HERD: PR632 - BEAVER RIM

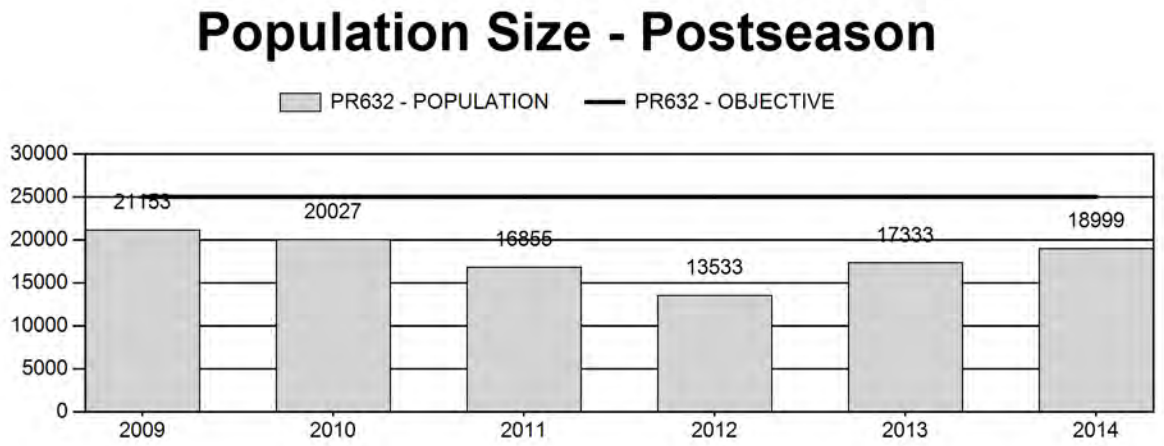
HUNT AREAS: 65-69, 74, 106 | PREPARED BY: STAN HARTER

	2009 - 2013 Average	2014	2015 Proposed
Population:	17,780	18,999	19,029
Harvest:	2,399	1,061	1,290
Hunters:	2,443	1,091	1,425
Hunter Success:	98%	97%	91%
Active Licenses:	2,747	1,212	1,400
Active License Success:	87%	88%	92%
Recreation Days:	7,751	3,746	4,000
Days Per Animal:	3.2	3.5	3.1
Males per 100 Females	54	55	
Juveniles per 100 Females	58	68	

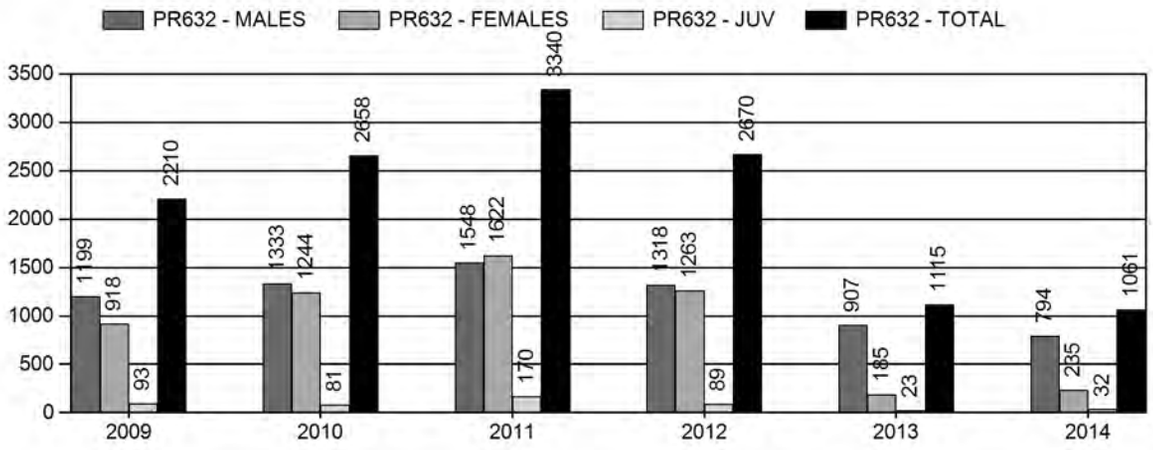
Population Objective (± 20%) :	25000 (20000 - 30000)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-24.0%
Number of years population has been + or - objective in recent trend:	7
Model Date:	2/25/2015

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

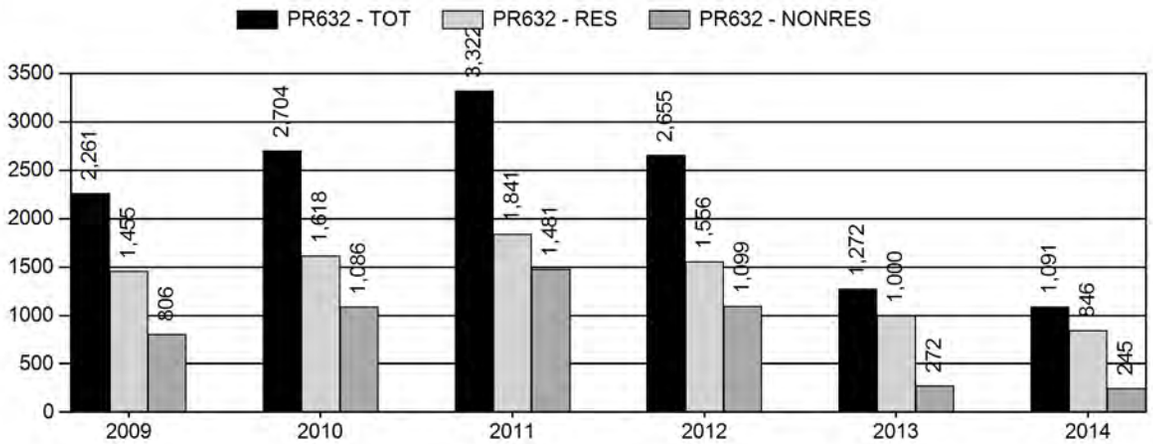
	JCR Year	Proposed
Females ≥ 1 year old:	2.8%	3.2%
Males ≥ 1 year old:	18.8%	23.4%
Juveniles (< 1 year old):	0.2%	0.2%
Total:	5.3%	6.8%
Proposed change in post-season population:	+7.4%	+0.2%



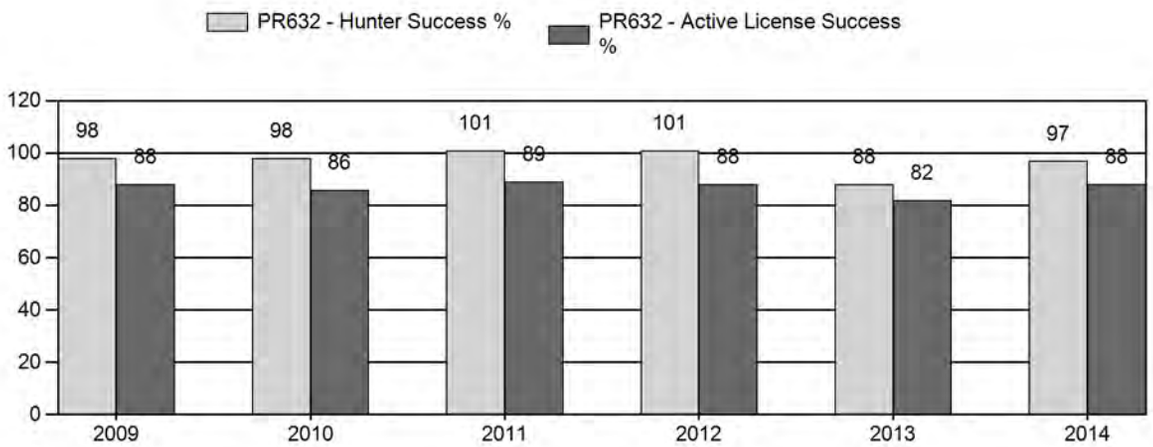
Harvest



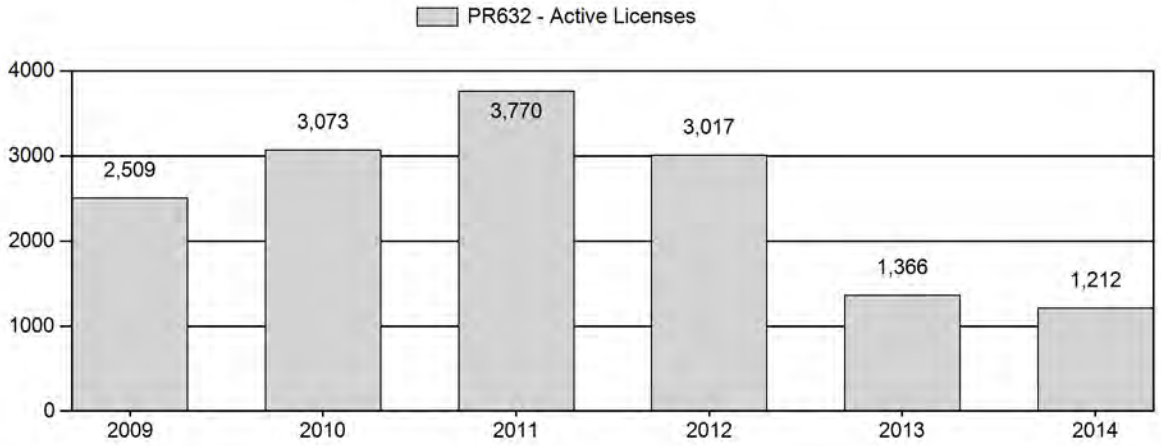
Number of Hunters



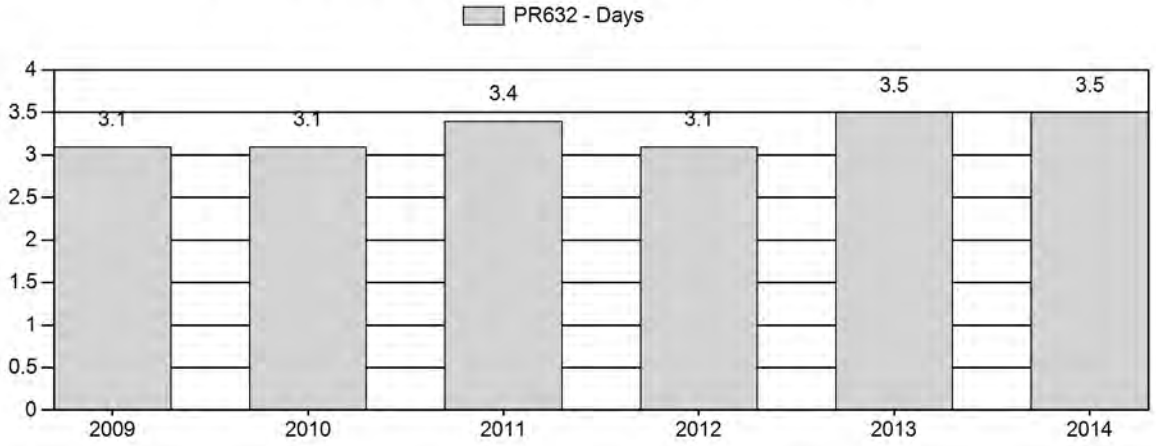
Harvest Success



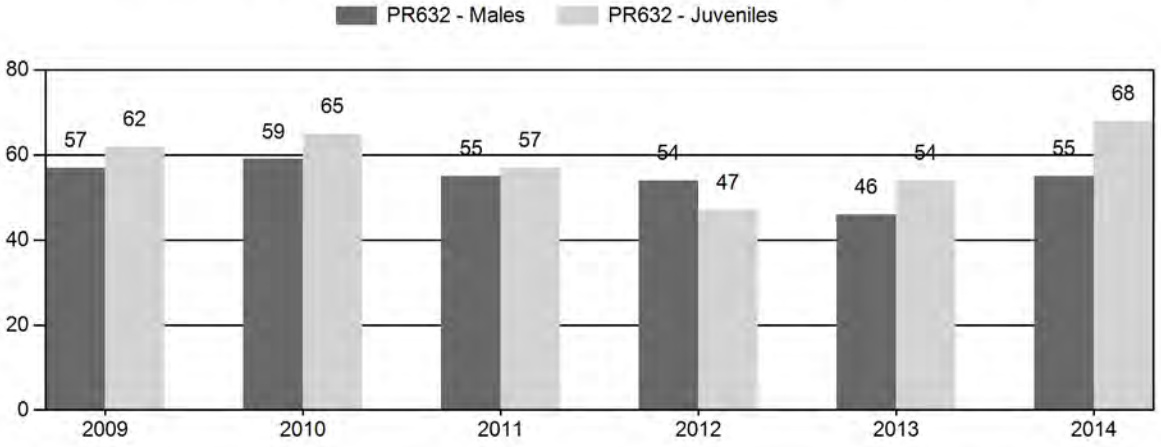
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 Preseason Classification Summary

for Pronghorn Herd PR632 - BEAVER RIM

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	23,584	649	1,673	2,322	26%	4,109	46%	2,529	28%	8,960	2,190	16	41	57	± 2	62	± 2	39
2010	22,951	778	1,745	2,523	26%	4,278	45%	2,800	29%	9,601	2,381	18	41	59	± 2	65	± 2	41
2011	20,529	521	1,413	1,934	26%	3,544	47%	2,011	27%	7,489	1,893	15	40	55	± 2	57	± 2	37
2012	16,470	317	1,234	1,551	27%	2,867	50%	1,350	23%	5,768	1,766	11	43	54	± 2	47	± 2	31
2013	18,560	149	1,314	1,463	23%	3,199	50%	1,725	27%	6,387	1,608	5	41	46	± 2	54	± 2	37
2014	20,166	419	1,240	1,659	25%	3,003	45%	2,035	30%	6,697	2,408	14	41	55	± 2	68	± 3	44

2015 HUNTING SEASONS
Beaver Rim Pronghorn Herd Unit (PR 632)

HUNT AREA	TYPE	Season Dates OPENS	CLOSES	2015 Quota	LIMITATIONS
65	1	Sept. 19	Oct. 22	75	Limited quota; any antelope
	6	Sept. 19	Oct. 22	25	Limited quota; doe or fawn
	7	Sept. 1	Nov. 15	75	Limited quota; doe or fawn valid north of the Little Popo Agie River
66	1	Sept. 19	Oct. 22	100	Limited quota; any antelope
	6	Sept. 19	Oct. 22	75	Limited quota; doe or fawn
67	1	Sept. 19	Oct. 22	275	Limited quota; any antelope
	6	Sept. 19	Oct. 22	25	Limited quota; doe or fawn
68	1	Sept. 19	Oct. 22	250	Limited quota; any antelope
	6	Sept. 19	Oct. 22	25	Limited quota; doe or fawn
69	1	Sept. 15	Oct. 31	100	Limited quota; any antelope
	6	Sept. 15	Oct. 31	25	Limited quota; doe or fawn
74	1	Sept. 19	Oct. 22	250	Limited quota; any antelope
	6	Sept. 19	Oct. 22	25	Limited quota; doe or fawn
106	1	Sept. 19	Oct. 22	50	Limited quota; any antelope
	6	Sept. 19	Oct. 22	25	Limited quota; doe or fawn

Archery

65-68, 74, 106	Aug. 15	Sept. 18	Refer to Section 3 of this Chapter
69	Aug. 15	Sept. 14	Refer to Section 3 of this Chapter

Hunt Area	Type	Change from 2014
66	**1**	+25
67	**1**	+25
69	**1**	+25
74	**1**	+50
106	**1**	-50
Total PR 632		**+100**

MANAGEMENT EVALUATION

Current Management Objective: 25,000
Management Strategy: Special (60-70 bucks/100 does)
2014 Post-season Population Estimate: ~19,000
2015 Post-season Population Estimate: ~19,000

Herd Unit Issues

Habitats are relatively intact with localized energy development and agricultural developments scattered throughout the herd unit, and urban/rural residential development occurring primarily near Lander. This population fluctuated below objective in the 1990s, reached objective in the mid-2000s, and has subsequently declined. The population increased in 2014 to about 19,000 pronghorn post-season, 24% below objective. The management objective has been reviewed, and a recommendation to maintain the population objective of 25,000 pronghorn is in process. This review included analyses of a potential combination of the Beaver Rim and Rattlesnake Pronghorn Herd Units, but data combinations did not lead to usable model or line-transect (LT) population estimates.

Weather/Habitat

Drought conditions were extreme to exceptional for most of 2011-13, beginning with minimal snowfall in winter 2011-12 and continuing with almost no precipitation during spring and summer 2012. In April 2013, a series of several late winter/early spring snow storms produced heavy snow through early May throughout the Beaver Rim Pronghorn Herd Unit. These storms were helpful in lessening the effects of drought, yet they only helped change the drought status from Extreme to Severe. Drought returned in summer 2013, with only 0.34 and 0.2 inches of precipitation recorded in Lander and Jeffrey City respectively from June 1 to September 1. This inhibited production in herbaceous and shrub species across the Beaver Rim herd unit, although some improvement over 2012 conditions was noted. Rain and snow returned to the area in September and October 2013, with nearly 300% of "normal" precipitation recorded in Lander and Jeffrey City with warm temperatures between early storms. Although winter 2013-14 had lower than average snowfall, the increase in soil moisture from the fall 2013 precipitation carried over into spring and was followed by good rainfall throughout most of the herd unit over summer 2014, leading to improvement in vegetation condition. Consequently, this led to improved pre-season fawn/doe ratios and should result in improved pronghorn survival over winter 2014-15. Winter 2014-15 was fairly mild, with above average temperatures and slightly below average snowfall/precipitation. Precipitation from April 1 through early May 2015 has been above average in Lander and Jeffrey City, and ahead of last year's pace. We anticipate habitat conditions will continue to improve as a result. Yet, due to long-term drought, many shrubs remain in poor condition and could contribute to pronghorn nutritional deficiencies and decreased survival.

Field Data

Fawn/doe ratios declined to a low of 47J/100F in 2012, but have recovered the past 2 years. The pre-season 2014 ratio of 68J/100F was the highest since 2004, and was 17% above the previous 5-year average. Buck/doe ratios recovered to 55M/100F in 2014, with the increase coming from recruitment of yearling bucks to a pre-season ratio of 14YM/100F. This followed an increase in the fawn/doe ratio in 2013 and favorable conditions through August 2014. Fawn/doe ratios varied by hunt area from 56J/100 to 73J/100F, while buck/doe ratios had higher variability between hunt areas, ranging from 37M/100F to 83M/100F. Conservative buck harvest is recommended for the near future to allow for replacement of younger age classes of bucks following low yearling buck/doe ratios in 2012 and 2013.

Harvest Data

License quotas were substantially reduced in 2013, with 2014 quotas remaining similar. Yet, harvest statistics indicated hunters in some hunt areas still had difficulty finding antelope. Hunter success in 2014 increased to 97% overall, along with active license success increasing from 82% to 88%. However, Type 1 (any antelope) hunters in hunt areas 69 and 106 had success rates of 72% and 76% respectively. Doe/fawn hunters saw overall good hunting success with a range of 85% to 100%. As a whole, it took 3.5 days of hunting for each animal harvested. This statistic was identical to that reported in 2013. Concerns about low pronghorn numbers were heard from hunters in a few areas, but less so than in 2013. Adjustments to the 2015 season structure have been made considering these variables, combined with variations in classification data to best fit harvest to individual hunt areas.

Population

A spreadsheet model was developed for this population in 2012. It has been updated utilizing 2014 pre-season classification and harvest data. The spreadsheet model (CJ/CA) works very well for Beaver Rim Pronghorn and tracks quite well with 7 line-transect (LT) estimates over the past 20 years. As such, we consider the model to be GOOD. The end-of-year estimates produced by the model run almost exactly through or very close to the LT estimates in 3 of 7 years, and through the confidence interval for 3 of the other 4 years (projected population is just below the last LT estimate's confidence interval in 2013). The model also produces post-season population estimates which closely follow trends observed by field personnel and the public. The population was at or slightly below objective for 7 years (2004 – 10), but declined sharply in 2011 and 2012, due to poor fawn recruitment as a result of intense drought. However, improved fawn/doe ratios in 2013 and 2014 indicate the population is recovering well and is moving back toward the current objective, with 19,000 pronghorn post-season 2014.

A line-transect survey was conducted in the Beaver Rim Pronghorn Herd Unit at the end of biological year 2013, with flights occurring on June 9-11, 2014 (Appendix 1). The survey required 21.7 hours to complete, including ferry time and travel to and from lines. Line-transect data were analyzed using DISTANCE (v6.2 Release 1). The half-normal/cosine estimator was selected based on minimum Akaike Information Criteria and ocular evaluation of model fit to the data histogram. The histogram for this analysis indicates detection of pronghorn was excellent (Figure 1). The best estimator had a low coefficient of variation (10.64), and the number of groups observed (333) exceeded the recommended minimum number of groups (100). The 2013 end-of-year population estimate derived by the Distance analysis of this line-transect survey was 16,521 pronghorn. This estimate represents a decline of 3,444 pronghorn -17%) compared to the line-transect estimate derived at the end of biological year 2010. The post-season population estimate of 19,000 produced by the spreadsheet model utilizes this LT, but aligns the end-of-year model projection just below the LT estimate's confidence interval.

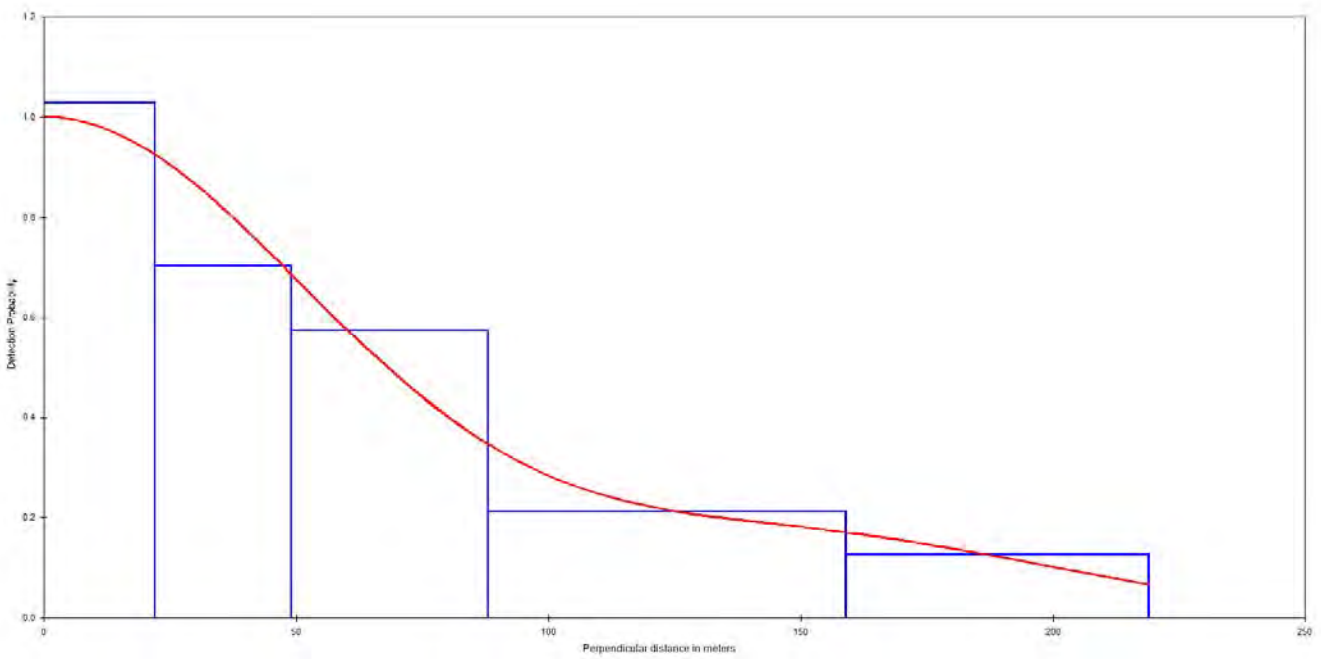


Figure 1. Histogram for line-transect (LT) Distance analysis completed at the end of bio-year 2013

Management Summary

For 2015, adjustments in license numbers were made to control localized private land damage situations, while providing hunter opportunity. The number of Type 1 licenses was reduced again in some areas, especially where buck/doe ratios fell or were already low. The overall buck/doe ratio of 55M/100F is about 8% below the minimum of 60M/100F needed to keep this population within the Department's Special Management criteria. The number of Type 1 license adjustments made for 2015 are intended to allow for improvement of buck/doe ratios toward that secondary objective. Current license quotas remain consistent with public comments received during hunting seasons and at public meetings.

The 2015 seasons may allow population improvement, if the weather patterns observed since fall 2013 continue and fawn production/survival improves. Doe/fawn licenses remain a part of the 2015 hunting season structure to address localized damage to private land hay crops. While growth in the number of pronghorn in the Lander Foothills may have stabilized, the number of Hunt Area 65 Type 7 licenses will remain at 75. At the request of at least one landowner who will provide access, the season length for that license will increase, ending on November 15. A total of 1,100 any antelope and 300 doe/fawn licenses will be available for 2015, and should result in a harvest of nearly 1,300 animals. With average survival in combination with our harvest, we anticipate the population to remain relatively stable at 19,000 pronghorn.

INPUT	
Species:	Pronghorn
Biologist:	Stan Harter
Herd Unit & No.:	Beaver Rim (PR632)
Model date:	02/25/15

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	110	119	☑ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	110	119	☐ SCJ,SCA Mode	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	89	191	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1994	4658	3831	9418	**17907**	4574	2980	8507	**16062**	3795	8860	**12655**				25000
1995	3860	3719	8683	**16262**	3860	3112	8664	**15636**	3779	8935	**12714**	12460	1658		25000
1996	5683	3703	8756	**18143**	5683	3056	8734	**17473**	4189	9464	**13653**				25000
1997	4921	4105	9275	**18301**	4900	3455	9246	**17602**	4350	9728	**14078**				25000
1998	5716	4263	9534	**19513**	5715	3604	9439	**18759**	4700	10111	**14811**	15290	2692		25000
1999	5673	4606	9909	**20188**	5662	3838	9869	**19369**	4887	10495	**15382**				25000
2000	5677	4789	10285	**20751**	5658	4012	10199	**19869**	5042	10791	**15833**				25000
2001	5367	4941	10575	**20883**	5360	4288	10550	**20198**	5235	11046	**16281**	14650	2577		25000
2002	5368	5131	10825	**21324**	5363	4451	10751	**20565**	5383	11226	**16609**				25000
2003	6268	5275	11002	**22546**	6267	4488	10873	**21628**	5638	11565	**17203**				25000
2004	7912	5525	11334	**24771**	7886	4786	11113	**23785**	6324	12182	**18506**	19677	2176		25000
2005	7836	6197	11939	**25972**	7810	5425	11612	**24847**	6887	12610	**19498**				25000
2006	7382	6750	12358	**26490**	7335	5741	11801	**24877**	7026	12633	**19659**				25000
2007	7419	6886	12380	**26685**	7345	5553	11573	**24470**	6816	12394	**19210**	17919	2347		25000
2008	7235	6679	12146	**26061**	7138	5493	11263	**23894**	6717	12043	**18761**				25000
2009	7264	6583	11803	**25650**	7162	5264	10793	**23219**	6498	11603	**18102**				25000
2010	7443	6368	11371	**25182**	7354	4902	10003	**22259**	6204	10894	**17098**	19965	2762		25000
2011	6058	6079	10676	**22814**	5871	4377	8892	**19140**	5293	9429	**14722**				25000
2012	4351	5188	9240	**18778**	4253	3738	7851	**15841**	4854	9383	**14236**				25000
2013	4958	4757	9195	**18910**	4933	3759	8991	**17683**	4740	9440	**14181**	16521	1758		25000
2014	6269	4645	9252	**20166**	6234	3772	8993	**18999**	4753	9782	**14536**				25000
2015	6203	4658	9587	**20448**	6176	3569	9284	**19029**							25000
0															25000
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Survival and Initial Population Estimates

Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1994	0.50			0.90		
1995	0.50			0.90		
1996	0.50			0.90		
1997	0.50			0.90		
1998	0.50			0.90		
1999	0.50			0.90		
2000	0.50			0.90		
2001	0.50			0.90		
2002	0.50			0.90		
2003	0.50			0.90		
2004	0.50			0.90		
2005	0.50			0.90		
2006	0.50			0.90		
2007	0.50			0.90		
2008	0.50			0.90		
2009	0.50			0.90		
2010	0.50			0.90		
2011	0.50			0.90		
2012	0.50			0.90		
2013	0.50			0.90		
2014	0.50			0.90		
2015	0.50			0.90		
0						
0						
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Parameters:	Optim cells
Juvenile Survival =	0.501
Adult Survival =	0.899
Initial Total Male Pop/10,000 =	0.383
Initial Female Pop/10,000 =	0.942

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

	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Males	Females	Juveniles	Total Harvest	Total Males	Females
1994		49.46	1.66	40.67	43.14	1.52	773	828	76	1677	22.2	9.7
1995		44.45	1.71	42.83	44.31	1.71	552	17	0	569	16.3	0.2
1996		64.91	2.21	42.30	36.32	1.50	589	20	0	609	17.5	0.3
1997		53.06	1.85	44.26	45.98	1.68	591	26	19	636	15.8	0.3
1998		59.96	1.95	44.72	48.77	1.70	599	86	1	686	15.5	1.0
1999		57.25	1.80	46.48	44.16	1.52	698	37	10	745	16.7	0.4
2000		55.20	1.75	46.56	48.18	1.59	706	78	18	802	16.2	0.8
2001		50.75	1.66	46.73	45.31	1.54	594	23	6	623	13.2	0.2
2002		49.59	1.66	47.40	41.20	1.47	618	67	5	690	13.2	0.7
2003		56.97	1.84	47.95	47.74	1.64	716	117	1	834	14.9	1.2
2004		69.81	2.03	48.75	51.63	1.65	672	201	24	897	13.4	2.0
2005		65.64	1.88	51.91	56.74	1.70	702	297	24	1023	12.5	2.7
2006		59.74	1.73	54.62	60.33	1.74	917	507	43	1467	14.9	4.5
2007		59.92	1.63	55.62	54.37	1.52	1212	734	67	2013	19.4	6.5
2008		59.57	1.59	54.99	56.95	1.54	1079	803	88	1970	17.8	7.3
2009		61.55	1.56	55.77	56.51	1.47	1199	918	93	2210	20.0	8.6
2010		65.45	1.59	56.00	58.98	1.48	1333	1244	81	2658	23.0	12.0
2011		56.74	1.58	56.94	54.57	1.54	1548	1622	170	3340	28.0	16.7
2012		47.09	1.55	56.14	54.10	1.71	1318	1263	89	2670	27.9	15.0
2013		53.92	1.61	51.73	45.73	1.44	907	185	23	1115	21.0	2.2
2014		67.77	1.95	50.21	55.24	1.69	794	235	32	1061	18.8	2.8
2015		64.71	1.77	48.59	58.82	1.66	990	275	25	1290	23.4	3.2
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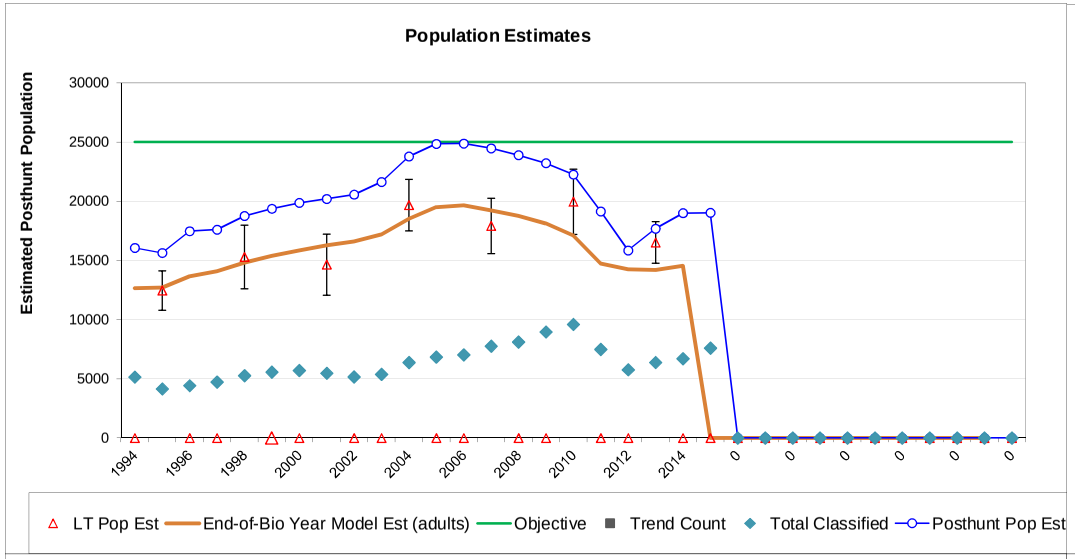
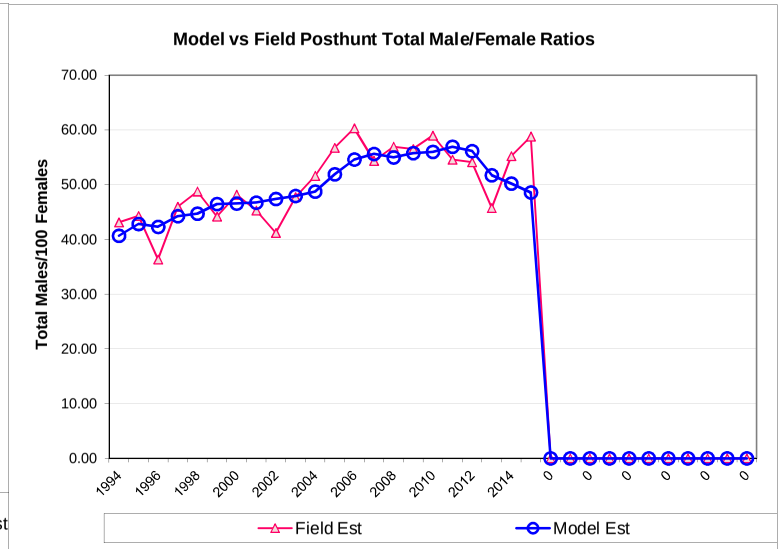
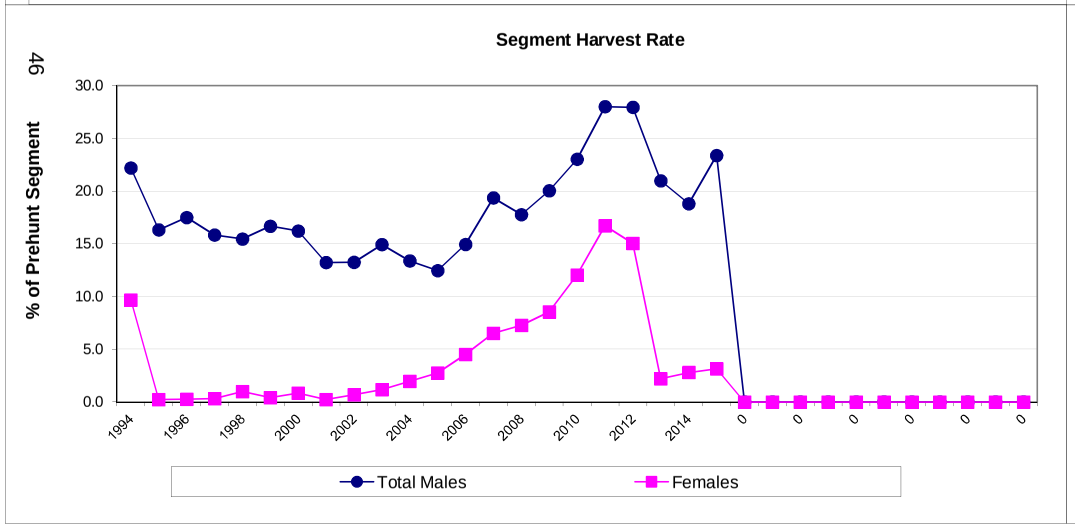
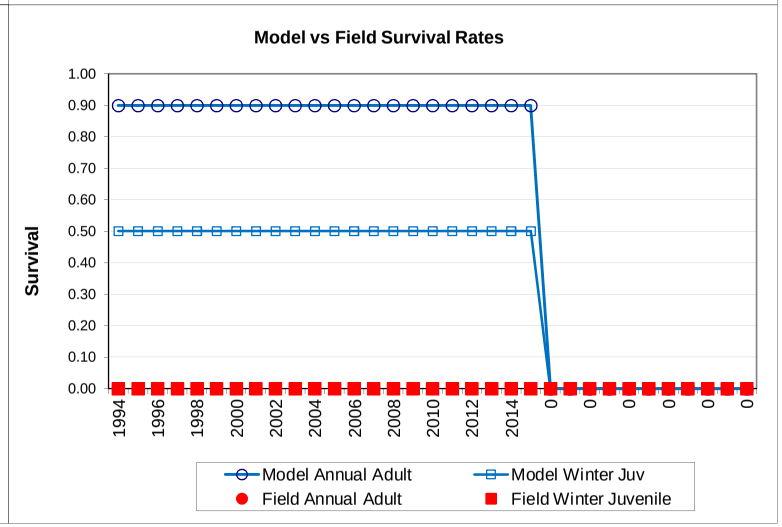
FIGURES









Comments:

Appendix 1.

2013 PR632 - BEAVER RIM Pronghorn Line-Transect Summary

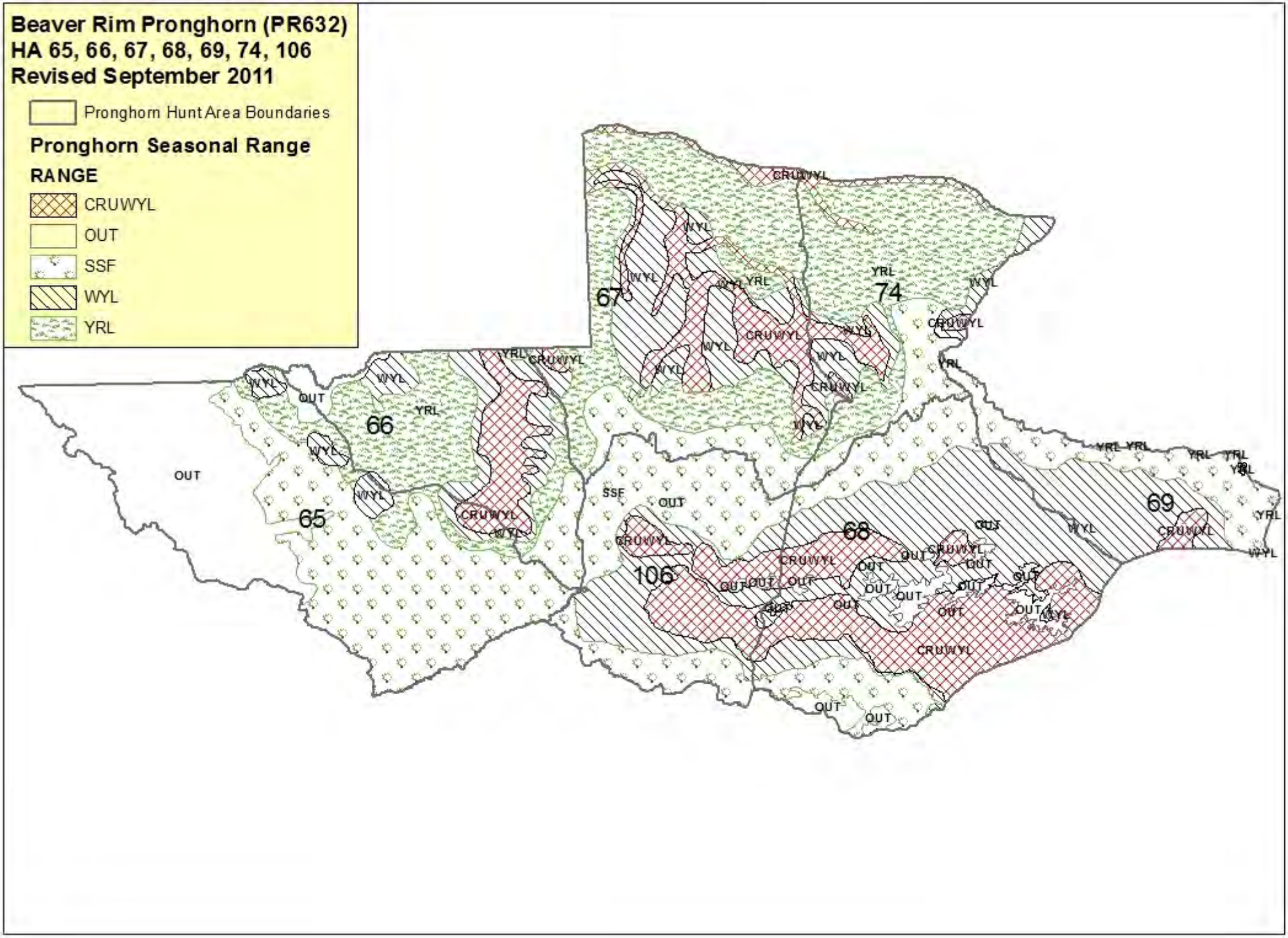
Survey Dates:	6/9/2014 - 6/11/2014
Survey Cost:	$ 5,875.00
Flight Service:	LAIRD FLYING SERVICE
Aircraft:	HUSKY AVIAT A1C
Observers:	Harter, G. Anderson

Weather Conditions:

Temperature (Degrees Fahrenheit):	65
Cloud Cover (%):	0
Wind Speed (MPH):	0 - 20

Transect Limits:	106 50 to 108 46
Transect Direction:	North/South
Transect Interval (Minutes of Longitude):	4
Transect Length: (Mi.):	1,032
Transect Altitude (AGL):	329 ft.

Occupied Habitat (mi^2):	3,620
Density Estimate (Animals/mi^2 with Confidence Intervals):	4.56 (3.7 - 5.6)
Population Estimate (with Confidence Intervals):	16,521 (13,392 - 20,382)


Beaver Rim Pronghorn (PR632)
HA 65, 66, 67, 68, 69, 74, 106
Revised September 2011
Pronghorn Hunt Area Boundaries
Pronghorn Seasonal Range
RANGE
CRUWYL
OUT
SSF
WYL
YRL
65
66
67
68
69
74
106

2014 - JCR Evaluation Form

SPECIES: Pronghorn

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

HERD: PR634 - BADWATER

HUNT AREAS: 75

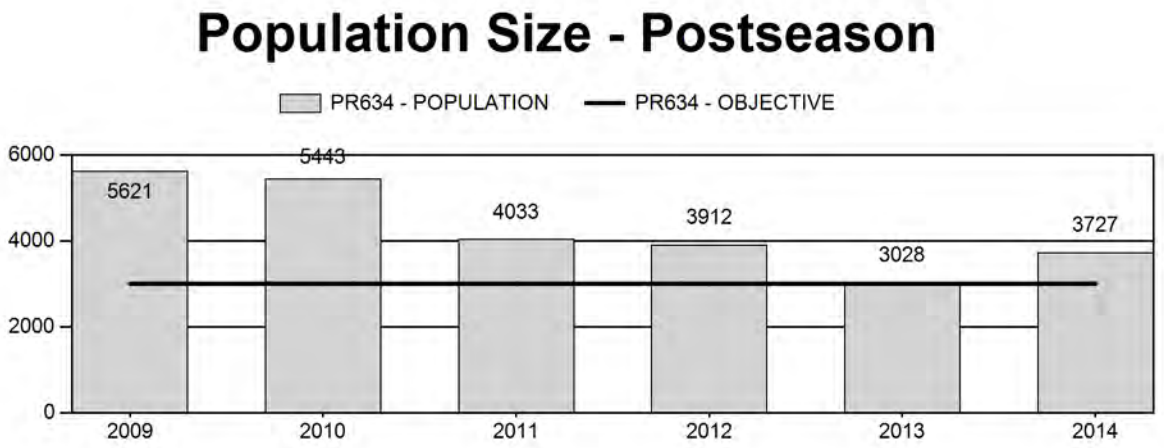
PREPARED BY: GREG ANDERSON

	2009 - 2013 Average	2014	2015 Proposed
Population:	4,407	3,727	3,396
Harvest:	657	219	455
Hunters:	678	270	475
Hunter Success:	97%	81%	96 %
Active Licenses:	735	282	500
Active License Success:	89%	78%	91 %
Recreation Days:	2,175	560	1,600
Days Per Animal:	3.3	2.6	3.5
Males per 100 Females	62	67	
Juveniles per 100 Females	49	70	

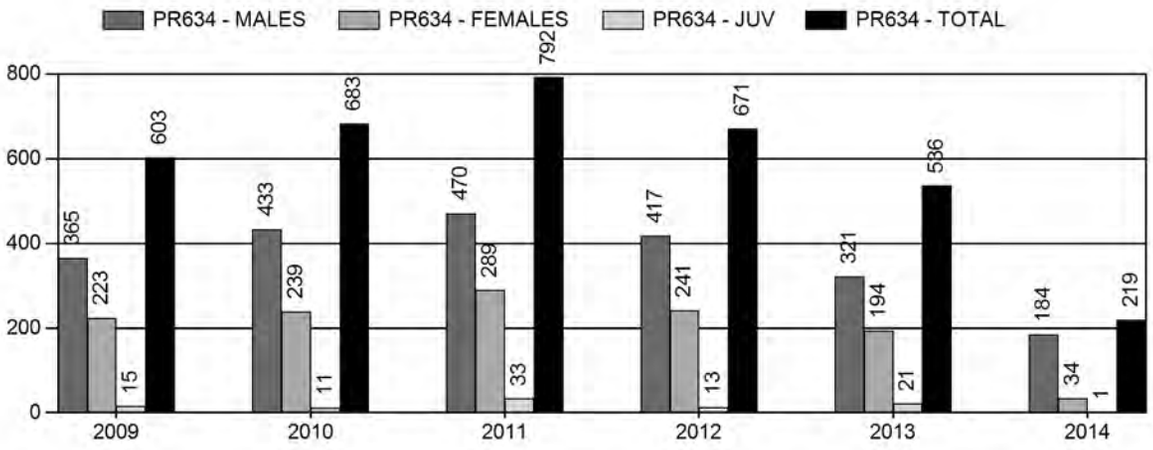
Population Objective (± 20%) :	3000 (2400 - 3600)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	24%
Number of years population has been + or - objective in recent trend:	10
Model Date:	02/17/2015

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

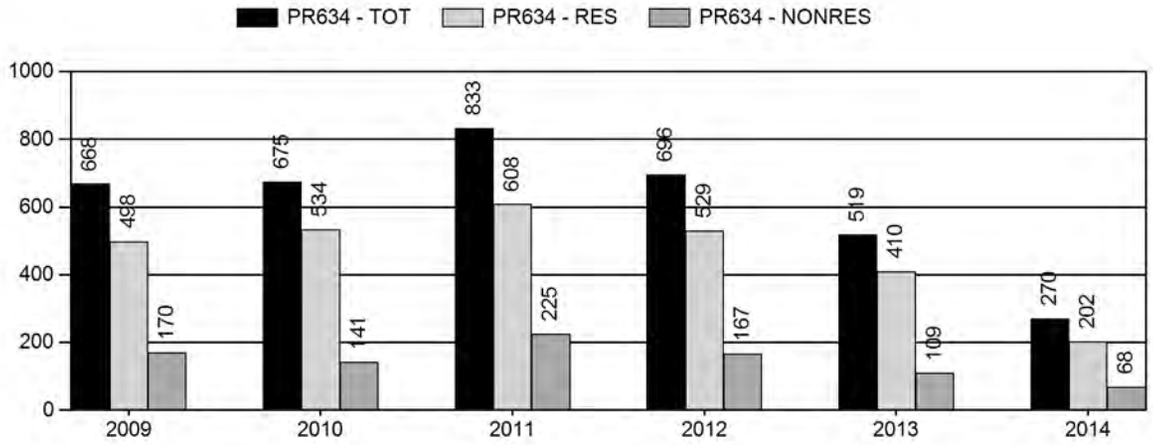
	JCR Year	Proposed
Females ≥ 1 year old:	3%	8%
Males ≥ 1 year old:	41%	40%
Juveniles (< 1 year old):	1%	1%
Total:	8%	12%
Proposed change in post-season population:	-2%	-9%



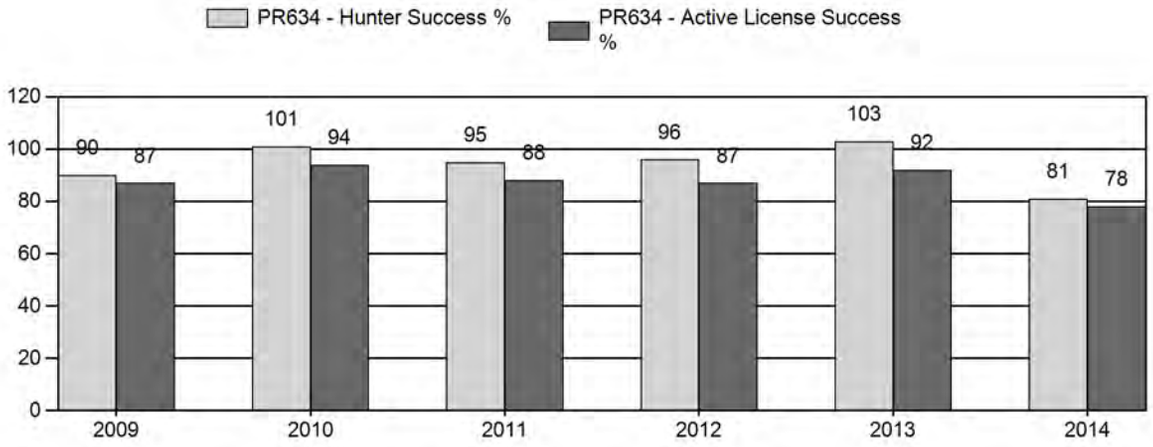
Harvest



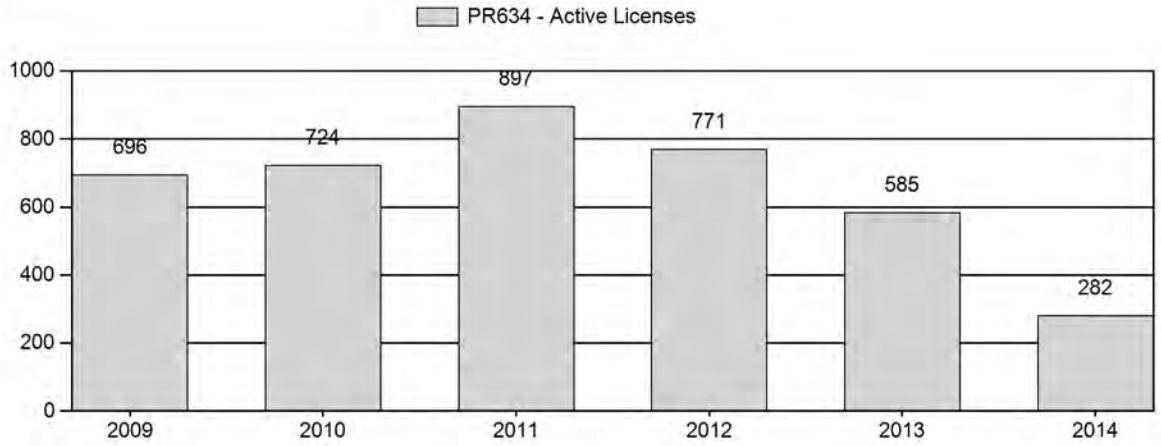
Number of Hunters



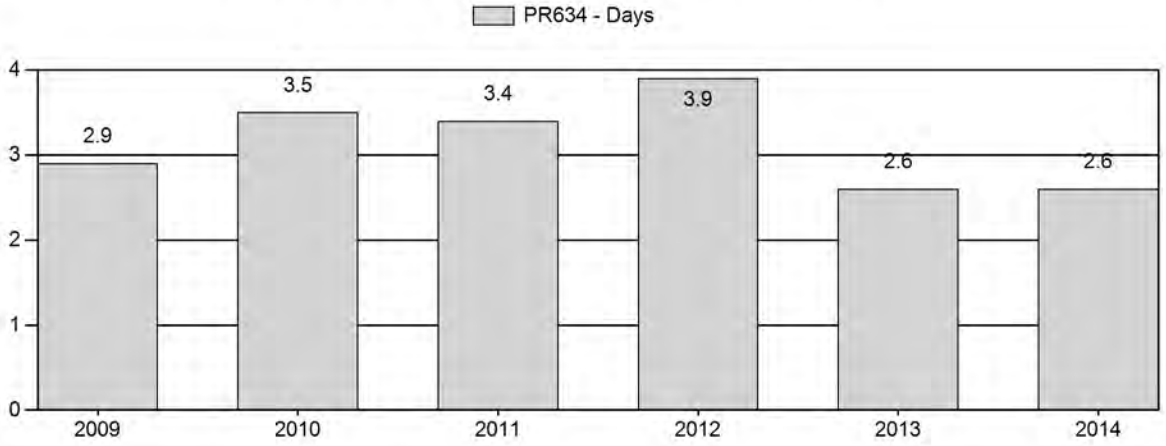
Harvest Success



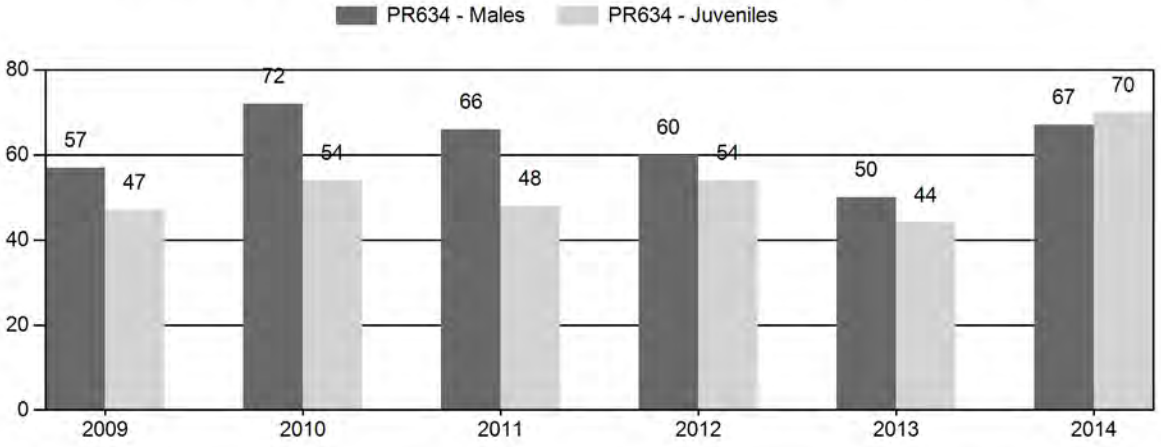
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 Preseason Classification Summary

for Pronghorn Herd PR634 - BADWATER

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	6,285	164	360	524	28%	923	49%	433	23%	1,880	1,279	18	39	57	± 4	47	± 4	30
2010	6,195	191	425	616	32%	860	44%	464	24%	1,940	1,955	22	49	72	± 5	54	± 4	31
2011	4,904	113	468	581	31%	875	47%	421	22%	1,877	1,689	13	53	66	± 5	48	± 4	29
2012	4,650	83	296	379	28%	631	47%	339	25%	1,349	1,522	13	47	60	± 5	54	± 5	34
2013	3,617	58	268	326	26%	646	51%	285	23%	1,257	1,098	9	41	50	± 5	44	± 4	29
2014	3,968	87	142	229	28%	340	42%	237	29%	806	1,678	26	42	67	± 8	70	± 9	42

2015 HUNTING SEASONS
BADWATER PRONGHORN (PR 634)

Hunt Area	Type	Season Dates Opens	Closes	Quota	Limitations
75	1	Sep. 19	Oct. 22	350	Limited quota; any antelope
	6	Sep. 19	Oct. 22	175	Limited quota; doe or fawn
Archery		Aug. 15	Sep. 18		Refer to Section 3 of this Chapter

Hunt Area	Type	Quota change from 2014
75	1	+50
	6	+150
Total	**1**	**+50**
	6	**+150**

Management Evaluation
Current Management Objective: 3,000
Management Strategy: Recreational
2014 Postseason Population Estimate: ~3,700
2015 Proposed Postseason Population Estimate: ~3,400

Management Issues
The Badwater pronghorn herd is managed toward a post-season population size objective of 3,000. The population is estimated using a spreadsheet model developed in 2012 and updated in 2014. The herd is managed for recreational opportunity. The objective was last reviewed in 2014. During the 2014 review, it was noted the new spreadsheet model appeared to track the same population trend as the previous POP-II model. However, annual population estimates tended to be about 1,000 animals higher in the new spreadsheet model. Initial attempts to increase the objective to 4,000 to compensate for the apparent higher estimates produced by the spreadsheet model were met with resistance from landowners and the BLM. When noted that leaving the objective at 3,000 would in effect mean managing for fewer antelope than in the past, a number of landowners and representatives from the BLM felt that was appropriate given long-term drought and poor habitat conditions in the area.

This pronghorn population inhabits a heavily industrialized area in central Wyoming. Much of the herd unit has or will soon be designated as a special management area emphasizing oil and gas production in both the Casper and Lander BLM RMPs. The Lander BLM is currently analyzing a proposal by EnCana to develop approximately 4,500 oil/gas wells in the central part of the herd unit. Given the commodities production emphasis in the area, it is likely a significant amount of pronghorn habitat will we lost or degraded over the next 20 years.

Habitat/Weather
This area has been impacted by extreme drought for much of the last decade. Virtually no vegetation grew throughout the herd unit in 2012 and 2013. In 2014 weather conditions resulted in excellent herbaceous production throughout central Wyoming. Although no vegetation transects are monitored annually in this herd unit, observations suggested vegetation growth was better in 2014 than any other year in the past decade. Both deer and antelope in the area appeared to enter winter in excellent body condition. Given average winter temperatures and precipitation, antelope winter survival is expected to be good in 2014.

Field Data
Personnel observed fewer antelope along classification routes each of the last 4 years. The 2014 sample size of 806 antelope was significantly lower than the 2013 sample of 1,257. Some of the decline in sample size in 2014 can be attributed to personnel turnover, but the 4 year decrease in observed antelope along designated routes is indicative of a significant, multi-year population decline. Classification samples from the herd unit have historically been close to desired sample levels for calculating confidence intervals around age/sex ratios. The sample in 2014 was 50% of the desired sample size and yielded a fawn/doe ratio of 70/100. This was the highest ratio over the last 10 years and is undoubtedly attributable to the excellent feed availability during spring/summer 2014. Given average winter conditions, it is expected many of these fawns will survive the year since they entered winter in good body condition. Following 4 years of declining buck/doe ratios, the buck/doe ratio increased dramatically in 2014. The buck/doe ratio increased from 50/100 in 2013 to 67/100 in 2014. The adult buck/doe ratio was similar to 2013 so the marked increase in the overall buck/doe ratio is entirely attributable to an increase in yearling bucks. The yearling buck/doe ratio in 2014 was 26/100 and was the highest on record over the past 10 years. The dramatic increase in the yearling buck/doe ratio for 2014 is particularly remarkable since the fawn/doe ratio in 2013 was fairly low at 44/100. This indicates there was outstanding survival from 2013 to 2014.

Harvest Data
Despite the high buck/doe ratio in the herd unit, Type 1 license success was only 77% in 2014. This was the lowest success rate in over 15 years and well below the 5 year average of 88%. The low success rate is somewhat confounding given the high buck/doe ratio in the population. It may be indicative of Type 1 license holders not wanting to harvest a yearling buck which accounted for much of the buck population in 2014. The days/animal statistic for Type 1 license holders was unremarkable in 2014 at 2.7. This was almost identical to the 2013 figure of 2.8 but lower than the 5 year average of 3.2.

Population
In 2012, a spreadsheet model was developed for this population. The model behaved predictably with the addition of 2013 and 2014 data. The model appears to track population trends reliably but the actual population estimate appears questionable. The model tracks significantly higher than 5 of 6 line-transect (LT) estimates. Recalibrating juvenile and adult survival rates in various versions of the model does nothing to bring the end-of-year estimate closer to these estimates. LT estimates for this population tend to have very high coefficients of variation attributable to low small samples sizes and variable densities across the herd unit. Due to the high standard

errors associated with the line-transect estimates the population model deviance errors are very small. These numbers are calculated by dividing the difference of the model estimate and the LT estimate by the standard error of the LT estimate. A large standard error in the denominator of this calculation results in a small population deviance value even if the difference between the model estimate and LT estimate is quite large. Since the Solver function of these models is designed to minimize the population deviance, there is little need to account for already small deviances. The bottom line is Solver has little incentive to consider even large differences between model population estimates and LT estimates and therefore, the model essentially ignores the LT estimates.. Concurrently, differences in annual observed versus modeled buck/doe ratios are given undo consideration by Solver. To deal with this problem, population deviances (the difference between model and LT estimates) are multiplied by a factor of 4 in the current model. This forces the model closer to the most recent LT estimate. A correction factor of 4 was chosen because it forces the end-of-year population to model close to the lower end of the confidence interval of a 2010 line transect estimate and at least the upper end of the confidence interval for a 2012 estimate. Without the correction factor, the model population is well above the confidence interval for the 2012 estimate. It should be noted, the overall population trend remains the same with or without the use of a correction factor.

For 2014, the SCJ/SCA version of the model was selected to simulate the population. This was the same version of the model selected in 2013. The SCJ/SCA model had a slightly higher AIC value than the CJ/CA model, but the CJ/CA version does not compensate for suspected, low survival associated with severe drought in 2012 and 2013. The TSJ/CA had a significantly higher AIC value but produced similar trends to the SCJ/SCA version. Annual juvenile survival in the selected model is constrained to a maximum of 0.8. Without that constraint, the model consistently estimated juvenile survival higher than adult survival which is not biologically defensible. The SCJ/SCA model has 3 years with modified juvenile survival to account for extreme winter conditions in 2010 and extreme drought conditions in 2012 and 2013. Juvenile survival for these years is constrained to a maximum of 0.4.

This model version produces a population trend mirroring field personnel impressions. The model indicates the population declined significantly from 2007 through 2013. This is supported by the decreased classification samples collected along standard routes since 2010 as well as declining buck/doe ratios from 2010 through 2013. The population was thought to be at objective in 2013. Given favorable conditions throughout the herd unit and good recruitment in 2014 it is likely the population increased. The model indicates an increase from around 3,300 antelope in 2013 to approximately 3,700 antelope in 2014. The estimated increase can be traced to the model's attempt to track a buck/doe ratio that increased from 50/100 in 2013 to 67/100 in 2014. The 2014 population estimate is 24% above objective. Given good recruitment in 2014 and excellent survival from 2013 (as indicated by the high yearling buck/doe ratio), the modeled increase is plausible. Reasons for poor Type 1 license success given high buck numbers are not known. Due to the lack of survival estimates, the model is considered a fair simulation.

Management Summary

Given the modeled population increase over the past year as well as the high buck/doe ratio, hunting opportunity in area 75 can be increased in 2015. Type 1 licenses will be increased by 50 to 350 to allow more recreational opportunity. Type 6 licenses will be increased to 175 to help manage the population toward objective. Given average recruitment, the population is predicted to decline to approximately 3,400 and be within 13% of objective.

INPUT	
Species:	Pronghorn
Biologist:	Greg Anderson
Herd Unit & No.:	Badwater
Model date:	02/17/15

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	164	173	☐ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	207	223	☑ SCJ,SCA Mod	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	122	227	☐ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	889	1103	1583	**3575**	841	647	1252	**2739**	835	1381	**2216**				3000
1994	718	818	1353	**2889**	701	466	1117	**2284**	639	1224	**1862**				3000
1995	763	626	1199	**2588**	740	380	1073	**2192**	594	1216	**1811**				3000
1996	1090	582	1192	**2864**	1090	391	1184	**2665**	757	1477	**2234**				3000
1997	805	742	1447	**2994**	805	520	1432	**2756**	749	1575	**2324**				3000
1998	1018	734	1543	**3295**	1014	542	1543	**3099**	858	1760	**2617**				3000
1999	1197	840	1725	**3762**	1197	671	1716	**3584**	1049	1984	**3032**				3000
2000	1039	1028	1944	**4011**	1039	846	1941	**3826**	1135	2116	**3252**	3090	751		3000
2001	907	1113	2074	**4094**	907	930	2071	**3908**	1154	2176	**3330**	2766	586		3000
2002	985	1131	2133	**4249**	985	951	2123	**4059**	1205	2252	**3457**				3000
2003	1188	1181	2207	**4576**	1188	975	2207	**4370**	1305	2410	**3715**				3000
2004	1663	1279	2362	**5303**	1663	1083	2357	**5103**	1594	2734	**4328**	3760	796		3000
2005	1881	1562	2679	**6123**	1879	1283	2610	**5772**	1844	3033	**4877**				3000
2006	1542	1807	2972	**6321**	1537	1464	2795	**5796**	1853	3039	**4892**				3000
2007	1877	1816	2978	**6671**	1861	1452	2749	**6062**	1971	3122	**5093**	2764	507		3000
2008	1565	1931	3060	**6556**	1552	1543	2831	**5926**	1920	3067	**4988**				3000
2009	1410	1882	3006	**6298**	1394	1480	2761	**5635**	1799	2939	**4738**				3000
2010	1554	1763	2880	**6197**	1542	1287	2617	**5445**	1363	2555	**3917**	5256	931		3000
2011	1205	1335	2503	**5043**	1168	818	2186	**4172**	1188	2405	**3593**				3000
2012	1266	1164	2357	**4787**	1252	706	2091	**4049**	914	2096	**3010**	2303	527		3000
2013	906	895	2054	**3856**	883	542	1841	**3266**	759	1938	**2698**				3000
2014	1324	744	1900	**3968**	1323	542	1862	**3727**	853	2029	**2882**				3000
2015	1072	836	1988	**3896**	1067	506	1823	**3396**							3000
2016															
2017															
2018															
2019															
2020															
2021															
2022															
2023															
2024															
2025															

Survival and Initial Population Estimates

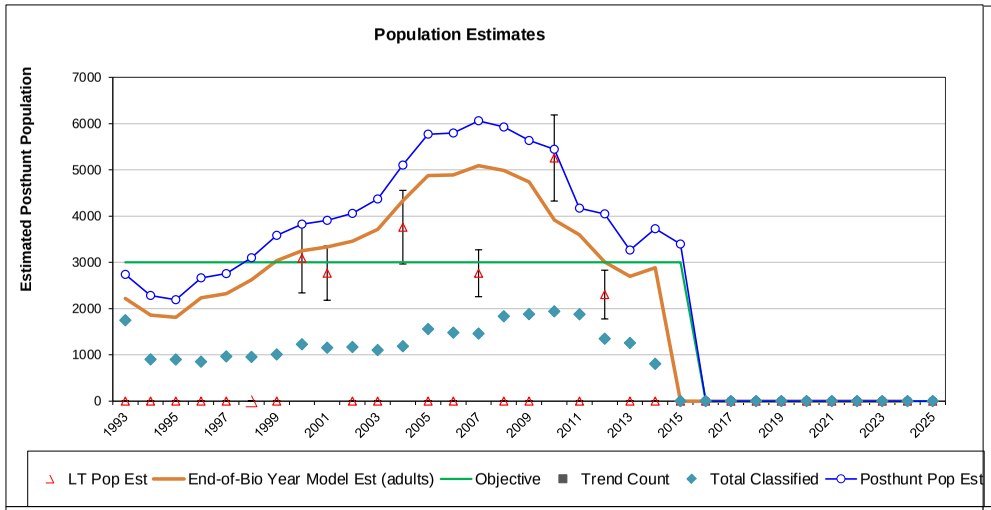
Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.80			0.85		
1994	0.80			0.85		
1995	0.80			0.85		
1996	0.80			0.85		
1997	0.80			0.85		
1998	0.80			0.85		
1999	0.80			0.85		
2000	0.80			0.85		
2001	0.80			0.85		
2002	0.80			0.85		
2003	0.80			0.85		
2004	0.80			0.85		
2005	0.80			0.85		
2006	0.80			0.85		
2007	0.80			0.85		
2008	0.80			0.85		
2009	0.80			0.85		
2010	0.40			0.85		
2011	0.80			0.85		
2012	0.40			0.85		
2013	0.40			0.85		
2014	0.80			0.85		
2015	0.80			0.85		
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

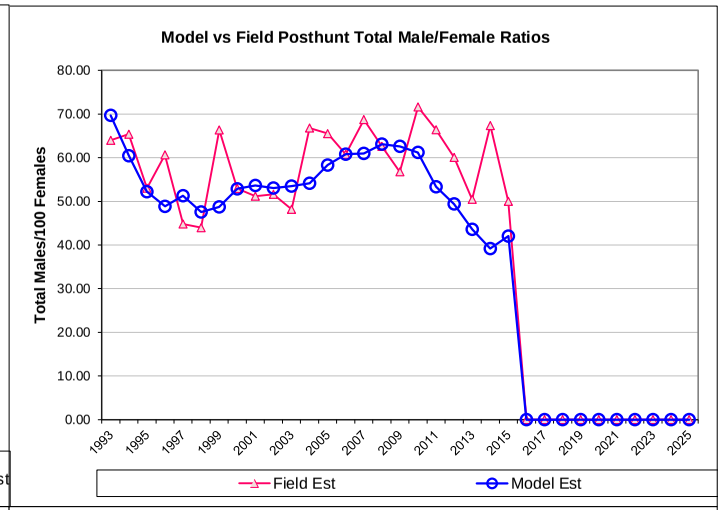
Parameters:	Optim cells
Juvenile Survival =	0.800
Adult Survival =	0.855
Initial Total Male Pop/10,000 =	0.110
Initial Female Pop/10,000 =	0.158

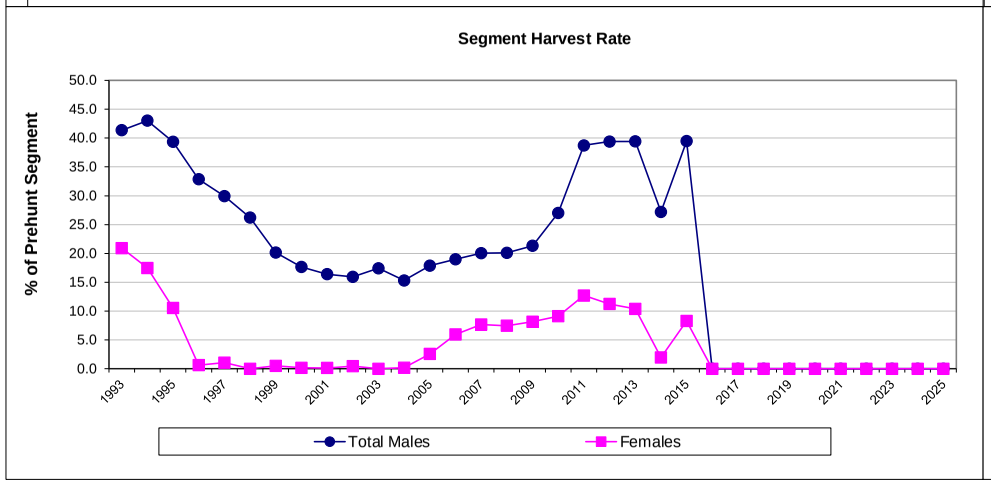
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult survival	98%

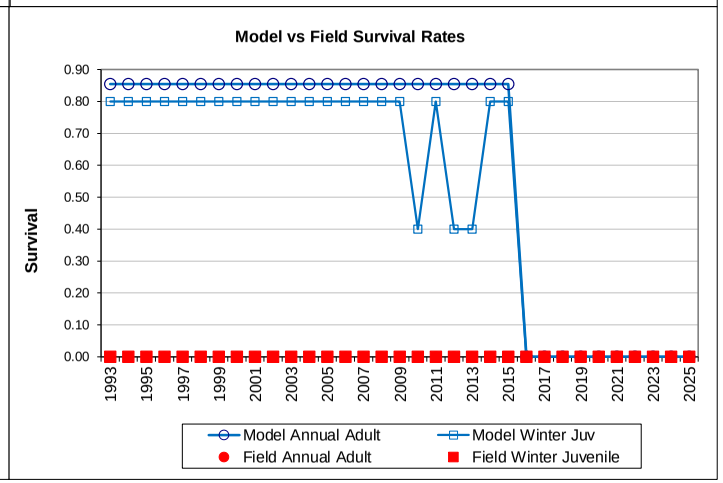
	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		56.17	3.32	69.70	63.98	3.64	44	415	301	760	41.4	20.9
1994		53.03	4.43	60.44	65.38	5.12	15	320	215	550	43.0	17.5
1995		63.61	5.01	52.21	53.01	4.42	21	224	115	360	39.4	10.5
1996		91.42	7.20	48.85	60.65	5.37	0	174	7	181	32.9	0.6
1997		55.60	4.24	51.29	44.81	3.67	0	202	14	216	29.9	1.1
1998		65.93	4.90	47.56	43.96	3.73	3	175	0	178	26.2	0.0
1999		69.39	5.24	48.73	66.36	5.08	0	154	8	162	20.2	0.5
2000		53.45	3.71	52.86	52.94	3.69	0	165	3	168	17.7	0.2
2001		43.75	3.26	53.64	51.18	3.62	0	166	3	169	16.4	0.2
2002		46.19	3.38	53.05	51.61	3.64	0	164	9	173	15.9	0.5
2003		53.85	3.90	53.50	48.17	3.62	0	187	0	187	17.4	0.0
2004		70.40	4.90	54.15	66.80	4.72	0	178	4	182	15.3	0.2
2005		70.20	4.25	58.31	65.51	4.05	2	254	63	319	17.9	2.6
2006		51.87	3.36	60.81	60.78	3.75	4	312	161	477	19.0	6.0
2007		63.02	4.04	60.98	68.73	4.29	14	331	208	553	20.0	7.7
2008		51.17	3.00	63.12	62.59	3.44	12	353	208	573	20.1	7.5
2009		46.91	2.73	62.61	56.77	3.11	15	365	223	603	21.3	8.2
2010		53.95	3.11	61.22	71.63	3.78	11	433	239	683	27.0	9.1
2011		48.11	2.85	53.34	66.40	3.55	33	470	289	792	38.7	12.7
2012		53.72	3.62	49.41	60.06	3.90	13	417	241	671	39.4	11.2
2013		44.12	3.14	43.59	50.46	3.43	21	321	194	536	39.4	10.4
2014		69.71	5.90	39.18	67.35	5.76	1	184	34	219	27.2	2.0
2015		53.92	3.72	42.03	50.00	4.08	5	300	150	455	39.5	8.3
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

FIGURES









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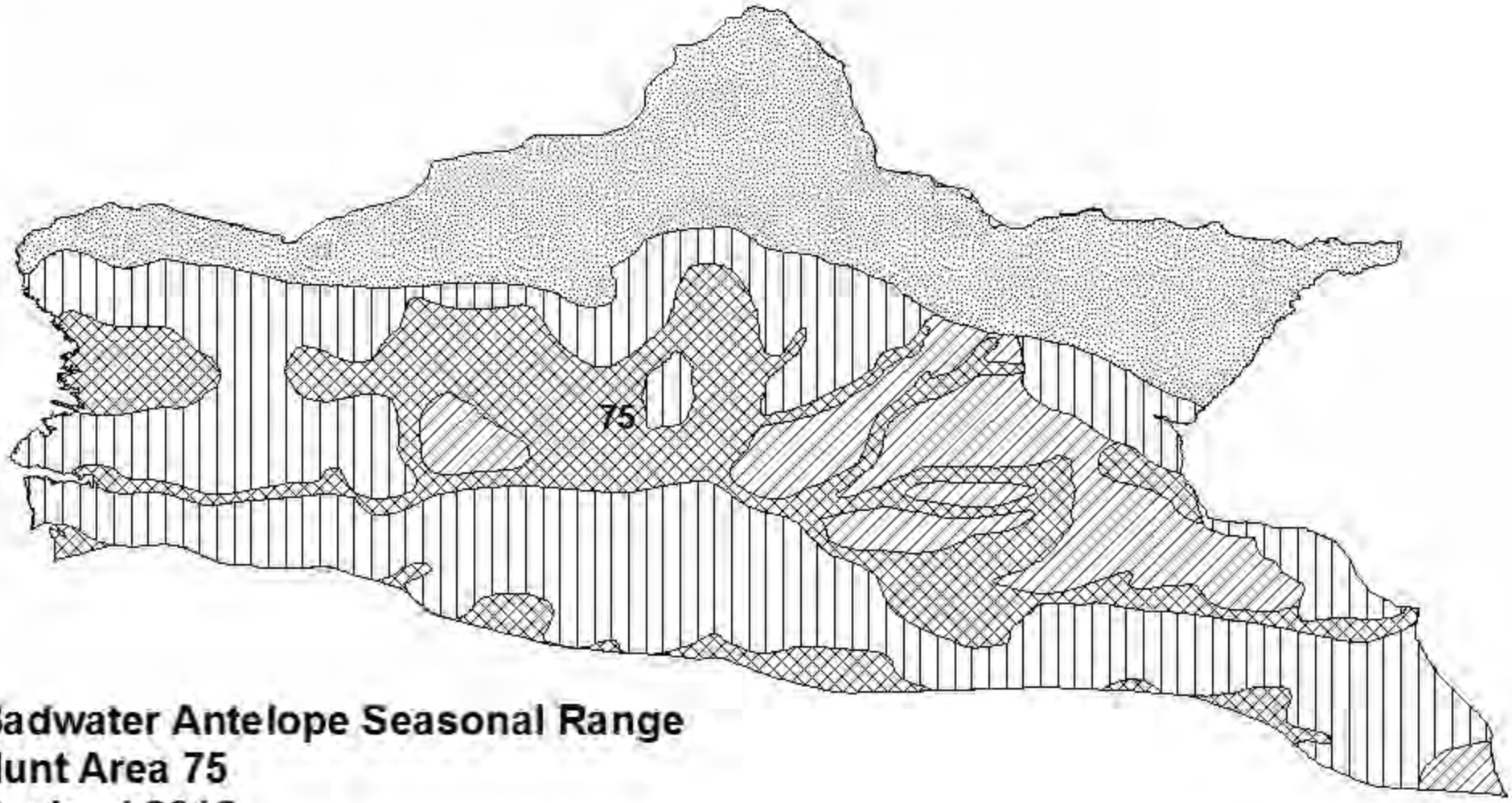


Badwater Antelope Seasonal Range
Hunt Area 75
Revised 2012

- CRUWYL
- OUT
- SSF
- WYL
- YRL

2014 - JCR Evaluation Form

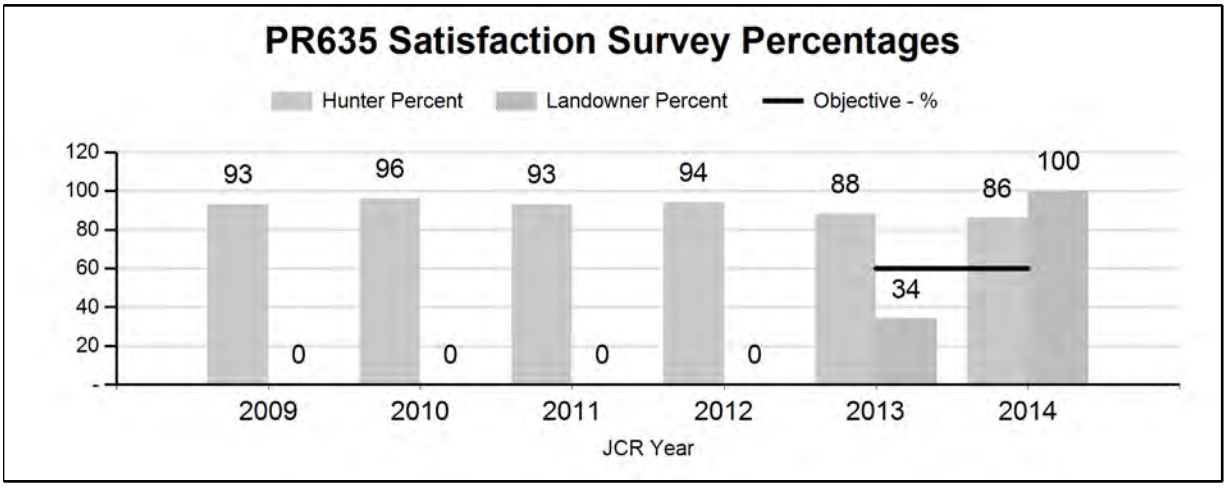
SPECIES: Pronghorn
HERD: PR635 - PROJECT
HUNT AREAS: 97, 117

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

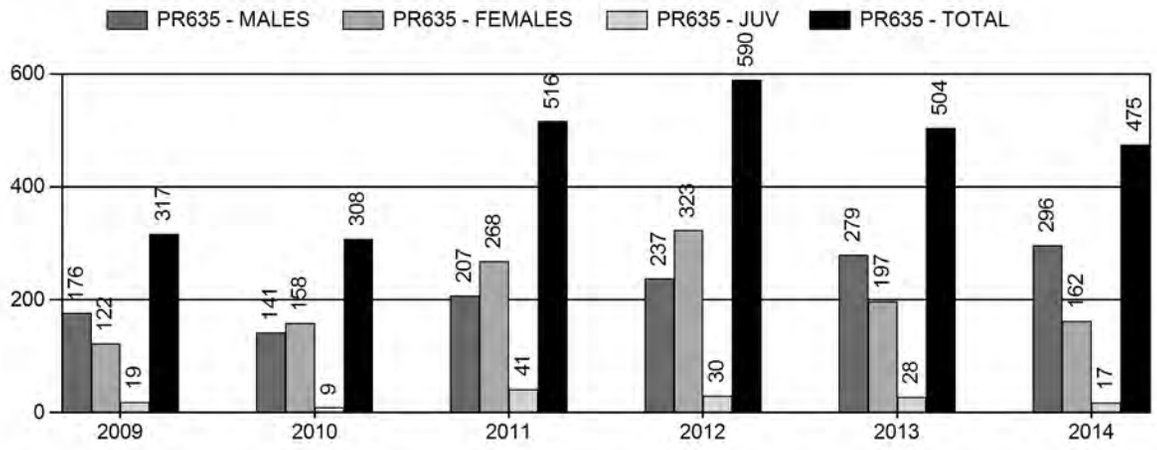
PREPARED BY: GREG ANDERSON

	2009 - 2013 Average	2014	2015 Proposed
Hunter Satisfaction Percent	93%	86%	90%
Landowner Satisfaction Percent	34%	100%	60%
Harvest:	447	475	475
Hunters:	387	408	400
Hunter Success:	116%	116%	119%
Active Licenses:	499	518	520
Active License Success:	90%	92%	91%
Recreation Days:	1,408	1,580	1,600
Days Per Animal:	3.1	3.3	3.4
Males per 100 Females:	66	69	
Juveniles per 100 Females	63	67	

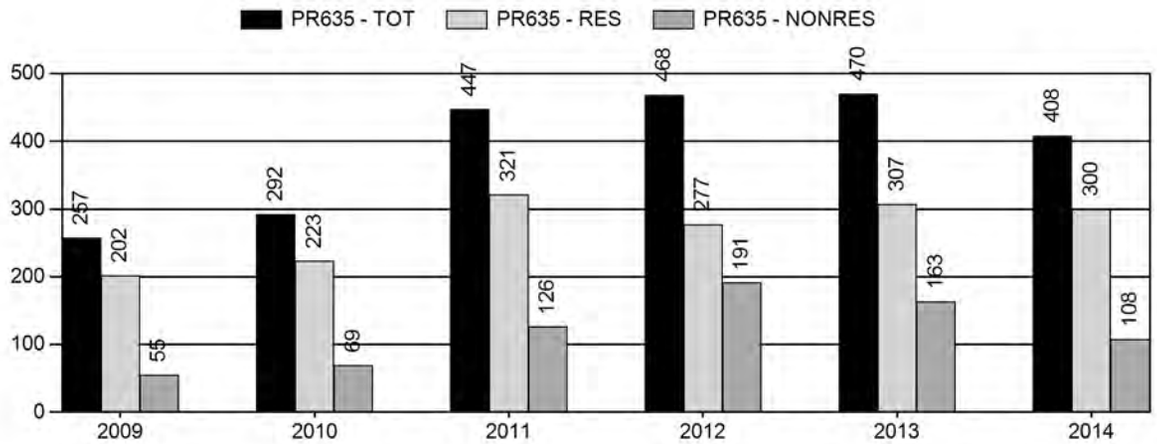
Satisfaction Based Objective	60%
Management Strategy:	Recreational
Percent population is above (+) or (-) objective:	33%
Number of years population has been + or - objective in recent trend:	2



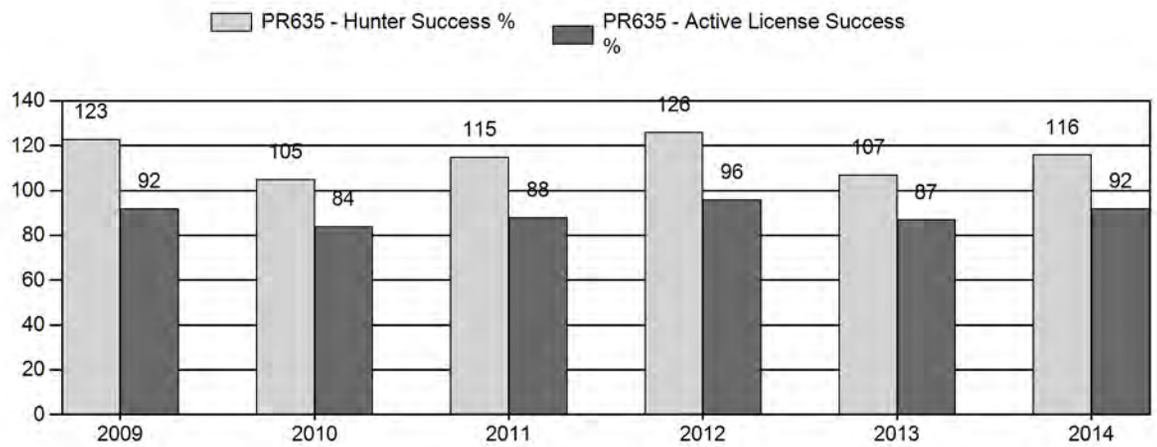
Harvest



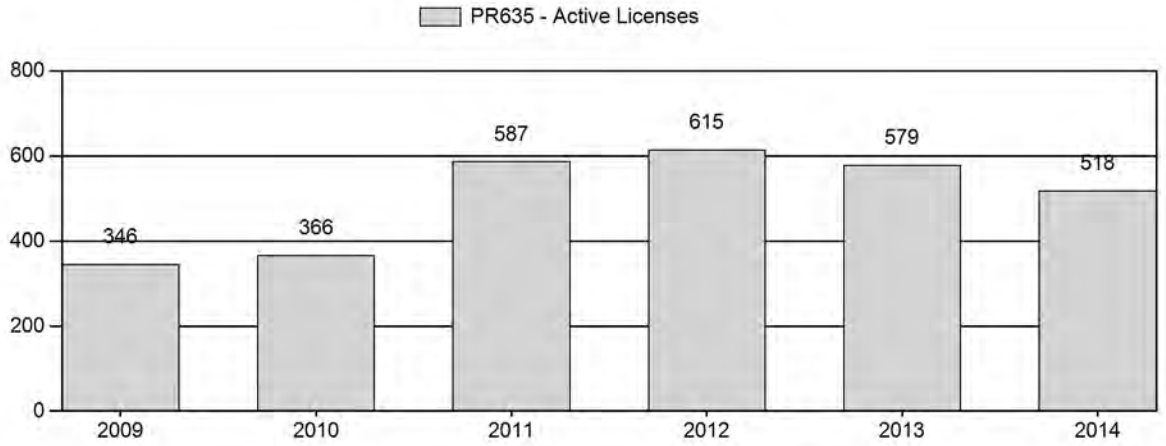
Number of Hunters



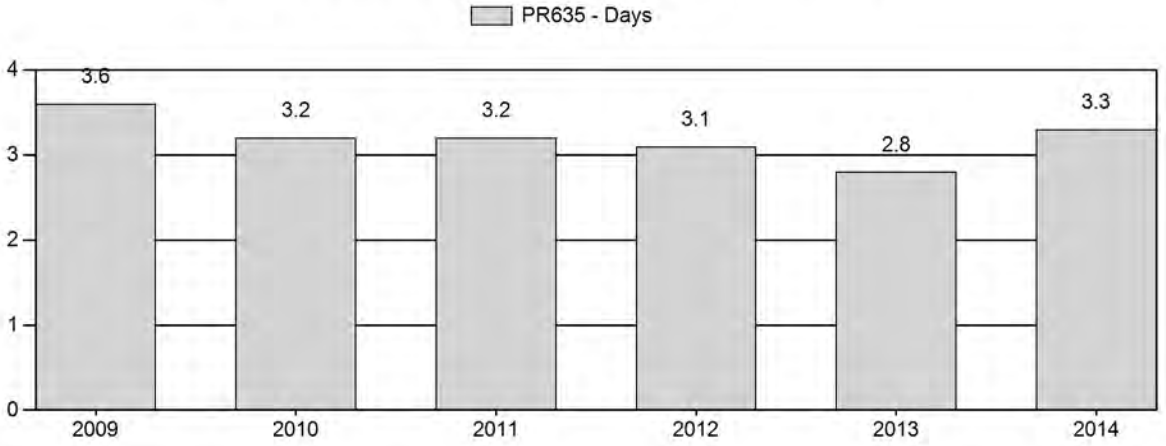
Harvest Success



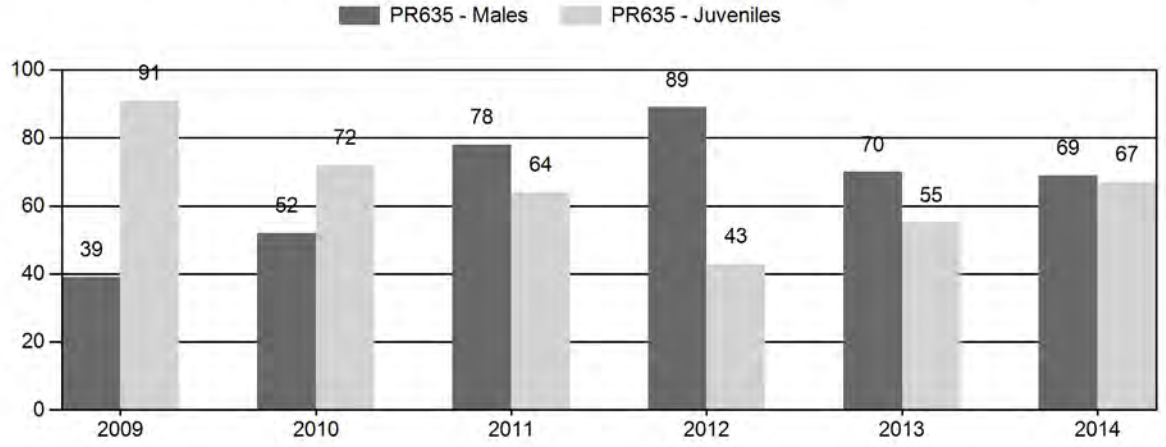
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 Preseason Classification Summary

for Pronghorn Herd PR635 - PROJECT

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	429	0	0	58	17%	149	43%	136	40%	343	391	0	0	39	± 0	91	± 0	66
2010	634	0	0	118	23%	226	45%	163	32%	507	524	0	0	52	± 0	72	± 0	47
2011	0	45	89	134	32%	171	41%	109	26%	414	0	26	52	78	± 0	64	± 0	36
2012	0	67	112	179	38%	202	43%	86	18%	467	0	33	55	89	± 0	43	± 0	23
2013	0	28	125	153	31%	219	45%	120	24%	492	0	13	57	70	± 0	55	± 0	32
2014	0	21	62	83	29%	120	42%	80	28%	283	0	18	52	69	± 0	67	± 0	39

2015 SEASONS
PROJECT PRONGHORN (PR 635)

Hunt Area	Type	Season Dates Opens	Closes	Quota	Limitations
97, 117	1	Sep. 19	Oct. 22	300	Limited quota; any antelope
	2	Aug. 15	Oct. 22	50	Limited quota; any antelope valid in Area 97 south of U.S. Highway 26 and in all of Area 117
	6	Sep. 19	Oct. 22	150	Limited quota; doe or fawn
	7	Aug. 15	Oct. 22	75	Limited quota; doe or fawn valid in Area 97 south of U.S. Highway 26 and in all of Area 117
Archery 97, 117		Aug. 15	Sep. 18		Refer to section 3 of this chapter

Hunt Area	Type	Quota change from 2014
97, 117		
Total		

<u>Management Evaluation</u>
Current Management Objective: Hunter/Landowner Satisfaction 60%
Management Strategy: Recreational
2014 Hunter Satisfaction: 86%
2014 Landowner Satisfaction: 100% *
3 year Average Hunter Satisfaction: 89%
3 year Average Landowner Satisfaction: unknown
*Note: the landowner satisfaction results are based on only 4 survey responses

Management Issues
In 2013 the Department conducted an objective review for the Project pronghorn herd unit. Previously the herd had a population objective of 400 pronghorn. The population objective was impractical because personnel were unable to collect adequate demographic data due to extensive interchange with the neighboring Wind River Reservation (WRR). Following an internal review, a public meeting and contact with numerous landowners the objective was changed in 2013 to manage for 60% hunter and 60% landowner satisfaction. Hunter satisfaction is taken directly from the harvest survey while landowner satisfaction in 2013 was determined by mailing a survey to 98 landowners in the herd unit. From the 98 surveys, the Department received 46 responses. Of those, 21 landowners provided e-mail addresses and indicated they wished to receive the survey in future years. In 2014, 21 surveys were e-mailed to landowners and the Department received 4 responses. One of the respondents requested to no longer receive the survey.

Habitat/Weather
This herd occupies a heavily agricultural area in central Wyoming as well as lands interspersed with the WRR. Land ownership patterns and extensive border with the WRR make it cost prohibitive to collect adequate demographic data in the herd unit. The highest densities of pronghorn are found along the northern portion of hunt area 97 and commonly move between the herd unit and the WRR. During periods of drought, this herd has typically been impacted less than surrounding populations due to the abundance of feed associated with agricultural operations. In 2014, weather conditions were conducive to good vegetative production throughout the herd unit including upland, native range. As such, antelope were well dispersed throughout the area. Fall observations and field checks indicate antelope in the herd unit entered winter in excellent body condition.

Field/Harvest Data/Population
The fawn/doe ratio in hunt area 97 was 67/100 in 2014. This was nearly the same as the 5 year average of 65/100 but well above recruitment levels over the past 2 years. The buck/doe ratio changed insignificantly from 70/100 in 2013 to 69/100 in 2014. It should be noted the number of mature bucks did decline from 57/100 in 2013 to 52/100 in 2014. Thus, the stable buck/doe ratio was the result of increased yearling bucks in the population. Type 1 license numbers were increased for several years to provide recreational opportunity and decrease the high buck/doe ratio in the herd unit. It appears the number of licenses in 2014 did decrease the mature buck/doe ratio. It should also be noted there appears to be an uneven distribution of bucks throughout area 97 where most of the harvest occurs. Publicly accessible areas throughout the herd unit tend to have significantly fewer bucks than private land areas. The buck/doe ratio remains high in the surveyed areas of this herd unit and harvest success on Type 1 licenses in 97 was 96% in 2014. These factors indicate recreational hunting remains good in the herd unit.

The population is considered to be at objective in 2014. Hunter satisfaction (satisfied or very satisfied) remained essentially unchanged between 2013 and 2014 at 88% and 86% respectively. This represents a high rate of satisfaction and in combination with a 96% Type 1 success rate indicates hunt quality was good. This was the second year the landowner satisfaction survey was conducted so long term comparisons are not possible. That said, it appears landowners are somewhat ambivalent about the survey. As mentioned above, only 4 landowners responded to a

simple electronic survey in 2014. Obviously the paucity of responses doesn't inspire confidence in the results. Of the 4 respondents, all 4 felt antelope numbers were at a desirable level.

Management Summary

Given the high level of hunter satisfaction and no indication of landowner dissatisfaction, 2015 management will remain unchanged from 2014. With average survival for the year, the population is expected to remain unchanged in 2015.

Appendix A
Electronic message sent to landowners requesting survey input.

February 18, 2015

Dear Landowner,

Last year the Wyoming Game & Fish Department began using a survey to assess landowner satisfaction with deer numbers in hunt areas 157 and 170 and antelope in hunt areas 97 and 117. Responses to these surveys help us determine harvest management (hunting seasons) for the upcoming year. The survey in the link below contains the same questions asked last year. We would appreciate any input you have by March 10. If surveys indicate a majority of respondents are satisfied with deer and antelope numbers, it is likely upcoming hunting seasons will be very similar to last year's. If the majority of respondents feel there are too many or too few deer or antelope, we will likely recommend issuing more or fewer licenses respectively.

This survey will only be conducted electronically by clicking the link below. We try to survey all of the landowners in these areas who express an interest. If you hear of anyone who did not get this survey please have them contact one of the Department personnel listed below so we can get their e-mail address and ensure they receive the survey in future years. If you have any questions, again, feel free to contact one of the Department personnel listed below.

https://docs.google.com/a/wyo.gov/forms/d/1eFaCcqXQVsF_FDpa-nWGKIUs2EQmtgyn5_xOsVBnKfY/edit?usp=sharing

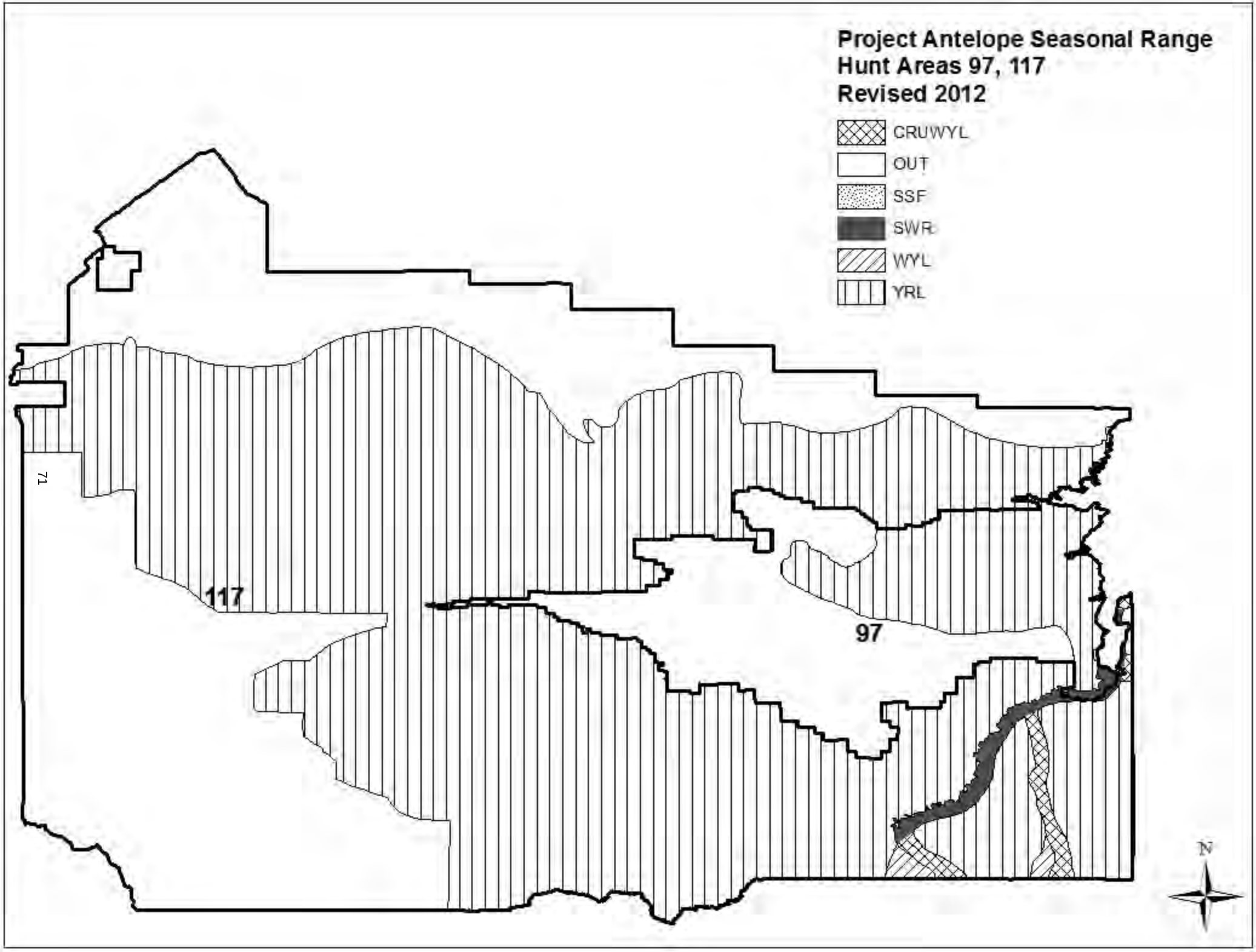
The Department sincerely values your input, and we thank you for your time.

Sincerely,

Greg Anderson, North Lander Wildlife Biologist. 307-332-2688

Jessica Beecham, North Riverton Game Warden. 307-856-4982

Brad Gibb, South Riverton Game Warden. 307-856-9005


Project Antelope Seasonal Range
Hunt Areas 97, 117
Revised 2012
CRUWYL
OUT
SSF
SWR
WYL
YRL
117
97
N

2014 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2014 - 5/31/2015

HERD: PR636 - NORTH FERRIS

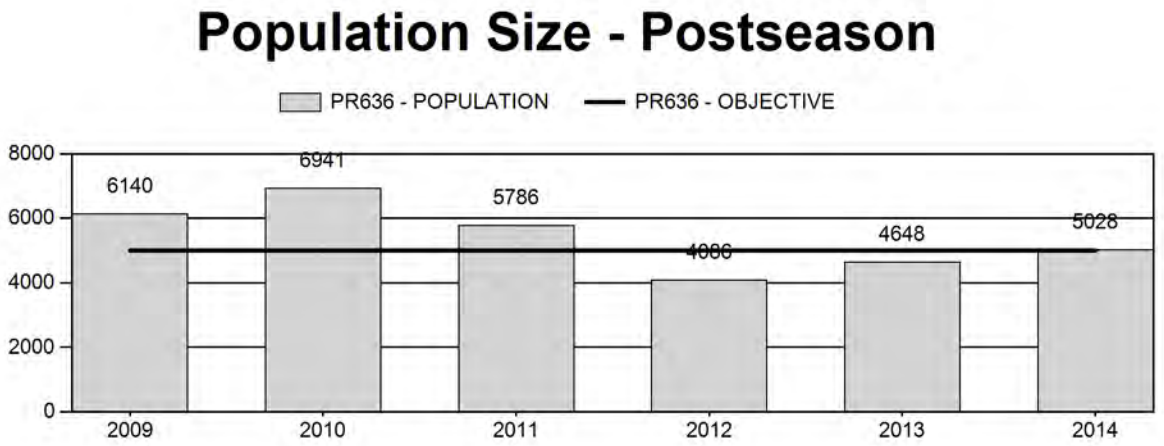
HUNT AREAS: 63 | PREPARED BY: GREG HIATT

	2009 - 2013 Average	2014	2015 Proposed
Population:	5,520	5,028	4,758
Harvest:	647	230	265
Hunters:	686	279	325
Hunter Success:	94%	82%	82 %
Active Licenses:	740	279	325
Active License Success:	87%	82%	82 %
Recreation Days:	2,060	762	900
Days Per Animal:	3.2	3.3	3.4
Males per 100 Females	66	61	
Juveniles per 100 Females	49	57	

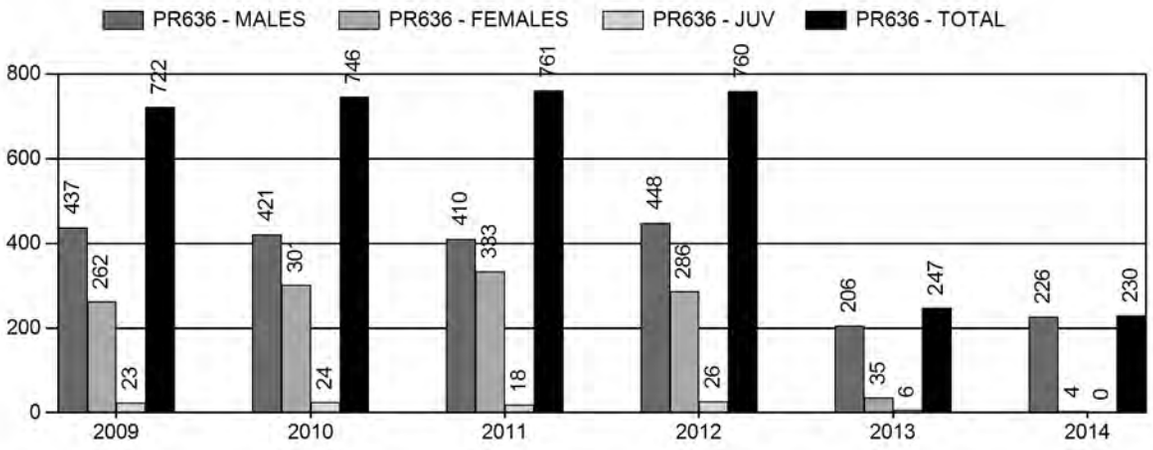
Population Objective (± 20%) :	5000 (4000 - 6000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	1%
Number of years population has been + or - objective in recent trend:	1
Model Date:	3/3/2015

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

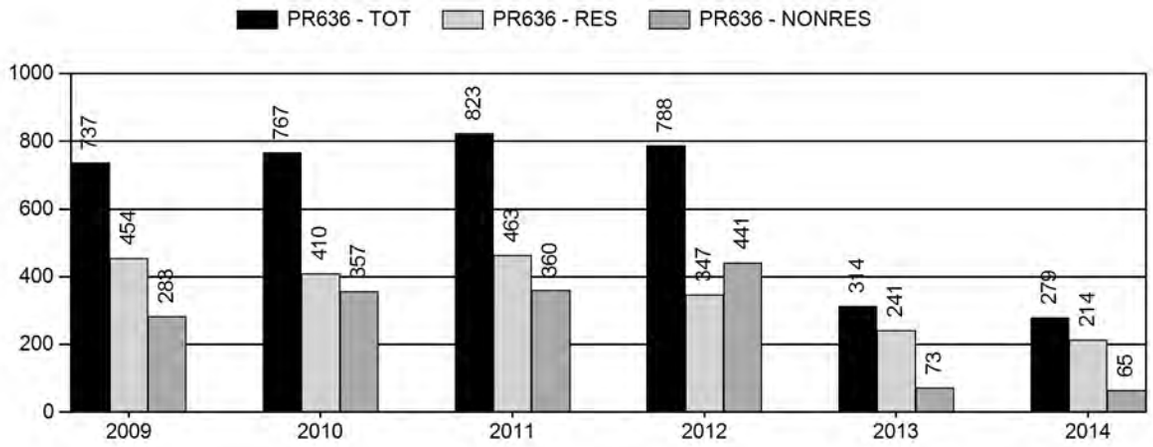
	JCR Year	Proposed
Females ≥ 1 year old:	0%	1.8%
Males ≥ 1 year old:	16.0%	18.2%
Juveniles (< 1 year old):	0%	0.4%
Total:	4.4%	5.2%
Proposed change in post-season population:	+3.9%	-5.4%



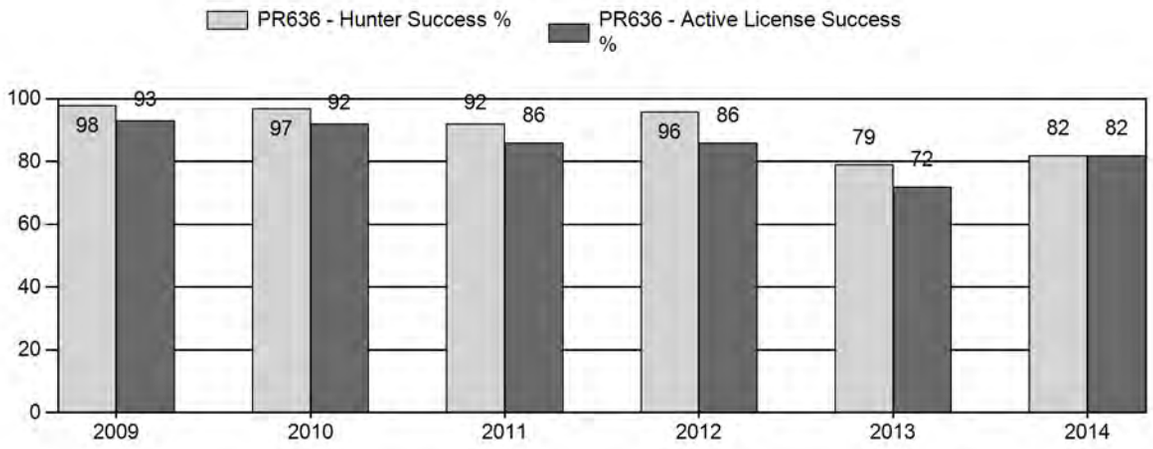
Harvest



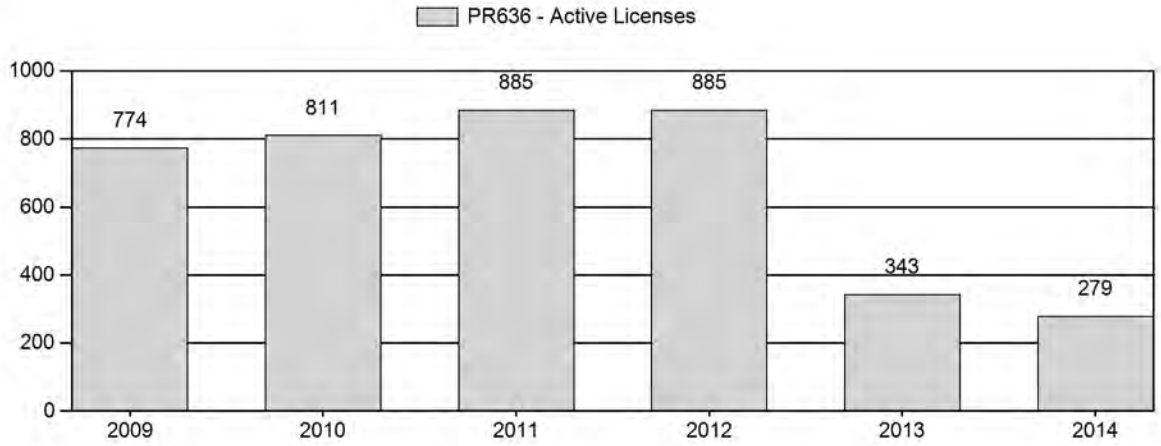
Number of Hunters



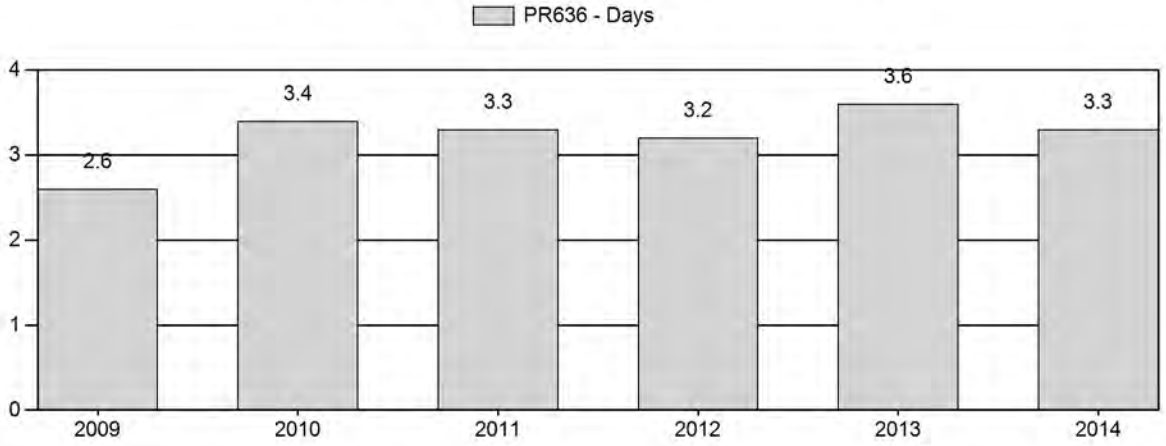
Harvest Success



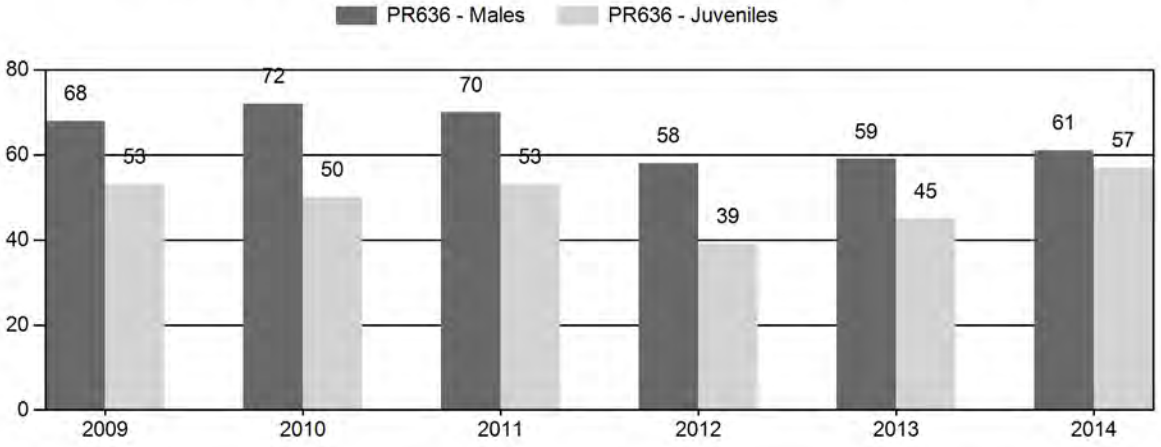
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 Preseason Classification Summary

for Pronghorn Herd PR636 - NORTH FERRIS

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	6,935	240	573	813	31%	1,192	45%	627	24%	2,632	2,040	20	48	68	± 4	53	± 3	31
2010	7,762	99	274	373	32%	519	45%	257	22%	1,149	2,145	19	53	72	± 7	50	± 6	29
2011	6,623	72	288	360	31%	516	45%	275	24%	1,151	1,914	14	56	70	± 7	53	± 6	31
2012	4,914	55	253	308	29%	534	51%	208	20%	1,050	1,330	10	47	58	± 6	39	± 5	25
2013	4,920	57	216	273	29%	459	49%	205	22%	937	1,460	12	47	59	± 7	45	± 6	28
2014	5,281	72	143	215	28%	350	46%	201	26%	766	0	21	41	61	± 8	57	± 8	36

2015 HUNTING SEASONS
NORTH FERRIS PRONGHORN HERD (PR636)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
63	1	Sep. 19	Oct. 31	100	Limited quota; any antelope
	2	Sep. 19	Oct. 31	200	Limited quota; any antelope valid east of the Buzzard Road (Natrona County Road 410 – Carbon County Road 497)
	6	Sep. 19	Oct. 31	25	Limited quota; doe or fawn
	7	Sep. 19	Oct. 31	25	Limited quota; doe or fawn valid east of the Buzzard Road (Natrona County Road 410 – Carbon County Road 497)
Archery 63		Aug. 15	Sep. 18		Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2012
63	1	0
	2	0
	6	+25
	7	+25
Total	**1 & 2**	**0**
	6 & 7	**+50**

<u>Management Evaluation</u>
Current Management Objective: 5,000
Management Strategy: Recreation
2014 Postseason Population Estimate: ~5,030
2015 Proposed Postseason Population Estimate: ~4,760

The North Ferris pronghorn herd is managed toward a post-hunt population of 5,000, an objective last reviewed in 2014. Population size is estimated using a spreadsheet model developed in 2012 and updated in 2014. The herd is in recreational management, with harvest quotas designed to maintain pre-hunt buck:doe ratios below 60:100.

Herd Unit Issues

Historically, access has not been an issue in this herd unit which is mostly public lands, but access to some large blocks of private land has become more difficult in recent years and may affect management ability to attain adequate harvests in the future. Potential for economic wind

power exists within the herd unit, but appears unlikely when other resource issues such as T&E species and sage-grouse Core Area are considered. Many miles of sheep-tight fences still stand in the herd unit, impeding pronghorn movements.

Weather

Drought conditions in 2012 and 2013 continued into the first half of 2014, with significant precipitation not arriving until the last quarter of July. Precipitation during the following three months produced good vegetative growth, but was probably too late to significantly improve fawn survival. Condition of pronghorn going into the winter is expected to have been good. The 2014-15 winter had numerous bitter cold spells, coupled with unusually warm periods, but little significant snowfall until late February. Losses may still be above average because many animals were dispersed off winter ranges prior to the late winter blizzards.

Habitat

While no herbaceous habitat transects are established within this herd unit, herbaceous forage production is expected to have improved due to the increased precipitation in the latter half of the summer. Two shrub transects have been established within this herd unit, primarily to monitor mule deer winter forage. One of these, on the Morgan Creek WHMA, was burned in the 2012 fires and the second was not read in 2014. New owners of the Pathfinder Ranch, which encompasses the north-central portion of this herd, have expressed interest in looking for opportunities for improving habitat conditions for wildlife, possibly as mitigation for wind power projects in other parts of the state. Shrub treatment on winter ranges, adjustments of grazing use, and modification of sheep-tight fences would benefit pronghorn in this herd unit.

Field Data

Classification sample size declined again for the fifth year, was the smallest sample since 1977, and was 40 percent less than the 5-year average. These data are collected from the ground along routes that have had only minor changes over the past two decades. Higher densities of pronghorn were again found in the eastern half of the area near Pathfinder Reservoir and along irrigated hayfields on the Buzzard and Sand Creek Ranches. Fawn production improved to 57:100, the highest in six years, but was still below the long term average for this herd.

Following exceptionally high recruitment of yearlings in 2005, buck:doe ratios exceeded the 60:100 maximum criterion for recreational management in this herd. Buck harvests were increased, often double or triple historic levels, and surplus bucks were successfully harvested with the buck:doe ratio returning to an acceptable 58:100 in 2012. The ratio recorded in 2013 was little changed, at 59:100. Much of the decline was attributable to the supply of adult bucks, with that ratio dropping to its lowest level in nine years in 2014. As expected, hunter complaints about poor quality of bucks increased as the adult buck:doe ratio declined. Yearling recruitment was high again in 2014, producing a slight increase in the buck:doe ratio to 61:100, despite the reduced supply of adult bucks.

Harvest Data

Success for hunters with Type 1 licenses improved slightly, to 84 percent. Hunters with Type 2 licenses, which restricted them to the eastern portion where pronghorn densities are typically higher, also had improved success but were still low at 81 percent. The average effort required to harvest a pronghorn was unchanged for the Type 1 hunters, and improved slightly for those with Type 2 licenses.

Population

This herd was below objective size for most of the decade following the 1992-93 winter, a consequence of low fawn production and poor recruitment. High fawn production followed by an unusually mild winter in 2004 provided the first significant growth in herd size.

Population estimates suggested this herd was well above objective size by 2006 and harvests were increased accordingly. The current spreadsheet model predicts the increased harvests successfully reduced the herd to objective size by 2011, and below objective in 2012. This current model, however, aligns near the maximum limit of the confidence interval on the most recent line transect survey and may be over-estimating herd size. Hunter comments, classification data and harvest statistics all suggest there has been a greater decline in herd size than predicted by the model.

The Time-Specific Juvenile & Constant Adult Survival (TSJ,CA) spreadsheet model provided the best fit with observed buck:doe ratios for this herd, particularly for the most recent seven years. The model behaved well when 2014 classification and harvest data were added and falls within the confidence intervals of all 3 line transect estimates. Annual adult survival was predicted at 82 percent, a level slightly lower than in models for some nearby pronghorn herds. Juvenile survival rates fluctuated within the allowed range but frequently settled at maximum or minimum allowed values, exceeding adult survival rates in some years. This is difficult to accept biologically, and as a result the model is only considered to be a “Fair” representation of the herd. The CJ,CA and SCJ,SCA models each had lower AIC values, but both models predicted herd sizes greatly exceeding past trend counts, without following count trends, and generated roughly stable buck:doe estimates that did not follow dips and rises in observed values. Estimated buck:doe ratios of these two models approximated observed values in only five or six of the past 20 years.

Due to the improved condition of animals going into this winter and improved browse conditions following the late summer moisture, fawn production in 2015 was projected to be near the 5-year average. The model was run using a median juvenile survival in 2015.

Losses to EHD were documented in pronghorn herds south and west of North Ferris in 2013, and reports of carcasses in Area 63 suggests the disease was present here as well. Effects of significant losses in late summer and early fall 2014 may not yet affect estimates in the model and it may be over-estimating herd size.

Management Summary

With slight improvement in fawn production and the herd estimated to be near objective size, doe harvest needs to be implemented to prevent any significant increase in herd size. As with the "any antelope" licenses, the recommendation is to restore both the Type 6 and Type 7 doe/fawn licenses which were eliminated in 2014, directing at least half the additional harvest to the eastern portion of the herd unit where pronghorn densities are typically higher and where most private lands are found. The model predicts even this slight increase in harvest will decrease herd size below 5,000 in 2015, unless fawn production exceeds average.

The expected harvest of roughly 220 bucks and 45 does and fawns from the 2015 license quotas should provide a slight decrease (~5 percent) in herd size, projected to be ~4,800 at post-hunt 2015. With the herd so close to objective, if either winter survival or fawn production exceeds expectations in 2015, harvests will probably need to be further increased in future years.

Opening date is shifted one day to remain on the third Saturday of September, synchronizing with Area 68 to the north and other areas in the Lander Region. Closing date is the same as in the previous three years and extends to the closing of the local deer season. Archery season uses a standardized opening date and closes the day before the opening of the regular season.

INPUT	
Species:	Pronghorn
Biologist:	Greg Hiatt
Herd Unit & No.:	North Ferris 636
Model date:	03/03/15

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	101	110	☐ CJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	79	93	☐ SCJ,SCA Mod	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	28	135	☑ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	800	1380	2988	**5168**	800	1179	2986	**4965**	1316	2862	**4178**				5000
1994	1281	1290	2805	**5375**	1281	1106	2800	**5187**	1478	2927	**4406**				5000
1995	1311	1449	2869	**5629**	1311	1257	2861	**5430**	1618	2992	**4609**				5000
1996	1964	1585	2932	**6481**	1964	1405	2932	**6301**	1615	2924	**4539**				5000
1997	1393	1582	2866	**5841**	1393	1395	2862	**5651**	1416	2676	**4091**				5000
1998	1783	1388	2622	**5793**	1783	1115	2618	**5516**	1245	2551	**3796**				5000
1999	1587	1220	2500	**5307**	1587	1032	2497	**5116**	1152	2410	**3562**				5000
2000	1225	1129	2362	**4715**	1221	957	2362	**4540**	1016	2222	**3238**				5000
2001	1600	996	2178	**4773**	1600	832	2175	**4607**	991	2144	**3135**				5000
2002	1486	972	2101	**4559**	1486	801	2101	**4388**	1240	2358	**3598**				5000
2003	1579	1215	2311	**5105**	1579	1031	2308	**4917**	1552	2653	**4205**				5000
2004	1842	1521	2600	**5963**	1842	1354	2600	**5796**	1946	3018	**4965**				5000
2005	2065	1907	2958	**6930**	2065	1738	2950	**6753**	2369	3412	**5781**				5000
2006	2009	2322	3344	**7674**	2009	2071	3301	**7381**	2607	3673	**6279**	6464	1033		5000
2007	2492	2555	3599	**8646**	2487	2214	3481	**8181**	2466	3566	**6033**				5000
2008	2354	2417	3495	**8266**	2321	2019	3275	**7615**	2626	3709	**6335**				5000
2009	1912	2574	3635	**8120**	1887	2093	3346	**7326**	2525	3608	**6133**	7186	1243		5000
2010	1751	2475	3536	**7762**	1725	2012	3205	**6941**	2050	3071	**5121**				5000
2011	1604	2009	3010	**6623**	1584	1558	2644	**5786**	1503	2527	**4030**				5000
2012	965	1473	2477	**4914**	938	980	2168	**4086**	1443	2473	**3916**	3367	539		5000
2013	1083	1414	2424	**4920**	1076	1187	2385	**4648**	1425	2518	**3943**				5000
2014	1417	1396	2468	**5281**	1417	1148	2463	**5028**	1354	2451	**3805**				5000
2015	1321	1327	2402	**5050**	1316	1085	2358	**4758**							5000
2016															5000
2017															5000
2018															5000
2019															5000
2020															
2021															
2022															
2023															
2024															
2025															

Survival and Initial Population Estimates

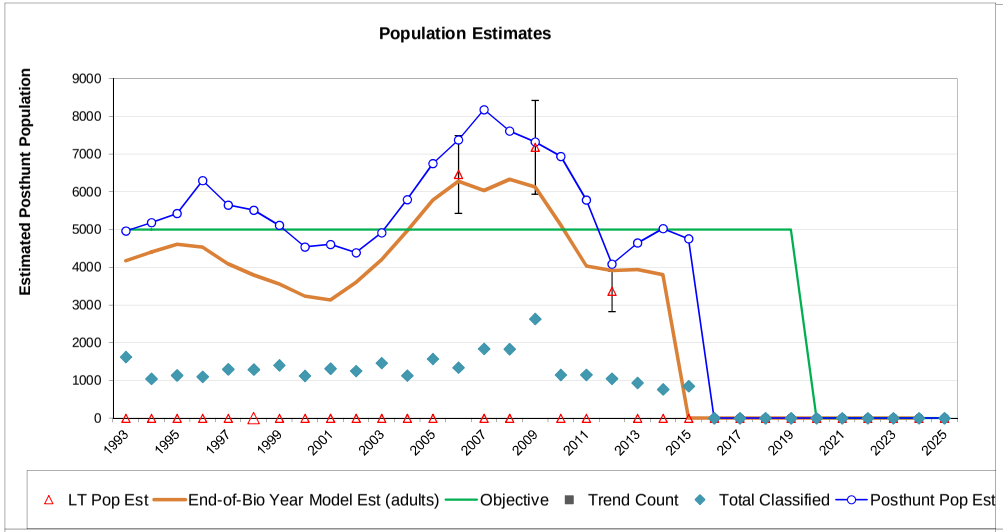
Year	Annual Juvenile Survival Rates			Annual Adult Survival Rates		
	Model Est	Field Est	SE	Model Est	Field Est	SE
1993	0.90			0.82		
1994	0.90			0.82		
1995	0.90			0.82		
1996	0.47			0.82		
1997	0.40			0.82		
1998	0.40			0.82		
1999	0.40			0.82		
2000	0.40			0.82		
2001	0.40			0.82		
2002	0.79			0.82		
2003	0.90			0.82		
2004	0.90			0.82		
2005	0.90			0.82		
2006	0.90			0.82		
2007	0.54			0.82		
2008	0.86			0.82		
2009	0.90			0.82		
2010	0.52			0.82		
2011	0.40			0.82		
2012	0.90			0.82		
2013	0.90			0.82		
2014	0.60			0.82		
2015	0.60			0.82		
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

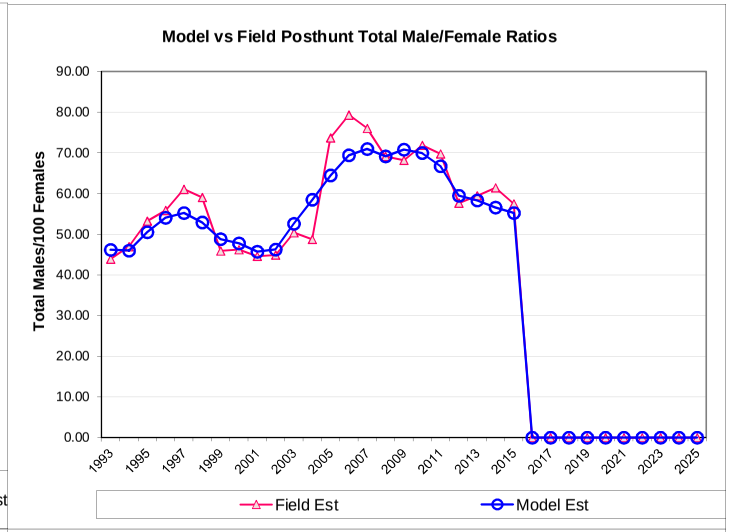
Parameters:	Optim cells
Adult Survival =	0.819
Initial Total Male Pop/10,000 =	0.138
Initial Female Pop/10,000 =	0.299

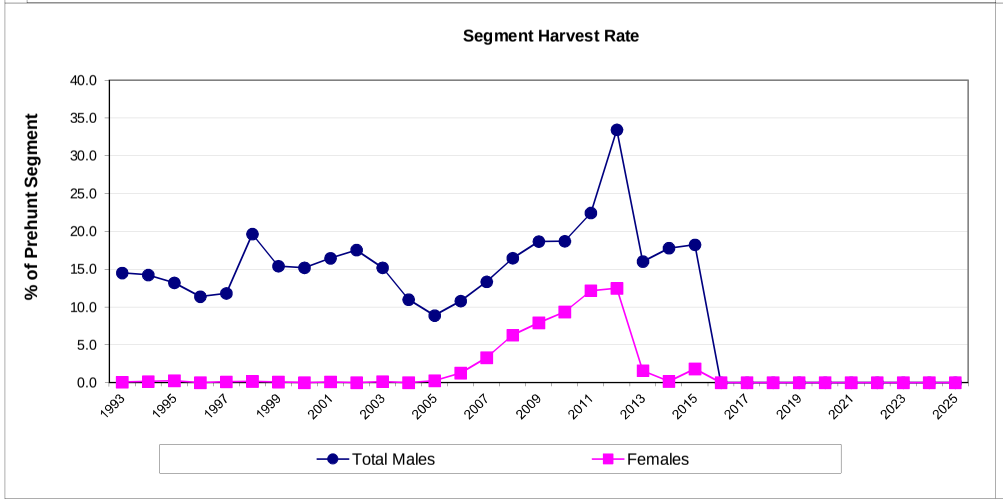
MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%
Over-summer adult surviva	98%

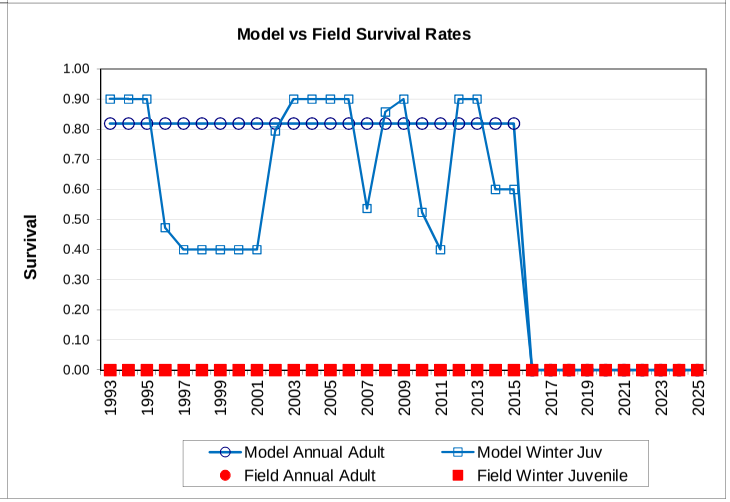
	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		26.79	1.89	46.17	43.91	2.58	182	2	0	184	14.5	0.1
1994		45.67	3.50	45.98	46.96	3.57	167	4	0	171	14.2	0.2
1995		45.71	3.42	50.50	53.24	3.78	174	7	0	181	13.2	0.3
1996		67.00	4.76	54.07	55.87	4.20	164	0	0	164	11.4	0.0
1997		48.63	3.42	55.22	61.07	3.99	170	3	0	173	11.8	0.1
1998		68.01	4.48	52.92	59.05	4.06	248	4	0	252	19.7	0.2
1999		63.49	3.93	48.82	45.90	3.16	171	2	0	173	15.4	0.1
2000		51.85	3.73	47.78	46.21	3.45	156	0	3	159	15.2	0.0
2001		73.47	4.60	45.73	44.61	3.27	149	2	0	151	16.5	0.1
2002		70.74	4.56	46.24	44.92	3.35	155	0	0	155	17.5	0.0
2003		68.31	4.15	52.60	50.37	3.36	168	3	0	171	15.2	0.1
2004		70.87	4.85	58.51	48.74	3.75	152	0	0	152	11.0	0.0
2005		69.81	4.28	64.48	73.68	4.45	154	7	0	161	8.9	0.3
2006		60.07	4.14	69.44	79.32	5.04	228	39	0	267	10.8	1.3
2007		69.24	3.95	70.97	76.03	4.22	310	108	5	423	13.3	3.3
2008		67.35	3.81	69.16	69.16	3.89	362	200	30	592	16.5	6.3
2009		52.60	2.59	70.81	68.20	3.10	437	262	23	722	18.7	7.9
2010		49.52	3.78	69.99	71.87	4.88	421	301	24	746	18.7	9.4
2011		53.29	3.98	66.74	69.77	4.79	410	333	18	761	22.5	12.2
2012		38.95	3.18	59.48	57.68	4.13			281	753	33.5	12.5
2013		44.66	3.75	58.33	59.48	4.55			35	247	16.0	1.6
2014		57.43	5.08	56.59	61.43	5.32			4	230	17.8	0.2
2015		55.00	4.62	55.23	57.50	4.76			40	265	18.2	1.8
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

FIGURES



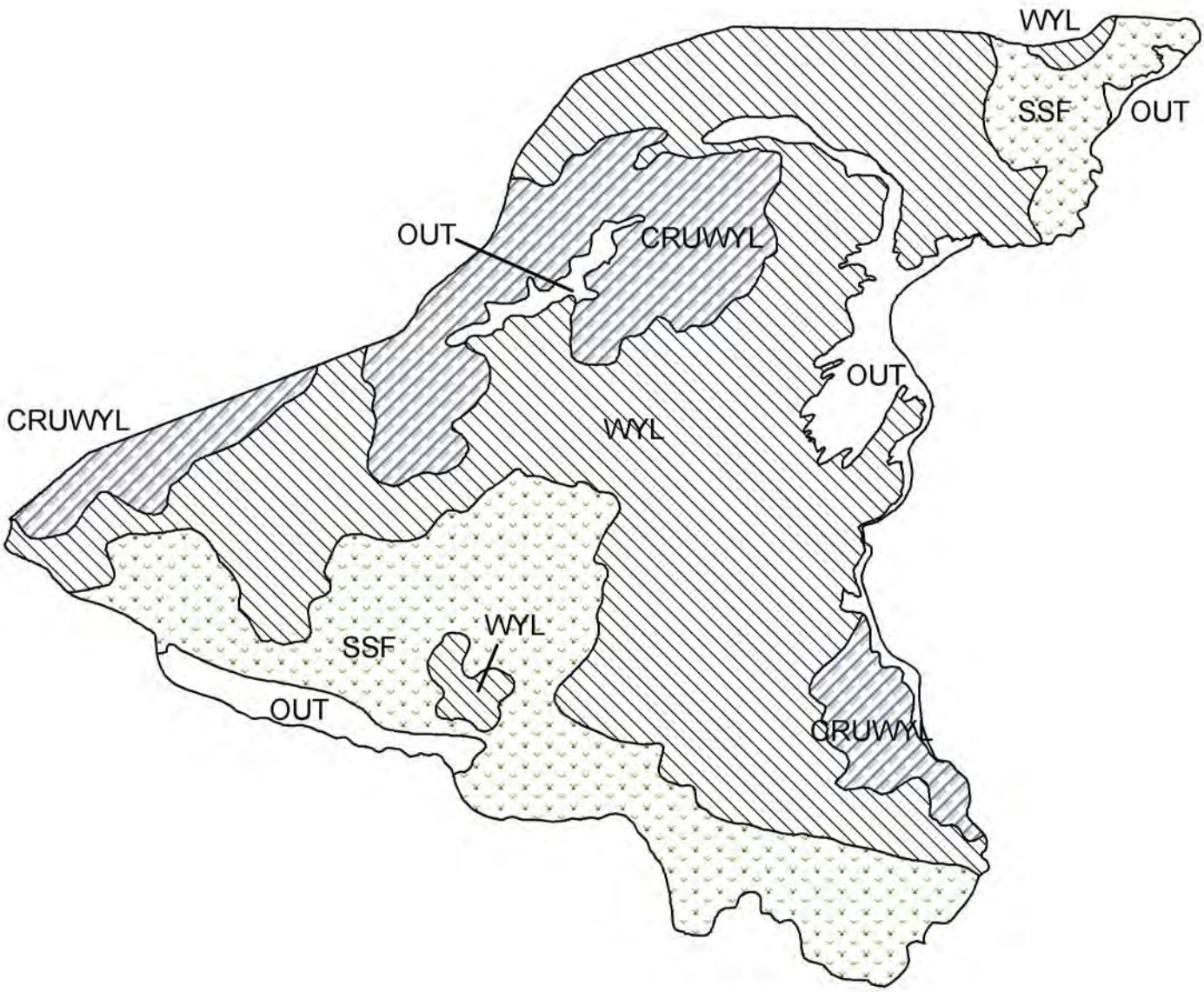






Comments:

PH636 - North Ferris
HA 63
Revised - 8/95



2014 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2014 - 5/31/2015

HERD: PR637 - SOUTH FERRIS

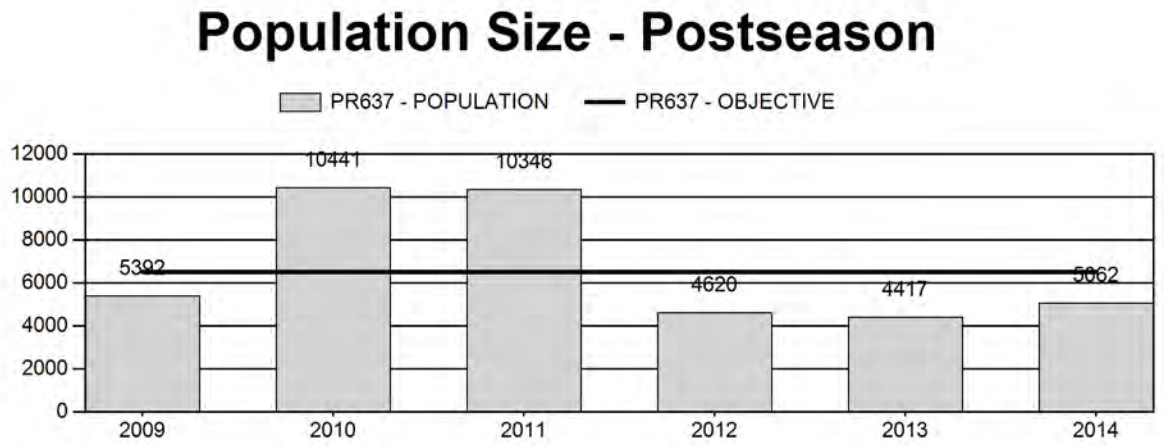
HUNT AREAS: 62 | PREPARED BY: GREG HIATT

	2009 - 2013 Average	2014	2015 Proposed
Population:	7,043	5,062	5,052
Harvest:	214	101	120
Hunters:	245	118	150
Hunter Success:	87%	86%	80 %
Active Licenses:	258	128	150
Active License Success:	83%	79%	80 %
Recreation Days:	727	510	450
Days Per Animal:	3.4	5.0	3.8
Males per 100 Females	60	64	
Juveniles per 100 Females	43	47	

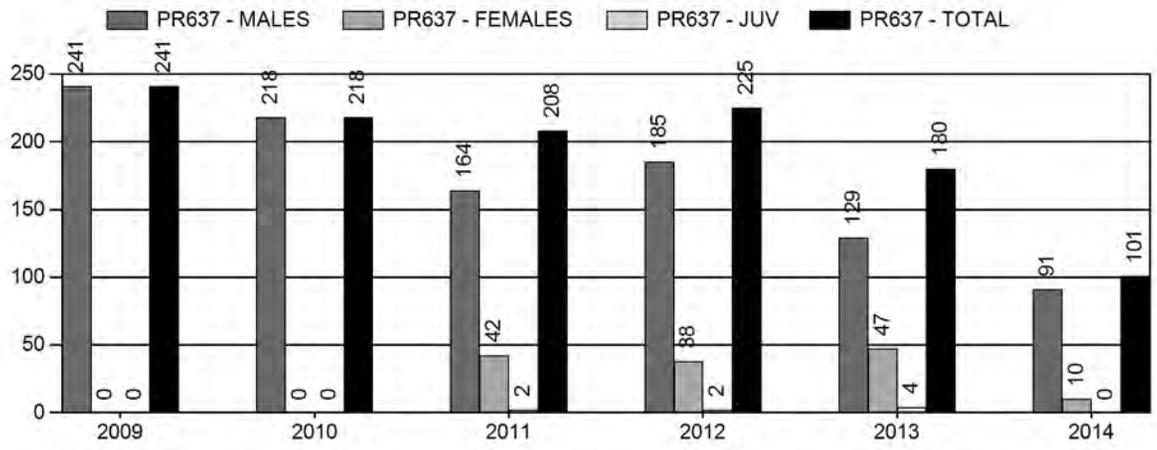
Population Objective (± 20%) :	6500 (5200 - 7800)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-22.1%
Number of years population has been + or - objective in recent trend:	3
Model Date:	3/3/2015

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

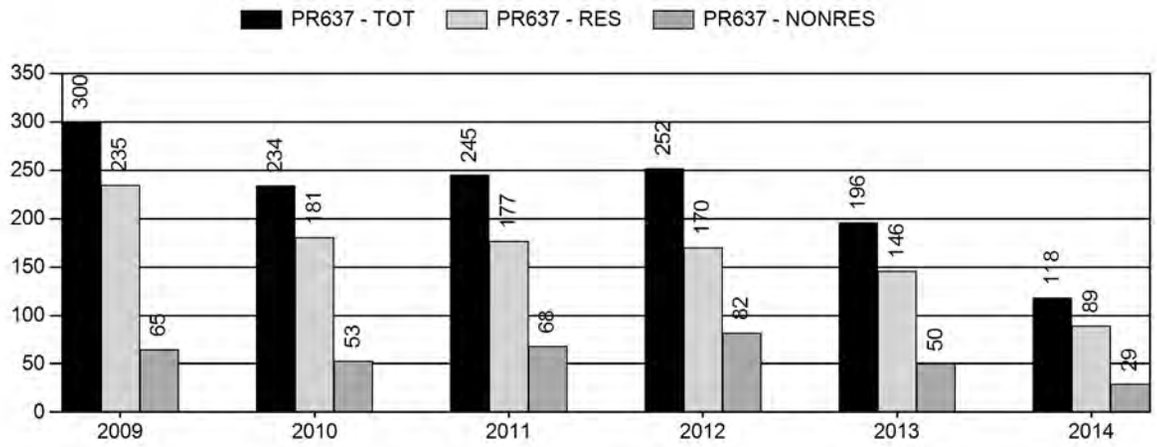
	JCR Year	Proposed
Females ≥ 1 year old:	0.8%	0.7%
Males ≥ 1 year old:	6.6%	7.6%
Juveniles (< 1 year old):	0%	0%
Total:	2.1%	2.3%
Proposed change in post-season population:	-7.2%	+0.2%



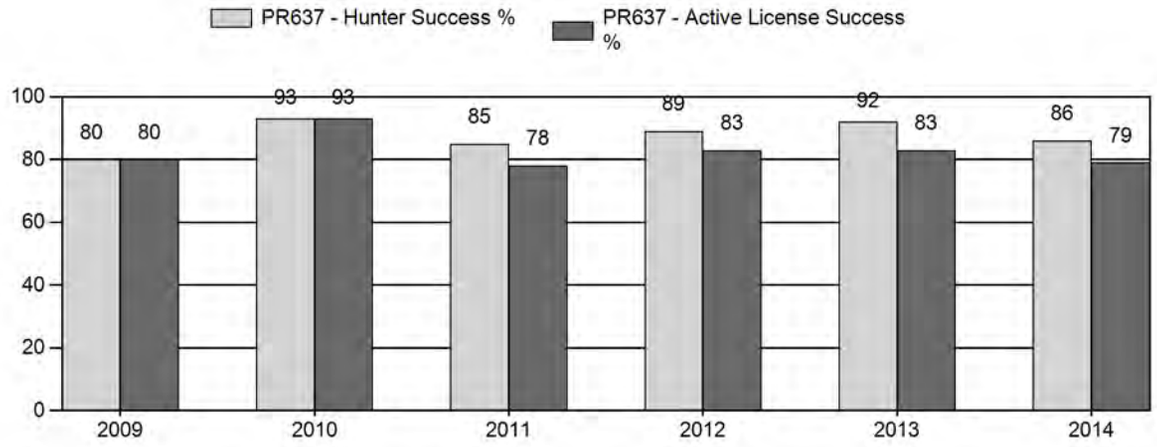
Harvest



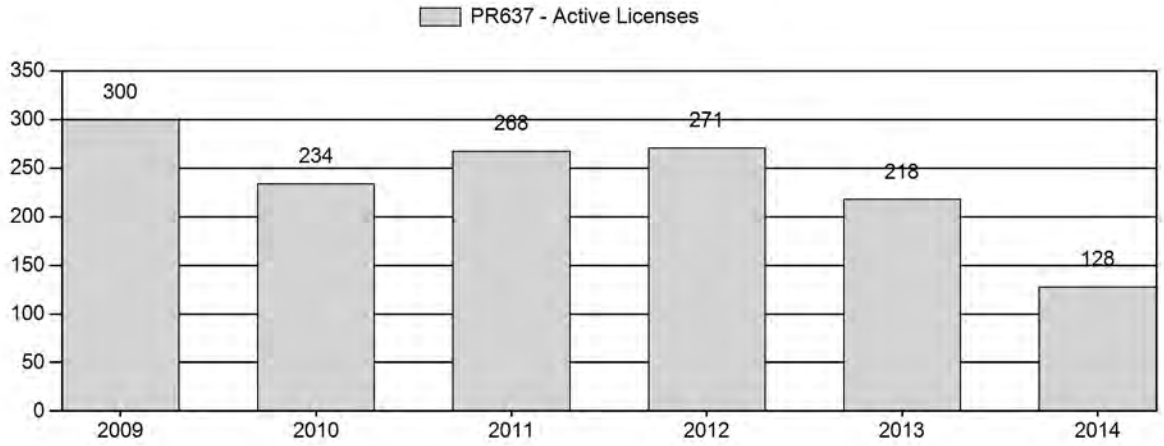
Number of Hunters



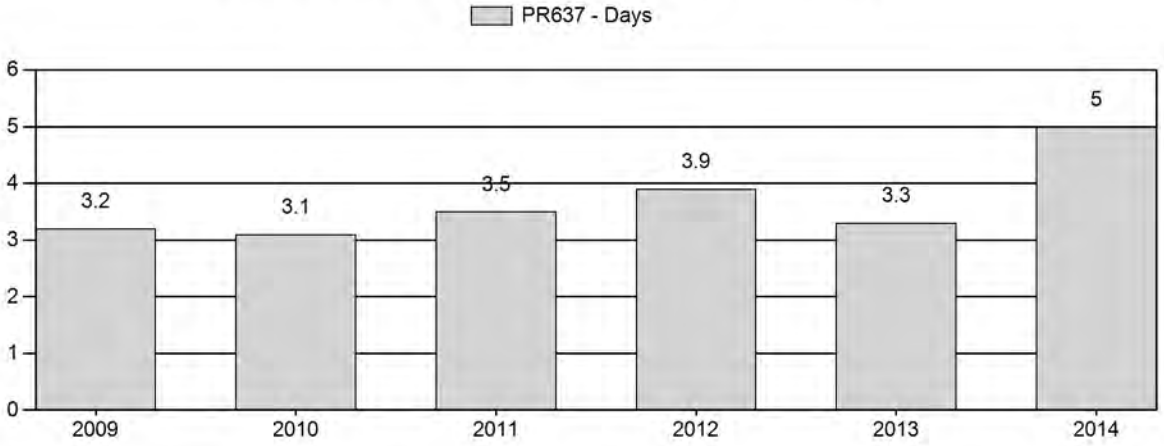
Harvest Success



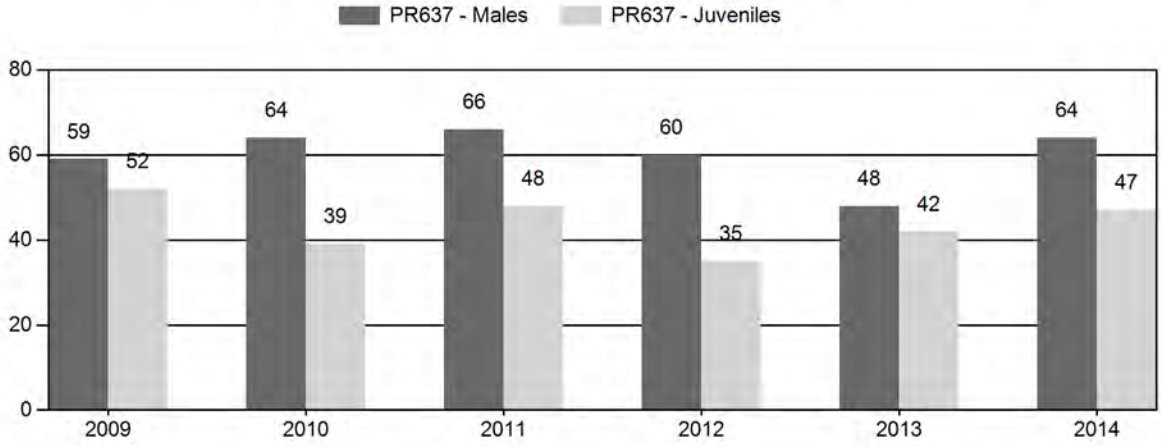
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2009 - 2014 Preseason Classification Summary

for Pronghorn Herd PR637 - SOUTH FERRIS

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2009	5,657	127	495	622	28%	1,049	47%	543	25%	2,214	1,553	12	47	59	± 0	52	± 0	32
2010	10,681	209	578	787	31%	1,234	49%	481	19%	2,502	1,652	17	47	64	± 4	39	± 3	24
2011	10,574	144	477	621	31%	943	47%	451	22%	2,015	1,776	15	51	66	± 5	48	± 4	29
2012	4,868	47	452	499	31%	827	51%	293	18%	1,619	1,502	6	55	60	± 5	35	± 3	22
2013	4,615	53	312	365	25%	766	53%	319	22%	1,450	1,145	7	41	48	± 4	42	± 4	28
2014	5,173	82	354	436	30%	686	47%	324	22%	1,446	1,638	12	52	64	± 5	47	± 4	29

2015 HUNTING SEASONS
SOUTH FERRIS PRONGHORN HERD (PR637)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	Limitations
62	1	Sep. 12	Oct. 31	40	Limited quota; any antelope
	2	Sep. 12	Oct. 31	100	Limited quota; any antelope valid east of the Continental Divide and north of Wise Dugout Draw)
	7	Aug. 15	Oct. 31	25	Limited quota; doe or fawn valid on private lands in the Muddy Creek drainage
Archery 62		Aug. 15	Sep. 11		Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2014
62	1	0
	2	+25
	7	0
Total	**1 & 2**	**+25**
	7	**0**

<u>Management Evaluation</u>
Current Management Objective: 6,500
Management Strategy: Recreation
2014 Postseason Population Estimate: 5,060
2015 Proposed Postseason Population Estimate: 5,050

The South Ferris pronghorn herd is managed toward a post-hunt population size of 6,500 pronghorn, an objective last publicly reviewed in 2014. Population size is estimated using a spreadsheet model developed in 2015. The herd is in recreational management, with harvest quotas designed to maintain pre-hunt buck:doe ratios below 60:100.

Herd Unit Issues

Hunter access to much of the eastern half of the herd has been severely limited by private landowners since the mid-1990s and has resulted in buck:doe ratios and pronghorn densities greatly skewed between the western and eastern portions.

Prior to 2012, population size was estimated using a Pop-II model with reasonable confidence. Attempts to develop a spreadsheet model for the herd in 2012 and 2013 were unsuccessful, presumably because buck:doe ratios vary widely between the lightly hunted eastern half and

publicly accessible lands in the western half of the herd unit. However, addition of the 2014 classification and harvest data allowed for a reasonable model of herd size and trend.

Fawn crops have only ranged from 28 to 55:100 over the past 14 years, averaging ~40:100. In addition to limited access to much of the herd, poor production and recruitment has reduced harvest levels the herd can support.

The large Peterson Ranch in the south-central portion of the herd has changed hands twice in recent years, and it is not known how the newest owners will handle hunter access. They have already decided to not renew the large Walk-In area along US287.

Losses to EHD were documented in this herd in 2013. By the number of reported and observed carcasses, losses appeared to be greatest along the west shore of Seminoe Reservoir, but spanned down to Rawlins and up towards Lamont. No similar mortalities were found in 2014, but the presence of the disease should remain a concern whenever drought conditions arise.

Weather

Drought conditions in 2012 and 2013 continued into the first half of 2014, with significant precipitation not arriving until the last quarter of July. Precipitation during the following three months produced good vegetative growth, but was probably too late to significantly improve fawn survival. Condition of pronghorn going into the winter is expected to have been good. The 2014-15 winter had numerous bitter cold spells, coupled with unusually warm periods, but little significant snowfall until late February. Losses may still be above average because many animals were dispersed off winter ranges prior to the late blizzards.

Habitat

While no herbaceous habitat transects are established within this herd unit, herbaceous forage production is expected to have improved from the increased late summer moisture. Only one shrub transect has been established near this herd unit, on the Morgan Creek WHMA. This transect used to monitor bitterbrush growth and utilization in the Seminoe Mountains was burned in the 2012 fires.

Owners of the Pathfinder Ranch, which encompasses the north-central portion of this herd, have expressed interest in looking for opportunities for improving habitat conditions for wildlife, possibly as mitigation for wind power projects in other parts of the state. Treatment of browse on winter ranges, adjustments of grazing use, and modification of sheep-tight fences would benefit pronghorn in this herd unit.

Field Data

Classification sample size in 2014 was essentially the same as in 2013, the smallest sample since 1979. Fawn production improved slightly, to 47:100, slightly above the 5-year average. Fawn production was significantly lower in the eastern portion of the herd at 36:100, compared to 55:100 in the west.

The buck:doe ratio jumped from 48:100 in 2013 to 64:100 in 2014. All of the increase in this ratio was in the eastern portion of the herd unit, where access is strictly limited. The eastern ratio rose from 55:100 in 2013 to 100:100 in 2014. Most of the increase was in the adult buck:doe ratio, which rose from 48:100 in 2013 to 80:100 in 2014, but the yearling buck ratio also increased, from 7:100 to 19:100. Buck:doe ratios in the western portion of the herd did not change, at 7:100 for yearling bucks and 33:100 for adult bucks in both 2013 and 2014. Buck:doe ratios have exceeded the 60:100 maximum criterion for recreational management in four of the past seven years, but always due to high ratios in the east half of the herd which is largely unavailable to most hunters. Buck:doe ratios in the western portion only averaged 42:100 over the previous five years, generating complaints of poor buck numbers and quality by hunters. Buck:doe ratios in the eastern portion, however, averaged 75:100 over those five years. The Type 2 licenses introduced in 2012 to address the disparity between buck densities between the two portions of the area have only been moderately successful.

Harvest Data

The difference in supply of bucks between the two halves of the herd unit is also apparent in the harvest statistics. While both Type 1 and Type 2 hunters had poor success in 2014, at 83 percent, those limited to the eastern portion of the herd unit only expended an average of 3.3 days to harvest an animal. The Type 1 hunters, able to hunt the entire area but usually only found in the western portion, expended a record 8.9 days for each pronghorn harvested.

Type 7 doe/fawn licenses were introduced in this area in 2013 to address complaints about high concentrations of pronghorn on irrigated fields along Muddy Creek. Nineteen does were harvested the first year, but only 10 were removed in 2014. Pronghorn use of the irrigated fields appears to have lessened, but it is not known if that is due to harvest, hunter activity or more forage opportunities on native ranges due to increased precipitation in 2014.

Population

Efforts to develop a reasonable spreadsheet model for this herd in 2012 and 2013 failed, a failure attributed to the highly skewed buck:doe ratios between the eastern and western portions of the herd unit. Last year's population estimates were obtained using two separate spreadsheet models, one each for the east and west portions of the herd unit. While effective, these separate models could not be anchored to defensible line transect estimates. This year, however, the addition of the 2014 classification and harvest data allowed for a reasonable model, despite the highly skewed buck:doe ratios.

A line transect survey in spring of 2013 estimated only 4,600 pronghorn in this herd, and found a noticeable disparity in pronghorn densities between the east and west portions. The population estimate was less than half that of a similar survey three years earlier, and standard spreadsheet models were apparently unable to accommodate that steep of a decline in herd size. This year's model, however, incorporated one year of variable adult survival in the Time-Specific Juvenile & Constant Adult Survival (TSJ,CA) model, for the severe 2011-12 winter.

While costing a degree of freedom, the resultant model has a reasonable AICc value, aligns closely with all three line transect estimates, has a reasonable track compared to historic trend

counts, and aligns well with most observed buck:doe ratios. Adult mortality for the majority of years in the model is estimated at a reasonable 88 percent, while adult survival in 2011 drops to 40 percent. This also appears reasonable, given the losses noted that year and the severe decline in line transect estimates. However, juvenile survival rates exceeded adult survival rates in some years of the model. This is difficult to accept biologically, and as a result the model is only considered to be a "Fair" representation of the herd.

The CJ,CA model had a similar AICc value, but did not track observed buck:doe ratios, aligned with only the two older line transect estimates, and predicted unrealistic counting success for early trend counts and equally unrealistic poor counting success for later trend counts. The SCJ,SCA model had the lowest AICc value, but only aligned with two of three line transect estimates, fit poorly with historic trend counts, observed buck:doe ratios and required four years of variable survival rates instead of one.

The new TSJ,CA model predicts the herd was about 22 percent below objective in 2014. Fawn production in 2015 was projected to be near the 5-year average. Assuming a mid-range fawn survival of 60 percent, the model predicts the herd will essentially be stable in 2015.

Management Summary

With the population well below objective, harvests need to remain low to allow the herd to recover and no changes are recommended for the Type 1 license quota. The exceptionally high buck:doe ratio in the eastern portion of the herd indicates there is a surplus of bucks that can be harvested in that portion. The recommended quota for Type 2 licenses is increased by 33 percent. While no doe harvest is needed for the herd as a whole, the Type 7 doe/fawn licenses on private lands along Muddy Creek are retained to address high numbers of pronghorn on irrigated croplands in the northwestern corner of the herd. Most of these lands are enrolled in the Department's Walk-In program, so access to these private lands should not be a concern.

The expected harvest of roughly 105 bucks and 15 does and fawns from the proposed license quotas should maintain herd size near the 2014 level of approximately 5,000 pronghorn.

Opening date falls on the traditional day of the week and will synchronize with neighboring Area 61. The closing date is the same as in the previous three years and extends to the closing of the local deer season. A standardized opening date is used for the archery season, which closes the day before the opening of the regular season.

INPUT	
Species:	Pronghorn
Biologist:	Greg Hiatt
Herd Unit & No.:	637 = S.Ferris=good?
Model date:	03/03/15

☐ Clear form

MODELS SUMMARY		Fit	Relative AICc	Check best model to create report	Notes
CJ,CA	**Constant Juvenile & Adult Survival**	151	160	☐ CJ,CA Model	
SCJ,SCA	**Semi-Constant Juvenile & Semi-Constant Adult Survival**	87	119	☐ SCJ,SCA Mod	
TSJ,CA	**Time-Specific Juvenile & Constant Adult Survival**	33	152	☑ TSJ,CA Model	

Population Estimates from Top Model

Year	Predicted Prehunt Population (year *i*)			Total	Predicted Posthunt Population (year *i*)			Total	Predicted adult End-of-bio-year Pop (year *i*)			LT Population Estimate		Trend Count	Objective
	Juveniles	Total Males	Females		Juveniles	Total Males	Females		Total Males	Females	Total Adults	Field Est	Field SE		
1993	1429	2139	3848	**7416**	1416	1748	3758	**6921**	2141	3977	**6118**				6500
1994	1602	2098	3897	**7598**	1598	1813	3817	**7228**	2154	3973	**6127**				6500
1995	1771	2111	3893	**7776**	1771	1919	3892	**7582**	2117	3906	**6023**				6500
1996	1941	2074	3828	**7843**	1941	1892	3821	**7654**	2065	3814	**5879**				6500
1997	1956	2024	3737	**7717**	1956	1832	3732	**7519**	2013	3737	**5750**				6500
1998	1602	1973	3662	**7237**	1602	1719	3656	**6978**	1833	3597	**5430**				6500
1999	1904	1796	3525	**7225**	1904	1557	3520	**6980**	2286	4070	**6356**				6500
2000	1855	2240	3989	**8084**	1852	2017	3930	**7798**	2673	4405	**7079**				6500
2001	1402	2620	4317	**8339**	1402	2427	4317	**8147**	2827	4541	**7368**				6500
2002	1668	2770	4451	**8889**	1668	2497	4451	**8616**	3008	4789	**7798**				6500
2003	1302	2948	4694	**8944**	1302	2702	4694	**8697**	3017	4830	**7846**				6500
2004	2390	2956	4733	**10079**	2390	2647	4728	**9765**	2817	4716	**7533**				6500
2005	2537	2761	4622	**9920**	2537	2378	4622	**9537**	2597	4652	**7249**				6500
2006	1317	2545	4559	**8421**	1306	2247	4518	**8071**	2235	4300	**6535**				6500
2007	1750	2191	4214	**8154**	1750	1855	4214	**7819**	2465	4617	**7083**				6500
2008	1699	2416	4525	**8640**	1699	2143	4525	**8367**	2706	4871	**7577**				6500
2009	2471	2652	4774	**9897**	2471	2387	4774	**9632**	3300	5468	**8768**	9642	1765		6500
2010	2089	3234	5359	**10681**	2089	2994	5359	**10441**	3074	5220	**8294**				6500
2011	2446	3013	5115	**10574**	2444	2832	5069	**10346**	1521	2545	**4066**				6500
2012	883	1491	2494	**4868**	881	1287	2452	**4620**	1369	2358	**3727**	4610	997		6500
2013	962	1342	2311	**4615**	958	1200	2259	**4417**	1565	2523	**4087**				6500
2014	1168	1533	2472	**5173**	1168	1433	2461	**5062**	1552	2492	**4044**				6500
2015	1221	1520	2442	**5184**	1221	1405	2426	**5052**							6500
2016															6500
2017															6500
2018															6500
2019															6500
2020															6500
2021															6500
2022															6500
2023															6500
2024															6500
2025															6500

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	0.87			0.88		
1994	0.70			0.88		
1995	0.47			0.88		
1996	0.40			0.88		
1997	0.40			0.88		
1998	0.40			0.88		
1999	0.95			0.88		
2000	0.95			0.88		
2001	0.95			0.88		
2002	0.95			0.88		
2003	0.95			0.88		
2004	0.40			0.88		
2005	0.40			0.88		
2006	0.40			0.88		
2007	0.95			0.88		
2008	0.95			0.88		
2009	0.95			0.88		
2010	0.40			0.88		
2011	0.40			0.40		
2012	0.40			0.88		
2013	0.95			0.88		
2014	0.50			0.88		
2015	0.60			0.88		
2016						
2017						
2018						
2019						
2020						
2021						
2022						
2023						
2024						
2025						

Parameters:	Optim cells
Adult Survival =	0.877
Initial Total Male Pop/10,000 =	0.214
Initial Female Pop/10,000 =	0.385

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

	Classification Counts						Harvest					
Year	Juvenile/Female Ratio			Total Male/Female Ratio							Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est	Field SE	Juv	Males	Females	Total Harvest	Total Males	Females
1993		37.14	1.92	55.60	55.60	2.51	356	82	12	450	18.3	2.3
1994		41.11	2.21	53.83	53.83	2.64	259	73	4	336	13.6	2.1
1995		45.50	2.45	54.23	54.23	2.76	175	1	0	176	9.1	0.0
1996		50.71	2.78	54.19	54.46	2.92	166	6	0	172	8.8	0.2
1997		52.33	2.78	54.16	59.82	3.05	175	5	0	180	9.5	0.1
1998		43.75	2.14	53.88	51.06	2.37	231	5	0	236	12.9	0.2
1999		54.00	2.44	50.95	49.07	2.29	217	5	0	222	13.3	0.2
2000		46.51	2.21	56.15	56.29	2.51	203	54	3	260	10.0	1.5
2001		32.48	1.89	60.69	59.09	2.79	175	0	0	175	7.3	0.0
2002		37.48	2.25	62.25	65.09	3.26	248	0	0	248	9.8	0.0
2003		27.74	1.84	62.81	63.01	3.13	224	0	0	224	8.4	0.0
2004		50.50	2.89	62.46	66.01	3.47	281	5	0	286	10.5	0.1
2005		54.90	2.92	59.73	59.90	3.09	348	0	0	348	13.9	0.0
2006		28.89	1.84	55.82	57.70	2.87	271	37	10	318	11.7	0.9
2007		41.52	2.10	51.99	47.02	2.28	305	0	0	305	15.3	0.0
2008		37.54	2.15	53.39	54.75	2.76	248	0	0	248	11.3	0.0
2009		51.76	2.74	55.55	59.29	3.00	241	0	0	241	10.0	0.0
2010		38.98	2.10	60.34	63.78	2.91	218	0	0	218	7.4	0.0
2011		47.83	2.74	58.89	65.85	3.40	164	42	2	208	6.0	0.9
2012		35.43	2.41	59.79	60.34	3.42			38	225	13.6	1.7
2013		41.64	2.78	58.06	47.65	3.03			47	180	10.6	2.2
2014		47.23	3.18	62.02	63.56	3.89			10	101	6.5	0.4
2015		50.00	3.27	62.25	60.00	3.70			15	120	7.6	0.7
2016												
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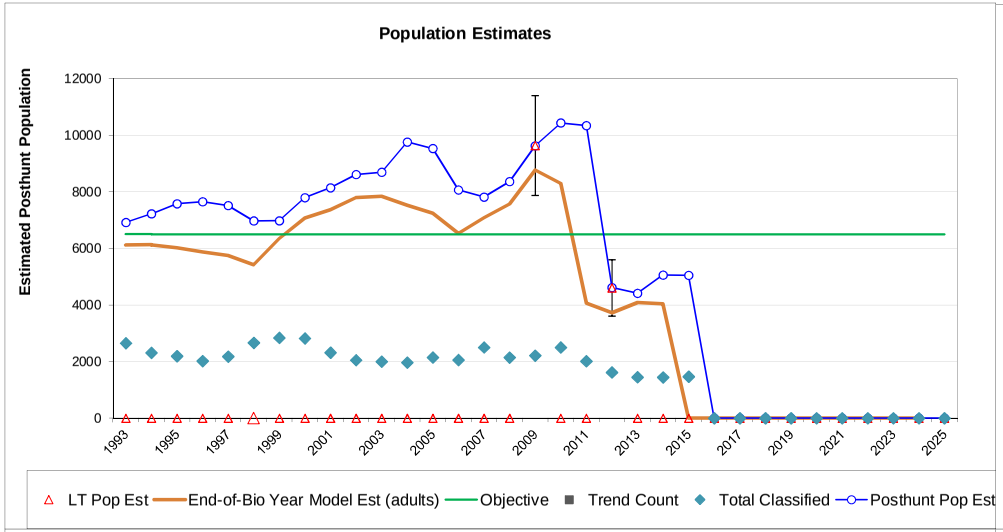
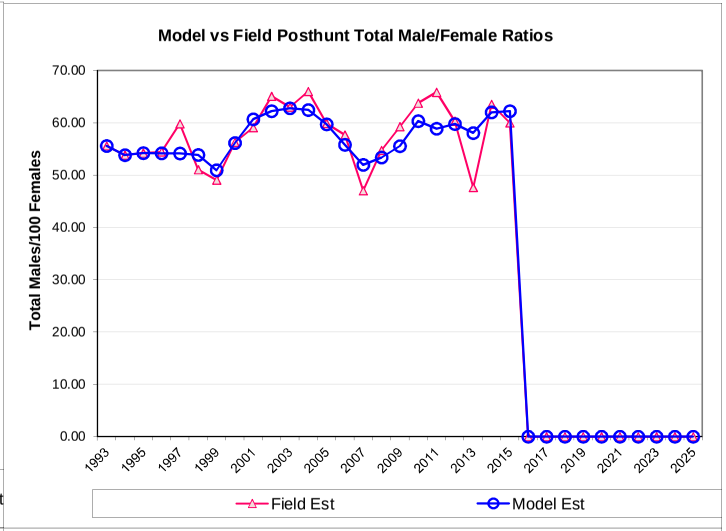
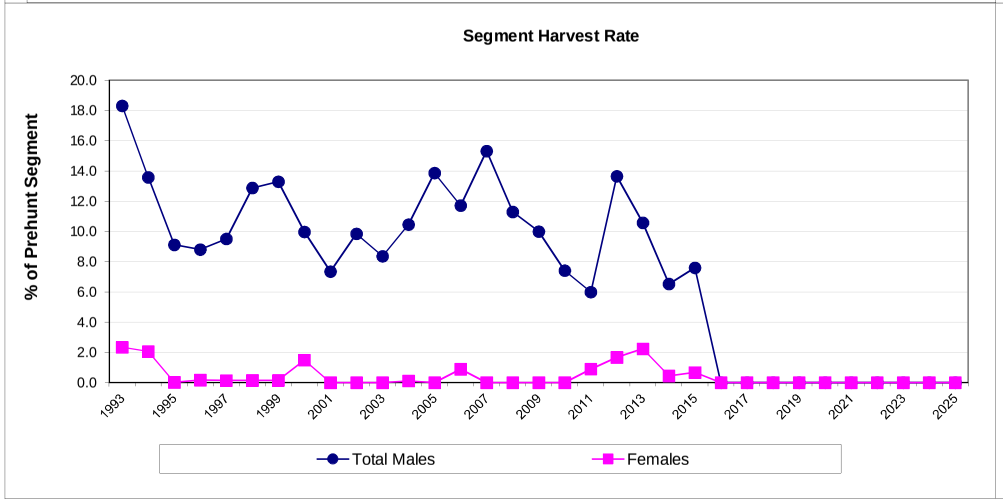
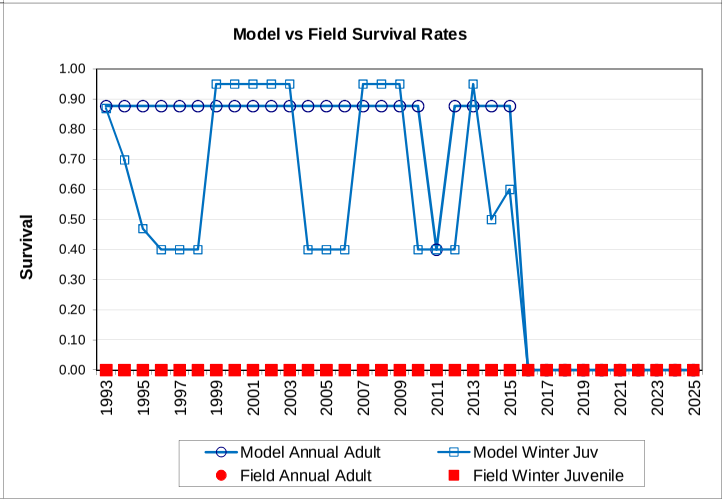
FIGURES









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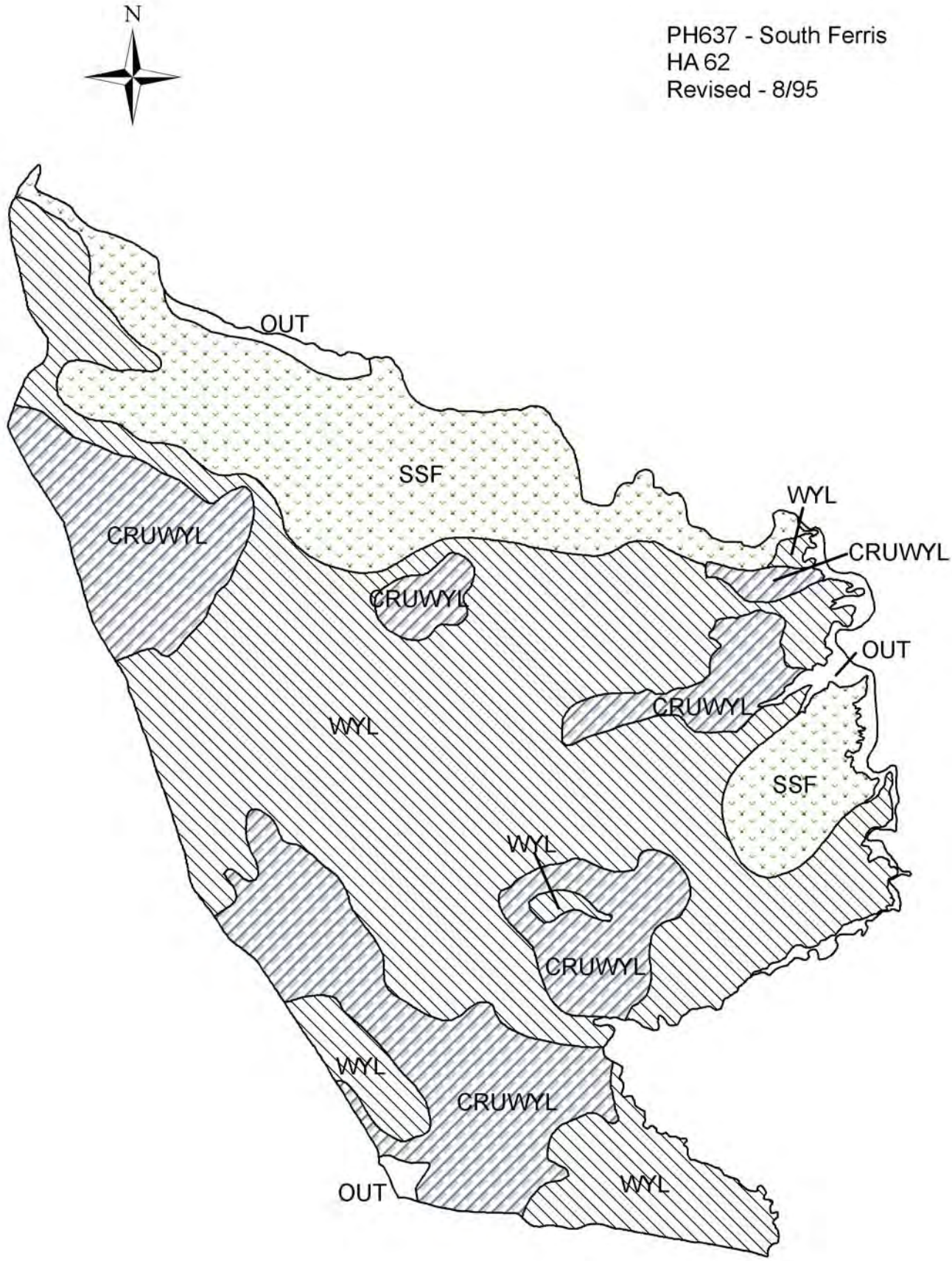
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