TABLE OF CONTENTS

Acknowledgement ii

Antelope

Rattlesnake (745) - Areas 70-72 1
North Natrona (746) - Area 73 11
North Converse (748) - Areas 25, 26 21
Black Thunder (750) - Areas 4-9, 24, 27, 29 31

Mule Deer

Cheyenne River (740) - Areas 7-14, 21 47
Black Hills (751) - Areas 1-6 61
North Converse (755) - Area 22 75
South Converse (756) - Area 65 83
Bates Hole - Hat Six (757) - Areas 66, 67 97
Rattlesnake (758) - Areas 88, 89 111
North Natrona (759) - Area 34 123

White-tailed Deer

Black Hills (706) - Areas 1-6 135
Central (707) - Areas 7-15, 21, 22, 34, 65-67, 88, 89 149

Elk

Black Hills (740) - Areas 1, 116, 117 159
Laramie Peak / Muddy Mountain (741) - Areas 7, 19 175
Rattlesnake (742) - Area 23 191
Pine Ridge (743) - Area 122 201

Acknowledgement

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

2016 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2016 - 5/31/2017

HERD: PR745 - RATTLESNAKE

HUNT AREAS: 70-72

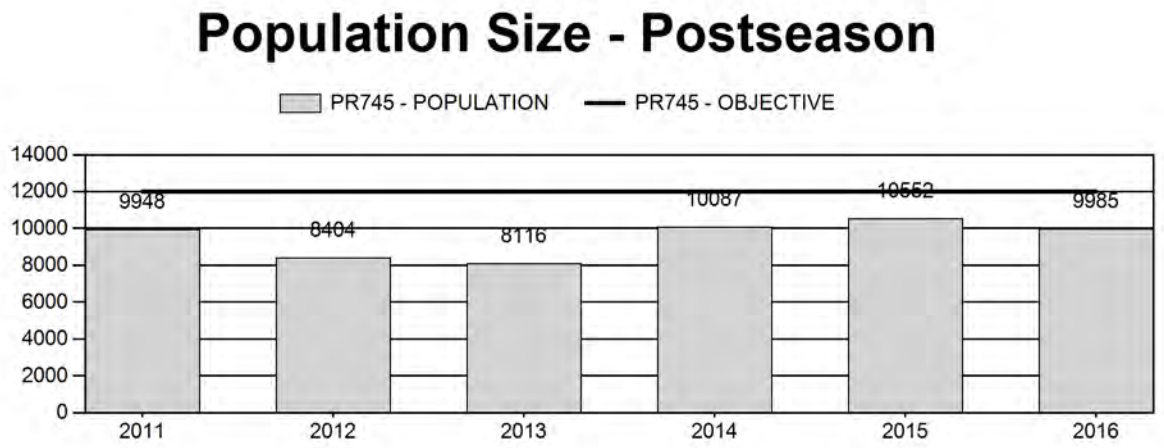
PREPARED BY: HEATHER O'BRIEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	9,421	9,985	10,200
Harvest:	1,283	377	322
Hunters:	1,405	373	350
Hunter Success:	91%	101%	92 %
Active Licenses:	1,564	421	370
Active License Success:	82%	90%	87 %
Recreation Days:	4,792	1,244	1,200
Days Per Animal:	3.7	3.3	3.7
Males per 100 Females	47	48	
Juveniles per 100 Females	58	74	

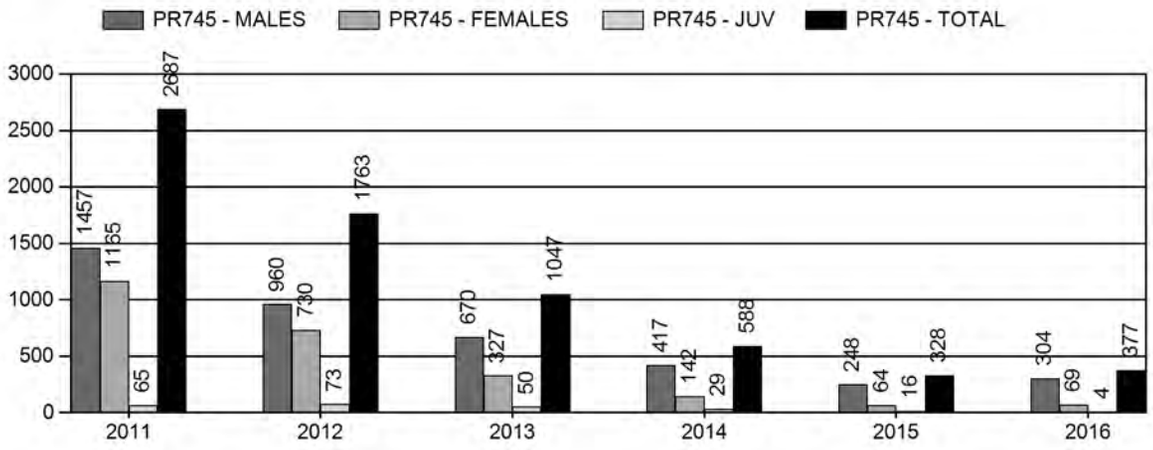
Population Objective (± 20%) :	12000 (9600 - 14400)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-16.8%
Number of years population has been + or - objective in recent trend:	6
Model Date:	02/14/2017

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

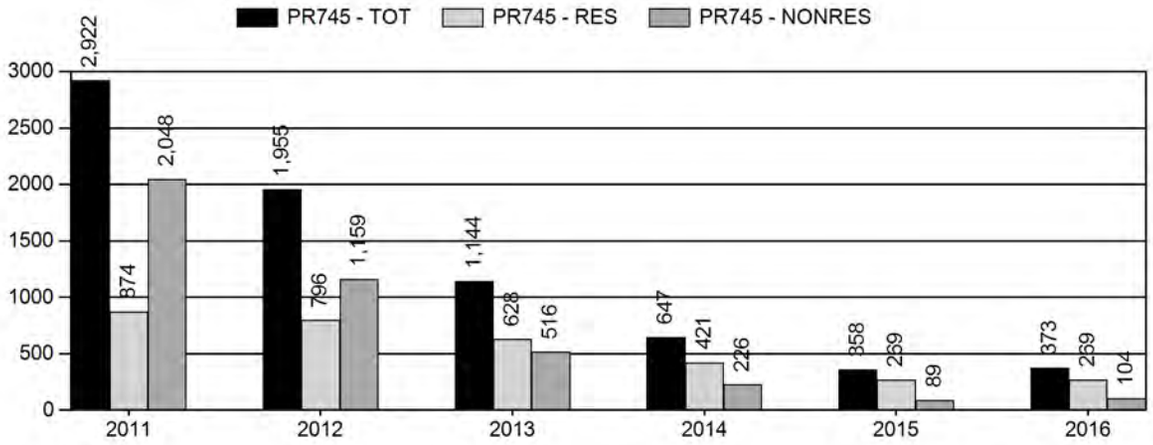
	JCR Year	Proposed
Females ≥ 1 year old:	1.6%	0.5%
Males ≥ 1 year old:	15.2%	14.6%
Total:	3.6%	3.1%
Proposed change in post-season population:	-3.0%	+2.2%



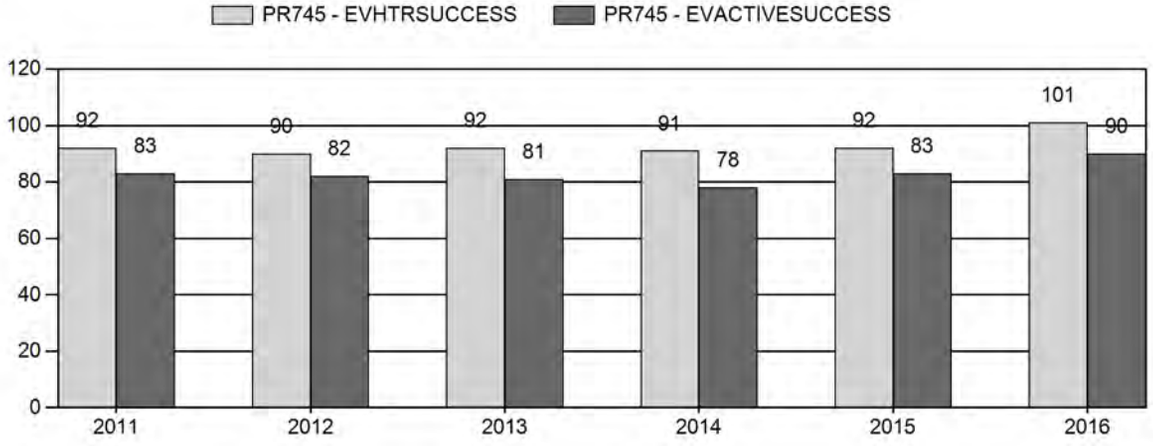
Harvest



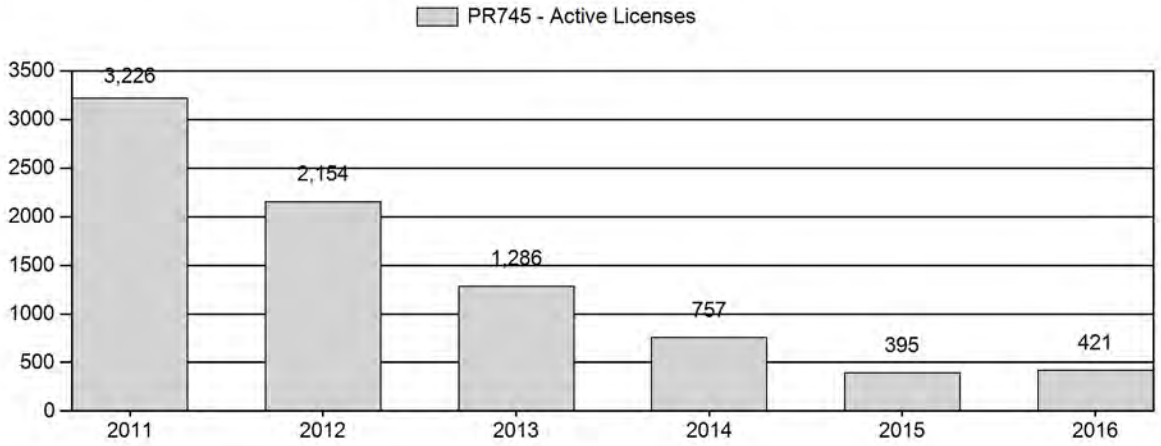
Number of Active Licenses



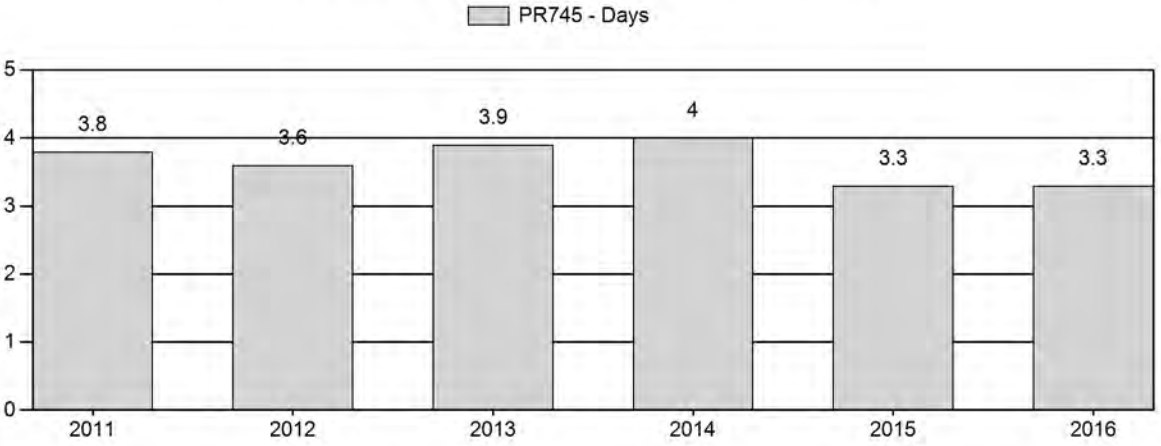
Harvest Success



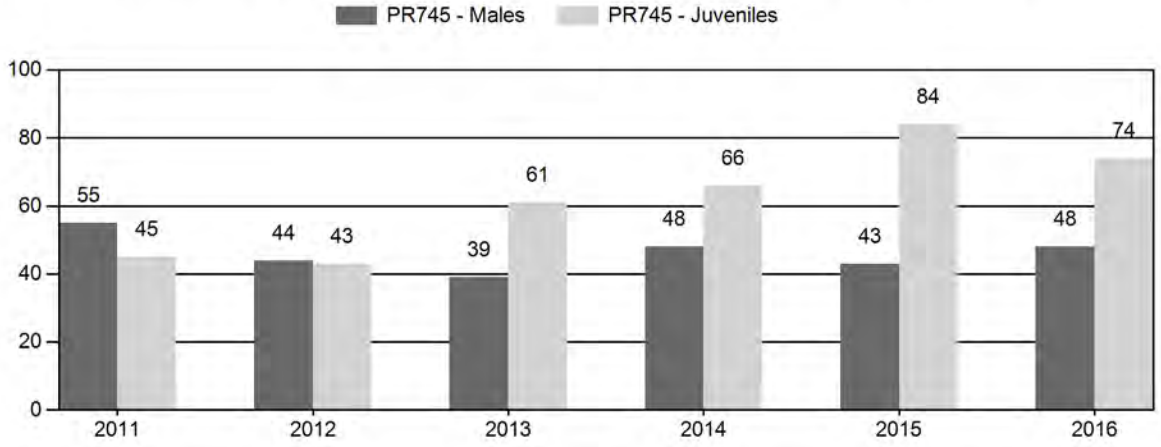
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2011 - 2016 Preseason Classification Summary

for Pronghorn Herd PR745 - RATTLESNAKE

		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
2011	12,938	195	683	878	27%	1,607	50%	721	22%	3,206	1,616	12	43	55	± 3	45	± 3	29
2012	10,343	82	209	291	24%	662	53%	285	23%	1,238	1,140	12	32	44	± 5	43	± 5	30
2013	9,268	45	199	244	20%	624	50%	381	31%	1,249	1,901	7	32	39	± 5	61	± 6	44
2014	10,921	111	191	302	22%	634	47%	416	31%	1,352	1,734	18	30	48	± 5	66	± 6	44
2015	10,913	160	243	403	19%	947	44%	796	37%	2,146	2,231	17	26	43	± 4	84	± 6	59
2016	10,400	178	281	459	21%	965	45%	711	33%	2,135	2,635	18	29	48	± 4	74	± 5	50

2017 HUNTING SEASONS
RATTLESNAKE PRONGHORN HERD (PR745)

Hunt Area	Type	Season Dates Opens	Season Dates Closes	Quota	License	Limitations
70	1	Sep. 15	Oct. 31	50	Limited quota	Any antelope
	6	Sept 15	Oct. 31	50	Limited quota	Doe or fawn antelope
71	1	Sep. 15	Oct. 31	75	Limited quota	Any antelope
72	1	Sep. 15	Oct. 31	250	Limited quota	Any antelope
Archery		Aug. 15	Sep. 14			Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2016
70	1	+25
	2	-25
	6	+50
	7	-25
71	1	No change
	6	-25
72	1	No change
	6	-25
Total	1	+25
	2	-25
	6	No change
	7	-25

Management Evaluation

Current Management Objective: 12,000
Management Strategy: Special
2016 Postseason Population Estimate: ~10,000
2017 Proposed Postseason Population Estimate: ~10,200
2016 Hunter Satisfaction: 89% Satisfied, 8% Neutral, 3% Dissatisfied

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

Herd Unit Issues

Hunting access within the herd unit is moderate, having some large tracts of public land as well as Walk-In Areas and a Hunter Management Area. Traditional ranching and grazing are the primary land use over the whole herd unit, with scattered areas of oil and gas development. Hunt Areas 70 & 71 are dominated by private lands. License issuance is typically maintained at a higher level relative to pronghorn densities in Area 70 to address damage issues on irrigated agricultural fields. Periodic disease outbreaks (i.e. hemorrhagic diseases, *Clostridium spp*. infections) are possible in this herd and can contribute to population declines when environmental conditions are suitable. However, there were no reported or confirmed cases of disease outbreak in pronghorn within the Rattlesnake Herd during 2016.

The southwest boundary of Hunt Area 70 will be changed in 2017. The current boundary is a hydrographic divide, which can be difficult to identify in the field. The new boundary will be an irrigation canal that is easier to recognize. The boundary change will also address issues of hunter crowding on public lands in the hunt area, which conflicts with management goals of directing harvest onto private agricultural lands. That segment of Area 70 will be added to Hunt Area 69, which includes similar proportions of public lands.

Weather

The severe winter of 2010-2011 and subsequent drought of 2012 resulted in very high mortality of pronghorn in the Rattlesnake Herd Unit. Fawn ratios were also very low during this time period, and the population remained well below objective. From 2013 to the present, weather trends have been more favorable, but range conditions and pronghorn numbers still seem to be lagging in their recovery. Fawn production and survival gradually increased from 2013 to 2015, as range conditions and nutritional status of does began to improve. The winter of 2015 was fairly average, though some areas experienced prolonged periods of persistent snow. The spring of 2016 was very wet, resulting in rapid plant growth and green-up of rangelands. However, the majority of the summer and fall were extremely dry, causing much of the available forage to cure. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided pronghorn with a valuable boost in nutrition prior to the winter of 2016-2017. While there were several notable snow storms and cold snaps during the winter of 2016-2017, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Thus, managers expect fairly average pronghorn survival for the winter of 2016-2017. For detailed weather data see http://www.ncdc.noaa.gov/gac/time-series/us.

Habitat

This herd unit has no established habitat transects to measure production and/or utilization on shrub species that are preferred browse for pronghorn. Anecdotal observations and discussions with landowners in the region indicate growth and moisture during the spring of 2016 was above average, but summer and early fall of 2016 were quite dry. Pronghorn became more concentrated in areas where moisture and green forage persisted during this time period, and may have overbrowsed preferred plant species in some cases. October precipitation resulted in a late fall green-up of forage that likely benefitted pronghorn nutritionally prior to the winter of 2016-2017.

Field Data

Harsh winter conditions in 2010-2011 combined with severe drought dropped this herd below management objective, and license issuance since 2012 has become extremely conservative. Improved moisture and favorable weather conditions appeared to have helped fawn production and survival from 2013-2016. Nevertheless, fawn production for the Rattlesnake Herd has not improved as much as adjacent herds over the past four years. This suggests the carrying capacity for the herd unit was still suppressed despite improved precipitation. Native habitats are likely still recovering from the very high pronghorn numbers of 2004 to 2011 and prolonged drought conditions. Fawn ratios finally increased in 2015 and 2016 to 84 and 74:100 does, respectively – levels of production which have not been observed within the herd unit since 2005.

Buck ratios for the Rattlesnake herd historically range from the mid 40s to mid 70s per 100 does. Buck ratios are most commonly in the upper 50s, just below the lower limit for special management. In more recent years, buck ratios have dropped to the mid-40s as a result of low fawn recruitment and high harvest pressure on a diminishing population. In 2013, the buck ratio for the Rattlesnake Pronghorn Herd reached a 22-year low of 39:100 does. Since then buck ratios have improved. In 2014 the buck ratio was 48:100 does - a result of reduced harvest pressure and improved overwinter survival. The buck ratio dropped slightly in 2015 to 43:100 does despite very conservative hunting seasons, but rebounded to 48:100 does in 2016. Yearling buck ratios were high during the same time period, with 17-18 per 100 does from 2014-2016. Higher fawn production and low winter mortality over the past three years should allow this herd to grow more steadily and improve buck ratios. However, overall buck ratios for the herd unit can seem low due to variation in management strategies for Area 70 versus Areas 71 & 72. Still, hunters have developed high expectations for buck numbers and quality within this herd. This population will again be managed conservatively to increase buck ratios within special management parameters while also increasing the overall population toward objective.

The 2016 post-season population estimate was approximately 10,000 and trending slightly upward from 2015 estimates. This herd unit did not have a functional population model until 2012, when a spreadsheet-based modeling system replaced the program POP-II to simulate herd dynamics. Prior management decisions for this herd were made using a combination of classification data, harvest statistics, observations of field personnel, and comments from hunters and landowners regarding pronghorn numbers. Line transect surveys were also conducted in 1998, 2000, 2003, 2007, and 2014 to provide end-of-year population estimates. The 2014 survey yielded good results, with a reasonable standard error that aligns well with the population model. The current population model is considered to be of fair quality, as personnel believe there is significant interchange with the adjacent Beaver Rim Herd Unit that is not accounted for in the model. However, a merged dataset of the Rattlesnake and Beaver Rim Herds did not show adequate improvements in predicting population size or trend to merit combining the two herds.

Harvest Data

License success in this herd unit is typically in the 90th percentile. Despite drastic reductions in license issuance, success declined from 2011-2014 to near the 80th percentile. At the same time hunter days increased, indicating pronghorn were more difficult for hunters to find and harvest. In 2014, active license success reached a 12–year low of 78%, hunter days reached a 17-year high, and reported hunter satisfaction for the Rattlesnake Herd Unit was the lowest in the state. Following further reductions in license issuance, harvest success for active licenses improved in 2015 and 2016 to 82% and 89%, respectively. Harvest days also declined to more typical levels for this herd unit. Hunter satisfaction improved markedly, from 68% in 2014 to around 90% in 2015 and 2016. Despite improved fawn production for the past two years, managers will continue to recommend a very conservative harvest prescription in 2017 with the goal of maintaining hunter satisfaction while increasing buck ratios, harvest success, and the overall population.

Population

The “Time-Specific Juvenile Survival – Constant Adult Survival” (TSJ,CA) spreadsheet model was chosen for the post-season population estimate of this herd. This model seemed most representative of the herd, as it selects for low juvenile survival in the years when managers agree that overwinter fawn survival was very poor – particularly in 2010-2012. The simpler

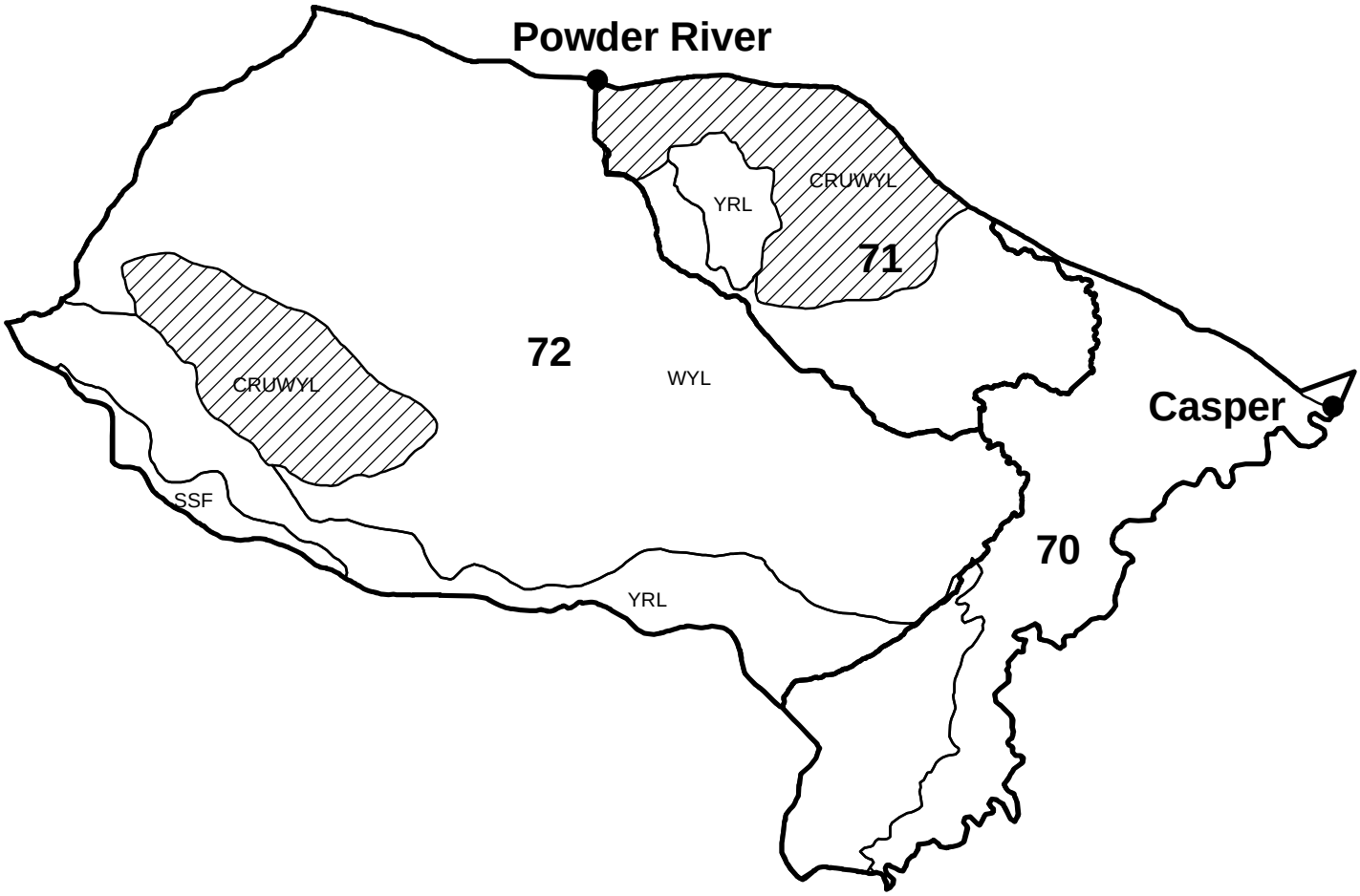
models (CJ,CA and SCA,CA) select for higher juvenile survival rates across years, which does not seem feasible for this herd given its very slow rate of growth. All three models follow a trend that is plausible; however both models show an extremely high buck harvest percentage in 2011, and the SCA,CA model shows a 2006 population peak that seems unrealistic. None of the models track very well with the three early line transect estimates, but all three models align very well with the 2013 line transect estimate. While the AIC for the TSJ,CA model is the not the lowest of the three, it is only due to year-by-year penalties on juvenile survival and is still well within one level of power in comparison to the AICs of the simpler models. The TSJ,CA model appears to be the best representation relative to the perceptions of managers on the ground and follows trends with license issuance and harvest success. Overall the current model is considered fair in quality as a representation of herd dynamics.

Management Summary

Traditional season dates in this herd unit run from September 15th through October 31st. We in all hunt areas. In 2016, license issuance in Area 70 included Type 2 and 7 licenses - valid on recommend the same season dates for 2017, maintaining extremely conservative license issuance private land only - to address an imbalance of harvest pressure on public lands. For 2017, these licenses will no longer be necessary with the change in hunt area boundary. Type 6 doe/fawn licenses will be removed from Areas 71 and 72 to protect and maximize the reproductive potential of the herd unit. These licenses can be reissued in future years as population growth improves. An additional 25 Type 6 licenses will be added to Area 70 to address damage complaints from several hay producers. The 2017 season includes a total of 375 any-antelope and 50 doe/fawn licenses. Goals for 2017 are to increase pronghorn numbers towards objective, improve buck ratios consistent with special management strategy, and maintain or increase hunter success.

If the projected harvest of 322 pronghorn is achieved and fawn production/survival is moderate in 2017, this herd should remain near its current population size. If fawn production/survival is good or excellent, this herd should increase. The predicted 2017 post-season population estimate for the Rattlesnake Pronghorn Herd size assuming moderate fawn production/survival is approximately 10,200 animals, which is 15% below objective.

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



2016 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2016 - 5/31/2017

HERD: PR746 - NORTH NATRONA

HUNT AREAS: 73

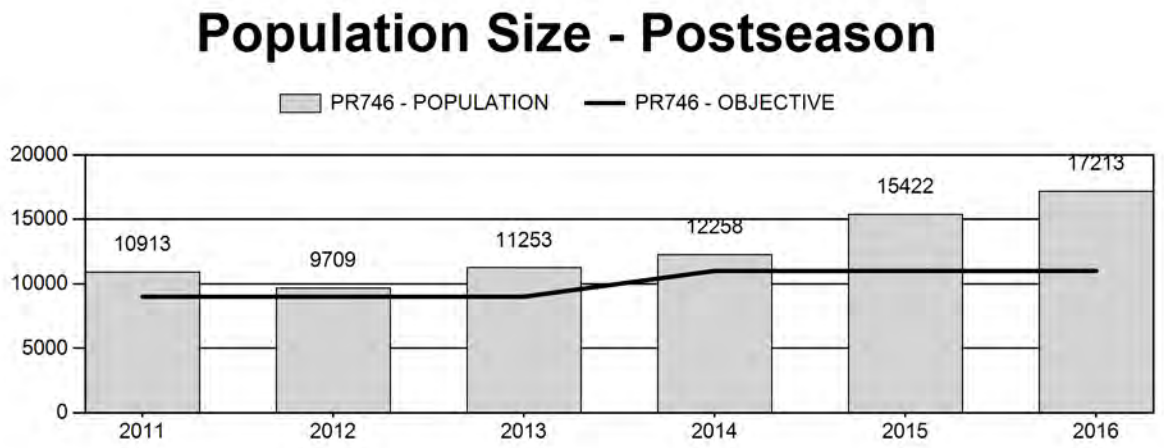
PREPARED BY: HEATHER O'BRIEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	11,911	17,213	14,313
Harvest:	863	1,216	1,790
Hunters:	1,000	1,314	1,900
Hunter Success:	86%	93%	94 %
Active Licenses:	1,049	1,365	2,000
Active License Success:	82%	89%	90 %
Recreation Days:	3,740	4,884	7,300
Days Per Animal:	4.3	4.0	4.1
Males per 100 Females	48	66	
Juveniles per 100 Females	65	91	

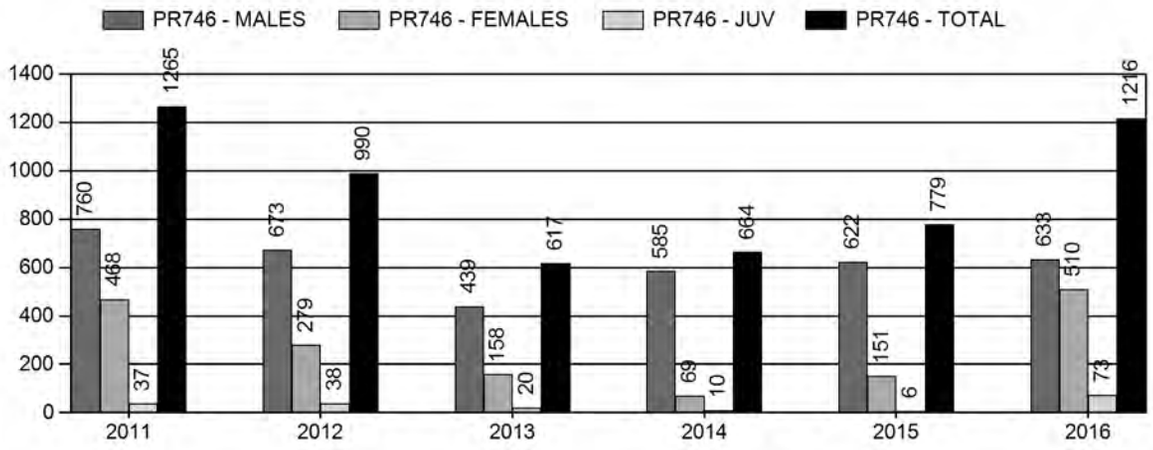
Population Objective (± 20%) :	11000 (8800 - 13200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	56%
Number of years population has been + or - objective in recent trend:	4
Model Date:	02/24/2017

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

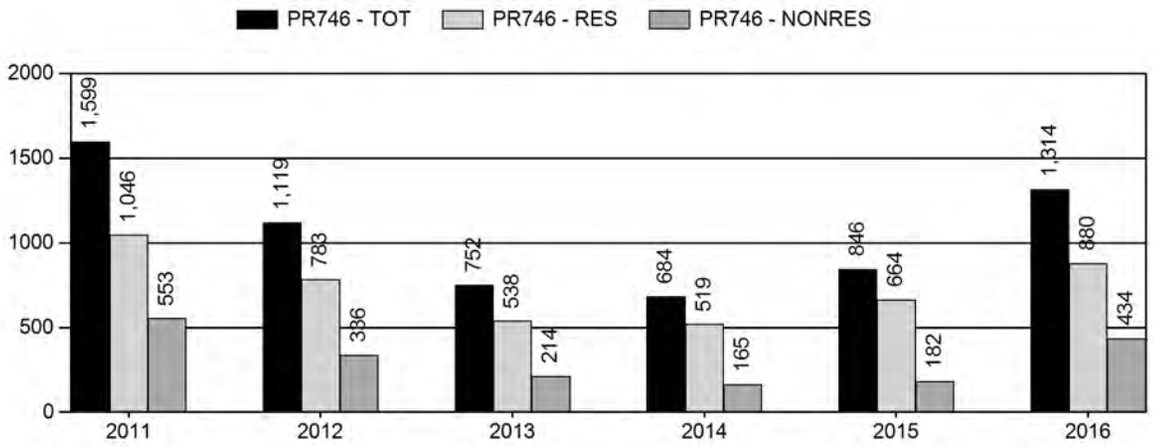
	JCR Year	Proposed
Females ≥ 1 year old:	8.5%	14.5%
Males ≥ 1 year old:	24.3%	20.3%
Total:	8.8%	12.7%
Proposed change in post-season population:	-10.5%	-17.4%



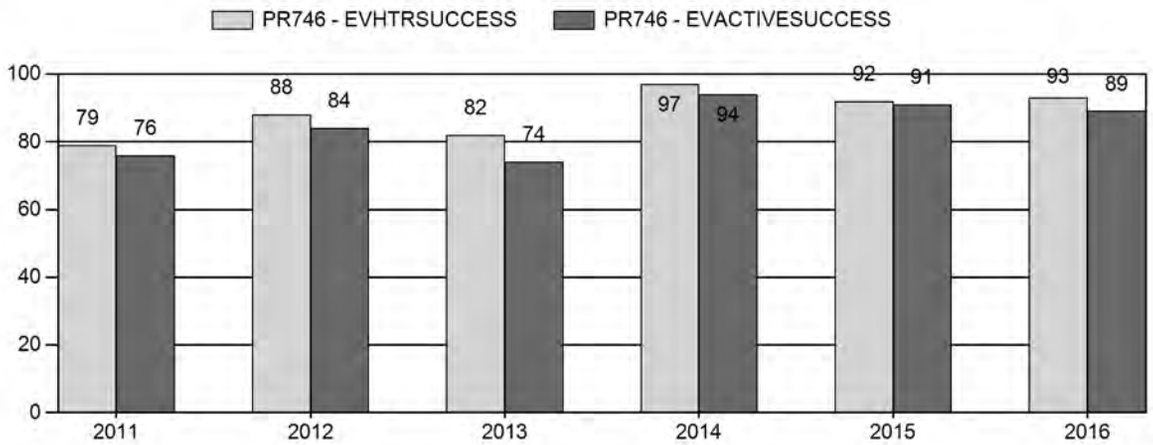
Harvest



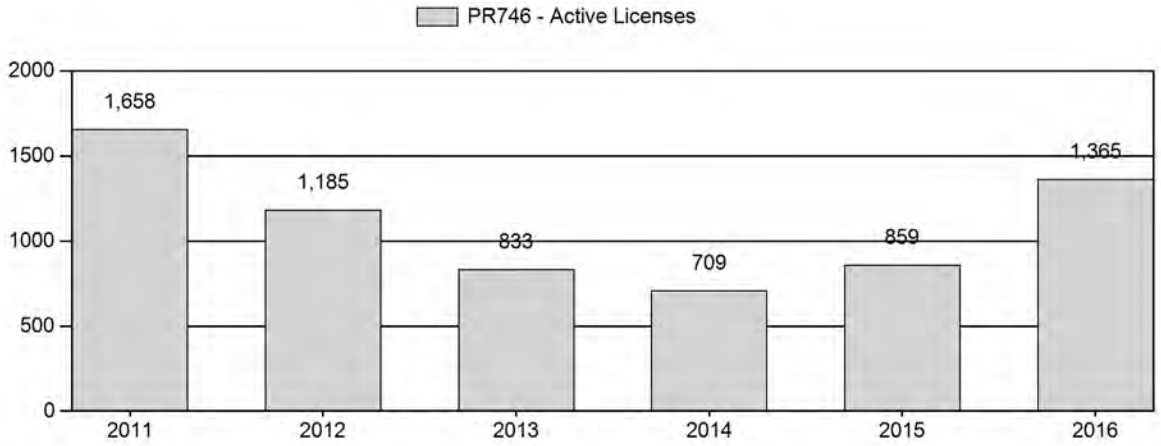
Number of Active Licenses



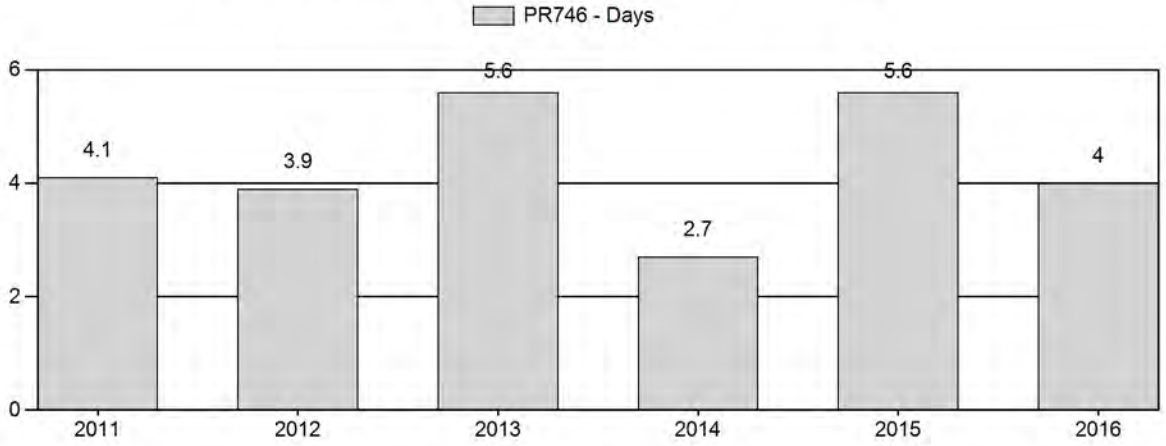
Harvest Success



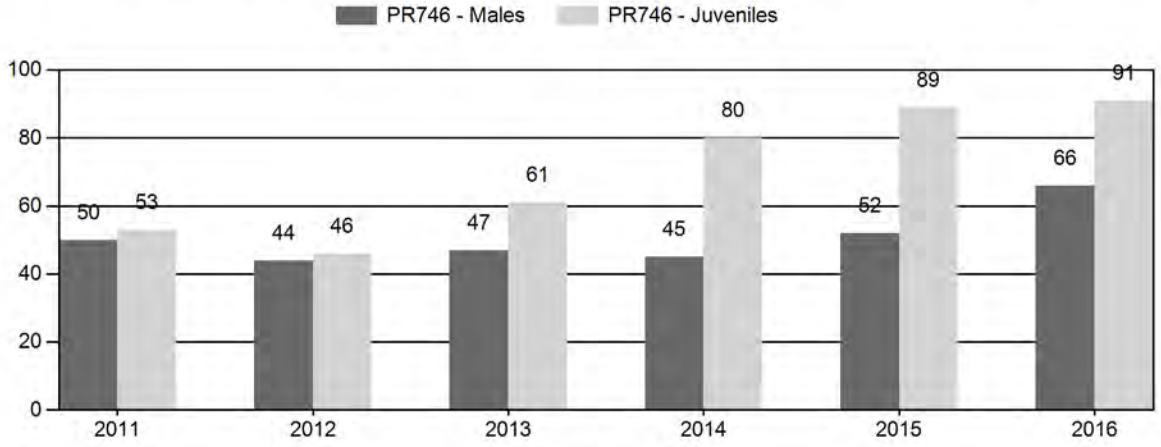
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2011 - 2016 Preseason Classification Summary

for Pronghorn Herd PR746 - NORTH NATRONA

		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
2011	12,323	119	540	659	25%	1,322	49%	697	26%	2,678	2,129	9	41	50	± 3	53	± 4	35
2012	10,798	127	190	317	23%	713	53%	327	24%	1,357	1,843	18	27	44	± 5	46	± 5	32
2013	11,932	69	318	387	23%	817	48%	497	29%	1,701	1,832	8	39	47	± 4	61	± 5	41
2014	12,988	85	210	295	20%	650	44%	520	35%	1,465	1,915	13	32	45	± 5	80	± 7	55
2015	16,279	215	268	483	21%	936	42%	835	37%	2,254	2,729	23	29	52	± 4	89	± 6	59
2016	18,661	319	281	600	26%	905	39%	820	35%	2,325	2,409	35	31	66	± 5	91	± 7	54

2017 HUNTING SEASONS
NORTH NATRONA PRONGHORN HERD (PR746)

Hunt Area	Type	Season Dates Opens	Season Dates Closes	Quota	License	Limitations
73	1	Sep. 15	Oct. 31	1,000	Limited quota	Any antelope
	6	Sep. 15	Oct. 31	1,000	Limited quota	Doe or fawn antelope
Archery		Aug. 15	Sep. 14			Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2016
73	1	+100
	6	+400

Management Evaluation

Current Postseason Population Management Objective: 11,000
Management Strategy: Recreational
2016 Postseason Population Estimate: ~17,200
2017 Proposed Postseason Population Estimate: ~14,300
2016 Hunter Satisfaction: 92% Satisfied, 6% Neutral, 2% Dissatisfied

The North Natrona Pronghorn Herd Unit has a post-season population management objective of 11,000 pronghorn. The herd is managed using the recreational management strategy, with a goal of maintaining preseason buck ratios between 30-59 bucks per 100 does. The objective and management strategy were formally reviewed and updated in 2014. Prior to 2014, the herd objective was set at 9,000 pronghorn.

Herd Unit Issues

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

suitable, though there were no reported or confirmed cases of disease outbreak within the North Natrona Herd in 2016.

Weather

The severe winter of 2010-2011 and subsequent drought of 2012 resulted in elevated mortality of pronghorn in the North Natrona Herd Unit. Fawn ratios were also very low during this time period, and the population remained well below objective. From 2013 to the present, weather trends have been more favorable, and pronghorn numbers have recovered quickly. Fawn production and survival increased from 2013 to 2016, as range conditions and nutritional status of does began to improve. The winter of 2015 was fairly average, though some areas experienced prolonged periods of persistent snow. The spring of 2016 was very wet, resulting in rapid plant growth and green-up of rangelands. The majority of the summer and fall were extremely dry, causing much of the available forage to cure. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided pronghorn with a valuable boost in nutrition prior to the winter of 2016-2017. While there were several notable snow storms and cold snaps during the winter of 2016-2017, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Thus, managers expect fairly average pronghorn survival for the winter of 2016-2017. For detailed weather data see http://www.ncdc.noaa.gov/gac/time-series/us.

Habitat

Eight sagebrush transects were established within this herd in 2014 as part of the population objective review. These transects are measured for utilization every spring (see Table 1). Average utilization has been lighter on transects each of the last three years of measurement. This seems contradictory, as pronghorn numbers have increased over the same time period. Decreased utilization may be attributed to improved overall range conditions over the last three years. Also, if sagebrush growth and production has improved over the reporting period, percent utilization by pronghorn may have less impact overall. Finally, distribution of pronghorn across suitable habitat may have shifted as range conditions improved over the reporting period. Regardless of which variables may be contributing factors, utilization measurements suggest current pronghorn population size and the revised objective are sustainable over available habitats.

Year	Average Utilization
2014	15.38%
2015	9.50%
2016	6.38%

Table 1. Average utilization of big sagebrush (*Artemisia tridentata* Nutt. Subsp. *wyomingensis*) for eight transects within the North Natrona Pronghorn Herd unit, 2014-2016.

Field Data

Harsh winter conditions in 2010-2011 combined with severe drought dropped this herd unit below management objective. By 2012, higher license issuance was no longer necessary to control herd growth, and licenses were reduced. Overall precipitation and resulting forage growth were exceptional from 2014-2016, and fawn ratios reached a 17-year high in 2016. Overwinter survival of fawns appeared to improve from 2014 to 2015 as well, as evidenced by high yearling buck ratios. The winter of 2016 has been of average severity so far, and average overwinter mortality of fawns is expected. With higher fawn ratios and average to high overwinter survival the past three years, this population has grown rapidly. Managers have observed higher densities of pronghorn throughout the herd unit, and in 2016 ground-classification sample sizes were the highest since 2011.

Buck ratios for the North Natrona Herd historically average in the mid-50s:100 does. Buck ratios dropped markedly in 2011 and reached a 15-year low of 44 bucks per 100 does in 2012. The buck ratio held steady in the mid-40s per 100 does for 2013 and 2014. In 2015 and 2016, buck ratios improved to 52 and 66:100 does respectively. Yearling buck ratios in both years were extremely high, indicating excellent overwinter survival the past two years. Typically buck ratios for the herd unit are easily maintained within the target range for recreational management. Ultimate management goals are to maintain buck ratios within this range to sustain high hunter satisfaction, while continuing to offer exceptional opportunity and good drawing odds via recreational management.

Harvest Data

License success in this herd unit is typically in the 80-90th percentile. Harvest success was lower from 2011-2013 as population size dropped. License issuance was also reduced during the same time period, but did not keep pace with declining pronghorn numbers. In 2014, license issuance was at a 10-year low, but pronghorn numbers also began to recover. Thus, hunters enjoyed much improved harvest success in the 90th percentile, and low average hunter days. From 2014 -

2016, hunter satisfaction has remained very high. While harvest success has declined incrementally, managers believe it is due to hunter selectivity, as buck availability has remained high. As a higher number of yearling bucks are recruited into adult age classes over the next two years, opportunity to harvest mature bucks should improve even more.

Population

The "Time-Specific Juvenile Survival - Constant Adult Survival" (TSJ,CA) spreadsheet model was chosen to use for the post-season population estimate of this herd. This model seemed the most representative of the herd, as it selects for higher juvenile survival during the years when field personnel observed mild winter conditions, particularly from 2003-2008 when drought conditions persisted and overwinter precipitation was minimal. The simpler models (CJ,CA and SCJ,CA) select for very low juvenile survival rates and very high adult survival rates across years, which does not seem feasible for this herd. All three models follow a trend that seems representative for the herd unit. However, the CJ,CA and SCJ,CA models estimate population peaks in 2009 that are unrealistically high compared to the perceptions of field personnel and landowners at that time. While the AIC for the TSJ,CA model is the highest of the three, it is only due to year-by-year penalties and is still well within one level of power in comparison to the AICs of the simpler models. While the TSJ,CA model does select upper and lower constraints for juvenile survival for several years of simulation, it still appears to be the best representation relative to the perceptions of managers on the ground while following trends with license issuance and harvest success. Overall the model is considered to be good in representing dynamics of the herd.

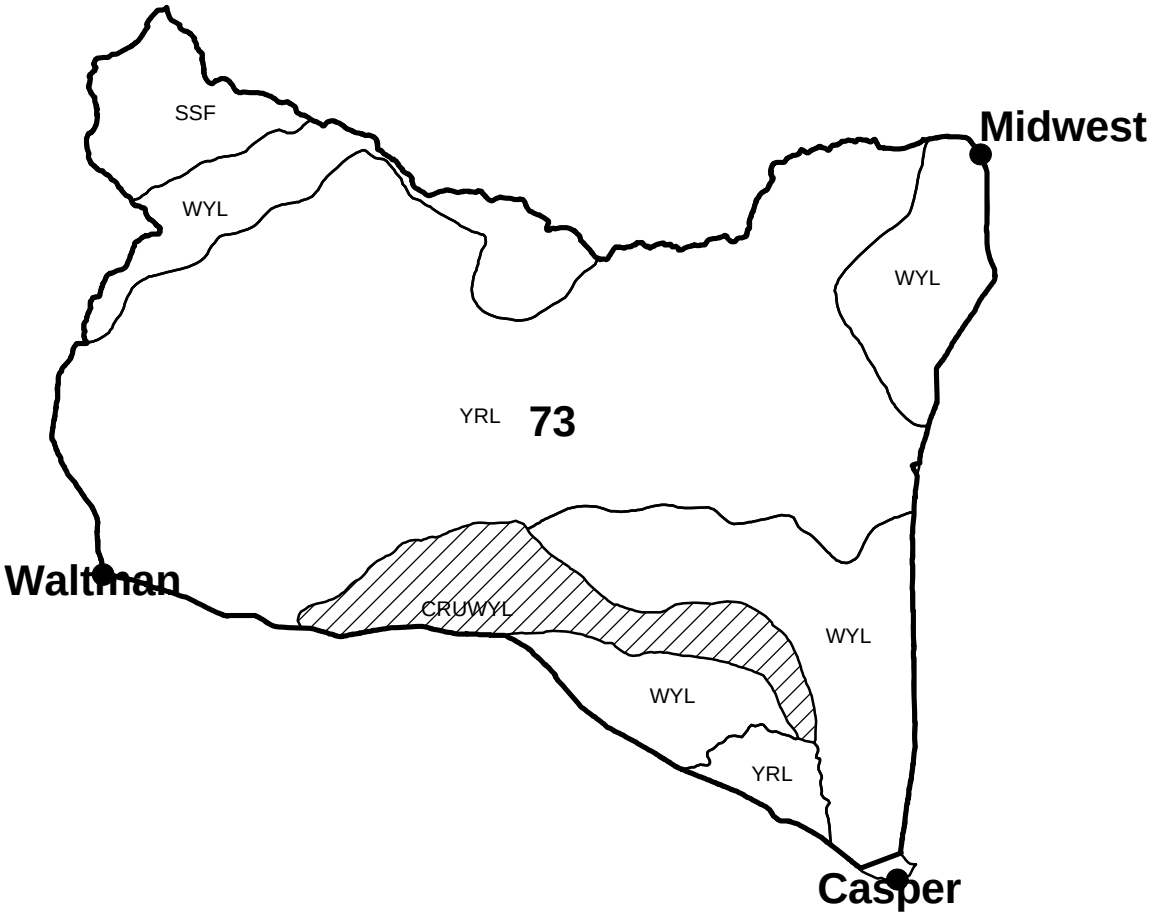
The three models each align partially to four early line-transect estimates – each model aligning through some but not all line-transect estimate confidence intervals. The 2012 line transect had a wide standard error, and is considered to be an overestimate of population size for that year. However, its addition in the model only changes the current population estimate by about 100 animals. Thus, it was left in the model as it provides an additional estimation point for the model to utilize. Conversely, the 2016 line transect resulted in an extremely high estimate with fairly wide standard error. Adding this estimate to the model changes the population estimate by about 2,000 animals. Since managers consider both the line transect population estimate and its impact on the model to be unrealistic, the 2016 line transect was not included in the model. This line transect will be further evaluated for errors before being considered an accurate and useful addition to the model.

Management Summary

Traditional season dates in this herd run from September 15th through October 31st. Season dates will remain the same for 2017, with increases in Type 1 and Type 6 license issuance to provide additional hunting opportunity and address rapid population growth above objective in the herd. The 2017 season includes 1,000 Type 1 licenses and 1,000 Type 6 licenses. Goals for 2017 are to further reduce the pronghorn population toward objective, increase opportunity particulary for doe/fawn harvest, and to maintain current buck ratios, hunter success, and hunter satisfaction.

If we attain the projected harvest of 1,790 pronghorn with average fawn production, this herd will be reduced from 36% to 23% above the objective. The predicted 2017 post-season population size of the North Natrona Pronghorn Herd is approximately 14,300 animals.

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



2016 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2016 - 5/31/2017

HERD: PR748 - NORTH CONVERSE

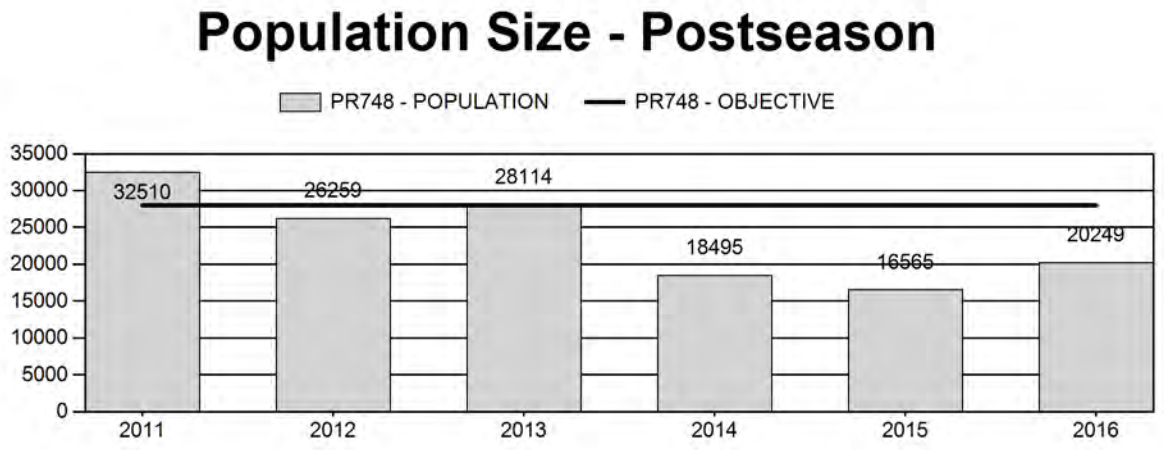
HUNT AREAS: 25-26 | PREPARED BY: WILLOW STEEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	24,389	20,249	21,344
Harvest:	2,398	1,503	1,840
Hunters:	2,745	1,507	2,000
Hunter Success:	87%	100%	92%
Active Licenses:	2,890	1,608	2,100
Active License Success:	83%	93%	88%
Recreation Days:	8,968	3,589	3,900
Days Per Animal:	3.7	2.4	2.1
Males per 100 Females	55	58	
Juveniles per 100 Females	77	85	

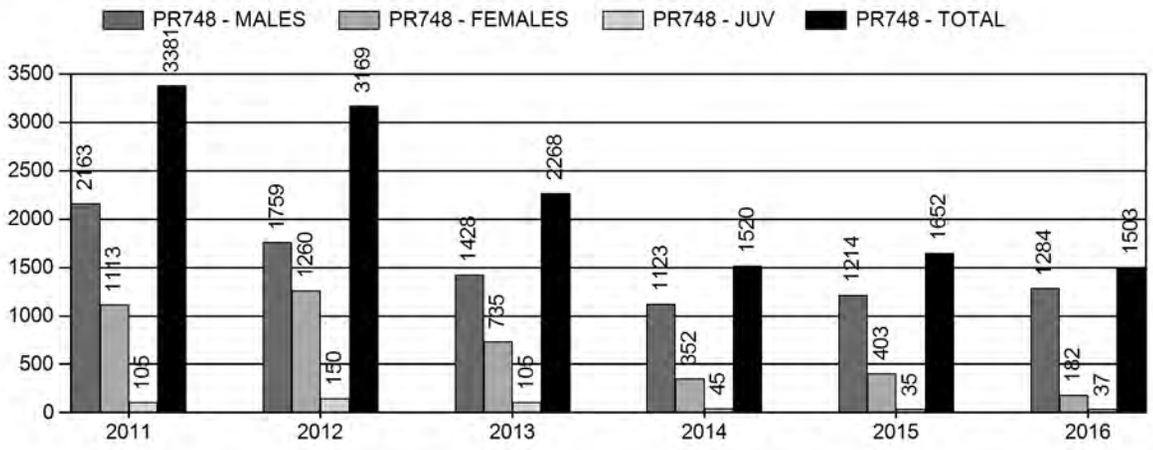
Population Objective (± 20%) :	28000 (22400 - 33600)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-27.7%
Number of years population has been + or - objective in recent trend:	6
Model Date:	02/15/2017

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

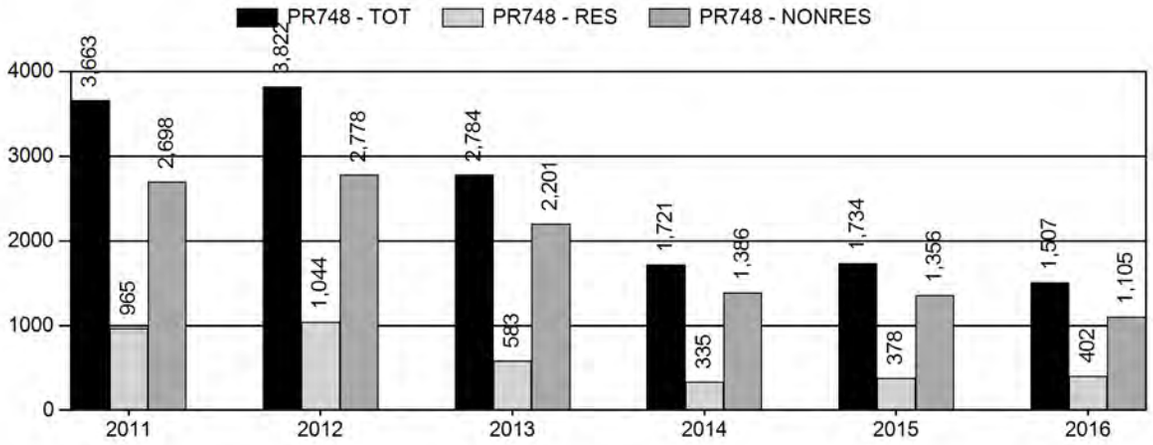
	JCR Year	Proposed
Females ≥ 1 year old:	2.0%	2.4%
Males ≥ 1 year old:	25.8%	28%
Total:	27.8%	32.4%
Proposed change in post-season population:	-7.5%	-8.7%



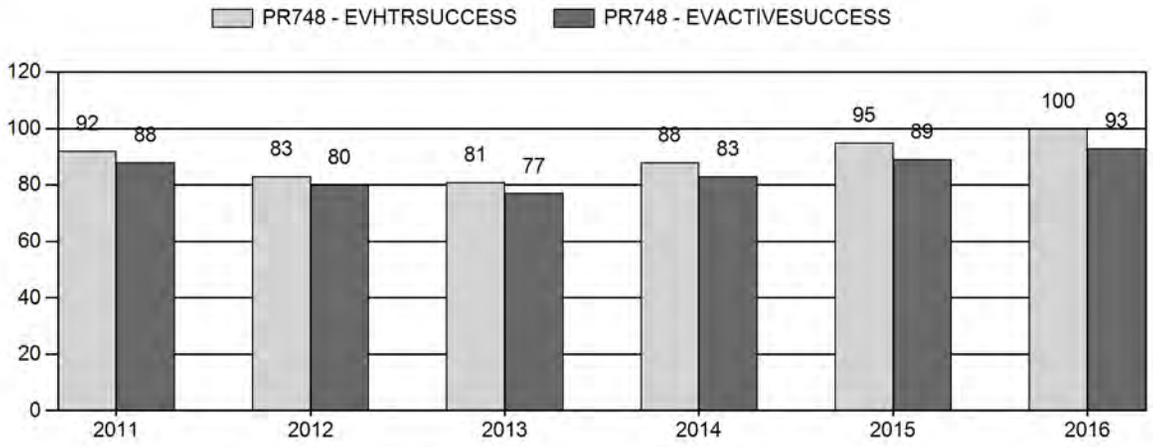
Harvest



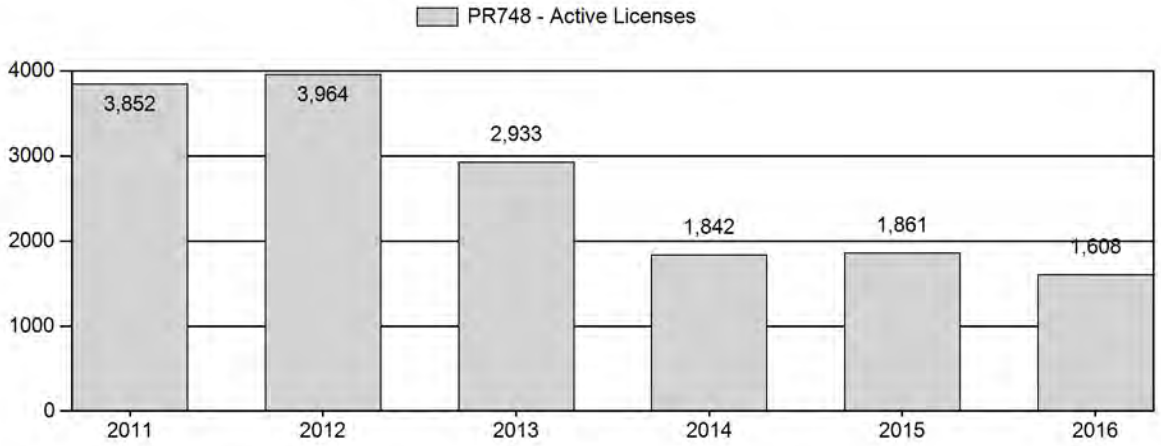
Number of Active Licenses



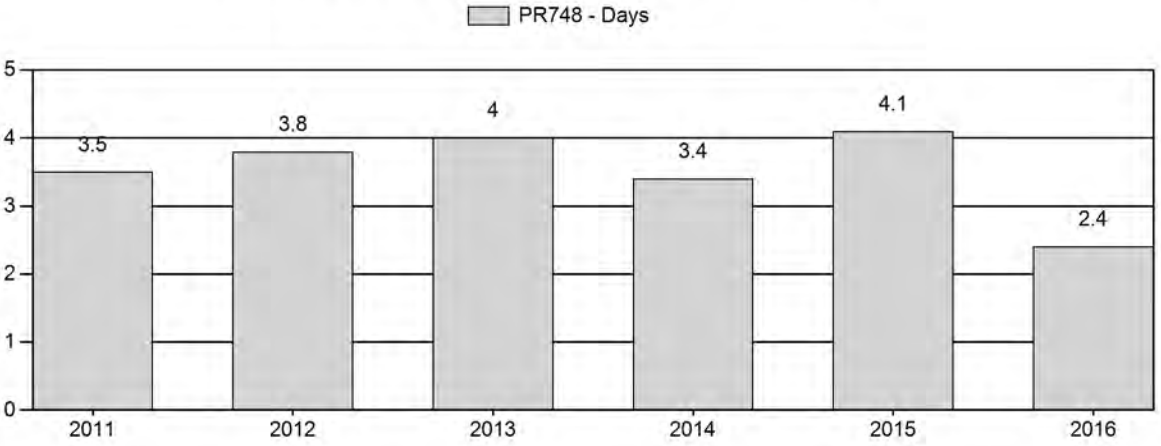
Harvest Success



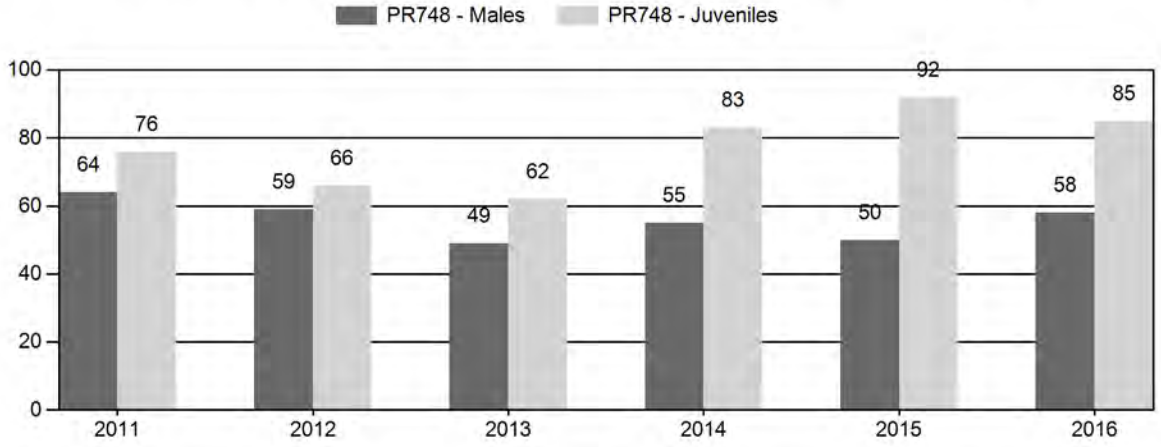
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2011 - 2016 Preseason Classification Summary

for Pronghorn Herd PR748 - NORTH CONVERSE

		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
2011	36,229	93	480	573	27%	895	42%	683	32%	2,151	3,105	10	54	64	± 5	76	± 6	47
2012	29,745	82	253	335	26%	567	44%	376	29%	1,278	3,040	14	45	59	± 7	66	± 7	42
2013	30,608	101	294	395	23%	803	47%	498	29%	1,696	2,059	13	37	49	± 5	62	± 6	42
2014	20,167	121	249	370	23%	669	42%	554	35%	1,593	3,415	18	37	55	± 6	83	± 8	53
2015	18,382	196	251	447	21%	896	41%	820	38%	2,163	3,717	22	28	50	± 4	92	± 7	61
2016	21,902	197	216	413	24%	716	41%	609	35%	1,738	3,480	28	30	58	± 6	85	± 7	54

2017 HUNTING SEASONS
NORTH CONVERSE PRONGHORN HERD (PR748)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
25	1	Oct. 1	Oct. 14	700	Limited quota	Any antelope
	6	Oct. 1	Oct. 14	250	Limited quota	Doe or fawn
26	1	Sep. 24	Oct. 14	1,100	Limited quota	Any antelope
	6	Sep. 24	Oct. 14	300	Limited quota	Doe or fawn
Archery		Aug. 15	Sep. 30			Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2016
25	1	+100
25	6	+100
26	1	+200
26	6	+150
Herd Unit Totals	**1**	**+300**
	6	**+250**

Management Evaluation
Current Postseason Population Management Objective: 28,000
Management Strategy: Recreational
2016 Postseason Population Estimate: ~20,200
2017 Proposed Postseason Population Estimate: ~ 21,300
2016 Hunter Satisfaction: 93% Satisfied, 3% Neutral, 4% Dissatisfied

Herd Unit Issues

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

Hunting access on public lands is poor within this herd unit, with only small tracts of accessible public land interspersed within predominantly private lands. Two Walk-In Areas provide some additional hunting opportunity, although they are relatively small in size. Primary land uses in

this herd unit include extensive oil and gas production, large-scale industrial wind generation, In-Situ uranium production, and traditional cattle and sheep grazing. In recent years, expansion of oil shale development has dramatically escalated anthropogenic disturbance throughout this herd unit. In addition to current development, two large-scale Environmental Impact Statements are currently being developed that are partially within this herd unit. The Converse County and Crossbow Oil and Gas EIS's combined propose to develop up to 6,000 wells on 1,600 pads over the next 10 years. The cumulative impacts on pronghorn in this herd from the present and planned natural resource development are potentially significant.

Weather

Above average precipitation was received during the early part of the growing season in 2016, leading to good early-season forage production. However, this was followed by hot and dry conditions beginning in June and continuing through the summer and into late fall. The 2016-2017 winter has been moderate, with average precipitation and several extreme cold snaps. Snow events and cold snaps were typically followed by warmer weather which exposed forage for wildlife. Therefore, pronghorn have likely experienced normal over-winter survival this year.

Habitat

There are no habitat transects in this herd unit due to the preponderance of private land. Habitat conditions are variable in this herd unit due to some past wildfires which have removed portions of sagebrush habitat. Habitat conditions were improved in recent years due to the above average precipitation which was needed to rejuvenate rangelands following the extreme drought of 2012. However, precipitation in 2016 was average and forage production was not quite as high as it has been in recent years. Sagebrush plants are recruiting in some areas of this herd unit, which may lead to higher quality forage availability in the future.

Field Data

It has been increasingly difficult to meet classification sample sizes in this herd unit as aerial surveys have been abandoned for safety reasons and budgetary constraints. The total number of animals classified has markedly decreased since aerial surveys were eliminated in 2011. In 2016, the adequate sample size was about 3,500 animals, yet only about 1,750 pronghorn were classified despite intensive ground coverage.

Fawn production in 2016 was improved over the previous 5-year average (76 per 100 does) with a ratio of 85 fawns per 100 does. The previous two years, 2014 and 2015 also yielded notably high fawn production with ratios of 83 and 92, respectively. While this population declined from 2010-2013, this herd is currently trending towards objective due to three years of high fawn production.

Preseason buck ratios increased in 2016 (58 per 100 does) compared to the 5-year average of 55, and are at the upper end of the management strategy criteria. Historically buck ratios often exceed the management strategy maximum due to limited hunter access and widespread outfitting. Therefore, managers are content with current buck ratios given past challenges with remaining within management criteria. Given high buck ratios and an increasing population, an increase in Type 1 licenses is being proposed for the 2017 season to provide more opportunity.

The 2016 yearling buck ratio is 28, which is higher than the 5-year average of 16, as a result of the high fawn productivity and recruitment from 2015. This indicates there will be a relatively high proportion of adult bucks available for harvest in the future.

Harvest

Overall harvest has declined in this herd unit as license issuance has decreased in lieu of population decline. The 2016 total harvest of 1,503 was the lowest total pronghorn harvest obtained in this herd unit over the last 25 years. However, Type 1 license success was 95.6% with 2.3 days to harvest an animal in 2016 which is an improvement over the previous 5-year average of 83% and 3.5 days. Type 6 license success was 82.2% with 2.7 days to harvest an animal, which is comparable to the previous 5-year average of 81% but a reduction from the 4.4 days to harvest animal. Overall success in this herd unit indicates this population is rebounding and can accommodate additional harvest.

In 2016, 93% of hunters reported being either satisfied or very satisfied with their hunt, indicating a remarkably high level of satisfaction given the lack of public access and recent population decline. It should be noted that most hunters who speak to Game and Fish personnel are advised to secure access on private land before purchasing a license in areas that have limited public access, or at least be cognizant of the fact that public land availability is extremely limited.

Population

The 2016 post-season population estimate is approximately 20,200 pronghorn, which is 28% below objective. While this population was historically above objective, the population dropped below objective due to elevated mortality during the relatively severe 2010-2011 winter, and continued to decrease through 2013. Significant reductions in licenses were made in response to population decrease. Poor fawn production in 2012 and 2013 further suppressed this herd, but a significant improvement was realized in 2014 through 2016. However, license issuance remained conservative in 2015 because managers were concerned about unreported hemorrhagic disease and stagnation in population growth despite high fawn production. However, field data and observations from 2016, as well as the current population trend, show that this herd is rebounding. High yearling buck ratios indicate fawn recruitment was excellent last year. In years past, high fawn productivity coupled with limited access has allowed this herd to exceed the objective very readily. Therefore managers are proposing to slow the growth of this population by issuing more licenses for the 2017 hunting season.

The “Time Specific Juvenile – Constant Adult” (TSJ-CA) spreadsheet model was chosen for the post-season population estimate of this herd. All three models had similar relative AIC values. The TSJ-CA model most accurately represented population trend based on field personnel and landowner perceptions. This model is considered to be of fair quality and tracks well with observed preseason buck ratios. However, this model has not been anchored to past end-of-year abundance estimates as multiple Line Transect surveys have yielded unusable results with widely fluctuating point estimates and high coefficients of variation.

Management Strategy

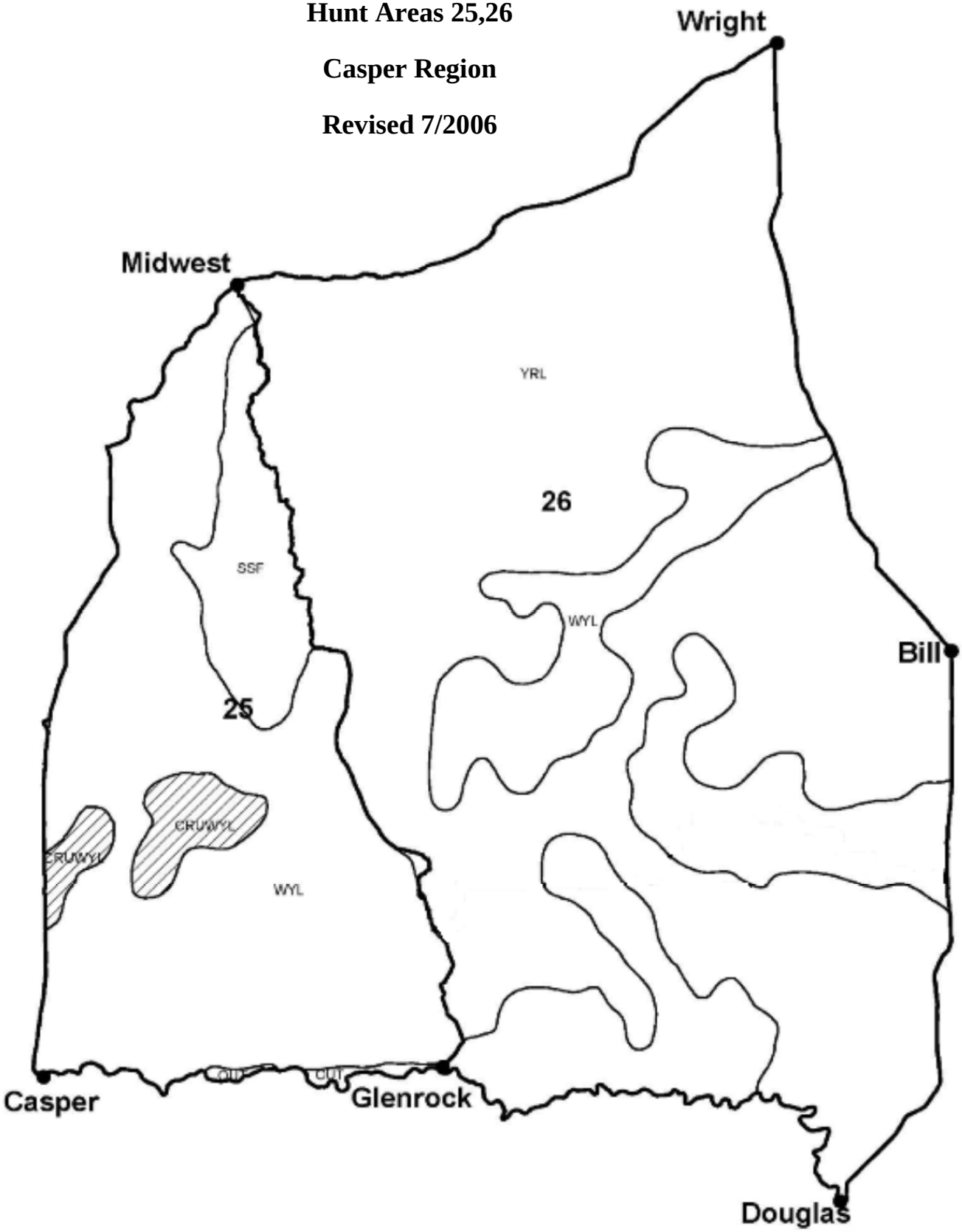
The traditional season dates in this herd unit are from October 1 to October 14 in Hunt Area 25 and from September 24 to October 14 in Hunt Area 26. These season dates have typically been adequate to meet landowner desires while accommodating a reasonable harvest. For 2017, herd unit-wide Type 1 license issuance will be increased to 1,800 licenses, and Type 6 license issuance to 550 licenses. This is an overall increase of 300 Type 1 licenses and 250 Type 6 licenses. In 2013, the post-hunt population estimate was 49% lower than the population objective. From 2013 to 2016, the population increased by 30%, showing this population's potential for rapid growth. Due to the high percentage of private land within this herd unit, this population can easily increase above the objective. While the population has not yet met the population objective, managers feel an increase is warranted in order to curb population growth. If we attain the projected harvest of ~1,850 pronghorn and realize normal fawn recruitment, this population is projected to increase to about 21,300 pronghorn, which is 24% below objective.

North Converse Antelope

Hunt Areas 25,26

Casper Region

Revised 7/2006



2016 - JCR Evaluation Form

SPECIES: Pronghorn | PERIOD: 6/1/2016 - 5/31/2017

HERD: PR750 - BLACK THUNDER

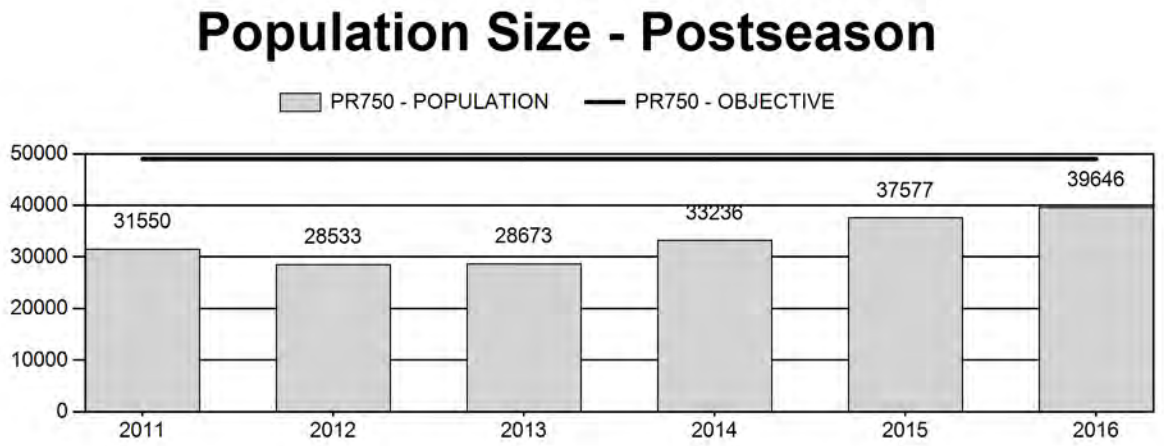
HUNT AREAS: 4-9, 24, 27, 29 | PREPARED BY: JOE SANDRINI

	2011 - 2015 Average	2016	2017 Proposed
Population:	31,914	39,646	42,390
Harvest:	4,323	3,943	4,345
Hunters:	5,025	4,518	4,900
Hunter Success:	86%	87%	89%
Active Licenses:	5,411	4,859	5,300
Active License Success:	80%	81%	82%
Recreation Days:	17,179	15,107	16,500
Days Per Animal:	4.0	3.8	3.8
Males per 100 Females	47	50	
Juveniles per 100 Females	75	76	

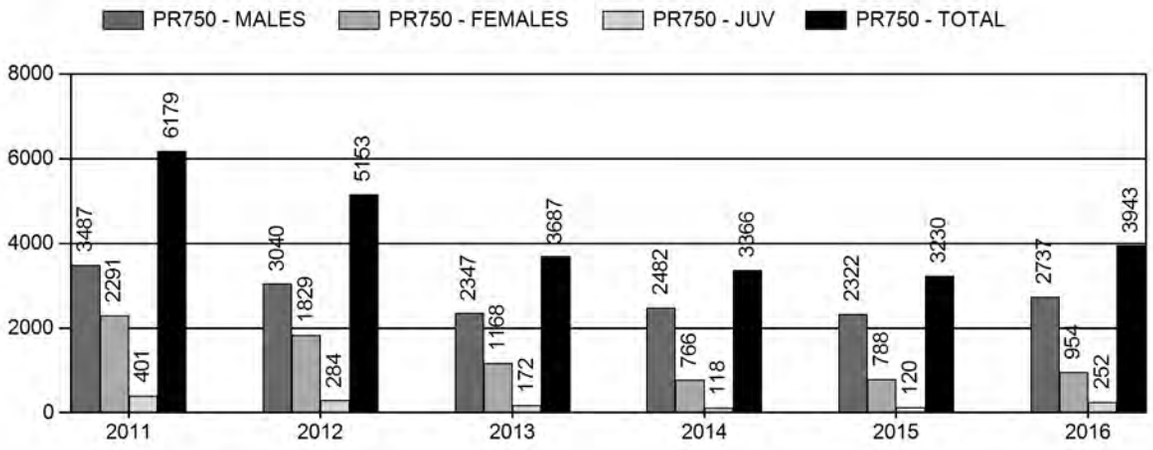
Population Objective (± 20%) :	49000 (39200 - 58800)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-19.1%
Number of years population has been + or - objective in recent trend:	6
Model Date:	02/06/2017

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

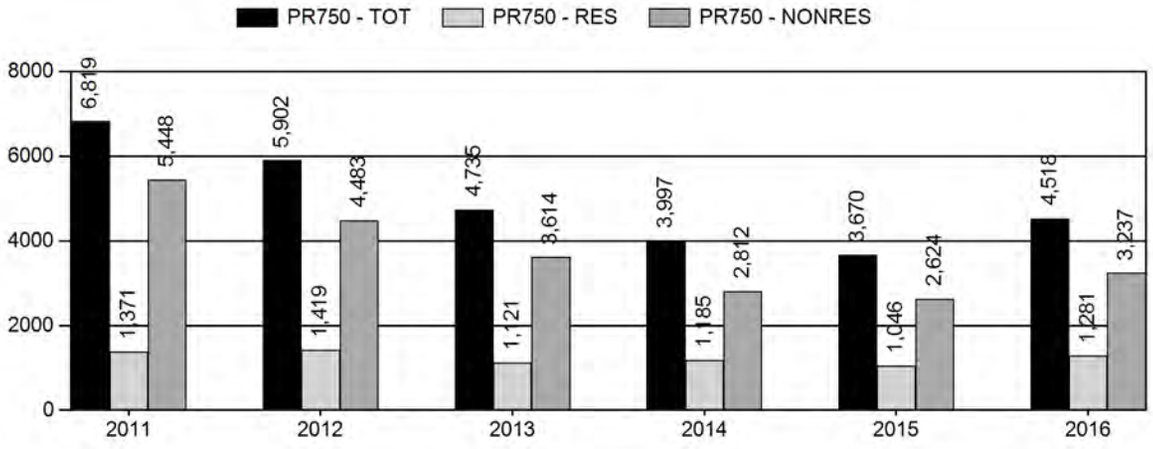
	JCR Year	Proposed
Females ≥ 1 year old:	5.3%	5.5%
Males ≥ 1 year old:	31.8%	33.4%
Total:	9.8%	10.1%
Proposed change in post-season population:	+6.2%	+6.9%



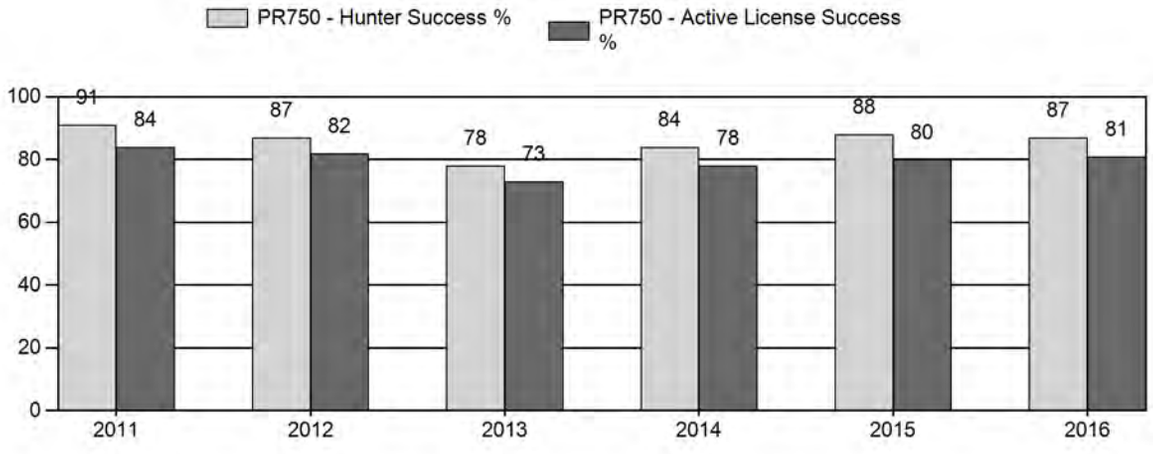
Harvest



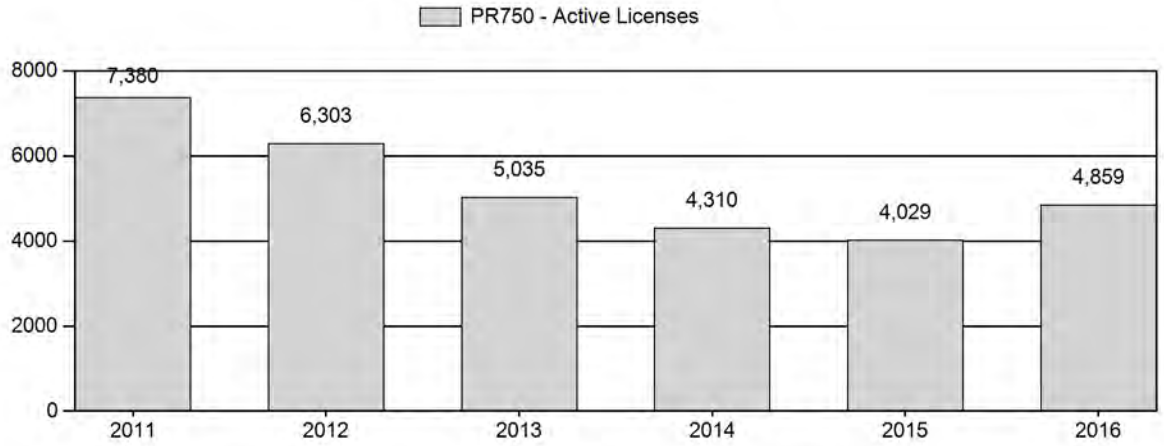
Number of Active Licenses



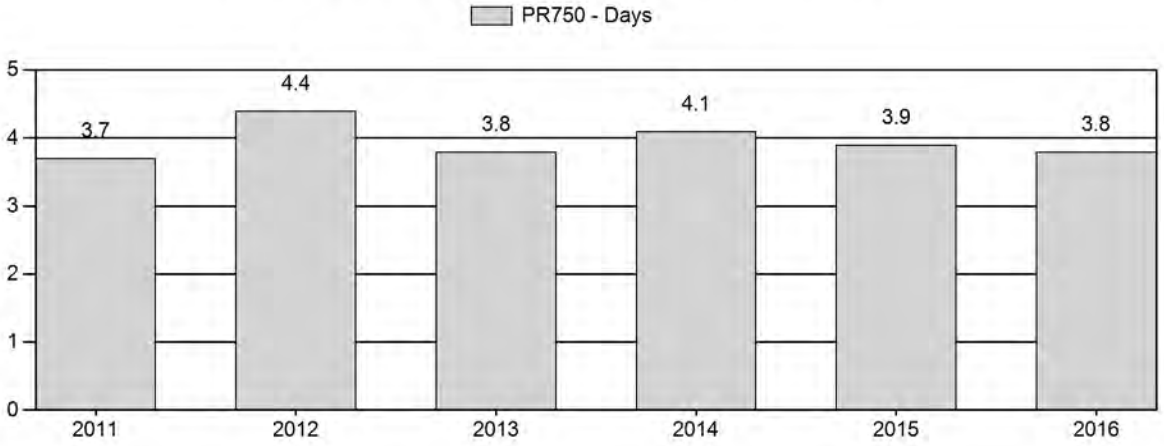
Harvest Success



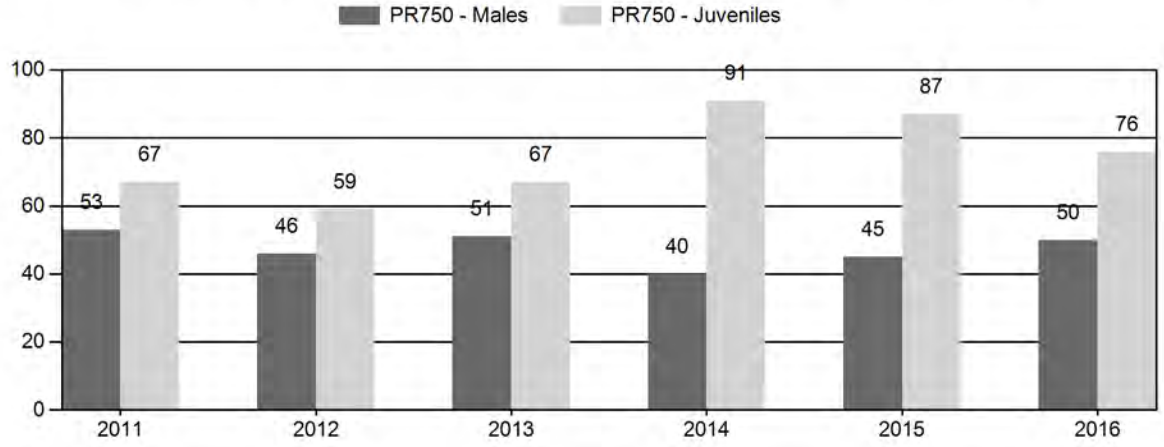
Active Licenses



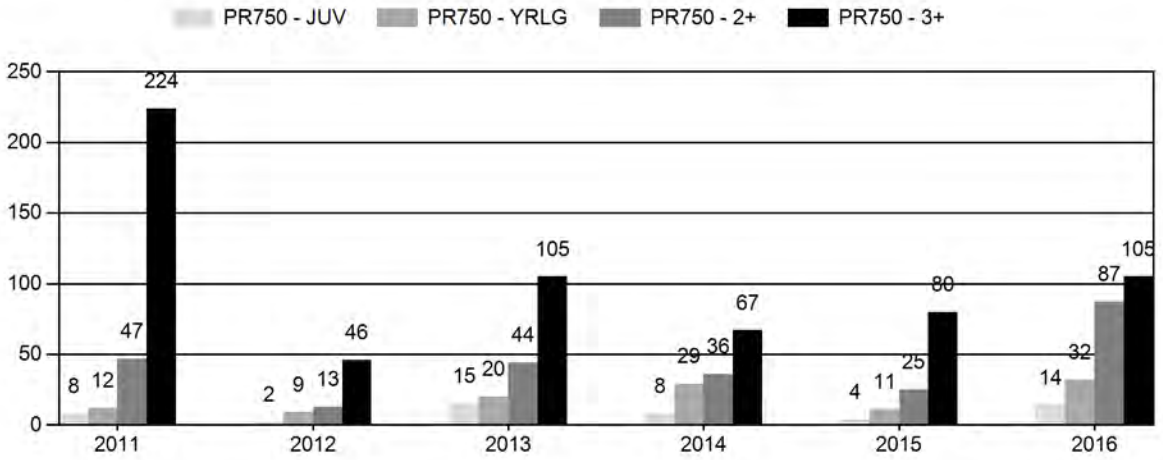
Days Per Animal Harvested



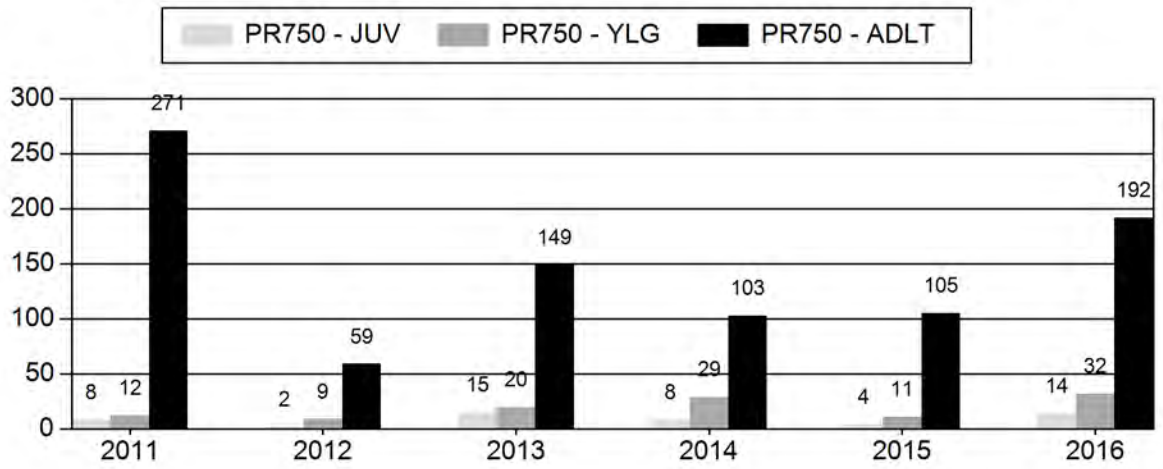
Preseason Animals per 100 Females



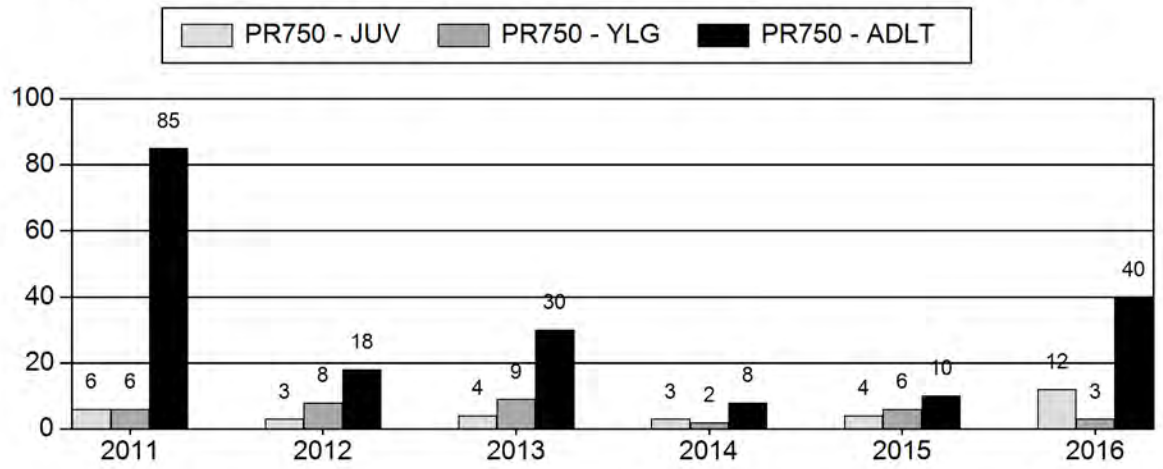
Age Structure of Field Checked Males



Age Structure Data (Field and Laboratory) - Male



Age Structure Data (Field and Laboratory) - Female



2011 - 2016 Preseason Classification Summary

for Pronghorn Herd PR750 - BLACK THUNDER

		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
2011	38,347	309	1,011	1,320	24%	2,477	45%	1,667	31%	5,464	2,490	12	41	53	± 3	67	± 3	44
2012	34,201	318	617	935	23%	2,022	49%	1,198	29%	4,155	1,962	16	31	46	± 3	59	± 3	41
2013	32,729	315	733	1,048	23%	2,067	46%	1,380	31%	4,495	2,444	15	35	51	± 3	67	± 4	44
2014	36,939	288	582	870	17%	2,197	43%	2,008	40%	5,075	3,888	13	26	40	± 2	91	± 4	65
2015	41,130	482	659	1,141	19%	2,558	43%	2,235	38%	5,934	3,717	19	26	45	± 2	87	± 4	60
2016	43,983	617	763	1,380	22%	2,770	44%	2,096	34%	6,246	3,046	22	28	50	± 3	76	± 3	51

2017 HUNTING SEASONS
BLACK THUNDER PRONGHORN HERD (PR750)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	License	Limitations
4	1	Oct. 1	Nov. 20	200	Limited quota	Any antelope
	6	Oct. 1	Nov. 20	200	Limited quota	Doe or fawn
5	1	Oct. 1	Nov. 20	100	Limited quota	Any antelope
	6	Oct. 1	Nov. 20	75	Limited quota	Doe or fawn valid on private land
6	1	Oct. 1	Oct. 15	350	Limited quota	Any antelope; also valid in that portion of Area 8 in Weston County
	6	Oct. 1	Oct. 15	50	Limited quota	Doe of fawn; also valid in that portion of Area 8 in Weston County
7	1	Oct. 1	Oct. 15	600	Limited quota	Any antelope
	6	Oct. 1	Oct. 15	75	Limited quota	Doe or fawn
	7	Oct. 25	Nov. 15	50	Limited quota	Doe or fawn valid on private land
8	1	Oct. 1	Oct. 15	375	Limited quota	Any antelope
9	1	Oct. 1	Oct. 31	700	Limited quota	Any antelope; also valid in that portion of Area 11 in Converse or Niobrara counties
	6	Oct. 1	Oct. 31	650	Limited quota	Doe or fawn; also valid in that portion of Area 11 in Converse or Niobrara counties
24	1	Oct. 1	Oct. 31	200	Limited quota	Any antelope
	2	Oct. 1	Oct. 31	500	Limited Quota	Any antelope valid on private land
	6	Oct. 1	Oct. 31	50	Limited quota	Doe or fawn
	7	Oct. 1	Oct. 31	300	Limited Quota	Doe or fawn valid on private land

27	1	Oct. 1	Oct. 15	300	Limited quota	Any antelope
	7	Oct. 1	Oct. 15	75	Limited quota	Doe or fawn valid on private land
29	1	Oct. 1	Oct. 15	125	Limited quota	Any antelope
	2	Oct. 1	Oct. 15	600	Limited quota	Any antelope valid on private land
	6	Oct. 1	Oct. 15	200	Limited quota	Doe or fawn valid on private land
	7	Oct. 1	Nov. 15	100	Limited quota	Doe or fawn valid south and west of Interstate Highway 25

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

SUMMARY OF CHANGES IN LICENSE NUMBER

Hunt Area	License Type	Quota change from 2016
5	6	+25
6	6	+25
7	1	+150
7	6	+25
24	1	-500
24	2	+500
24	6	-300
24	7	+300
27	1	+25
27	7	+25
29	2	+100
29	6	+50
Herd Unit Total	**1**	**- 325**
	2	**+ 600**
	6	**- 175**
	7	**+ 325**

Management Evaluation

Current Postseason Population Management Objective: 49,000
Management Strategy: Recreational
2016 Postseason Population Estimate: ~ 39,600
2017 Postseason Population Estimate: ~ 42,400
2016 Hunter Satisfaction[1]: 85% Satisfied**,** 8% Neutral**,** 8% Dissatisfied

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

The Black Thunder Pronghorn herd unit encompasses much of northeastern Wyoming. Because of the disparity of habitats across the herd unit and the preponderance of private land, this herd unit is managed for recreational hunting. The herd unit encompasses approximately 8,315 mi^2, of which slightly more than 7,100 mi^2 are delineated as occupied pronghorn habitat. This figure was revised in 2016 using aerial photography and GIS technology to better quantify unsuitable and unoccupied habitat such as towns, ponderosa pine habitat and large, active mine pits. The largest blocks of unoccupied habitat are found in Hunt Areas (HA's) 4 and 5 and generally include a portion of the Black Hills having topographical and vegetative features unsuitable for pronghorn.

Approximately 77% of this herd unit is private land. The remaining 23% includes lands managed by the United States Forest Service (USFS), the Bureau of Land Management (BLM), and the State of Wyoming. Most occupied USFS lands that are publically accessible to hunters are part of the Thunder Basin National Grassland (TBNG) located in HA's 5, 6, 7, 27, and 29, with HA 27 containing the largest contiguous amount followed by HA's 7 and 29. The State of Wyoming owns a large parcel of land in HA 9. Remaining public lands are scattered throughout the herd unit, and many are not accessible to the public. Access fees for hunting are common on private land, and many landowners have leased their property to outfitters. Therefore, accessible public lands are subjected to disproportionately heavy hunting pressure.

Major land uses in this herd unit include livestock grazing, oil and gas production, farming, and timber harvest. There are several oil and gas fields which occur primarily in HA's 6, 7, 8, 24 and 29, and development pressure has increased in recent years in HA's 8 and 29. Several large surface coal mines represent a substantial land use within HA's 24 and 27. Farming generally occurs in the southern most portion of the herd unit; but there are a number of wheat, oat, and alfalfa fields near Sundance, Upton, and Gillette. When pronghorn numbers are high, damage to growing alfalfa can become an issue, especially near Sundance and Lusk.

WEATHER: Harsh 2010-11 winter conditions resulted in significant pronghorn over-winter and spring mortality. Subsequent drought in 2012 and 2013 then contributed to depressed fawn

[1] Rounding results in total over 100%

recruitment and may have contributed to an outbreak of hemorrhagic disease. Weather conditions improved markedly in 2014 and 2015. In both years, spring and summer temperatures were near long-term averages, while precipitation was above average - including significant flooding along some drainages due to thunderstorms in 2015. Consequently, forage production during 2014 and 2015 was excellent. Overall, winter conditions in 2014 and 2015 also favored pronghorn, with daily winter temperatures hovering close to, or above average, with precipitation generally remaining below normal. During the spring of 2016, moderate to mildly severe drought beset the area. In many locations, cool season forage production was nominal and warm season production limited. This drought was somewhat ameliorated between the middle of August and mid-September with regular thunderstorms and rainfall across the herd unit. Overall, range conditions were generally poor going into the 2016/2017 winter. The 2016/17 winter saw a return of more severe winter weather. Consequently, moderately harsh weather conditions coupled with below normal forage production will likely result in increased over-winter mortality. (Weather summary details available at http://www.ncdc.noaa.gov/cag/)

HABITAT: This wide ranging herd unit is largely characterized by stands of Wyoming big sagebrush (*Artemesia tridentata wyomingensis*) and silver sagebrush (*Artemesia cana*) interspersed with mid-prairie grasses such as wheatgrasses (*Agropyron* spp.), grama grasses (*Bouteloua* spp.), and needle grasses (*Stipa* spp.). Other areas are dominated by grasslands with less sage influence and more agricultural production, notably near the towns of Douglas, Lusk, Gillette, Newcastle, Upton, and Sundance. In addition, there are several major drainages throughout the herd unit dominated by plains cottonwood (*Populus deltoides*) and greasewood (*Sarcobatus vermiculatus*). These drainages include the head waters of the Belle Fourche River in the north and those of the Niobrara River in the south; while the Cheyenne River drainage (including Beaver Creek, Black Thunder Creek, Antelope Creek, Old Woman Creek, Hat Creek, Lance Creek, and Lightning Creek) make up the bulk of the herd unit. Steep canyons in the southern and central Black Hills are found in the northeast corner of the herd unit, where vegetation consists generally of ponderosa pine (*Pinus ponderosa*) forests and its associated savannah.

Habitat suitability for pronghorn varies greatly throughout the herd unit. Much of the habitat in the northeast portion of the herd unit is marginal, consisting of topography and vegetation not particularly favorable for pronghorn. The west-central portions of the herd unit represent the largest block of contiguous sagebrush habitat. While the eastern and southern sections of the herd unit are dominated more by mid-grass prairie and agricultural lands, but locally do support good numbers of pronghorn.

Habitat disturbance throughout the herd unit is generally high. There are a number of developed oil fields and areas impacted by surface coal mining, and to a lesser extent bentonite mining. In areas dominated by irrigated and dry land farming, historic sagebrush control projects have decreased the amount of sagebrush available for wintering pronghorn. In addition to sagebrush control, livestock grazing practices and wildfires have converted areas once thought to be dominated by Wyoming big sagebrush to more grass, prickly pear and silver sage dominated communities. Yet, pronghorn still winter in some of these locations. Habitat loss and fragmentation is expected to continue and negatively impact this herd. Based upon current exploration and leasing trends, the amount of disturbance caused by mining, and oil & gas

activities will continue to increase in HA's 8, 24, 27 and 29. In addition, a large wind farm is planned in HA 29.

After about a decade of collecting annual Wyoming big sagebrush leader growth and utilization data in this herd unit, the Department suspended these efforts. This was because it had been demonstrated annual leader production was generally proportional to the amount of spring and early summer moisture received; while over-winter browsing of shrubs could be fairly well gauged through causal observation. During 2014 and 2015 wet spring and summer conditions combined with low numbers of pronghorn and mule deer on the range to yield excellent leader growth and low levels of winter use, respectively. Observations in 2016 indicated little in the way of cool season grass and forb production together with reduced leader growth on shrubs. However, fawn production and survival was generally good, indicating this population is still below carrying capacity and can be permitted to continue to grow towards objective.

FIELD DATA: This population last peaked in 2007 and declined through 2012. That decline was accentuated by the winter of 2010-2011 and subsequent drought of 2012. In addition, fawn:doe ratios continued to remain below average, as they had since 2006. This trend in low fawn:doe ratios persisted even with a substantially lower population, and was likely due to drought in 2012 and Epizootic Hemorrhagic Disease (EHDV) in 2013. In 2014, fawn production and survival increased substantially as demonstrated by an observed, preseason fawn:doe ratio of 91:100, a value of magnitude not seen in a decade. This was followed by a second year of great fawn production and survival in 2015 when the observed fawn:doe ratio was 87:100, even with significant numbers of yearling does in the population. Fawn production and survival in 2016 returned to average levels at 76 fawns per 100 does. However, the disproportionately large number of yearling and two-year old does in this population likely masked how good production and survival of fawns birthed by older does was in 2016. This can be asserted by assuming one yearling doe was observed for every yearling buck classified and then subtracting that number from the total number of does classified. Such an effort produced an observed fawn to 2^+ year old doe ratio of 97:100. Consequently, even with the gradual liberalizing hunting seasons, the population model for this herd indicates the post-season population increased about 16% in 2014, 13% in 2015, and 7% in 2016.

Over the last 20^+ years, annual productivity of this herd, as measured by preseason fawn:doe ratios (while experiencing cyclic fluctuations) has generally declined (Figure 1). This is thought to be the result of a gradual reduction in habitat quantity and quality intensified by long-term drought, plant succession, aging of sagebrush, and over-browsing by both domestic livestock and wildlife. Between 2008 and 2013 the herd's preseason fawn:doe ratio trended upwards slightly, but averaged only 62 fawns per 100 does *(std. dev 5.0).* This resulted in a continued population decline, even as hunting seasons became more conservative. As previously mentioned, thanks to excellent fawn production between 2014 and 2016, this population has begun to increase once again.

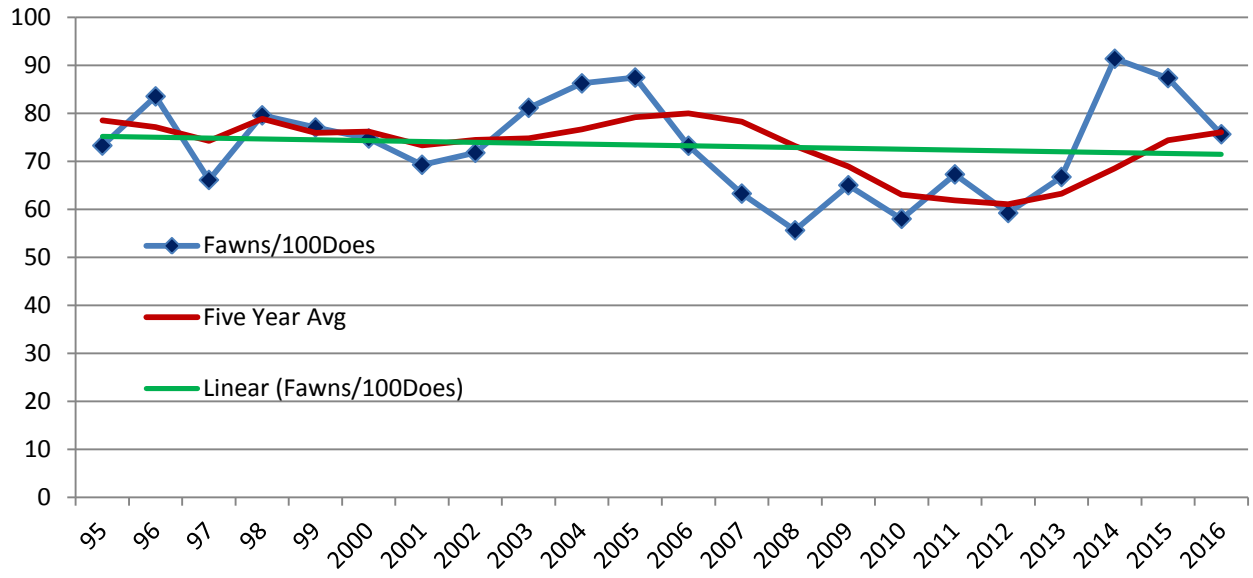


Figure 1: Observed Annual, and Five-Year Average, Preseason Fawn:Doe Ratios in the Black Thunder Pronghorn Herd Unit

As this population grew during the early and mid 2000's, preseason buck:doe ratios generally rose. Then as this population dropped and the percentage of bucks harvested from the population increased each year, preseason buck:doe ratios declined - dropping to a low of about 40:100 in 2014. With generally conservative buck hunting in place and enhanced fawn production and survival, the observed preseason buck:doe ratio increased to 45:100 in 2015 and 50:100 in 2016. Given excellent recruitment into this herd over the past three years and the liberalization of harvest in 2016, the preseason buck:doe ratio is projected to drop slightly in 2017 to about 47:100, a value near the mid-point of recreational management criteria.

HARVEST DATA: Hunter success dropped while effort remained fairly consistent between 2010 and 2013 as this population declined. In both 2014 and 2015, with conservative hunting seasons in place and a growing pronghorn population, hunter success improved each year while hunter effort fluctuated around 4 days per animal harvested. These harvest statistics remained essentially unchanged in 2016, as seasons were liberalized to moderate population growth.

After several years of hunter success below that normally observed and desired for pronghorn hunting in Wyoming, in 2015 and 2016 most hunt areas in the herd unit witnessed a return to hunter success on par with historic levels. There have been some notable exceptions, however. Hunter success on doe/fawn licenses ranged from a low of ~58% (HA 5 Type 6 & HA's 7 and 27 Type 7) to a high of 85% (HA 4), with mean success rate for doe/fawn hunters in the herd unit being 73%. While we would like to see this value ten to fifteen percent higher, it seems to be suppressed due primarily to poor success for hunters with doe/fawn tags valid on private land only. Low success on doe/fawn tags is also common in hunt areas where publically accessible hunting lands are very limited. In both cases, low success is likely result of hunters not consulting the regulations prior to purchasing licenses and/or purchasing licenses without

realizing how truly limited public hunting opportunity can be. Hunter success on Type 1 and 2 licenses ranged from 65% (HA 24) to 99% (HA 6). And, hunter success was a bit lower than desired in HA 8 (78%) and HA 9 (83%). This may have been due in part to HA 8 licenses no longer being valid in HA 6, and decreased pronghorn densities in the Department's Walk-In-Areas in HA 9, respectively. However, the dismal success on Type 1 licenses in HA 24 is a result of large numbers of leftover licenses selling to naïve non-resident hunters who travel out to hunt, find very little public land hunting opportunity, and are unwilling to pay access fees to hunt private land. Aside from HA's 8, 9, and 24, hunter success on Type 1 and 2 licenses was excellent, averaging 90% in the six remaining hunt areas.

Hunter success dropped steadily between 2010 and 2013, and remained low until 2015 when pronghorn numbers noticeably increased while license issuance remained fairly conservative. In 2015, hunter satisfaction rose about 8 percentage points with 45% of the hunters reporting they were very satisfied, and 36% stating they were satisfied. Hunter satisfaction rose again slightly in 2016, with 46% of hunters reporting they were very satisfied and 38% satisfied. The vast majority of hunters in this herd unit are non-residents from states without pronghorn who, despite what Department personnel still consider fairly low pronghorn numbers, are amazed at the numbers of pronghorn they see and level of success they experience compared to hunting other big game species in their home states.

POPULATION: Following the recent herd unit combination, an official population model was constructed in February, 2015 (see 2015 PR750 JCR for details). As has been the case in previous years, the "Semi Constant Juvenile & Semi Constant Adult" (SCJ SCA) spreadsheet model was chosen to estimate this herd's population. All three competing models generally simulate a population rise between 2000 and 2006, followed by a decline through 2012 or 2013 and an increase since. All three models also produce post-season population estimates for 2012 within about 5% of each other and within 10% in 2014 and 2015. However, the SCJ SCA model begins to diverge from the competing models and produces a 2016 post-season population estimate about 11% above the other two. However, the SCJ SCA model exhibits the lowest AICc value and a fit value halfway between the competing models without appearing to over parameterize modeled buck:doe ratios. Finally, the magnitude of population trends produced by SCJ SCA model dovetail with general trends in harvest statistics and perceptions of local game managers, landowners, and hunters.

Amongst competing models the SCJ SCA model more substantially fits LT estimates. However, it should be noted that while an LT survey was flown in this herd unit during 2015, the end of bio-year population estimate produced by that effort (~49,700) was 66% above what was the modeled end of bio-year population estimate, exceeded the post-season population objective of the herd, and was completely unreasonable in relation to historic data. In addition, none of the available models were even able to come close to intercepting the confidence intervals of the 2015 estimate. Regardless, the SCJ SCA model does yield the highest end of bio-year 2015 estimate of all three models. Post hoc revisions to the 2015 LT (using various methods of post-survey stratification of observed data and a revised estimate of occupied habitat) still failed to render these survey data reasonable or usable. It is unknown why the 2015 LT estimate was so high, but analysis may have been confounded by very high densities of antelope being encountered on most lines in the northern one-third and near the southern border of the herd unit, while very low densities were encountered between these areas. This may have been a result of

the weather experienced in May and June of 2015, antelope redistribution, or the alteration of survey lines from previous surveys.

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

The Black Thunder pronghorn population is projected to have increased steadily from the late 1990's through 2006, when it peaked about 60% above objective at ~72,000 pronghorn. During this timeframe, above average fawn:doe ratios were observed, while doe/fawn harvest was limited by our inability to sell all available licenses. After its peak in 2006 / 2007, the postseason population declined through 2012 and remained essentially unchanged in 2013 at about 42% below objective. Some of this decline was due to increased harvest following regulatory and license issuance changes that increased doe/fawn licenses sales and acted in concert with enrollment of private lands in our walk-in hunting program to increase harvest. But more ostensibly, the drop resulted from reduced fawn recruitment due to drought, significant mortality during and following the 2010-11 winter; and increased summer mortality of all age classes due to Epizootic Hemorrhagic Disease (EHDV), and perhaps even some unknown density dependent factor(s). Conservative hunting seasons, excellent fawn production and favorable weather has allowed this population to increase over the past four years.

MANAGEMENT SUMMARY: Hunting seasons between 2012 and 2015 were quite conservative. Hunting seasons have since been modestly liberalized to slow growth as this population is now projected to be about 19% below objective. Doe/fawn harvest remains significantly reduced from historic levels even with increases in license issuance. Any-antelope license issuance has been liberalized somewhat in 3 of 9 hunt areas to allow increased hunting opportunity as buck:doe ratios have climbed.

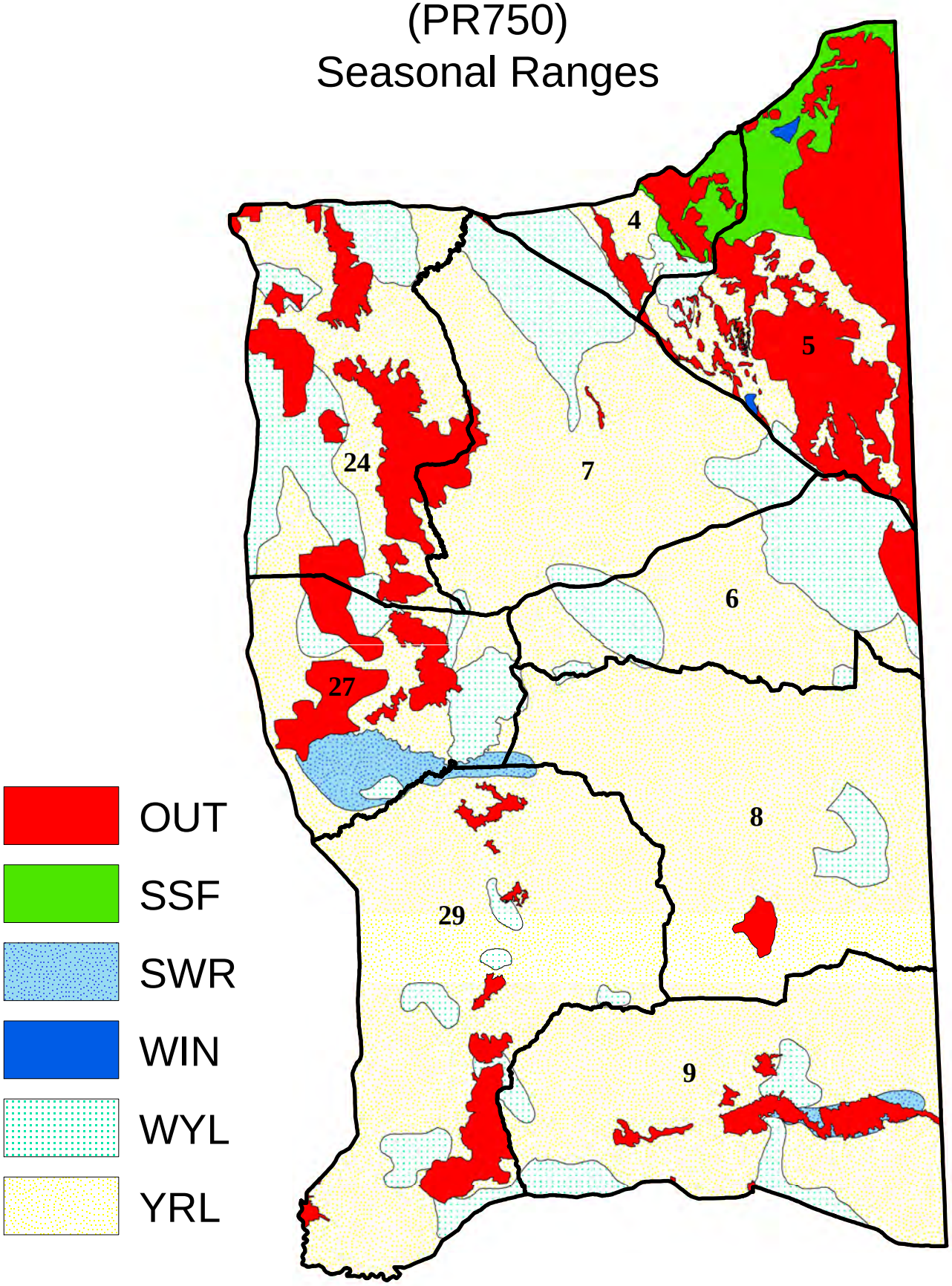
In HA 9, claims for pronghorn damage are no longer being submitted, landowners have noted a drop in pronghorn numbers, and harvest success has hovered around 80% on Type 1 and 75% on Type 6 licenses. However, harvest pressure will be maintained here to continue to limit herd growth. Similarly, in HA 7 the "late season" Type 7 license introduced last year to address a specific damage complaint of migrating pronghorn congregating on irrigated hayfields is being retained. In HA 29, as a response to complaints from landowners and hunters about low pronghorn numbers and hunter success on public lands, the bulk of any-antelope licenses will continue to be issued as Type 2, which are reverting to the limitation of being valid on private land rather than off national grasslands to ease hunter confusion. Changes made in this hunt area over the past several years have been well received by many landowners and have significantly reduced harvest pressure on public lands in the northern part of HA 29. Similarly, Type 2 and Type 7 licenses, which are valid only on private land, have been added to HA 24 this year, and will comprise the bulk of issued licenses for this HA. This is being done to address extreme overcrowding on the limited public land accessible to hunters, better distribute hunters across the area, and provide a number of Type 1 licenses available in the initial drawing that reflects historic demand. Overall, recruitment and survival of pronghorn has allowed the buck:doe ratio

in this herd to climb. As a result, the prescribed 7% increase in the total number of Type 1 & 2 licenses being issued is warranted, and will be distributed across HA's where success has been excellent and hunters can still find places to hunt.

Concerns about low pronghorn numbers on public lands, notably on the TBNG in both HA's 27 and 29, have begun to ease somewhat as pronghorn numbers rebound. However, expansion of the coal mines in HA 27 has blocked hunter access to a significant amount of public land there, and drought combined with high numbers of prairie dogs has left most of the southern portion of this HA in poor vegetative condition. To balance habitat conditions with hunter expectations, doe/fawn license issuance in HA 27 is being increase 50% to 75 licenses, but their use continues to be limited to private lands. Type 1 license issuance will also be increased slightly (10%) to allow more hunting opportunity. In HA 27, residents hold 80% of the licenses and draw odds for non-residents are some of the most difficult in the state. Type 1 license success in HA 27 has increased notably since 2014; and, after seeing relatively low hunter satisfaction between 2012 and 2014, the percentage of hunters reporting they were satisfied or very satisfied with their HA 27 hunt has continued to climb.

In 2017, total harvest should rise about 10% above last year, and should be about 33% above that of 2014 & 2015. With an overall increase in license issuance and an increasing population, harvest in most hunt areas should climb to some degree, with the total increase being generally proportionate to the increase in license issuance. Given average survival rates, preseason age/sex ratios observed over the past 5-years, and the predicted harvest of ~4,350 pronghorn, the 2017 hunting season should allow the post-season population of this herd to grow about 7%, to 42,400 pronghorn, which is ~13% below objective.

Black Thunder Pronghorn Herd Unit (PR750) Seasonal Ranges



2016 - JCR Evaluation Form

SPECIES: Mule Deer | PERIOD: 6/1/2016 - 5/31/2017

HERD: MD740 - CHEYENNE RIVER

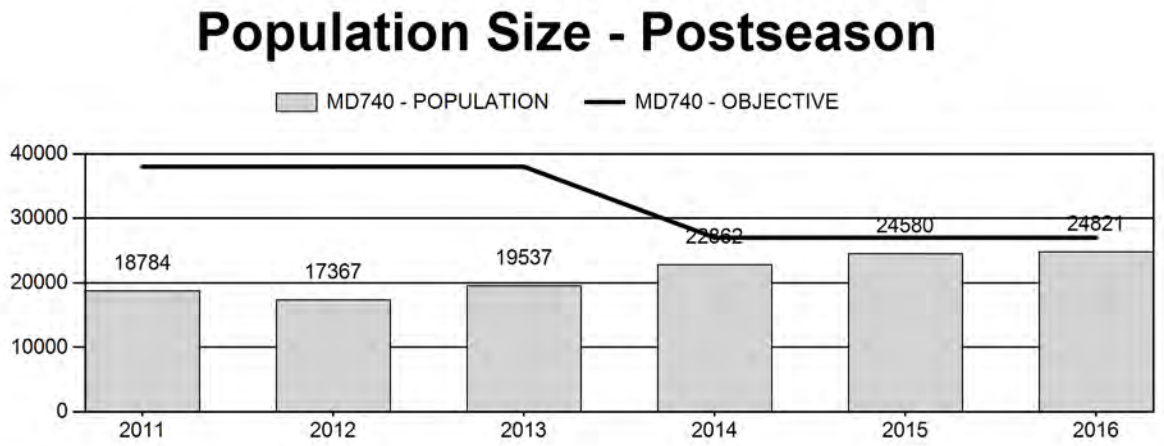
HUNT AREAS: 7-14, 21 | PREPARED BY: JOE SANDRINI

	2011 - 2015 Average	2016	2017 Proposed
Population:	20,626	24,821	25,947
Harvest:	1,126	1,202	1,340
Hunters:	2,132	1,996	2,195
Hunter Success:	53%	60%	61%
Active Licenses:	2,170	2,026	2,230
Active License Success:	52%	59%	60%
Recreation Days:	8,743	7,909	8,750
Days Per Animal:	7.8	6.6	6.5
Males per 100 Females	37	51	
Juveniles per 100 Females	66	67	

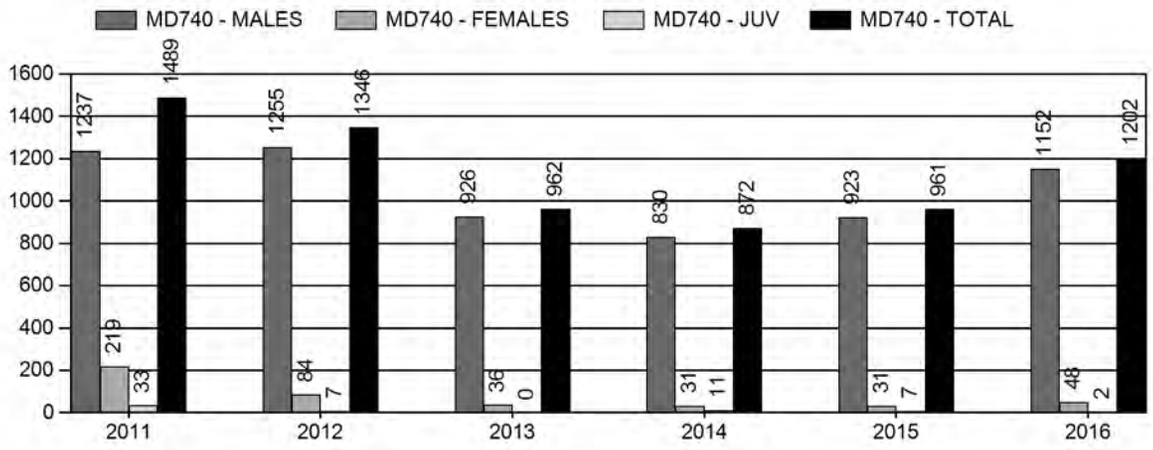
Population Objective (± 20%) :	27000 (21600 - 32400)
Management Strategy:	Private Land
Percent population is above (+) or below (-) objective:	-8.1%
Number of years population has been + or - objective in recent trend:	8
Model Date:	02/22/2017

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

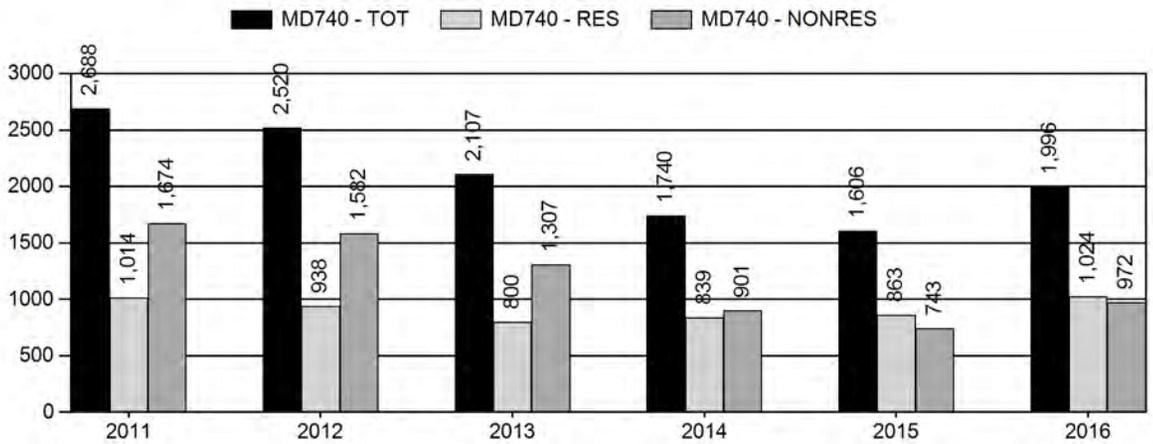
	JCR Year	Proposed
Females ≥ 1 year old:	0.4%	0.4%
Males ≥ 1 year old:	19.3%	20.5%
Total:	5.0%	5.3%
Proposed change in post-season population:	+4.0%	+4.4%



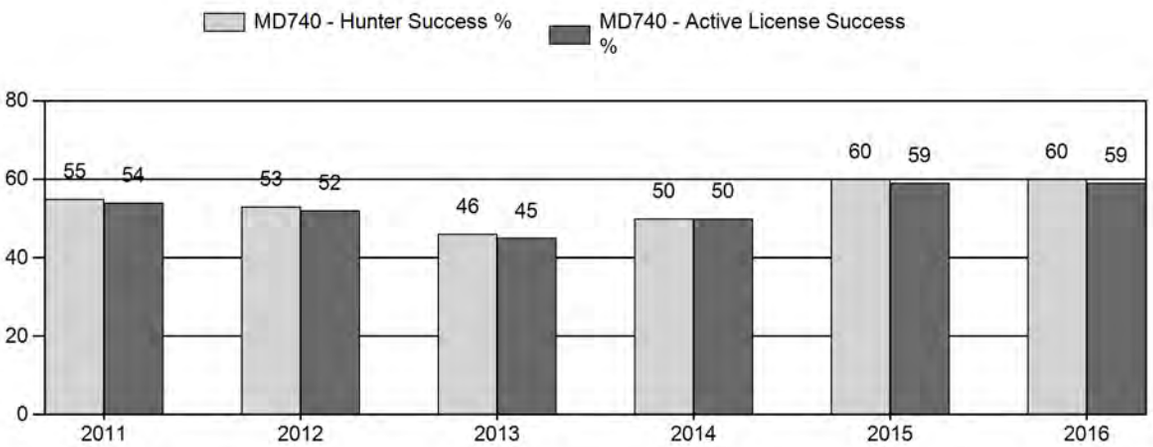
Harvest



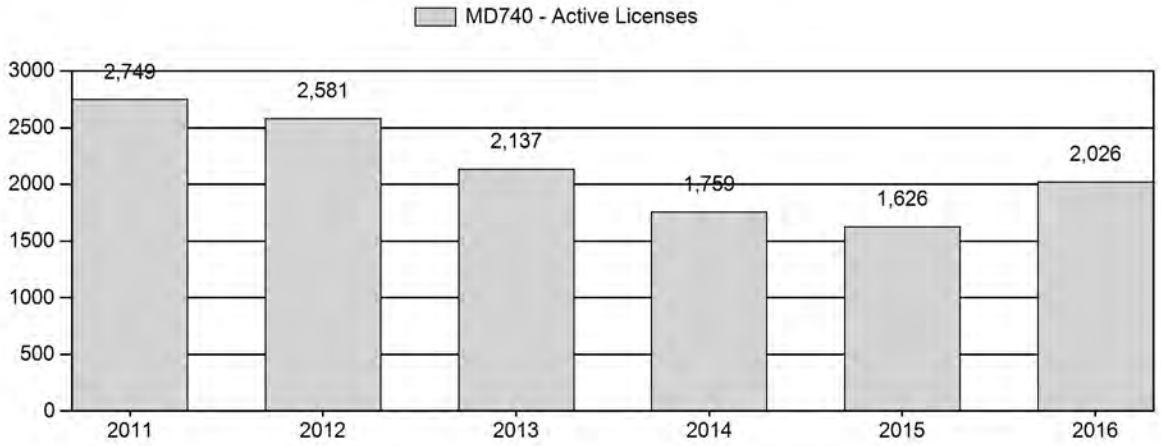
Number of Active Licenses



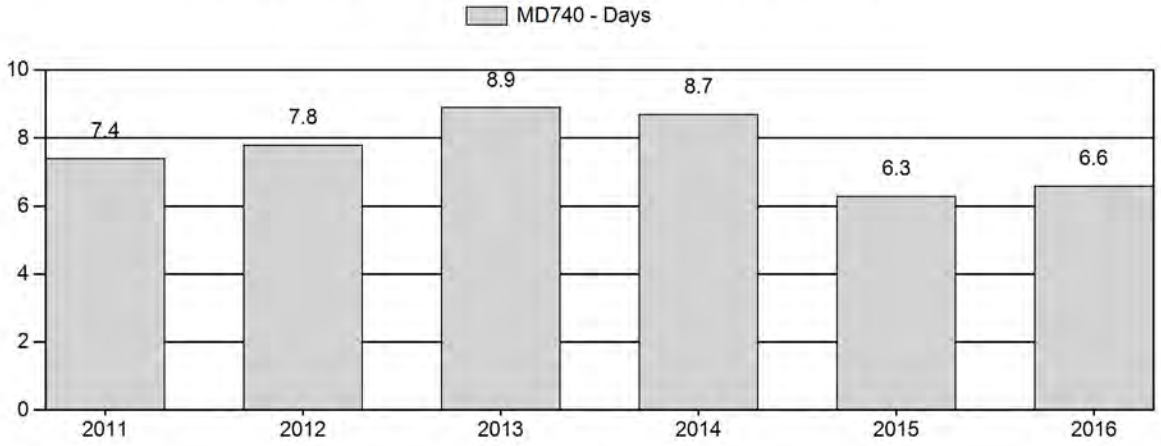
Harvest Success



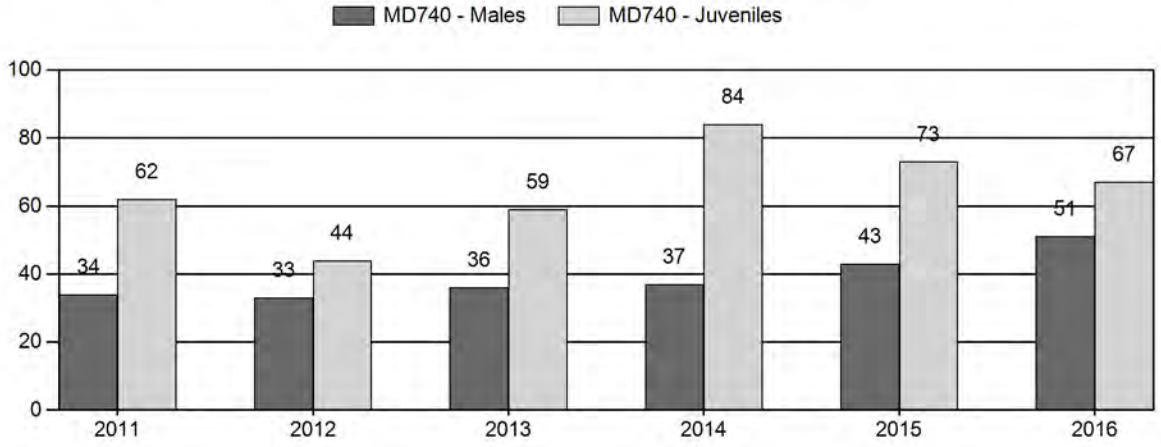
Active Licenses



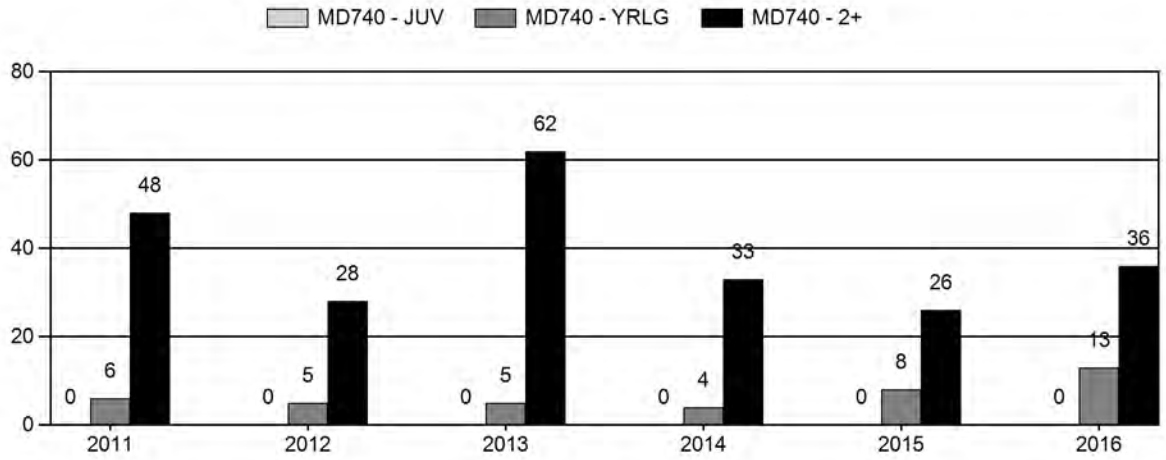
Days per Animal Harvested



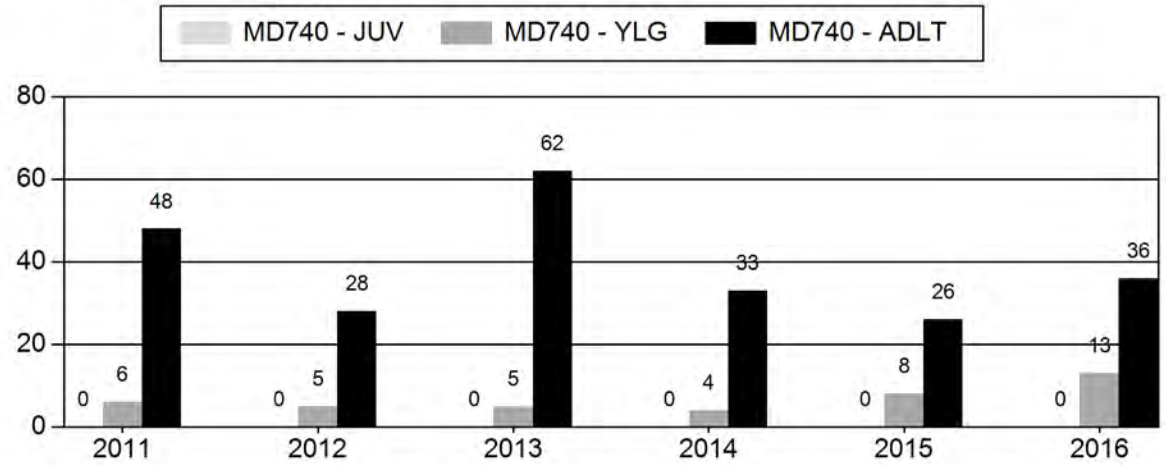
Postseason Animals per 100 Females



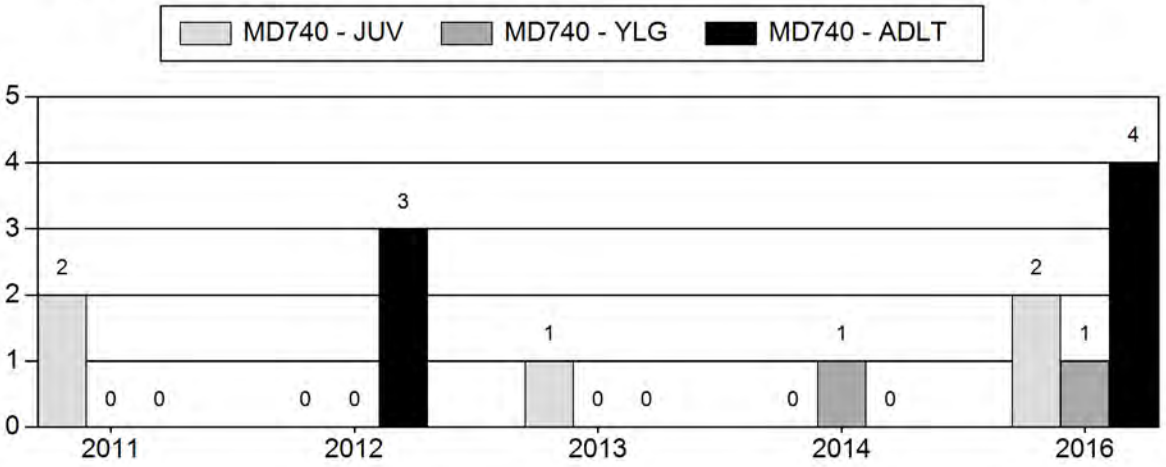
Age Structure of Field Checked Males



Age Structure Data (Field and Laboratory) - Male



Age Structure Data (Field and Laboratory) - Female



2011 - 2016 Postseason Classification Summary

for Mule Deer Herd MD740 - CHEYENNE RIVER

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	18,784	113	0	0	0	281	394	17%	1,155	51%	711	31%	2,260	1,211	10	24	34	± 2	62	± 4	46
2012	17,367	119	0	0	0	185	304	19%	932	57%	406	25%	1,642	708	13	20	33	± 3	44	± 3	33
2013	19,537	114	0	0	0	302	416	19%	1,142	51%	669	30%	2,227	1,137	10	26	36	± 3	59	± 3	43
2014	22,862	186	0	0	0	336	522	17%	1,426	45%	1,198	38%	3,146	2,044	13	24	37	± 2	84	± 4	61
2015	24,580	268	193	76	15	43	595	20%	1,373	46%	1,009	34%	2,977	1,672	20	24	43	± 3	73	± 4	51
2016	24,821	298	297	90	8	0	693	23%	1,371	46%	916	31%	2,980	1,506	22	29	51	± 3	67	± 3	44

2017 HUNTING SEASONS
CHEYENNE RIVER MULE DEER HERD (MD740)

Hunt Area	Type	Season Dates Opens	Season Dates Closes	Quota	License	Limitations
7		Oct. 1	Oct. 15		General	Antlered mule deer or any white-tailed deer
8		Oct. 1	Oct. 15		General	Antlered mule deer or any white-tailed deer
9		Oct. 1	Oct. 15		General	Antlered mule deer or any white-tailed deer
10	1	Oct. 1	Oct. 15	100	Limited quota	Antlered deer
11		Oct. 1	Oct. 15		General	Antlered mule deer or any white-tailed deer
11		Oct. 16	Nov. 30		General	Any white-tailed deer
12		Oct. 1	Oct. 15		General	Antlered mule deer or any white-tailed deer
12		Oct. 16	Nov. 30		General	Any white-tailed deer
12	6	Oct. 1	Nov. 30	50	Limited quota	Doe or fawn
13		Oct. 1	Oct. 15		General	Antlered mule deer or any white-tailed deer
13		Oct. 16	Nov. 30		General	Any white-tailed deer
14		Oct. 1	Oct. 15		General	Antlered mule deer or any white-tailed deer
14		Oct. 16	Nov. 30		General	Any white-tailed deer
21		Oct. 1	Oct. 15		General	Antlered mule deer or any white-tailed deer
21	7	Oct. 1	Oct. 31	50	Limited quota	Doe or fawn valid on private land

Special Archery Season Hunt Areas	Season Dates Opens	Season Dates Closes
1-14, 21	Sep. 1	Sep. 30

Region B Nonresident Quota: 1,100

SUMMARY OF CHANGES IN LICENSE NUMBER

Hunt Area	License Type	Quota change from 2016
	1	none
	6	none
Herd Unit Totals	7	none
	Region B	+100

Management Evaluation
Current Management Objective: 27,000
Management Strategy: Private Land Management
2016 Postseason Population Estimate: ~ 24,800
2017 Proposed Postseason Population Estimate: ~ 25,900
2016 Hunter Satisfaction: 75% Satisfied 16% Neutral 9% Dissatisfied

HERD UNIT ISSUES: The Cheyenne River mule deer herd was created in 2009 by combining the Thunder Basin and Lance Creek herds. In 2014, following an internal review and public input process, the postseason population objective was revised downward from 38,000 to 27,000 and the management strategy changed from recreational to private land. This was done to better align the post-season population objective with historic herd performance, habitat capacity, and address the consequences of limited access to private land for mule deer hunting.

There are about 6,350 mi^2 in this herd unit, and 5,485 mi^2 (86%) are considered occupied habitat. Approximately 75% of the land within the herd unit is privately owned, with the remaining lands being administered by the United States Forest Service, Bureau of Land Management, or the State of Wyoming. As a result, hunter access is largely controlled by private landowners. Access fees along with outfitted hunting are common. Consequently, hunting pressure can be heavy on what lands are legally accessible to the public. Historically, two-thirds or more of the hunters pursuing mule deer in this herd unit have been non-residents. In recent years, due to reductions in the Region B quota, nonresident hunter numbers have more closely approximated that of the approximately 1,000 residents who hunt here annually. Compared to residents, non-residents typically are more willing to pay trespass or access fees for hunting privileges or hire an outfitter. Consequently, many resident hunters and an increasing percentage of non-residents pursue mule deer with general licenses on accessible on public land, which significantly concentrates hunting pressure there.

Primary land uses within the herd unit include livestock grazing, oil and gas production, and some crop production. By far, the dominant land use is livestock grazing. The majority of oil and gas development occurs in the western and north central portions of the herd unit. However, substantial new oil and gas development is occurring in northern Niobrara County (HA's 9 & 11) and near Douglas (HA 14). In addition, horizontal oil well development over a large portion of hunt areas 10, 11, 14 and 21 is expected to increase disturbance in the future. There are also

several large surface coal mines in HA 10 and HA 21, which create a high level of disturbance and limit access to public lands for hunting. Cultivation of alfalfa, grass hay, oats, and wheat occur mostly in the southern and eastern portions of the herd unit.

WEATHER: Between 2006 and 2012 drought combined with poor habitat condition and about normal winter weather patterns to reduce recruitment of fawns into the adult segment of this herd. The winter of 2010-11 was fairly severe and over-winter mortality elevated. Generally warm and dry late summer conditions between 2009 and 2012 fostered outbreaks of Epizootic Hemorrhagic Disease (EHD). As such, weather patterns observed between 2006 and 2012 are thought to be the remote cause for the population drop during this time by differentially affecting various proximate mortality factors.

Weather conditions improved markedly in 2014 and 2015, when spring and summer temperatures were close to average, and precipitation above average. Consequently, forage production during 2014 and 2015 was excellent. Overall, winter conditions in 2014 and 2015 also favored mule deer, with daily winter temperatures hovering close to or above average, and precipitation generally remaining below normal. During the spring of 2016, moderate to mildly severe drought beset much of the herd unit. In many locations, notably in the north half of the herd unit, cool season forage production was nominal and warm season production limited. This drought was somewhat ameliorated between the middle of August and mid-September with regular thunderstorms and rainfall. Overall, mule deer went into the 2016-2017 winter with range conditions in fair to poor shape. The 2016-17 winter also saw a return of more severe winter weather. Consequently, the weather conditions experienced by this herd over the past year resulted in below normal forage production and what will likely be average to slightly elevated over-winter mortality. (Weather summary available at http://www.ncdc.noaa.gov/cag/)

HABITAT: Sagebrush (*Artemisia ssp.*) steppe and sagebrush grasslands with scattered hills dominated by ponderosa pine (*Pinus ponderosa*) comprise most of the western, central, and northern segments of the herd unit. The easternmost lands in the herd unit are comprised of short grass prairie punctuated by pine breaks, and there is a small area (about 30 mi^2) of southern Black Hills habitat along the state line near Newcastle. Rolling ponderosa pine and limber pine (*Pinus flexilis*) hills and ridges dominate the southern portions of the herd unit. Major agricultural crops are grass and alfalfa hay and winter wheat. Croplands are localized and found primarily near Gillette, Moorcroft, Upton, Newcastle, Manville, and Lusk. These variations in habitat types and limited riparian areas affect deer densities and distribution. The majority of mule deer are typically found utilizing broken topography characterized by sagebrush, conifer covered hills, or cottonwood and sagebrush dominated riparian communities. Scattered mule deer are found in the open sagebrush-grassland areas.

Several major cottonwood drainages traverse the herd unit including the headwaters of the Belle Fourche River in the north and those of the Niobrara River to the south. The Cheyenne River and many of its tributary creeks such as Beaver Creek, Lightning Creek, Twenty-Mile Creek, Lance Creek, and Old Woman Creek make up the bulk of the herd unit. Overstory canopy along these drainages is dominated by decadent stands of plains cottonwood (*Populus deltoides*). These riparian cottonwood groves comprise one of the most important habitat types for mule deer in this herd unit. Unfortunately, many are in poor condition and lack recruitment of new

cottonwoods along with the general lack of woody understory species. The health and vigor of riparian cottonwood communities and shrub stands needs to be enhanced if mule deer are going to thrive in this part of Wyoming.

After about a decade of collecting annual Wyoming big sagebrush leader growth and utilization data in this herd unit, the Department suspended these efforts. This was because it had been demonstrated annual leader production was proportional to the amount of spring and early summer moisture received; while over-winter browsing of shrubs could be fairly well gauged through causal observation. During 2014 and 2015, wet spring and summer conditions combined with low numbers of pronghorn and mule deer on the range to yield excellent leader growth and low levels of winter use. Observations in 2016 indicated little in the way of cool season grass and forb production together with reduced leader growth on shrubs. However, fawn production by mature does and subsequent fawn survival was generally good, at least until mid winter, indicating this population was still below carrying capacity and could be permitted to grow even though it is near objective.

FIELD DATA: While postseason fawn:doe ratios have undergone cyclic fluctuations, they have generally trended downward (Figure 1). In 2016, the observed, post-season fawn:doe ratio was 67:100, which was a drop of 8% from 2015 and 20% from the recent high of 84:100 observed in 2014. However, fawn production in both 2015 & 2016 by mature does was likely excellent because removing yearling does from the fawn:doe calculations (based upon numbers of yearling bucks observed) yields fawn to mature doe ratios for 2015 and 2016 of 91:100 and 85:100, respectively. At any rate, the fawn:doe ratios observed the past three years were a marked improvement over those observed during this herd's decline (2006 – 2012), when an average of only 58 fawns per 100 does was observed. Overall, suppressed fawn:doe ratios witnessed between 2000 and 2013 were thought to have been a result of generally poor range conditions due to protracted drought coupled with significant use by domestic and wild ungulates laid atop habitat fragmentation and loss. In fact, with extreme drought in 2012, the lowest fawn:doe ratio in recent history was observed. Following that nadir, excellent moisture and forage production has allowed doe body condition to improve, resulting in a spike in fawn production and survival.

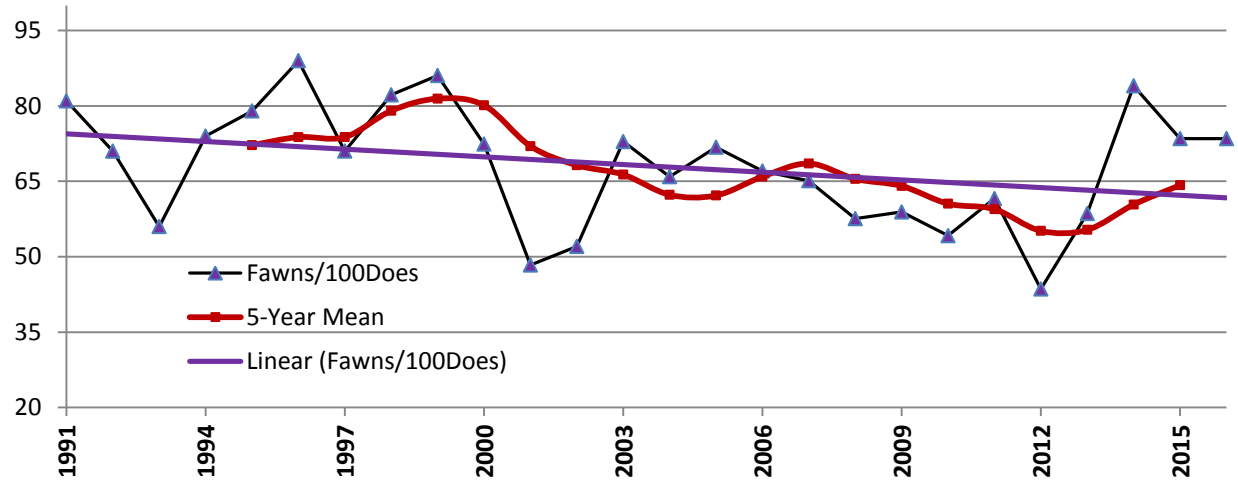


Figure 1. Post-Season Fawn:Doe Ratios (1991 – 2016) with 5-year mean values in the Cheyenne River Mule Deer Herd.

Post-season buck:doe ratios have fluctuated cyclically in this herd (Figure 2). Prior to 2008, moderate productivity coupled with limited access for hunters to private land yielded an increasing buck:doe ratio despite enhanced license issuance. Then, as fawn production and survival dropped, buck:doe ratios declined. Region B license issuance was lowered during this time and buck:doe ratios stabilized. Excellent fawn production and over-winter survival beginning in 2014 caused the total buck:doe ratio to jump to 43:100 in 2015 and 51:100 this past year. Driven substantially by the respective 2015 and 2016 yearling buck:doe ratios of 20:100 and 22:100, which were 66% above the average detected over the previous two decades, the relative number of bucks in this herd has become substantial.

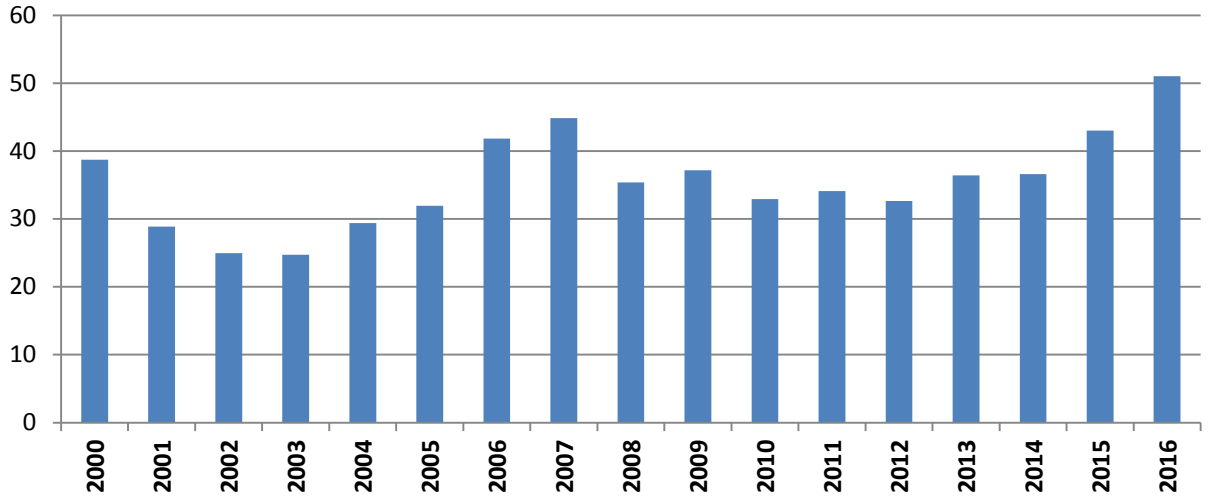


Figure 2. Post-Season Buck:Doe Ratios, Cheyenne River Mule Deer Herd (1997-2015).

HARVEST DATA: In this herd unit, most harvested mule deer are taken off private land because it provides the majority of mule deer habitat. The Department is currently attempting to balance desires of landowners and hunters to increase deer numbers, but still keep the population at levels that will reduce the chance of a large-scale die-off. This was part of the reason for reducing the post-season population objective in 2014.

Access to private lands for deer hunting continues to reamain impoverished due to leasing by outfitters and landowners limiting hunting in the wake of the recent population decline. Many landowners have stated they are still not willing to host increased numbers of hunters, or tolerate much in the way of doe/fawn hunting. Consequently, we seem to be near access saturation at this time on much of the private land within the herd unit. Compounding this situation, over the past two decades, outfitter control has significantly curtailed public hunting access to buck deer, and harvest of bucks has dropped, even at times when seasons have been liberalized. Continual reductions in access to private land for deer hunters over the past twenty years has steadily increased hunting pressure on accessible public lands and resulted in lower numbers of bucks there. This was a primary reason HA 10 was changed to limited quota hunting in 2015.

Between 2006 and 2014, hunter numbers and harvest declined steadily, while hunter effort increased. The trend in hunter effort was slightly ameliorated in 2014, as the population began to

increase and hunter participation declined. Non-resident hunter participation has dropped steadily between 2006 and 2015 as the Region B quota was successively lowered most years. Likely in response to declining deer numbers, resident hunter numbers declined steadily through 2013 before increasing about 5% in 2014 and 3% in 2015 and 18% in 2016. With proportionately greater increases in buck deer numbers relative to total hunter numbers, complaints about the low number of deer seen and harvested have begun to diminish over the past couple of years.

It was evident from the reduced number of deer found during classification efforts between 2010 and 2013, changes in harvest statistics, and landowner contacts that this herd had declined substantially. So, it is notable that the preseason population estimate for this herd increased 2% between 2012 and 2013, while hunter success dropped precipitously and effort increased substantially, even with fewer hunters afield. It is most likely the 2013 harvest statistics were influenced in part by the poor weather and road conditions caused by winter storm Atlas. In addition, nearly 20% of the available Region B tags did not sell in the regular drawing that year, but were purchased after the draw. It was apparent from field contacts that many of the hunters purchasing leftover licenses have been forced to hunt already overcrowded public land; and more than a few landowners have turned hunters away whom they previously granted permission to hunt. This situation has ameliorated itself somewhat the past couple of years as demand for Region B licenses exceeded issuance in the initial license draw, deer numbers have improved, and HA 10 converted to limited quota.

Harvest statistics have generally reflected changes in population estimates and license sales. These statistics seem to indicate this population dropped to its low point in 2013, versus 2012 as projected by the model. However, with the vast majority of the harvest being adult bucks, it is likely the harvest statistics more ostensibly reflect changes in mature buck numbers rather than gross population changes. As such, we could expect an offset between harvest statistics and population estimates of a year or two as recruitment fluctuates. In 2014, harvest statistics reversed their course from declining hunter success and increasing effort to improved success and reduced effort. This same scenario continued in 2015, with substantial increases in hunter success and reductions in effort. Hunter success and effort values leveled off in 2016 as hunter numbers increased for the first time in many years and there was less of a projected change in the herd's population size.

POPULATION: This herd's 2016 post-season population estimate of ~24,800 puts it about 8% below objective; and represents an increase of 43% since 2012. This substantial rebound has been a result of good to excellent reproduction and survival since 2014, a considerable course reversal considering this herd declined appreciably between 2007 and 2012 when it bottomed out 31% below objective. However, placing great confidence in these population estimates is cautioned against since the inherent constraints in the spreadsheet models used make population estimates at the extremes of the years modeled the most tenuous.

The Semi-Constant Juvenile / Semi-Constant Adult (SCJ SCA) model was chosen to estimate this herd's population. It was selected over competing models because it had the lowest AICc and fit observed buck ratios well without being overly parameterized. Preseason population estimates of the selected model are also 94% correlated with changes in hunter success, and

inversely correlated 85% with changes in hunter effort between 2006 and 2016. However, modeled changes in population size do not seem to be of the magnitude field personnel and many landowners report. There seemed to be more of a peak in deer numbers about 2006 or 2007 with a steeper increase preceding this and more abrupt decline following. More recently, it does not appear on the ground that the increase in deer numbers has been as great as the model suggests. Consequently, the chosen model is considered to be of fair quality because it has 15-20 years of data; ratio data available for all years in model; the juvenile and adult survival estimates are reasonable; it exhibits modest fit; and results are generally defensible. But, we do not have any specific survival rates or independent population estimates for this herd; and the population increases indicated are not totally congruent with field observations.

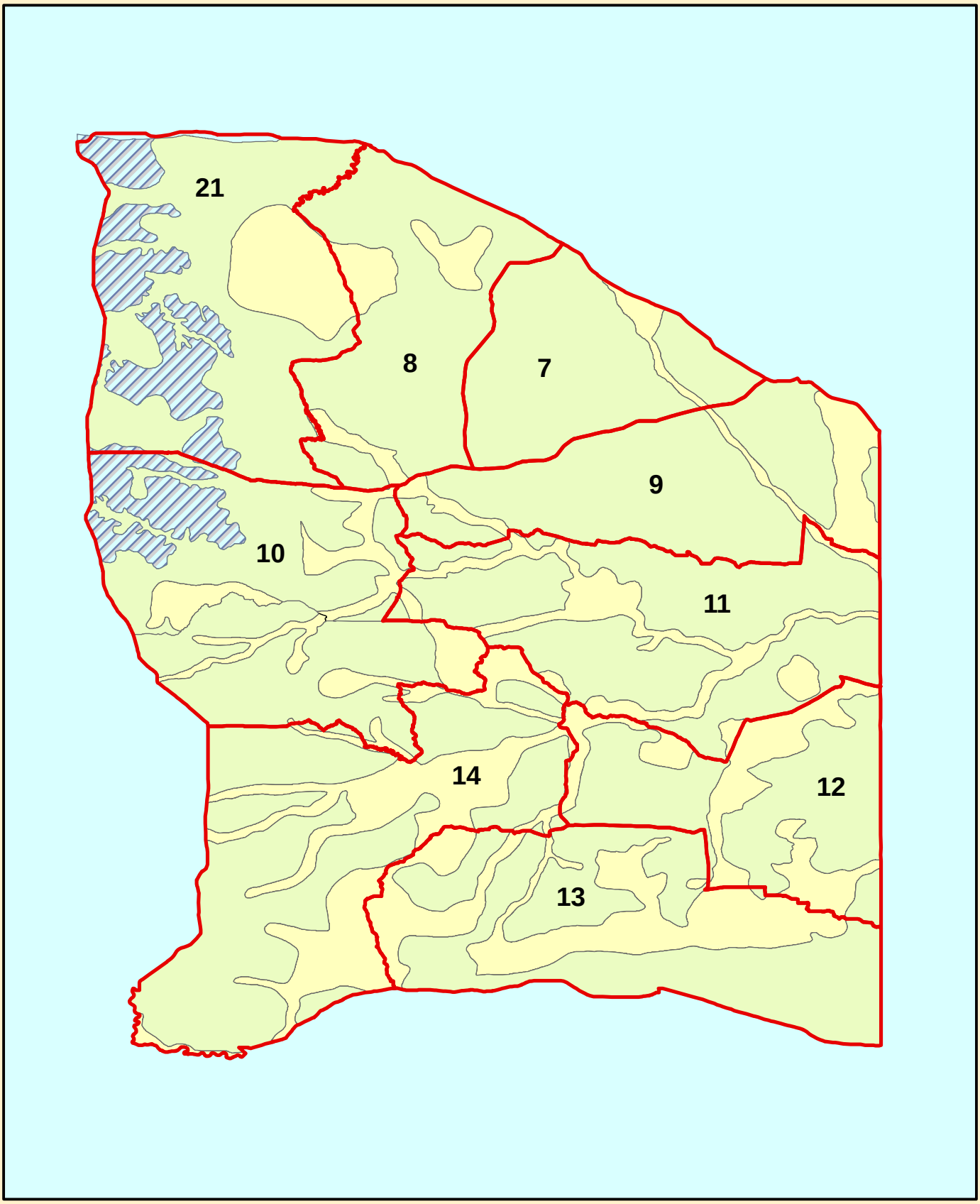
MANAGEMENT SUMMARY: The traditional season dates for this herd unit are Oct. 1-15. In order to facilitate population growth commensurate with landowner and hunter desires, we are proposing to continue with very little doe/fawn harvest and antlered-only general license seasons for mule deer. Limited doe/fawn harvest will continue in HA 12, where a couple landowners are experiencing some damage and want to reduce mule deer numbers, and 50 Type 7 licenses valid on private land will again be issued in HA 21 to address localized concentrations of mule deer around cultivated and landscaped areas.

Due to heavy hunting pressure on accessible public land there is a discrepancy in deer numbers and densities between these areas and surrounding private lands. Historically, this was best exemplified in HA 10, which contains the highest proportion of public land in the herd unit. To address low buck numbers and hunter crowding in this hunt area we steadily reduced the Region B quota, decreased season length, and finally implemented a 3-point restriction in 2012. These strategies helped improved the HA 10 buck:doe ratio to the herd-wide average in 2009 and 2010, but deer densities remained depressed. With the 3-point restriction in place during 2012, the post-season buck:doe ratio improved to 42:100. The same classification effort in 2013 & 2014 detected more bucks each year, and the buck:doe ratio remained near 36:100. Following the inaugural limited quota season, similar classification efforts found a buck:doe ratio of 51:100 in 2015 and 57:100 in 2016. However 30% of the bucks observed were yearling bucks in 2015 and 43% in 2016. It is likely we can begin to liberalize license issuance in Area 10 over the next couple of years barring a significant mortality event as these younger deer reach trophy class potential ages. Finally, limited quota hunting in this hunt area was initially very well received by those who hunted here, as an average of 83% of these hunters reported being satisfied or very satisfied with their hunt, while only 2% reported any measure of dissatisfaction in 2015. These satisfaction values fell some in 2016, with 78% of the hunters reporting some level of satisfaction and 6% dissatisfaction.

Even as this population has begun to recover, many landowners have continued to state they are not willing to host increased numbers of deer hunters. In addition, since 2013 a number of ranches that would normally host several hundred deer hunters have turned these hunters away, and apparently plan to follow a similar course in 2017. This has resulted in local game wardens being strongly reluctant to increase Region B license issuance due to concerns over nonresident hunters purchasing licenses without securing permission on private lands, resulting in widespread complaints and dissatisfaction from those hunters relegated to hunting isolated parcels of public land. However, now that HA 10 has been limited quota for a couple of years, nonresident license demand is strong, and the buck:doe ratio has steadily increased the past three

years, an increase in the Region B quota is warranted. As such, 1,100 Region B licenses will be issued in 2017, representing a 10% increase.

The 2017 hunting season should result in harvest of about 1,250 bucks and about 50 antlerless deer. Given five-year average postseason classification values and modeled survival rates, this harvest is projected to allow the post-season population to increase about 4% to ~25,900, which would put it at a value 4% below objective. However, given winter weather has been fairly severe at times and considering long-term fawn:doe ratios, this population will more likely level off or could even drop slightly in 2017.



Legend

- Hunt_Areas
- OUT
- YLG
- WYL

MD 740

0 4.25 8.5 17 25.5 34 Miles

Coordinate System:
Central Meridian:
1st Std Parallel:
2nd Std Parallel:
Latitude of Origin:

2016 - JCR Evaluation Form

SPECIES: Mule Deer | PERIOD: 6/1/2016 - 5/31/2017

HERD: MD751 - BLACK HILLS

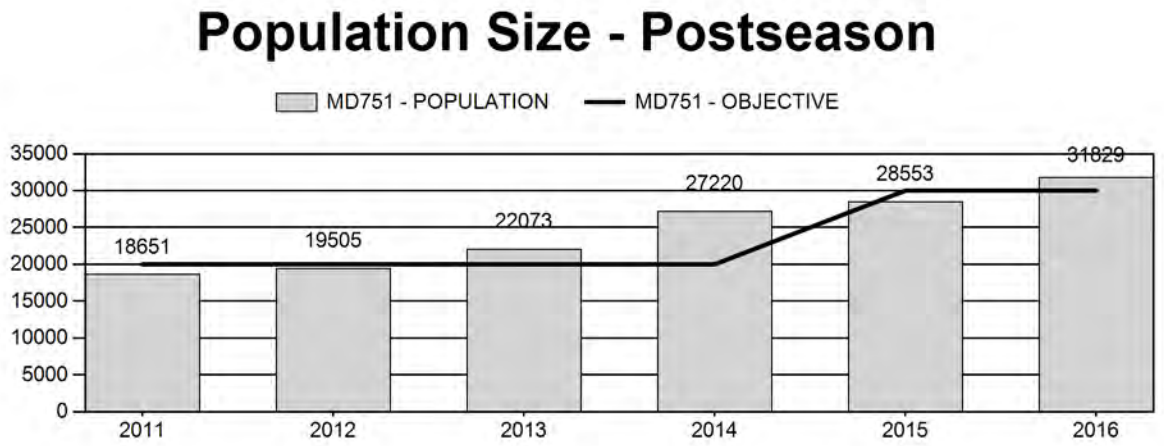
HUNT AREAS: 1-6 | PREPARED BY: JOE SANDRINI

	2011 - 2015 Average	2016	2017 Proposed
Population:	23,200	31,829	31,219
Harvest:	1,689	2,765	2,795
Hunters:	3,910	5,583	5,600
Hunter Success:	43%	50%	50 %
Active Licenses:	3,989	5,831	5,850
Active License Success:	42%	47%	48 %
Recreation Days:	12,302	16,239	16,250
Days Per Animal:	7.3	5.9	5.8
Males per 100 Females	22	36	
Juveniles per 100 Females	79	68	

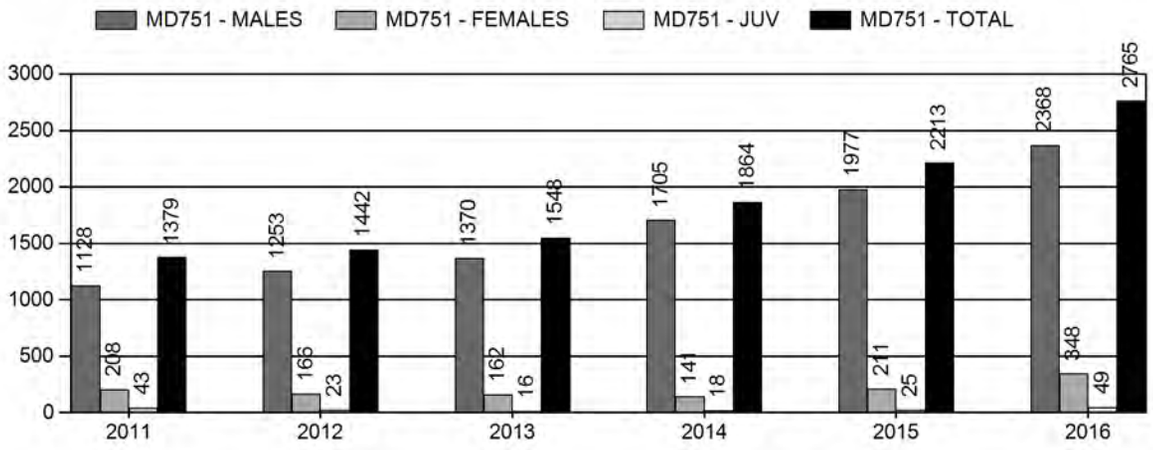
Population Objective (± 20%) :	30000 (24000 - 36000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	6%
Number of years population has been + or - objective in recent trend:	1
Model Date:	02/22/2017

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

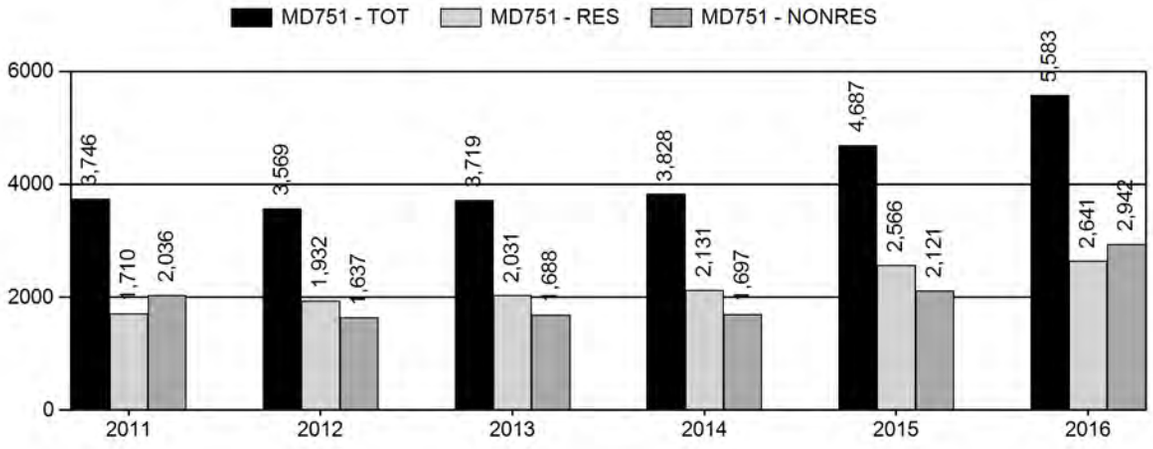
	JCR Year	Proposed
Females ≥ 1 year old:	2.4%	2.6%
Males ≥ 1 year old:	32.5%	38.6%
Total:	8.7%	9.0%
Proposed change in post-season population:	+12.5%	-2.0%



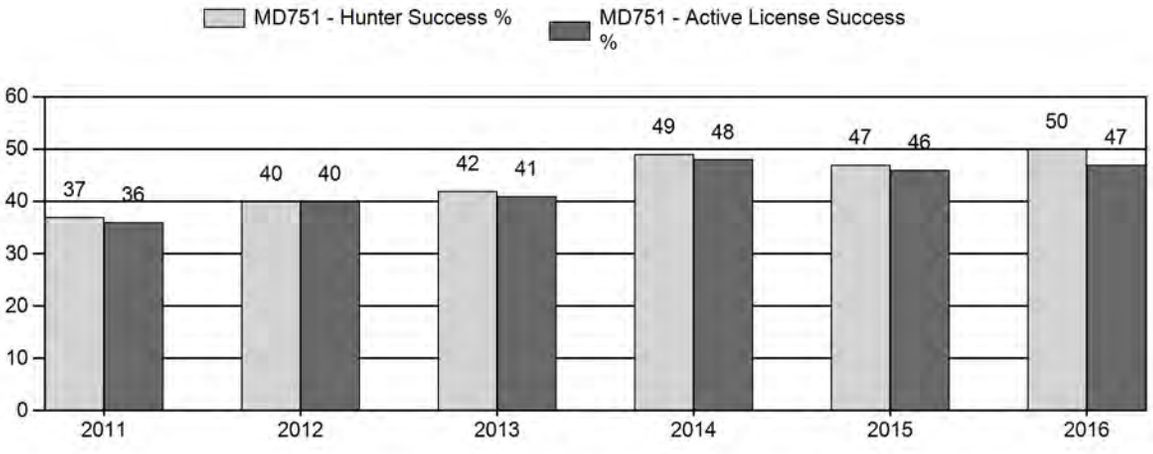
Harvest



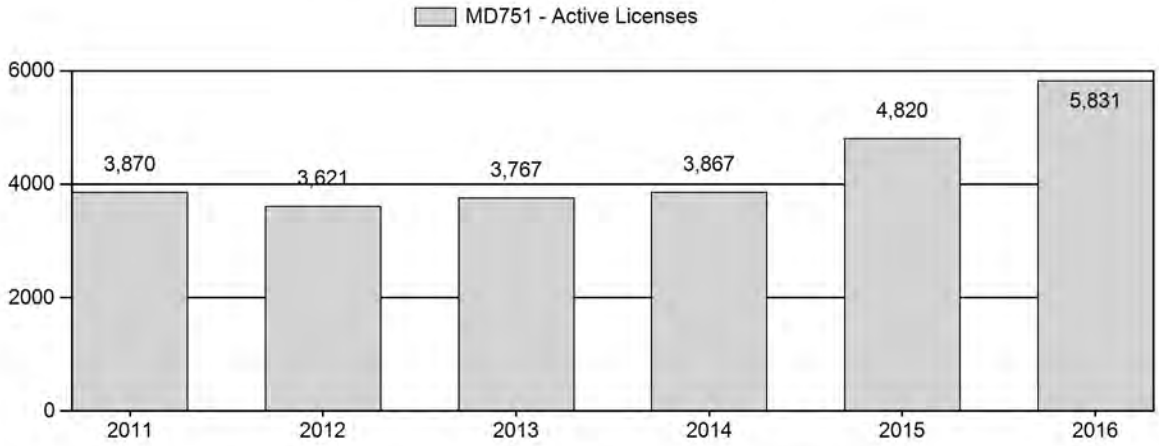
Number of Active Licenses



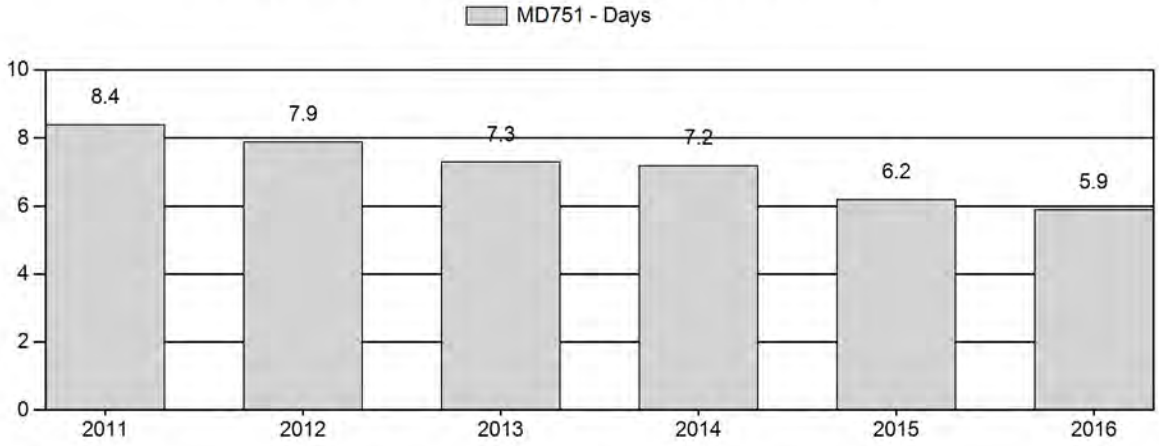
Harvest Success



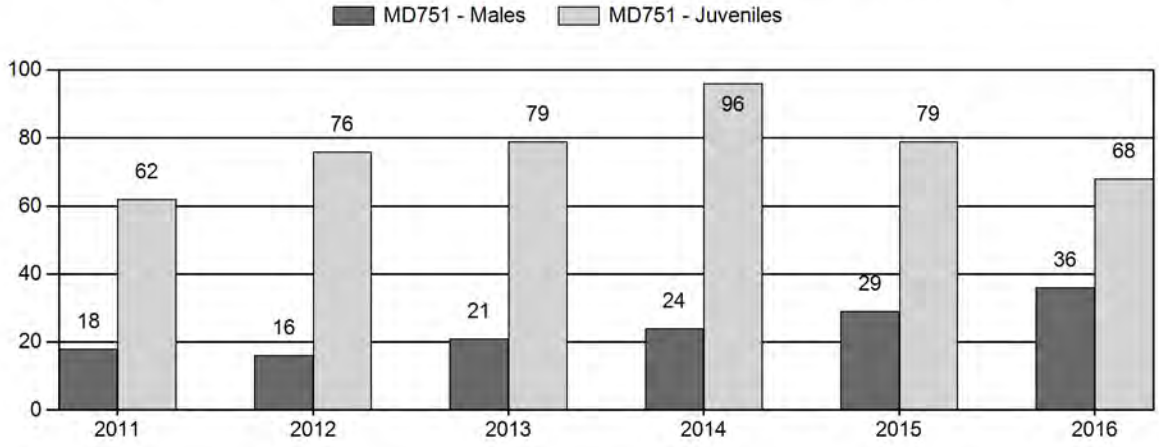
Active Licenses



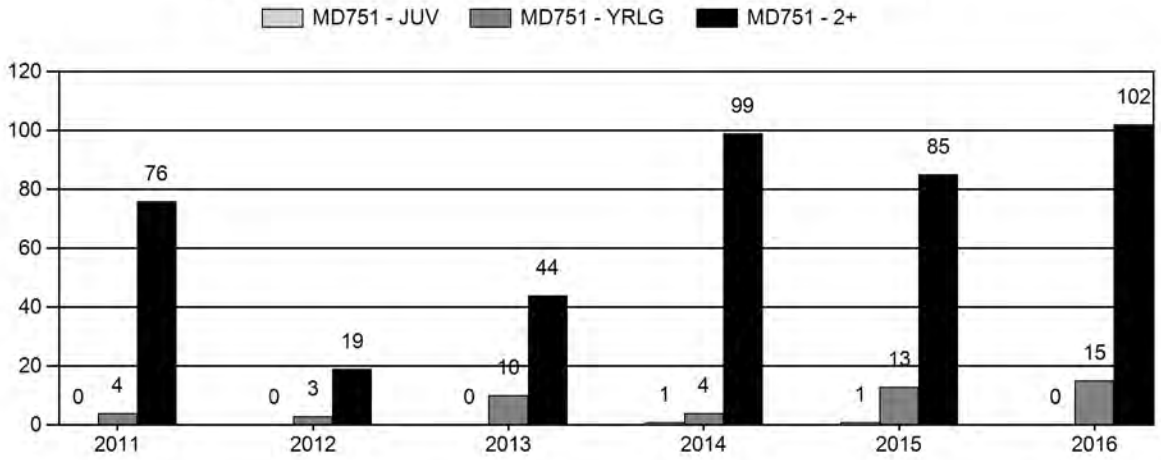
Days per Animal Harvested



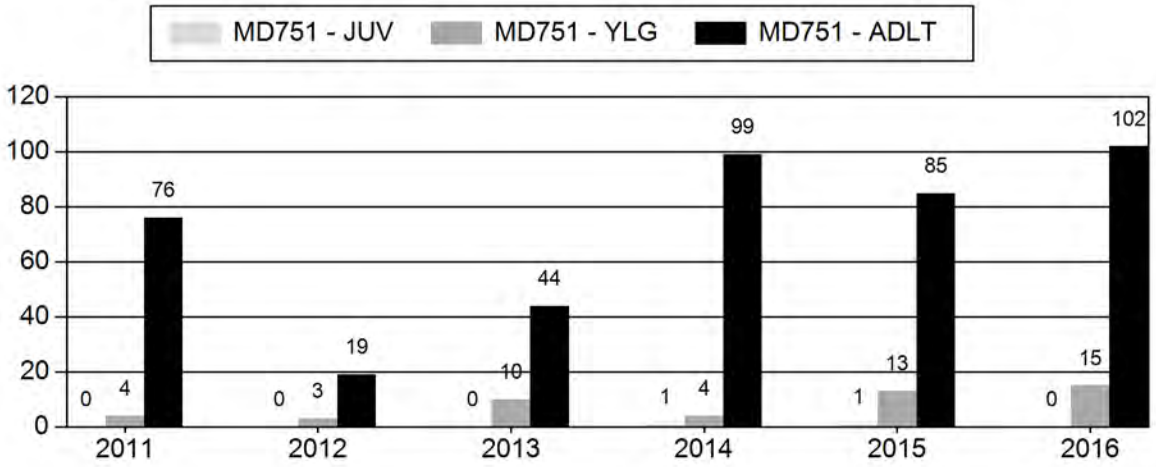
Postseason Animals per 100 Females



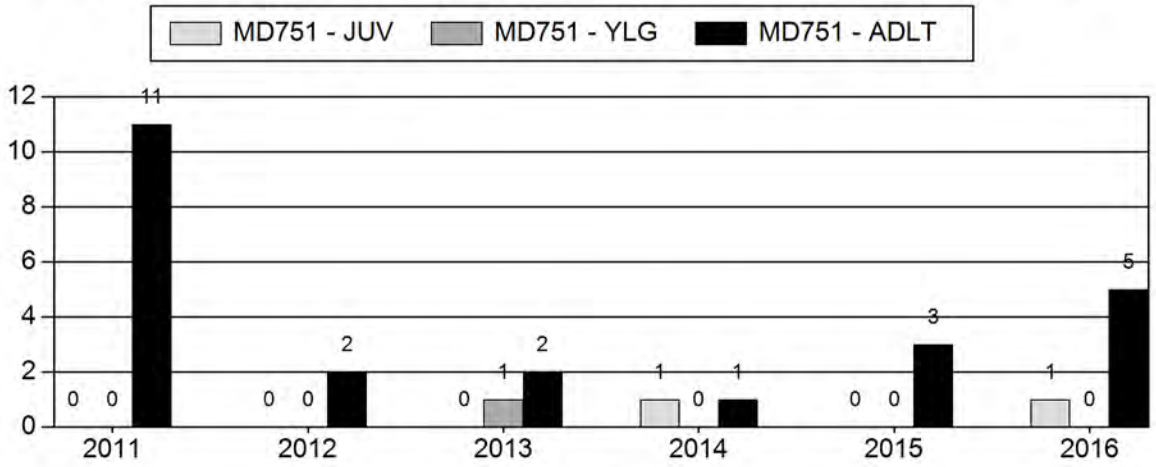
Age Structure of Field Checked Males



Age Structure Data (Field and Laboratory) - Male



Age Structure Data (Field and Laboratory) - Female



2011 - 2016 Postseason Classification **S**ummary

for Mule Deer Herd MD751 - BLACK HILLS

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	18,651	41	0	0	0	76	117	10%	658	56%	406	34%	1,181	1,118	6	12	18	± 2	62	± 5	52
2012	19,505	58	0	0	0	70	128	8%	787	52%	596	39%	1,511	1,553	7	9	16	± 2	76	± 5	65
2013	22,073	71	0	0	0	62	133	11%	634	50%	499	39%	1,266	1,714	11	10	21	± 2	79	± 6	65
2014	27,220	98	0	0	0	113	211	11%	880	45%	847	44%	1,938	2,466	11	13	24	± 2	96	± 6	78
2015	28,553	158	90	16	0	9	273	14%	939	48%	746	38%	1,958	1,812	17	12	29	± 2	79	± 5	62
2016	31,829	182	183	32	0	0	397	17%	1,113	49%	762	34%	2,272	1,467	16	19	36	± 3	68	± 4	50

2017 HUNTING SEASONS
BLACK HILLS MULE DEER HERD (MD751)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	License	Limitations
1		Nov. 1	Nov. 20		General	Antlered mule deer off private land; any mule deer on private land
1	7	Nov. 1	Nov. 20	200	Limited quota	Doe or fawn valid on private land
2		Nov. 1	Nov. 30		General	Antlered deer off private land; any deer on private land
2	6	Nov. 1	Nov. 30	500	Limited quota	Doe or fawn valid on private land
3		Nov. 1	Nov. 30		General	Antlered deer off private land; any deer on private land
4		Nov. 1	Nov. 20		General	Antlered deer off private land; any deer on private land except the lands of the State of Wyoming's Ranch A property shall be closed
4	6	Nov. 1	Nov. 20	300	Limited quota	Doe or fawn valid on private land
5		Nov. 1	Nov. 20		General	Antlered deer off private land; any deer on private land
5	6	Nov. 1	Nov. 20	150	Limited quota	Doe or fawn
6		Nov. 1	Nov. 20		General	Antlered deer off private land; any deer on private land
Archery		Sep. 1	Sep. 30			Refer to license type and limitations in Section 2

Region A Nonresident Quota: 4,500

SUMMARY OF CHANGES IN LICENSE NUMBER

Hunt Area	License Type	Quota change from 2016
Herd Unit Totals	**6**	none
	7	+100
	Region A	none

Management Evaluation
Current Postseason Population Management Objective: 30,000
Management Strategy: Recreational
2016 Postseason Population Estimate: ~ 31,800
2017 Proposed Postseason Population Estimate: ~ 31,200
2016 Hunter Satisfaction[1]: 83% Satisfied 12% Neutral 6% Dissatisfied

HERD UNIT ISSUES: In 2015, the management objective of the Black Hills Mule Deer Herd Unit was revised to a post-season population of 30,000 mule deer. Prior to this revision, an objective of 20,000 had been in place since 1986. The herd continues to be managed under the Department's "Recreational Management Strategy," which calls for 20 to 29 bucks per 100 does post-season.

The Black Hills mule deer herd unit encompasses 3,181 mi^2 of occupied habitat**.** Approximately 76% of the land in the herd unit is privately owned. Significant blocks of accessible public land are found on the Black Hills National Forest in Hunt Area (HA) 2 and HA 4, and on the Thunder Basin National Grassland in HA 6. A block of BLM land with a couple of access points is also present in HA 1. Because the majority of private landowners charge access fees for hunting and given the timing of the Black Hills deer season, these parcels of public land receive much greater hunting pressure than private lands and are some of the most heavily hunted in the State.

Historically, management of this mule deer herd has been a derivative of managing the Black Hills White-Tailed Deer Herd, as hunting seasons have been primarily structured to address the white-tailed deer population - although this has changed somewhat in recent years. As with many of the herd units in the eastern half of Wyoming, the Game & Fish Department has tried to maintain deer numbers at levels acceptable to landowners. In the case of these two deer herds, landowners typically feel saturated with white-tailed deer before mule deer become a problem.

White-tailed deer are the more numerous deer species in HA's 2 and 4, whereas more equal proportions or greater numbers of mule deer occupy HA's 1, 3, 5, and 6, depending upon habitat type. The vast majority of mule deer in the herd unit reside on private land. This results in their management being strongly influenced by landowner sentiments. Field personnel report mule deer numbers continue to improve and are near tolerance levels in some locations; but many landowners, especially those near Newcastle, desire to see more mule deer.

WEATHER: The second half of the last decade saw a transition from persistent drought to decent growing season moisture, while about average winter conditions persisted most years. This mule deer population peaked during that time and then began to decline. The weather may have contributed to the decline as peak populations coincided with the last two years of an eight year drought, sending high populations into poor forage winters. This resulted in some detected mortality in late winter and early spring, most notably during the 2010-11 winter, which was harsh. More recently, severe drought plagued the Black Hills throughout 2012, and a class III drought beset the much of the herd unit during the primary growing season in 2016. Both of these transient droughts resulted in very poor forage production and led to several large wildfires. However, the inter-drought period provided growing seasons with temperatures and

[1] Rounding combined values results in total over 100%

rainfall generally above average. This resulted in good to excellent forage growth from 2013 through 2015. Fall and winter weather over that same timeframe was characterized by normal to above average temperatures and average to below normal precipitation. However, coming on the heels of the 2016 drought, more normal to severe winter weather was again experienced. See http://www.ncdc.noaa.gov/cag/ for detailed weather information.

Based upon weather, habitat conditions and deer numbers, it is likely mule deer entered the 2014-15 and 2015-16 winters in good to excellent condition. In addition, winter weather those years resulted in excellent over-winter survival, as indicated by very robust post-season yearling buck ratios in 2015 and 2016. The changes witnessed in bio-years 2014 & 2015 were a reversal of what had been experienced as this herd declined between 2007 and 2011, and then remained suppressed in 2012. However, with drought last summer and more severe weather this winter, it is likely improvements in this herd's performance may have come to a temporary end.

HABITAT: Ponderosa pine (*Pinus ponderosa*) is the dominant overstory species on forested lands. Quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and bur oak (*Quercus macrocarpa*) stands are also present. Important shrubs include big sagebrush and silver sage (*Artemesia spp.*), Saskatoon serviceberry (*Amelanchier alnifolia*), Oregon grape (*Berberis repens*), common chokecherry (*Prunus virginiana*), wild spiraea (*Spiraea betulifolia*), and true mountain mahogany (*Cercocarpus montanus*). Many non-timbered lands in the herd unit are dominated by sagebrush or are used to produce agricultural crops such as winter wheat (*Triticum aestivum*), alfalfa hay (*Medicago sativa*), and grass hay.

Currently, no quantification of mule deer habitat quality or quantity is being conducted within this herd unit. A single true mountain mahogany and two bur oak production and utilization transects were established in the past. The true mountain mahogany transect is located on mule deer transitional and winter range typical of the southern Black Hills, and the bur oak transects are in winter range more typical of white-tailed deer habitat in the northern hills. While little habitat data have been collected, it appears past drought conditions negatively affected shrub production, and peak mule deer numbers several years ago may have exceeded what the forage conditions could sustain given the lack of precipitation at the time. Bio-years 2013 through 2015 resulted in excellent forage production, and browse availability on winter and transitional ranges appeared to be generally good to excellent. However, during the present bio-year (2016), forage conditions were fair to poor in most locations, and winter use subsequently high.

FIELD DATA: Between 2009 and 2011, fawn productivity and survival were suppressed (mean post-season fawn:doe ratio = 65:100, std. dev.=3). In 2012, this situation reversed itself as the observed fawn:doe ratio improved to 76:100. Then between 2013 and 2015 it averaged 85:100, peaking at 96:100 in 2014, before falling to 68:100 in 2016. Consequently, this population has increased significantly since 2012. Because a post-season ratio of 66 fawns per 100 does is thought to be the level necessary to sustain hunted mule deer populations, the population decline experienced between 2006 and 2011 was likely due initially to increased harvest rates and a drop in over-winter survival, while increased non-hunting mortality augmented the decline after 2008. This same period witnessed a 75% decline in preseason trend counts (Figure 1). With better fawn production and survival since 2012, this population has grown steadily, something also reflected in trend counts.

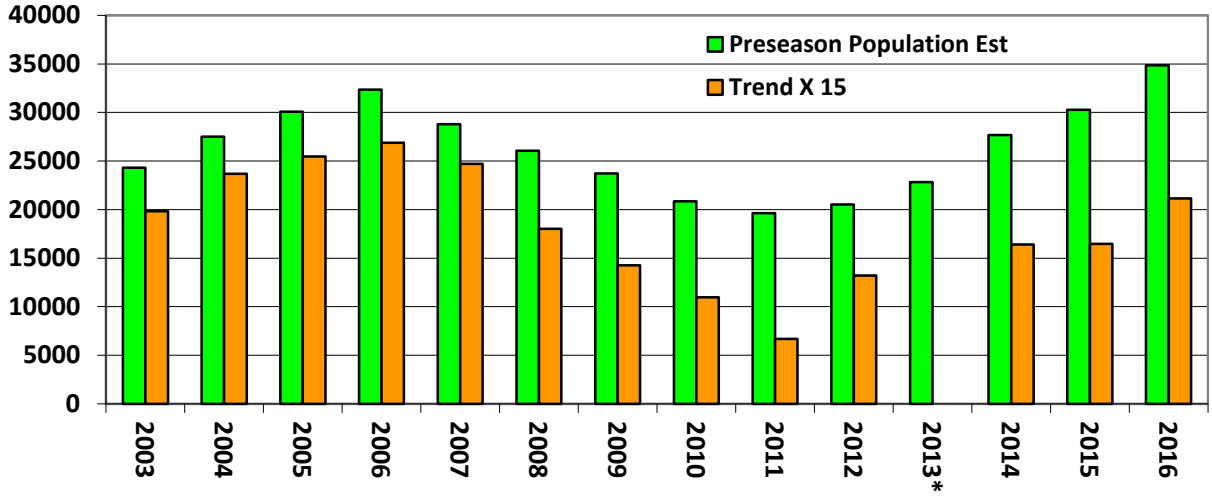


Figure 1. 2003 – 2016 pre-season population estimates produced by the current TSJ CA model, and mule deer observed preseason along trend count routes (increased by a factor of 15). ** Trend counts were not conducted in 2013 due to winter storm Atlas.*

As this population declined, so did post-season buck:doe ratios, averaging 17:100 (std. dev.=1) between 2008 and 2012. With better fawn production and survival since 2012, yearling buck numbers have improved, driving an increase in the total observed buck:doe ratio from 16:100 in 2012 to 36:100 in 2016. However, adult buck:doe ratios observed during this time period remained fairly constant around 13:100 (std. dev.=4), but did jump to 19:100 in 2016 thanks to a strong class of two-year old bucks. Over the past five years, post-season buck:doe ratios have averaged 25:100 with variability (std. dev.= 7.5) due to increasing numbers of yearling bucks entering the population. As such, this herd has improved from exhibiting buck:doe ratios below the Department's minimum management criteria for recreational hunting to exceeding its upper end. Provided non-hunting mortality does not increase significantly and fawn survival is about average, we anticipate the 2017 hunting season will reduce this herd's buck:doe ratio to near the midrange of the Department's recreational management criteria.

HARVEST DATA: Deer hunting seasons in the Black Hills have been traditionally structured to address white-tailed deer management. Consequently, harvest of mule deer bucks has been generally managed by balancing white-tailed deer seasons and landowner tolerance for deer (both species) with recreational opportunity, whereas antlerless harvest has been regulated more through doe/fawn license issuance. An analysis of historic general license harvest information shows the number of hunters in the field pursuing bucks has the greatest impact on total harvest. As such, buck harvest has been regulated by altering non-resident hunter numbers via changes in the Region A quota, while resident buck hunter participation can only be limited by shortening the season – notably by inclusion or removal of the Thanksgiving Day weekend and the days following in November. Department surveys and contacts with non-resident hunters indicate most non-residents want to harvest mule deer. This fact, combined with a hunting season that targets bucks during the rut, results in very heavy hunting pressure on buck mule deer. Considering this and the drop in total buck numbers between 2007 and 2011, it was prudent to substantially limit harvest of buck mule deer through 2014. We are now on the heels of five years of overall good fawn production and survival and our current level of mule deer harvest

can likely be sustained in 2017, even with lower fawn:doe ratios and increased winter mortality in bio-year 2016.

With conservative hunting season structures in place between 2010 and 2014, mule deer harvest dropped about 40% from the level experienced when this population peaked, although reported harvest increased substantially in 2014 without concomitant increases in license issuance.[2] In 2015, Region A license issuance was liberalized some 27%, doe/fawn license issuance more than doubled, and HA's 2 and 3 returned to 30-day seasons. As a result, reported harvest climbed 19%. License issuance was again significantly liberalized in 2016, and total harvest increased another 25%.

Overall, hunting seasons between 2010 and 2014 reduced harvest of mule deer bucks about 37% from that experienced during the immediately preceding 5-year period with the traditional 30-day November season north of I-90. Comparing these same time periods, resident harvest of mule deer bucks dropped a bit more than 20%, while non-resident harvest of mule deer bucks dropped closer to 50%. During this period of conservative season structures, harvest of white-tailed deer bucks declined less (see 2015, WD706). As a result, post-season mule deer buck:doe ratios held fairly stable and then began to improve. Meanwhile, hunter satisfaction remained basically unchanged between 2011 and 2013, with about 68% of hunters of both deer species reporting they were either satisfied or very satisfied with their Black Hills deer hunt. Satisfaction measures then improved in 2014 with 75% of both mule deer and white-tailed deer hunters reporting they were satisfied with their Black Hills deer hunt. Hunter satisfaction increased again in 2015, with just over 80% of both mule deer and white-tailed deer hunters reporting they were satisfied, and about 7% or less reporting dissatisfaction. Hunter satisfaction climbed another couple percentage points in 2016. It can be inferred that steady increases in deer hunter success and declines in the effort required to harvest a deer since 2013 have strongly influenced changes in hunter satisfaction.

POPULATION: Population modeling of this herd has always been difficult. The population violates the closed population assumption due to significant interstate movement of deer combined with interchange between adjacent mule deer herds in Wyoming. In addition, changes in doe harvest rates, outbreaks of EHDV, possible adenovirus mortalities, substantial predation, a high level of vehicle-deer collisions, occasional severe weather events, and inadequate classification sample sizes at times make constructing a reliable population model questionable at best. In 2014, the spreadsheet model for this herd was reconstructed and re-initiated after correcting errors detected in the previous model. Model choice for this herd has changed each of the past couple of years and did so again in 2016, when the Time Sensitive Juvenile, Constant Adult (TSJ, CA) model was chosen over competing models (see explanation below).

The 2016 modeled, post-season population estimate of Black Hills mule deer is about 31,800. However, this value may be somewhat inflated due to significantly increased reported harvest in 2014 without commensurate changes in season structure or perceived population size. With the 2016 change in model selection and updated data, the population is now projected to have peaked in 2006 at an estimated postseason population of around 28,800 mule deer (versus the 36,000 reported for that year in 2015), and then declined to near 18,100 in 2011 (versus 16,500

[2] 2014 harvest survey statistics indicate mule deer buck harvest increased about 36% in 2014, something that appears very incongruent with no significant changes in hunter number or season structure given population trends and field observations.

reported in 2015). It is then estimated to have begun to rebound, growing about 76% into post-season 2016. Because the models we use to simulate populations produce the most unreliable estimates in the first and last few years of model construction, we question whether this population has grown as much as indicated over the past three or four years. This is asserted because recent trend counts are below those found in years contained in the middle of the model at a time when this population is projected to have been at a similar level (Figure 1). At any rate, this herd has definitely rebounded after a substantial decline and is projected to level off or decline some in 2017.

As mentioned above, population modeling of this herd is difficult; and use of the Time Sensitive Juvenile / Constant Adult (TSJ CA) model this year was reinstated, replacing the Semi Constant Juvenile / Semi Constant Adult (SCJ SCA) model used in 2015. This was done because both models exhibited AICc values within about 20% of each other, and when the data are only modeled through actual data (2016), the TSJ CA model had a slightly lower AICc. Both models are well correlated with preseason trend counts since 2006 (SCJ SCA ~88% and TSJ CA ~84%), but the TSJ CA model fits observed buck:doe ratio data substantially better. Additionally, the TSJ CA model seems to more accurately reflect perceived population changes, and provides for a leveling off or decline into 2017 as is expected. Plus, it does not reach the upper constraint on adult survival (0.9) that the SCJ SCA model does in all years not constrained. The TSJ CA model instead produces a more reasonable adult survival rate of 0.852 and an average juvenile survival rate of 62%, which is slightly higher than that of 57% produced by the SCJ SCA model. Overall, we consider the selected model to be of fair to poor quality due to the lack of herd specific survival data, violations of the closed population assumption, below adequate classification in some years, and aerial classifications in terrain that makes classifying yearling bucks difficult at times.

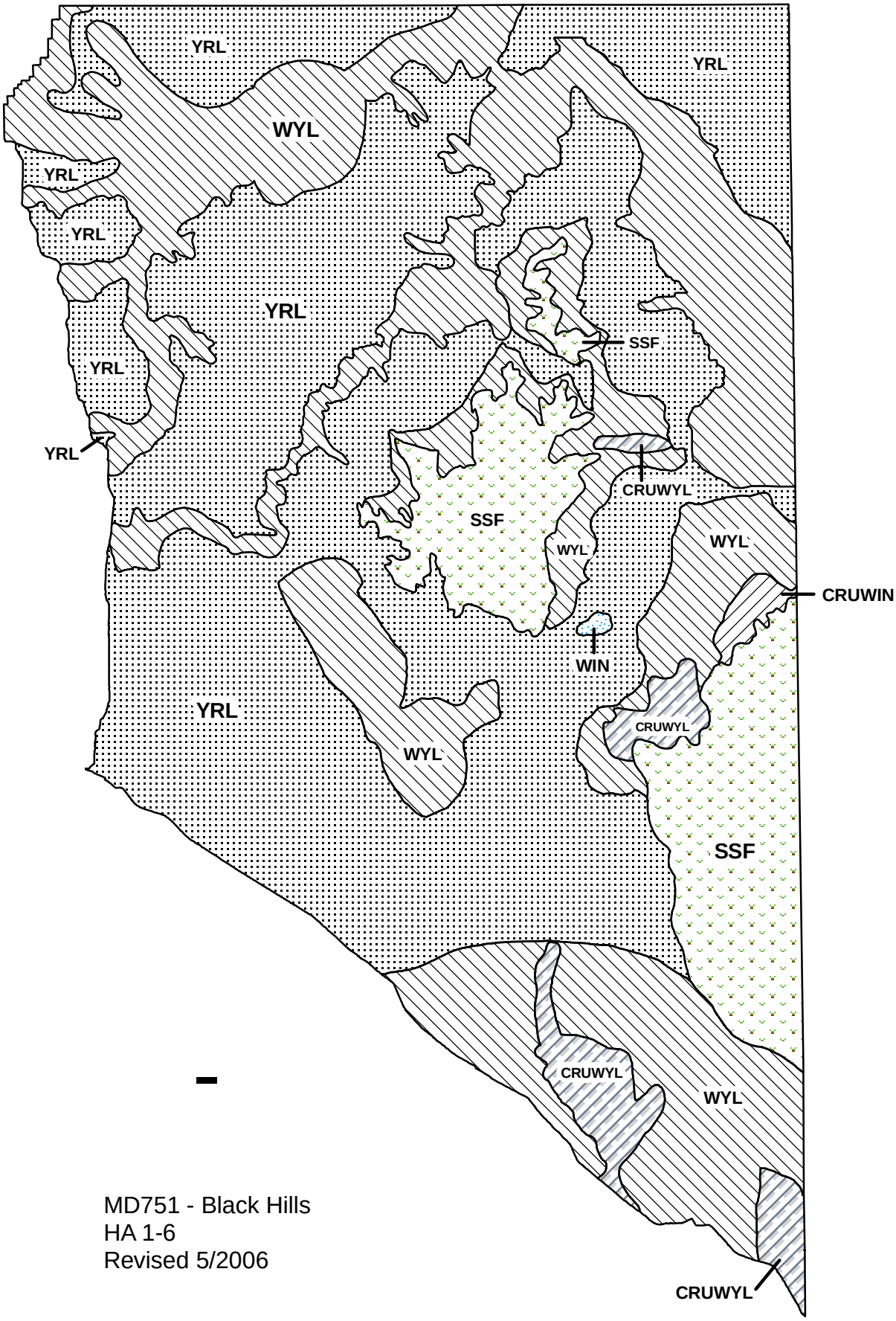
MANAGEMENT SUMMARY: The spreadsheet model used for the herd suggests it is near its management objective of 30,000 mule deer. If the herd actually numbers close to 30,000 mule deer post-season, then the current objective may be below some landowner's and hunter wishes, especially south of I-90. Based upon habitat conditions, the desires of hunters, and landowner sentiments a season designed to allow this herd stabilize or decline slightly is warranted at this time. Therefore, the 2017 hunting season is designed to maintain buck hunting opportunity and harvest of antlerless deer essentially commensurate with 2016 levels. This prescription should keep buck:doe ratios in the mid-range of recreational management range and result in a stabile or slightly declining population given the forage conditions and winter weather experienced.

Buck mule deer numbers have substantially improved in this herd unit in recent years. Based upon classification data and population estimates, there should be strong cohorts of 2, 3 and even some 4 year-old bucks available for hunters in 2017, while older bucks will be harder to come by. As such, it seems reasonable to maintain buck harvest, something that attracts more hunters into the area, many of whom will harvest both mule deer and whitetail does, which is needed to slow the growth of both populations. The 2017 hunting season should again result in a mule deer buck harvest about 80% above that witnessed with very conservative hunting seasons in place when this population hit is last nadir.

Issuance of Type 7 doe/fawn tags has been increased slightly in HA 1, while other doe/fawn license types valid for mule deer in this herd unit have not changed. Type 6 & 7 doe/fawn license issuance will enable landowners to control deer of either species. Because we believe

resident general license hunter numbers will not change significantly in 2017 and most non-residents don't harvest antlerless deer on their Region A License, it is anticipated doe/fawn harvest on general licenses will not change much. Overall, we believe antlerless mule deer harvest will increase about 30 to 50 deer above 2016 levels given changes in doe/fawn license numbers. The relatively low level of female and juvenile mule deer harvest (less than 3%) does not warrant complicating the regulations further by segregating mule deer and white-tailed deer harvest more than we already have on general licenses.

The 2017 hunting season is expected to yield a postseason population of about 31,200 mule deer, which represents about a 2% drop in the post-season population. Such a change in the population will keep this herd within 4% of objective.



MD751 - Black Hills
HA 1-6
Revised 5/2006

2016 - JCR Evaluation Form

SPECIES: Mule Deer | PERIOD: 6/1/2016 - 5/31/2017

HERD: MD755 - NORTH CONVERSE

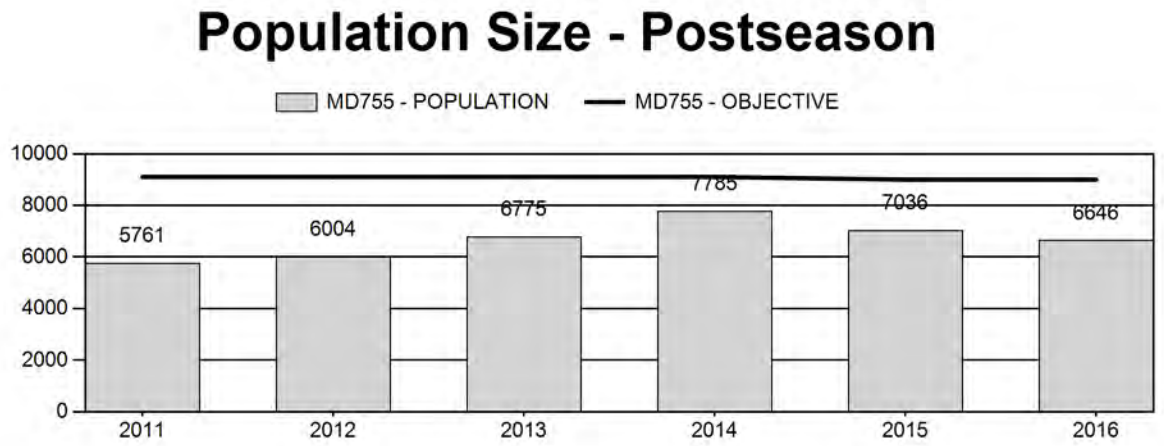
HUNT AREAS: 22 | PREPARED BY: WILLOW STEEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	6,672	6,646	7,151
Harvest:	371	213	215
Hunters:	500	247	150
Hunter Success:	74%	86%	143 %
Active Licenses:	523	247	150
Active License Success:	71%	86%	143 %
Recreation Days:	1,955	844	860
Days Per Animal:	5.3	4.0	4
Males per 100 Females	36	37	
Juveniles per 100 Females	78	67	

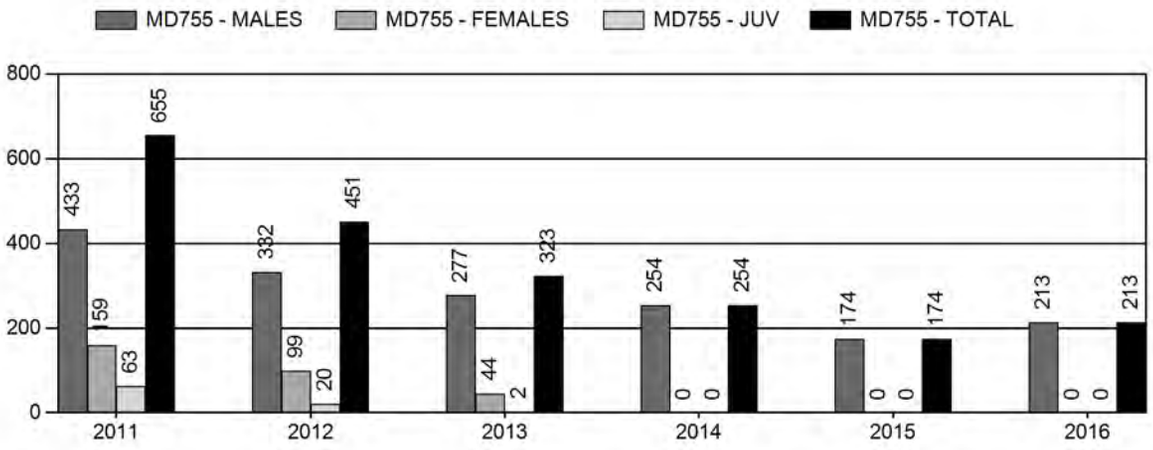
Population Objective (± 20%) :	9000 (7200 - 10800)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-26.2%
Number of years population has been + or - objective in recent trend:	6
Model Date:	02/16/2017

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

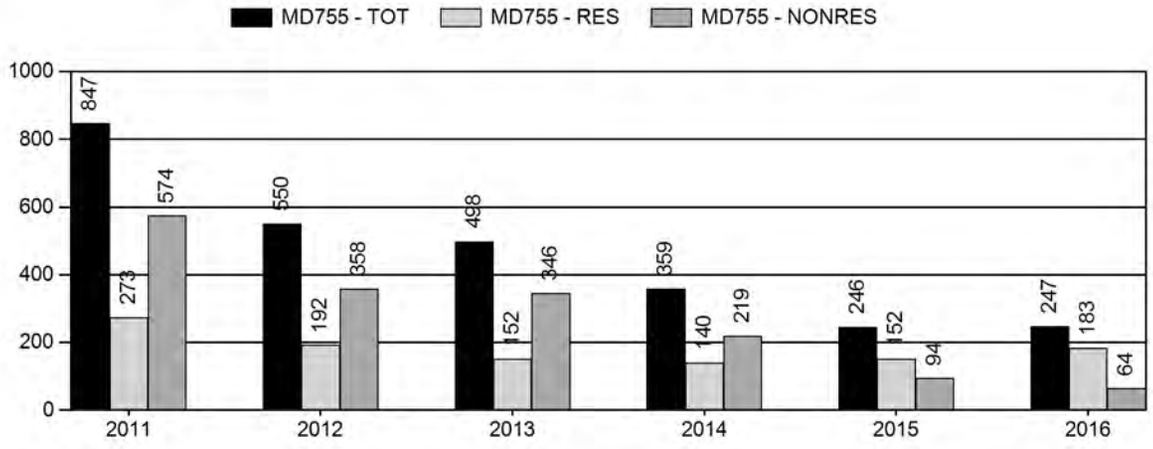
	JCR Year	Proposed
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	14%	15%
Total:	14%	15%
Proposed change in post-season population:	-14%	-15%



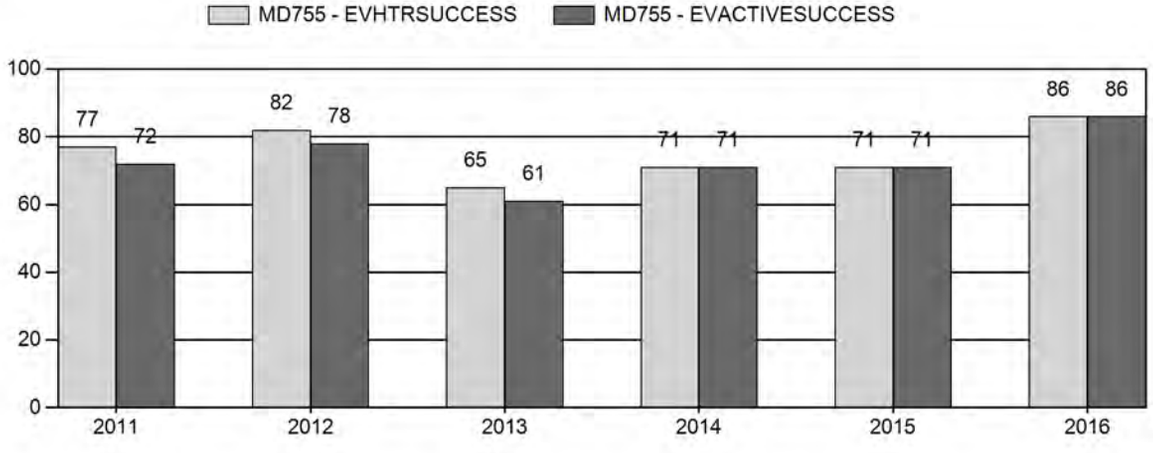
Harvest



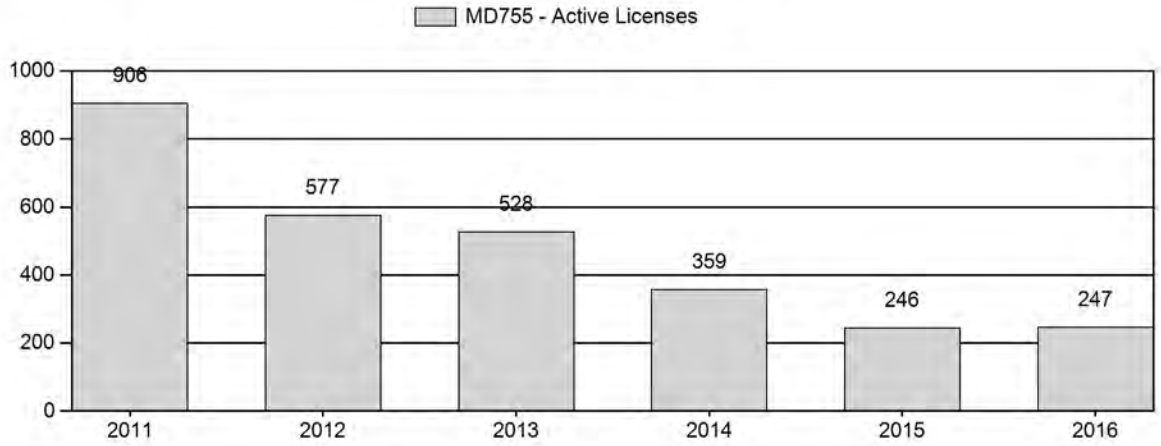
Number of Active Licenses



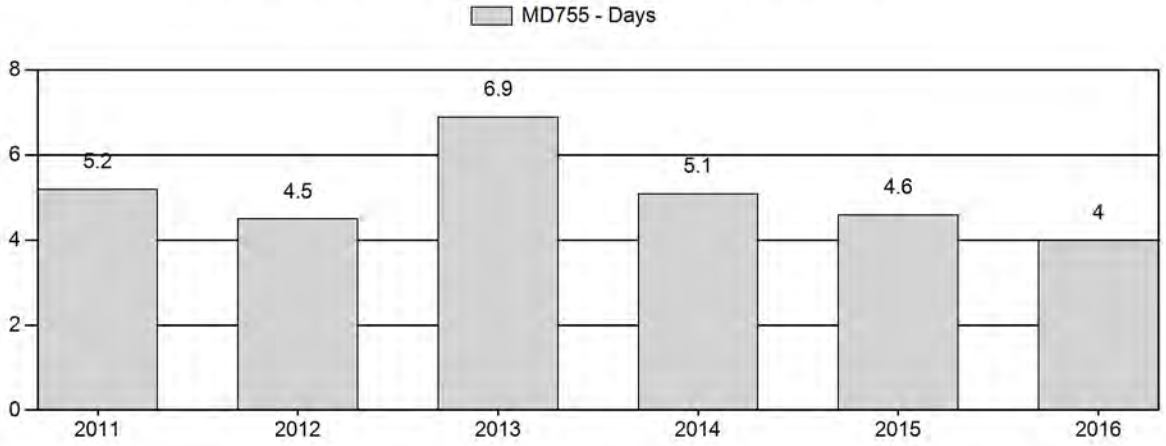
Harvest Success



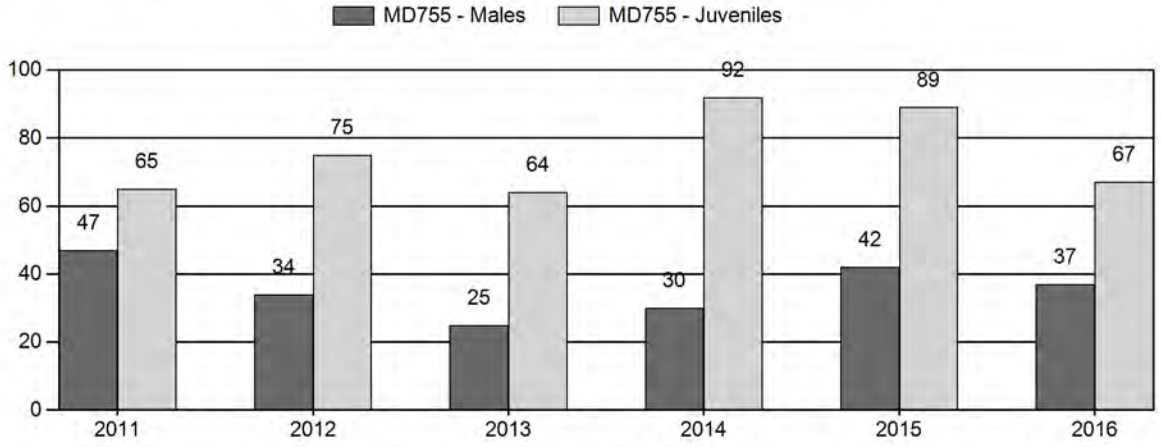
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2011 - 2016 Postseason Classification Summary

for Mule Deer Herd MD755 - NORTH CONVERSE

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	5,761	26	0	0	0	94	120	22%	257	47%	166	31%	543	1,276	10	37	47	± 6	65	± 8	44
2012	6,004	23	0	0	0	44	67	16%	198	48%	149	36%	414	1,216	12	22	34	± 6	75	± 10	56
2013	6,775	30	0	0	0	39	69	13%	275	53%	176	34%	520	1,095	11	14	25	± 4	64	± 8	51
2014	7,785	23	26	14	3	0	66	14%	220	45%	202	41%	488	1,936	10	20	30	± 5	92	± 11	71
2015	7,036	65	54	35	10	0	164	18%	393	43%	351	39%	908	1,858	17	25	42	± 5	89	± 8	63
2016	6,646	37	42	24	2	14	119	18%	324	49%	217	33%	660	1,224	11	25	37	± 5	67	± 7	49

2017 HUNTING SEASONS
NORTH CONVERSE MULE DEER HERD (MD755)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
22	1	Oct. 1	Oct. 14	300	Limited quota	Antlered mule deer or any white-tailed deer
Archery		Sep. 1	Sep. 30			Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2015
22	1	No Changes

Management Evaluation
Current Postseason Population Management Objective: 9,000
Management Strategy: Special
2016 Postseason Population Estimate: ~6,600
2017 Proposed Postseason Population Estimate: ~7,200
2016 Hunter Satisfaction: 95% Satisfied, 5% Neutral, 0% Dissatisfied

Herd Unit Issues

The North Converse Mule Deer herd has a postseason population objective of 9,000 mule deer and is managed under the special management strategy, with a goal of maintaining postseason buck ratios between 30-45 bucks per 100 does. The objective and management strategy were last revised in 2015.

Public hunting access within the herd unit is poor, with only small tracts of accessible public land interspersed with predominantly private lands. High trespass fees and outfitting for mule deer are common on most ranches within this herd unit. Primary land uses in this area include extensive oil and gas production, large-scale industrial wind generation, In-situ uranium production, and traditional cattle and sheep grazing. In recent years, expansion of oil shale development has dramatically escalated anthropogenic disturbance throughout this herd unit.

Weather

Above average precipitation was received during the early part of the growing season in 2016, leading to good early-season forage production. However, this was followed by hot and dry conditions beginning in June and continuing through the summer and into late fall. Above average precipitation in 2014 and 2015 contributed to increased fawn production and survival in those years. However, the 2016 fawn ratios showed a decrease in production for 2016 which may be a result of the relatively lower amount of precipitation received this year. The 2016-2017 winter has been moderate, with average precipitation and several extreme cold snaps. Snow

events and cold snaps were typically followed by warmer weather which exposed forage for wildlife. Therefore, mule deer likely experienced normal over-winter survival this year.

The most recent extreme weather event to cause over-winter mortality was in 2010/2011. Survival was impacted significantly enough that reduced survival values were used for modeling this population.

Habitat

There are no habitat transects in this herd unit due to the preponderance of private land. Habitat conditions are variable in this herd unit due to some past wildfires which have removed portions of sagebrush habitat. Habitat conditions were improved in recent years due to the above average precipitation which was needed to rejuvenate rangelands following the extreme drought of 2012. However, precipitation in 2016 was average, and therefore there was a noticeable reduction in forage production as compared to the past few years. Sagebrush plants are recruiting in some areas of this herd unit, which may lead to higher quality forage availability in the future.

Field Data

The total number of mule deer classified has steadily decreased in this herd unit as classification sample sizes have been difficult to meet since this herd has not been a budget priority. Given the potential level of oil and gas disturbance that may be forthcoming, managers prioritized this herd unit for aerial flights in 2015 and 2016 in order to collect more representative baseline pre-disturbance information. The bulk of aerial survey time was spent classifying mule deer along the Pine Ridge where limited road densities and difficult access preclude ground classifications. Classification efforts in 2016 resulted in 660 mule deer classified, although the sample size goal for 90% confidence was 1,200 mule deer.

Fawn production decreased from the previous 5-year average (77 per 100 does) in 2016 with a ratio of 67. This could be due to an overall decrease in precipitation resulting in relatively less forage than the previous few years, or due to a higher proportion of does being yearling and two-year old does in the population (from previous years' high fawn recruitment) reproducing at a lower rate. The previous years' fawn and yearling ratios were 89 and 17, respectively which are both high. Several consecutive years of average to above average fawn production and survival will be needed to continue trending toward the population objective.

The 2016 postseason buck ratio (37) was comparable to the previous 5-year average of 37 bucks per 100 does. Yearling buck ratios in 2017 (11) were also comparable to the previous 5-year average of 12 bucks per 100 does. The buck ratios are well within management criteria and 2017 license issuance should allow managers to continue to meet buck ratio goals.

Harvest

Overall harvest has declined in this herd unit as license issuance has decreased to address population decline, although this trend reversed in 2016. From 2011 to 2015, Type 1 quotas were reduced by 63% and buck harvest decreased by 60%. The 2015 harvest of 174 bucks was by far the lowest total deer harvest ever obtained in this herd unit. There were 213 bucks harvested during the 2016 season with 86.2% hunter success despite static license issuance. In 2016, it took

hunters an average of 4 days to harvest an animal, which is an improvement over the previous 5-year average of 5.3 Overall, 2016 harvest statistics suggest increased buck mule deer availability and improved hunting opportunity within this herd unit.

In 2016, 95% of hunters reported being either satisfied or very satisfied with their hunt, indicating a remarkably high level of satisfaction given the lack of public access and population decline. It should be noted that most hunters whom speak to Game and Fish personnel are advised to secure access on private land before purchasing a license in areas that have limited public access, or at least be aware of the limited availability of accessible public land.

Population

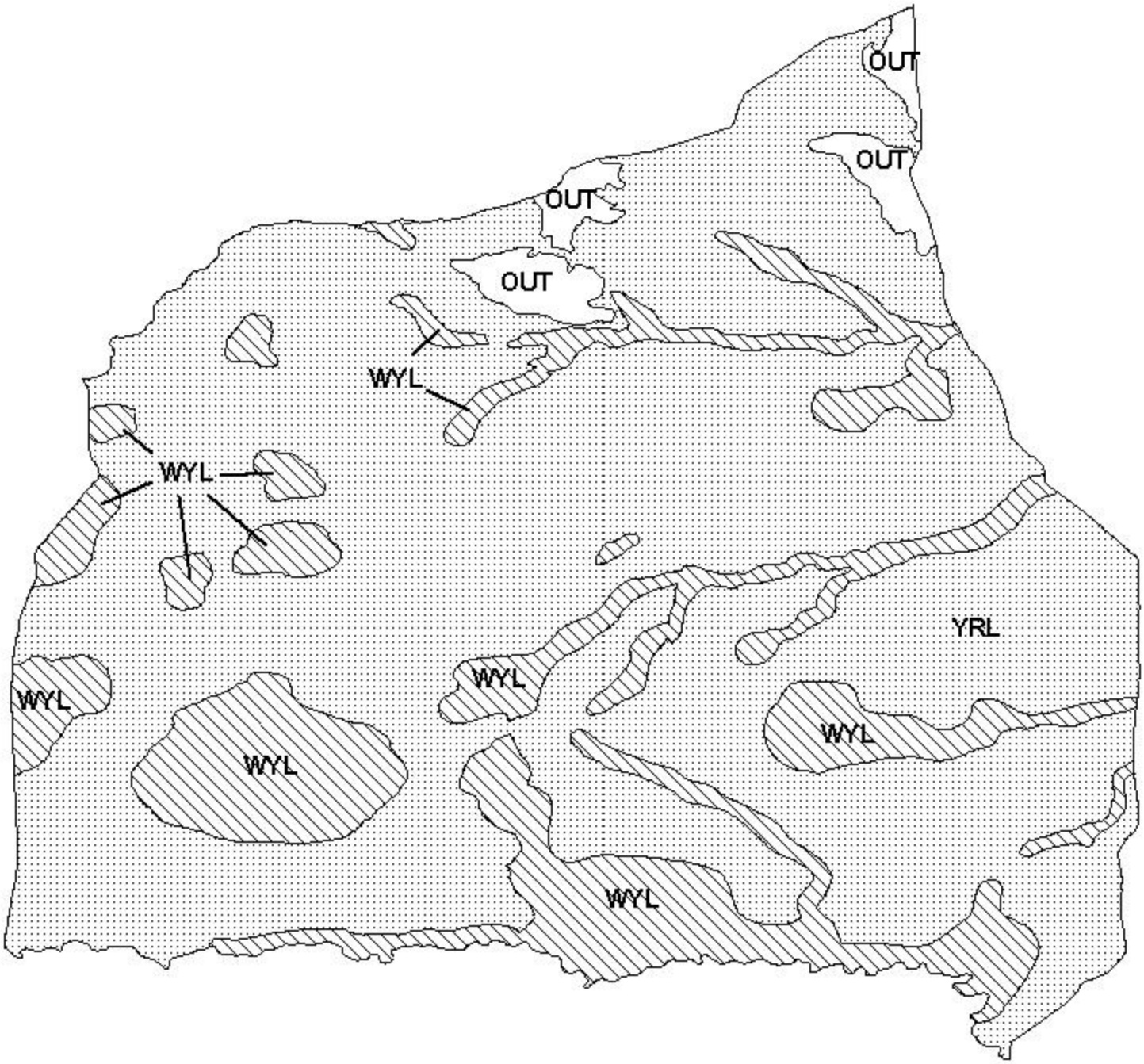
The 2016 postseason population estimate was about 6,600 mule deer. After population decline following substantial winter mortality in bio-year 2010, this herd is beginning to trend toward objective due to increased fawn production.

The "Semi-Constant Juvenile & Semi-Constant Adult Survival" (SCJ-SCA) spreadsheet model was chosen for the post-season population estimate of this herd. This model had a low relative AIC (65) and most accurately depicted population trend and size based on field personnel perceptions and landowner input. Adult survival was constrained between 0.5 and 0.7 for 2010 as a result of high winter mortality that year. This model is considered to be of fair quality based on model fit and simulated population trend. Given consistently inadequate classification sample sizes, observed buck ratios may not be accurate, rendering population estimates simulated by the model somewhat questionable.

Management Summary

The hunting season in this area has traditionally run from October 1st to October 14th. These season dates have generally been adequate to meet landowner desires while allowing a reasonable harvest. For 2017, the Department is maintaining the Type 1 quota at 300 licenses. The license reduction in previous years allowed buck ratios to increase back within special management criteria. Doe/fawn license issuance was considerable in past years, but was eliminated in 2014 due to population concerns. Continued conservative hunting season structure, including relatively low Type 1 license issuance and no doe/fawn licenses, is warranted until this population increases and more mature bucks are available for harvest. In this herd unit, the Department gives considerable deference to landowner input regarding mule deer management given the high percentage of private land. There is broad landowner support for current management direction.

If we attain the projected harvest of 215 bucks and experience normal fawn productivity, the predicted 2017 postseason population will likely increase slightly to 7,200 mule deer, which is 20% below objective.



Mule Deer (MD755) - North Converse
HA 22
Revised - 98

2016 - JCR Evaluation Form

SPECIES: Mule Deer | PERIOD: 6/1/2016 - 5/31/2017

HERD: MD756 - SOUTH CONVERSE

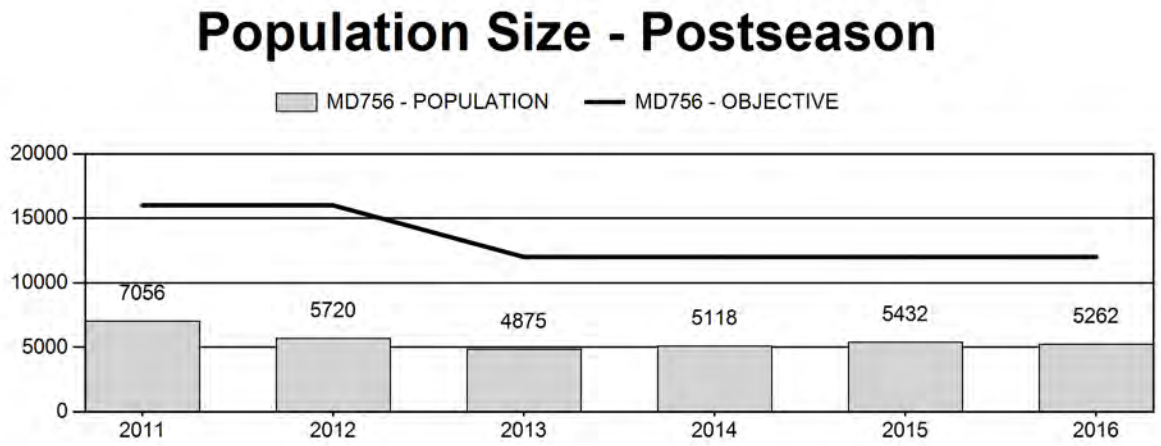
HUNT AREAS: 65 | PREPARED BY: WILLOW STEEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	5,640	5,262	5,935
Harvest:	280	285	300
Hunters:	763	730	750
Hunter Success:	37%	39%	40 %
Active Licenses:	763	730	750
Active License Success:	37%	39%	40 %
Recreation Days:	2,868	2,547	2,575
Days Per Animal:	10.2	8.9	8.6
Males per 100 Females	36	39	
Juveniles per 100 Females	60	55	

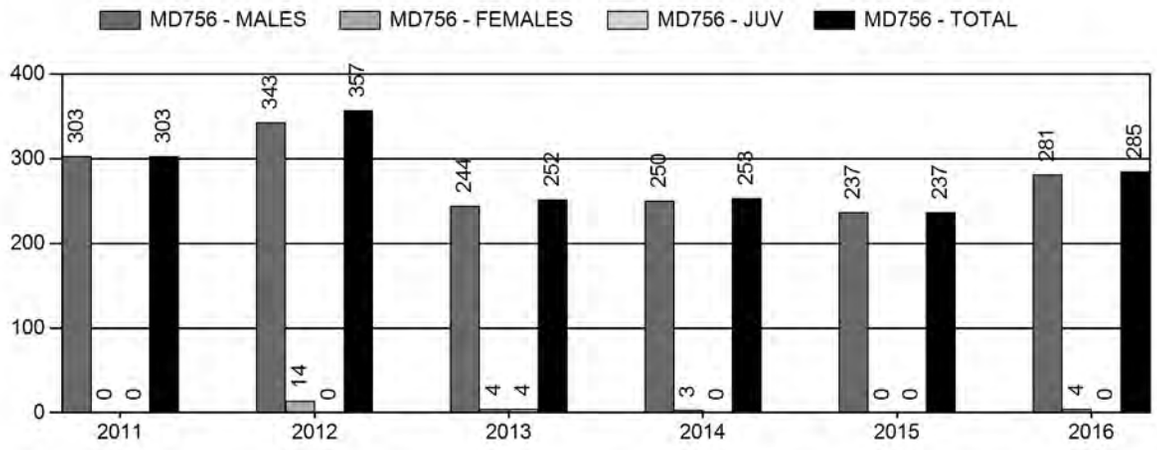
Population Objective (± 20%) :	12000 (9600 - 14400)
Management Strategy:	Private Land
Percent population is above (+) or below (-) objective:	-56.2%
Number of years population has been + or - objective in recent trend:	8
Model Date:	02/28/2017

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

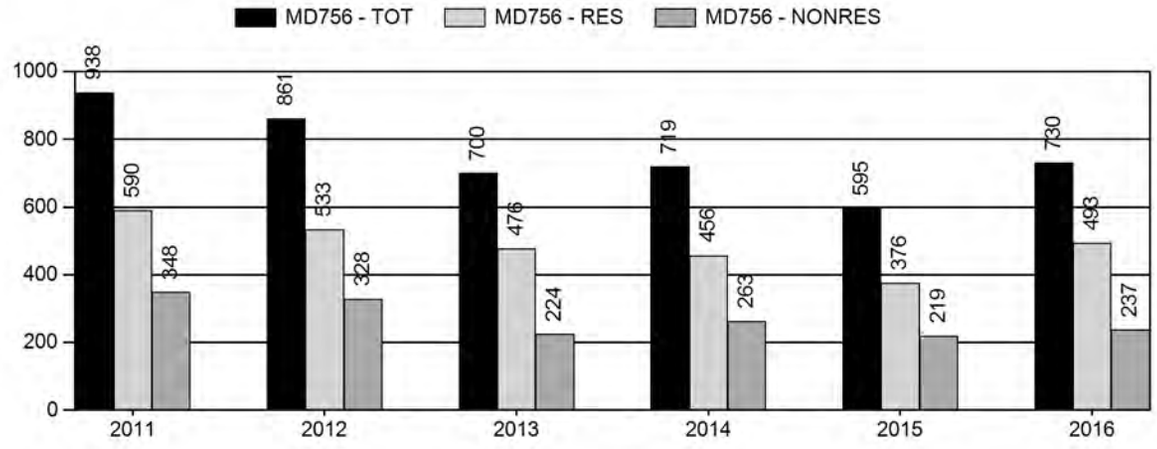
	JCR Year	Proposed
Females ≥ 1 year old:	0.0%	0%
Males ≥ 1 year old:	22.4%	22.0%
Total:	22.4%	22.0%
Proposed change in post-season population:	-5.6%	-5.4%



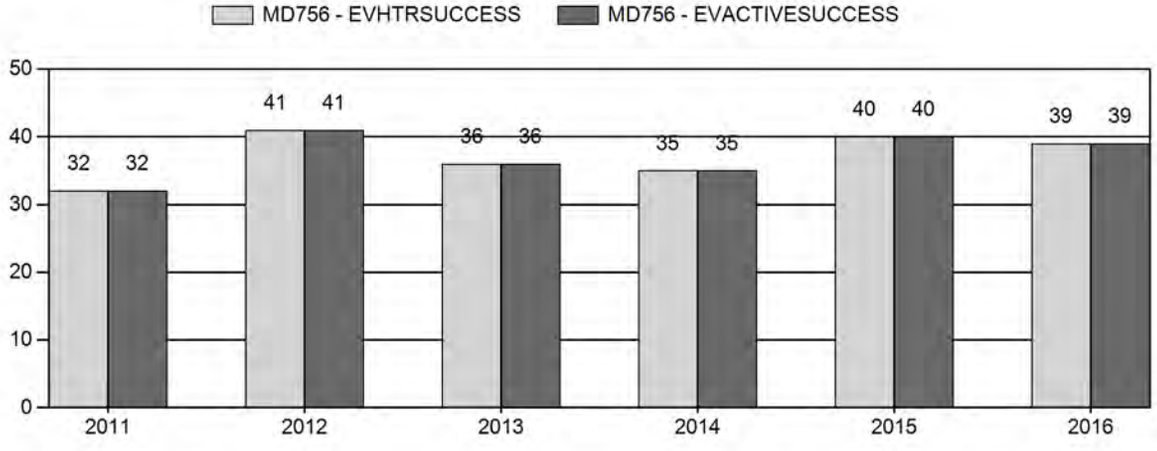
Harvest



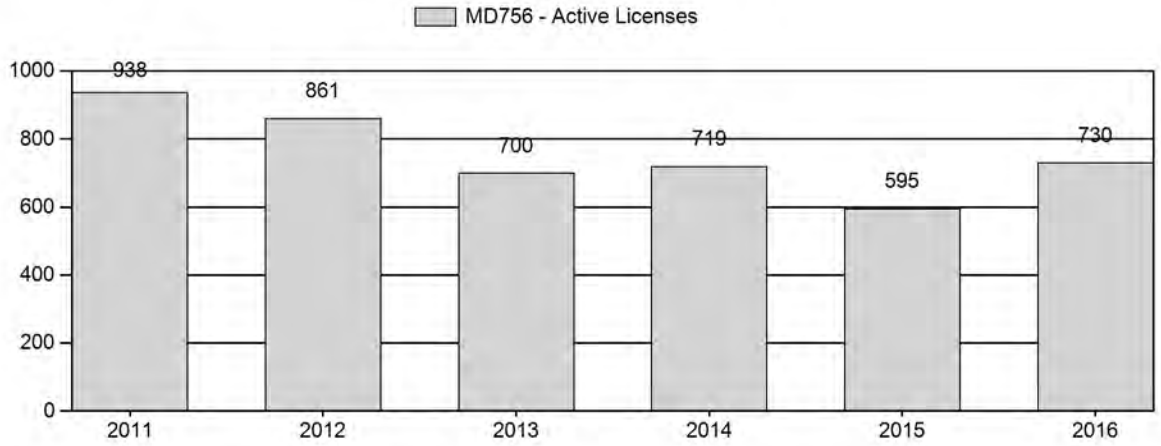
Number of Active Licenses



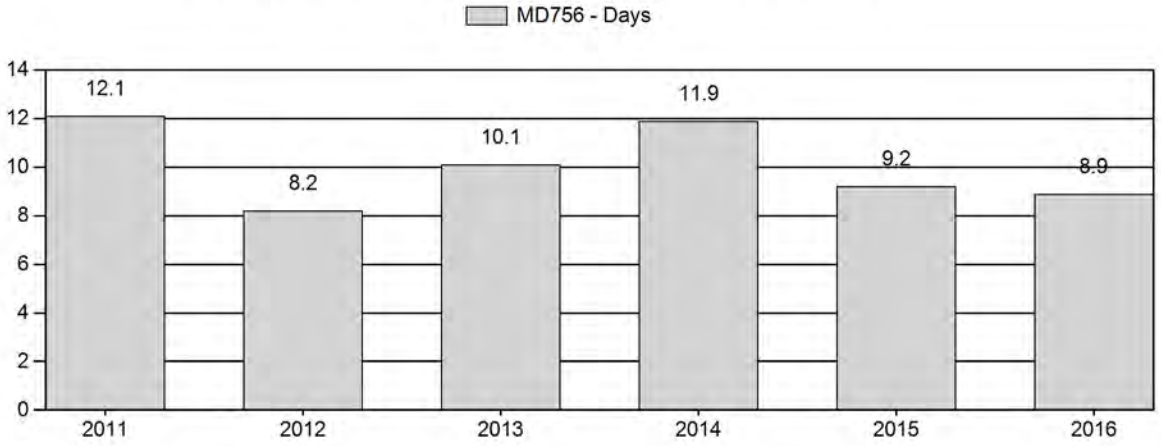
Harvest Success



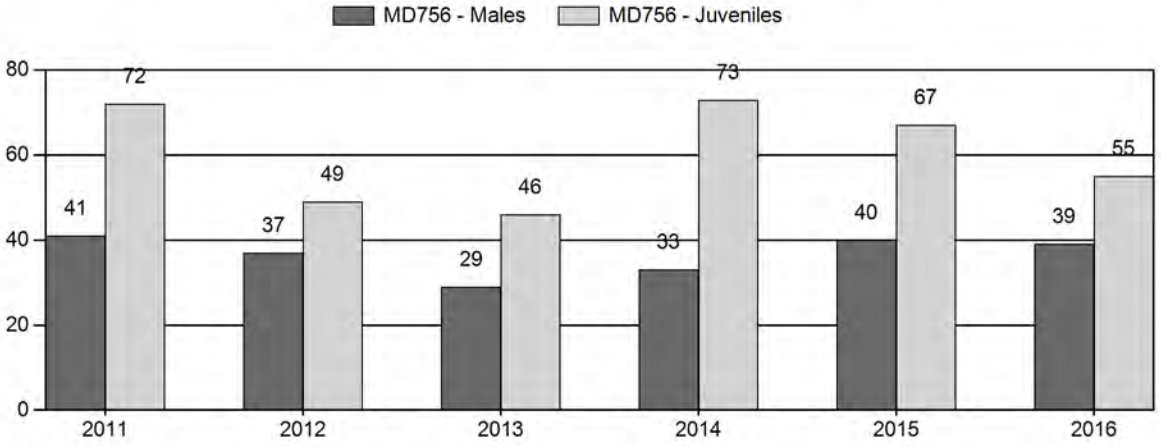
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2011 - 2016 Postseason Classification Summary

for Mule Deer Herd MD756 - SOUTH CONVERSE

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	7,056	83	99	57	11	0	250	19%	612	47%	441	34%	1,303	778	14	27	41	± 4	72	± 5	51
2012	5,720	111	124	36	20	0	291	20%	787	54%	385	26%	1,463	720	14	23	37	± 3	49	± 3	36
2013	4,875	64	65	17	8	0	154	17%	528	57%	245	26%	927	719	12	17	29	± 3	46	± 4	36
2014	5,118	30	56	24	19	0	129	16%	393	49%	286	35%	808	1,281	8	25	33	± 4	73	± 7	55
2015	5,432	81	68	29	7	0	185	19%	458	48%	308	32%	951	1,164	18	23	40	± 4	67	± 6	48
2016	5,262	137	176	70	20	0	403	20%	1,030	51%	568	28%	2,001	900	13	26	39	± 2	55	± 3	40

2017 HUNTING SEASONS
SOUTH CONVERSE MULE DEER (MD756)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
65		Oct. 15	Oct. 21		General	Antlered mule deer or any white-tailed deer
Archery		Sep. 1	Sep. 30			Refer to license types and limitations in Section 2

Management Evaluation

Current Management Objective: 12,000
Management Strategy: Private Land
2016 Postseason Population Estimate: ~ 5,300
2017 Proposed Postseason Population Estimate: ~ 5,900
2016 Hunter Satisfaction: 62% Satisfied, 21% Neutral, 17% Dissatisfied

The South Converse Mule Deer Herd Unit has a postseason population management objective of 12,000 deer. The herd is managed using a private land management strategy, as buck ratios are difficult to influence with hunting seasons as the majority of mule deer in this herd unit occupy private lands. The objective and management strategy were last revised in 2013.

Herd Unit Issues

Hunting access within the herd unit is marginal, with tracts of public land and national forest interspersed with predominantly private lands. The main land use is traditional ranching and grazing of livestock, with agricultural fields that have the potential for damage issues when big game are abundant. Doe/fawn licenses have historically been issued to address damage, but are not currently necessary for mule deer. Disease issues are a concern within this herd unit in particular, as the prevalence of Chronic Wasting Disease (CWD) is higher here than any other area in Wyoming or adjacent states. Research investigating population-level effects of CWD was concluded in 2014, with a published dissertation and additional publications pending (Devivo, 2015). Please refer to Appendix A of this report for further information regarding CWD and recently completed research in the South Converse Herd Unit. It should be noted that the CWD prevalence estimate derived from hunter-harvested mule deer in 2015 and 2016 were calculated from low sample sizes. The Department is exploring options for increasing CWD sampling for 2017.

Weather

Above average precipitation was received during the early part of the growing season in 2016, leading to good early-season forage production. However, this was followed by hot and dry conditions beginning in June and continuing through the summer and into late fall. Above average precipitation in 2014 and 2015 contributed to increased fawn production and survival in those years. However, the 2016 fawn ratios showed a decrease in production for 2016 which may be a result of the relatively lower amount of precipitation received this year. The 2016-2017 winter has been moderate, with average precipitation and several extreme cold snaps. Snow events and cold snaps were typically followed by warmer weather which exposed forage for wildlife. Therefore, mule deer likely experienced normal over-winter survival.

Habitat

Given average precipitation and informal assessments of habitat conditions throughout this herd unit, forage production and quality were moderate in 2016. A significant portion of mule deer habitat in this herd unit is comprised of decadent shrubs with lower palatability and available nutrition. The poor condition of these decadent shrub stands throughout the herd unit may be one of the primary limiting factors on this deer herd. In fall of 2015, the Department treated 310 acres of True Mountain Mahogany with the goal of rejuvenating stands in order to provide more nutritious forage for mule deer. An additional 1,400 acres of treatments are planned for implementation in the next few years.

Field Data

Fawn production/survival was moderate in this herd through the mid-2000's, and the population fluctuated between approximately 8,000 and 12,000 deer during this time period. The general license season during this time period was 11 days (except in 2008 when it was extended to 17 days), and issuance of doe/fawn licenses ranged from 50 to 400 licenses. From 2008-2013, fawn production/survival was extremely poor, with fawn ratios averaging 50 per 100 does. The population has declined significantly since 2008 from approximately 8,000 to 5,000 deer. In accordance, the general license season was shortened to 7 days and doe/fawn licenses were diminished and subsequently eliminated from the 2011-2016 hunting seasons. In 2014 and 2015, fawn production improved (ratios of 73 and 67, respectively). The fawn ratio decreased to 55 in 2016. This could be due to the relatively lower amount of precipitation received in 2016, or the larger proportion of yearling and two-year old does not reproducing in the population as a result of higher fawn recruitment from the previous two years. Since 2013, the population has been trending upward, and the current model estimates a 2016 post-season population of 5,300 mule deer. In 2016, just over 2,000 deer were classified in this herd unit which is the highest sample size acquired since 1992 despite similar levels of effort in other years. The previous 10-year

average classification sample size was 1,074 deer. Although conditions in 2016 were ideal with high visibility, good snow cover, and calm conditions, the sample size supported field managers' perception that deer numbers have been increasing in recent years. Annual survival of mule deer has likely increased over the past three years due to improved habitat conditions, which is also contributing to population increase. Several more years of improved fawn production and survival will be needed for this herd to increase to objective.

While fawn production improved in this herd over the past two years, fawn ratios remain well below adjacent mule deer herds. From 2007 – 2016, postseason fawn ratios averaged 56 (per 100 does) in the South Converse Herd Unit. Over the same time frame, fawn ratios averaged 63 in the Bates Hole / Hat Six Herd (Hunt Area 66) and 64 in the Laramie Mountains Herd (Hunt Areas 59, 60, & 64). Such relatively low fawn production/survival in the South Converse Herd was thought to be partially attributed to the extraordinarily high prevalence of CWD. However, recently concluded research within this herd unit suggests neither fawn production nor recruitment were significantly affected in CWD-positive radio-marked adult females (DeVivo, 2015. Regardless, the high prevalence of CWD in this herd has the potential to reduce overall fawn production and recruitment over the long term as infected deer exhibit far lower survival rates than uninfected deer due to deaths from clinical CWD as well as increased vulnerability to predation, winter loss, vehicular strikes, etc. Although climatic and habitat conditions have the largest influence on the nutritional condition of does, and therefore fawn production and survival, long-term fawn production may be impacted in areas with high prevalence of CWD. Given diminished survival rates of marked CWD-positive deer in this study and model projections stemming from recent research, endemic CWD at current prevalence levels may contribute to substantial population decline over the long term.

Buck ratios within the South Converse Herd historically average in the 30s-40s. These ratios seem counterintuitive, as CWD research references higher prevalence in males than females (Farnsworth et al, 2005). Despite the general season structure, higher buck ratios in this unit are a function of limited access to hunting on private lands where minimal harvest pressure on bucks is typical. In 2013, the buck ratio dropped to a 15-year low of 29, but has since increased back to 39 bucks per 100 does in 2016. The yearling buck ratio was 18 in 2015 and 13 in 2016, indicating good recruitment from previous years, which may result in continued good availability of adult bucks in the population in the coming years despite endemic CWD.

Since 2008, bucks classified in the South Converse Mule Deer Herd Unit have been further categorized based on antler size. Classification efforts in 2016 resulted in antler classifications in line with the long-term average with 66% Class I (small), 26% Class II (medium), and 8% Class III (large) bucks.

Harvest Data

Harvest success was 39% in 2016, which is comparable to the previous 5-year average of 37%. Harvest success is not expected to improve in this herd unit until long-term fawn production/survival improves and enhances the growth rate of this herd. In 2016, there were 730 active licenses and 281 harvested bucks, which is also comparable to the previous 5-year average of 763 active licenses and 278 harvested bucks. While resident hunter numbers dropped in 2015 (376 in 2015 vs. the previous 5-year average of 539), resident hunters increased in 2016 to 493. The 2015 reduction in resident hunting pressure was attributed to fewer deer, reduced private land hunting permission, and some level of hunter self-regulation as many hunters have expressed dissatisfaction with availability of mule deer on the few parcels of publicly accessible land in the herd unit. In addition to poor population performance, such restricted hunting access contributes to relatively low harvest success rates in this herd unit. However, during the 2016 hunting season, many hunters conveyed their perception that there were more deer available as this population has modestly increased in recent years. Therefore, it appears that 2016 resulted in less hunter self-regulation.

Population

The 2016 postseason population estimate was approximately 5,300 mule deer. This population is beginning to recover from a long-term downward trend which began in the late 1990s. Population decline in this herd is thought to be a combination of multiple limiting factors including poor habitat condition, lower fawn productivity/survival, and high prevalence of CWD.

The "Semi-Constant Juvenile Survival – Semi-Constant Adult Survival" (SCJ,SCA) spreadsheet model was chosen for the postseason population estimate of this herd. Adult female survival estimates from the aforementioned CWD research conducted from 2010 to 2013 were between 0.65 and 0.73, which were very low relative to most published mule deer survival rates. Therefore, survival was constrained between these values for those years. Improved habitat conditions in recent years undoubtedly enhanced fawn survival from 2014-2016, therefore fawn survival was constrained between 0.75 and 0.9 for those years. AIC values between all 3 models were very similar, but the SCJ-SCA model produced the most plausible trend and population estimate. However, the model does estimate adult survival in years other than 2010-2013 to be quite high; much higher than survival estimates from the research study. The model also shows very low fawn survival. Managers believe fawn survival is most likely higher while adult survival is lower than model estimates. Therefore, this model is considered to be of fair quality.

Management Summary

Opening day for hunting the South Converse Mule Deer Herd Unit has traditionally been October 15th, with closing dates that have changed to offer greater or lesser opportunity depending on the management direction desired. In recent years, general licenses have been valid for antlered mule deer only. The 2017 hunting season will consist of a short, seven-day season with no doe/fawn licenses, as the population is considerably below objective.

If we attain the projected harvest of 300 bucks and fawn production remains average, this herd will likely remain relatively stable but low. The predicted 2017 postseason population size of the South Converse Herd is approximately 5,900 mule deer. Given poor habitat conditions may be limiting population growth with continual low fawn production/ recruitment, management goals for 2017 include maintaining a conservative hunting season framework to allow for population growth should environmental conditions allow. Future considerations for this herd may include implementing an antler point restriction and extending season length to provide more opportunity to harvest mature bucks. In addition, managers intend to implement prescriptive treatments in key habitats to benefit mule deer in this herd unit as opportunities arise.

Citations

DeVivo, Melia. Chronic Wasting Disease Ecology and Epidemiology of Mule Deer in Wyoming. Diss. University of Wyoming, 2015.

Farnsworth, M.L., L.L. Wolfe, N.T. Hobbs, K.P. Burnham, E.S. Williams, D.M. Theobald, M.M. Conner, & M.W. Miller. Human Land Use Influences Chronic Wasting Disease Prevalence in Mule Deer. Ecological Applications, 15(1): 119-126.

APPENDIX A

Chronic Wasting Disease in the South Converse Mule Deer Herd Unit: Prevalence and Management Concerns

The South Converse Mule Deer Herd Unit (Wyoming Hunt Area 65) has the highest prevalence of Chronic Wasting Disease (CWD) in Wyoming. High prevalence of CWD in mule deer is of particular concern to local wildlife managers, as mule deer herds statewide have declined due to a number of environmental factors. Managers are concerned that CWD may be an additive factor influencing mortality rates in the South Converse Herd, as it may be decreasing adult female survival, degrading the health of breeding-age females and affecting health and survival of neonates. Additionally, CWD may be adversely affecting mule deer survival due to behavioral changes - rendering infected deer more vulnerable to natural causes of mortality such as predation or exposure.

Hunter-harvested deer have been tested for CWD in this herd unit since 2001. It should be noted that hunter-harvested samples do not represent a random sample of this population. Rather, samples are biased towards younger age-class males, as hunting seasons have focused on antlered deer, and hunters who harvest larger mature bucks often decline sampling to preserve their cape for taxidermy purposes. Thus, prevalence in hunter-harvested deer may not be representative of the herd as a whole, but trends are likely to be similar. Additionally, few adult female mule deer have been tested since 2004 due to changes in hunting season structure.

Since 2001, prevalence of CWD in hunter-harvested mule deer increased significantly in the South Converse Mule Deer Herd, while the population concurrently decreased (Table 1). However, this concurrent decrease cannot be solely attributed to CWD as mule deer populations throughout most of Wyoming decreased over this same time frame (due to prologned drought, deteriorating habtiat condition, etc.). Unfortunately, low sample sizes of hunter harvested mule deer preclude rigorous statistical analysis of CWD prevalence for most years. Since 2015, sample sizes have been too low to make any reasonable inference on recent CWD prevlance trend. In addition, there has been a modest increase in this mule deer population over the past three years due to favorable environmental conditions. Despite a recent uptick in the population, such high CWD prevalence levels documented in recent years is extremely concerning, especially considering CWD is ultimately fatal in all cervids.

A collaborative research project was initiated in 2010 to investigate the effects of CWD on the South Converse Mule Deer Herd. Using GPS-collared deer, a number of variables were explored to better understand the relationship between CWD and the dynamics of the population. This research was a cooperative effort of the United States Geological Survey, the University of

Wyoming, and the Wyoming Game and Fish Department, and was concluded in 2014. The research was published in a dissertation in 2015 titled "Chronic Wasting Disease Ecology and Epidemiology of Mule Deer in Wyoming".

The research concluded that CWD is a population limiting disease, and estimated $\lambda 1 = 0.81$, corresponding to a 19% annual decline in the population. Further, males had a high prevalence of CWD (43%) compared to females (18%). They found that infected males showed higher activity levels, but noted that these males may have been more active prior to infection which placed them at a higher risk of encountering infected deer and contaminated environments. Further, infected deer were more likely to be predated upon by mountain lions or harvested by hunters due to their altered behavior. Lastly, the study found reduced incidence of CWD for deer of a certain genotype and documented genetic shift within the population as a result of higher fitness associated with that genotype. Despite selection towards deer with higher fitness (as it pertains to CWD), the study's population models still predicted severe decline in the next 50 years (Devivo, 2015).

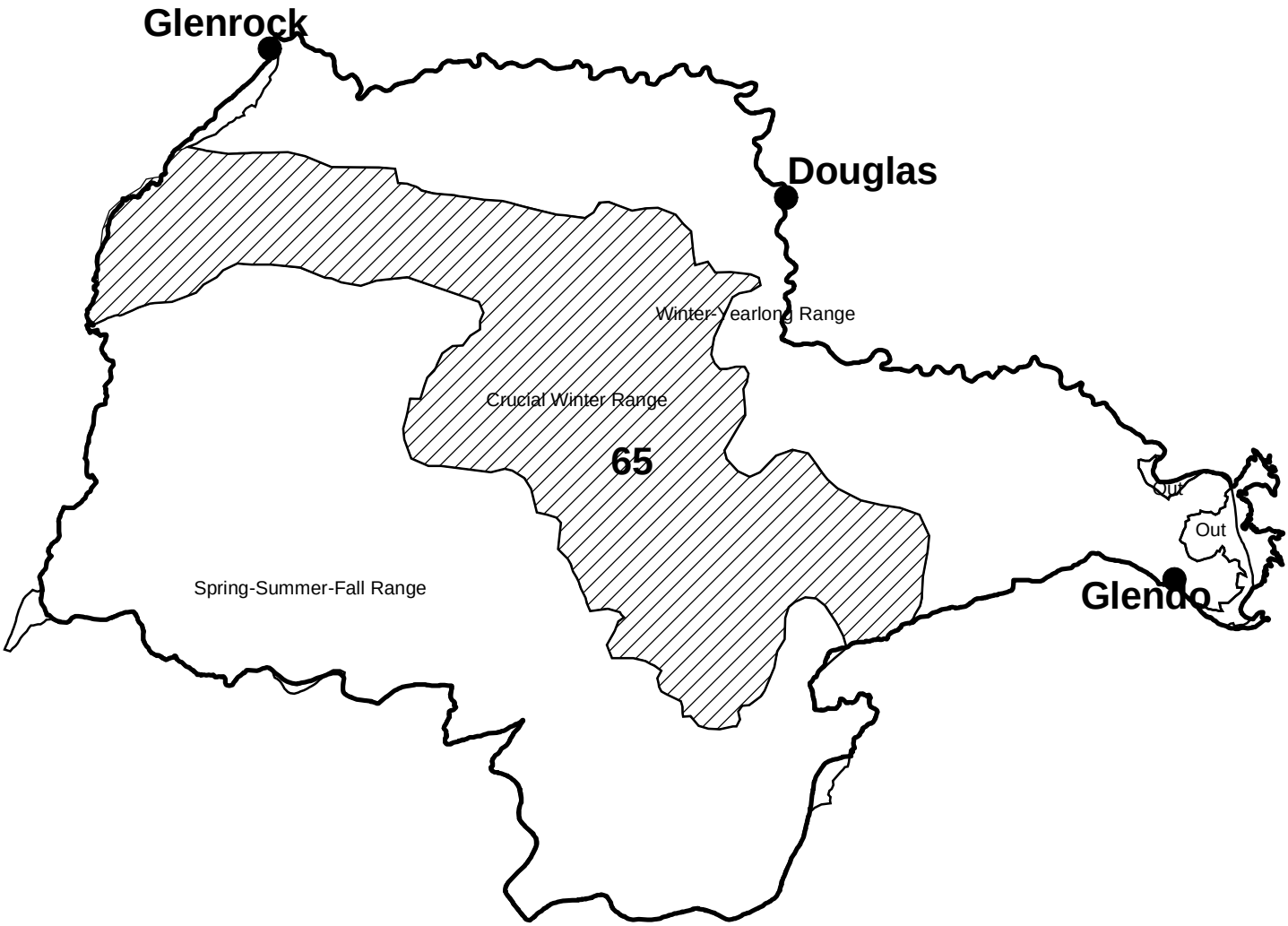
Citations

DeVivo, Melia. Chronic Wasting Disease Ecology and Epidemiology of Mule Deer in Wyoming. Diss. University of Wyoming, 2015.

Table 1. CWD surveillance in hunter-harvested mule deer in the South Converse Herd Unit, 2001-2016.

Year	Total Harvest	N Tested	N Positive	**CWD Prevalence**
2001	885	81	12	**15%**
2002	825	98	23	**24%**
2003	733	155	46	**30%**
2004	533	52	14	**27%**
2005	461	88	29	**33%**
2006	555	81	32	**40%**
2007	729	74	30	**41%**
2008	708	44	19	**43%**
2009	425	48	20	**42%**
2010	365	42	20	**47%**
2011	303	35	20	**57%**
2012	345	30	14	**47%**
2013	252	41	18	**44%**
2014	253	38	12	**32%**
2015	237	4	3	**75%**
2016	285	14	6	**43%**

Mule Deer - South Converse
Hunt Area 65
Casper Region
Revised 3/94



2016 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2016 - 5/31/2017

HERD: MD757 - BATES HOLE/HAT SIX

HUNT AREAS: 66-67

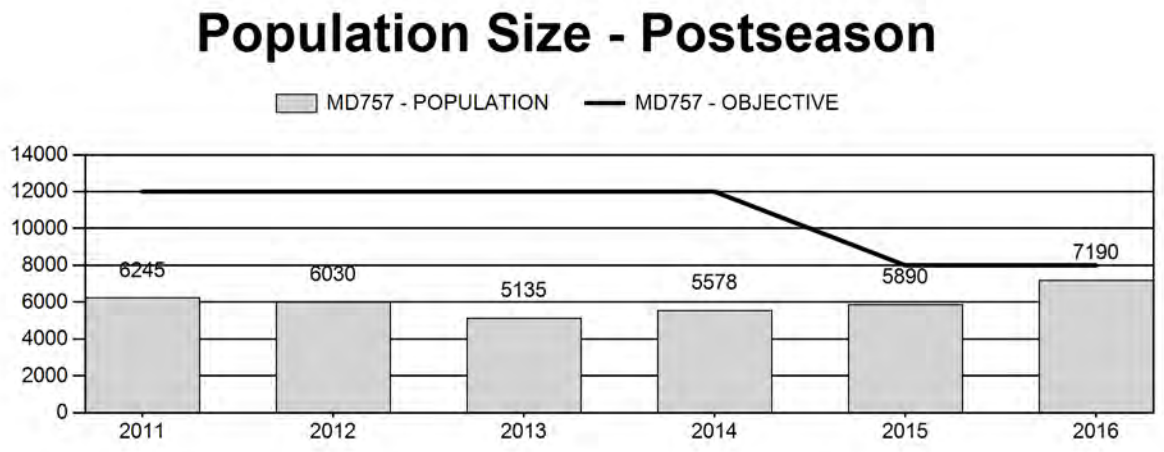
PREPARED BY: HEATHER O'BRIEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	5,776	7,190	7,610
Harvest:	248	392	510
Hunters:	802	944	950
Hunter Success:	31%	42%	54%
Active Licenses:	802	944	950
Active License Success:	31%	42%	54 %
Recreation Days:	2,982	3,714	3,000
Days Per Animal:	12.0	9.5	5.9
Males per 100 Females	24	41	
Juveniles per 100 Females	66	66	

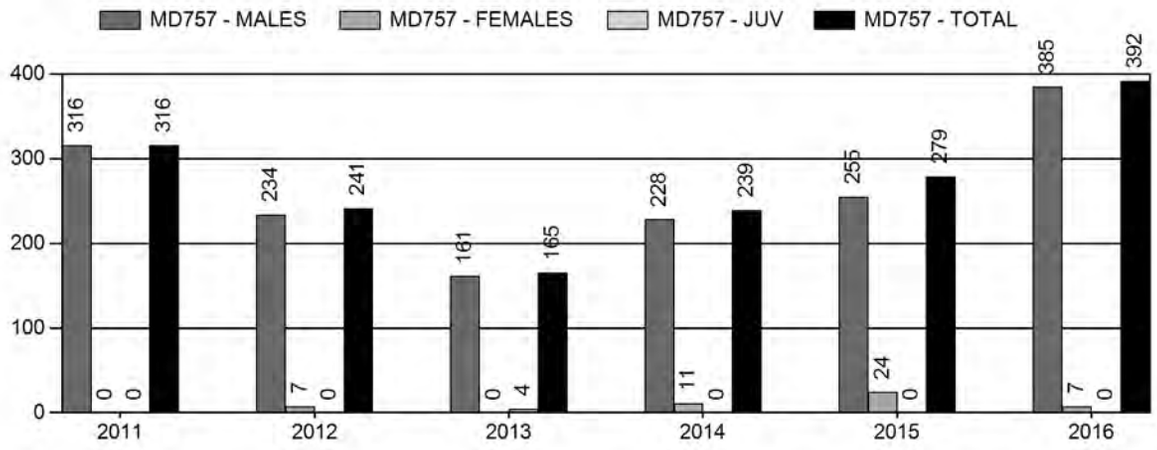
Population Objective (± 20%) :	8000 (6400 - 9600)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-10.1%
Number of years population has been + or - objective in recent trend:	24
Model Date:	02/22/2017

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

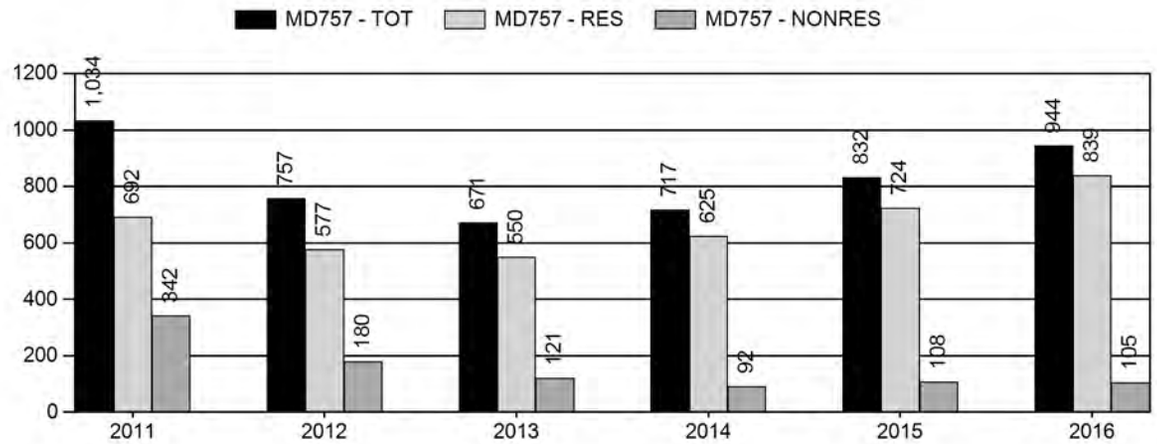
	JCR Year	Proposed
Females ≥ 1 year old:	0.2%	.2%
Males ≥ 1 year old:	25.4%	28.7%
Total:	4.4%	6.2%
Proposed change in post-season population:	+1.95%	+5.5%



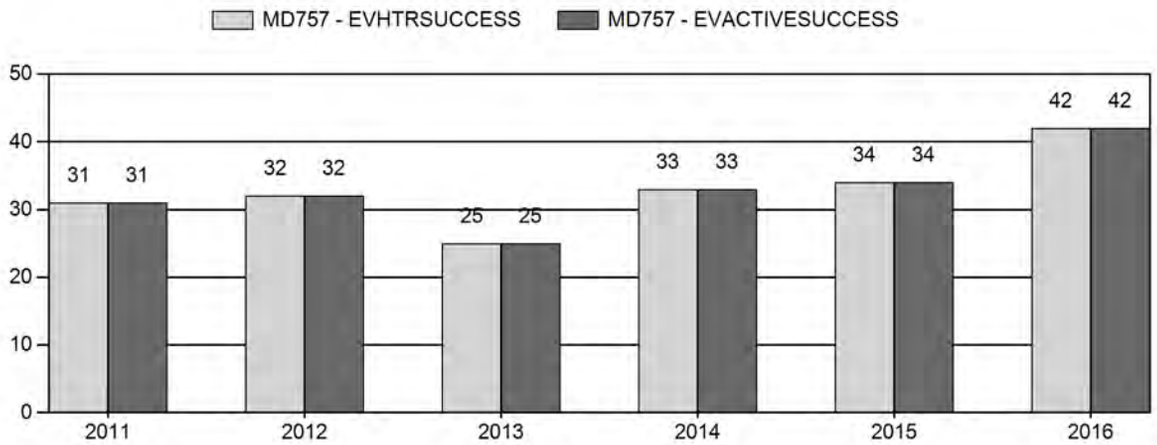
Harvest



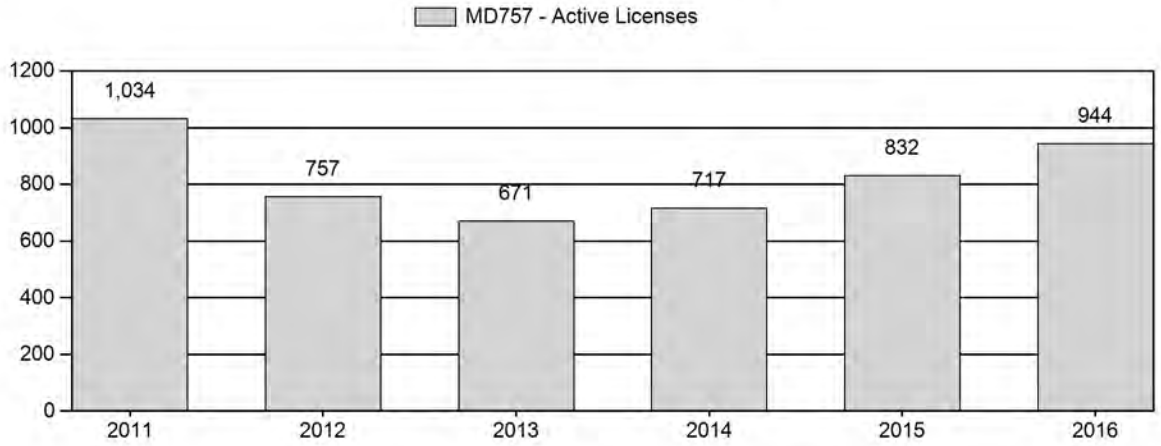
Number of Active Licenses



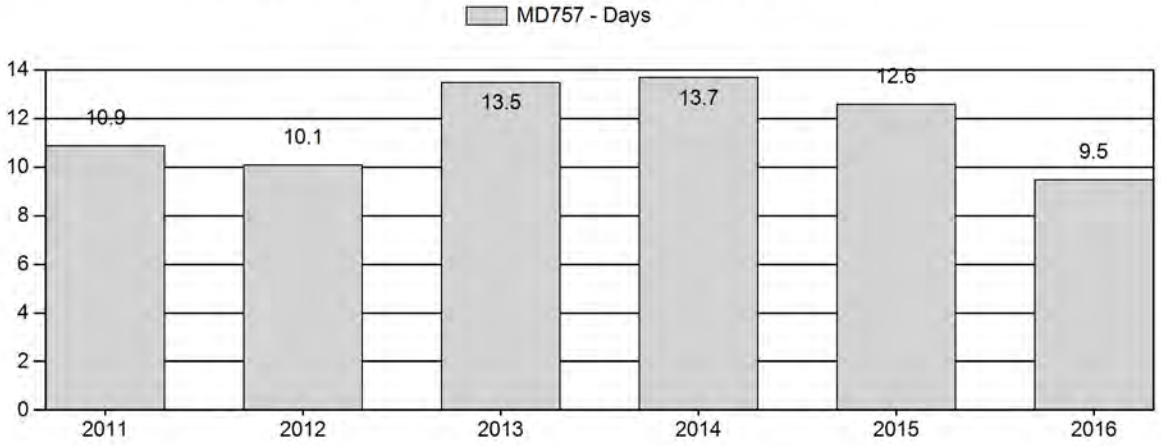
Harvest Success



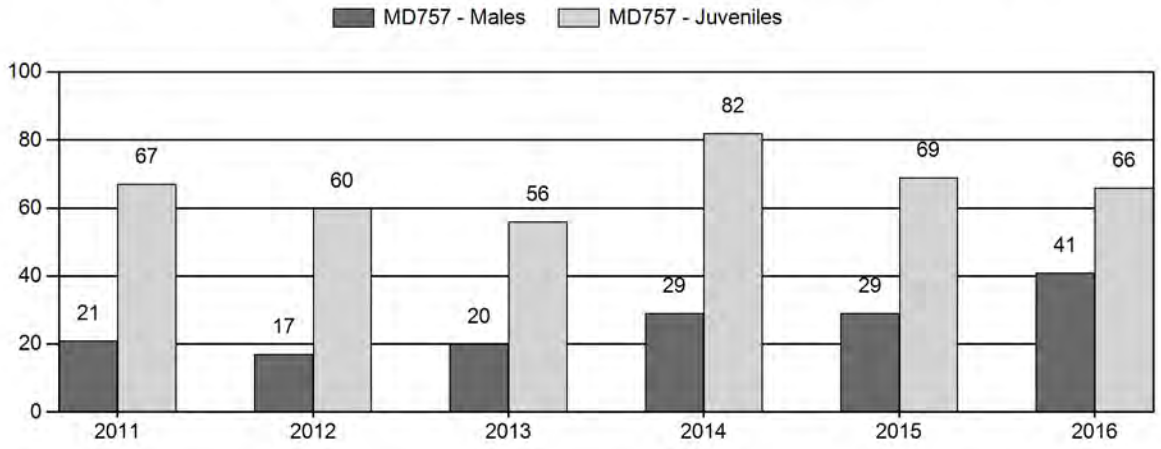
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2011 - 2016 Postseason Classification Summary

for Mule Deer Herd MD757 - BATES HOLE/HAT SIX

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	6,245	47	52	33	7	0	139	11%	666	53%	443	35%	1,248	698	7	14	21	± 2	67	± 5	55
2012	6,030	28	55	30	9	0	122	10%	718	56%	432	34%	1,272	650	4	13	17	± 2	60	± 4	51
2013	5,135	86	50	25	7	0	168	11%	845	57%	470	32%	1,483	959	10	10	20	± 2	56	± 3	46
2014	5,578	83	79	26	7	0	195	14%	665	47%	543	39%	1,403	1,464	12	17	29	± 3	82	± 5	63
2015	5,890	164	97	29	13	0	303	15%	1,039	50%	719	35%	2,061	1,208	16	13	29	± 2	69	± 3	54
2016	7,190	132	198	31	4	0	365	20%	886	48%	585	32%	1,836	1,236	15	26	41	± 3	66	± 4	47

2017 HUNTING SEASONS
BATES HOLE / HAT SIX MULE DEER (MD757)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
66		Oct. 15	Oct. 21		General	Antlered mule deer or any white-tailed deer
67						CLOSED
Archery		Sep. 1	Sep. 30			Refer to license type and limitations in Section 2

Management Evaluation

Current Postseason Population Management Objective: 8,000
Management Strategy: Special
2016 Postseason Population Estimate: 7,200
2017 Proposed Postseason Population Estimate: 7,600
2016 Hunter Satisfaction: 60% Satisfied, 24% Neutral, 16% Dissatisfied

The Bates Hole / Hat Six Mule Deer Herd Unit has a postseason management objective of 8,000 deer. The herd is managed using the special management strategy, with a goal of maintaining postseason buck ratios between 30-45 bucks per 100 does. As part of the statewide Mule Deer Initiative, a citizen working group was formed in 2014 to discuss issues in the Bates Hole Hat / Six Mule Deer Herd Unit. The group developed a management plan and formal recommendations to Department managers in summer 2015 (MD757 2015 JCR, Appendix A). These recommendations, along with the objective and management strategy, were formally reviewed in 2015.

Herd Unit Issues

In Hunt Area 66, hunting access is very good, with large tracts of public land as well as a sizeable Hunter Management Area. The main land use within the herd unit is traditional ranching and grazing of livestock. Very little industrial or energy development exists in this herd unit. Hunt Area 67, which includes the north-central portion of Casper Mountain, remains closed to hunting. Residents with small properties that dominate the hunt area are strongly opposed to hunting in their portion of the herd unit.

Weather

The severe winter of 2010-2011 and subsequent drought of 2012 resulted in elevated fawn mortality in the Bates Hole / Hat Six Herd Unit. Fawn ratios were also very low during this time period, and the population remained well below objective. From 2013 to the present, weather trends have been more favorable, and mule deer numbers have slowly recovered. Fawn production and survival increased markedly in 2014 & 2015, as range conditions and nutritional status of does began to improve. The winter of 2015 was fairly average, though some areas experienced prolonged periods of persistent snow. The spring of 2016 was very wet, resulting in rapid plant growth and green-up of rangelands. The majority of the summer and fall were extremely dry, causing much of the available forage to cure. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided mule deer with a valuable boost in nutrition prior to the winter of 2016-2017. While there were several notable snow storms and cold snaps during the winter of 2016-2017, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Thus, managers expect fairly average mule deer survival for the winter of 2016-2017. For detailed weather data see Appendix A and http://www.ncdc.noaa.gov/gac/time-series/us.

Habitat

This herd unit has eight established transects that measure production and utilization on True Mountain Mahogany (*Cercocarpus montanus*). Average leader growth on mahogany in 2016 was 4.29 inches (109 mm), and represents only a slight decrease in production from the record high production observed in 2015 (Figure 1). Above-average herbaceous plant production throughout the herd unit in recent years is attributed to good moisture during growing seasons. Average utilization on transects has increased over the past five years, and was 25.9% in 2016 (Table 1). Better habitat conditions in the herd unit in 2014-2016 contributed to improved spring and summer fawn survival compared to previous years, and this herd has grown since 2012. Increased average utilization on shrubs correlates to an increasing mule deer population, although shrub utilization on some transects may also be attributed to other species, such as elk.

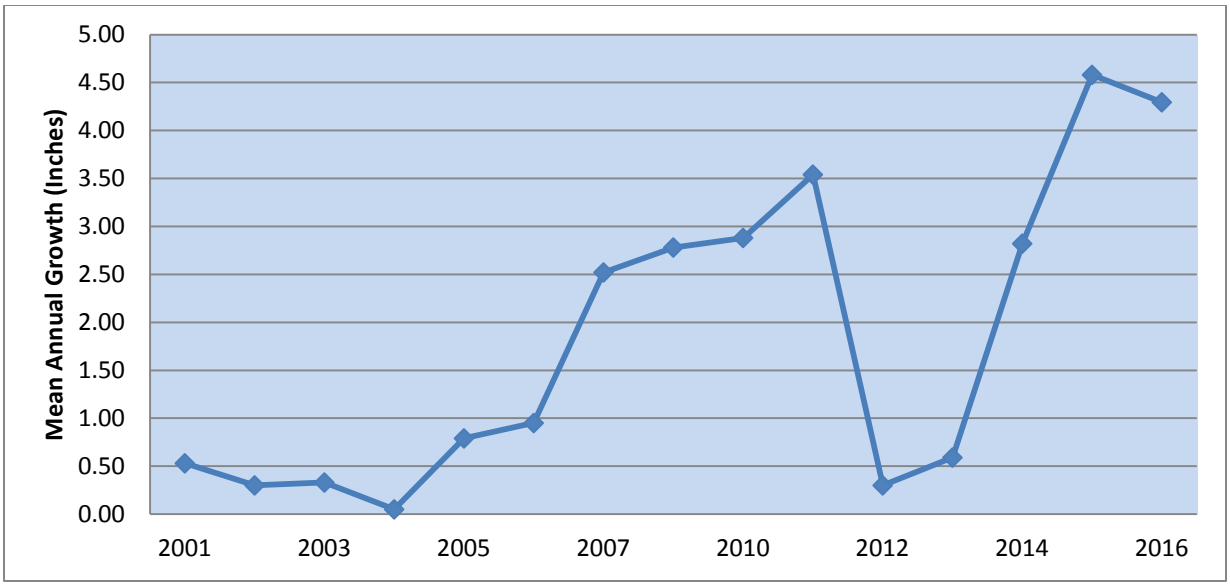


Figure 1. Mean annual growth of true mountain mahogany **(***Cercocarpus montanus*) in the Bates Hole / Hat Six Mule Deer Herd Unit, 2001-2016.

Year	01-02	02-03	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	15-16
Mean Utilization	28.9	30.65	23.75	12.27	26.73	15.33	23.33	28.00	13.67	20.29	25.90

Table 1. Mean utilization of true mountain mahogany **(***Cercocarpus montanus*) in the Bates Hole / Hat Six Mule Deer Herd Unit, 2001-2016. Note data were not collected or reported in some years.

Field Data

For much of the past 15 years, fawn production/survival in this herd was moderate to poor. Fawn production/survival reached a 25-year low in 2010, with 45 fawns per 100 does postseason. Fawn ratios increased from 2011-2013, but were still below levels needed to enhance population growth and recovery. Despite the elimination of doe/fawn hunting and restrictions placed on buck harvest, the population was still slow to recover. Fawn ratios finally improved in 2014 to 82 per 100 does as a result of favorable weather and range conditions. Winter conditions from 2014-2016 were also relatively mild, and were followed by spring weather and range conditions that were favorable for pregnant does. As a result, overwinter survival of fawns also improved from 2014-2016. Fawn ratios appeared to be lower in 2015 and 2016, but this data must be tempered with the knowledge that a large proportion of does

surveyed were yearlings and are unable to produce fawns of their own. Thus, the 2015 and 2016 observed fawn ratios were tempered by a higher proportion of younger does in the population.

Buck ratios for the Bates Hole / Hat Six Herd historically average in the mid-20s per 100 does, though they have occasionally exceeded recreational limits and risen into the low to mid 30's. In 2012, the buck ratio reached a low of 17 per 100 does, due to a combination of consistent harvest pressure and declining fawn production. In an attempt to improve yearling buck survival, an antler-point restriction was added in 2013, requiring harvested bucks to have three points or more on one side. The antler-point restriction has allowed higher yearling buck recruitment into adult age classes, while reducing overall harvest pressure on the male segment of the herd. In 2015, the Area 66 Mule Deer Initiative Working Group recommended maintaining antler point restrictions in the herd until the overall buck ratio reaches or exceeds 35 per 100 does. At that time, restrictions would be removed unless the buck ratio drops below 25 per 100 does. This recommendation stemmed from a public desire to improve hunting quality and overall buck numbers while maintaining a general license season structure. In 2016, the observed buck ratio was 41 as a result of high fawn production and survival in 2014 and 2015, but also owing to the protection of yearling bucks under the antler point restriction. In 2017 the point restriction will be removed to provide more liberal hunting opportunity, with ample availability of bucks.

Since 2008, bucks classified in Area 66 have been categorized based on antler size (see Table 2). The best distribution of mature buck classes was observed in 2008, with 50% Class I (small), 36% Class II (medium), and 14% Class III (large) bucks. Bucks classified from 2010-2016 showed a decrease in antler quality, as the percentage of Class I bucks increased and percentage of Class II bucks decreased. It should come as no surprise that Class I bucks increased from 2012 to 2016 with improved fawn production and the addition of antler-point restrictions. The proportion of Class III bucks has consistently remained under 10% in all years. It should be noted as well that the total number of bucks surveyed in 2016 was at a 25-year high (N=365). Only four Class III bucks were observed during 2016 surveys, but a higher number of Class II bucks were observed. This may be due to shifts of available bucks within the older age classes – an artifact from years when fawn production and survival were very low. The consistent number of Class II & III bucks surveyed across years is perhaps surprising at first glance - considering surveys occur post-season, that Area 66 is a general license hunt area, and that hunting pressure is assumed to be high. However, many deer also occupy private lands or rough terrain with conifer cover which allows for good buck escapement. Class III bucks, despite their discovery during post-season surveys, are more difficult for hunters to find during hunting season. In addition, many general license hunters may be simply hunting for meat without regard to trophy quality, or may feel a sense of urgency given the short season length, and are thus more likely to harvest smaller bucks as the opportunity arises.

Bio-Year	Total Class N for HA	# Bucks Classified					Buck Ratios per 100 Females					
		Ylng	Class I	Class II	Class III	Total	Ylng	Class I	Class II	Class III	All Adult	Total
2008	1,254	75	57 (50%)	41 (36%)	16 (14%)	189	12	9	6	2	18	29
2009	1,320	59	61 (54%)	41 (37%)	10 (9%)	171	8	8	6	1	15	23
2010	1,479	82	49 (49%)	42 (42%)	9 (9%)	182	9	5	5	1	11	20
2011	1,248	47	52 (56%)	33 (36%)	7 (8%)	139	7	8	5	1	14	21
2012	1,272	28	55 (59%)	30 (32%)	9 (9%)	122	4	8	4	1	13	17
2013	1,483	86	50 (61%)	25 (30%)	7 (9%)	168	10	6	3	1	10	20
2014	1,403	83	79 (71%)	26 (23%)	7 (6%)	195	12	12	4	1	17	29
2015	2,061	164	97 (70%)	29 (21%)	13 (9%)	303	16	9	3	1	13	29
2016	1,836	132	198 (85%)	31 (13%)	4 (2%)	365	15	22	3	1	26	41

Table 2. Antler classification analysis for **Area 66** within the Bates Hole/Hat Six Mule Deer Herd Unit, 2008 – 2016.

Harvest Data

Hunter success in this herd has fluctuated as a function of population size and season length. As this population declined, harvest success has decreased and hunter days have increased as the season was shortened and antler point restrictions were added. No significant female harvest has been prescribed since 2007. Hunter satisfaction has been low in this herd, which may be a function of hunter crowding and a perceived lack of bucks that are of legal harvest size. Hunter participation and overall harvest declined when antler point restrictions were added, but has gradually increased from 2013-2016 as the herd has grown as well. At the same time, Region D non-resident license issuance was reduced significantly from 2,100 licenses in 2011 to only 400 licenses in 2014-2016. In Area 66, only 11% of hunters were non-residents during the 2016 season. Harvest success was 42% in 2016, which is 10 percentage points than the five-year average. Total harvest also increased in 2016 compared to the previous four years, despite the antler-point restriction and virtually no harvest of does or fawns. All of these metrics suggest the population has grown, resulting in increased buck numbers. In addition, hunters and landowners commented on seeing more mule deer in the field, especially younger age-class bucks and does with fawns.

Population

The 2016 postseason population estimate was approximately 7,200 and has increased after reaching a low of about 5,100 deer in 2013. No sightability or separate population estimate data are currently available to further align the model in conjunction with postseason classification and harvest data. This herd had poor fawn production/survival and thus poor population performance since from 2006-2013. The herd has grown modestly in recent years as a result of conservative hunting, improved weather and range conditions, and improved fawn production/survival. Some areas of the herd unit that previously contained higher densities of mule deer were slower to recover at first, but have rebounded over the past two years. Landowners, hunters, and managers have observed higher numbers of mule deer overall, especially does and fawns in healthier condition. Field personnel have observed higher total mule deer numbers during survey flights the past three years without additional effort, indicating this herd has begun to grow more noticeably.

The "Semi-Constant Juvenile, Semi-Constant Adult" (SCJ,SCA) spreadsheet model was chosen for the postseason population estimate of this herd. Managers are confident in the accuracy of observed buck ratios in this herd unit, as sample sizes are typically very good and coverage is very thorough. However, all of the models assume harvest is proportional across age and sex classes, and rely heavily on male ratios and harvest. Thus, harvest regimes that are specific to one sex or age class (as they have been in Area 66) make it difficult for the model to simulate true population dynamics. The SCJ, SCA model seems the most representative of the herd in terms of recent trends, though some earlier years in the model is not consistent with historic estimates from that era. Juvenile survival rates were more liberally constrained in years when field observations confirm that overwinter conditions were very mild (i.e. 2005-2006, 2013-2016). More liberalized constraints from 2013-2016 also assist the model in compensating for lower, skewed harvest, as these are years that included the antler point restriction. Without this change in the juvenile survival constraint, the model assumes low male-only harvest is due to lack of animals in the population. The CJ,CA model was rejected, as it depicts a herd that is much larger than managers suspect. The TSJ, CA model predicts a similar population size and trend as the SCJ,SCA model for the most years, but then declines as it assumes a lack of animals in years when the antler point restriction was in place. The SCJ,SCA model ultimately appears to be the best representation relative to the perceptions of managers and field personnel, is of good quality, and follows trends with license issuance and harvest success.

Management Summary

Opening day for hunting in Area 66 has traditionally been October 15th, with closing dates that have changed to offer greater or lesser opportunity depending on the management direction desired. General licenses have been valid only for antlered mule deer since 2000. Doe/fawn

licenses have been offered in years when winter range shrub utilization has been excessive, although no meaningful doe harvest has been prescribed since 2007. A short, seven-day season with no doe/fawn licenses will be sustained for 2017. The 2017 season will no longer include an antler point restriction (APR), as the herd has exceeded the 35 bucks per 100 doe threshold recommended by the Mule Deer Initiative. Hunters will be allowed to harvest any buck mule deer, and harvest should then spread itself more evenly across available age classes. In future years, if the observed buck ratio declines below 25 bucks per 100 does, the antler point restriction will be reinstated.

If we attain the projected harvest of 510 deer with fawn ratios similar to the last five years, this herd will grow slightly. The predicted 2017 postseason estimate for the Bates Hole / Hat Six Herd is approximately 7,600 animals, which is 5% below objective.

Appendix A
Weather Data for the Bates Hole / Hat Six Mule Deer Herd Unit

Precipitation

From October 2015 through September 2016 (water year 2016), precipitation in the Bates Hole/Hat Six Mule Deer Herd Unit was 2.9 inches higher than the 30-year average for the same water year time frame (Figure 1). The 2015-2016 winter experienced precipitation levels that were well above normal, though overall winter severity was considered only slightly above average. While snow persisted at higher elevations, cycles of warm temperatures and winds melted and cleared habitats of deep snow at lower elevations in many places. Precipitation continued well above normal through the spring growing season (April-June 2016), which was one inch above the 30-year average. Following the very wet winter and spring, summer conditions were relatively dry, and the July through August precipitation level fell to near the 30-year average for the same time frame. Fall 2016 precipitation increased and was slightly above the 30-year average.

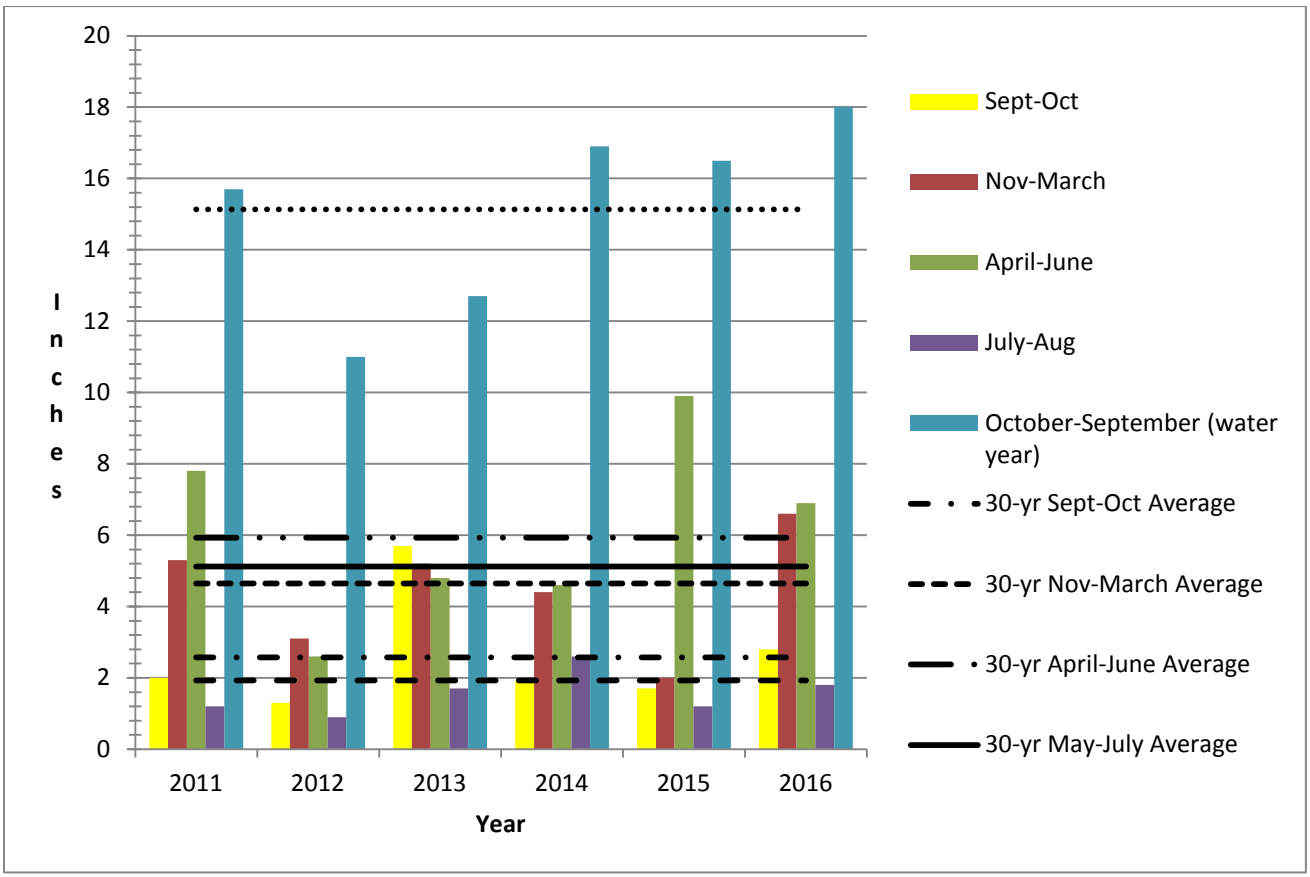


Figure 1. Seasonal precipitation received compared to 30-year averages within the Bates Hole / Hat Six Mule Deer Herd Unit (2011-2016).

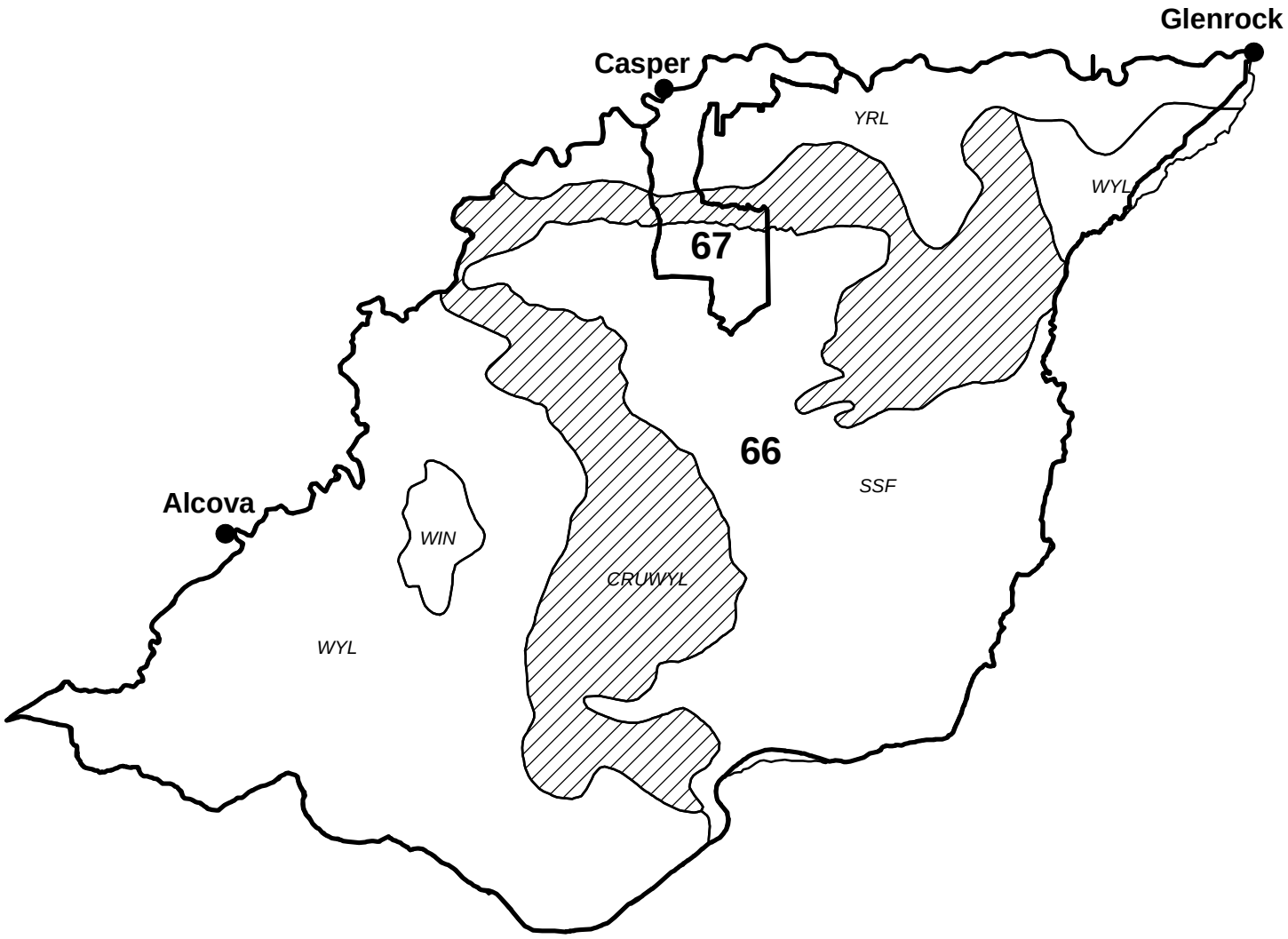
Winter Severity

Within this herd unit, the 2015-2016 winter was relatively average despite precipitation levels well above average. The 2016-2017 winter started out mild with very little snowfall until a winter storm in late-December brought several inches of snow followed by prolonged sub-freezing temperatures. The late December snow was followed by several additional snow events that added a few inches of base during each storm. Snows did not appear to crust over in most places due to low temperatures and high winds. Conditions improved by late January and early February as both temperatures and wind increased. Access to forage was improved during this time, and deer were able to move more freely on their winter ranges. From late February to May 2017, air temperatures fluctuated between above normal and cooler periods, producing several timely precipitation events with modest snow accumulations. However, snowfall did not last for more than a few days following each precipitation event from mid-February on.

Habitat and Mule Deer Body Condition

Precipitation, weather, and habitat conditions have been favorable from 2014 to present. Mule deer nutritional condition was very good entering the 2015-2016 winter. Winter conditions were average for 2015-2016, resulting in average mule deer fawn production and survival during bio-year 2015. Above-average precipitation was received during the growing season (April – June) of 2016, resulting in good herbaceous forage production and mixed-mountain shrub leader growth. Although the summer of 2016 was very dry, mild temperatures and good forage production enabled mule deer to enter the 2016-2017 winter in very good nutritional condition. While the early winter of 2016-2017 was marked by heavy snows and a prolonged cold snap, the remainder of the winter was fairly average in terms of snow accumulation and temperature (precipitation data not yet available). Over-winter survival of mule deer was thought to be average across all age classes, and is corroborated by mortality data from mule deer that were collared in late February 2017. Although total weather data is not yet available, average to above average precipitation has been recorded during the growing season of 2017 thus far, which should result in another year of good forage production for mule deer in the coming year.

Mule Deer - Bates Hole/Hat Six
Hunt Area 66, 67
Casper Region
Revised 2/94



2016 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2016 - 5/31/2017

HERD: MD758 - RATTLESNAKE

HUNT AREAS: 88-89

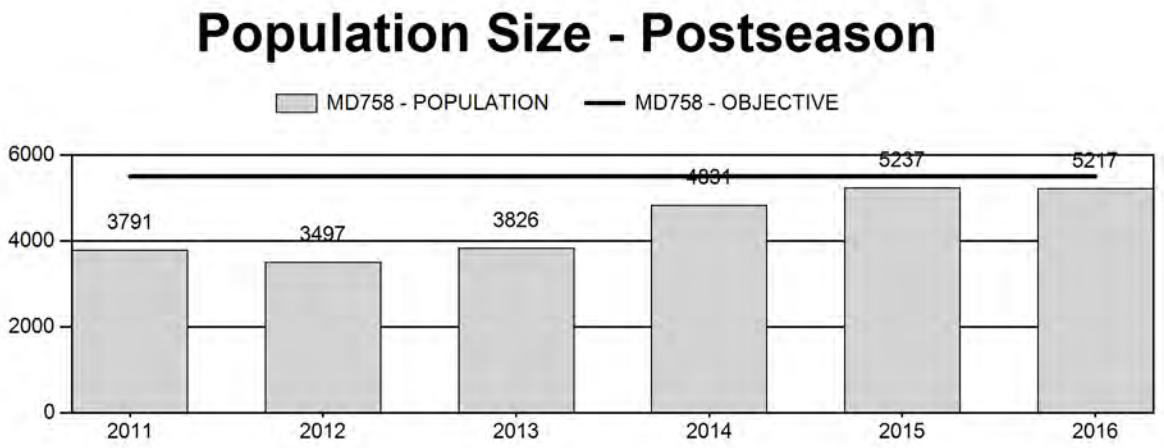
PREPARED BY: HEATHER O'BRIEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	4,236	5,217	5,501
Harvest:	176	161	175
Hunters:	374	337	350
Hunter Success:	47%	48%	50 %
Active Licenses:	383	337	360
Active License Success:	46%	48%	49 %
Recreation Days:	1,417	1,243	1,350
Days Per Animal:	8.1	7.7	7.7
Males per 100 Females	39	38	
Juveniles per 100 Females	60	64	

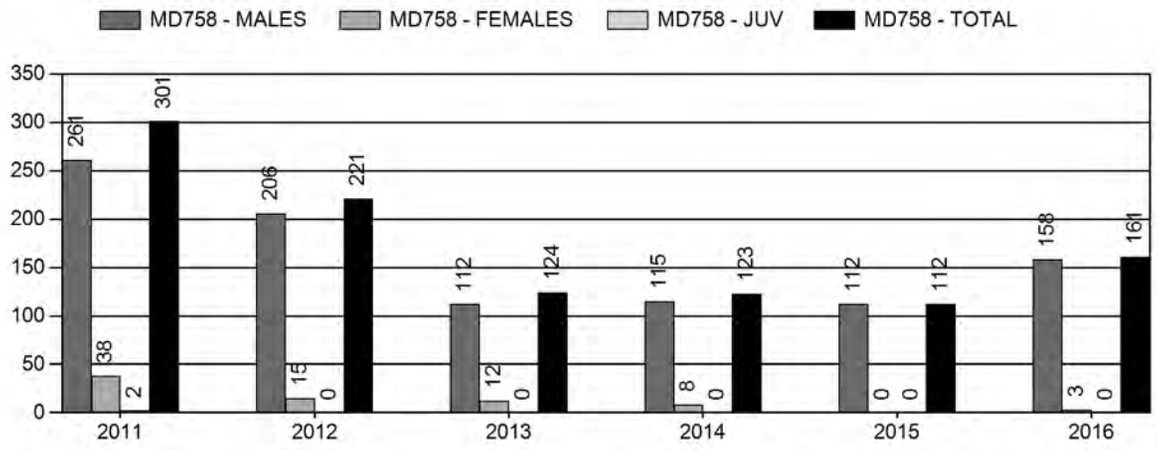
Population Objective (± 20%) :	5500 (4400 - 6600)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-5.1%
Number of years population has been + or - objective in recent trend:	9
Model Date:	02/28/2017

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

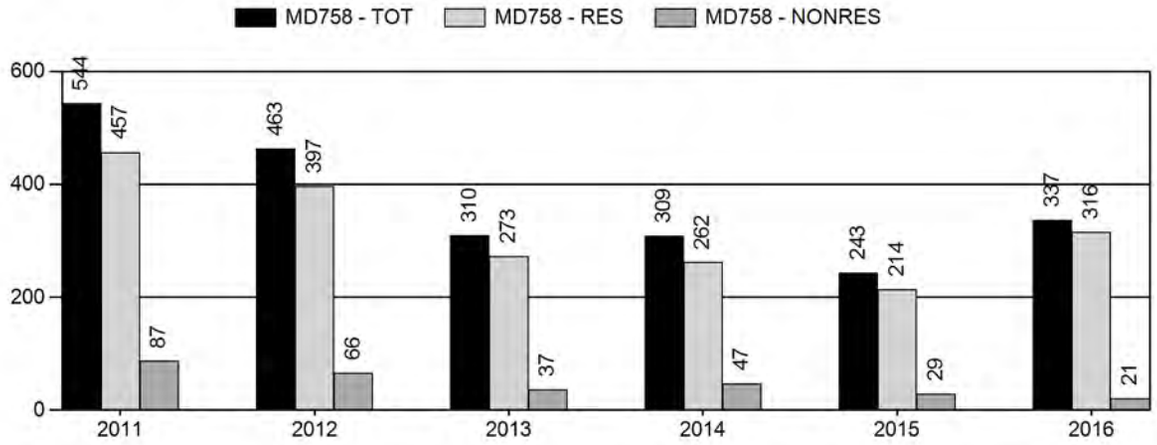
	JCR Year	Proposed
Females ≥ 1 year old:	0%	.2%
Males ≥ 1 year old:	11.8%	14.5%
Total:	2.4%	3.2%
Proposed change in post-season population:	+5.84%	+5.2%



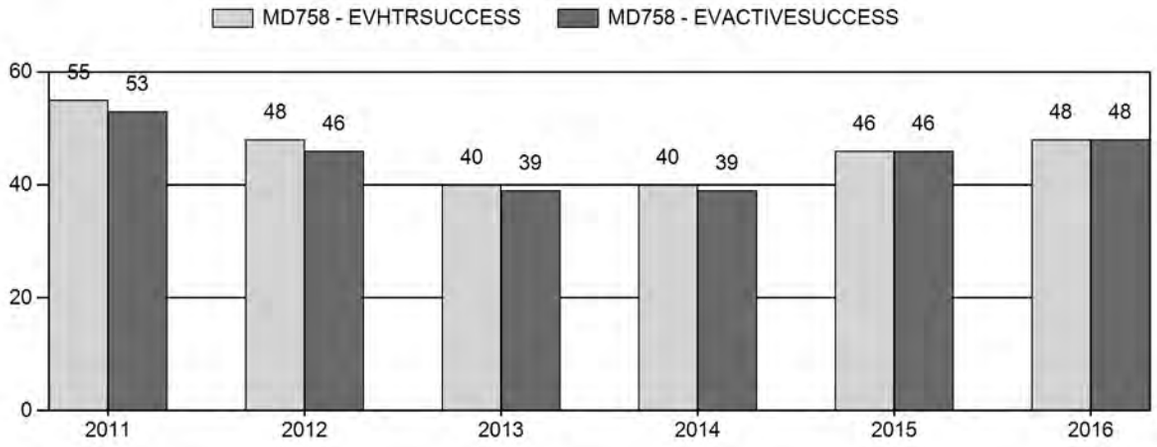
Harvest



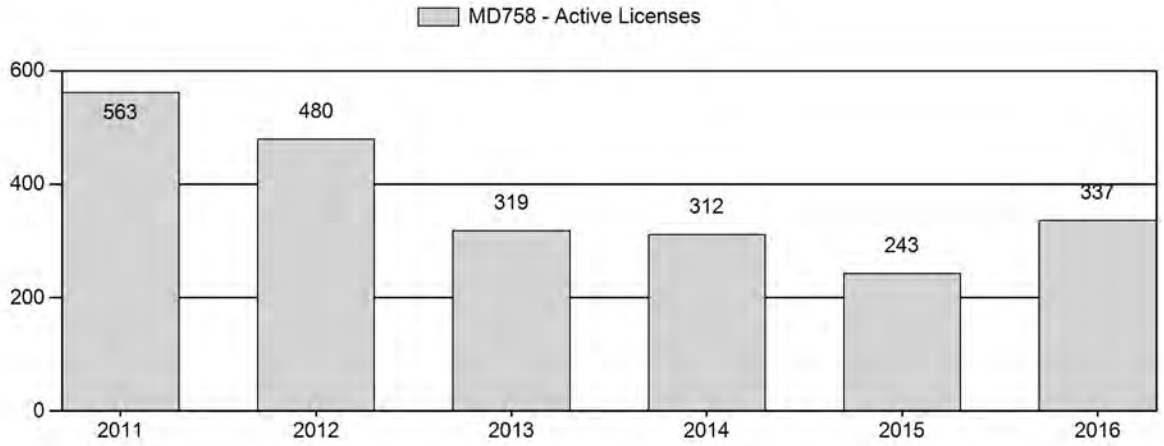
Number of Active Licenses



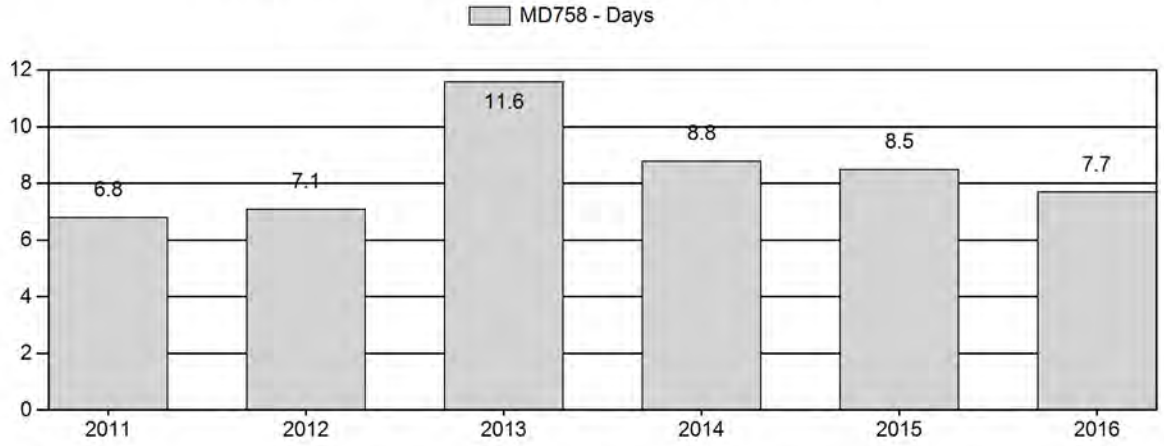
Harvest Success



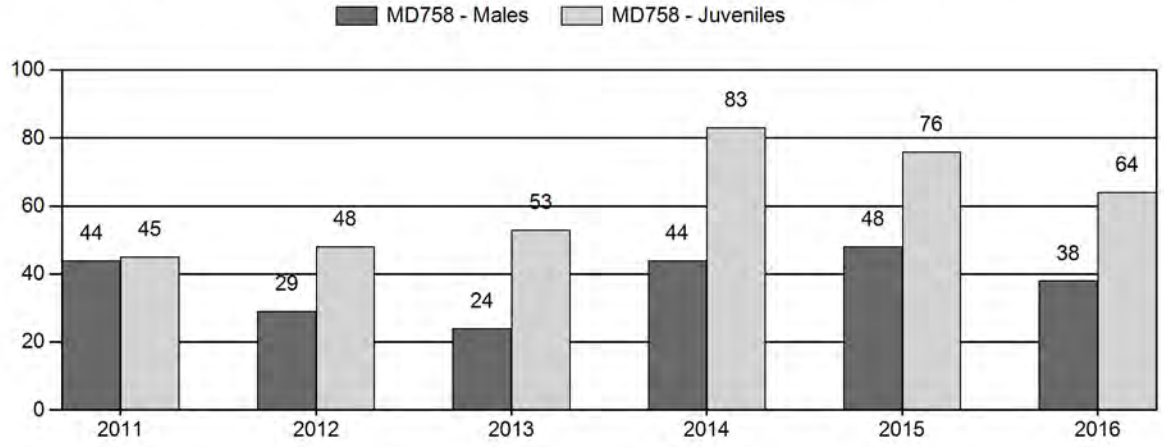
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2011 - 2016 Postseason Classification Summary

for Mule Deer Herd MD758 - RATTLESNAKE

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	3,791	53	136	63	9	0	249	23%	570	53%	258	24%	1,077	781	9	34	44	± 4	45	± 4	32
2012	3,497	25	83	10	2	0	109	16%	381	57%	184	27%	674	830	7	22	29	± 4	48	± 5	38
2013	3,826	14	61	20	1	0	91	14%	376	57%	198	30%	665	671	4	20	24	± 3	53	± 5	42
2014	4,831	47	84	36	6	0	161	19%	368	44%	304	36%	833	1,446	13	31	44	± 5	83	± 7	57
2015	5,237	96	97	41	3	0	237	22%	491	45%	371	34%	1,099	1,209	20	29	48	± 4	76	± 6	51
2016	5,217	58	96	30	3	0	187	19%	487	49%	314	32%	988	1,288	12	26	38	± 4	64	± 5	47

2017 HUNTING SEASONS
RATTLESNAKE MULE DEER (MD758)

Hunt Area	Type	Season Dates Opens	Season Dates Closes	Quota	License	Limitations
88		Oct. 15	Oct. 21		General	Antlered mule deer or any white-tailed deer
89	1	Oct. 15	Oct. 31	125	Limited quota	Antlered deer
Archery		Sep. 1	Sep. 30			Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2016
88	6	No Change
89	1	+25
Total	1	+25

Management Evaluation

Current Postseason Population Management Objective: 5,500
Management Strategy: Special
2016 Postseason Population Estimate: 5,200
2017 Proposed Postseason Population Estimate: 5,500
2016 Hunter Satisfaction: 66% Satisfied, 17% Neutral, 17% Dissatisfied

The Rattlesnake Mule Deer Herd Unit has a postseason population objective of 5,500 deer. The herd is managed using the special management strategy, with the goal of maintaining postseason buck ratios between 30-45 bucks per 100 does. Management of this herd unit and interpretation of harvest data can be perplexing, with different management strategies for Area 88 versus Area 89. The objective and management strategy were last revised in 2015.

Herd Unit Issues

Hunting access within the herd unit is moderate. While there are large tracts of public lands and several large Walk-In Areas, there are also many parcels of private land with restricted access. Hunt Area 88 is dominated by private lands with several small public land parcels. Harvest pressure on females was previously maintained in Area 88 to address potential damage issues on

irrigated agricultural fields, but has not been necessary in recent years. General license hunting pressure has become disproportionately high on public lands within Area 88. Consequently, managers may attempt to modify hunt area boundaries in 2018 to mirror those of Antelope Area 70. Traditional ranching and grazing are the primary land use over the whole unit, with scattered areas of oil and gas development and bentonite mining. Periodic disease outbreaks (i.e. hemorrhagic diseases) are possible in this herd and can contribute to population declines when environmental conditions are suitable.

Weather

The severe winter of 2010-2011 and subsequent drought of 2012 resulted in above average mortality of mule deer in the Rattlesnake Herd Unit. Fawn ratios were also very low during this time period, and the population remained well below objective. From 2013 to the present, weather trends have been more favorable, but range conditions and mule deer numbers still seem to be slow in their recovery compared to some adjacent herds. Fawn production and survival gradually increased from 2013 to 2015, as range conditions and nutritional status of does began to improve. The winter of 2015 was fairly average, though some areas experienced prolonged periods of persistent snow. The spring of 2016 was very wet, resulting in rapid plant growth and green-up of rangelands. However, the majority of the summer and fall were extremely dry, causing much of the available forage to cure. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided mule deer with a valuable boost in nutrition prior to the winter of 2016-2017. While there were several notable snow storms and cold snaps during the winter of 2016-2017, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Thus, managers expect fairly average mule deer survival for the winter of 2016-2017. For detailed weather data see http://www.ncdc.noaa.gov/gac/time-series/us.

Habitat

This herd unit has no established habitat transects to measure production and/or utilization on shrub species that are preferred browse for mule deer. Anecdotal observations and discussions with landowners in the region indicate growth and moisture during the spring of 2016 was above average, but summer and early fall of 2016 were quite dry. Mule deer became more concentrated in areas where moisture and green forage persisted during this time period. October precipitation resulted in a late fall green-up of forage that likely benefitted mule deer nutritionally prior to the winter of 2016-2017.

Field Data

The Rattlesnake Mule Deer Herd typically has moderate fawn production, with a long-term average of 66 fawns per 100 does. Harsh winter conditions in 2010-11 combined with severe drought in 2012 produced the lowest fawn ratios (in the mid-40s) in over 15 years for the herd unit. Issuance of doe/fawn licenses in Area 88 was reduced incrementally in accordance with this decline until being eliminated in 2015. Fawn ratios recovered significantly in 2014 with 83 per 100 does and were again above average in 2015. Fawn ratios were lower in 2016, with 64 fawns per 100 does observed. The lower observed ratio may in part be due to a high number of younger does without fawns in the population, but this ratio is still considered lower than desired considering yearling recruitment did not appear to be proportionally above average. Doe/fawn licenses therefore are not yet warranted, as the population is just reaching its objective and there are no complaints of damage to agriculture from any landowners within the herd unit.

Buck ratios for the Rattlesnake Mule Deer Herd have been maintained consistently within special management parameters since 1999. As a result, hunters have developed high expectations for buck numbers and trophy quality within this herd unit. It can be difficult to maintain buck ratios over the entire herd unit, as Area 88 is managed for a low number of deer and Area 89 is managed for high mature buck ratios. While this herd has dropped in overall numbers over the past six years, higher buck ratios have been maintained by adjusting Area 89 license issuance accordingly. However, the buck ratio dropped below special management range to 24:100 does in 2013 following several years of very poor yearling buck recruitment. Since then, buck ratios have recovered, thanks to above average fawn production/survival and low harvest pressure. Given this population has also increased in size, managers feel a conservative increase in Area 89 licenses is warranted. An increase of 25 licenses will provide additional hunting opportunity while still maintaining the buck ratio within special management parameters and assuring an adequate proportion of mature bucks are available for harvest.

Since 2008, bucks classified in Area 89 have been categorized based on antler size (Table 1). In 2009, the best distribution of mature buck classes was observed, with 53% Class I (small), 39% Class II (medium), and 9% Class III (large) bucks. The proportion of bucks in larger (Class II & III) antler classes was low in 2012 but has fluctuated since then, dependent upon fawn production/survival and harvest pressure. In 2016, 74% of bucks were categorized as Class I, with 24% Class II and 2% Class III bucks. In this instance, the higher proportion of Class I bucks is likely due to higher fawn production the previous two years. Despite a buck ratio on the upper end of special management criteria, overall distribution of bucks remains weighted toward smaller antler classes. With hunter expectations high for trophy-quality hunting, managers consider this further justification to only modestly increase Type 1 license numbers for the 2017 hunting season. Modest harvest pressure should allow a healthy portion of younger age class

bucks to survive into older age classes, improving the distribution of bucks into higher antler classes over the next few years.

Bio-Year	Total Class N for HA	# Bucks Classified					Buck Ratios per 100 Females					
		Ylng	Class I	Class II	Class III	Total	Ylng	Class I	Class II	Class III	All Adult	Total
2008	1,220	71	126 (74%)	40 (23%)	5 (3%)	242	11	20	6	1	27	38
2009	848	31	74 (53%)	54 (39%)	12 (9%)	171	7	17	13	3	33	40
2010	778	38	59 (54%)	45 (41%)	6 (5%)	148	9	14	11	1	26	35
2011	1,009	48	114 (62%)	61 (33%)	9 (5%)	232	9	21	11	2	34	43
2012	503	17	61 (84%)	10 (14%)	2 (3%)	90	6	22	4	1	26	32
2013	548	11	53 (74%)	18 (25%)	1 (1%)	83	4	17	6	0	24	27
2014	684	37	66 (65%)	30 (29%)	6 (6%)	139	12	22	10	2	34	46
2015	896	80	90 (69%)	38 (29%)	3 (2%)	211	20	22	9	1	28	48
2016	717	45	78 (74%)	25 (24%)	3 (2%)	151	13	22	7	1	30	42

Table 1. Antler classification analysis for Area 89 within the Rattlesnake Mule Deer Herd Unit, 2008-2016.

Harvest Data

License success in this herd unit is confusing to consider at the herd unit level given the season structure and access differences between Areas 88 & 89. Harvest success in Area 88 was 35% in 2016, which is near the 5-year average and typical for a general license area with little public land access. Harvest success in Area 89 was 80% in 2016, which is the highest success rate for the hunt area since 2011. In 2016, total deer harvested increased in both hunt areas compared to 2015, indicating availability of deer was improved in both hunt areas. Hunter days declined for the third year in a row in Area 89. However, it can be difficult to use days per animal as a reference to population trends as hunters tend to be more selective of bucks and take more time to harvest a deer. It can also be difficult to interpret hunter satisfaction at the herd unit level, as hunters in Area 89 are typically more satisfied due to low hunter crowding and better access, while Area 88 hunters are less satisfied due to higher crowding and less hunting access. Hunter satisfaction at the herd unit level did increase to 66% in 2016 compared to around 57% the past three consecutive years. Although this herd has grown and current high buck ratios can support increased harvest, liberal increases in license issuace are not yet warranted. A large proportion of bucks in the herd are in younger age classes and will need a few more years to mature.

Managers thus plan to conservatively increase license issuance in an effort to provide increased hunting opportunity while maintaining special management buck ratios in the herd unit.

Tooth boxes were mailed to all hunters who successfully drew an Area 89 license in 2009, 2012, and from 2014-2016 with the goal of collecting additional demographic information from harvested deer (Table 2). Hunter participation and submission of samples has been poor since 2014, despite mailing boxes and instructions to all hunters who succeed in drawing a license. In 2016 only 12 tooth samples were submitted for aging by hunters out of 75 who harvested a deer. Despite low participation, average tooth age within the hunt area appears to be fairly steady across years, with no major declines in average or median tooth age. Average measurements for antler spread have also remained fairly constant across years, indicating consistent availability of mature bucks.

	2009	2012	2014	2015	2016
Average Tooth Age	5.6	5.07	5.83	5.88	5.67
Median Tooth Age	5.5	4.5	6.5	5.5	5.5
Average Antler Spread	22	20	23	23	23
Total Sample Size (N)	59	37	13	8	12

Table 2. Hunter-submitted tooth age and antler measurement data from Area 89 deer, 2009-2016.

Population

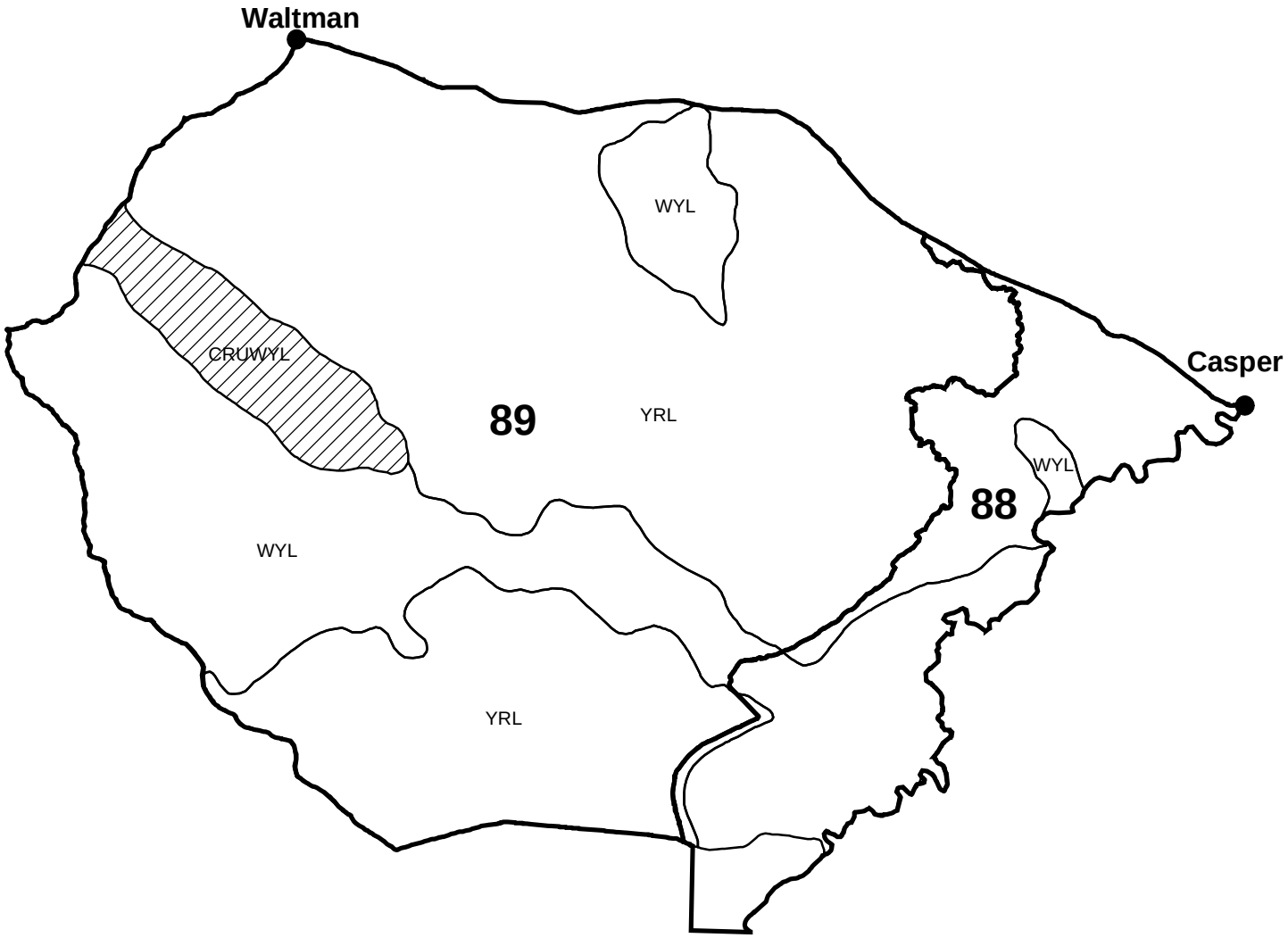
The 2016 postseason population estimate was approximately 5,200 mule deer and trending upward from an estimated low of 4,100 deer in 2012. The "Semi-Constant Juvenile, Constant Adult" (SCJ,CA) spreadsheet model was selected for the postseason population estimate of this herd. This model seemed most representative of the herd, as it mirrors fluctuations in herd size observed by field personnel in previous years. The simpler model (CJ,CA) overestimates herd size while the more complicated (TSJ,CA) model underestimated herd size and displays some trends that do not match with field observations. The SCJ,CA model was used to apply lower constraints on juvenile survival from 2010-2012. These constraints match observed trends of low fawn ratios followed by very poor yearling buck ratios, implying over-winter fawn survival was poor. The AIC for the SCJ,CA model is the higher than the CJ,CA model due only to penalties incurred from constraining juvenile survival in these three years. The SCJ,CA model appears to be the best representation relative to the perceptions of managers on the ground and follows trends with license issuance and harvest success. However, since managers believe the herd unit boundaries to be highly permeable, and because there are no additional survival or population estimate data to augment the model, it is only considered to be fair in quality.

Management Summary

Traditional season dates in this herd run from October 15th through October 31st for limited quota licenses in Area 89, and October 15th through October 21st for general licenses in Area 88. The same season dates will be applied to the 2017 hunting season. There will be an addition of 25 Type 1 licenses to Area 89 to provide additional hunting opportunity, while allowing a high number of young age-class bucks another season to mature. Area 88-Type 6 licenses remain unnecessary, as there are currently no concerns regarding damage and few access opportunities on private lands. The 2017 season thus includes a total of 125 Type 1 licenses in Area 89, and a general season in Area 88 for antlered mule deer or any white-tailed deer. Goals for 2017 are to manage buck ratios within special management, and increase hunter success and satisfaction.

If we attain the projected harvest of 175 deer with fawn production similar to the five-year average, this herd will increase slightly. The predicted 2017 postseason population size for the Rattlesnake Mule Deer Herd Unit is approximately 5,500 deer, which is at objective.

Mule Deer - Rattlesnake
Hunt Areas 88, 89
Casper Region
Revised 4/88



2016 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2016 - 5/31/2017

HERD: MD759 - NORTH NATRONA

HUNT AREAS: 34

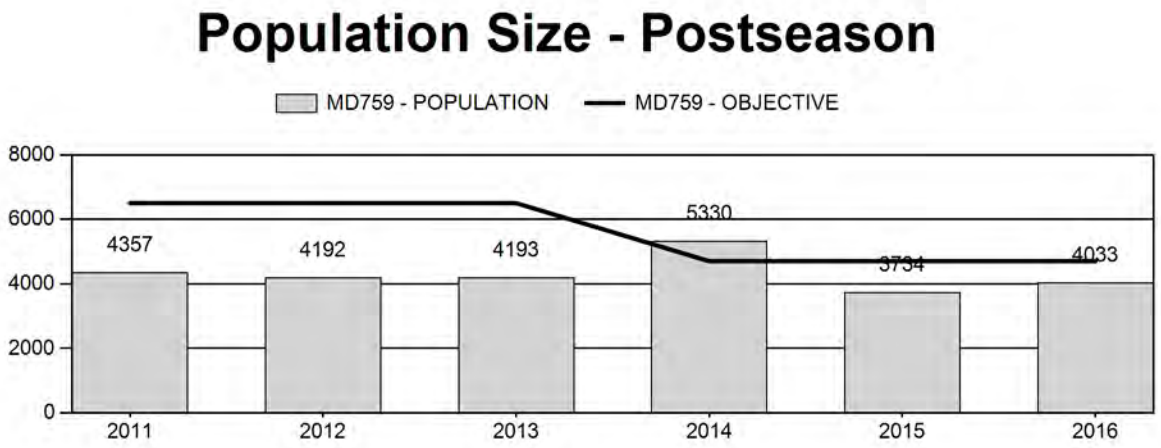
PREPARED BY: HEATHER O'BRIEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	4,361	4,033	4,623
Harvest:	177	144	187
Hunters:	234	188	225
Hunter Success:	76%	77%	83 %
Active Licenses:	244	188	225
Active License Success:	73%	77%	83 %
Recreation Days:	1,180	1,120	1,350
Days Per Animal:	6.7	7.8	7.2
Males per 100 Females	36	37	
Juveniles per 100 Females	67	74	

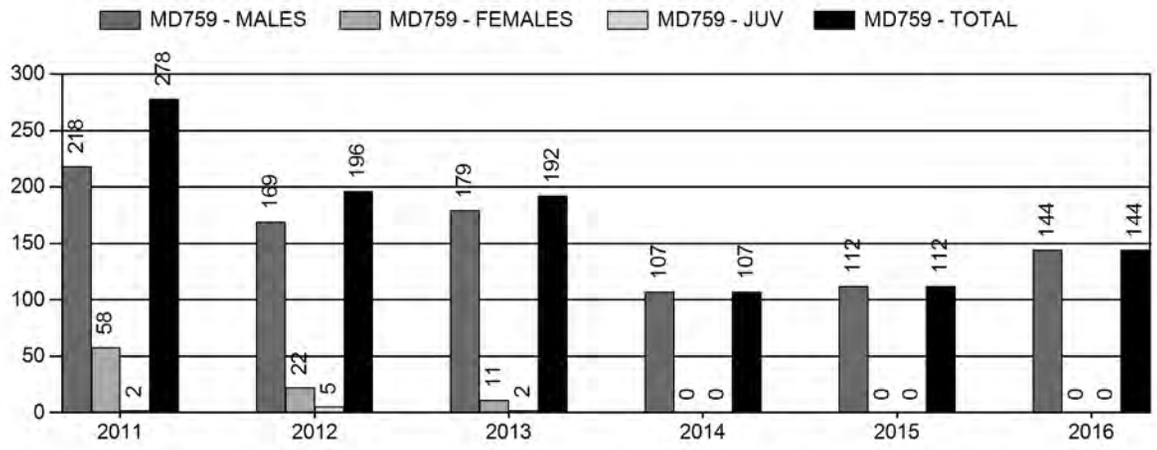
Population Objective (± 20%) :	4700 (3760 - 5640)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-14.2%
Number of years population has been + or - objective in recent trend:	3
Model Date:	02/28/2017

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

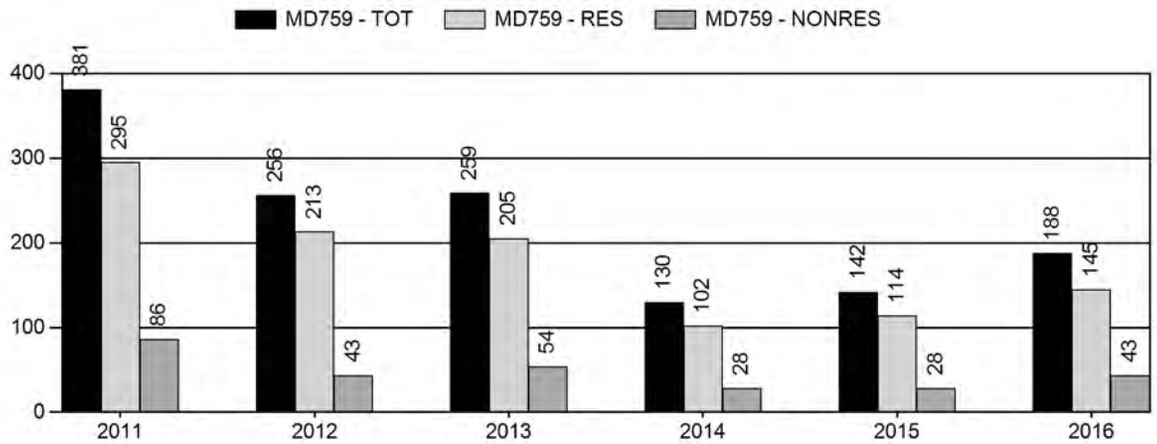
	JCR Year	Proposed
Females ≥ 1 year old:	0%	1.9%
Males ≥ 1 year old:	16.6%	14.9%
Total:	3.6%	4.3%
Proposed change in post-season population:	+1.3%	+14.3%



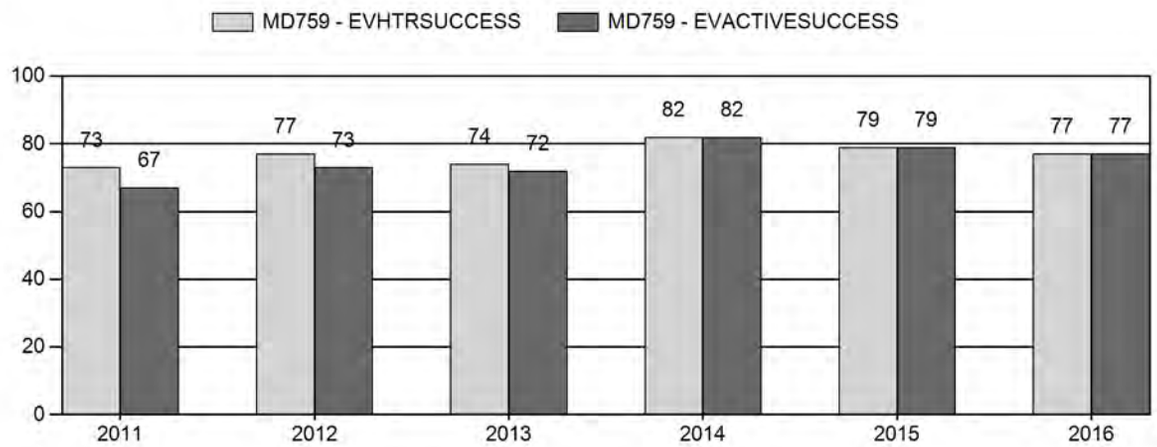
Harvest



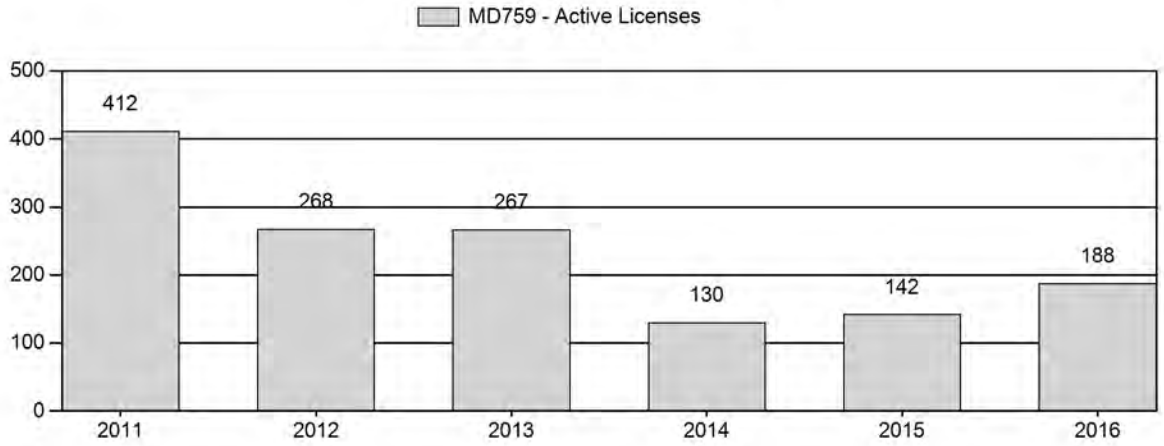
Number of Active Licenses



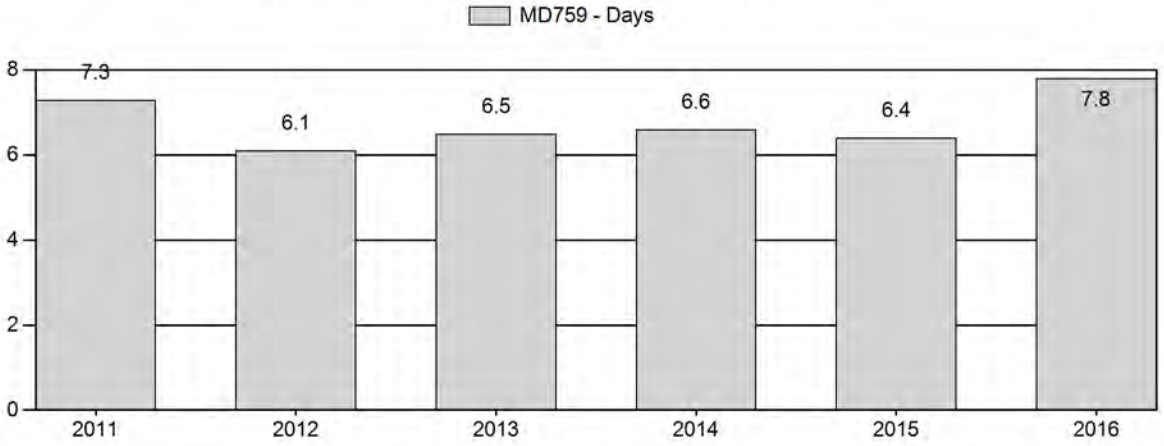
Harvest Success



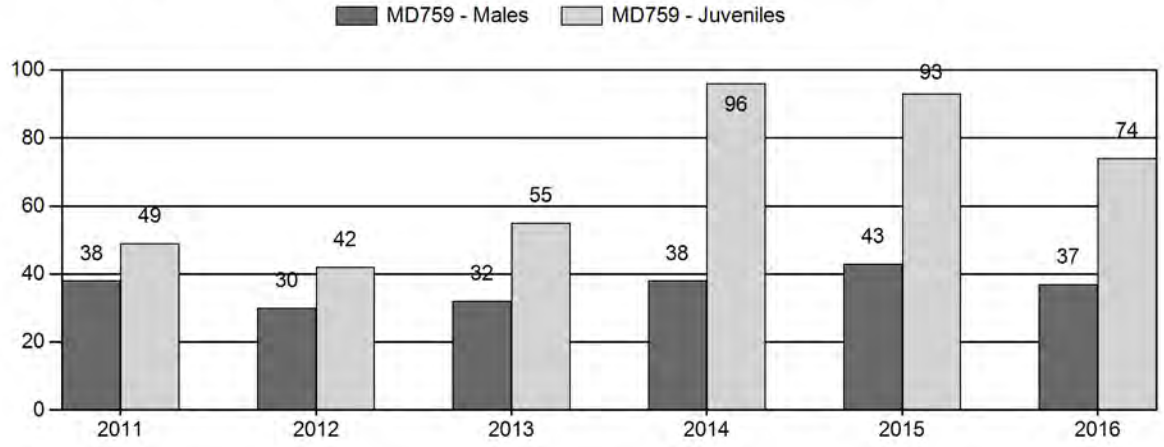
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2011 - 2016 Postseason Classification Summary

for Mule Deer Herd MD759 - NORTH NATRONA

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	4,357	52	64	34	4	0	154	20%	406	53%	200	26%	760	851	13	25	38	± 4	49	± 5	36
2012	4,192	36	91	20	6	0	153	18%	503	58%	212	24%	868	760	7	23	30	± 3	42	± 4	32
2013	4,193	28	60	19	1	0	108	17%	342	54%	187	29%	637	580	8	23	32	± 4	55	± 6	42
2014	5,330	51	84	30	2	0	167	16%	441	43%	425	41%	1,033	1,713	12	26	38	± 4	96	± 8	70
2015	3,734	78	93	22	1	0	194	18%	452	42%	419	39%	1,065	1,236	17	26	43	± 4	93	± 7	65
2016	4,033	68	105	36	3	0	212	18%	571	47%	425	35%	1,208	1,336	12	25	37	± 3	74	± 5	54

2017 HUNTING SEASONS
NORTH NATRONA MULE DEER HERD (MD759)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
34	1	Oct. 15	Oct. 31	200	Limited quota	Antlered deer
	7	Oct. 15	Nov. 30	50	Limited quota	Doe or fawn deer valid on private land
Archery		Sep. 1	Sep. 30			Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2016
34	1	No change
	7	+50

Management Evaluation

Current Postseason Population Management Objective: 4,700
Management Strategy: Special
2016 Postseason Population Estimate: 4,033
2017 Proposed Postseason Population Estimate: 4,600
2016 Hunter Satisfaction: 80% Satisfied, 10% Neutral, 10% Dissatisfied

The North Natrona Mule Deer Herd Unit has a postseason population management objective of 4,700 mule deer. The herd is managed using the special management strategy, with the goal of maintaining postseason buck ratios between 30-45 bucks per 100 does. The objective and management strategy were formerly reviewed and revised in 2014. Prior to this review, the population objective was 6,500.

Herd Unit Issues

Hunting access within the herd unit is very good, with large tracts of public land as well as Walk-In Areas available for hunting. The southeastern corner of the herd unit is the only area dominated by private lands. In this area, specific doe/fawn licenses have been added to address damage issues on irrigated agricultural fields in years when landowners agree to allow hunting

access. The main land use within the herd unit is traditional ranching and grazing of livestock. Industrial-scale developments, including oil and gas development, are limited and isolated within this herd unit.

Weather

The severe winter of 2010-2011 and subsequent drought of 2012 resulted in elevated mortality of mule deer in the North Natrona Herd Unit. Fawn ratios were also very low during this time period, and the population remained well below objective. From 2013 to the present, weather trends have been more favorable, and mule deer numbers have recovered quickly. Fawn production and survival increased from 2013 to 2015, as range conditions and nutritional status of does began to improve. The winter of 2015 was fairly average, though some areas experienced prolonged periods of persistent snow. The spring of 2016 was very wet, resulting in rapid plant growth and green-up of rangelands. The majority of the summer and fall were extremely dry, causing much of the available forage to cure. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided mule deer with a valuable boost in nutrition prior to the winter of 2016-2017. While there were several notable snow storms and cold snaps during the winter of 2016-2017, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Thus, managers expect fairly average mule deer survival for the winter of 2016-2017. For detailed weather data see http://www.ncdc.noaa.gov/gac/time-series/us.

Habitat

This herd unit has no established habitat transects to measure production and/or utilization on shrub species that are preferred browse for mule deer. Anecdotal observations during the summer 2016 growing season suggests range conditions were above average during the wet spring, but conditions became very dry during mid to late summer. Herbaceous forage species were observed to be in very good condition in spring and early summer, but had cured by mid to late summer. Late fall moisture and resulting green-up likely benefitted mule deer going into the winter months of 2016-17, and mule deer appeared to be in very good body condition during aerial and ground classification surveys during late November and early December 2016.

Field Data

From 2006-2013, fawn production/survival was moderate to poor, and reached a 15-year low in 2012. Fawn production has improved strikingly since then and reached a historic high of 96 per

100 does in 2014. Fawn production remained high in 2015 and 2016, with an observed fawn ratio of 93 and 74 per 100 does, respectively. Mild winter weather and excellent growing seasons have helped to improve conditions for fawns and lactating does. Overwinter survival of fawns has remained high as well, as evidenced by higher yearling buck ratios the past three years.

Buck ratios for the North Natrona Herd historically average in the mid 30s per 100 does. However, buck ratios declined in 2012-2013 to the lower cusp of special management. Yearling buck ratios were extremely poor during the same period, indicating poor recruitment and slowing the recovery of mature buck ratios. Buck ratios rebounded with a reduction in license issuance and improved fawn production/survival, and were near the upper threshold of special management by postseason 2015. Thus, license issuance was liberalized for 2016, and the buck ratio decreased slightly to 37 for postseason surveys. Despite an increase in license issuance, harvest success remained in the 76^{h} percentile for 2016, and hunter satisfaction improved to the 80th percentile. Management goals for 2017 are to maintain buck ratios within the range of special management while maintaining current license opportunity.

Since 2008, classified bucks have been further categorized based on antler size (Table 1). The best distribution of mature buck classes was observed in 2010, with 46% Class I (small), 37% Class II (medium), and 18% Class III (large) bucks. Bucks classified in 2013 showed a marked decrease in antler quality compared to previous years. Bucks classified in 2014 showed similar distribution, with a slight shift from Class I to Class II. In 2015, increased recruitment within younger age classes increased the proportion of Class I bucks within the herd. Similar to the pattern noted from 2013 to 2014, distribution of bucks shifted slightly from Class I to Class II from 2015 to 2016. While this herd has increased in size substantially due to high fawn production, there are two large cohorts of younger age-class bucks which will require a few years to mature to the point where most Type 1 license holders will pursue them. With hunter expectations high for trophy-quality hunting, managers view the current availability of trophy class bucks as further justification to maintain current issuance of Type 1 licenses for the 2017 hunting season.

Bio-Year	Total Class N for HA	# Bucks Classified					Buck Ratios per 100 Females					
		Ylng	Class I	Class II	Class III	Total	Ylng	Class I	Class II	Class III	All Adult	Total
2008	1,023	59	111 (73%)	36 (24%)	5 (3%)	211	11	20	7	1	28	39
2009	1,009	51	87 (60%)	44 (31%)	13 (9%)	195	9	16	8	2	26	35
2010	905	47	55 (46%)	44 (37%)	21 (18%)	167	10	12	9	4	25	35
2011	760	52	64 (63%)	34 (33%)	4 (4%)	154	13	16	8	1	25	38
2012	868	36	91 (78%)	20 (17%)	6 (5%)	153	7	18	4	1	23	30
2013	637	28	60 (75%)	19 (24%)	1 (1%)	108	8	18	6	0	23	32
2014	1,033	51	84 (72%)	30 (26%)	2 (2%)	167	12	19	7	1	26	38
2015	1,065	78	93 (80%)	22 (19%)	1 (1%)	194	17	21	5	0	26	43
2016	1,208	68	105 (73%)	36 (25%)	3 (2%)	144	12	18	6	1	26	37

Table 1. Antler classification analysis for the North Natrona Mule Deer Herd Unit, 2008-2016.

Harvest Data

Hunter success in the North Natrona Mule Deer Herd Unit is typically in the 70-80th percentile, and was 77% in 2016. Hunter days remained fairly average for this herd unit, at 7.8 days per animal, despite fairly low issuance of Type 1 licenses. Survey totals, comments from hunters and landowners, and population modeling all indicate this herd has grown consistently from 2013-present due to improved fawn production/survival. Thus, managers suspect hunters are being selective, as the herd has developed a reputation of having high quality mature bucks.

Tooth age data were collected from harvested bucks in the North Natrona Mule Deer Herd Unit in 2010 and 2013-2016 (Table 2). It should be noted that changes in overall sample size between years are in part due to reductions in license issuance between sample years. Comparing data between years shows a consistency of hunter selection for mature bucks, with the average and median age remaining within prime age classes for mule deer. Average antler spread reported by hunters has also remained relatively consistent across sample years. Relatively static results for average and median age of harvested bucks suggests availability of mature bucks has remained constant due to adjustments in license issuance. Therefore, these tooth-age data indicate past and current management prescription has resulted in most hunters harvesting prime-age bucks, which is consistent with management strategy.

	2010	2013	2014	2015	2016
Average Age	4.44	5.4	5.27	5.27	4.85
Median Age	4.5	5.5	4.5	4.5	5.5
Average Antler Spread	21.2	21.2	20	20.9	21.5
Sample Size (N) =	68	52	44	32	40

Table 2. Lab tooth age and antler spread data from Hunt Area 34 harvested mule deer, 2010, 2013-2016.

Population

The 2016 postseason population estimate was approximately 4,000, which represents an increase of approximately 600 deer since postseason 2015. No sightability or other population estimate data are currently available to further align the model in conjunction with postseason classification and harvest data. In the past, this herd has not typically exhibited abrupt changes in population size, as fawn production is usually moderate and habitat conditions are often fair. However, this herd appears to have grown rapidly over the past three years, due mainly to very high fawn production and good overwinter survival. Despite significantly reduced survey effort due to time and budget constraints in 2016, managers classified 1,208 mule deer during postseason classifications, the highest survey total on record for the herd unit. Higher densities of mule deer are also becoming a damage issue on irrigated farmlands in the southeast corner of the herd unit for the first time since 2011.

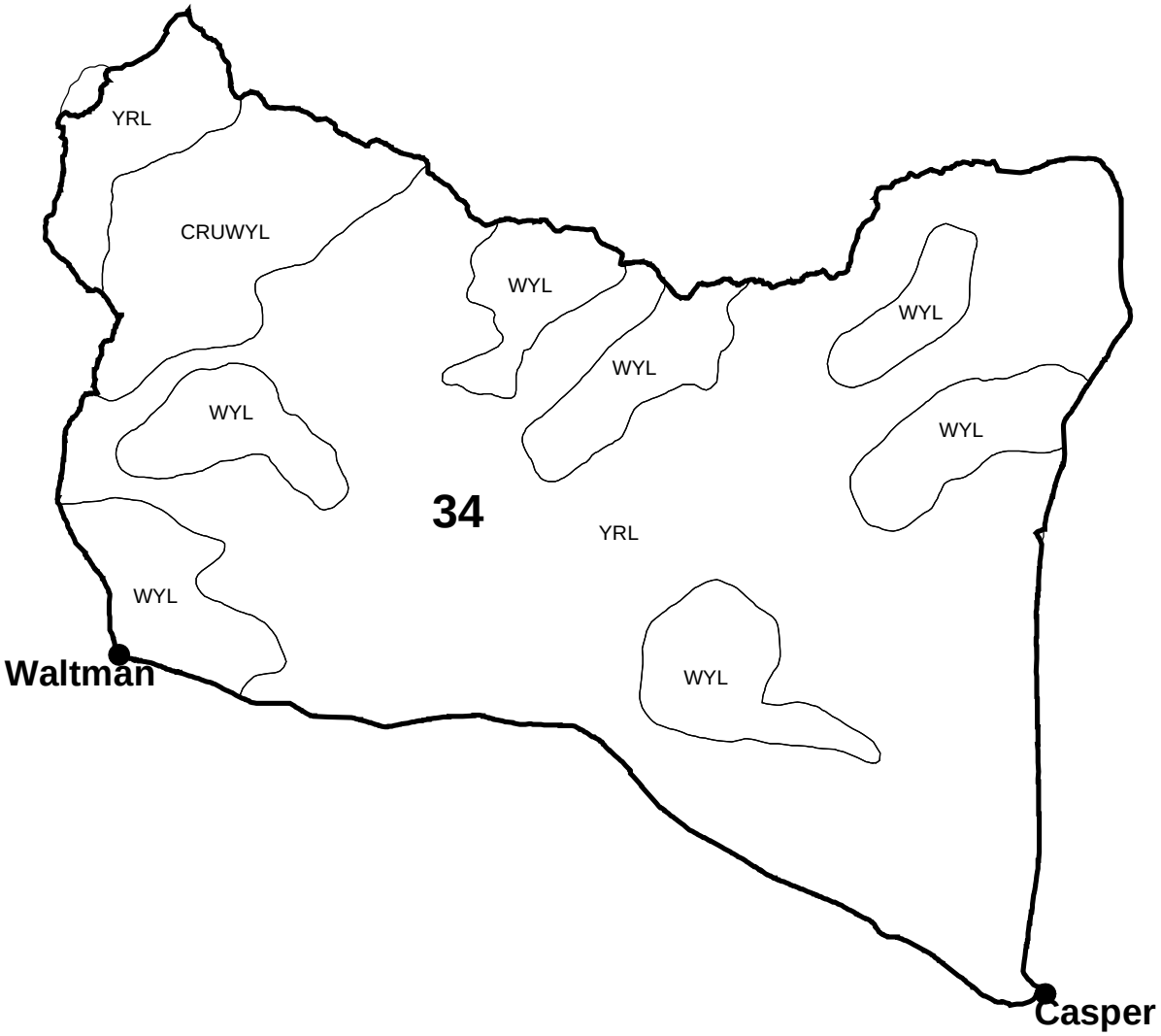
The "Semi-Constant Juvenile – Semi-Constant Adult Survival" (SCJ,SCA) spreadsheet model was chosen for the postseason population estimate of this herd. This model appears to be most representative of trends within the herd, especially during the years represented in middle portions of the model. More current years in the model may predict population size with less accuracy, as they need additional years of data to attenuate. Modeling this herd can be difficult, as harvest regimes are biased toward bucks and the model assumes unbiased harvest across age and gender as well as consistent hunter effort. The SCJ,SCA model selects an adult survival rate that is very reasonable for this herd, but was constrained to a lower survival range in 2010 to account for a harsh winter. Lower constraints for juvenile survival were raised from 0.4 to 0.6 to account for the milder winters of 2014 and 2015. Managers believe these to be acceptable adjustments, as they account for known winter conditions and produce model trends that track with observed trends. The CJ,CA model was rejected, as it predicts an unreasonably high rate of population growth. The TSJ,CA was rejected as it predicts a stagnation in population growth that does not correspond to high fawn production/survival and increased total mule deer surveyed over the past three years. All three models have AICs that are low and well within one magnitude of power of each other. Thus, AIC has little bearing on model selection for this herd. The SCJ,SCA model is considered to be of fair quality in representing population trends and estimates for this herd based on established model criteria.

Management Summary

Traditional season dates in this herd run for two weeks from October 15th through October 31st. The 2017 season offers the same number of Type 1 licenses, as these were increased in 2016. While population size has increased, buck ratios are in the middle of special management parameters, and distribution of mature bucks across antler classes is still mediocre. Thus, an increase in Type 1 license issuance is not warranted for the 2017 season. Managers would rather maintain high harvest success and hunter satisfaction while allowing younger bucks to mature into older age classes. In addition, 50 Type 7 licenses will be added for the 2017 season to address issues of mule deer congregating on irrigated farmlands. These licenses will be valid on private land only to curb potential damage issues, while conserving doe mule deer on native habitats.

If we attain the projected harvest of 187 mule deer with fawn ratios similar to a 5-year average, this herd will increase in size. The predicted 2017 postseason population size of the North Natrona Mule Deer Herd is approximately 4,600 animals, or 2% below objective.

Mule Deer - North Natrona
Hunt Area 34
Casper Region
Revised 4/88



2016 - JCR Evaluation Form

SPECIES: White tailed Deer | PERIOD: 6/1/2016 - 5/31/2017

HERD: WD706 - BLACK HILLS

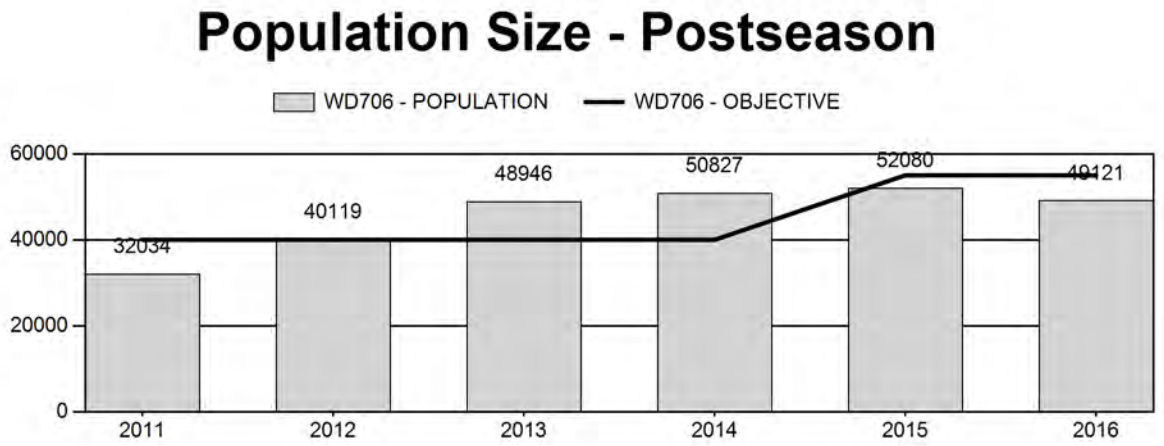
HUNT AREAS: 1-6 | PREPARED BY: JOE SANDRINI

	2011 - 2015 Average	2016	2017 Proposed
Population:	44,801	49,121	52,558
Harvest:	4,233	6,772	6,870
Hunters:	6,903	9,764	9,800
Hunter Success:	61%	69%	70 %
Active Licenses:	7,341	10,596	10,700
Active License Success:	58%	64%	64 %
Recreation Days:	29,918	39,499	40,000
Days Per Animal:	7.1	5.8	5.8
Males per 100 Females	27	32	
Juveniles per 100 Females	73	68	

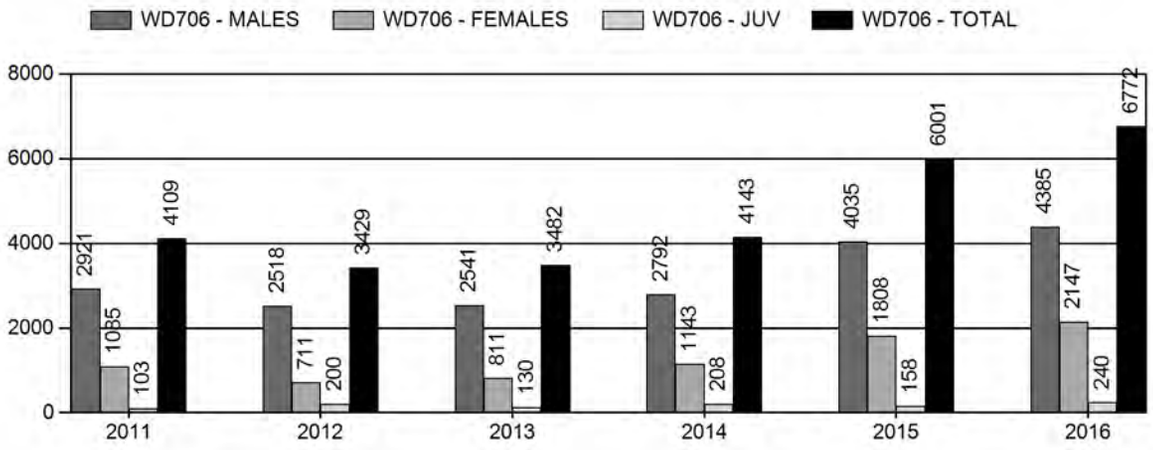
Population Objective (± 20%) :	55000 (44000 - 66000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-10.7%
Number of years population has been + or - objective in recent trend:	9
Model Date:	02/22/2017

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

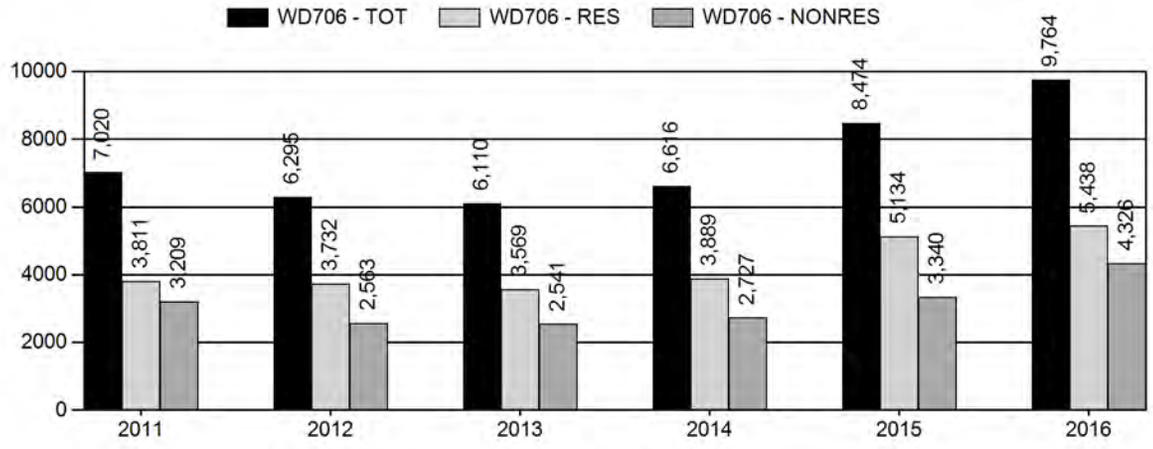
	JCR Year	Proposed
Females ≥ 1 year old:	8.8%	8.8%
Males ≥ 1 year old:	41.0%	40.4%
Total:	13.2%	12.6%
Proposed change in post-season population:	2.3%	+7.0%



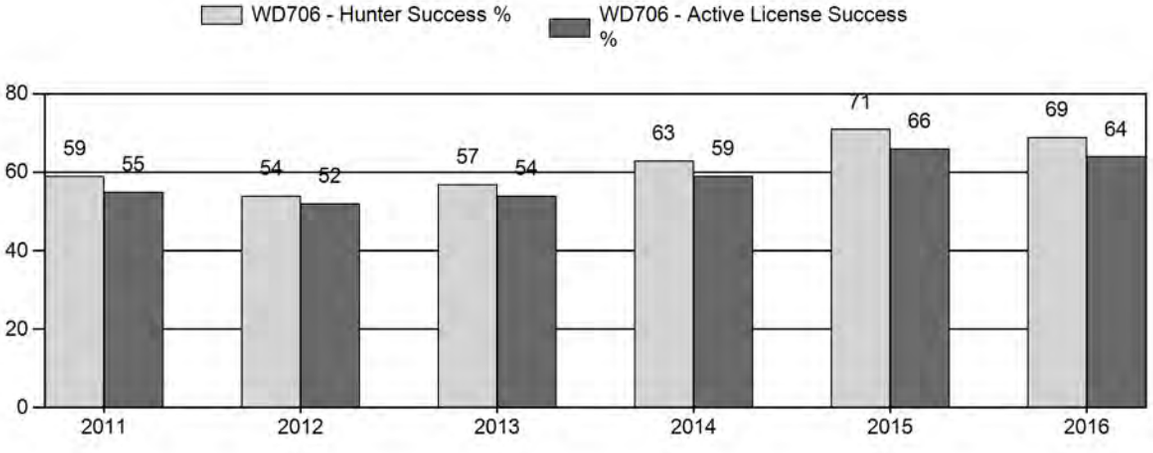
Harvest



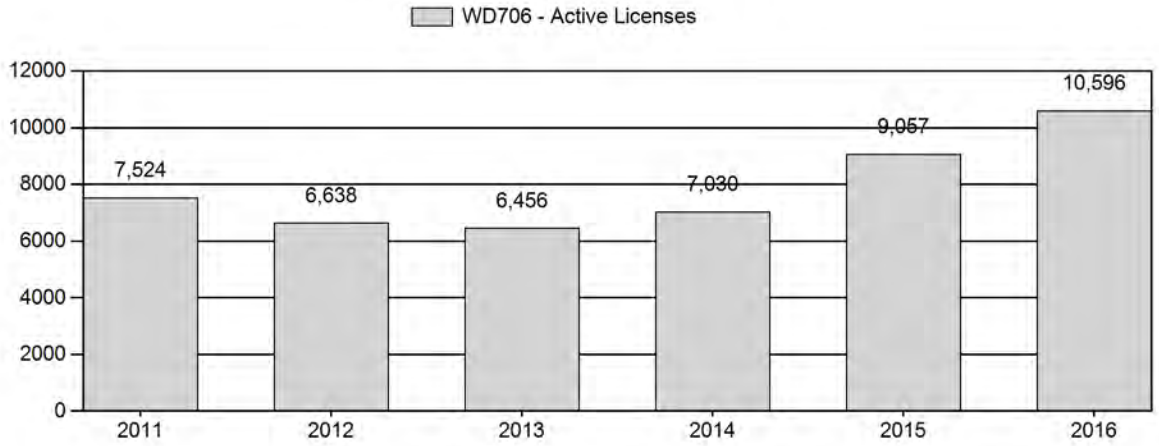
Number of Active Licenses



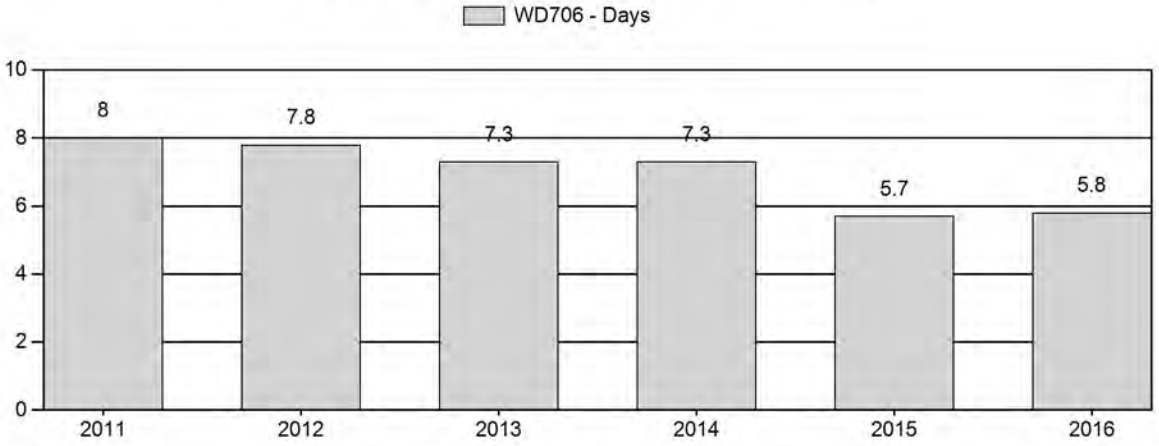
Harvest Success



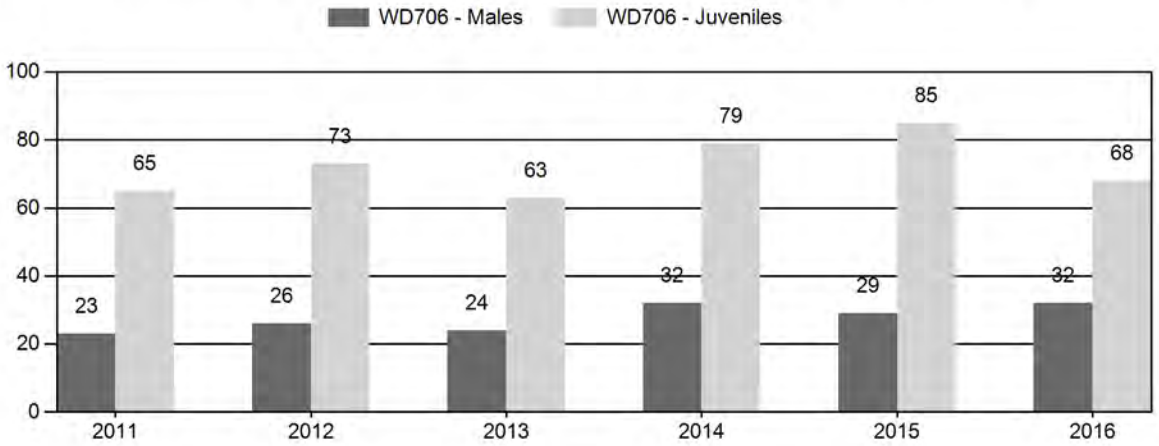
Active Licenses



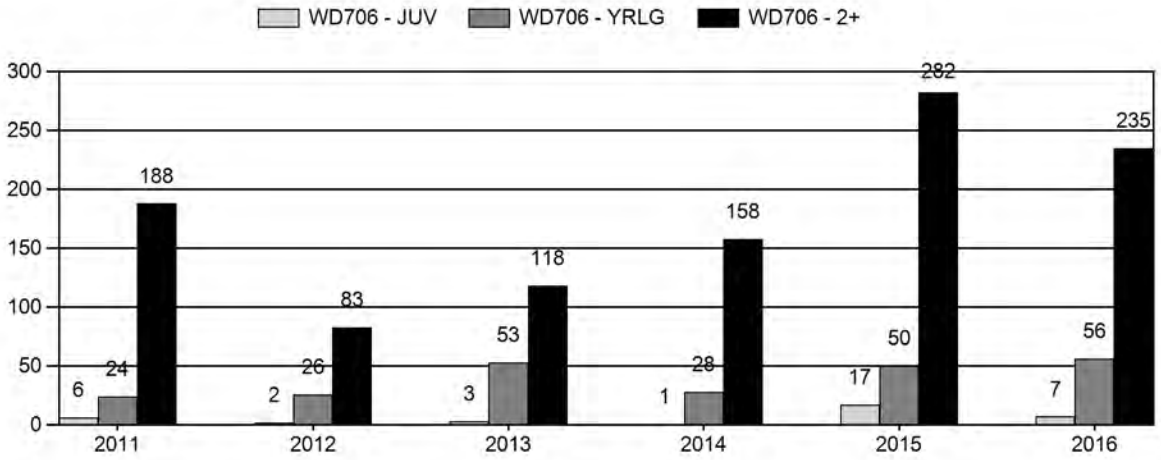
Days Per Animal Harvested



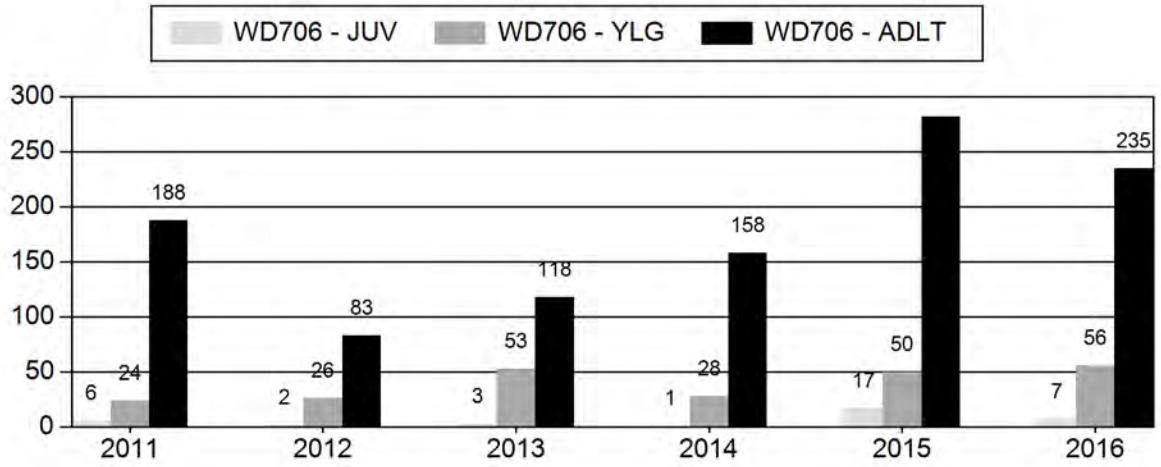
Preseason Animals per 100 Females



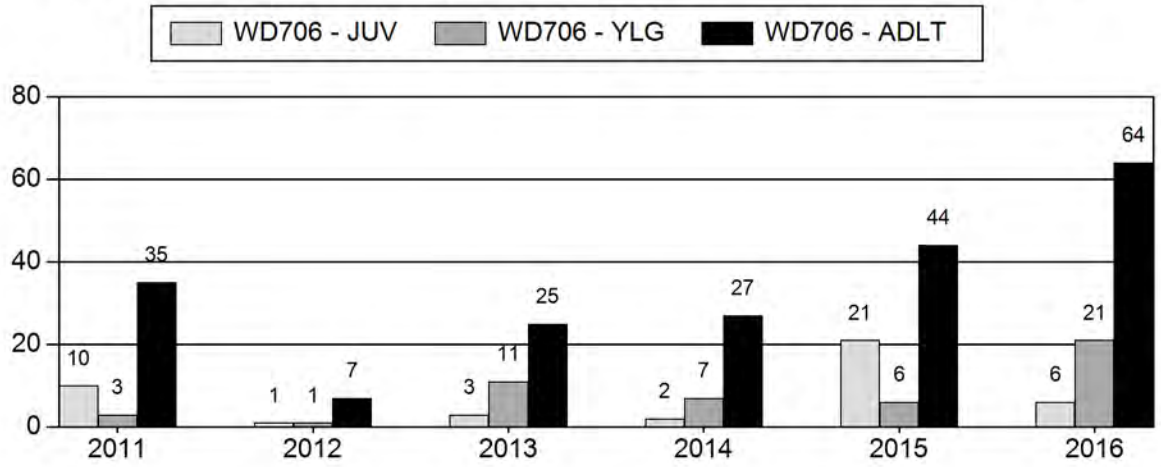
Age Structure of Field Checked Males



Age Structure Data (Field and Laboratory) - Male



Age Structure Data (Field and Laboratory) - Female



2011 - 2016 Preseason Classification Summary

for White tailed Deer Herd WD706 - BLACK HILLS

		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
2011	36,554	48	149	197	12%	856	53%	559	35%	1,612	1,278	6	17	23	± 0	65	± 0	53
2012	43,891	93	143	236	13%	919	50%	675	37%	1,830	1,590	10	16	26	± 0	73	± 0	58
2013	52,709	163	153	316	13%	1,303	53%	827	34%	2,446	1,232	13	12	24	± 0	63	± 0	51
2014	55,385	111	198	309	15%	980	47%	778	38%	2,067	1,888	11	20	32	± 0	79	± 0	60
2015	58,681	157	212	369	14%	1,276	47%	1,079	40%	2,724	2,132	12	17	29	± 0	85	± 0	66
2016	56,571	169	224	393	16%	1,216	50%	825	34%	2,434	1,464	14	18	32	± 0	68	± 0	51

2017 HUNTING SEASONS
BLACK HILLS WHITE-TAILED DEER HERD (WD706)

Hunt Area	Type	Dates of Seasons Opens	Closes	Quota	License	Limitations
1		Nov. 1	Nov. 30		General	Antlered white-tailed deer off private land; any white-tailed deer on private land
1	7	Nov. 1	Nov. 20	200	Limited quota	Doe or fawn valid on private land
1, 2, 3	8	Nov. 1	Nov. 30	3,500		Doe or fawn white-tailed deer valid on private land
2		Nov. 1	Nov. 30		General	Antlered deer off private land; any deer on private land
2	6	Nov. 1	Nov. 30	500	Limited quota	Doe or fawn valid on private land
3		Nov. 1	Nov. 30		General	Antlered deer off private land; any deer on private land
4		Nov. 1	Nov. 20		General	Antlered deer off private land; any deer on private land, except the lands of the State of Wyoming's Ranch A property shall be closed
4	6	Nov. 1	Nov. 20	300	Limited quota	Doe or fawn valid on private land
5		Nov. 1	Nov. 20		General	Antlered deer off private land; any deer on private land
5	6	Nov. 1	Nov. 20	150	Limited quota	Doe or fawn
6		Nov. 1	Nov. 20		General	Antlered deer off private land; any deer on private land
Archery		Sep. 1	Sep. 30			Refer to license type and limitations in Section 2

Region A Nonresident Quota: 4,500

SUMMARY OF CHANGES IN LICENSE NUMBER

Hunt Area	License Type	Quota change from 2016
1	*7*	*see MD751*
1,2,3	8	none
2	*6*	*see MD751*
4	*6*	*see MD751*
5	*6*	*see MD751*
Herd Unit Totals	**8**	**none**
	Region A	***None (see MD751)***

Management Evaluation
Current Management Objective: 55,000
Management Strategy: Recreational
2016 Postseason Population Estimate: ~ 49,100
2017 Proposed Postseason Population Estimate: ~ 52,600
2016 Hunter Satisfaction: 81% Satisfied, 13% Neutral, 6% Dissatisfied

HERD UNIT ISSUES: In 2015, the management objective of the Black Hills White-Tailed Deer Herd Unit was revised to a post-season population of 55,000 white-tailed deer. Prior to this revision, an objective of 40,000 had been in place since 1983. The herd continues to be managed under the Department's "Recreational Management Strategy," which calls for 24 to 44 bucks per 100 does pre-season.

Over the years, modeling this population has been extremely difficult and frustrating. This is due to substantial interstate movement of deer, wide fluctuations in observed fawn:doe ratios, large changes in doe harvest, regular outbreaks of epizootic hemorrhagic disease virus (EHDV), mountain lion predation, a high level of vehicle-deer collisions, severe weather events, and low and irregular visibility of bucks during classifications. Consequently, the population model is thought to be of low quality and estimates produced by the model should be viewed cautiously. Because of this, and the fact that much of the herd unit is comprised of private property, management of this herd has been based heavily on perceptions of deer numbers relative to landowner tolerance.

The Black Hills White-Tailed Deer Herd unit is located primarily within Crook and Weston Counties in northeastern Wyoming and encompasses about 3,140 mi^2 of occupied habitat. Seasonal range maps for this herd were updated in 2004, and currently 335 mi^2 are delineated as crucial winter range. Dominant land uses in the herd unit include livestock grazing and forage crop production. Most forested lands are actively managed for timber production and harvest. There is some extraction of minerals, primarily bentonite and oil. The majority of white-tailed deer are found in the eastern two-thirds of this herd unit and within the Belle Fourche River drainage where habitat is most favorable.

Approximately 79% of the land within this herd unit is privately owned. The largest blocks of accessible public land are found on the Black Hills National Forest in Hunt Areas (HA) 2 and 4, Thunder Basin National Grasslands in HA 6, and BLM lands in HA 1. Due to the late timing of deer hunting season in the Black Hills relative to other areas in Wyoming and the potential to harvest a whitetail on public land, this herd unit is extremely popular with resident hunters (hosting over 5,400 resident hunters in 2016). Its proximity to the upper Midwestern United States and availability of sympatric mule deer hunted concurrently also make it very popular with non-residents as well (over 4,300 in 2016). Access fees for hunting are very common on private land, and many holdings have been leased to outfitters. Consequently, accessible public lands are subject to very heavy hunting pressure, probably the highest in the State. Due to limited access for hunters to private land, keeping the growth of this herd in check is difficult when habitat and weather conditions are favorable.

Whitetails are the most numerous deer species in HA's 2 and 4, whereas more equal proportions or greater numbers of mule deer occupy HA's 1, 3, 5, and 6 depending upon habitat type. A high proportion of white-tailed deer in the herd unit reside on private land. This results in their management being strongly influenced by landowner sentiments. Field personnel report white-tailed deer numbers (primarily north of I-90) are now close to or exceeding local tolerance. A survey of about 450 Black Hills landowners at the end of 2014 revealed half of the respondents (52%) having whitetails on their property believed their numbers to be "about right;" while just over a third (35%) reported their numbers to be "too low;" and only 13% felt whitetail numbers were "too high." More recently, as this population has rebounded, fewer landowners are asking to see more deer on the landscape, hunter satisfaction has increased, and more landowners would like to reduce white-tailed deer numbers.

WEATHER: The second half of the last decade saw a transition from persistent drought to decent growing season moisture, while about average winter conditions persisted most years. This white-tailed deer population peaked during that time and then began to decline. The weather may have contributed to the decline as peak populations coincided with the last few years of an eight year drought, sending high populations into poor forage winters. This resulted in some detected mortality in late winter and early spring - most notably during the 2010-11 winter, which was harsh. More recently, severe drought plagued the Black Hills throughout 2012, and a class III drought beset the much of the herd unit during the primary growing season in 2016. Both of these transient droughts resulted in very poor forage production and led to several large wildfires. However, the inter-drought period provided growing seasons with temperatures and rainfall generally above average. This resulted in good to excellent forage growth from 2013 through 2015. Fall and winter weather over that same timeframe was characterized by normal to above average temperatures and average to below normal precipitation. However, coming on the heels of the 2016 drought, more normal to severe winter weather was again experienced. See http://www.ncdc.noaa.gov/cag/ for detailed weather information.

Based upon weather, habitat conditions and deer numbers, it is likely white-tailed deer entered the 2014-15 and 2015-16 winters in good to excellent condition. In addition, winter weather those years resulted in excellent over-winter survival, as indicated by pre-season yearling buck ratios about 30% above average in both 2015 and 2016. The changes witnessed in bio-years 2014 & 2015 were a reversal of what was experienced as this herd declined from 2007 to 2011 before beginning to rebound in 2012.

HABITAT: Ponderosa pine (*Pinus ponderosa*) is the dominant overstory species on forested lands. Quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and bur oak (*Quercus macrocarpa*) stands are also present. Many areas dominated by deciduous trees are in late successional stages. Important shrubs include Saskatoon serviceberry (*Amelanchier alnifolia*), Oregon grape (*Berberis repens*), common chokecherry (*Prunus virginiana*), and wild spiraea (*Spirea betulifolia*). Non-timbered lands in this portion of the herd unit are used to produce agricultural crops such as winter wheat (*Triticum aestivum*), alfalfa hay (*Medicago sativa*), or mixed-grass hay.

FIELD DATA: Preseason age and sex classifications are conducted in this herd unit during the second half of October each year along standardized routes. Most of these routes have been used for over 40 years. Since the 1980's, fawn production and survival has been generally below that observed in most white-tailed deer herds, and at times fluctuated dramatically. The underlying cause is thought to be related to poor nutrition and body condition of does. However, over the last decade observed fawn:doe ratios have generally improved and fluctuations diminished (Figure 1), likely a result of vegetative responses to fire enhancing forage quality and quantity.

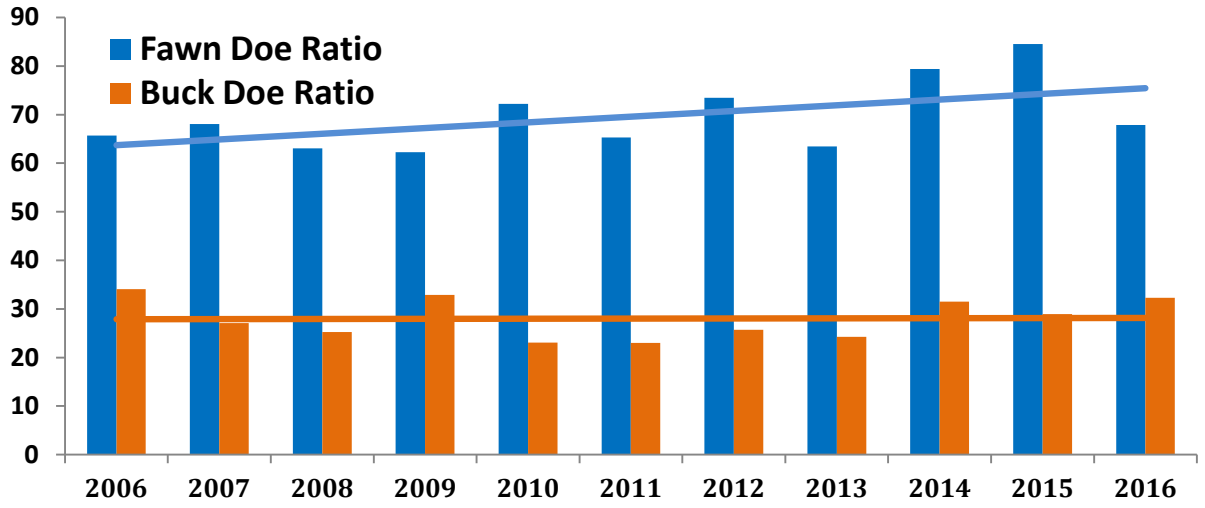


Figure 1. Observed, preseason fawn:doe and buck:doe ratios in the Black Hills White-Tailed Deer Herd (2006-2016).

This herd's observed, preseason buck:doe ratios are at the lower end of the Department's recreational management criteria. However, it should be noted that classifications are made outside the rut, and because whitetails are secretive we have always modeled this herd's preseason buck:doe ratio about 30% above observed values. This corrective factor was determined from historical modeling efforts with POP-II and the inflation in buck:doe ratios needed to get those models to run given harvest levels of bucks. Additionally, there have been occasional years when observed buck ratios inexplicably jumped about 30% (something attributed to intermittently enhanced visibility of bucks). Overall, preseason buck:doe ratios the past ten years have been generally stable ($mean_{(07\text{-}16)}$ = 27:100; std. dev = 3.8). This stability is thought to be a result of substantial reductions in buck hunting pressure when this population declined and non-hunting mortality increased. The recent, observed increases in the preseason buck:doe ratio have probably been due to a combination of transient, enhanced visibility and increased fawn production and survival.

HARVEST DATA: In the Black Hills, deer management entails regulating both mule deer and whitetail harvest under general license season structures across a variety of habitats, with serious deference given to landowner desires. Historical analysis of harvest information suggests hunter number has the greatest impact on buck harvest. Therefore, buck harvest has been regulated by altering non-resident hunter participation via changes in the Region A quota, while resident buck hunter participation can only be limited by shortening the season - notably by inclusion or removal of the Thanksgiving Day weekend and the days following in those hunt areas north of I-90. This alteration of season length impacts resident hunter participation by encouraging or curtailing the late season influx of hunters during a period when buck deer are highly vulnerable to harvest. For example, when the 30-day white-tailed deer hunting season was reinstated in these hunt areas during 2015 & 2016, resident hunter numbers increased about 40% above the average number witnessed the five preceding years when shorter seasons were in place.

With conservative hunting season structures in place between 2010 and 2013, harvest of both antlered and antlerless whitetails dropped. After 2014, as this herd began to recover, doe/fawn license issuance was increased and buck harvest climbed with increases in the Region A quota and resident hunter participation. As a result, annual harvest has increased 63% since 2014. Additionally, after a five year period of fairly consistent harvest success, both hunter success and active license success climbed in 2014 and 2015, then leveled off in 2016. Overall, harvest statistics strongly support the current population model's projection that this population peaked in 2007, declined substantially, and has since increased.

Hunting seasons between 2010 and 2014 reduced annual harvest of whitetail bucks about 30% from that experienced during the traditional November season the preceding four years. Comparing these time periods, resident harvest of white-tailed bucks dropped about 20%, while non-resident harvest of white-tailed bucks dropped closer to 40%. As mentioned above, resident hunter numbers have increased substantially since 2014, as the white-tailed deer hunting season was extended to the entire month of November in HA's 1, 2, & 3. Likewise, increases in the Region A quota have put significantly more non-resident hunters on the ground. As a result, white-tailed buck harvest has risen nearly 60% since 2014.

Despite the harvest trends, preseason whitetail buck:doe ratios held fairly stable and deer hunter satisfaction remained essentially unchanged between 2011 and 2013, with about 68% of white-tailed deer hunters reporting they were either satisfied or very satisfied with their Black Hills deer hunt. Satisfaction improved in 2014 as hunter success climbed and effort dropped, with 75% of the white-tailed deer hunters reporting they were satisfied. With continued good success and declines in the effort required to harvest a deer, hunter satisfaction improved to a level just above 80% in both 2015 and 2016.

POPULATION: As noted above, population modeling of this herd has always been very difficult and problem filled. In 2014, the spreadsheet model for this herd was reconstructed and re-initiated after correcting errors detected in the previous model and experimenting with models of various constructions. Of the final three competing spreadsheet models, the Semi-Constant Juvenile / Semi-Constant Adult survival (SCJ SCA) model has continued to be selected each year to estimate this population. In a change from prior years, the present model was set to solve through the projected bio-year (2017) instead of only on years for which actual field data exist. This change lowered the 2016 population estimate somewhat, but allows for consideration of increased mortality during season setting given the more severe winter experienced.

While the Constant Juvenile / Constant Adult survival (CJ CA) model will function with this herd's observed data set, it produces an essentially stable population of about 87,000 deer since 1993, which does not comport at all with field observations or harvest statistics. The AICc of this model is also about double that of the competing models and it most poorly fits observed data. On the other hand, the Time Sensitive Juvenile / Constant Adult survival model (TSJ CA) yields an AICc value about 15% lower than that of the SCJ SCA model and provides best fit of observed buck:doe ration data. However, this model was rejected because in order to get it to function, juvenile survival rates had to be allowed to vary down to 25% in 8 out of 23 years, and it predicts very low (about 33%) survival in four other years. Additionally, this model is not as well correlated with preseason trend count data or harvest statistics. The SCJ SCA model is 72% correlated with preseason trend counts while the TSJ CA model is only 63% correlated (Figure 2). The preseason population estimates produced by the SCJ SCA model are also better correlated with hunter success (87% compared to 57% with the TSJ CA model). Similarly, preseason population estimates of the SCJ SCA model exhibit a 76% inverse correlation with hunter effort, while the TSJ CA model predictions are negatively correlated at only 56%. Finally, the trends produced by the SCJ SCA model are more congruent with field personnel and landowner perceptions. However, this model does indicate a substantial decline in the population in 2009 that was not actually realized until after the 2010/11 winter. Also on the flip side, the SCJ SCA model estimates a mean buck harvest rate of 40% since 2000, while the TSJ CA model produces a mean buck harvest percentage value of 31% (something more tenable). Therefore, due to the variety of factors identified, we consider the chosen model to be of poor quality, but better than the competing models.

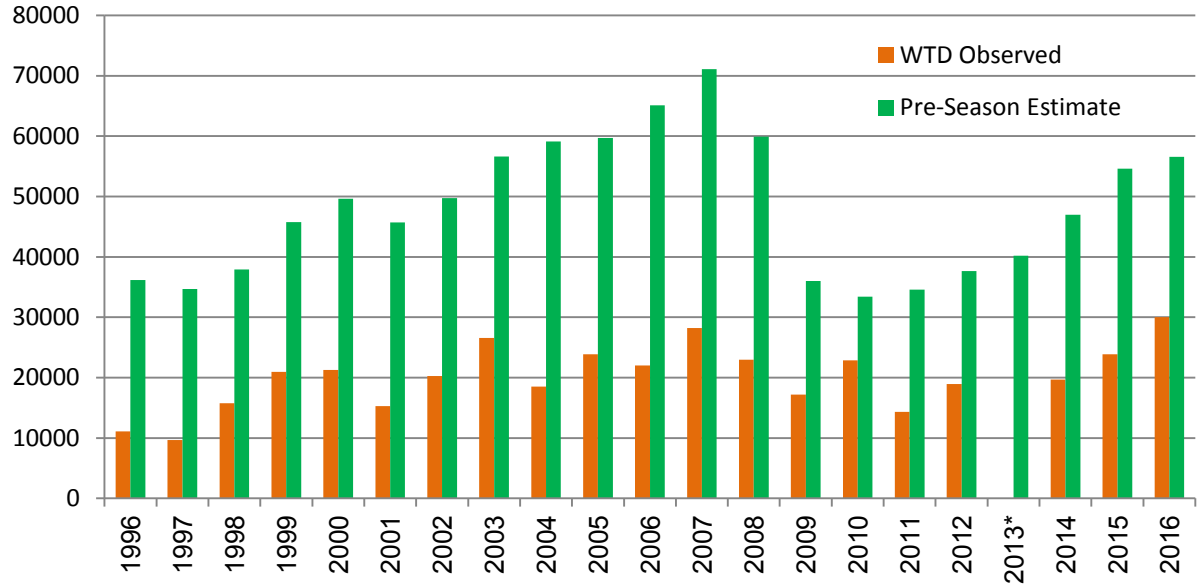


Figure 2. 1996-2016 white-tailed deer, estimated preseason population and trend count data, increased by a factor of 5. *Note, trend count not completed 2013.*

It should also be noted that the post-season population estimates recorded in the JCR program and presented on page 1 are no longer updated each year, but rather remain fixed following JCR finalization in a given bio-year. Because of this, and the fact that estimates produced by the

models at the beginning and ending years of model construction are the most tenuous and subject to change as more years of data are added, the estimates provided in Figure 3 better reflect recent trends in this herd's population size.

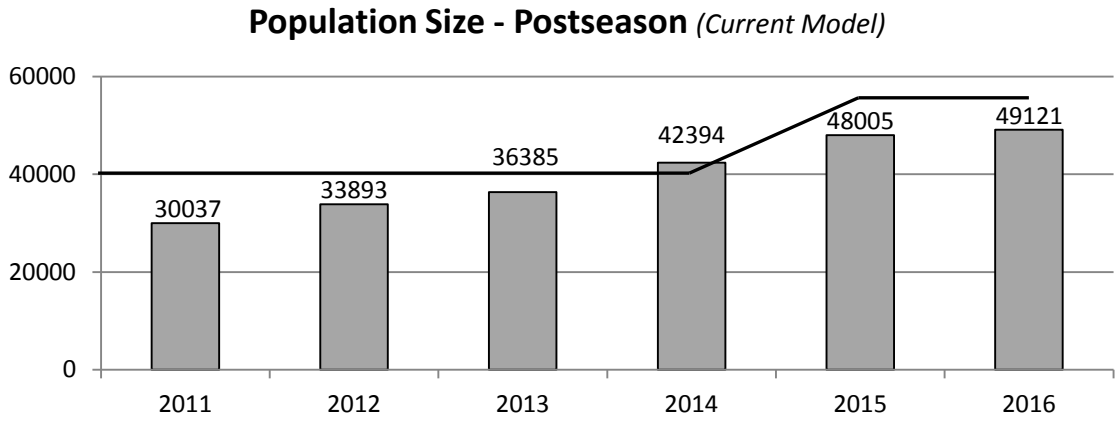


Figure 3. Post-season population estimates produced by the 2016 SCJ SCA model

Based upon the current SCJ SCA model, this population grew 56% between 2001 and 2007. The population then about declined 55% to its low point in 2010, before rebounding 71% through 2016. The 2007 peak, subsequent decline and rebound in the population reflects overall field observations. However, as previously noted, by all accounts this population dropped steadily from 2007 through 2011 – a trend shown one year antecedent in the model's projections. If population estimates produced by the spreadsheet model are close to accurate, then our current objective is near landowner tolerance and yields excellent hunter satisfaction.

During the last substantial population rise, hunting seasons in this herd unit were structured to retard growth, which was only mildly successful. Population growth was reversed in 2007, but that directional change was due primarily to increased non-hunting mortality rather than enhanced harvest. Reductions in survival rates were most ostensibly attributed to increased over-winter mortality and EHDV outbreaks. Between 2007 and 2010, evidence also suggests the mountain lion population in the Black Hills reached historically high levels. As a result, elevated harvest, weather conditions, disease and increased predation acted in concert to reduce this population considerably. In response, hunting seasons were very conservative between 2010 and 2013, which allowed this herd to increase as reproduction and survival improved. As this herd has rebounded significantly over the past three years, hunting seasons again have been liberalized.

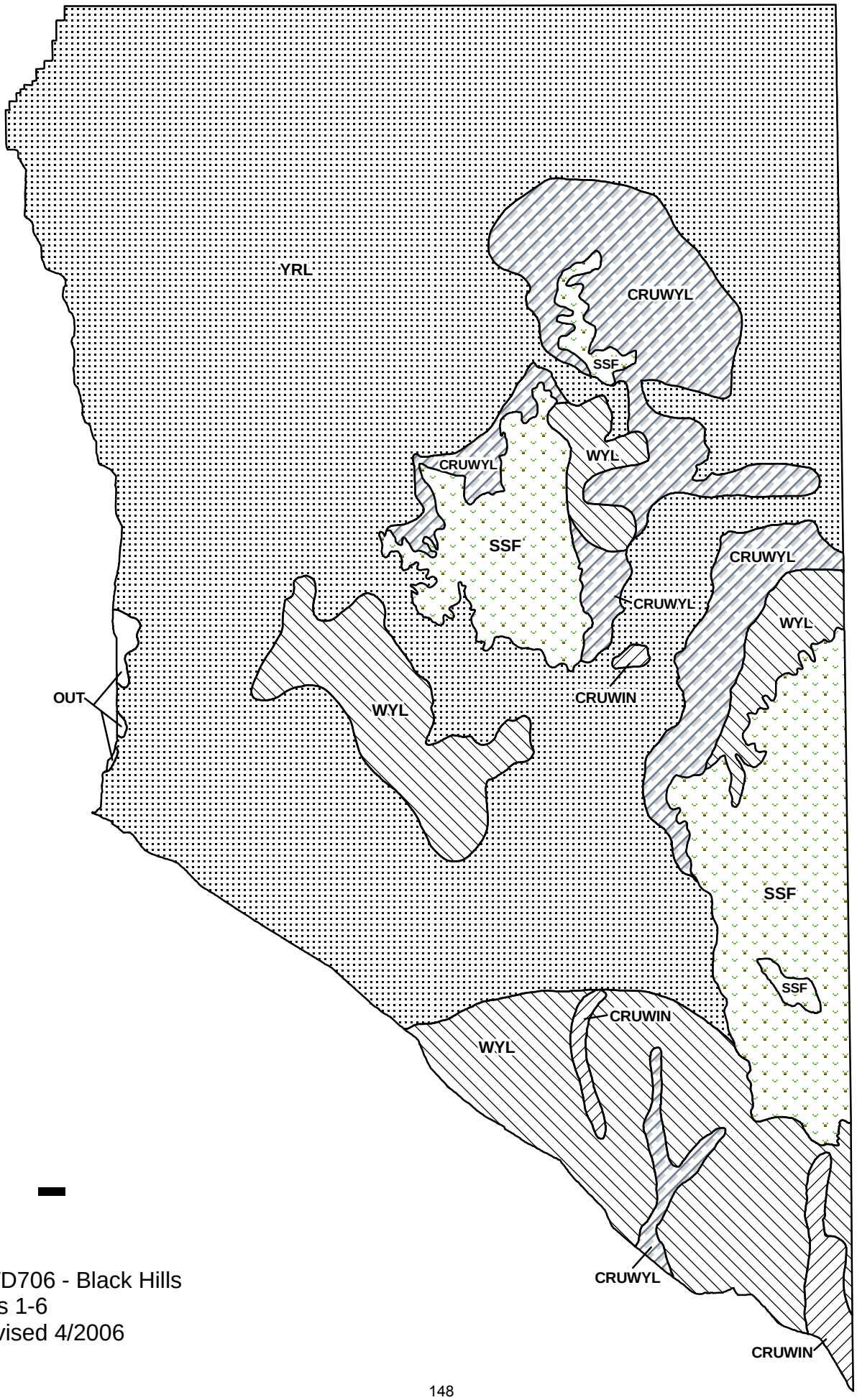
MANAGEMENT SUMMARY: Changes to the 2017 white-tailed deer hunting season in the Black Hills were designed to maintain buck harvest at 2016 levels and increase take of antlerless white-tailed deer slightly. This season structure also maintains the traditional November 30th closing date in Hunt Areas 1, 2, and 3, and that of November 20th in HA's 4, 5, & 6. These structures have been put in place to continue to temper population growth and stabilize the buck:doe ratio with what has likely been increased over-winter mortality compared to the previous two years.

Whitetail buck numbers have improved in recent years based upon classification data and population estimates. As such, there should be a strong cohort of 1 to 3 year-old bucks available for hunters in 2017, along with a fair contingent of 4 & 5 year-old bucks. As such, it seems

prudent to maintain buck harvest even with some increased non-hunting mortality. This will also help maintain non-resident hunter numbers, which is important to affect doe harvest. White-tailed doe harvest needs to be sustained or augmented as well to begin to stabilize this population. It is projected Region A license issuance and continuation of a 30-day season north of Interstate Highway 90 will yield harvest rates similar to 2016, and the buck:doe ratio should drop slightly.

In order to help limit herd growth and allow landowners to be proactive in curbing increases in whitetail numbers, issuance of Type 8 doe/fawn white-tailed deer licenses valid on private land in HA's 1, 2, & 3 has been maintained for 2017 (note, 42% of these licenses remained unsold in 2016). This follows an almost 300% increase in issuance of these license types between 2013 and 2016. Availability of Type 6 & 7 doe/fawn licenses in HA's 1 & 2, which are valid for both mule deer and white-tailed deer on private land, has been increased about 15%; and south of I-90 Type 6 license issuance in HA's 4 and 5 was maintained at 2016 levels.

The 2017 hunting season is expected to yield an estimated postseason population of about 52,600 white-tailed deer, which represents a 7% increase in the current post-season population. However, these projections assume over-winter survival will be average and summer losses to EHDV minimal. Provided the change in population is reached, this herd would be about 4% below objective, and near a number most landowners would like to see at this time while still satisfying hunters.



WTD706 - Black Hills
HAs 1-6
Revised 4/2006

2016 - JCR Evaluation Form

SPECIES: White tailed Deer | PERIOD: 6/1/2016 - 5/31/2017

HERD: WD707 - CENTRAL

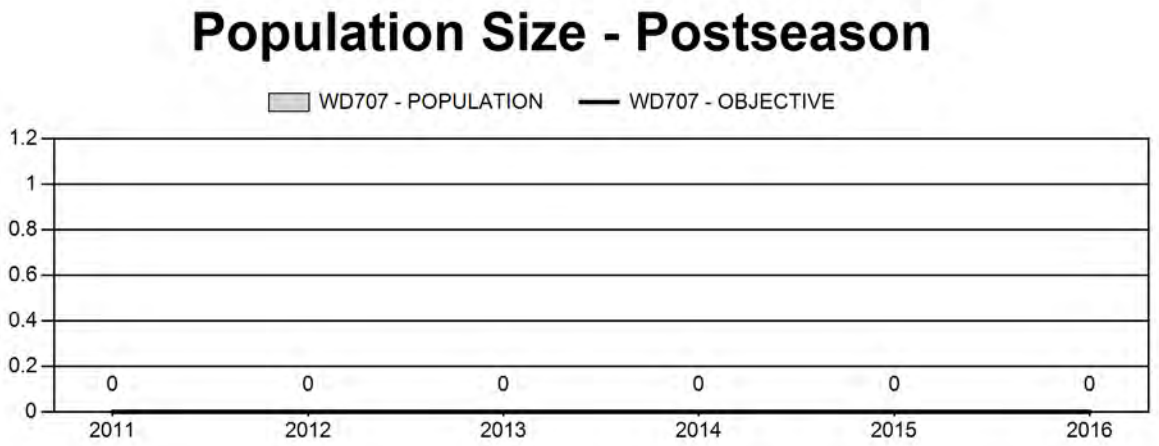
HUNT AREAS: 7-14, 21-22, 34, 65-67, 88-89 | PREPARED BY: WILLOW STEEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	0	N/A	N/A
Harvest:	1,143	908	1,200
Hunters:	2,465	2,007	2,200
Hunter Success:	46%	45%	55%
Active Licenses:	2,835	2,253	2,400
Active License Success:	40%	40%	50%
Recreation Days:	12,328	8,248	8,500
Days Per Animal:	10.8	9.1	7.1
Males per 100 Females	35	32	
Juveniles per 100 Females	66	69	

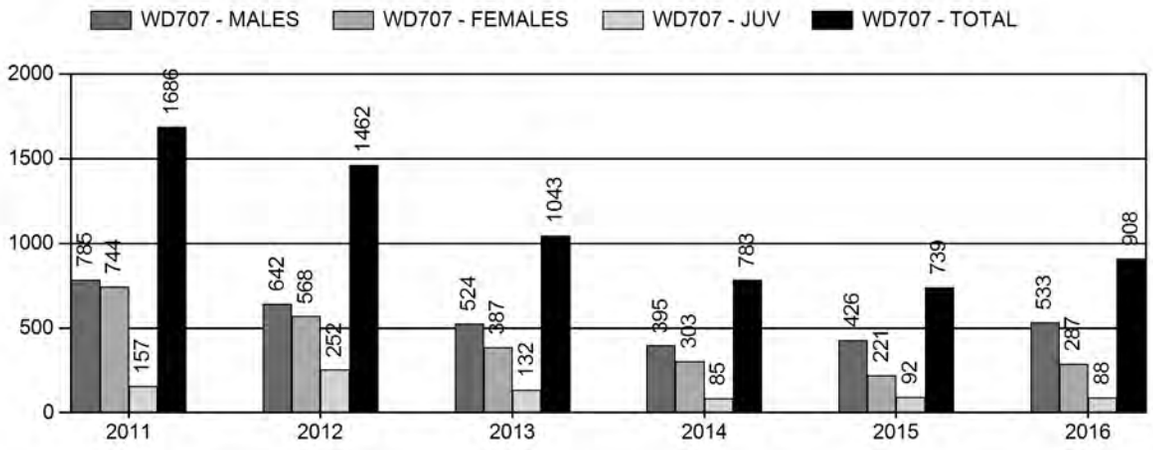
Population Objective (± 20%) :	0 (0 - 0)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	0
Model Date:	None

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

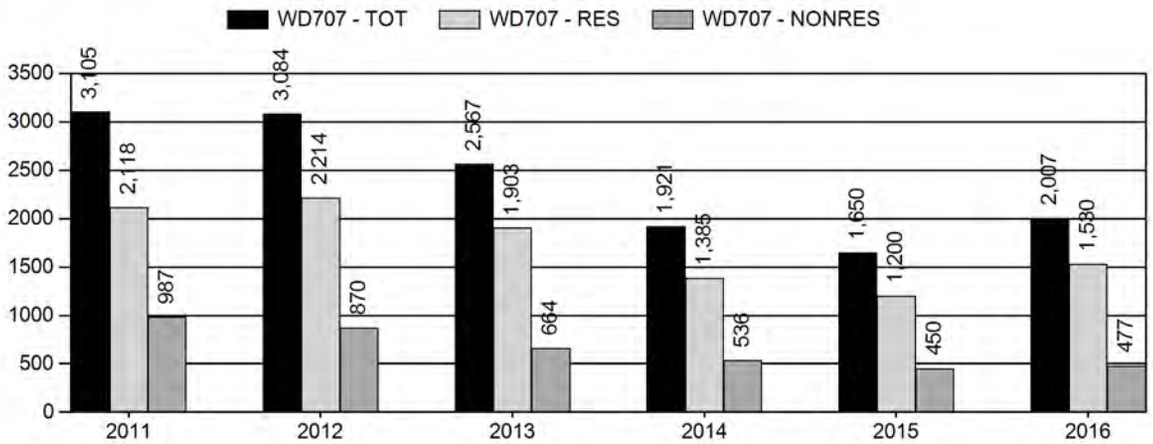
	JCR Year	Proposed
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	0%	0%
Total:	0%	0%
Proposed change in post-season population:	0%	0%



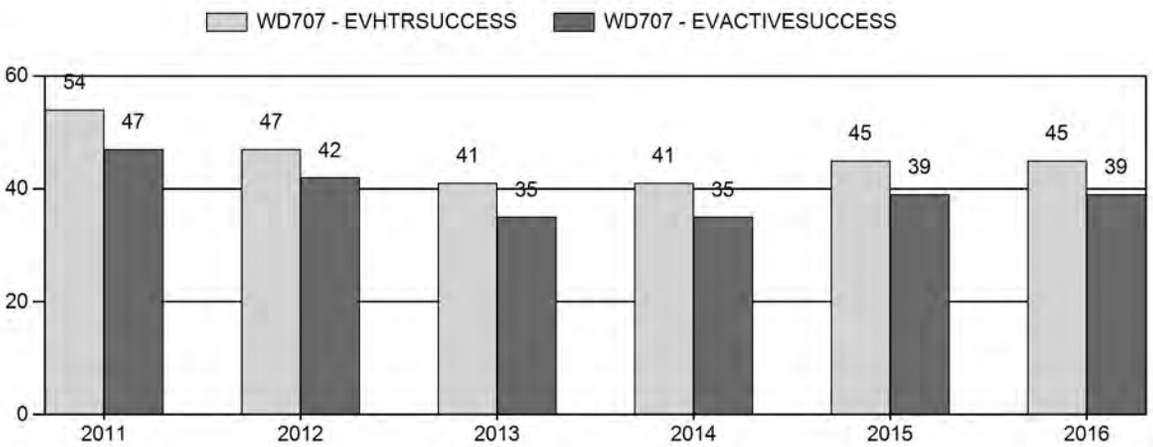
Harvest



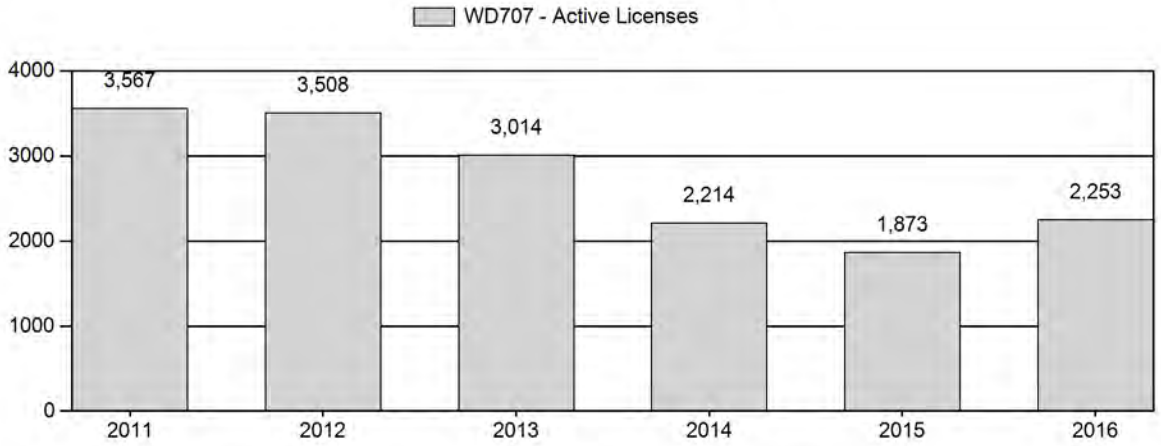
Number of Active Licenses



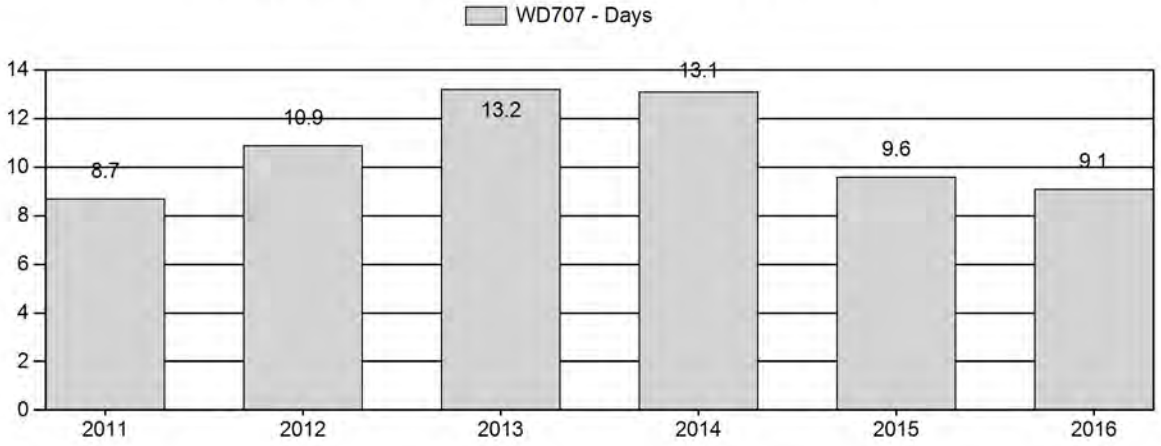
Harvest Success



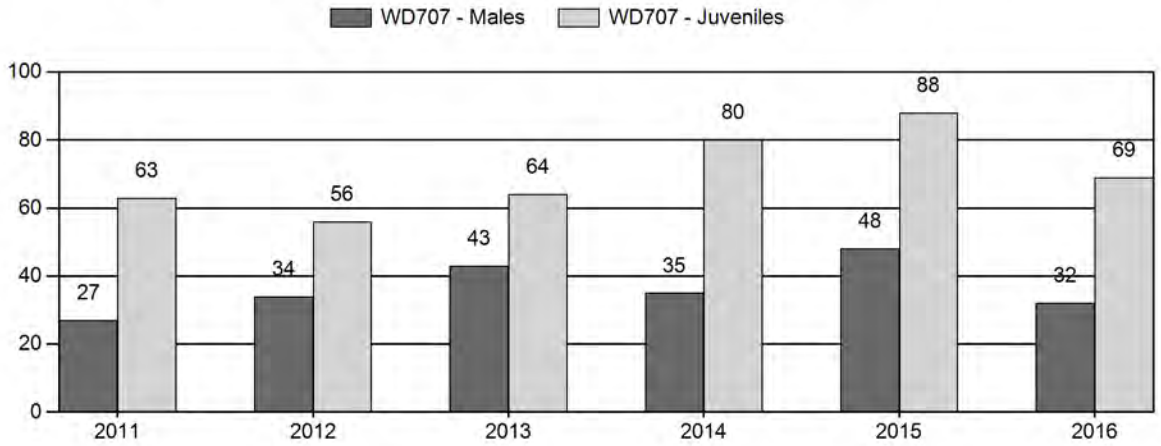
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2011 - 2016 Postseason Classification Summary

for White tailed Deer Herd WD707 - CENTRAL

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	0	45	81	126	14%	467	53%	292	33%	885	0	10	17	27	± 0	63	± 0	49
2012	0	54	76	130	18%	381	53%	212	29%	723	0	14	20	34	± 0	56	± 0	41
2013	0	19	61	80	21%	188	48%	121	31%	389	0	10	32	43	± 0	64	± 0	45
2014	0	11	24	35	16%	100	47%	80	37%	215	0	11	24	35	± 0	80	± 0	59
2015	0	48	59	107	20%	223	42%	196	37%	526	0	22	26	48	± 0	88	± 0	59
2016	0	78	127	205	16%	635	50%	436	34%	1,276	0	12	20	32	± 0	69	± 0	52

2017 HUNTING SEASONS
CENTRAL WHITE-TAILED DEER (WD707)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
10,11,12 13,14	3	Oct. 1	Nov. 30	300	Limited quota	Any white-tailed deer
	8	Oct. 1	Nov. 30	300	Limited quota	Doe or fawn white-tailed deer
		Oct. 16	Nov. 30		General	Any white-tailed deer
21	8	Oct.1	Oct. 31	50	Limited quota	Doe or fawn white-tailed deer valid on private land
22	3	Oct. 1	Nov. 30	75	Limited quota	Any white-tailed deer
	8	Oct. 1	Nov. 30	50	Limited quota	Doe or fawn white-tailed deer
34	3	Oct. 15	Nov. 30	25	Limited quota	Any white-tailed deer
65	3	Oct. 15	Nov. 30	300	Limited quota	Any white-tailed deer, also valid in that portion of Area 66 in Converse County
	8	Oct. 15	Nov. 30	200	Limited quota	Doe or fawn white-tailed deer, also valid in that portion of Area 66 in Converse County
66,88,89	3	Oct. 15	Nov. 30	100	Limited quota	Any white-tailed deer
66,88,89	8	Oct. 15	Nov. 30	50	Limited quota	Doe or fawn white-tailed deer
Archery						Refer to license type and limitations in Section 2

Note: The above season limitations are restricted to only those lines in the Chapter 6 Regulation that directly affect white-tailed deer hunting. Additional general and limited quota seasons occur in hunt areas 7-14, 22, 34, 65-67, 88, and 89 but are not captured here.

Hunt Area	License Type	Quota Change from 2016
21	8	+50
22	3	+25
	8	+25
65	3	+150
	8	+100
66, 88, 89	3	+50
	8	+25
Herd Unit Total	**3**	**+225**
	8	**+200**

Management Evaluation

Current Management Objective: ≥ 20 bucks:100 does postseason
Management Strategy: Recreational
2016 Postseason Population Estimate: NA
2017 Proposed Postseason Population Estimate: NA
2016 Hunter Satisfaction: 68% Satisfied, 22% Neutral, 10% Dissatisfied

The Central White-tailed Deer Herd Unit has a postseason management objective of ≥20 bucks per 100 does. No population model exists for this herd unit, as this is not a well-defined or closed population. Managers are unable to obtain adequate classifications over this large herd unit as it is not a budget priority for helicopter surveys and there is poor sightability of white-tailed deer in cottonwood riparian habitats. Access to perform ground surveys is inconsistent and highly variable from year to year as most white-tailed deer inhabit private lands.

Herd Unit Issues

White-tailed deer densities in this herd are highest along major cottonwood riparian communities of the Cheyenne River and North Platte River drainages and on irrigated hay fields in the La Prele Creek, La Bonte Creek, and Casper Creek drainages. Most white-tailed deer habitats in this herd unit are on private lands. Landowners typically have a low tolerance for white-tailed deer, and access to hunt them is generally good. Periodic disease outbreaks (i.e. hemorrhagic diseases, adenovirus, Asian louse, Chronic Wasting Disease) are known to occur within this herd, and can contribute to population declines in localized areas when environmental conditions are suitable. Female harvest in this herd is typically insufficient to curtail growth when the population is high since many Type 8 licenses typically remain unsold each year. Epizootic Hemorrhagic Disease (EHD) often regulates this population given the lack of female harvest.

Weather

In addition to EHD outbreaks, white-tailed deer likely experienced increased mortality in recent years due to the harsh winter conditions of 2010-2011 and the 2012 drought. In addition, such weather conditions were not conducive to good fawn productivity/survival over this time frame. Conditions improved in 2013 with adequate precipitation throughout the growing season and moderate winter conditions. Weather conditions throughout 2014 and 2015 produced above average precipitation, especially during the growing season, which resulted in excellent forage production throughout the herd unit. Improved forage, coupled with low competition for resources due to low white-tailed deer densities, yielded good fawn production. In 2016, above average precipitation was received during the early part of the growing season, leading to good early-season forage production. However, this was followed by hot and dry conditions beginning in June and continuing through the summer and into late fall. These conditions could have contributed to the lower fawn recruitment in 2016 compared to recent years. The 2016-2017 winter has been moderate, with average precipitation and several extreme cold snaps. Snow events and cold snaps were typically followed by warmer weather which exposed forage for wildlife. Therefore white-tail deer should exhibit normal over-winter survival this winter.

Habitat

This herd unit has no established habitat transects that measure growth and/or utilization on shrub species that are preferred browse of white-tailed deer. However, browse quality and availability were relatively high along riparian corridors due to the above average precipitation in 2014 and 2015, and the average precipitation in 2016. Anecdotal observations from field personnel noted good browse and herbaceous forb conditions throughout the herd unit. Many landowners also reported improved conditions for irrigation of hay fields in recent growing seasons.

Field Data

Fawn production is typically good for this herd, with ratios ranging in the 60-70s per 100 does. Observed fawn ratios were above average in 2014 and 2015 at 80 and 88 per 100 does, respectively. The fawn ratio in 2016 was 68, which is more comparable to the previous 5 year average of 70. This herd appears to be rebounding from a low point following disease outbreak, harsh winters in 2010 and 2011, and the severe drought of 2012. While this herd unit will require several more years of improved fawn production and survival before managers can expect any significant increase in population size, the population appears to be increasing.

Buck ratios for the Central White-tailed Deer Herd historically average in the mid 30s per 100 does, but occasionally swell into the 40s or drop into the 20s. In 2016 the observed buck ratio was 32 per 100 does, with 13 of those being yearling bucks. Observed ratios may vary from year to year due to differing levels of effort or success in sampling white-tailed deer during post-season classification surveys. Buck ratios vary widely across the large variety of habitats in this herd unit as well. Additionally, white-tailed deer can be difficult to classify on private lands and in riparian cover, particularly bucks that may be solitary and elusive. Still, observed buck ratios have always met management objectives for this herd by remaining at or above 20 bucks per 100 does. However, postseason classification ratios in this herd should be viewed with caution as sample sizes are typically small and are not well stratified throughout the herd unit. For example, in 2016, about 59% of the deer classified in this herd were found in Area 65. This hunt area has the highest population of white-tailed deer within the herd unit. Over the past 3 years, significantly more white-tailed deer were classified in this herd unit, which is likely due to an increasing population as well as increased sampling effort.

Harvest Data

License success in this herd unit is typically in the 40-50th percentile, and was 45 percent in 2016. License issuance varies greatly between the many hunt areas contained within the herd unit. Hunters can take white-tailed deer on general licenses and also purchase additional limited quota licenses valid for any white-tailed deer or doe/fawn white-tailed deer. In recent years, reductions in limited quota white-tailed deer licenses have been made due to low deer densities, declining hunter success, and few complaints regarding damage on private lands.

White-tailed deer hunting opportunity peaked in 2011 with over 3,100 hunters afield. Since then license issuance has been gradually reduced as the population and hunting access have decreased, resulting in a low of 1,650 hunters afield in 2015. In 2016, there were about 2,000 whitetail hunters in this herd unit, most likely as a response to the increasing population. From 2011-2014, harvest success declined 28% while hunter effort increased 50%, although this trend is reversing as harvest success and hunter effort were improved by 11% and 31%, respectively since 2014. These numbers reflect field personnel's observations that white-tail hunting opportunity is increasing. License increases are proposed for 2016 given the increasing population within many areas.

Population

Currently there is no population model that accurately represents this herd. Therefore, management is based on maintaining postseason buck ratios with a goal of $\geq$20 bucks per 100 does. Observed buck ratios continue to exceed this goal, and harvest increases support field manager's beliefs that this population is recovering from recent declines. The population reached

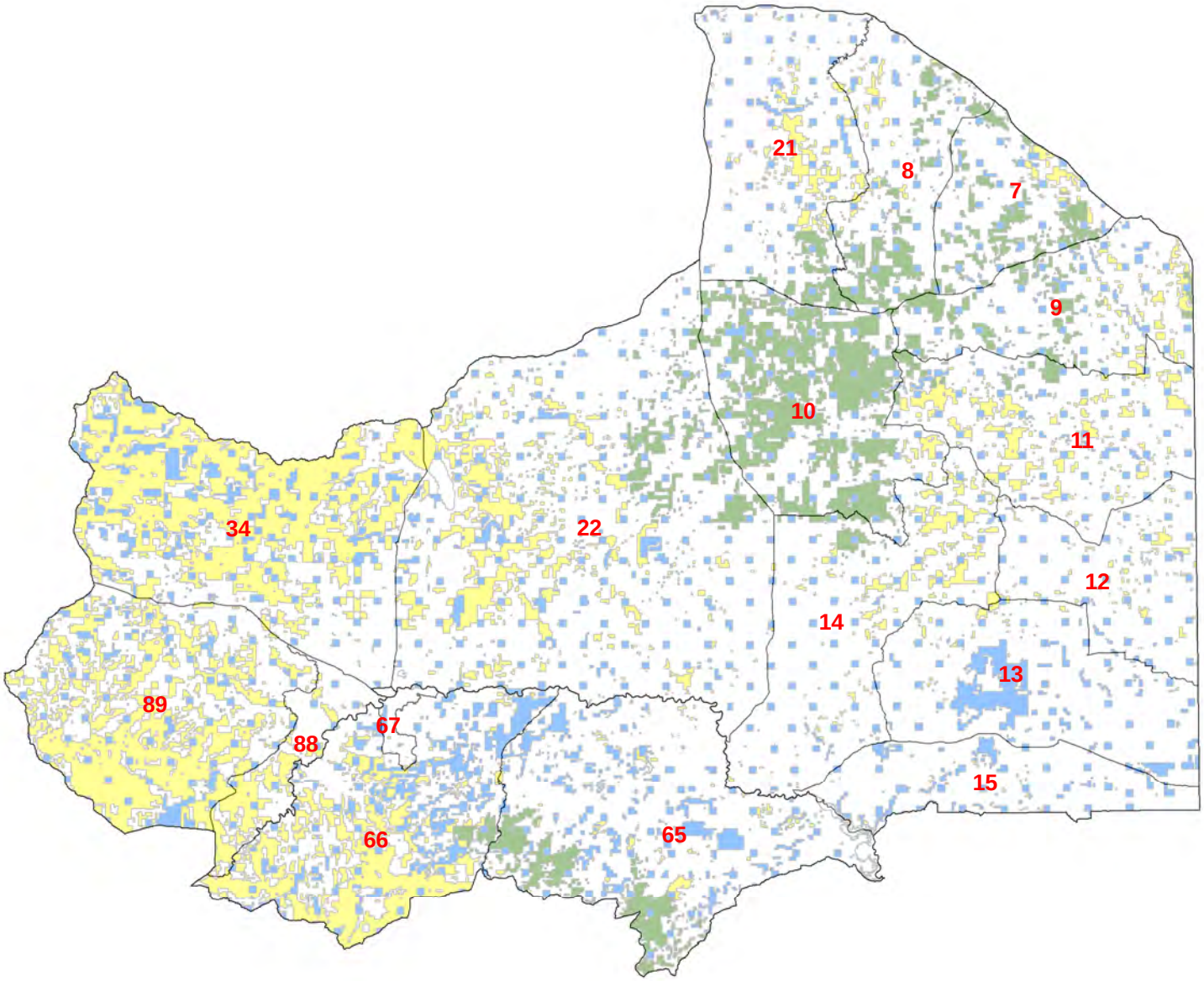
in low point in 2013, following a harsh winter in 2010/2011, drought in 2012, and epizootic hemorrhagic disease in 2013. Fawn production and recruitment significantly improved beginning in 2014, and the population has been on an upward trajectory for the past 3 years.

Management Summary

Traditional season dates in this herd vary from one hunt area to the next. Generally, white-tailed deer seasons run concurrently with October mule deer seasons, and are extended into November to maximize hunter opportunity and harvest. The 2017 season includes 800 Type 3 licenses, 650 Type 8 licenses, and additional opportunities to harvest white-tailed deer on General, Type 1, and Type 6 licenses. Increased Type 6 and 8 licenses are being offered in Areas 22, 65, 66, 88, and 89. Type 8 licenses were added for Area 21 to address damage issues on private land. Goals for 2017 are to maintain buck ratios, improve hunter opportunity, afford landowners the opportunity to address agricultural damage on private lands if necessary, and allow for more hunting opportunity as a result of population increase.

If we attain the projected harvest of 1,000 white-tailed deer with fawn production/survival similar to the five-year average, buck ratios should be maintained above 20 per 100 does.

Central White-tailed Deer Herd Unit
(WD707)
Revised May 12, 2010
Hunt Areas 7-15, 21, 22, 34, 65-67, 88, 89



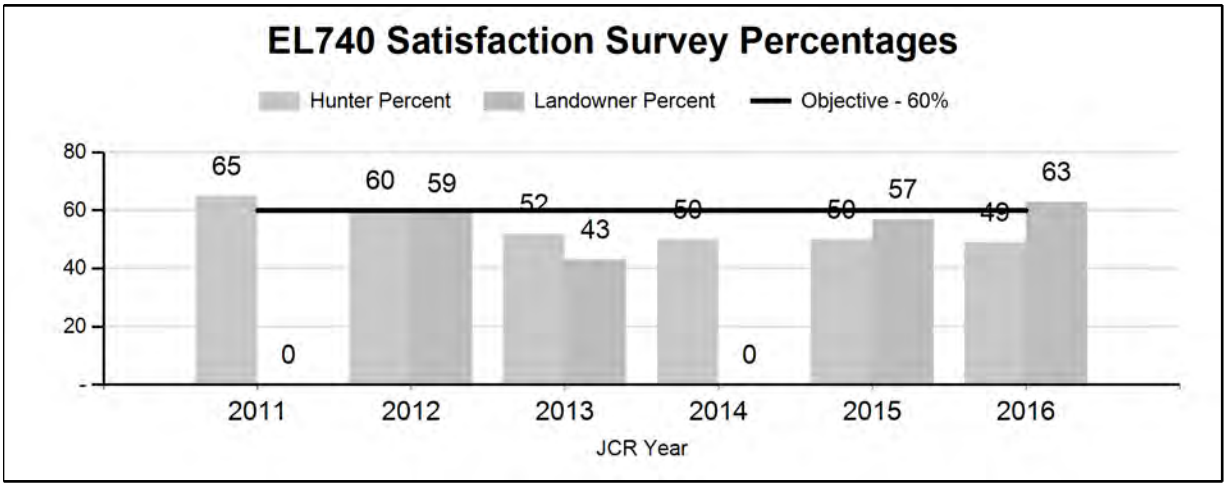
2016 - JCR Evaluation Form

SPECIES: Elk
HERD: EL740 - BLACK HILLS
HUNT AREAS: 1, 116-117

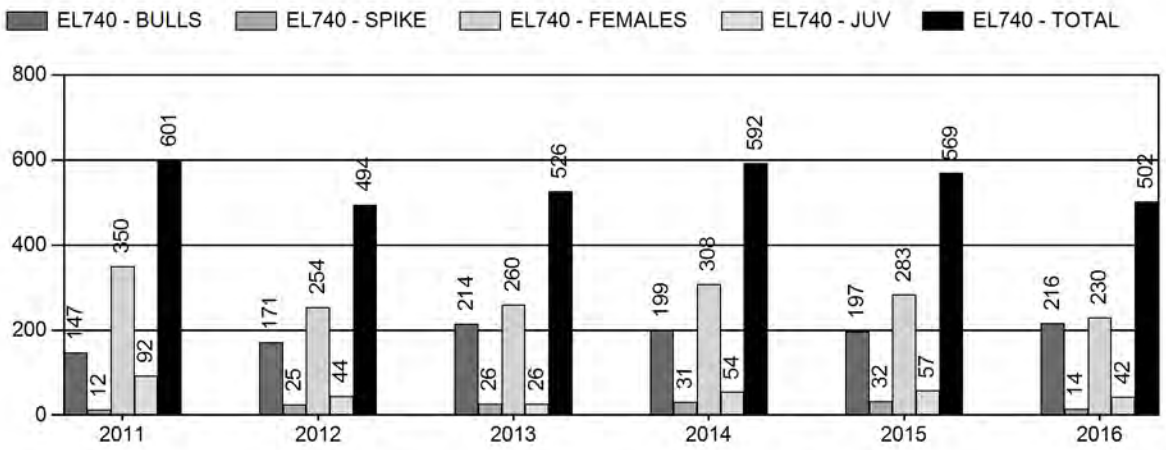
PERIOD: 6/1/2016 - 5/31/2017
PREPARED BY: JOE SANDRINI

	2011 - 2015 Average	2016	2017 Proposed
Hunter Satisfaction Percent	54%	49%	50%
Landowner Satisfaction Percent	55%	63%	60%
Harvest:	556	502	580
Hunters:	1,580	1,740	1,850
Hunter Success:	35%	29%	31%
Active Licenses:	1,665	1,816	1,900
Active License Success:	33%	28%	31%
Recreation Days:	17,423	18,351	19,000
Days Per Animal:	31.3	36.6	32.8
Males per 100 Females:	29	0	
Juveniles per 100 Females	33	0	

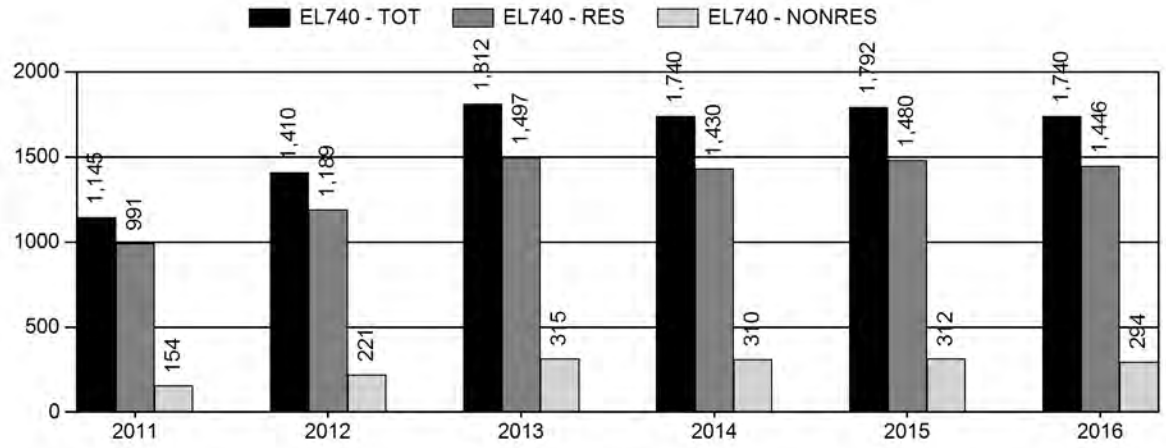
Satisfaction Based Objective	60%
Management Strategy:	Private Land
Percent population is above (+) or (-) objective:	-4%
Number of years population has been + or - objective in recent trend:	4



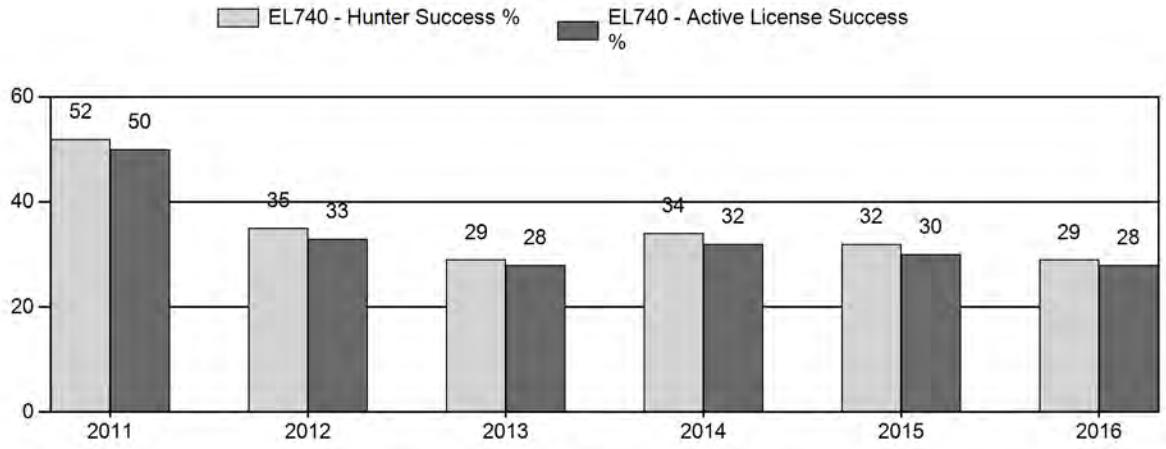
Harvest



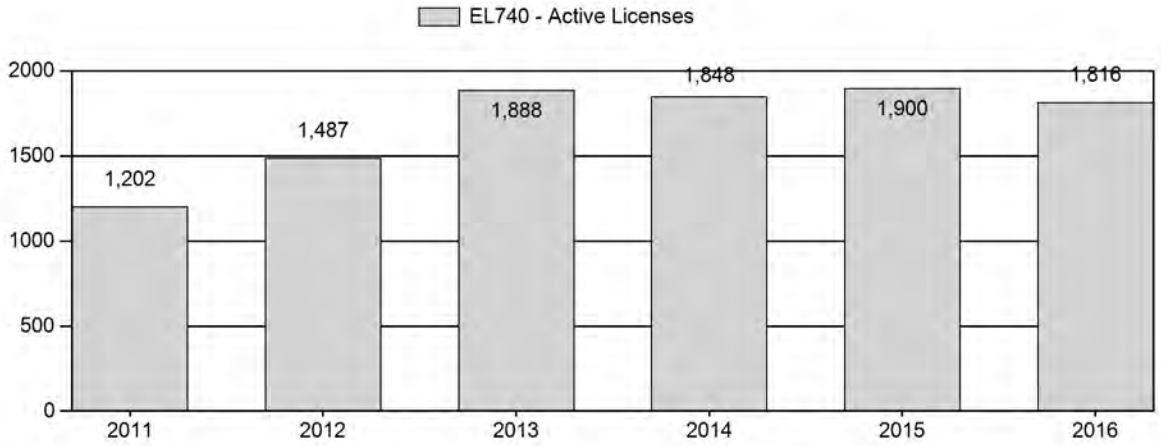
Number of Hunters



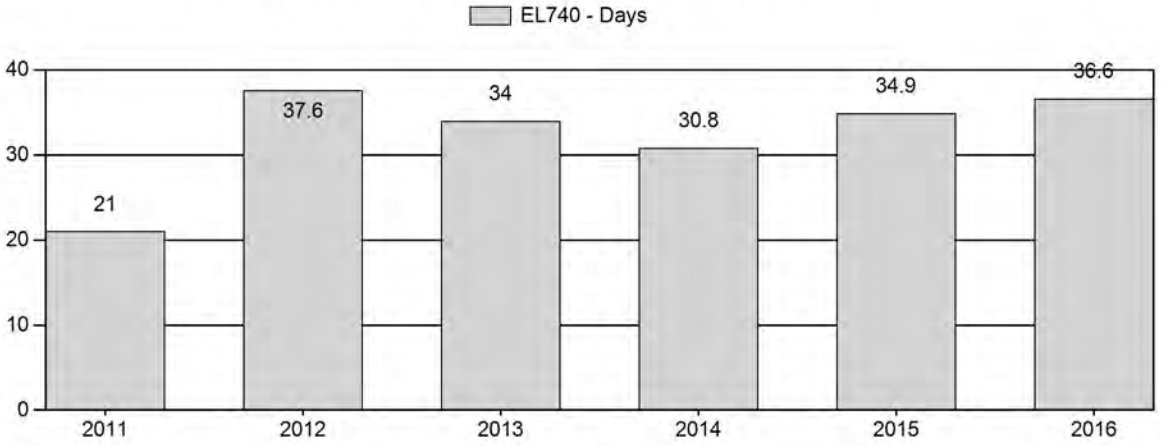
Harvest Success



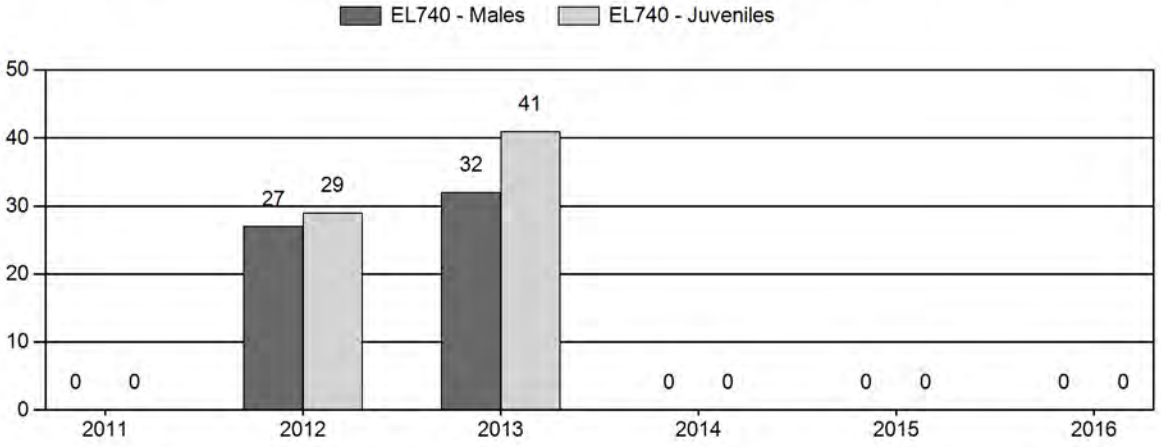
Active Licenses



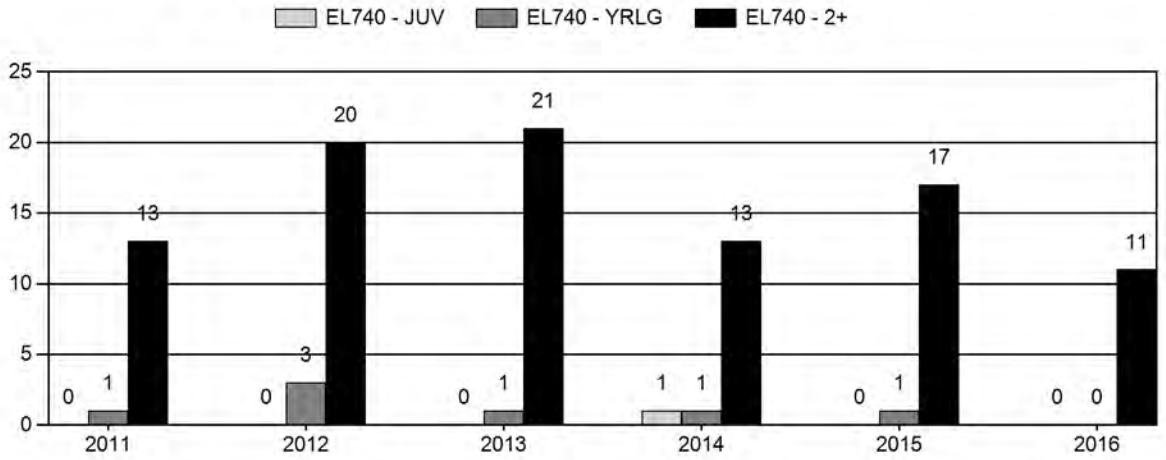
Days per Animal Harvested



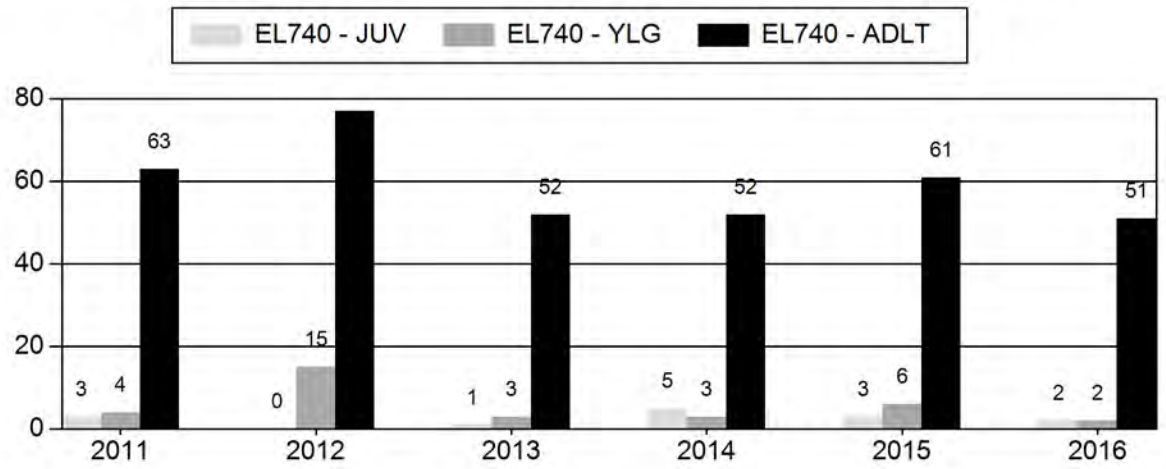
Postseason Animals per 100 Females



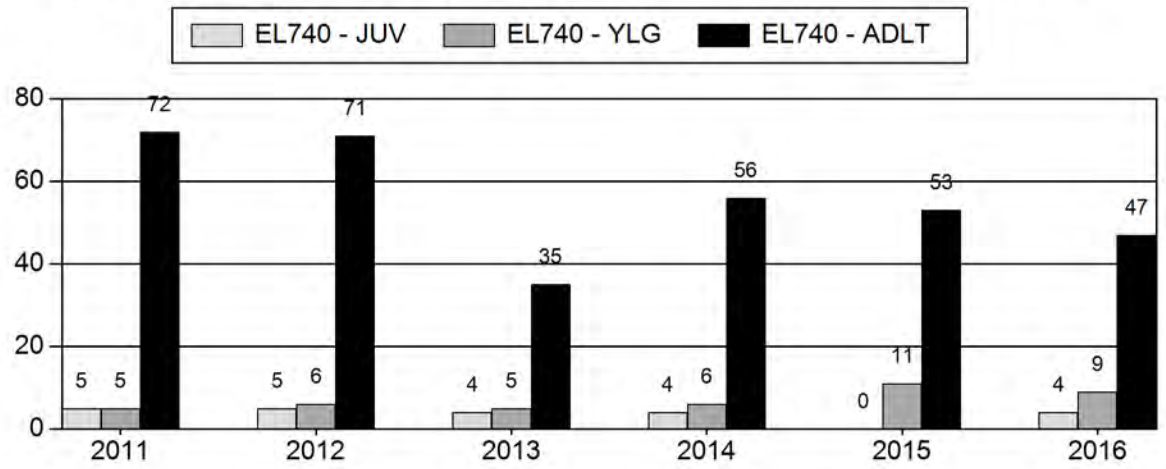
Age Structure of Field Checked Males



Age Structure Data (Field and Laboratory) - Male



Age Structure Data (Field and Laboratory) - Female



2011 - 2016 Postseason Classification Summary

for Elk Herd EL740 - BLACK HILLS

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2012	0	32	32	64	17%	239	64%	69	19%	372	0	13	13	27	± 0	29	± 0	23
2013	0	19	24	43	19%	133	58%	54	23%	230	0	14	18	32	± 0	41	± 0	31
2014	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2015	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0
2016	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0

2017 HUNTING SEASONS
BLACK HILLS ELK HERD (EL740)

Hunt Area	Type	Season Dates Opens	Season Dates Closes	Quota	License	Limitations
1	1	Oct. 15	Nov. 30	100	Limited quota	Any elk
1	4	Oct. 15	Nov. 30	75	Limited quota	Antlerless elk
116		Oct. 15	Nov. 10		General	Any elk
116		Nov. 11	Nov. 30		General	Antlerless elk
116	6	Oct. 15	Jan. 31	250	Limited quota	Cow or calf
116	8	Aug. 15	Oct. 14	50	Limited quota	Cow or calf valid off national forest
117	1	Oct. 15	Nov. 30	275	Limited quota	Any elk
117	1	Dec. 1	Jan. 31			Antlerless elk
117	4	Oct. 15	Jan. 31	250	Limited quota	Antlerless elk
117	6	Oct. 15	Jan. 31	250	Limited quota	Cow or calf
117	7	Aug. 15	Sept. 15	50	Limited quota	Cow or calf valid south of the Green Mountain Road (Weston County Road 11), east of the Skull Creek Road (Weston County Road 14), and west of the Oil Creek Road (Weston County Road 10)
117	7	Dec. 1	Jan. 31			Cow or calf valid south of the Green Mountain Road (Weston County Road 11), east of the Skull Creek Road (Weston County Road 14), and west of the Oil Creek Road (Weston County Road 10)
117	8	Aug. 15	Oct. 14	75	Limited quota	Cow or calf valid off national forest

Special Archery Season Hunt Areas	Season Dates Opens	Season Dates Closes
1, 116, 117	Sep. 1	Sep. 30

SUMMARY OF CHANGES IN LICENSE NUMBER

Hunt Area	Type	Change from 2016
Herd Unit Totals	1	none
	4	none
	6	none
	7	+50
	8	+25

Management Evaluation

Current Hunter/Landowner Satisfaction Management Objective: 60% landowner & hunter
Management Strategy: Private Land
Secondary Management Strategy: Age distribution of harvested bulls

2016 Hunter Satisfaction Estimate: 49%
2016 Landowner Satisfaction Estimate: 63%

Most Recent 3-year Running Average Hunter Satisfaction Estimate: 50%
Most Recent 3-year Running Average Landowner Satisfaction Estimate[1]: 61%

2016 Postseason Population Estimate: *~ 2,700 (Field Estimate)*
2017 Proposed Postseason Population Estimate: *~ 2,700 (Field Estimate)*

HERD UNIT ISSUES: The Black Hills Elk Herd Unit is managed for 60% or greater landowner and hunter satisfaction. The management strategy is private land, with a secondary management objective seeking an annual bull harvest (based upon tooth age data) comprised of 20% aged ≤ 2 years old; 60% aged 3 to 5 years old; and 20% aged 6 years old, or older *(± 5% in all categories).* These management objectives and strategies were adopted in 2013. Field personnel anecdotally estimated Wyoming's Black Hills elk population to have numbered about 2,700 at the close of the 2016 hunting season.

We can neither construct a population model, nor generate a population estimate for this herd as the Department has never been able to collect adequate classification data. Additionally, radio collar data show substantial numbers of elk regularly cross the Wyoming / South Dakota Stateline violating the closed population assumption of models. Consequently, no attempts have been made to model this population since 1996. As a result, the aforementioned non-numerical management objectives were adopted in 2013.

The Black Hills Elk Herd Unit is comprised of Hunt Areas (HA's) 1, 116, & 117. It is located in the northeast corner of Wyoming and encompasses approximately 3,270 mi^2, of which 1,920 mi^2 are considered occupied habitat. Elk are not ubiquitous across occupied habitat either in time or

[1] Includes only data for bio-years 2015 & 2016 (data not collected for bio-year 2014 due to survey changes).

space. Rather, they tend to move about depending upon range conditions, snow depth and human activity, with some areas seeing regular elk use and others very infrequent use. Approximately 73% of the occupied habitat is private land, with the single largest block of public land being found on the Black Hills National Forest (BHNF), which contributes 14% of the occupied habitat. HA 1 is 95% public land, and represents the largest contiguous block of public land extensively inhabited by elk. Elk do occur on other portions of the Black Hills National Forest and dispersed sections of State and other federally owned lands. However, elk use and harvest in those areas are not nearly as consistent.

The adopted management framework for this herd states all landowners receiving landowner elk licenses and other landowners whose property see regular elk use, or have expressed an interest in elk management will receive a mail survey with prepaid response envelopes every three years; and annual, documented one on one visits (or an annual meeting with "key" landowners) will be conducted on non-survey years.[2] In recent years, we have been conducting the former in lieu of the latter based upon administration direction. Landowner satisfaction with elk numbers was first quantified for bio-year 2012 with the proposal to move to a non-numerical objective. At that time, 167 Black Hills landowners were mailed a short survey to gauge their satisfaction with elk numbers and quantify support for a non-numerical objective. 71 landowners responded, and slightly more than 60% of these noted they were satisfied, very satisfied, or neutral with respect to elk numbers. During bio-year 2013, thirty large landowners who regularly harbor elk, allow some level of hunting and often experience conflict with elk were individually contacted. 48% of these landowners reported being satisfied or very satisfied; one landowner reported "no opinion," and neutral responses were not solicited.

The criteria used to gauge landowner satisfaction were formalized in bio-year 2014 by Wildlife Division Administration when it was deemed landowners reporting elk numbers to be "at, or about at" desired levels were to be considered satisfied, while those reporting numbers to be above or below desired levels characterized as unsatisfied. As such, survey results for bio-years 2012 and 2013 were reanalyzed using these criteria where they could be teased from the responses collected. Consequently, the recorded satisfaction values were changed to 59% and 43% for bio-years 2012 and 2013, respectively. Unfortunately, due to the timing of survey efforts and administrative direction regarding satisfaction measurement criteria, no landowner satisfaction survey data meeting the revised standards were collected during bio-year 2014.

In January 2016, a mail survey was sent to 167 landowners. Subtracting for undelivered surveys, the response rate was 50%. Of the responding landowners, 18% reported elk numbers were below, 57% at, and 25% above desired levels. However, when specifically asked about satisfaction, 44% reported being satisfied or very satisfied, 19% neutral, and 37% dissatisfied or very dissatisfied. The reasons for dissatisfaction were: 44% felt elk numbers were "too low;" 22% thought elk numbers were "too high;" another 22% indicated elk causing damage (or a combination of damage and too many elk); and 11% indicated "other" reasons for dissatisfaction, such as not qualifying for landowner licenses. The majority of neutral respondents (57%) stated they had no strong feelings about elk numbers, and 36% were "happy the way things are," while the remaining 7% were "unsure." In summary, 63% of survey respondents were not specifically

[2] See "Final Black Hills Herd Unit and Population Review" adopted by the Dept. and Commission in 2013.

dissatisfied with elk numbers or management, versus 57% reporting elk numbers were "at or about at" desired levels.

In January 2017, a similar survey was sent to 174 landowners. Excluding undeliverable surveys, the response rate was 48%. Of the responding landowners, 13% reported elk numbers were below, 64% at, and 21% above desired levels. When specifically asked about satisfaction, 43% reported being satisfied or very satisfied, 28% neutral, and 29% dissatisfied or very dissatisfied. The reasons for dissatisfaction were: 14% felt elk numbers were "too low;" 27% thought elk numbers were "too high;" another 50% indicated elk causing damage (or a combination of damage and too many elk); and 9% indicated "other" reasons for dissatisfaction. The majority of neutral respondents (76%) stated they had no strong feelings about elk numbers or were "happy the way things are." In summary, 71% of survey respondents were not specifically dissatisfied with elk numbers or management, versus 64% reporting elk were "at or about at desired level."

The survey data collected in 2016 & 2017 demonstrate how difficult it is to broadly quantify landowner satisfaction in the Black Hills. Most of the properties are relatively small by typical Wyoming ranch standards, and many are not dependent on agriculture for profit. A significant portion of these of landowners enjoy having elk around and would like to see more, as would other non-traditional landowners who have purchased property for hunting. On the other hand, there are traditional ranching landowners negatively impacted by elk and frustrated with the damage they cause along with the lack of hunting on adjoining or nearby properties, with 50% of the reported dissatisfaction being due to damage. As such, these two contingents are diametrically opposed in what they desire in the way of elk numbers. The end result is conflict between the disparate positions, with both contributing to quantified dissatisfaction.

In the normal course of duties, Department field personnel contact landowners on an almost daily basis. Complaints about elk numbers are regularly received from some landowners, especially those experiencing damage to fences and growing or stored hay. However, no elk damage claims were made in the Sundance or Moorcroft game warden districts this past year; while three claims were submitted in the Newcastle district. Those claims totaled approximately $2,900.00, and compensated elk depredation to growing hay crops and damage to fences. Overall, field personnel report ambivalence among landowners regarding elk management, with some noting conflicts and dissatisfaction, and others expressing real satisfaction or a desire for more elk. Given landownership patterns and disparate attitudes towards allowing hunting, damage claims will likely persist.

WEATHER: For the most part, winter weather and growing season conditions over most of the past decade in the Black Hills have been neither specifically detrimental, nor abundantly beneficial for elk; but did result in some late summer and winter depredation complaints. More recently, severe drought plagued the Black Hills in 2012, and a class III drought beset the majority of the herd unit during the primary growing season of 2016. Both of these transient droughts resulted in very poor forage production and the led to several large wildfires. However, the inter-drought period provided growing seasons with temperatures and rainfall generally above average. This resulted in good to excellent forage growth from 2013 through 2015. Fall and winter weather over that same timeframe was characterized by normal to above average temperatures and average to below normal precipitation. However, coming on the heels of the

2016 drought, more normal to severe winter weather was again experienced. See http://www.ncdc.noaa.gov/cag/ for detailed weather information.

Based upon weather and habitat conditions observed over the past ten years, elk have likely entered most winters in good condition, except perhaps following the summer droughts of 2012 and 2016. Overall, weather patterns have been generally favorable for elk. However, fluctuations in weather patterns such as the 2012 and 2016 droughts, along with a few significant snow events and persistent deep snow at times have likely impacted herd demographics and exacerbated damage.

HABITAT: The Black Hills is the western most extension of many eastern plant species. These species are often found mixed with more typical western plants providing a large variety of habitats used by elk. Ponderosa pine (*Pinus ponderosa*) is the predominant overstory species. There are scattered patches of quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), bur oak (*Quercus macrocarpa*), and mountain mahogany (*Cercocarpus montanus*). Many of these stands are in late successional stages. Important shrubs include Saskatoon serviceberry (*Amelanchier alnifolia*), Oregon grape (*Berberis repens*), common chokecherry (*Prunus virginiana*), and wild spiraea (*Spiraea betulifolia*). Since 2000, wildfires in both Wyoming and South Dakota have burned well over 10% of the BHNF and significant amounts of private land in this ecosystem. These fires have been beneficial for elk by creating early succession plant communities and increasing available forage. However, there are no habitat evaluation or vegetation surveys located within this herd unit related to elk forage or cover.

Elk habitat quantity and quality are thought to be good, but security areas may be impacted or lacking in areas due to high road densities. These road densities, along with vast tracts of commercially thinned ponderosa pine stands, do not provide what is usually considered classic, good elk habitat. Despite the lack of cover in areas and numerous roads, the elk population significantly expanded through the 1990's and into the early years of the next decade. Several factors benefited this population. First, herbaceous forage is abundant, and wildfires have increased available forage. Second, despite high road densities, much of the land inhabited by elk is privately owned. This private land has lower road densities and experiences limited human activity. Many of these same private land areas provide elk refuge from hunting pressure during the fall. Also benefiting the situation, in 2010 USFS increased the number of road closures on the Black Hills National Forest when they adopted a new travel management plan.

FIELD DATA: Collection of classification data were suspended in 1996, and only occasionally are limited classification data garnered during other field activities. The limited data that have been collected over the years have generally reflected larger samples collected in the Black Hills of South Dakota by SDGF&P. SDGF&P collects preseason classification data on elk every year, and since 2003 these data consistently yielded calf:cow ratios near 50:100, but more variable bull:cow ratios, which have averaged near 30:100 (South Dakota Department of Game, Fish and Parks, 2015). In 2015 & 2016, no specific efforts were made by the WGFD to classify elk. However, the WGFD did partially fund SDGF&P's 2015 helicopter-based late winter elk survey. This funding was used to pay for SDGF&P's survey efforts across much of the occupied habitat south of Interstate Highway 90 (I-90) in Wyoming HA's 1 & 117. That effort detected a total of 923 elk in the portion of Wyoming surveyed. Of the elk observed, SDGF&P personnel were

able to classify 516 (262 cows, 52 calves, and 202 bulls). The 407 unclassified elk were primarily large groups of cows and calves. It is hoped the data collected can eventually be used in light of SDGF&P's past studies to estimate elk numbers in that portion of Wyoming south of I-90 harboring wintering elk; or act as the basis for a winter trend count.

While classification data are lacking, tooth age data have been collected from harvested elk most years since 1987.[3] Tooth age data can estimate annual recruitment via the percentage of yearlings in the female segment of the harvest (Figure 1). Since 1987, this figure has averaged 16.2% (std. dev. 7.7%)[4] suggesting most years 8 to 24 yearling cows (and about the same number of yearling bulls) are added per 100 adult cows into this population. However, as noted in previous reports (2015 EL740 JCR) recruitment of yearling elk has been lower since 2000. Because of this and significantly increased license issuance with extended hunting seasons, there had been an increase in the percentage of harvested female elk over age 5 and a decline in the percentage of young (≤ 2 years old) females taken, while the relative percentage of mid-aged cows has remained fairly stable (Figure 2). However, this trend has reversed itself the past two years as the percentage of yearling cows in the female harvest increased and the relative percentage of older cows dropped. Similarly, the yearling buck:doe ratios in sympatric deer herds increased significantly as well in 2015 & 2016, suggesting strong production and recruitment since 2014 amongst Black Hills ungulates.

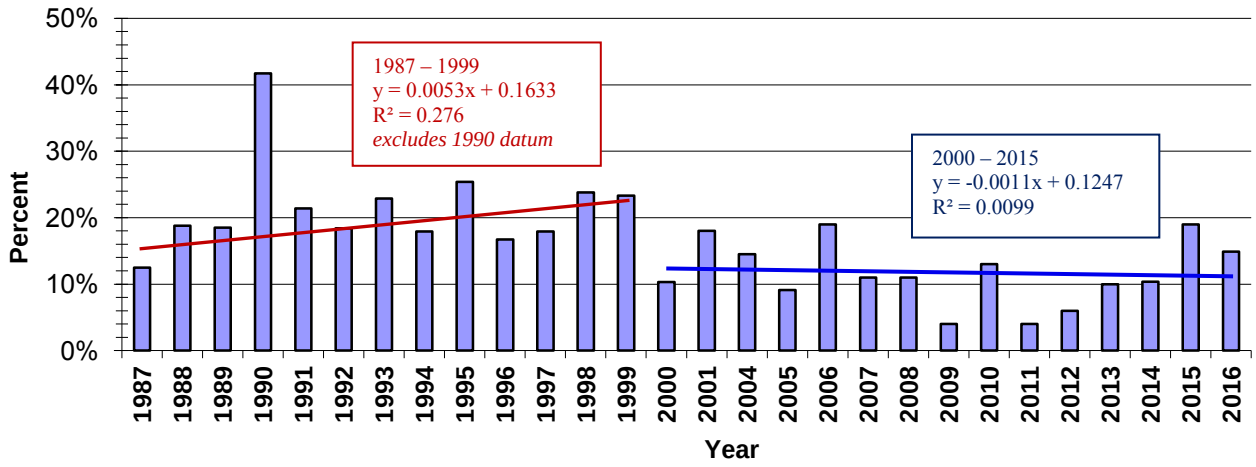


Figure 1. Percentage of yearlings in the female segment of the elk harvest (1987 – 2016).

Of course there is greater hunter selectivity when it comes to take of bulls. Between 2000 and about 2009, tooth age data suggest a slight decline in the relative percentages of both middle-aged (3-5 year old) and young (≤ 2 years old) bulls in the harvest, and a slight increase in the percentage of bulls 6^{+} years old harvested (Figure 3). However, since 2010 this trend may have reversed itself, as it appears a greater proportion of younger bulls (≤ 5 years old) have been harvested more recently - although this trend was contraindicated in 2016. However, 33% of the tooth aged bull harvest consisted of 3 year old elk. Considered in light of the larger relative increases in antlerless license versus any elk license issuance, it is reasonable to assume we have impacted the antlerless segment of the herd. This is reflected in the increasing percentage of

[3] Budgetary constraints prevented tooth age data collection in 2002 & 2003.
[4] Omitting 1990 data reduces this average to 15.2% with a std. dev. 6.0%.

female elk in the total harvest and, if this population has stabilized or is declining, one would expect to see an increase in the percentage of younger aged bulls harvested, as availability of older bulls declines with decreased production and recruitment in the face of sustained antlerless harvest and consistent bull take. It does appear we may be shifting harvest pressure on to younger-aged bulls (Figure 3 & Table 1), and if these recent trends continue, our ability to meet our secondary objective of age distribution of harvested bulls may become difficult without reductions in Type 1 license issuance.

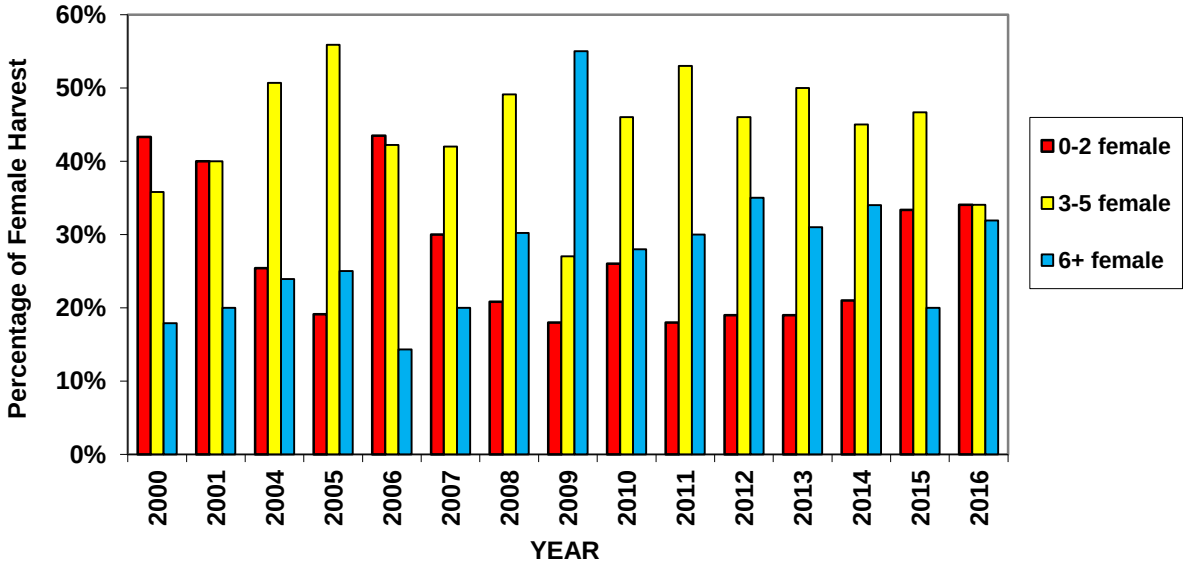


Figure 2. Relative percentages of various age classes of female elk harvested (2000 – 2016).

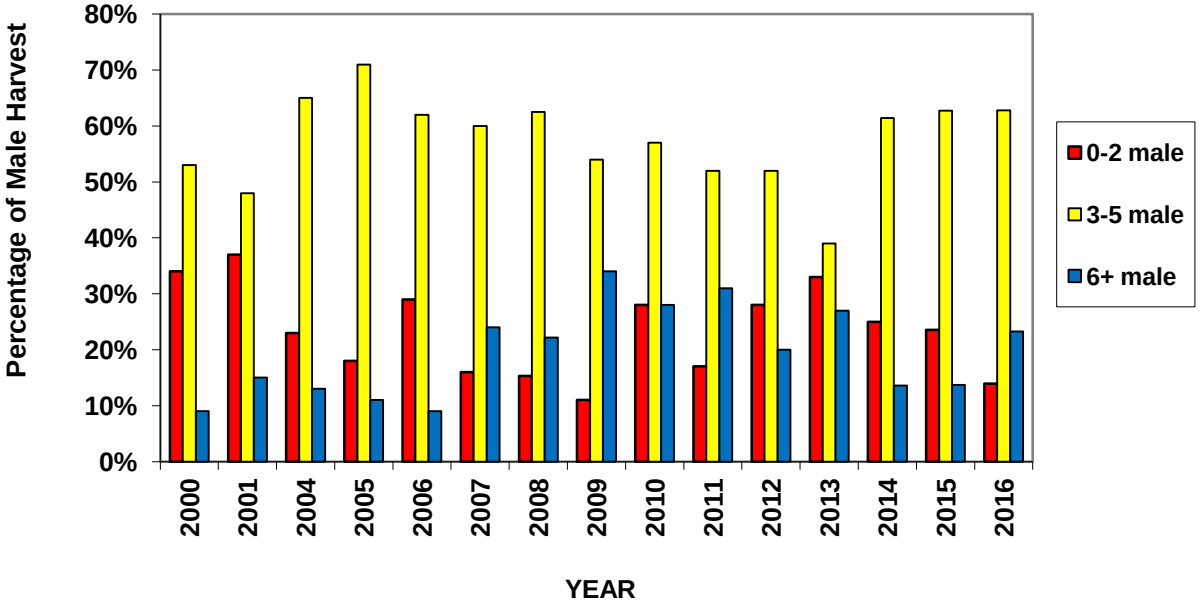


Figure 3. Relative percentages of various age classes of male elk harvested (2000 – 2016).

Segment of Bull Harvest	*Objective*	2014	2015	2016
Bulls 0-2 yrs. old	*20%*	25%	25%	14%
		3 yr. mean		21%
Bulls 3-5 yrs. old	*60%*	61%	62%	63%
		3 yr. mean		62%
Bulls 6+ yrs. old	*20%*	14%	13%	23%
		3 yr. mean		17%

Table 1. Secondary management objective, relative distribution of ages of harvested bulls

HARVEST: The low percentage of yearling females present in the harvest between 2000 and 2014 suggests reduced recruitment, as does the fact elk have not been pioneering into unoccupied habitats as they once were. However, over the years the bulk of tooth age data have been returned from HA 1 and 117 and therefore any decrease in recruitment should only be ascribed to that segment of the herd. It does seem harvest rates adequate to manage elk numbers may be achieved some years south of I-90, but poor success by hunters pursuing female elk in HA 116 is likely allowing that portion of the herd to grow. Conservative elk management at times in South Dakota and interstate elk movement further confound our ability to make herd-wide judgments relative to current harvest level's capacity to manage elk numbers.

Elk harvest bounced back to predicted levels in 2014, as weather conditions allowed hunters easier access to elk compared to 2013 when their travels were severely hindered by winter storm "Atlas." In 2015, with the same hunting season structure in place as the previous two years, total harvest fell midway between that experienced in 2013 and 2014. Field personnel also reported that hunters seemed to struggle a bit more to find and harvest elk in 2015. The same scenario played out in 2016 with fewer total elk being harvested compared to 2015 with the same season structure in place – although there was an increase in the total bull harvest, while antlerless harvest declined 15%.

Across Wyoming, at the herd unit level, elk hunter success is highly correlated with reported hunter satisfaction (close to 90% in years examined). Beginning in 2013, HA 116 moved from limited quota license hunting to a liberal general license season combined with a significant number of reduced priced cow/calf licenses. Due to very limited access to elk hunting on private land, this has resulted in a large number of license holders hunting the BHNF north of Sundance where few elk reside. Consequently, since 2013 hunter success on general licenses has been low, averaging less than 15%, while success on cow/calf licenses has averaged only 28% and that of total active licenses was 18%. These poor success rates are reflected in low hunter satisfaction in HA 116, where satisfaction has averaged just over 40% during this same timeframe. That figure biases the herd unit hunter satisfaction numbers low, since an average of 55% of the hunters at the herd unit level are sampled each year from HA 116. In contrast, since 2013, hunter satisfaction in HA 1 and HA 117 has averaged close to 60% each year.

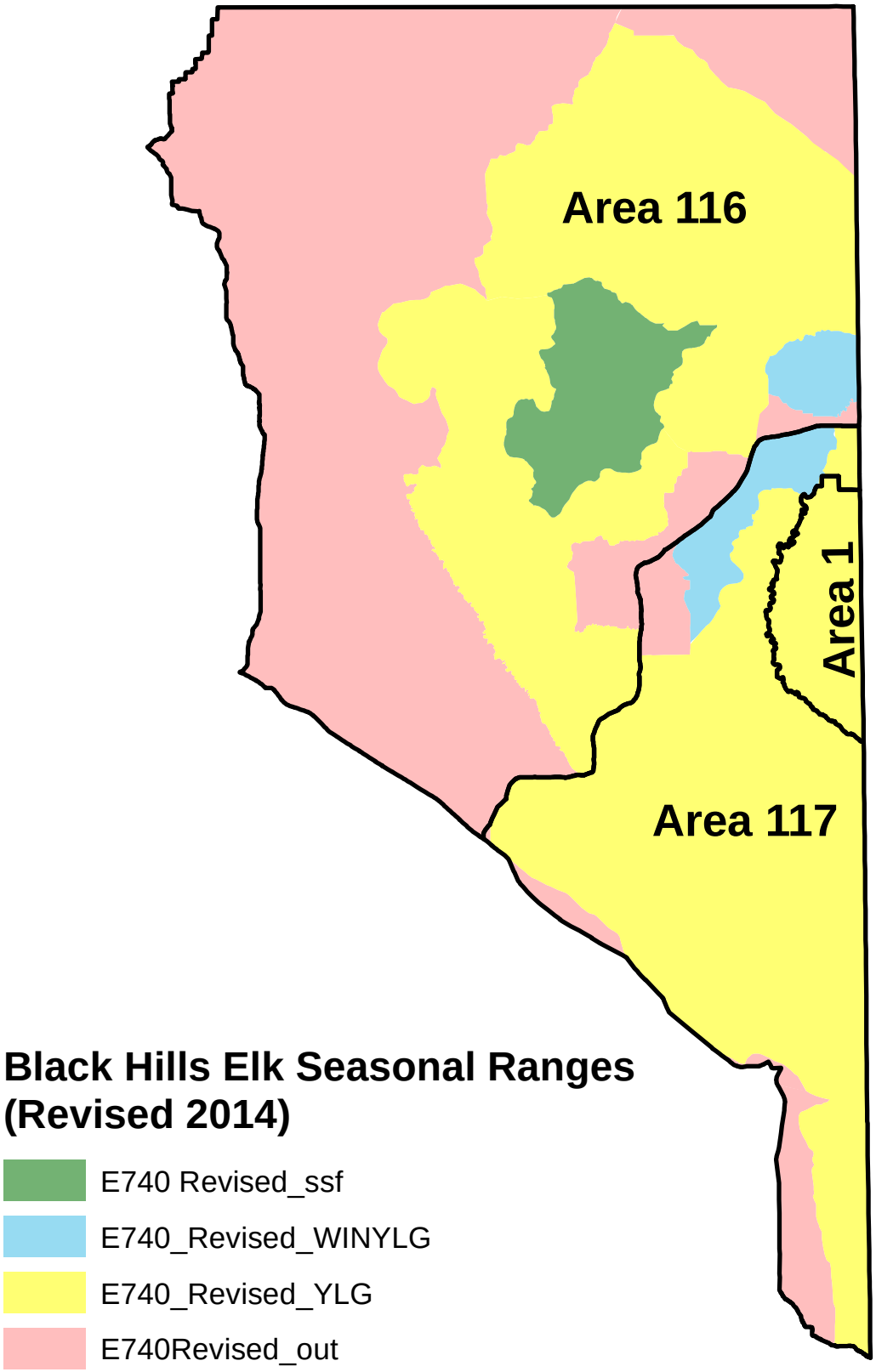
Given an average annual recruitment of 30 yearling elk per 100 cows (based upon 15% yearling cows in total cow elk harvest) and assuming a pre-season herd composition of 40 bulls per 100 cows and 47 calves per 100 cows, the 2016 estimated harvest of 498 adult elk would have removed the annual recruitment of yearlings from a total population of about 3,100 elk. Thus, (based upon our anecdotal population estimate of 2,700) the 2016 harvest should have about kept this elk herd in check or reduced it some. However, several hundred elk (perhaps nearly 1,000 head) regularly cross the Stateline and winter in South Dakota making it difficult to determine the real effect harvest is having on our post-season population; and most of the tooth age data and harvest come from HA's 1 & 117.

POPULATION: Despite the lack of a population estimate, indications are elk numbers increased quite a bit between 1990 and 2010 as elk significantly expanded their distribution. Silvicultural practices and wildfires throughout the region have also created habitat favorable for elk. Although habitat changes have continued to favor elk in recent years, elk have not continued to pioneer into previously unoccupied areas. Harvest statistics and tooth age data suggest population growth may have been curbed recently, at least south of I-90. But, it is likely robust reproduction and survival since 2014 has allowed this sub-population to once again grow. Given the high quality habitat in the region, limited access to hunt elk on private land, and sustained high harvest rates of mountain lions, this herd will likely continue to exhibit growth potential in many areas due to limited private land access for hunting.

MANAGEMENT SUMMARY: Changes implemented in 2013 expanded HA 116 and put it under a general license hunting season framework augmented with Type 6 and 8 cow/calf licenses. This was done to liberalize harvest opportunity as much as the Department felt could be done and retain some level of public support. This resulted in a hunt area with very low hunter success rates and satisfaction compared to the rest of Wyoming. However, it is also important to note that while only 48% of the landowners surveyed in 2014 were satisfied with elk numbers, a whopping 82% did not want a change in license numbers and several expressed dissatisfaction with the long hunting season. In the 2016 landowner survey the following question was added, "If you think elk numbers are too high, how can we work together to substantially reduce the herd size through public hunting?" Unfortunately, no viable or positive answers were returned. These facts bears out that while some traditional landowners complain about elk numbers, few are willing to allow hunting at the levels needed to significantly reduce this population. However, a group of landowners in the Skull Creek drainage of HA 117 desire to participate in a Hunter Management Assistance Program (HMAP) to address a sub-herd of about 300 head. To accommodate and facilitate this request, a type 7 license valid in this portion of the area has been added with 50 tags available, and HA 117 Type 8 license issuance has been increased by 25. Overall, management tactics the past 5 years seems to be reducing or holding elk numbers in check where there is adequate access for hunting, but allowing sub-herds to grow in areas without adequate hunter access.

Given mean hunter participation and success rates over the past decade and a half, the 2016 harvest should result in about 580 total elk taken. This harvest estimate is predicated on a similar number of elk being harvested from HA 116 on general licenses, continued average success rates in other hunt areas, and includes take of 55 calves. However, the long season for antlerless elk hunting in HA's 116 and 117 (five and a half months), plus the addition of the HMAP could

increase antlerless harvest above predicted values if access to elk improves. If projected harvest levels are reached, elk numbers could stabilize or decline south of I-90, while elk numbers north of the Interstate will likely continue to increase. Based upon an estimated preseason herd composition of 47:100:40 (calf:cow:bull) and a recruitment rate of 30 yearling elk per 100 cows, a harvest of 525 adult elk would remove the annual yearling recruitment from a herd of ~3,250 elk (all age classes), a number below what field personnel believe to be present at this time.


Area 116
Area 1
Area 117
Black Hills Elk Seasonal Ranges
(Revised 2014)
E740 Revised_ssf
E740_Revised_WINYLG
E740_Revised_YLG
E740Revised_out

2016 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2016 - 5/31/2017

HERD: EL741 - LARAMIE PEAK/MUDDY MOUNTAIN

HUNT AREAS: 7, 19

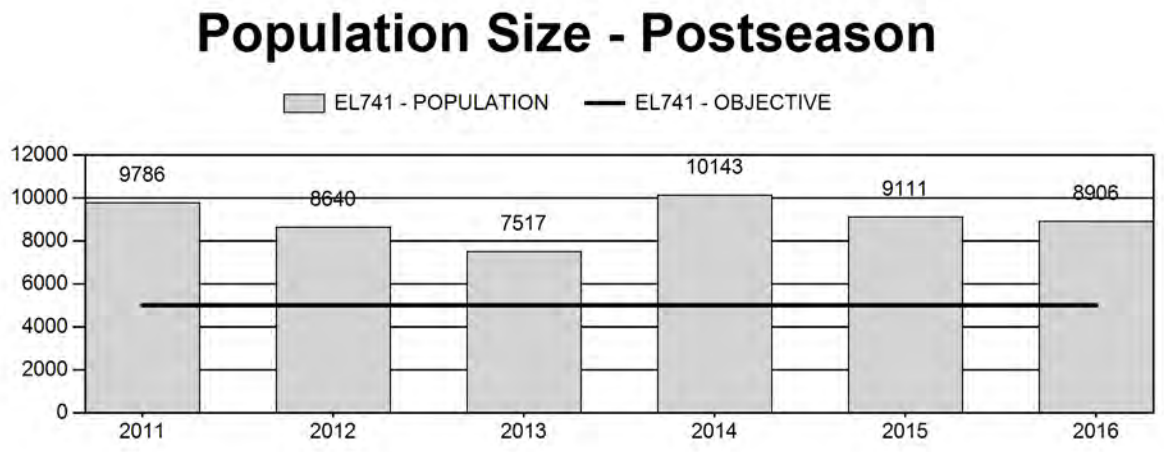
PREPARED BY: HEATHER O'BRIEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	9,039	8,906	7,575
Harvest:	2,397	2,435	2,225
Hunters:	4,741	4,887	5,000
Hunter Success:	51%	50%	44%
Active Licenses:	4,832	4,945	5,000
Active License Success:	50%	49%	44%
Recreation Days:	36,663	39,372	37,000
Days Per Animal:	15.3	16.2	16.6
Males per 100 Females	30	36	
Juveniles per 100 Females	37	29	

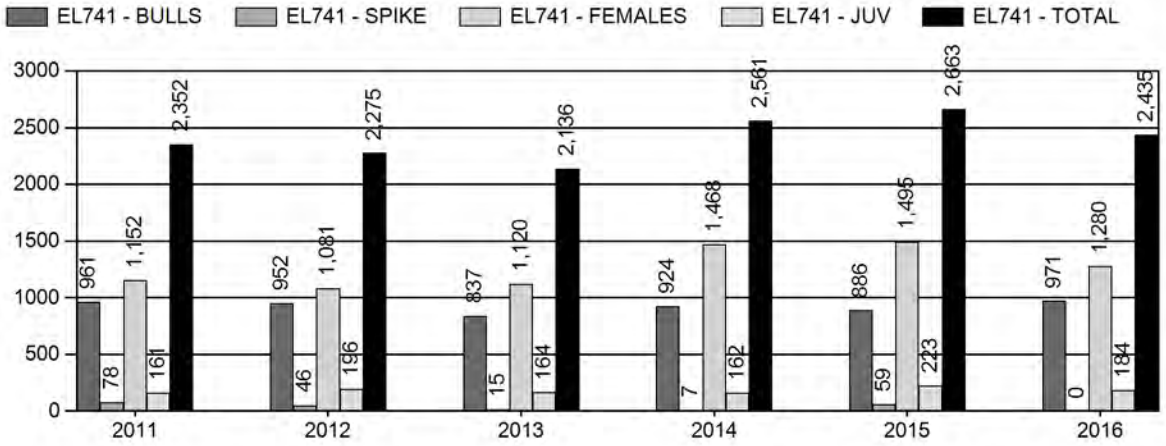
Population Objective (± 20%) :	5000 (4000 - 6000)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	78%
Number of years population has been + or - objective in recent trend:	16
Model Date:	03/02/2017

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

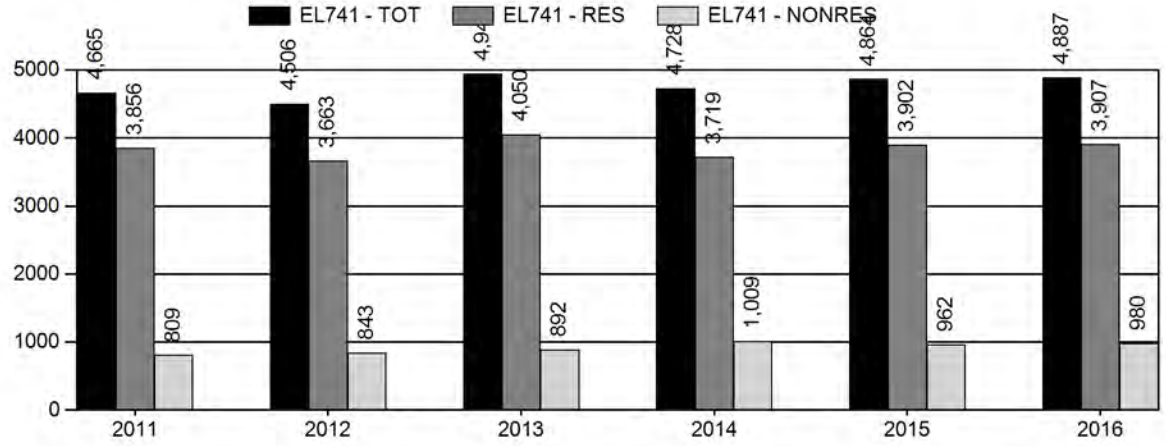
	JCR Year	Proposed
Females ≥ 1 year old:	24.9%	21.3%
Males ≥ 1 year old:	36.5%	37.0%
Total:	30.1%	23.8%
Proposed change in post-season population:	-12.5%	-15.5%



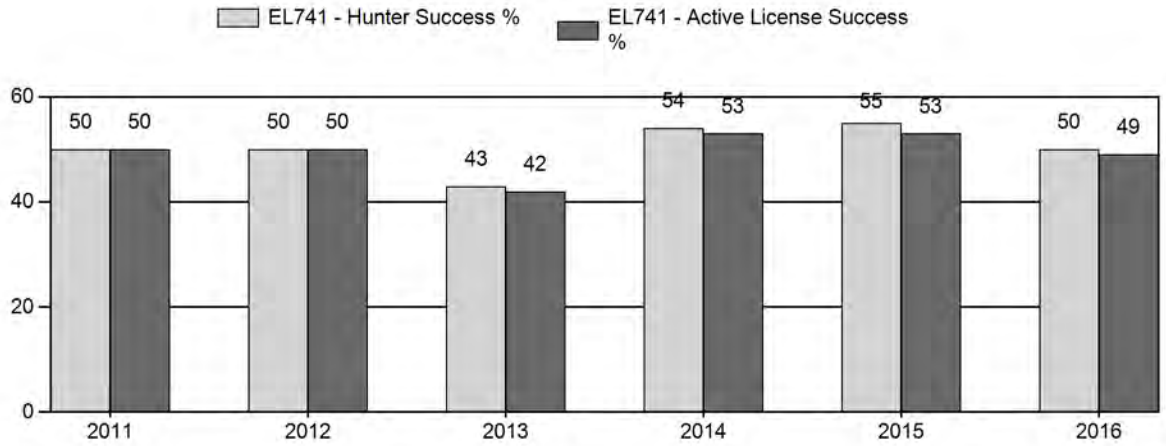
Harvest



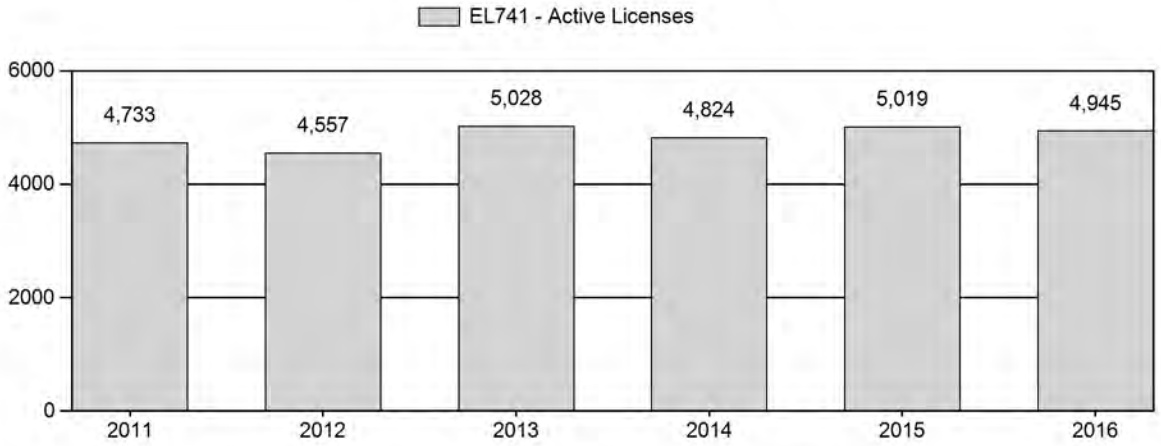
Number of Hunters



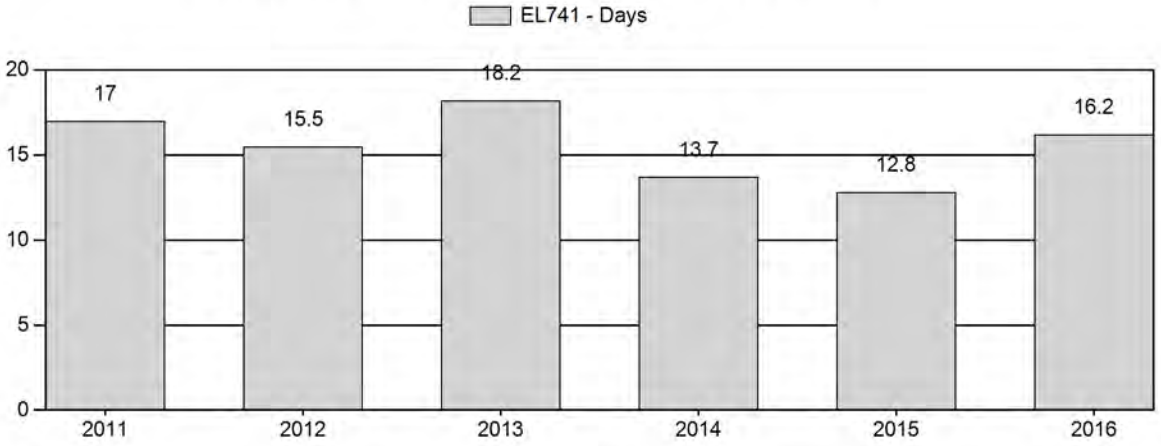
Harvest Success



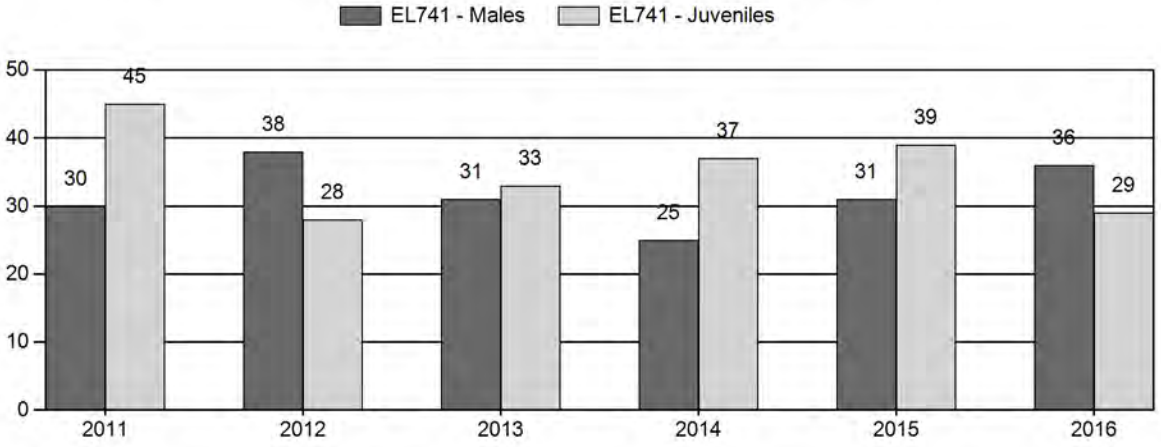
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2011 - 2016 Postseason Classification Summary

for Elk Herd EL741 - LARAMIE PEAK/MUDDY MOUNTAIN

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	9,786	324	548	872	17%	2,890	57%	1,298	26%	5,060	539	11	19	30	± 1	45	± 1	35
2012	8,640	143	362	505	23%	1,334	60%	379	17%	2,218	617	11	27	38	± 2	28	± 2	21
2013	7,517	328	487	815	19%	2,605	61%	869	20%	4,289	535	13	19	31	± 1	33	± 1	25
2014	10,143	383	468	851	15%	3,454	62%	1,270	23%	5,575	592	11	14	25	± 1	37	± 1	30
2015	9,111	404	485	889	18%	2,882	59%	1,116	23%	4,887	504	14	17	31	± 1	39	± 1	30
2016	8,906	383	581	964	21%	2,803	61%	806	18%	4,573	495	14	21	34	± 1	29	± 1	21

2017 HUNTING SEASONS
LARAMIE PEAK MUDDY MOUNTAIN ELK (EL741)

Hunt Area	Type	Season Dates Opens	Season Dates Closes	Quota	License	Limitations
7	1	Oct. 15	Nov. 20	1,500	Limited quota	Any elk
		Nov. 21	Dec. 31			Antlerless elk
	4	Oct. 15	Dec. 31	1,200	Limited quota	Antlerless elk
	6	Aug. 15	Oct. 14	1,800	Limited quota	Cow or calf valid in Platte County and on private land in Albany and Converse Counties
		Oct. 15	Dec. 31			Cow or calf valid in the entire area
	7	Jan. 1	Jan. 31	500	Limited quota	Cow or calf
19	1	Oct. 1	Oct. 14	150	Limited quota	Any elk
		Nov. 21	Jan. 31			Antlerless elk
	2	Nov. 1	Nov. 20	150	Limited quota	Any elk
		Nov. 21	Jan. 31			Antlerless elk
	4	Oct. 1	Oct. 14	125	Limited quota	Antlerless elk
		Nov. 21	Jan. 31			Antlerless elk
	5	Nov. 1	Jan. 31	125	Limited quota	Antlerless elk
	6	Oct. 1	Oct. 14	225	Limited quota	Cow or calf
		Nov. 1	Jan. 31			Cow or calf
Archery		Sep. 1	Sep. 30			Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2016
7, 19	All	**No change**

Management Evaluation

Current Postseason Population Management Objective: 5,000
Management Strategy: Special
2016 Postseason Population Estimate: 8,906
2017 Proposed Postseason Population Estimate: 7,523
2016 Hunter Satisfaction: 67% Satisfied, 17% Neutral, 16% Dissatisfied

The Laramie Peak / Muddy Mountain Elk Herd Unit has a postseason population management objective of 5,000 elk. The herd is managed using the special management strategy, with a goal of maintaining postseason bull ratios between 30-40 bulls per 100 cows and a high percentage of branch-antlered bulls in the male harvest segment. The objective and management strategy were last reviewed in 2013, when managers and landowners agreed to maintain both the population objective and the special management strategy for bulls.

Herd Unit Issues

Hunting access within the herd unit is variable, with a mix of national forest, state lands, and private lands. The addition of Walk-In Areas and Hunter Management Areas greatly expands hunting opportunity within the herd unit as well. Landowners offer varying levels of access to hunting. While most landowners offer some form of access – whether it be free or fee hunting – there are a few ranches that offer little access. These areas tend to harbor high numbers of elk that are inaccessible during hunting seasons. The main land use within the herd unit is traditional ranching and grazing of livestock; however several properties in the herd unit have become "non-traditional" in that they are owned by individuals who do not make a living by ranching their lands. Industrial-scale developments are minimal within this herd unit, though there is potential for the expansion of wind energy development. Chronic Wasting Disease is present in this herd at low prevalence (typically 6-8% of hunter-harvested elk).

Weather & Habitat

The summer of 2012 was the driest on record since 1904 in much of Wyoming. Extensive wildfires displaced and redistributed elk, especially in the east-central portion of the herd unit. The severe drought and resulting wildfires likely impacted calf survival, as post-season ratios were low at 28 calves per 100 cows. The winter of 2012 was mild with below average snow

accumulation, while spring of 2013 was wet with significant precipitation. In early October 2013, winter storm "Atlas" blanketed the area with 12-36" of wet snow, with greater depths at higher elevations. The 2013-2014 winter brought temperature and precipitation conditions near the recent 30-year average, and the growing season of 2014 was one of the best growing seasons the region had seen in years. Winter 2014-2015 was generally mild, and the 2015 growing season was just above average for the region. Fall of 2015 was relatively dry, and much of the herd unit remained accessible for hunting for the majority of the hunting season. 2016 was mild at first with a wet spring, but then became quite dry for the majority of the summer and fall. The fall of 2016 was dry with above average temperatures. Hunting was difficult, as elk activity was more limited to early morning and late evening when temperatures were cooler. Late fall precipitation provided green forage and a nutritional boost for elk prior winter. While there were several notable snow storms and cold snaps during the winter of 2016-2017, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Thus, managers expect good calf survival for the winter of 2016-2017. For detailed weather data see http://www.ncdc.noaa.gov/gac/time-series/us.

Field Data

Calf ratios are typically in the 40s per 100 cows for the Laramie Peak / Muddy Mountain Elk Herd. While calf survival can vary from year to year, adult elk in this herd are thought to have rather high rates of survival as predation pressure is relatively low and there is little mortality from disease and winter weather. Prior to 2005, antlerless license issuance was not adequate to keep up with the production of this herd. Since then, antlerless license issuance has increased substantially, and the population has stabilized or begun to decrease as harvest pressure on cows has greatly intensified. In 2012, the calf ratio reached a historic low of 28 calves per 100 cows. Calf production increased slowly from 2013-2015, but was low again in 2016 with 29 calves per 100 cows observed. Calf ratios over the previous 5 years (average = 36) have been much lower than the long-term average of 43 (1991-2015). This may be due to a number of factors including stress on pregnant cows from January hunting seasons, changes in habitat quality, or increased competition due to higher elk densities. Cow harvest continues to remain high, and late-season access to hunt was good in the herd unit for 2016. While lower calf production/survival from 2012-2016 may slow population growth, continued high license issuance and harvest of cows is still necessary to reduce this herd toward objective.

Bull ratios for the Laramie Peak / Muddy Mountain Herd historically average in the mid-30s per 100 cows, though there have been years where the ratio has dropped below special management limits into the 20s. Prior to 2016, the accuracy of bull ratios was questionable from year to year in this herd. While post-season classification samples are well distributed within this herd unit, changes in distribution of elk, ability to locate large cow/calf groups, and concealment of bulls in timber during January can influence results from year to year. In 2016 a new survey method was

developed, using stratified random selection of sample units delineated from previous elk location data. This survey method should eliminate surveyor bias and provide a more consistent and accurate estimate of bull ratios within the herd. The 2016 observed bull ratio for the herd unit was 34 per 100 cows. Consistent use of the new survey method should also improve the accuracy of the population model, as the model relies strongly on observed male ratios for alignment and predict population size.

From 2010-present, Type 1 licenses have fluctuated between 1,500 and 1,750 licenses in Area 7, depending upon hunter, landowner, and manager perceptions of bull quality. While annual tooth-age data illustrate hunters are consistently harvesting prime age-class bulls over the past four years, antler-class data show a decrease in the percentage of Class-II antlered bulls (Appendix A). Hunters have more frequently communicated concern about declines in trophy quality within this herd in recent years as well. While consistent harvest pressure on trophy-class bulls may be one contributing factor, other influences including competition for key resources may also be influencing antler quality in this herd. Managers regularly observed 800-1,100 bulls during postseason helicopter surveys from 2007-2016. While a higher number of bulls implies more hunting opportunity, it also signifies a higher potential for competition for forage and other resources. It should also be noted that expectations of hunters for increasingly larger bulls in a prized hunt area may also be influencing perceptions of bull quality. Regardless, hunters, landowners, and managers seem to be satisfied with current bull ratios and the opportunity is still readily available for a quality hunt in this herd unit. Consequently, any-elk license issuance will be maintained in Areas 7 and 19 at 1,800 licenses, which is considered conservative for this herd unit.

Harvest Data

License success in this herd unit is typically in the 50th percentile. It should also be noted that days per animal can be high in this herd unit compared to others, as hunters have high expectations regarding bull quality and will exert more effort in finding a mature bull. Archery hunting has also become more popular in the herd unit, as hunters want to maximize their time in the field to harvest a mature bull. Days per animal was 16.2 in 2016, which is higher than the 10-year average of 14.4 days per animal. Weather and access conditions were both excellent during much of the 2016 hunting season, though temperatures were well above normal in November, making it difficult to locate elk. Overall harvest success in 2016 (50%) was on par with the ten-year average (52%). Total harvest (2,435) was higher than the ten year average, but similar to total harvests for 2014 & 2015. Bull harvest (971) was the highest it has been since 2012, and cow harvest (1,280) remained higher than the 10-year average (1,139). Total harvest of cows and calves was exceptional in both hunt areas for 2016. In Area 19, an estimated 178 cows and calves were harvested, while in Area 7 over 1,286 were harvested. Both totals

represent very high cow/calf harvests for each hunt area, and may be attributed to favorable weather, prolonged hunting seasons, and good access to elk in 2016.

Population

The 2016 postseason population estimate was approximately 8,900 and managers believe the herd is either stable or slowly trending downward. A sightability survey was conducted in conjunction with January 2017 classification surveys, and will be available to further align the model for 2018. It is difficult for managers to have confidence in the model for this herd, which consistently predicts a declining or even crashing population. Between 2,000 and 2,700 elk have been harvested annually since 2007, and harvest success has remained above 50% in all but one year (when weather conditions greatly restricted hunting access). During classification flights in 2010, nearly 6,500 elk were observed with excellent survey conditions. During classification flights in 2016, over 6,200 elk were observed under similar conditions. Though the model illustrates a declining population, this herd continues to support a high level of harvest without declines in harvest success. Tooth age data have shown that prime-age bulls and cows have consistently been harvested from the herd in recent years. All these data, combined with the ability to reliably observe large numbers of elk during annual surveys, suggest the herd is more likely stable than declining. A rudimentary population model suggests this herd must contain 13,700 elk in order to sustain current levels of harvest. However, managers do not feel that over 7,000 elk were undetected during surveys. On the contrary, all major wintering complexes with large congregations of elk were surveyed intensively. Field personnel agree that it is highly unlikely that less than fifty percent of elk were observed during January 2017 flights. Thus, managers have low confidence in the validity of the population model. Population, harvest, and tooth data combined with observations from field personnel, hunters, and landowners all indicate this herd is likely either stable or slowly declining.

The "Time-Specific Juvenile Survival, Constant Adult Survival," (TSJ,CA) spreadsheet model was selected to represent the Laramie Peak / Muddy Mountain Herd Unit for 2016. In previous years the TSJ,CA,MSC, TSJ,CA and CJ,CA models have each been used. Shifting to a new TSJ,CA model in 2016 will result in inconsistent data between previous years and 2016. However, the TSJ,CA model is currently the only model that seems representative of the herd in current years without additional unwarranted manipulation. The CJ,CA and SCJ,SCA models predict precipitous declines and/or population crashes that are improbable and/or impossible for the herd given field observations and harvest data. Both models also predict unrealistically high harvest segments for bulls in recent years that range from 45 to 60%. The TSJ,CA,MSC model predicts a higher than expected population size for the herd, and also assumes that adult males have a lower annual survival rate than females. This assumption is unreasonable for the herd, as females receive a high level of harvest pressure during early and late cow seasons when bulls receive no harvest pressure. In addition, this herd does not have a high level of natural predation

that would create a lower survival rate for bulls. The TSJ,CA model predicts a more reasonable population size, though it selects the upper constraint for adult survival and frequently hits both upper and lower constraints for calf survival across years.

Managers have low confidence in any of the models for the Laramie Peak / Muddy Mountain Herd Unit with the data currently available. The addition of a sightability coefficient (to be calculated in 2017) should improve alignment of the model. The new stratified random classification survey method should also help enhance model quality. This survey methodology, once refined and used over multiple years, will improve model quality by contributing age and sex ratios that are more accurate for this herd. Until additional years of improved data can be added to the model, it is considered of poor quality.

Management Summary

Season dates for this herd have changed from year to year, and in general have been liberalized over time to maximize cow harvest and reduce damage on agricultural fields. Meetings with landowners continue to be held to discuss ideas to maximize female harvest and maintain bull quality, and the majority of landowners have expressed their satisfaction with the current season structure. Thus, season dates and limitations will remain unchanged for 2017 in both hunt areas. Area 7 Type 6 licenses will remain valid early from August 15th through October 14th to address damage on hay fields in Albany and Converse Counties. Area 7 Type 7 licenses will provide further opportunity to harvest a cow or calf in January, while unused Area 19 licenses will continue to be valid for antlerless elk through January as well. Currently, access is predicted to be similar in 2017 compared to previous years. If additional access is secured in Area 19, increased license issuance will be considered by managers for future seasons. Goals for 2017 are to continue reduction of the herd toward objective, maintain bull ratios within special management limits, maintain good harvest success, and reduce elk damage to agricultural fields.

If we attain the projected harvest of 2,225 elk with average calf ratios, this herd will decline further toward objective. The predicted 2017 postseason population size of the Laramie Peak / Muddy Mountain Elk Herd is approximately 7,600 animals, which is 50% above objective.

APPENDIX A:
Tooth-Age and Antler Class Data for Laramie Peak / Muddy Mountain Elk

The Laramie Peak / Muddy Mountain Elk Herd Unit (Wyoming Hunt Areas 7 & 19) has historically built a reputation for superior hunting in terms of high bull ratios, bull quality, and good hunter success. Bull ratios are managed under the special management criteria, with the goal of maintaining 30-40 per 100 cows. Bull quality is monitored annually using cementum annuli tooth aging from a sample of hunter-harvested elk and categorical postseason classifications based on antler size.

Tooth age data from the Laramie Peak / Muddy Mountain herd have been collected in nearly all years from 1997-2016. Tooth samples are solicited from both bull and cow elk hunters, as female age data is more representative of a random sample across age classes, while bull age data is potentially biased towards hunter preferences for more mature age classes. Sample size has varied from year to year depending upon hunter response rates. In 2016, a total of 800 "any-elk" hunters and 775 antlerless elk hunters in the herd unit were solicited for tooth samples. Of those solicited, 132 returned teeth from bulls and 90 returned teeth from cows. Samples received from calf elk were removed from resulting totals so as not to skew statistics on adult age classes.

Average tooth age of harvested adult males slowly increased from 1999-2015, and decreased slightly in 2016 (Table 1). Average tooth age of harvested female elk has been more variable over time, but has steadily increased since 2011 and was the highest on record in 2016 (Table 2). Median age of males decreased from 6.5 to 5.5 years old in 2016, while median age of females held constant at 4.5 years old. This slight divergence between harvested bull and cow ages suggests that hunter selectivity is for larger, older age class bulls; while the younger age class of harvested cows is likely to represent the most abundant age class in this herd. Hunters who harvest a 1.5 year old bull are also less likely to submit teeth for aging, as they are usually aware of the age of their "spike" elk in the field. Hunters who harvest a 1.5 year old cow have no certain way to age their elk in the field, and thus are more likely to submit teeth.

The percentage of harvested bulls aged 6-10 gradually increased from 2001-2016, indicating that older age-class bulls may be increasingly available for harvest. This contradicts some years of observed antler class data during the same time period that shows a decline of Class II (6 points on a side or better) bulls in the herd (Table 3). This disparity may be due to increased selectivity of hunters for older age-class bulls, compared to the more random sample of bulls surveyed during postseason classification flights. In addition, hunters submitting teeth may be biased towards older age class bulls, as hunters who are pleased with the quality of their animals may be more likely to submit samples.

The increasingly high percentage of older age-class bull elk is a surprising trend, considering that managers believe this herd has been stable or decreasing since 2009. License issuance has remained high, and one would expect it to become increasingly difficult to find and harvest older age-class bulls. At the same time, average age of sampled cows has slowly increased, while license issuance and season length have been liberalized, and this herd has either stabilized or begun to decrease. These data are somewhat confounding as they suggest that females are increasingly reaching older age classes in the herd before they are harvested and/or there are relatively fewer younger age class cows available for harvest. However, calf ratios have also declined in recent years, meaning lower calf recruitment may have suppressed the distribution of elk in younger age classes.

Trends in antler class of classified bull elk are more difficult to interpret on their own. Class I bulls are mature bulls that have < 6 points on both antlers, while Class II bulls have ≥ 6 points on either antler. The percentage of Class II bulls declined from 2008-2011, but then increased and seems to have stabilized from 2012-2016. During the same time period, average tooth-age of harvested bulls increased from 5.01 to 6.40, with a slight decline to 6.20 in 2016. The lack of symmetry between the two data sets suggests antler quality is not always correlated positively with bull age for this herd. Factors such as nutrition and genetics may also be contributing to antler quality. Studies of the tooth-age dataset certainly temper any assumptions made regarding changes in the antler class dataset and aid in making sound management decisions for this herd. Collectively, these data indicate this herd can continue to support the current number of any-elk licenses for the 2017 season without compromising bull ratios or bull quality. Managers must continue to scrutinize harvest data and hunter feedback, and perhaps begin to reduce issuance of any-elk licenses if the percentage of Class II bulls observed during classification surveys continues to decline. Managers may also consider incentivizing the submission of tooth samples from hunters as a means to improve and maintain adequate sample sizes, as hunter participation appears to have dropped in recent years.

Table 1. Tooth-age data analysis for adult bull elk harvested within the Laramie Peak/Muddy Mountain Herd Unit, 1997 - 2016.

	Number of Adult Males per Age Class (Tooth Sampling)																					
Year	**1+**	**2+**	**3+**	**4+**	**5+**	**6+**	**7+**	**8+**	**9+**	**10+**	**11+**	**12+**	**13+**	**14+**	**15+**	**16+**	**17+**	**18+**	**19+**	**20+**	**21+**	**22+**
1997	7	13	5	5	6	2	2	3	0	2	1	0	0	0	0	0	0	0	0	0	0	0
1998	1	16	19	10	10	4	3	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0
1999	20	26	39	24	16	9	8	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0
2000	22	36	41	28	24	13	6	1	3	1	1	0	0	0	0	1	0	0	0	0	0	0
2001	15	22	27	29	14	10	3	3	1	0	2	2	0	0	0	0	0	0	0	0	0	0
2004	7	8	16	19	6	10	5	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0
2005	6	3	27	16	10	11	6	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
2007	1	11	24	18	12	12	8	3	0	0	1	1	0	0	0	1	0	0	0	0	0	0
2008	4	2	19	24	22	17	12	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0
2010	4	3	16	27	32	27	13	2	1	2	5	1	0	0	0	0	0	0	0	0	0	0
2011	7	9	11	19	25	24	7	4	6	3	3	0	0	0	0	0	0	0	0	0	0	0
2012	2	9	9	22	22	20	9	3	4	0	1	0	0	0	0	0	0	0	0	0	0	0
2013	3	3	11	33	22	40	11	9	7	4	1	0	2	0	0	0	0	0	0	0	0	0
2014	3	4	19	27	35	31	17	13	7	5	2	0	0	1	0	0	0	0	0	0	0	0
2015	4	6	10	17	18	29	27	11	9	5	2	0	1	0	0	0	0	0	0	0	0	0
2016	1	4	13	20	31	21	18	12	5	2	3	2	0	0	0	0	0	0	0	0	0	0

Year	**1**	**2-5**	**6-10**	**11-12**	**13+**	**N**	**Avg Age**
1997	7	29	9	1	0	46	**4.41**
1998	1	55	12	1	0	69	**4.12**
1999	20	105	20	1	0	146	**3.91**
2000	22	129	24	1	1	177	**3.99**
2001	15	92	17	4	0	128	**4.17**
2004	7	49	19	1	0	76	**4.48**
2005	6	56	20	1	0	83	**4.51**
2007	1	65	23	2	1	92	**4.58**
2008	4	67	35	1	0	107	**5.01**
2010	4	78	45	6	0	133	**5.33**
2011	7	64	44	3	0	118	**5.35**
2012	2	62	36	1	0	101	**5.44**
2013	3	69	71	1	2	146	**6.07**
2014	3	85	73	2	1	164	**6.02**
2015	4	51	81	2	1	139	**6.40**
2016	1	63	63	5	0	132	**6.20**

	Percentages				
Year	**1**	**2-5**	**6-10**	**11-12**	**13+**
1997	15%	63%	20%	2%	0%
1998	1%	80%	17%	1%	0%
1999	14%	72%	14%	1%	0%
2000	12%	73%	14%	1%	1%
2001	12%	72%	13%	3%	0%
2004	9%	64%	25%	1%	0%
2005	7%	67%	24%	1%	0%
2007	1%	71%	25%	2%	1%
2008	4%	63%	33%	1%	0%
2010	3%	59%	34%	5%	0%
2011	6%	54%	37%	3%	0%
2012	2%	61%	36%	1%	0%
2013	2%	47%	49%	0%	1%
2014	2%	52%	45%	1%	1%
2015	3%	37%	58%	1%	1%
2016	<1%	48%	48%	4%	0%

Table 2. Tooth-age data analysis for adult female elk harvested within the Laramie Peak/Muddy Mountain Herd Unit, 1997 - 2016.

	Number of Adult Females per Age Class (Tooth Sampling)																					
Year	**1+**	**2+**	**3+**	**4+**	**5+**	**6+**	**7+**	**8+**	**9+**	**10+**	**11+**	**12+**	**13+**	**14+**	**15+**	**16+**	**17+**	**18+**	**19+**	**20+**	**21+**	**22+**
1997	8	3	5	9	5	1	1	2	1	1	3	0	0	0	0	0	0	0	0	0	0	0
1998	3	14	6	10	6	7	5	2	1	2	1	1	1	0	0	0	1	0	0	0	0	0
1999	14	22	16	20	8	8	6	7	3	1	8	3	3	1	0	0	0	0	0	0	0	1
2000	19	26	21	17	13	11	6	4	6	0	4	3	0	1	2	1	0	0	0	0	1	0
2001	11	15	24	11	15	9	10	5	4	4	3	3	0	0	0	1	0	0	0	0	0	0
2004	8	4	13	8	8	6	3	2	3	0	0	1	0	0	0	0	0	0	0	0	0	0
2005	26	14	39	34	21	14	16	15	4	6	5	5	0	4	4	0	0	1	0	0	0	0
2007	4	7	19	24	7	6	8	5	11	4	5	2	2	1	0	2	1	0	0	0	0	0
2008	8	11	14	14	17	8	11	5	3	2	1	2	3	1	0	2	1	1	0	1	0	0
2010	5	7	14	9	13	9	3	5	3	5	1	1	2	0	1	1	0	0	0	0	0	0
2011	4	4	11	10	14	6	7	6	2	1	0	0	0	0	1	2	0	0	0	0	0	0
2012	10	9	15	8	7	5	4	6	2	1	4	1	1	0	0	0	0	0	0	0	0	0
2013	5	1	11	20	14	8	4	3	3	2	1	4	0	0	0	0	0	0	0	0	0	0
2014	9	11	19	25	18	11	13	11	6	4	2	3	0	3	1	1	0	0	0	0	0	0
2015	16	9	12	16	10	3	9	7	3	1	5	4	3	1	2	0	1	0	0	0	0	0
2016	7	12	15	13	7	6	7	5	6	1	2	3	2	1	0	0	3	0	0	0	0	0

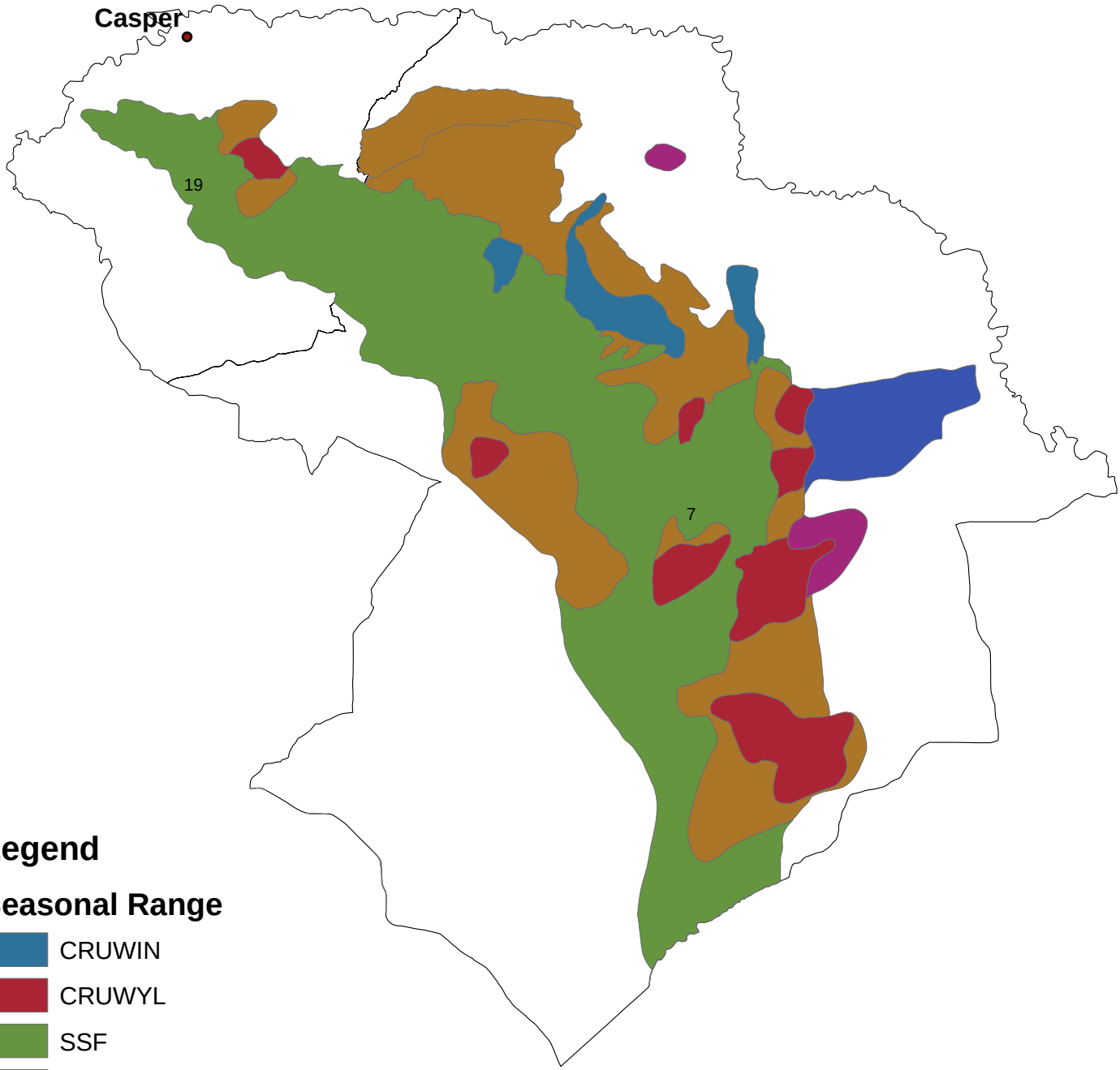
Year	**1**	**2-5**	**6-10**	**11-12**	**13+**	**N**	**Avg Age**
1997	8	22	6	3	0	39	**4.38**
1998	3	36	17	2	2	60	**4.90**
1999	14	66	25	11	5	121	**5.02**
2000	19	77	27	7	5	135	**4.61**
2001	11	65	32	6	1	115	**4.84**
2004	8	33	14	1	0	56	**4.27**
2005	26	108	55	10	9	208	**5.16**
2007	4	57	34	7	6	108	**5.97**
2008	8	56	29	3	9	105	**5.71**
2010	5	43	25	2	4	79	**5.49**
2011	4	39	22	0	3	68	**5.34**
2012	10	39	18	5	1	73	**5.20**
2013	5	46	20	5	0	76	**5.70**
2014	9	73	45	5	5	137	**5.88**
2015	16	47	23	9	7	102	**6.05**
2016	7	47	25	5	6	90	**6.07**

	Percentages				
Year	**1**	**2-5**	**6-10**	**11-12**	**13+**
1997	21%	56%	15%	8%	0%
1998	5%	60%	28%	3%	3%
1999	12%	55%	21%	9%	4%
2000	14%	57%	20%	5%	4%
2001	10%	57%	28%	5%	1%
2004	14%	59%	25%	2%	0%
2005	13%	52%	26%	5%	4%
2007	4%	53%	31%	6%	6%
2008	8%	53%	28%	3%	9%
2010	6%	54%	32%	3%	5%
2011	6%	57%	32%	0%	4%
2012	14%	53%	25%	7%	1%
2013	7%	61%	26%	7%	0%
2014	7%	53%	33%	4%	4%
2015	16%	46%	23%	9%	7%
2016	8%	52%	28%	5%	7%

Table 3. Antler classification of bull elk from the Laramie Peak/Muddy Mountain Herd Unit, 2008-2016.

Mature Bull Antler Classification									
Bio-Year	Area 7 (N / %)			Area 19 (N / %)			**EL 741 (N / %)**		
	Class I	Class II	Total	Class I	Class II	Total	**Class I**	**Class II**	**Total**
2008	82 (23%)	270 (77%)	352	41 (26%)	119 (74%)	160	**123 (24%)**	**389 (76%)**	**512**
2009	211 (49%)	219 (51%)	430	58 (41%)	84 (59%)	142	**269 (47%)**	**303 (53%)**	**572**
2010	246 (47%)	280 (53%)	526	61 (54%)	52 (46%)	113	**307 (48%)**	**332 (52%)**	**639**
2011	278 (69%)	128 (31%)	406	104 (73%)	38 (27%)	142	**382 (70%)**	**166 (30%)**	**548**
2012	76 (56%)	60 (44%)	136	160 (71%)	66 (29%)	226	**236 (65%)**	**126 (35%)**	**362**
2013	213 (56%)	169 (44%)	382	57 (54%)	48 (46%)	105	**270 (55%)**	**217 (45%)**	**487**
2014	165 (64%)	93 (36%)	258	106 (57%)	79 (43%)	185	**271 (61%)**	**172 (39%)**	**443**
2015	212 (74%)	74 (26%)	286	93 (47%)	106 (53%)	199	**305 (63%)**	**180 (37%)**	**485**
2016	318 (70%)	137 (30%)	455	111 (57%)	85 (43%)	196	**429 (66%)**	**222 (34%)**	**651**

Laramie Peak/Muddy Mountain Elk Herd Unit
(EL741)
Revised May 18, 2010
Hunt Areas 7 & 19



Legend

Seasonal Range

- CRUWIN
- CRUWYL
- SSF
- WIN
- WYL
- YRL

2016 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2016 - 5/31/2017

HERD: EL742 - RATTLESNAKE

HUNT AREAS: 23

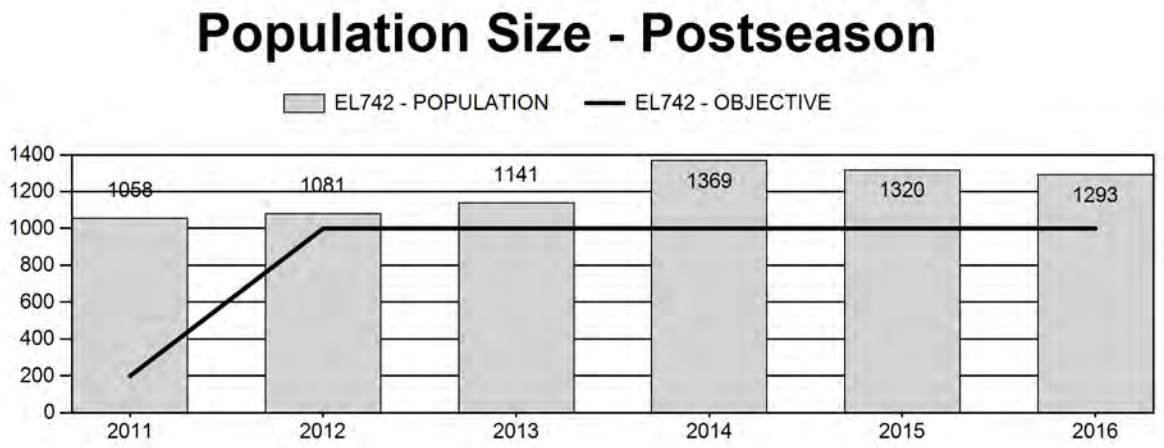
PREPARED BY: HEATHER O'BRIEN

	2011 - 2015 Average	2016	2017 Proposed
Population:	1,194	1,293	1,289
Harvest:	171	206	230
Hunters:	380	380	390
Hunter Success:	45%	54%	59%
Active Licenses:	401	402	420
Active License Success:	43%	51%	55 %
Recreation Days:	3,423	3,611	3,500
Days Per Animal:	20.0	17.5	15.2
Males per 100 Females	59	27	
Juveniles per 100 Females	37	24	

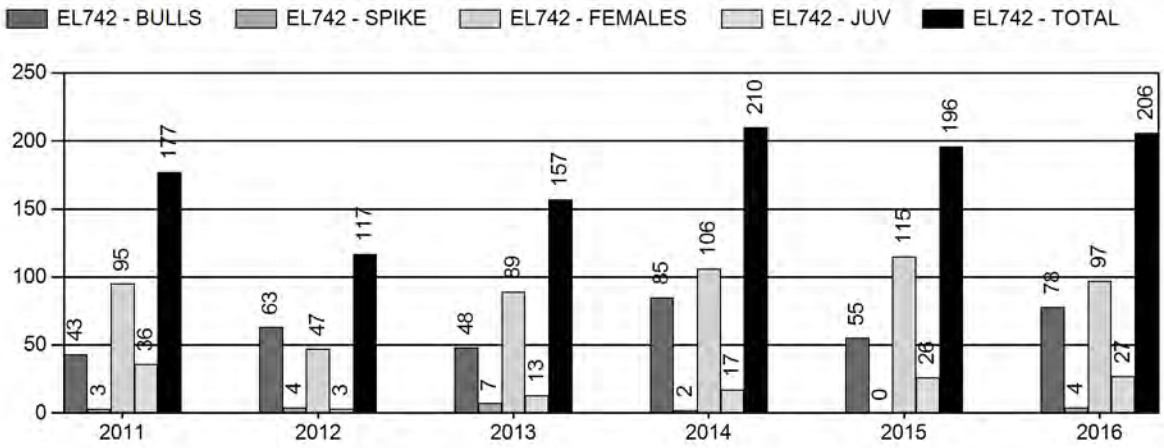
Population Objective (± 20%) :	1000 (800 - 1200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	29%
Number of years population has been + or - objective in recent trend:	25
Model Date:	3/01/2017

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

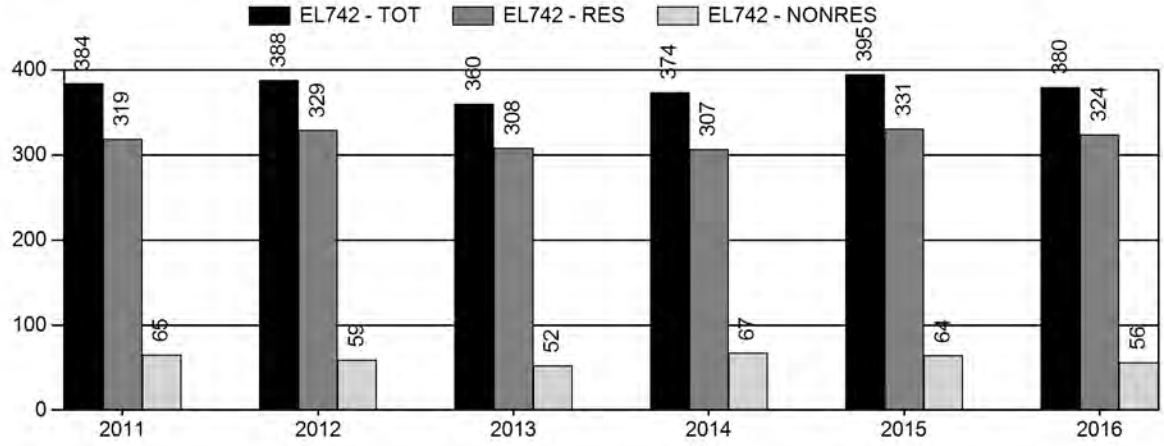
	JCR Year	Proposed
Females ≥ 1 year old:	16.2%	13.1%
Males ≥ 1 year old:	18.5%	21.0%
Total:	14.0%	15.0%
Proposed change in post-season population:	-10.6%	0%



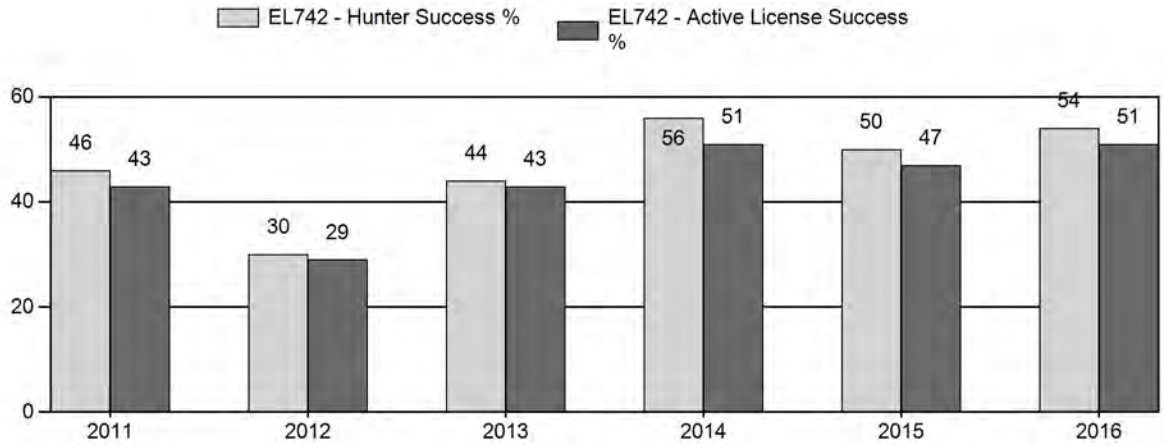
Harvest



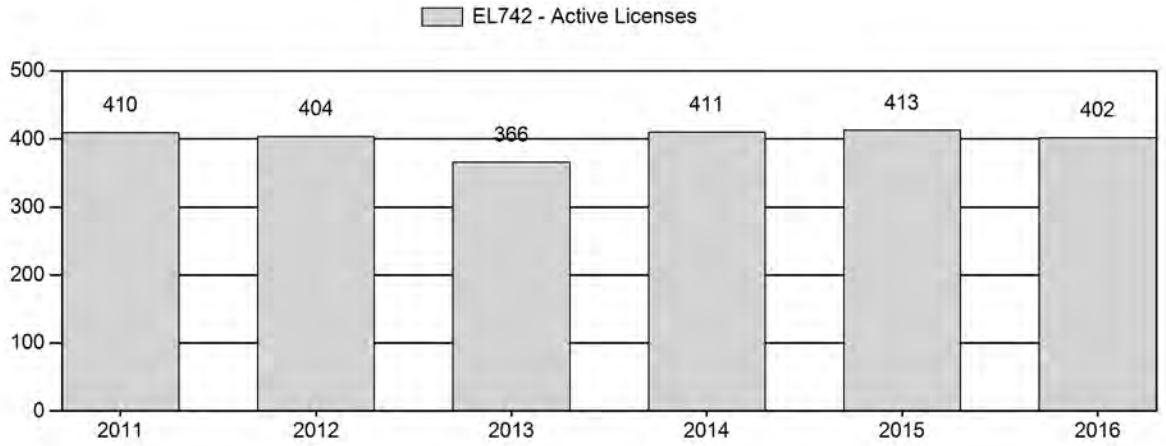
Number of Hunters



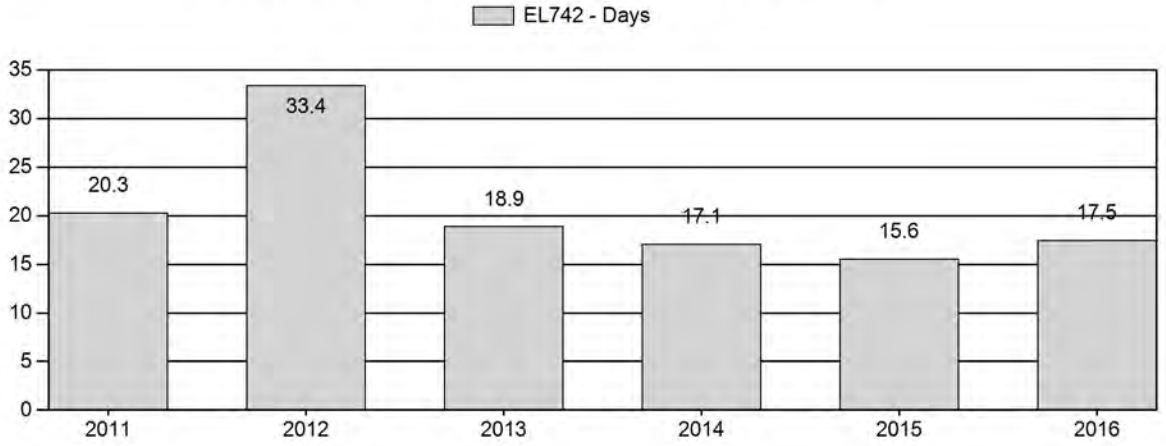
Harvest Success



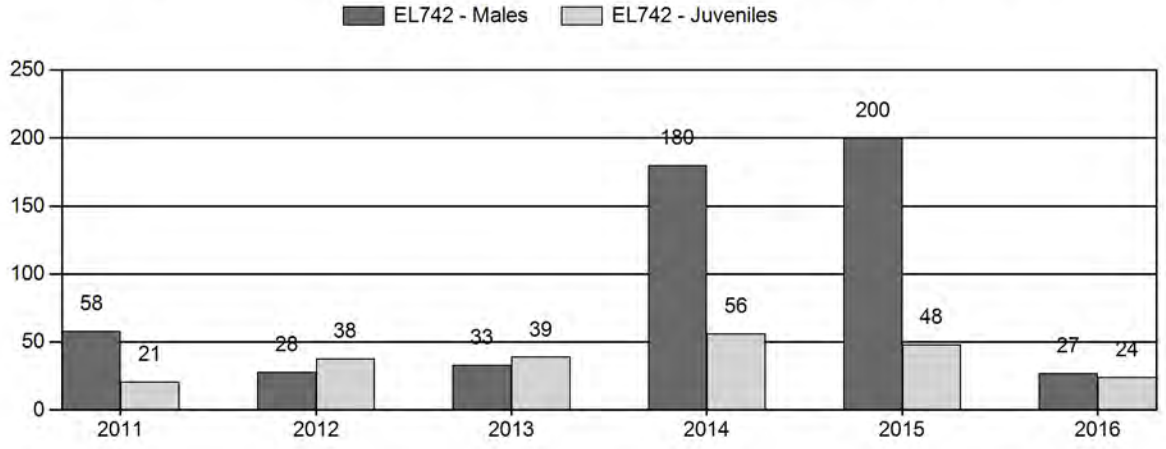
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2011 - 2016 Postseason Classification Summary

for Elk Herd EL742 - RATTLESNAKE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	1,058	17	90	107	32%	185	56%	38	12%	330	443	9	49	58	± 7	21	± 4	13
2012	1,081	26	32	58	17%	204	60%	77	23%	339	384	13	16	28	± 4	38	± 5	29
2013	1,141	26	102	128	19%	390	58%	153	23%	671	479	7	26	33	± 3	39	± 3	30
2014	1,369	35	113	148	54%	82	30%	46	17%	276	406	43	138	180	± 28	56	± 12	20
2015	1,320	10	86	96	57%	48	29%	23	14%	167	390	21	179	200	± 42	48	± 15	16
2016	1,293	53	77	130	18%	478	66%	114	16%	722	395	11	16	27	± 2	24	± 2	19

2017 HUNTING SEASONS
RATTLESNAKE ELK (EL742)

Hunt Area	Type	Season Dates Opens	Season Dates Closes	Quota	License	Limitations
23	1	Oct. 1	Oct. 31	150	Limited quota	Any elk
		Nov. 15	Dec. 15			Any elk
	4	Oct. 1	Oct. 31	125	Limited quota	Antlerless elk
		Nov. 15	Dec. 15			Antlerless elk, also valid in Area 128
	6	Oct. 1	Oct. 31	200	Limited quota	Cow or calf
		Nov. 15	Dec. 15			Cow or calf, also valid in Area 128
	7	Nov. 15	Dec. 15	50	Limited quota	Cow or calf, also valid in Area 128
Archery						Refer to license type and limitations in Section 2

Hunt Area	Type	Quota change from 2016
23	1	+25
	4	No changes
	6	+25
	7	No changes

Management Evaluation

Current Postseason Population Management Objective: 1,000
Management Strategy: Recreational
2016 Postseason Population Estimate: 1,300
2017 Proposed Postseason Population Estimate: 1,300
2016 Hunter Satisfaction: 56% Satisfied, 17% Neutral, 27% Dissatisfied

The Rattlesnake Elk Herd Unit has a postseason population management objective of 1,000 elk. The herd is managed using the recreational management strategy, with a goal of maintaining

postseason bull ratios of 15-29 bulls per 100 cows. The objective and management strategy were revised in 2012.

Herd Unit Issues

Hunting access within the herd unit is variable. The majority of occupied elk habitat is accessible for hunting via public land and Hunter Management Area access. However, there is one ranch within the central part of occupied habitat that does not allow any access for hunting and harbors the vast majority of elk within the herd unit. Hunters have expressed frustration when elk take refuge in this area, as they tend to remain there due to low hunter pressure and good forage conditions. The main land use within the herd unit is traditional ranching and grazing of livestock, with isolated areas of oil and gas development. There is the potential for future mining of precious metals and rare earth minerals in the hunt area, but current levels of activity are low. Disease outbreaks are not a current concern in this herd unit.

Weather

The severe winter of 2010-2011 and subsequent drought of 2012 may have caused higher mortality of elk in the Rattlesnake Herd Unit, particularly calves. From 2013 to the present, weather trends have been more favorable, and elk have fared well within the herd. Range conditions were particularly good from 2013 to 2015, when spring and summer moisture improved and winters were mild. The winter of 2015 was fairly average, though some areas experienced prolonged periods of persistent snow. The spring of 2016 was very wet, resulting in rapid plant growth and green-up of rangelands. However, the majority of the summer and fall were extremely dry, causing much of the available forage to cure. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided elk with a boost in nutrition prior to the winter of 2016-2017. While there were several notable snow storms and cold snaps during the winter of 2016-2017, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Thus, managers expect good calf survival for the winter of 2016-2017. For detailed weather data see http://www.ncdc.noaa.gov/gac/time-series/us.

Habitat

This herd unit has no established habitat transects that measure production and/or utilization on vegetation preferred by elk. Anecdotal observations and discussions with landowners in the region indicate late summer forage production may have been poor, but fall forage availability

for elk improved in 2016. Harvested elk, elk observed during November aerial surveys, and elk observed during February 2017 ground surveys appeared to be in good body condition.

Field Data

Observed calf ratios are highly erratic in this herd unit due to varying classification survey conditions and levels of effort across years. Thus it is difficult to correlate changes in population size or make decisions regarding license issuance based on observed calf ratios. Even with excellent survey conditions during 2016 classification flights, it was difficult to accurately classify individuals within very large cow/calf groups recorded on digital video. Instead of focusing on changes in observed calf ratios, managers continue to focus on maximizing cow harvest without over-saturating public lands with hunter pressure. Increases in cow license issuance are not warranted unless access improves and there are no large areas where elk can take refuge from harvest pressure.

Observed bull ratios are also highly erratic as a result of variable survey conditions and levels of effort from year to year. Since 2001, observed bull ratios have ranged from 13 to 58 per 100 cows during favorable survey years. Years with low observed bull ratios were followed by years with much higher observed ratios; indicating bulls were likely missed during classification surveys in some years, and/or elk are immigrating/emigrating to and from adjacent hunt areas. In years when large cow/calf groups are missed during aerial surveys, resulting bull ratios appear to be artificially high. While real survey data in these years are reported in classification results; long-term averages are applied in the population model to represent more realistic bull ratios. Coverage during 2016 classification surveys was considered excellent, with good flight and observation conditions. Managers therefore believe the resulting bull ratio of 27 per 100 cows is likely an accurate representation of real bull ratios within this herd. While license issuance and season structure changes in this herd are not typically made based on observed classification ratios, current harvest pressure on bulls seems to be well tolerated. Future season structure should persist in maximizing cow harvest while maintaining relatively good license success without overcrowding hunters.

Harvest Data

License success in this herd unit is typically in the 40th percentile and is fairly consistent given license issuance and hunter opportunity has remained relatively similar across years. Hunter days per animal fluctuate from year to year, but this may be a function of changes in access due to weather and road conditions. The persistence of unattainable elk in the aforementioned private land refugia most certainly contributes to increased hunter days and low harvest success in most

years. In 2016, weather conditions were mostly favorable and access to public hunting areas was good. Overall harvest success improved to 55%, compared to the 25-year average of 48%. The longer, split season in 2013-2016 also facilitated movement of elk off of private refugia. Elk have moved into accessible hunting areas during the November 1-14th closure in all four years. Late-season licenses were also valid in the adjacent Hunt Area 128, where portions of the herd sometimes migrate during the fall and winter months. Field personnel continue to receive positive comments from hunters and landowners who are pleased with this hunting season structure. In 2016, the late season was extended from two to four weeks in length to further maximize female harvest. Success on late season cow licenses improved immensely – from 15% in 2015 to 59% in 2016 – and hunters commented that they were pleased to have more hunting opportunity. Overall, harvest was the second highest on record, and hunter satisfaction improved in 2016.

Population

The 2016 postseason population estimate was approximately 1,300 elk. Managers believe this herd is slightly larger than the model predicts, since 1,225 elk were observed during 2016 postseason classification surveys. No sightability or other population estimate data are currently available to further align the model in conjunction with classification and harvest data. There have been few complaints from landowners in recent years with regard to elk numbers. Harvest pressure and success have increased with longer seasons since 2013, but may also be improving if this elk herd is growing slightly. It is difficult to determine how many elk may emigrate from the herd unit into adjacent areas, but managers believe this population to be relatively stable.

The "Time-Specific Juvenile – Constant Adult Survival – Male Survival Coefficient " (TSJ,CA, MSC) spreadsheet model was selected for the postseason population estimate of this herd. This population is difficult to model as it is small in size and appears to have consistent interchange with an adjacent herd, thus violating the closed population assumption of the model. High variability in observed bull and calf ratios also render this herd challenging to model. Long-term classification averages are used in years when adequate sample sizes are not reached during postseason surveys to avoid inaccuracies from high variability in the model. Trend count data are also included in the model to document higher numbers of elk that have been seen in some years but could not be classified. The TSJ,CA and CJ,CA models were discarded, as they predict population sizes that are lower than observed survey totals. When juvenile survival was increased in years known to have mild winter conditions, the SCJ,CA model predicted a reasonable population size. However, the model applied the extreme lower survival constraint for juveniles and the upper survival constraint for adults, indicating poor model performance and quality. While the TSJ,CA,MSC model appears to be the best choice to represent the herd, it should be noted that this model frequently selected for the upper and lower juvenile survival

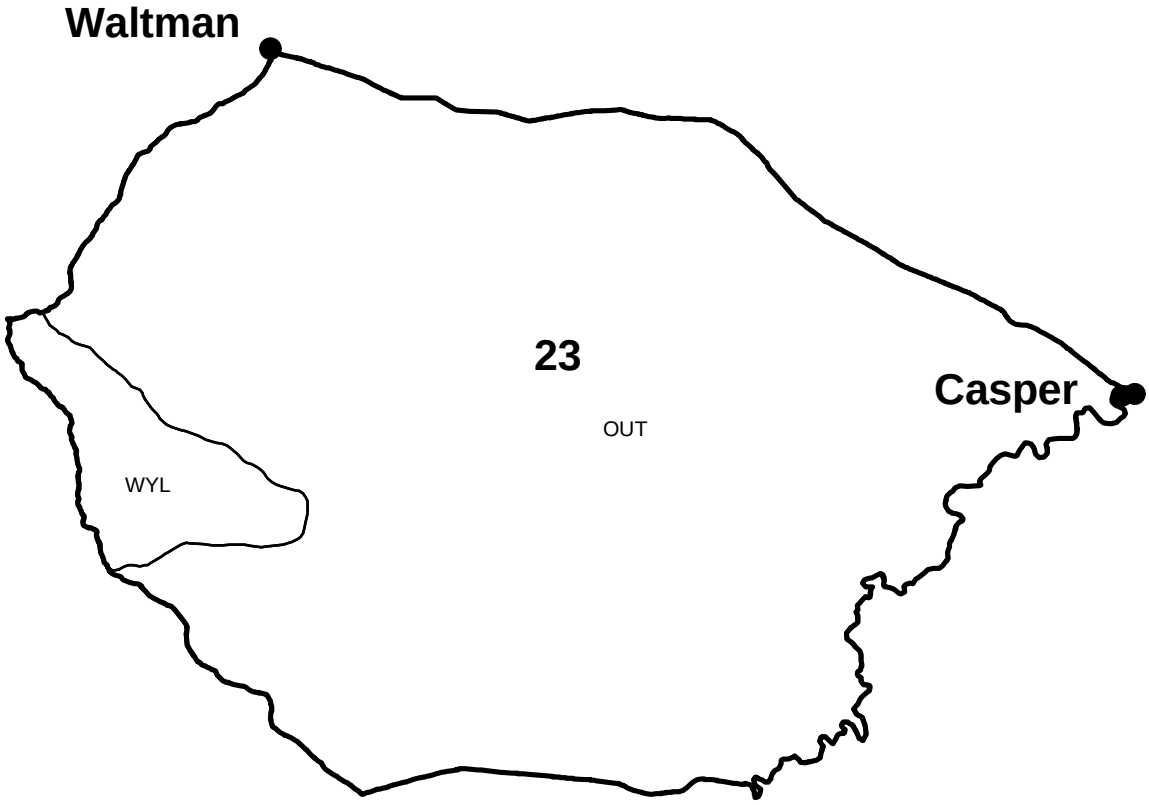
constrains and selected the highest adult survival constraint, indicating that it is of poor quality. If the model continues to be troublesome and inaccurate in reflecting trends and known numbers of elk, managers may consider changing to trend-count based management for this herd.

Management Summary

Opening day of hunting season in this herd is traditionally October 1st, and closing dates have differed with changing harvest prescriptions from year to year. Season structure has also changed to include a split season in recent years to maximize cow harvest. Longer split season dates with a closure from November 1 – 14 have been well-received the last four years by hunters, and have resulted in record high harvest success and harvest totals. Since this has worked well, the same season structure is being implemented for 2017. The addition of 25 Type 1 and 25 Type 6 licenses in 2017 is justified by the very high number of elk observed during classification surveys. If the addition of these licenses causes noticeable hunter crowding or reduced harvest success, license reductions will be considered for 2018. The 4-week late cow season will be continued as a means to provide extended opportunity for those license holders. Goals for 2017 are to continue high harvest pressure on cows, maintain extended opportunity to hunt bulls, and maintain or improve overall harvest success.

If we attain the projected harvest of approximately 203 elk and assuming average calf production/survival, this herd should remain relatively stable. The predicted 2017 postseason population estimate for the Rattlesnake Elk Herd is approximately 1,300 animals, or 30% above objective.

Elk - Rattlesnake
Hunt Area 23
Casper Region
Revised 8/94



2016 - JCR Evaluation Form

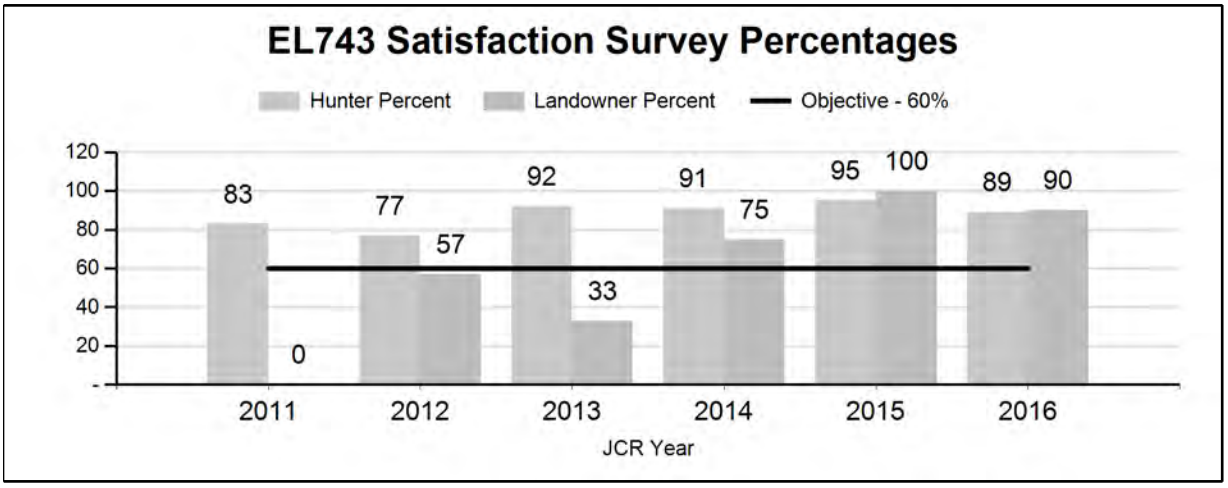
SPECIES: Elk
HERD: EL743 - PINE RIDGE
HUNT AREAS: 122

PERIOD: 6/1/2016 - 5/31/2017

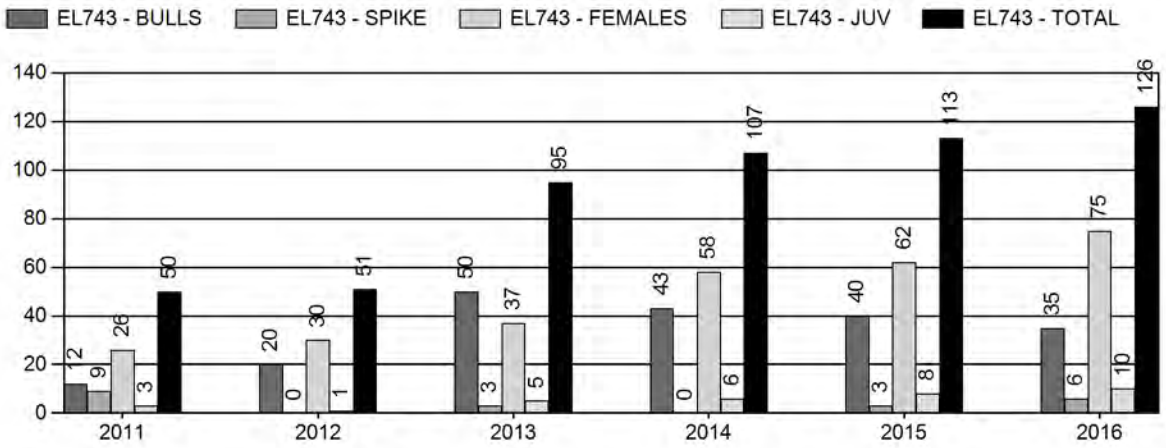
PREPARED BY: WILLOW STEEN

	2011 - 2015 Average	2016	2017 Proposed
Hunter Satisfaction Percent	89%	89%	90%
Landowner Satisfaction Percent	68%	90%	90%
Harvest:	83	126	130
Hunters:	106	143	145
Hunter Success:	78%	88%	90 %
Active Licenses:	113	155	158
Active License Success:	73%	81%	82 %
Recreation Days:	466	525	530
Days Per Animal:	5.6	4.2	4.1
Males per 100 Females:	0	0	
Juveniles per 100 Females	0	0	

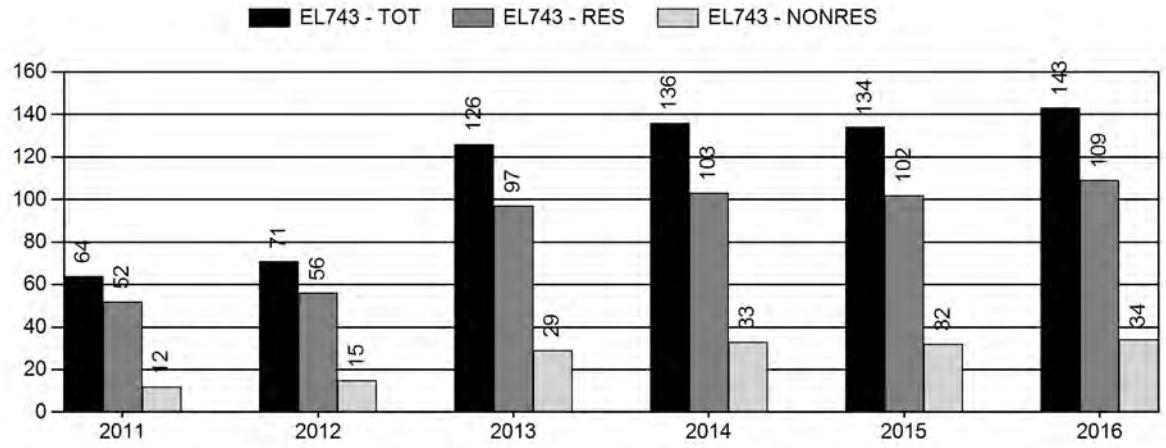
Satisfaction Based Objective	60%
Management Strategy:	Private Land
Percent population is above (+) or (-) objective:	30%
Number of years population has been + or - objective in recent trend:	3



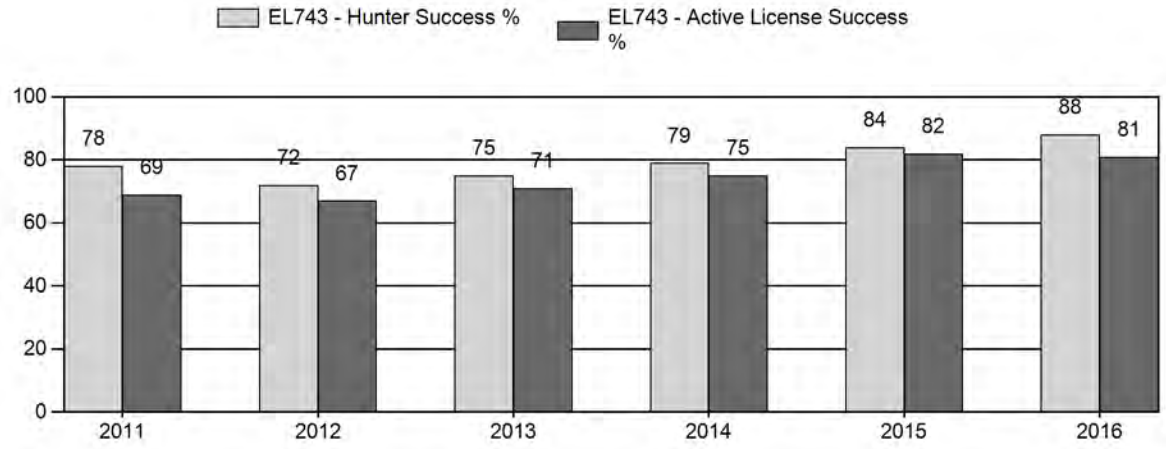
Harvest



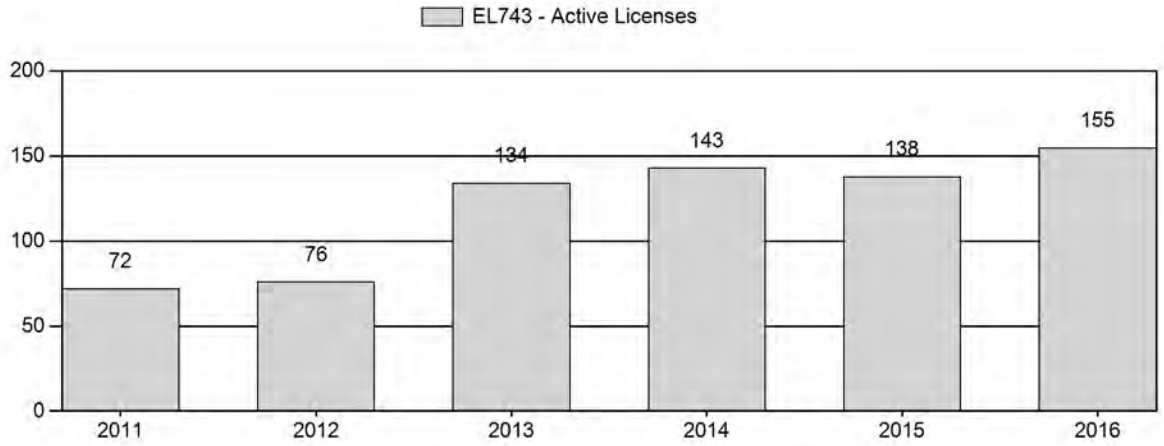
Number of Hunters



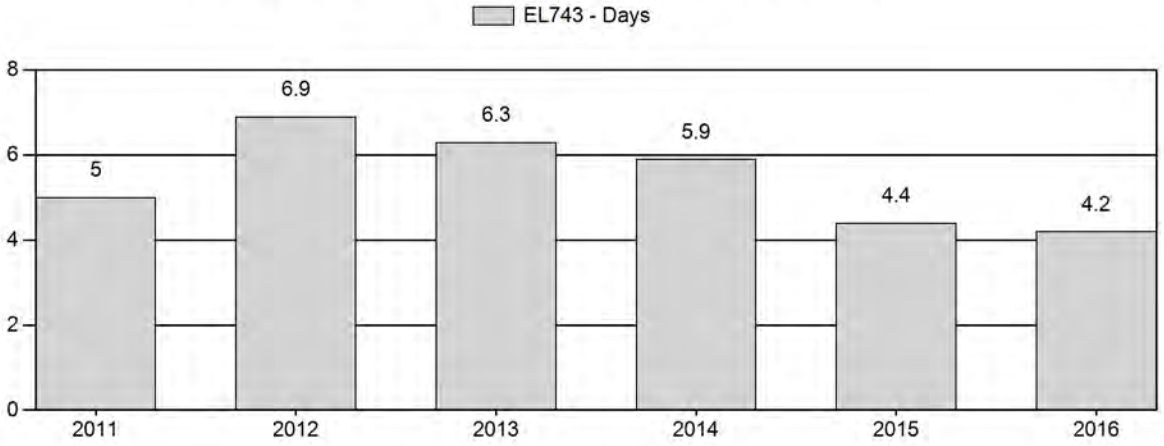
Harvest Success



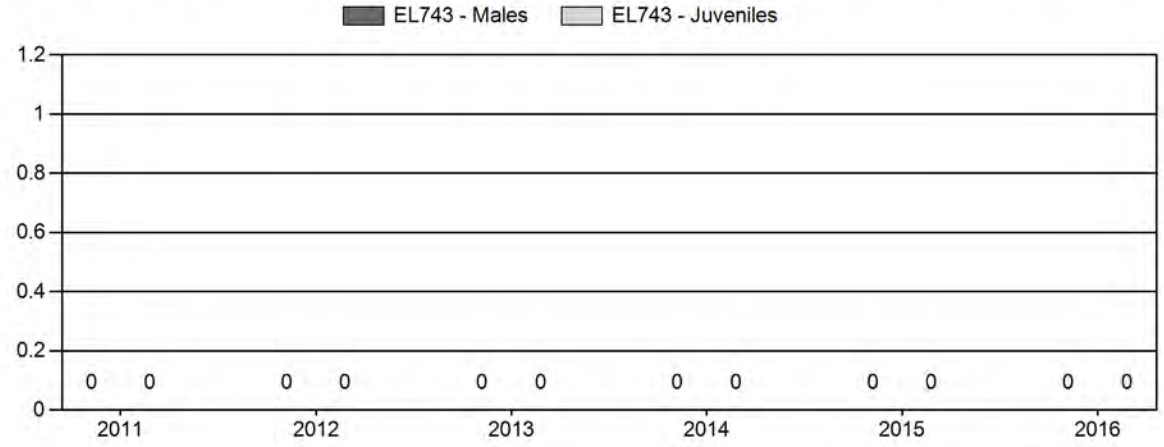
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2017 HUNTING SEASONS
PINE RIDGE ELK HERD (EL743)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
122	1	Oct. 15	Nov. 30	75	Limited quota	Any elk
		Dec. 1	Dec. 31			Antlerless elk
	6	Oct. 15	Dec. 31	150	Limited quota	Cow or calf
Archery		Sep. 1	Sep. 30			Refer to license and type limitations in Section 2

Management Evaluation

Current Hunter/Landowner Satisfaction Management Objective: 60% hunter/landowner satisfaction; bull quality
Management Strategy: Private Land
2016 Hunter Satisfaction Estimate: 89%
2016 Landowner Satisfaction Estimate: 90%
Most Recent 3-year Running Average Hunter Satisfaction Estimate: 92%
Most Recent 3-year Running Average Landowner Satisfaction Estimate: 88%
2016 Postseason Population Estimate: *~ 900 (Field Estimate)*
2017 Proposed Postseason Population Estimate: *~ 900 (Field Estimate)*

The Pine Ridge Elk Herd Unit has a management objective based on 60% or higher landowner and hunter satisfaction. As a secondary objective, managers strive to maintain a bull harvest consisting of 60% mature, branch-antlered bulls. This objective was revised in 2012. An objective based upon postseason population estimates was not feasible for this herd unit.

Herd Unit Issues

Nearly all elk in this herd reside in and along the timbered Pine Ridge escarpment in the north central portion of the herd unit. Land use consists of traditional ranching and livestock grazing mixed with areas of intensive oil and gas, wind, and uranium development. Access to hunting is tightly controlled by private landowners, and achieving adequate harvest to manage growth of this herd can be difficult, although it has been significantly improved in recent years. Given the

private-land nature of this elk herd, the Department gives serious deference to landowner desires. In past years, landowners have expressed dissatisfaction with growing elk numbers. However, the majority of landowners are now expressing satisfaction with current season structure, level of harvest, and elk numbers. Recently liberalized season structure, as well as increased commitment from landowners to harvest cow elk, have resulted in continually increasing harvest rates, which appear to be maintaining elk numbers.

Weather & Habitat

The Pine Ridge Elk Herd resides in relatively low-elevation habitat, and weather typically has minimal influence on elk productivity, survival and movements. In addition, there are no habitat or classification data collected in this herd unit given the Department's minimal management influence and budgetary constraints. Thus no meaningful analysis of weather and habitat data will be presented.

Field Data

Fixed-wing winter trend counts are conducted in this herd unit as budget and weather conditions allow. Past trend counts of this herd typically found between 150 and 350 elk. In 2013, a winter trend count conducted under optimum conditions found a total of 840 elk, indicating this herd was larger than previously believed. A trend count conducted in February 2014 found a total of 454 elk; however snow conditions were not ideal and elk were difficult to see bedded amongst exposed rocks and shrubs. In February 2015, a trend count yielded only 276 elk despite good survey conditions and thorough coverage. In November of 2015, field personnel attempted to conduct the trend count during deer helicopter classification flights, but were only able to locate 49 elk. In 2016, elk were counted during deer flights in November (total of 271 elk) as well as a trend count in February under ideal conditions (566 elk). Based on past observations and landowner input, managers still estimate this herd likely numbers 900-1,000 elk.

Current information on this herd is somewhat limited given budget constraints and the private land nature of this herd. Despite these limitations, field managers and many landowners feel that the population is stagnant. However, given typical calf ratios found in other Central Wyoming herds (in the 40s), if the population is indeed at about 900 elk, the average level of harvest in this herd (5-year average of 58 cow/ calves; 98 total elk), is not sufficient to curtail population growth. Managers therefore assume that there may be population emigration occurring in this herd. There are few major geographical or anthropogenic barriers to elk movement in this area. Managers and landowners observe small groups of elk, particularly bulls, moving east from Pine Ridge, often crossing Highway 59. The population may violate the herd definition of less than 10% interchange. However, lack of specific information regarding these elk movements precludes re-defining the herd.

Landowner and hunter satisfaction surveys are used to gauge management of the Pine Ridge Elk Herd. Annual survey results must show that at least 60% of hunters were either "satisfied" or "very satisfied" with the previous year's hunting season. In addition, landowner surveys must show that at least 60% or more respondents are satisfied with elk numbers in their area. Should these satisfaction thresholds not be met, changes in management should be prescribed to address reasons for dissatisfaction. A secondary objective is also used in the Pine Ridge Elk Herd Unit to anchor the results of satisfaction surveys to a population parameter. In this case, age class targets are determined from the harvest survey and used as a measure of bull quality. The percentage of mature branch-antlered bulls in the male portion of the annual harvest is used, with a 3-year trend average of 60% minimum being the threshold for management action.

Pine Ridge landowners continue to express their preference for the Department to hold an in-person meeting every year as opposed to conducting a mailer survey. Due to poor road conditions, landowners did not attend the scheduled in-person meeting this year. Landowners were therefore contacted via phone and asked for their input regarding the elk herd. For the 2016 season, 90% of landowners (N=10) were satisfied, while 89% of hunters who returned surveys were "satisfied" or "very satisfied" with their hunting experience in the Pine Ridge Elk Herd Unit. For the secondary objective, the three-year average for mature bulls in the harvest was 93%. Landowner satisfaction, hunter satisfaction, and the percentage of mature bulls in the harvest all exceeded the 60% threshold for bio-year 2016.

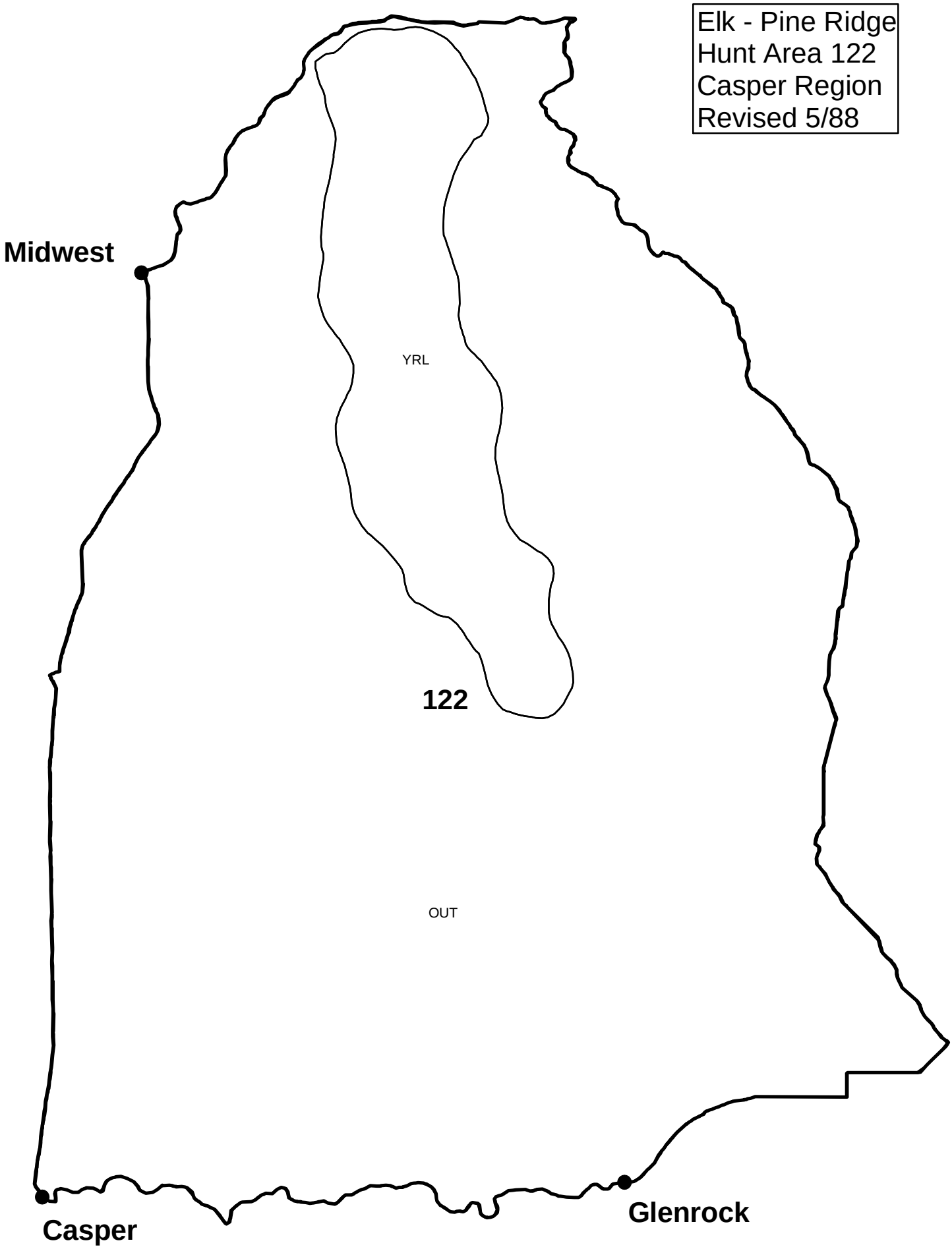
Harvest Data

Hunter success has remained high for the last 5 years (72-88%). In the past, antlerless elk licenses were undersubscribed as landowners have been unwilling to allow access for cow hunters. However, landowners have recently become more willing to allow hunting access and harvest more elk. A majority of Type 6 licenses were available as leftovers after the initial drawing in 2016, and 25 remained unsold. Despite the unsold licenses, total harvest was the highest it has ever been in 2016 with 126 elk harvested. Of these, 67% were cows or calves. In years prior to 2013, harvest was typically somewhere between 45 and 50 elk. Since 2012, there has been a steady increase in total harvest, with total harvest ranging from 95 to 126 elk.

Perceived loss of bull quality was also a concern amongst certain landowners in the past. However, landowners in recent years agreed that bull quality was still high and that a quota of 75 was desirable. Landowner perceptions of bull availability are reflected in the harvest results as license success was 72% on the Type 1 license with 85% of those being branch-antlered bulls.

Management Summary

The hunting season in this herd unit opens on October 15th and closes on December 31st. In recent years, closing dates and quotas have been extended as landowners agreed to liberalize access for cow elk hunting later in the season. Type 1 license issuance will remain at 75, and Type 6 license issuance at 150. Some landowners expressed interest in an October 1st opener in order to increase harvest on the southern end of the ridge due to elk residing there during this time. Since the 2016 in-person meeting wasn't possible due to weather this year, managers plan to address this change with landowners prior to formulating the 2018 application packet. Both managers and the majority of the landowners feel that the population trend and level of harvest have improved in recent years and the goal for the 2017 season is to maintain these improvements.


Elk - Pine Ridge
Hunt Area 122
Casper Region
Revised 5/88
Midwest
YRL
122
OUT
Casper
Glenrock