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PRONGHORN

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2018 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2018 - 5/31/2019

HERD: PR309 - PUMPKIN BUTTES

HUNT AREAS: 23

PREPARED BY: ERIKA PECKHAM

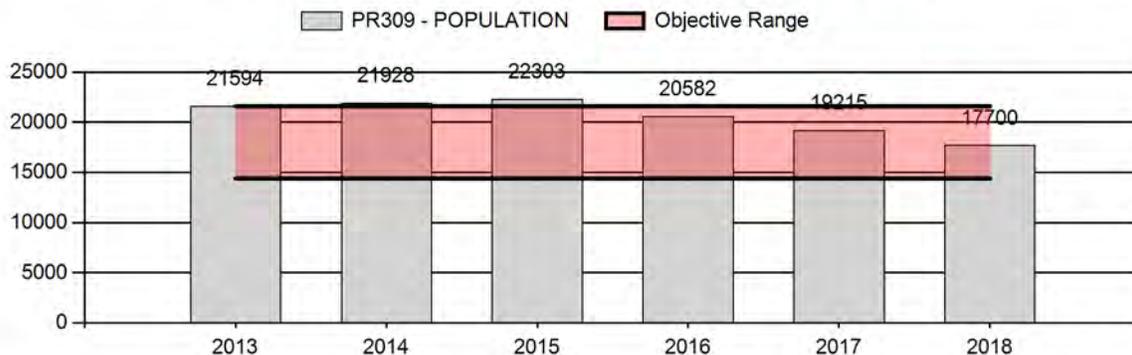
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	21,124	17,700	16,630
Harvest:	2,313	2,571	2,470
Hunters:	2,508	2,636	2,600
Hunter Success:	92%	98%	95 %
Active Licenses:	2,657	2,793	2,800
Active License Success:	87%	92%	88 %
Recreation Days:	8,932	7,389	7,600
Days Per Animal:	3.9	2.9	3.1
Males per 100 Females	47	44	
Juveniles per 100 Females	74	78	

Population Objective (± 20%) :	18000 (14400 - 21600)
Management Strategy:	Private Land
Percent population is above (+) or below (-) objective:	-1.7%
Number of years population has been + or - objective in recent trend:	4
Model Date:	02/08/2019

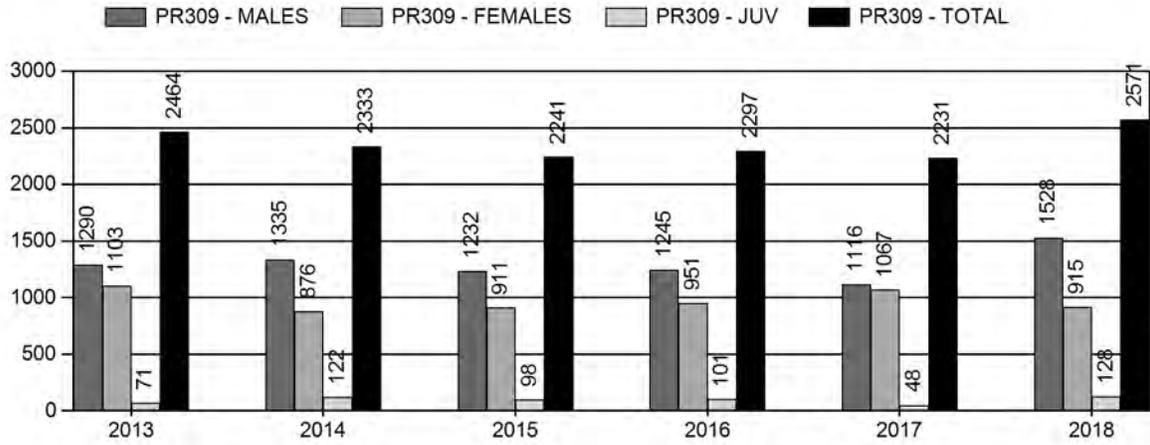
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	15.0%	12.2%
Males ≥ 1 year old:	26.3%	36.6%
Total:	12.6%	-14.0%
Proposed change in post-season population:	-12.6%	-6.0%

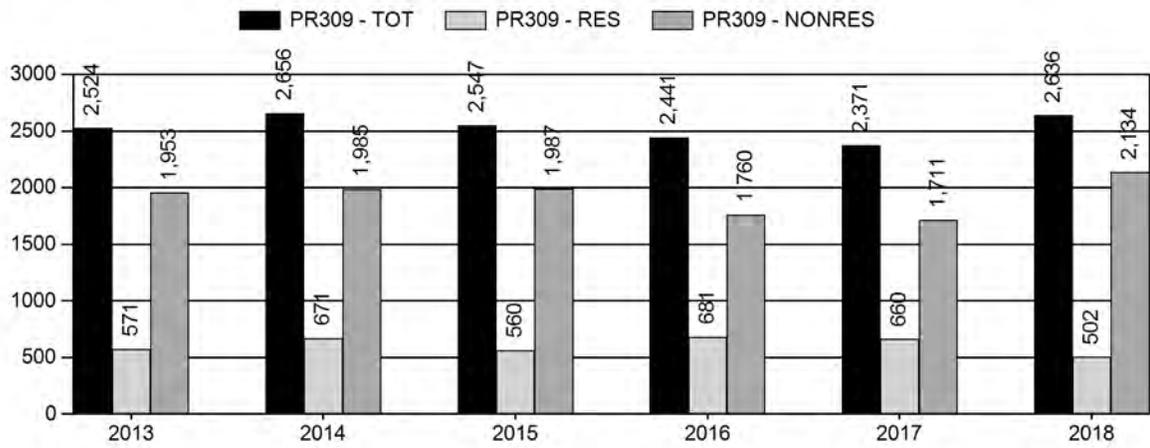
Population Size - Postseason



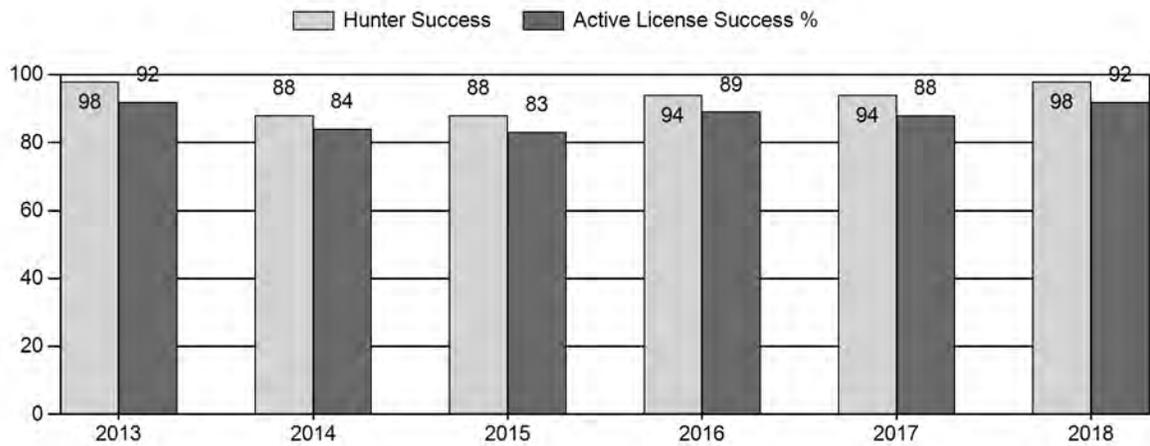
Harvest



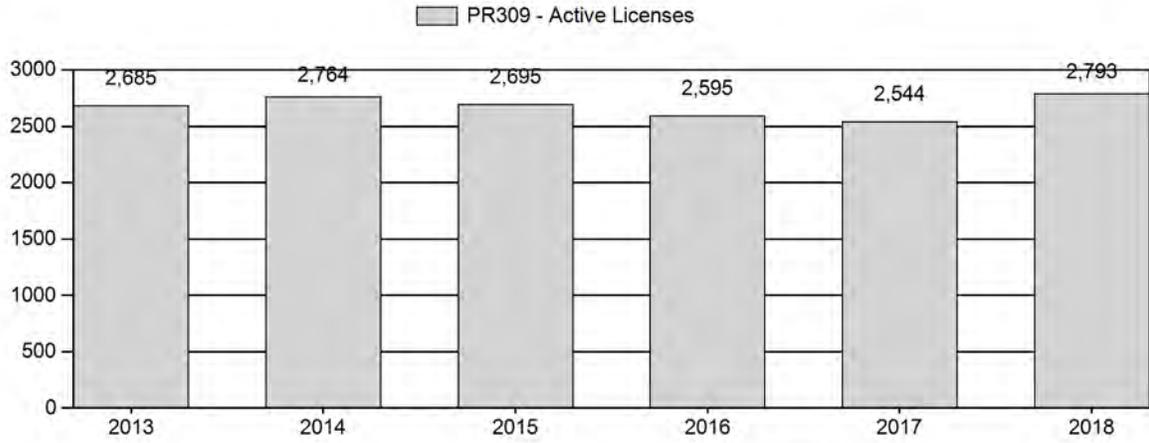
Number of Active Licenses



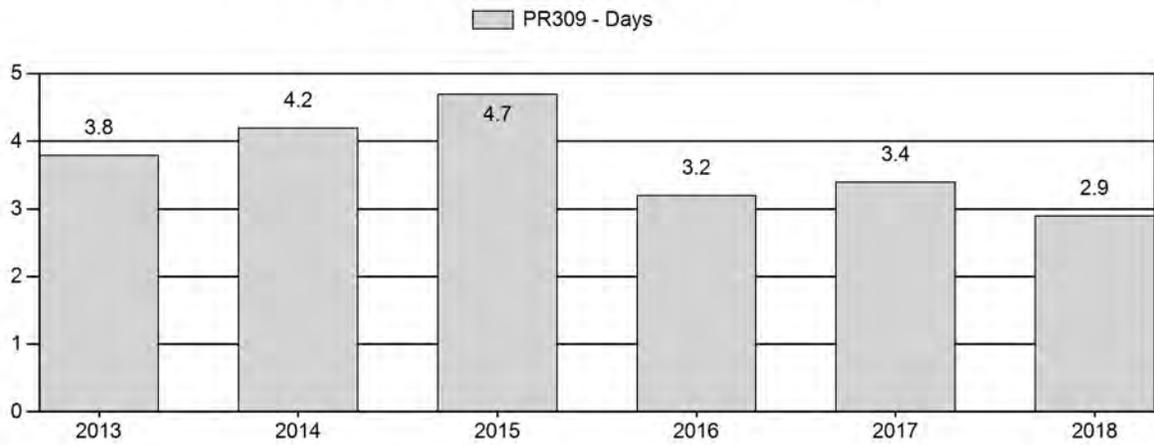
Harvest Success



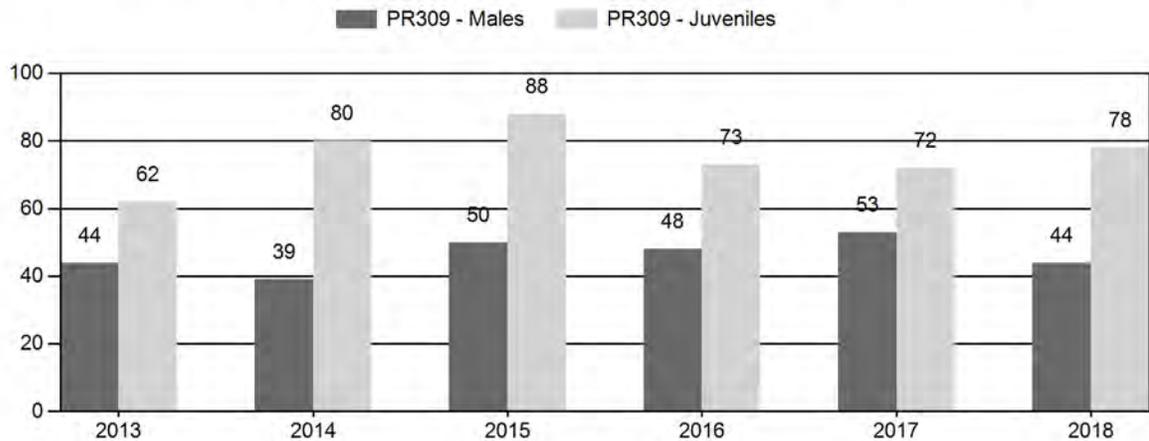
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR309 - PUMPKIN BUTTES

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	24,305	183	317	500	22%	1,129	49%	695	30%	2,324	2,050	16	28	44	± 4	62	± 5	43
2014	24,494	134	199	333	18%	853	46%	682	37%	1,868	2,097	16	23	39	± 4	80	± 6	58
2015	24,769	239	290	529	21%	1,063	42%	935	37%	2,527	2,866	22	27	50	± 4	88	± 6	59
2016	23,108	281	360	641	22%	1,328	45%	970	33%	2,939	2,976	21	27	48	± 4	73	± 5	49
2017	21,670	267	475	742	23%	1,413	45%	1,013	32%	3,168	2,465	19	34	53	± 4	72	± 4	47
2018	20,520	238	476	714	20%	1,605	45%	1,254	35%	3,573	2,691	15	30	44	± 3	78	± 4	54

**2019 HUNTING SEASONS
PUMPKIN BUTTES PRONGHORN HERD (PR309)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
23	1	Oct. 1	Oct. 31	550	Limited quota	Any antelope
23	2	Oct. 1	Oct. 31	1,600	Limited quota	Any antelope valid on private land
23	6	Oct. 1	Oct. 31	400	Limited quota	Doe or fawn
23	7	Oct. 1	Oct. 31	1,200	Limited quota	Doe or fawn valid on private land

Special Archery Season Hunt Areas	Opening Date	Limitations
23	Aug. 15	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
23	1	No Change
23	2	+200
23	6	No Change
23	7	+200

Management Evaluation

Current Postseason Population Management Objective: 18,000

Management Strategy: Private Lands

2018 Postseason Population Estimate: ~17,700

2019 Proposed Postseason Population Estimate: ~16,630

2018 Hunter Satisfaction: 93% Satisfied, 5% Neutral, 2% Dissatisfied

Herd Unit Issues

The postseason population objective for the Pumpkin Buttes Pronghorn Herd Unit is 18,000 pronghorn. The management strategy is private lands management. The objective and management strategy were last reviewed and updated in 2015.

The primary issue with achieving adequate harvest in this herd is hunter access, as most of the pronghorn are found on private lands. In 2016, two new license types were added. The Type 2 and Type 7 licenses allow for maximum hunting potential on private land and result in a better

quality hunt on the very limited accessible public lands. Prior to this change, many comments were received from hunters in the field and surveys stating that there were few animals and the limited public land was overcrowded. This new license structure has also decreased the number of reported trespass issues and seems to be working smoothly.

During the early to mid-2000's, extensive coal bed methane development occurred in the herd unit and resulted in a network of roads and other development. Additionally, beginning roughly around 2013, portions of this herd unit experienced increased conventional oil well drilling and production, with many wells transitioning from the planning to development stage. Currently, both CBM and conventional oil has tapered off for the time being. In the southern part of this herd unit there is also uranium mining that is occurring. Although this herd unit has experienced various forms of energy development, it still contains excellent pronghorn habitat.

Weather

Weather throughout 2018 was optimal for overall rangeland conditions. Precipitation was favorable, resulting in good forage availability. The winter of 2018-2019 was fairly mild with minimal amounts of snow as winter commenced. Colder temperatures were experienced as winter progressed, however, there was still an overall lack of snow, allowing animals to access residual forage. Over winter survival was likely not negatively impacted.

The Palmer Drought Index indicates that all months of 2018 experienced "normal" conditions in the Powder River drainage. Additionally, looking at historic temperature information for November and December 2018, mean temperatures were very close to the 30-year normals.

Habitat

This herd unit has high quality pronghorn habitat comprised of wide-open sagebrush (*A. tridentata*) flats. Considerable portions of the sagebrush stands in this area are in good health and provide winter forage and cover for fawns during fawning season. The bulk of this herd unit is designated yearlong habitat. The Powder River delineates the western boundary of this herd unit where rugged topography is not as favorable for pronghorn as opposed to the open sagebrush flats found elsewhere. Consequently, pronghorn are found at lower densities in this area.

There is currently no formal habitat monitoring occurring in this herd unit. Anecdotal observations indicate that drought conditions were not experienced during the 2018 growing season and therefore residual forage was available through the winter of 2018-2019. Some private landowners are spraying sagebrush in the southern portion of this herd unit. Whether their goals are to eradicate or just reduce canopy cover of sagebrush is unknown, but the spraying may influence pronghorn distribution.

Field Data

This herd has the potential for rapid growth as has been seen in years past. Historically there have been years where 80+ fawns per 100 does have been classified, though in the more recent past this has not been the case. In 2018, the fawn to doe ratio was 78 as compared to 72 in 2017 and a five year average of 75. The buck ratio is typically fairly high, which is not uncommon for private land herds. Classifications in 2018 yielded an observed buck ratio of 44, down from 53 in 2017 and below the preceding 5-year average of 47.

Because this is a primarily private land area, a landowner post-season survey is conducted which provides another perspective of the population and hunting seasons. Ninety-two percent of respondents felt that the pronghorn numbers were at a desired level while 93% of hunters reported being either “very satisfied” or “satisfied” with their hunting experience.

Harvest

In 2018, there were 3,350 licenses available, comprised of four license types. These included 550 Type 1 any antelope, 1,400 Type 2 any antelope, valid private lands only, 400 Type 6 doe/fawn licenses and 1,000 Type 7 doe/fawn licenses, valid private land only. Close to 3,230 licenses were sold by the season’s close. The Type 2 (92%) and Type 7 (99%) licenses came very close to selling out, but there were a few left at the end of the season. The Type 1 and Type 6 licenses were in high demand and sold out in the draw. The total harvest was the highest for the six-year period, coming in at an estimated 2,571 pronghorn harvested. This was the highest harvest since 2009. Hunter success was 98%, above the five year average of 92%. Hunter success was slightly variable between the Type 1 (82%) and Type 2 (99%) licenses and comparable between the Type 6 (89%) and Type 7 (89%) licenses. Prior to 2016, there were only Type 1 and Type 6 licenses available. In 2016, the separate public and private land licenses were made available with an emphasis on having plenty of private land only licenses available for landowners to have maximum flexibility in management. After two years of assessing the new license structure, favorable hunter success warranted an increase in public land opportunity so license quotas were increased for the 2018 season. The number currently issued seems to strike a good balance between access and the number of people on the ground on the very limited public land. The total number of licenses issued was in line with what the population could support. Overall, comments received from both hunters and landowners were positive over the last three years of this new license structure.

Population

The “Constant Juvenile – Constant Adult Mortality Rate” (CJCA) spreadsheet model was chosen for the post season population estimate (AIC value 151). The model illustrated a peak population in 2006 followed by a declining population. The 2018 post-season population estimate is 17,700 pronghorn.

The last line transect survey was conducted in June of 2016, which resulted in an estimated population of 10,600 pronghorn (end of biological year). It is uncertain why this estimate came out to be so low. Although the standard error is also lower than it has been, it is likely that this estimate is not very accurate as hunter harvest, hunter success, ease of obtaining classification survey sample size, and landowner survey results indicate a much higher population. The 2018 buck harvest and total harvest were the highest since 2010 and 2009, respectively, with very favorable hunter success and hunter effort. The spreadsheet model aligns relatively well to the past line transect estimates. Line transects were flown in 2006 and 2009, with estimates of 32,900 and 18,000, respectively.

Field observations indicate that this population has been trending upwards the last few years. Total number of animal classified began to climb in 2013. Although these numbers are not necessarily statistically significant, as the same routes are driven at the same time of year, it can be useful as overall trend information. Fawn production has been fairly consistent the last few years and

overwinter survival has been favorable based on yearling buck ratios. In this regard, the model predictions are not in line with field observations.

It should also be noted that numerous reports were received and verified of pronghorn dying beginning Mid-April and into May. This was typically one in a herd and they would present with symptoms associated with overconsumption of green grass. The Wyoming State Veterinary Lab came to the area to attempt to assess what the exact cause was. It seems that some years are worse than others for this occurrence and the spring of 2019 seemed to be exceptionally bad throughout portions of this herd unit.

Management Strategy

When pronghorn are at peak numbers it is difficult to achieve adequate harvest because it is predominantly private land, most of which is outfitted under conservative management strategies. It is important to have ample licenses available to address this concern. As public land is extremely limited, the dual license types work well. These multiple license types allow for liberal harvest on private lands and limit overcrowding on limited public lands. Overall, hunter success was high and days per harvest were relatively low. As both the Type 2 and Type 7 private land licenses have been very close to selling out the last couple of years, an increase in these licenses quotas was warranted. The idea behind the license type split is to allow maximum harvest on private lands.

The traditional season has been the entire month of October. This season time and length seems to be adequate to allow a reasonable harvest. The majority (92%) of landowners that responded to the survey indicated that they feel pronghorn numbers are at an acceptable level. According to the model, field observations and data, this population peaked in 2006 at about 31,000 animals.

If the projected harvest of 2,470 pronghorn is achieved and fawn recruitment is average, this population is predicted to slightly decrease.

2018 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2018 - 5/31/2019

HERD: PR318 - CRAZY WOMAN

HUNT AREAS: 22, 113

PREPARED BY: CHEYENNE STEWART

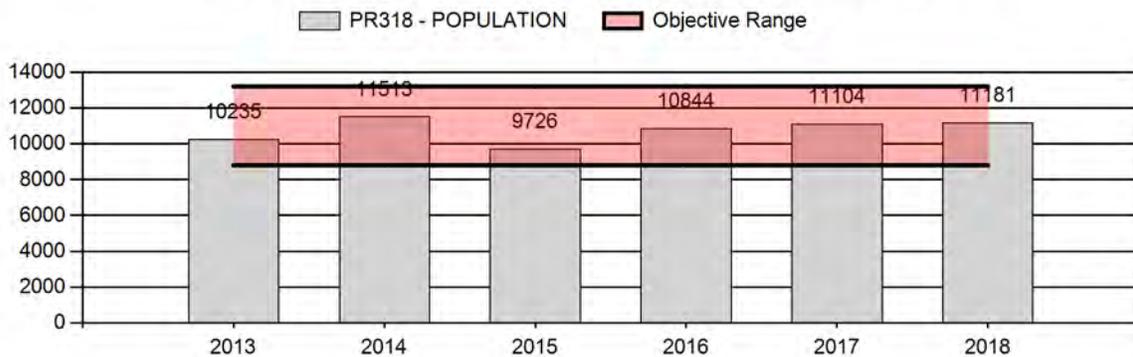
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	10,684	11,181	12,618
Harvest:	1,748	1,797	1,718
Hunters:	1,936	1,839	1,850
Hunter Success:	90%	98%	93 %
Active Licenses:	2,109	2,021	2,000
Active License Success:	83%	89%	86 %
Recreation Days:	6,743	5,746	6,000
Days Per Animal:	3.9	3.2	3.5
Males per 100 Females	51	48	
Juveniles per 100 Females	84	69	

Population Objective (± 20%) :	11000 (8800 - 13200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	2%
Number of years population has been + or - objective in recent trend:	0
Model Date:	2/6/2019

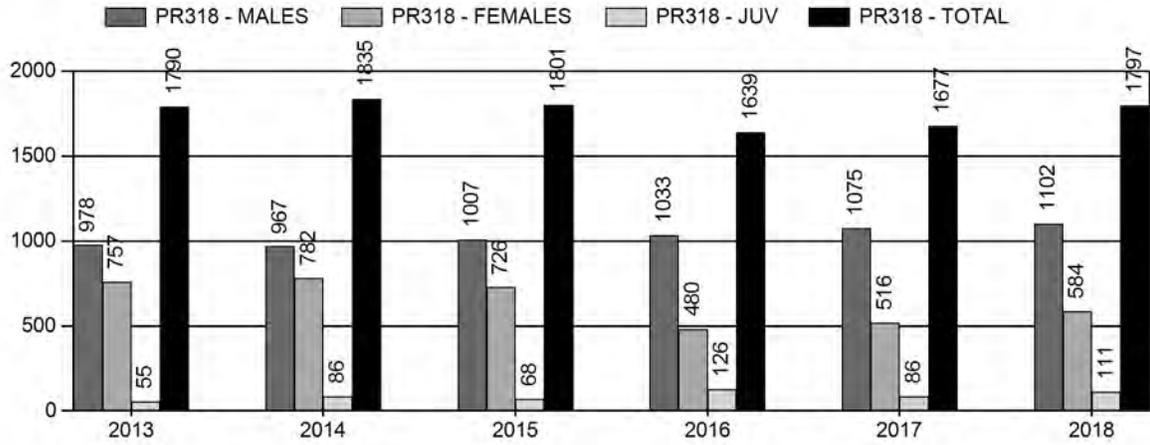
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	10%	8%
Males ≥ 1 year old:	37%	37%
Total:	14%	12%
Proposed change in post-season population:	+1%	+11%

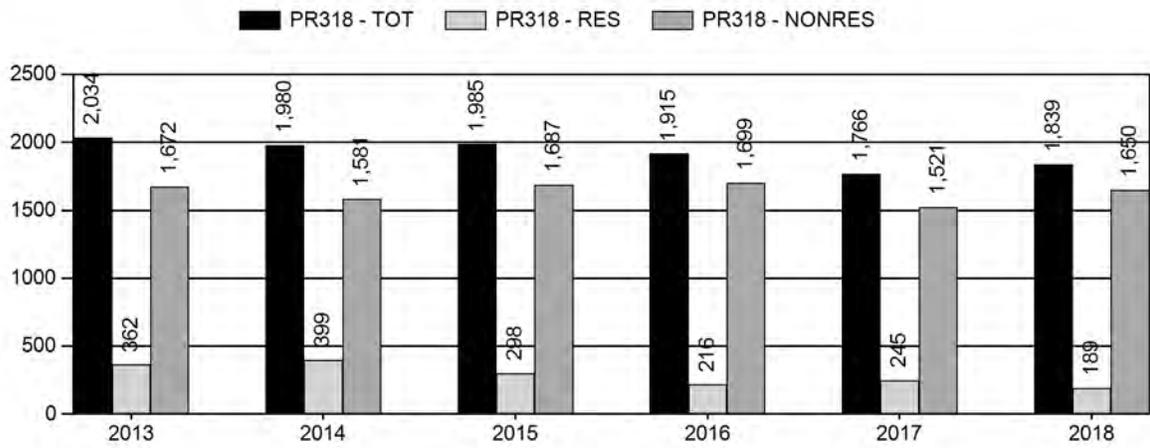
Population Size - Postseason



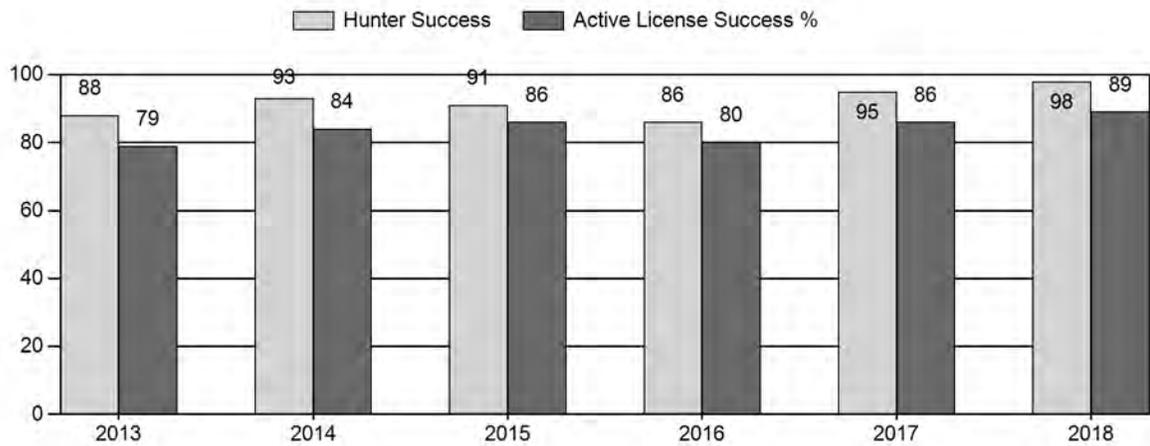
Harvest



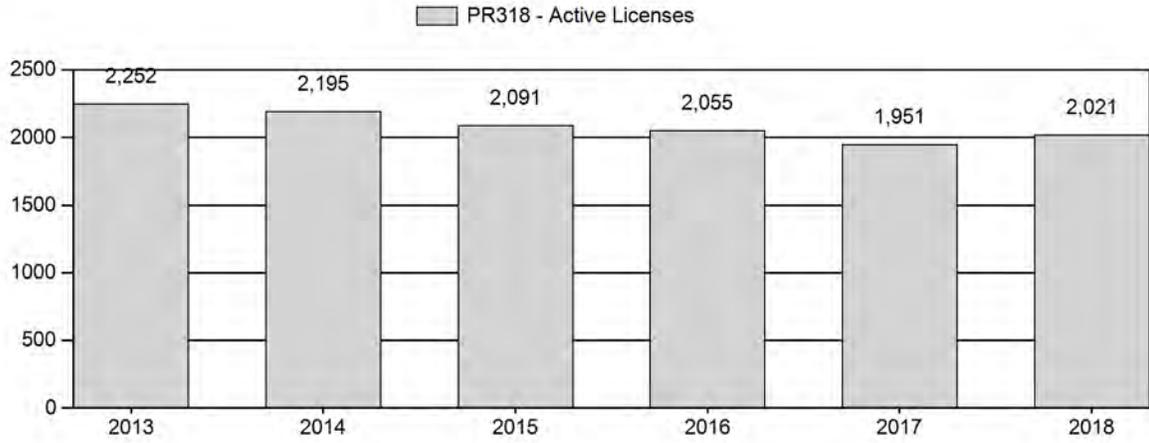
Number of Active Licenses



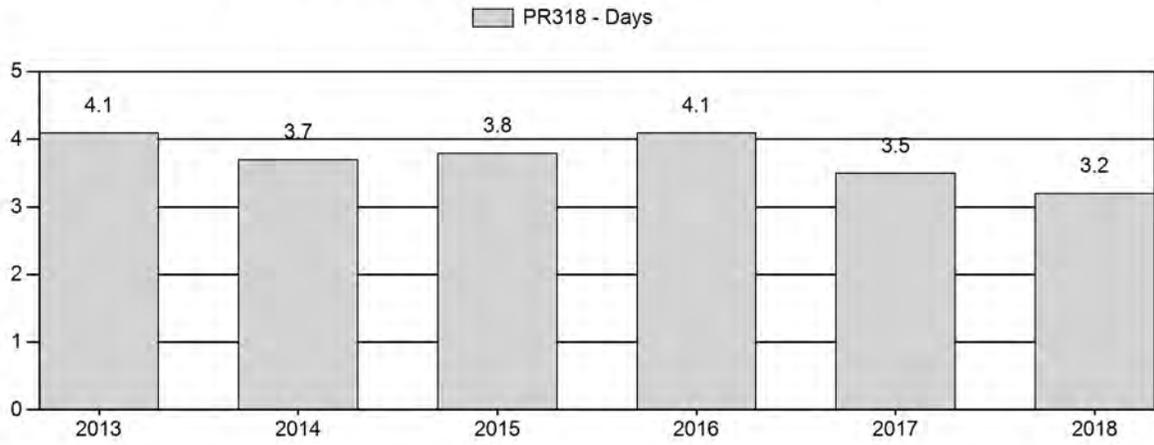
Harvest Success



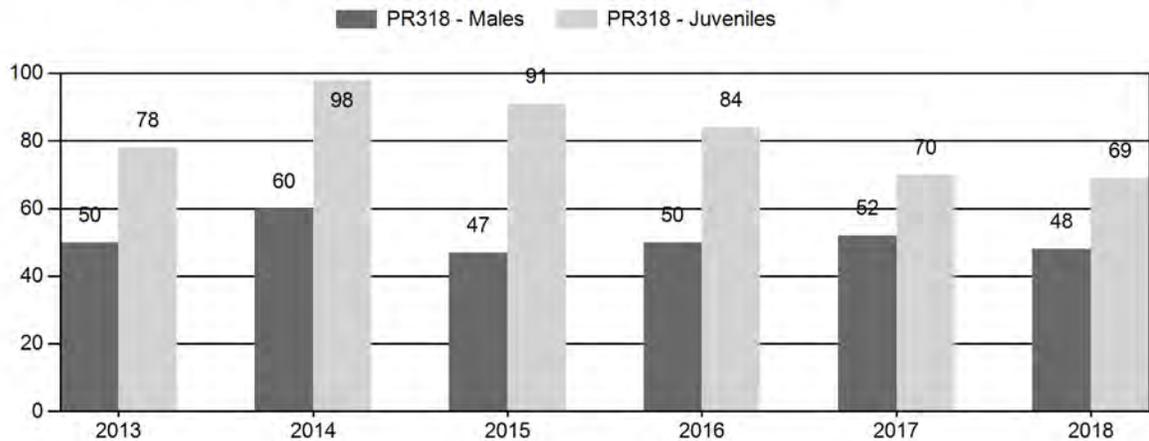
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR318 - CRAZY WOMAN

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	12,204	64	344	408	22%	818	44%	635	34%	1,861	2,745	8	42	50	± 5	78	± 6	52
2014	13,531	124	321	445	23%	743	39%	727	38%	1,915	3,790	17	43	60	± 5	98	± 8	61
2015	11,707	173	294	467	20%	989	42%	901	38%	2,357	3,311	17	30	47	± 4	91	± 6	62
2016	12,647	161	364	525	21%	1,044	43%	879	36%	2,448	2,874	15	35	50	± 4	84	± 6	56
2017	12,949	157	291	448	23%	868	45%	610	32%	1,926	0	18	34	52	± 5	70	± 6	46
2018	13,157	132	365	497	22%	1,044	46%	718	32%	2,259	3,097	13	35	48	± 4	69	± 5	47

**2019 HUNTING SEASONS
CRAZY WOMAN PRONGHORN HERD (PR318)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
22	1	Oct. 1	Oct. 31	1000	Limited quota	Any antelope
22	6	Sept. 1	Sept. 30	600	Limited quota	Doe or fawn valid on private land north of Crazy Woman Creek
22	6	Oct. 1	Oct. 31		Limited quota	Doe or fawn valid in the entire area
113	1	Oct. 1	Oct. 31	175	Limited quota	Any antelope
113	2	Oct. 11	Oct. 31	175	Limited quota	Any antelope
113	6	Oct. 1	Oct. 31	200	Limited quota	Doe or fawn

Special Archery Season Hunt Areas	Season Dates	
	Opens	Closes
22, 113	Aug. 15	Sep. 30

SUMMARY OF CHANGES IN LICENSES NUMBERS

Hunt Area	Type	Quota change from 2018
22	1	No change
	6	No change
113	1	No change
	2	No change
	6	No change
Herd Unit Total		No change

Management Evaluation

Current Postseason Population Management Objective: 11,000

Management Strategy: Recreational

2018 Postseason Population Estimate: ~11,181

2019 Proposed Postseason Population Estimate: ~12,618

2018 Hunter Satisfaction: 89% Satisfied

Herd Unit Issues

The Crazy Woman Pronghorn Herd Unit consists of hunt areas 22 and 113 and is managed by the Buffalo Wildlife Biologist. The management objective is a post-season objective of 11,000 pronghorn, which was increased from 7,000 during the 2013 herd unit review. No changes were

made when the herd unit was last reviewed in 2018. The management strategy is recreation management, with the goal of a pre-hunt buck:doe ratio of 30 – 59 bucks:100 does.

Hunt area 22 is predominantly private land with limited public land hunting opportunities. Access for hunting is largely determined by landowners. Increased outfitter leasing of ranches typically results in more restrictive access. Area 113 contains a large amount of inaccessible public land. Even with the expansive outfitting industry, at the herd unit level hunters are finding hunting opportunity and surprisingly good success. This may be due in part to GPS technology that allows hunters to readily identify public and private land boundaries.

Weather

Weather conditions are summarized Natural Resources Conservation Services Applied Climate Information System (www.wcc.nrcs.usda.gov) data from the Kaycee, Buffalo, and Midwest stations (Station IDs 5055, 1165, and 6195, respectively) for precipitation and the Palmer Drought Index (www.ncdc.noaa.gov) from Climate Division 5 (Powder, Little Missouri and Tongue drainages) for drought conditions. Long-term temperature data is lacking for the area.

Precipitation patterns vary greatly throughout the herd unit. The start of the biological year (June 2018) varied from dryer conditions (76% of average precipitation) in the northern portion of the unit to very wet conditions in the southern portion of the unit (297%). Summer (July - Sept) precipitation patterns were the opposite, with dry conditions in Kaycee (58%) and slightly above average conditions in Buffalo (110%). Fall (Oct – Dec) had slightly greater than average precipitation (109-119%) at all sites. Winter (Jan – Apr) was dry in Buffalo (81%) and Midwest (46%) with higher than average precipitation in Kaycee (130%). Throughout the herd unit, colder than average temperatures persisted in February. Generally, 2018 was an average year for weather patterns, with drier conditions in the southern portion of the herd unit. The winter prior to the 2018 biological year (Jan – Mar 2018) had greater than average precipitation (123-152%) in Buffalo and Kaycee, with lower than average precipitation in Midwest (87%), and was followed by an average spring (Apr – May) in Buffalo and Kaycee in contrast to Midwest which had 132% of average precipitation. Local weather conditions were corroborated by the broader-scale climate data, which classified all of 2018 as having “mid-range” climate conditions.

Habitat

The Crazy Woman herd unit includes a combination of sagebrush grassland and grassland habitat. Topography ranges from large valleys to small drainages and breaks. Water is widely available due to livestock operations maintaining water sources for cattle and sheep. There are no established habitat transects in this herd unit. The average weather conditions in 2018 produced average forage growth. Productivity often varies on a north-south gradient in the herd unit, with some slight differences due to varying winter and spring precipitation patterns along that gradient.

Precipitation patterns in 2018 may have resulted in depressed forage quality, which in conjunction with cold February 2019 temperatures could have negative impacts on fawn recruitment and adult winter survival. We have not, however, observed major winter die-offs and do not expect to see population level impacts.

Field Data

The pre-season classification was conducted in September of 2018 via ground classifications and resulted in 2,259 pronghorn being classified. The sample size was short of the 3,097 classification objective. Since converting from aerial classification surveys to ground surveys, attaining adequate sample sizes has proved difficult. We have not reached the classification objective since 2010.

Classifications in 2018 yielded a fawn:doe ratio of 69:100. Fawn production was lower in 2017 (70:100) and 2018 than it has been in the previous 7 years ($\geq 76:100$ since 2010). The lower fawn ratio in 2017 was attributed to low sample size and personnel turnover during classifications. The 2018 ratio varied drastically between hunt areas 22 (79:100) and 113 (34:100), with only 466 pronghorn classified in hunt area 113. Access is difficult to classify in hunt area 113 and similar to 2017, the low fawn ratio is likely due to low sample size of pronghorn classified in area 113.

The 2018 buck:doe ratio at the herd unit level was 48:100 which is slightly lower than the previous five-year average of 52:100 from 2013 – 2017. The buck ratio in hunt area 22 (45:100) was lower than that observed in hunt area 113 (56:100). The buck:doe ratios across the herd unit and within each hunt area is within the objective of 30 – 59 bucks:100 does.

Twenty-two landowners responded to the postseason landowner survey. Most landowners responded that pronghorn were at desired levels (59%), while 32% believe that pronghorn numbers are above desired levels. The number of landowner surveys indicating that pronghorn are above desired levels has been increasing since 2015, while those indicating that pronghorn are below desired levels have been decreasing over the same period. This provides some indication that this population has been increasing over the last three years.

Harvest Data

Total harvest (1,797) increased slightly from 2017 (1,677) and is very similar to the previous five-year average (1,748 from 2013 – 2017). Hunter success (98%) and active license success (89%) were higher than they have been since 2012. The addition of 25 Type 1 and 25 Type 2 tags in hunt area 113 appears to have provided some additional opportunity without diminishing hunter satisfaction or success. Hunter effort remains lower (3.2 days per animal harvested) than it has been since 2011. All licenses sold out in the draw.

Hunter satisfaction was extremely high, with 88% and 90% satisfied or very satisfied in hunt areas 22 and 113, respectively. These rates are surprising, given the crowding on limited public lands. Multiple hunter comments complained about the lack of access to landlocked public lands and crowding on public lands. This is a theme of hunter comments every year. We also received complaints about illegal off-road vehicle use on Bureau of Land Management property, which Wyoming Game and Fish does not enforce. The high satisfaction rates can, however be explained by the high hunter success rates. Use of GPS and phone technology with land ownership maps may be increasing hunter success on public lands by improving their ability to navigate to small and dispersed sections of public lands. We do not know how the satisfaction rates and success rates vary between public and private land hunters.

Population

We used integrated population models, referred to as Excel Spreadsheet Models, based on White and Lebow (2002) to estimate the pronghorn population. Model parameters and input follow the “User’s Guide: Spreadsheet Model for Ungulate Population Data” (Morrison 2012).

The semi-constant juvenile/semi-constant adult (SCJ/SCA) model out-performed the other models and produced the lowest AIC value (76). Line transect data collected in 2003, 2005, 2010, and 2014 informed the model. A June 2016 line transect survey produced a very high estimate that was considered unreliable due to poor distribution of observed groups through the distance bands. Therefore, that estimate has not been incorporated into the model.

The 2018 post-season population estimate of 11,181 pronghorn maintains this population at objective of 11,000 pronghorn. The model estimate indicates the population has been at objective since 2013, which coincides with the 2013 decision to increase the population objective from 7,000 to 11,000 pronghorn. The population estimates show a stable population over the last three years and a predicted population increase in 2019, however the low fawn ratios observed in 2018 are more likely to result in a stable and not increasing population in 2019.

Landowner survey responses over the past four years indicate that population may be increasing at a greater rate than the population estimates generated by the model. Harvest data is also suggestive of an increasing population across the herd unit over the past two or more years.

Classification data is vitally important to the population model estimates and sample sizes of classification data in this herd unit are consistently inadequate. Conversely, line-transect data helps improve the models. The model trend is reasonable, however landowner and hunter data suggest that the actual population is probably higher than the model estimate. According to the model, 37% of the male population is being harvested annually, which is unreasonably high and further indicates that model is underestimating the population estimate. The model is useful but could be improved with better classification samples, an updated line transect survey, and independent survival estimates. We will try and increase our sample size during classifications and we have a line transect survey planned for 2019. At this time, the model is therefore considered fair.

Management Summary

This herd unit is at objective and we do not expect excessive winter mortality to affect the 2019 hunting season.

Hunt area 22 continues to have high hunter success (96%) and low effort (3.2 days per animal harvested) as well as good landowner and hunter satisfaction. There are some indications that this population is increasing, and perhaps already higher than the population model estimates. There is increasing concern that pronghorn numbers will surpass the population objective and become problematic for landowners. Increasing the Type 6 licenses is a possibility; however increased hunting pressure will continue to push pronghorn onto refuge properties where little or no hunting occurs, which is already happening. It is challenging to ensure that enough licenses are available to obtain needed harvest, while maintaining high harvest success and not exacerbating the crowding issues. We propose no changes to this season for 2019 and plan to gauge public perceptions at the 2019 season setting meetings for potential changes for the 2020 season.

After increasing the Type 1 and Type 2 licenses in hunt area 113 in 2017, we were able to maintain high hunter success (103%) and satisfaction (90%). It is difficult to set quotas in this area that

provide enough harvest opportunity for population management, while minimizing crowding on public lands and maintaining high harvest rates. We propose no changes to this season for 2019.

A harvest of 1,718 pronghorn is projected for the 2019 hunting season. We do not expect hunter satisfaction, success, and participation to change significantly, although we continue to expect comments about access issues. We may see increased landowner concern with high pronghorn numbers in hunt area 22.

Both hunt areas offer limited public land hunting opportunity even though pronghorn densities are high. Securing private land access ensures a successful hunt. There appears to be increased interest in hunting in this part of Wyoming as license quotas have been reduced in other areas of the state. Hunters unsuccessful in the license draw pick up leftover licenses in northeast Wyoming and take their chances on public lands. However, private land access is essential to achieving harvest objectives.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet model for ungulate population data. Wyoming Cooperative Fish and Wildlife Research Unit. Unpublished. 41 pp.

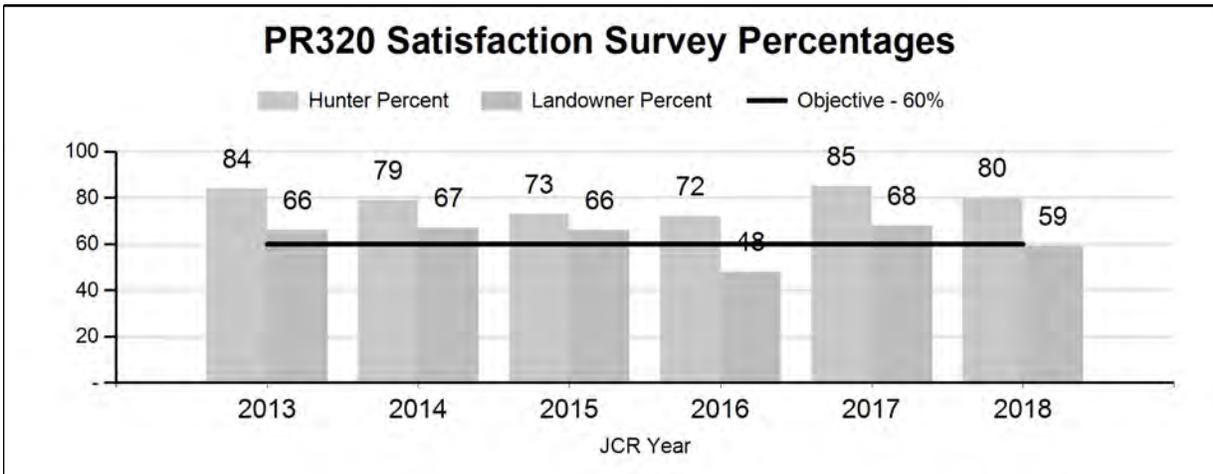
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2018 - JCR Evaluation Form

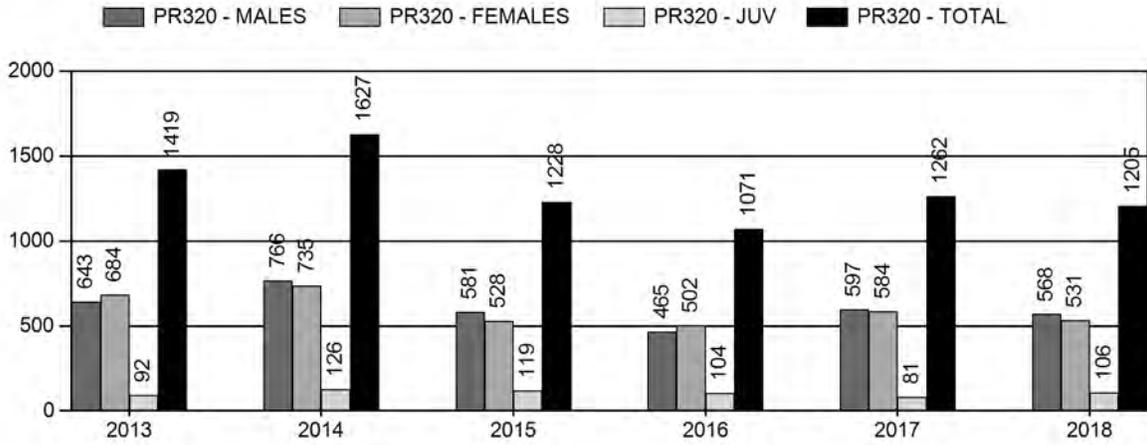
SPECIES: Pronghorn
 HERD: PR320 - HAZELTON
 HUNT AREAS: 20, 102

PERIOD: 6/1/2018 - 5/31/2019
 PREPARED BY: CHEYENNE STEWART

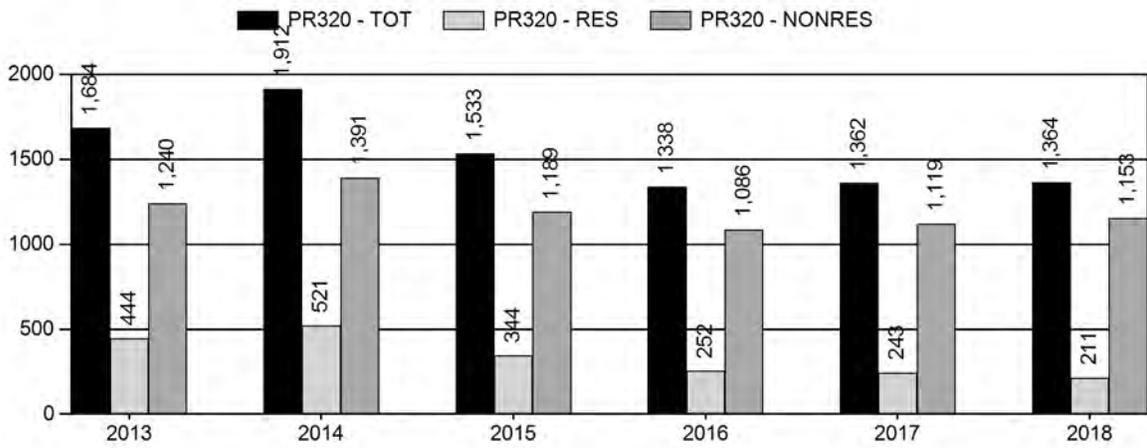
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Hunter Satisfaction Percent	79%	80%	80%
Landowner Satisfaction Percent	63%	59%	60%
Harvest:	1,321	1,205	1,200
Hunters:	1,566	1,364	1,400
Hunter Success:	84%	88%	86%
Active Licenses:	1,752	1,487	1,450
Active License Success:	75%	81%	83%
Recreation Days:	6,368	5,291	5,000
Days Per Animal:	4.8	4.4	4.2
Males per 100 Females:	80	68	
Juveniles per 100 Females	86	74	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			10%
Number of years population has been + or - objective in recent trend:			0



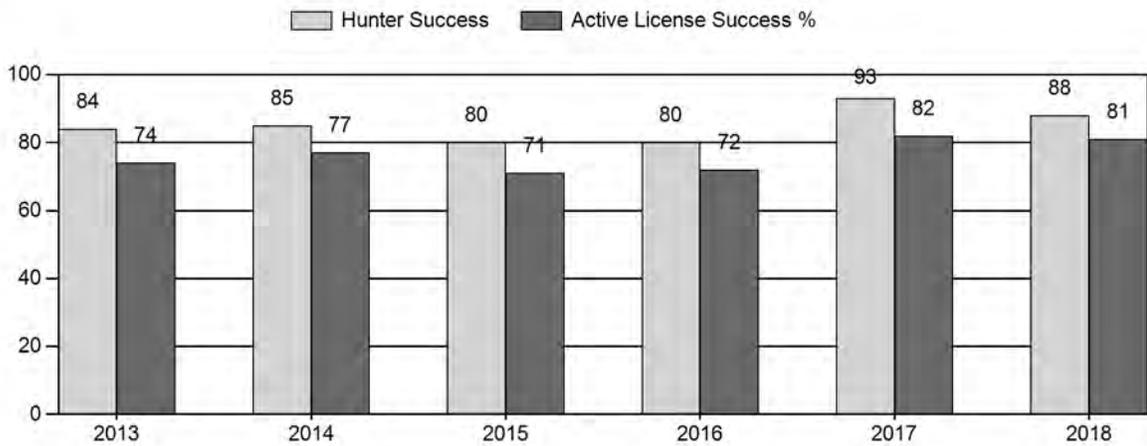
Harvest



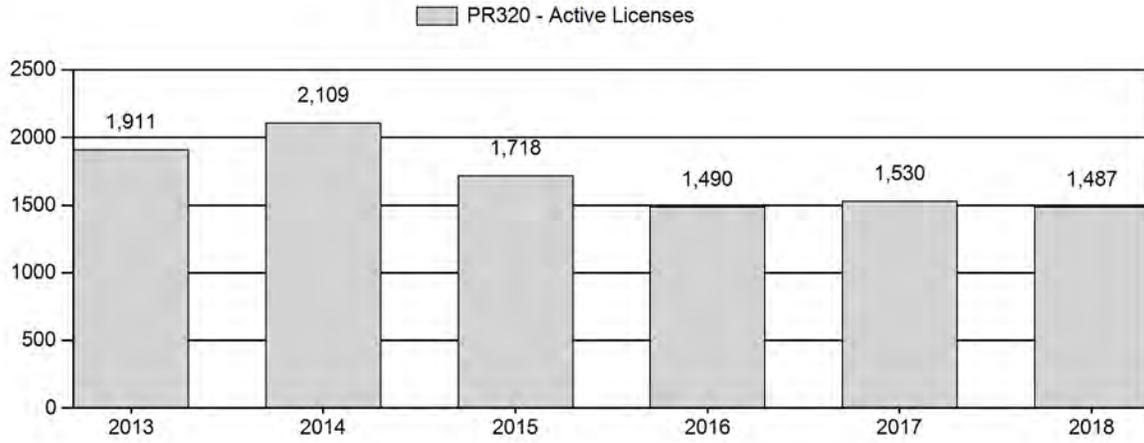
Number of Active Licenses



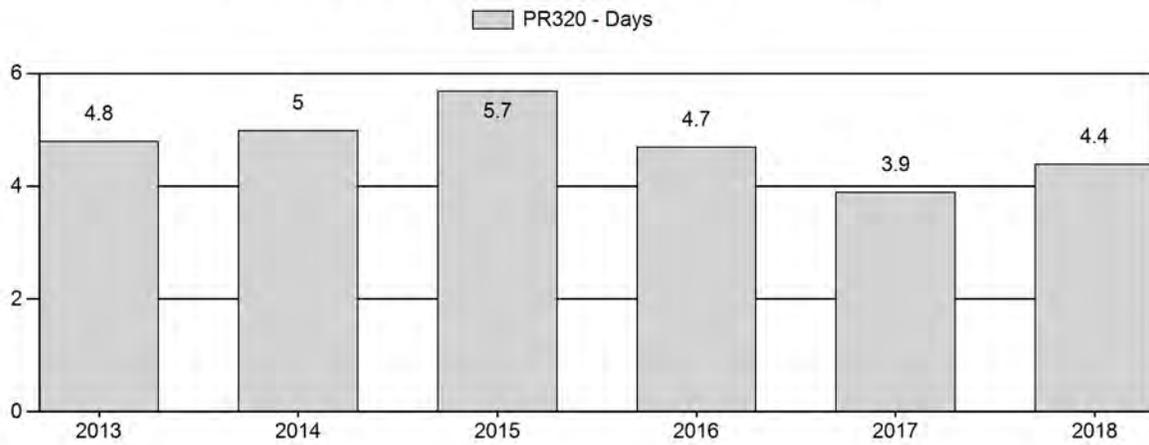
Harvest Success



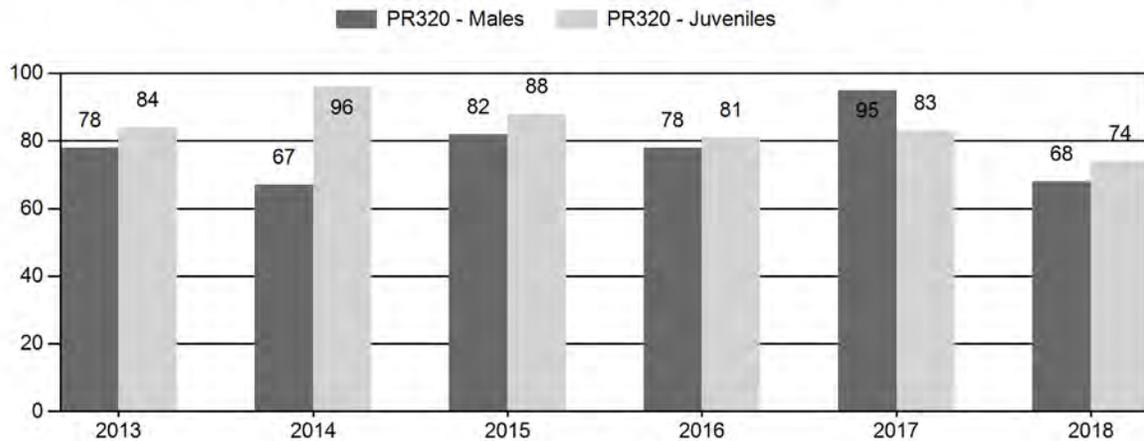
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR320 - HAZELTON

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	211	430	641	30%	817	38%	688	32%	2,146	5,131	26	53	78	± 0	84	± 0	47
2014	0	198	465	663	25%	993	38%	949	36%	2,605	3,080	20	47	67	± 0	96	± 0	57
2015	0	193	426	619	30%	753	37%	663	33%	2,035	2,905	26	57	82	± 0	88	± 0	48
2016	0	222	577	799	30%	1,021	39%	826	31%	2,646	2,440	22	57	78	± 0	81	± 0	45
2017	0	272	670	942	34%	994	36%	828	30%	2,764	0	27	67	95	± 0	83	± 0	43
2018	0	211	585	796	28%	1,176	41%	865	30%	2,837	2,443	18	50	68	± 0	74	± 0	44

**2019 HUNTING SEASONS
HAZELTON PRONGHORN HERD (PR320)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
20	1	Oct. 15	Nov. 15	500	Limited quota	Any antelope
20	6	Oct. 15	Nov. 15	500	Limited quota	Doe or fawn
102	1	Oct. 15	Nov. 15	400	Limited quota	Any antelope
102	6	Sep. 1	Sep. 30	400	Limited quota	Doe or fawn valid on private land
102	6	Oct. 15	Nov. 15			Doe or fawn valid in the entire area

Special Archery Season Hunt Areas	Season Dates	
	Opens	Closes
20, 102	Aug. 15	Oct. 14

SUMMARY OF CHANGES IN LICENSES NUMBERS

Hunt Area	Type	Quota change from 2018
20, 102	1	No change
	6	No change
Herd Unit Total		No change

Management Evaluation

Current Postseason Population Management Objective: 60% Landowner/Hunter Satisfaction

Management Strategy: Private Lands

2018 Landowner Satisfaction Survey: 59% Satisfied

2018 Hunter Satisfaction Survey: 80% Satisfied

2018 Postseason Population Estimate: ~3,200 (unreliable population model)

2019 Proposed Postseason Population Estimate: ~2,300

Herd Unit Issues

The Hazelton Herd Unit consists of hunt areas 20 and 102 and is managed by the Buffalo Wildlife Biologist. In 2013, the Buffalo (Hunt Area 102) and Upper Powder River (Hunt Area 20) Pronghorn Herd Units were combined to create the Hazelton Herd Unit. The herd was renamed to “Hazelton” in 2016 to provide for the maintenance of historical herd data in the JCR program.

The management objective for the herd unit is landowner and hunter satisfaction. The management strategy is private land management. Management objectives and strategies were last reviewed in 2018, with no changes made.

This herd unit is predominately private land with limited public land hunting opportunity, resulting in a disproportionate amount of hunting pressure on accessible public land. Subdivisions, restricted access to private land, and landlocked public land aggravate this situation. In general, it is getting more difficult to attain needed harvest. Increased outfitter leasing of ranches reduces the number of hunters a given ranch will take. Several ranches have changed ownership from traditional ranching operations to nonresident landowners with more conservative hunting philosophies. Additionally, pronghorn are often displaced by hunting pressure from ranches and public land and take refuge on neighboring ranches where limited or no hunting occurs. These factors contribute to high buck ratios, hunter overcrowding on publicly accessible public lands, and difficulty attaining needed harvest.

The population is characterized by high densities of pronghorn with high fawn ratios and high buck ratios. The Area 102 segment is somewhat immune from effects of drought because of irrigated meadows interspersed throughout much of the hunt area. Complaints of crop depredation are common in Area 102.

Weather

Weather conditions are summarized using Natural Resources Conservation Services Applied Climate Information System (www.wcc.nrcs.usda.gov) data from the Kaycee and Buffalo stations (Station IDs 5055 and 1165, respectively) for precipitation, the Bear Trap Meadow SNOTEL site (Station ID 325) for temperature, and the Palmer Drought Index (www.ncdc.noaa.gov) from Climate Division 5 (Powder, Little Missouri and Tongue drainages) for drought conditions.

Precipitation varies greatly throughout the herd unit. The beginning of the biological year (June), for example, ranged from greater precipitation in the southern end and lower elevations portion of the unit (151%) to lower precipitation at the higher elevation portion of the unit (46%). Alternatively, summer (July - Sept) had dry conditions in Kaycee (58%) and average conditions in Buffalo (110%). Mean summer temperatures were within the expected range (51-88°F) based on 20-year averages per month (49-86°F). Fall (Oct – Dec) had slightly greater than average precipitation (114-119%) with average mean temperatures (21-36°F). Winter (Jan-Apr) had less precipitation than average (57-81%) in Buffalo and Bear Trap but greater than average moisture in Kaycee (130%). February 2019 had persistent colder than normal temperatures. The winter conditions prior to the biological year (Jan – Mar 2018) had greater than average precipitation (123-152%) with average mean temperatures for each month (16-25°F) as compared to the 20-year average mean temperatures for each month (21-28°F). Spring (Apr – May) was slightly dryer than average (87-93% precipitation) with average mean temperatures (35-47°F). The generally average local weather conditions were corroborated by the broader-scale climate data, which classified all of 2018 as having “mid-range” climate conditions.

Habitat

The Hazelton herd unit includes a combination of sagebrush grassland and grassland habitat with interspersed irrigated hay meadows in the eastern half of both hunt areas. The western portion of hunt area 102 and northwestern portions hunt area 20 encompasses the Bighorn Mountain range and foothills. Some portions of the higher elevation areas that aren't heavily timbered provide

spring/summer/fall habitat for pronghorn. With the exception of the southern one-third of Area 20, sagebrush habitat is scattered at best. There are no established habitat transects in this herd unit. The average weather conditions likely produced average habitat productivity, with a potentially late green up and lower productivity towards the southern portion of the unit.

Field Data

The pre-season classification survey was conducted in September 2018 and resulted in a sufficient sample size (2,837) based on a power analysis classification objective of 2,443 pronghorn classified. The classifications should be viewed with caution, however, as the survey is road-biased and the population models may be under-estimating the population.

The fawn:doe ratio (74:100) was the lowest ratio since 2010, with each classification since then resulting in ratios greater than 81:100. It should be noted that 2010 was the last year that classifications were conducted aurally in Area 20. In general, fawn ratios showed a notable increase since 2010, which has been attributed to inaccessible areas with lower fawn productivity not being represented in the sample. The lower fawn ratio observed in 2018 could be attributed to a dryer spring (later green-up), sampling error, or other factors.

The buck:doe ratio in 2017 was the highest recorded in at least 24 years at 95:100. In 2018 however, the buck:doe ratio dropped to 50:100 which is more similar to the previous five-year average when excluding the high 2017 ratio (2012-2016: 53:100). In general, this herd unit has higher buck ratios, which are not managed for, but result from private land access and outfitted hunting, which have led to conservative harvest strategies. Yearling buck:doe ratios were lower in 2018 (18:100) than the previous five-year average (2013-2017, 24:100), which could be the result of higher than average snowfall in winter 2018 causing some winter mortality of the 2017 fawn crop.

Fifty-seven percent of surveyed landowner respondents ($n=30$) following the hunting season indicated that pronghorn numbers were at desired levels. Of the 30% that thought the numbers were above desired levels, none responded favorably to a survey question asking if the landowner would be interested in discussing WGFD hunter/landowner coordination options, such as those available through the Access Yes program. Responses were similar between Hunt Areas 20 and 102. The landowner survey responses over the past several years show a trend suggesting pronghorn numbers are becoming stable in both hunt areas. In 2018, 67% of respondents thought the 2019 seasons should be the same as the 2018 seasons, with 23% requesting more liberal seasons.

Harvest Data

Total harvest (1,205) decreased slightly (5%) from 2017 (1,262), even with the addition of 50 Type 1 tags and 50 Type 6 tags in 2018. Hunter success (88%) and active license success (81%) remain high and above the previous five-year averages of 84% and 75%, respectively. Hunter effort increased from 3.9 days/animal harvested in 2017 to 4.4 days, which is comparable to the five-year average (4.8 days). All license types sold out.

Hunters responding to the 2018 hunter satisfaction survey reported high hunter satisfaction (80%), likely due to the high hunter success rates. For Area 20, 80% of nonresidents reported satisfied/very satisfied as opposed to 43% and 29% of resident hunters who were neutral or dissatisfied/very dissatisfied, respectively. This discrepancy was not apparent in Area 102 where 82% of nonresident hunters and 90% of resident hunters were satisfied/very satisfied. The

discrepancy between residents and nonresidents in Area 20 could be due to nonresidents being more likely to partake in an outfitted hunt on private land. We do not know how the satisfaction rates vary between public and private land hunters.

Population

We used integrated population models, referred to as Excel Spreadsheet Models, based on White and Lebow (2002) to estimate the pronghorn population in this herd unit. Model parameters and input follow the “User’s Guide: Spreadsheet Model for Ungulate Population Data” (Morrison 2012).

The semi-constant juvenile/semi-constant adult (SCJ/SCA) model out-performed the other models and produced the lowest AIC value (88), although none of the models produced realistic population estimates or trends. The 2018 post-season population estimate of 3,189 pronghorn is a 34% reduction from the 2017 estimate (4,799), and continues the 13-year decreasing population trend estimated by the model. The model predicts a steadily decreasing population from a high of over 13,000 pronghorn in 2005 to the low in 2018 with 3,189 pronghorn. Model predictions for 2019 continue the population reduction trend. The model aligns to a 2014 line transect estimate which may be driving the population estimate down. This was the first and only line transect completed for newly created the herd unit.

By aligning to the 2014 line transect population estimate, the models appear to have initiated a consistent downward trend in the population, which is resulting in an over-estimation of the harvest impacts. As a result, the model is under-estimating the population level impacts of consistently high observed fawn ratios. The high male and female harvest rates (45% and 32%) generated in the model are unrealistic given the landownership status of this herd. Ground classifications have resulted in classifying greater than 2,000 pronghorn each year since 2011 without changing routes or methods over that time. If the model’s population prediction was accurate, we would expect to find it more challenging to consistently classify that many pronghorn.

Landowner survey data suggests that the population has decreased since 2010, however landowner responses have not indicated any major population reductions since that time. In six of the last seven years, over 25% of respondents still believe the area has more pronghorn than desired.

In general, it is unlikely that the population is decreasing to the extent suggested by the model given the consistently high harvest numbers, hunter success rates, landowner satisfaction, and fawn ratios. The model is therefore considered a poor model. A more accurate population estimate is desirable but not immediately necessary to manage this herd given it is now managed to hunter and landowner satisfaction objectives which are appropriate for this private land herd.

Management Summary

This herd unit is at objective and we do not expect excessive winter mortality or reductions in fawn:doe and yearling male:doe ratios in 2019.

Hunt Area 20 has high hunter success (89%), hunter satisfaction (80%) and favorable landowner survey results (15/16 respondents note population above or at desired levels). Active license success improved (>80% in 2018) with reduced quotas since 2015 when success was below 70%. We propose no changes to this season.

Hunt Area 102 has increased in popularity and the September doe/fawn season corresponds to a doe/fawn white-tailed deer season because landowners deal with high numbers of both species. In

2018, both the Type 1 and Type 6 licenses were increased by 50 each based on landowner requests, which were substantiated by very high hunter satisfaction (86%), success (88%), an increase in license holder participation (85%), and a reduction in effort (4.4 days/animal harvested) in 2017. Following the quota increase in 2018, there were no major changes in hunter satisfaction (84%), success (87%), and effort (4.4 days/animal harvested). We propose no changes to this season.

License quotas will be more than adequate to address depredation and herd growth potential if hunter access is available. The opportunity to manage for a lower population is reasonable given depredation concerns and limited sagebrush habitat in the two hunt areas. Private land access will ultimately determine the level of harvest achieved in these hunt areas. The license adjustments in recent years will help alleviate hunter frustration with purchasing leftover licenses in hunt areas with limited public access and high public land hunting pressure.

A harvest of 1,205 pronghorn is projected for the 2019 hunting season if access is granted and hunter success is maintained. We expect hunter satisfaction, success, and participation to be heavily dependent on hunter access.

Both hunt areas offer very limited public land hunting opportunity and even though pronghorn densities are high, securing private land access ensures a successful hunt. There appears to be increased interest in hunting in this part of Wyoming as license quotas have been reduced in other areas of the state. Hunters unsuccessful in the license draw pick up leftover licenses in northeast Wyoming and take their chances on public lands. However, private land access is essential to achieving harvest objectives.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet model for ungulate population data. Wyoming Cooperative Fish and Wildlife Research Unit. Unpublished. 41 pp.

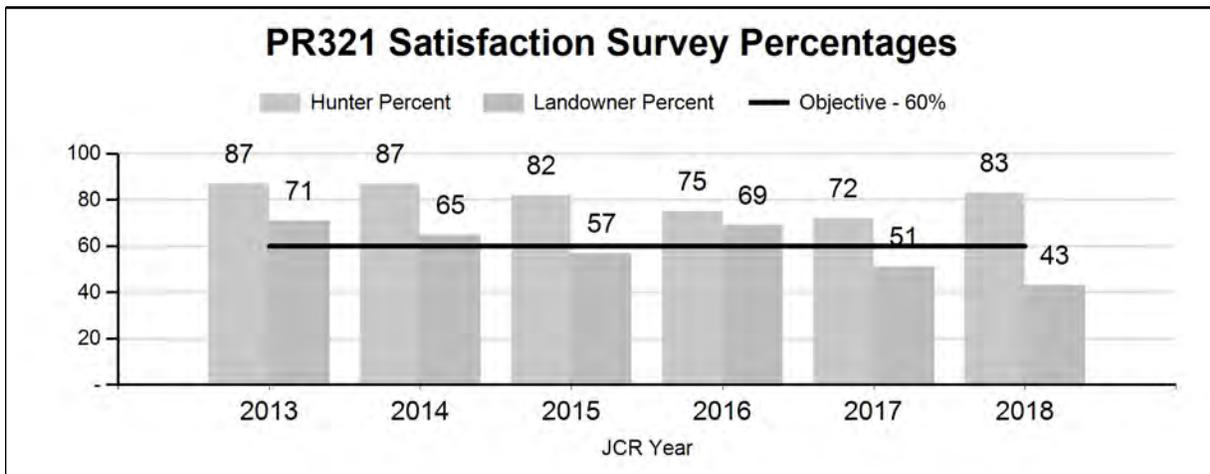
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2018 - JCR Evaluation Form

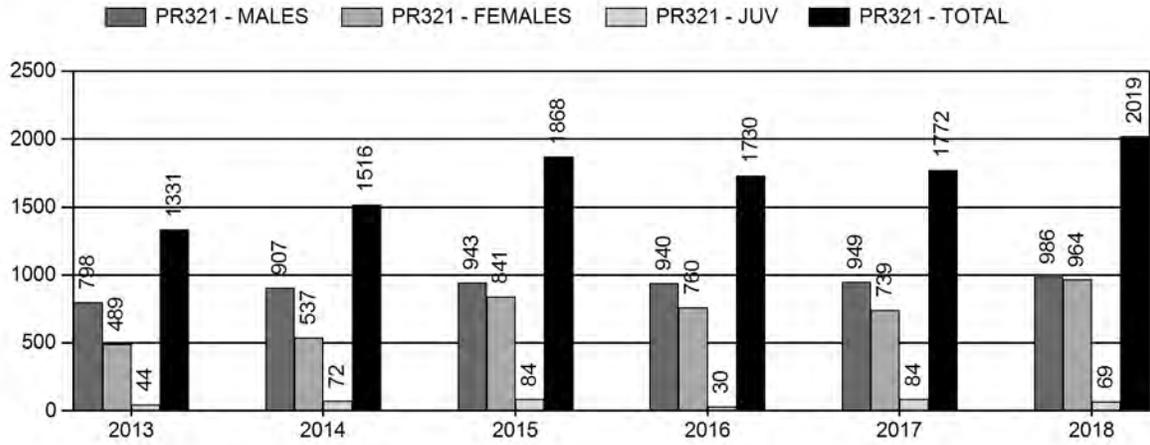
SPECIES: Pronghorn
 HERD: PR321 - LEITER
 HUNT AREAS: 10, 15-16

PERIOD: 6/1/2018 - 5/31/2019
 PREPARED BY: TIM THOMAS

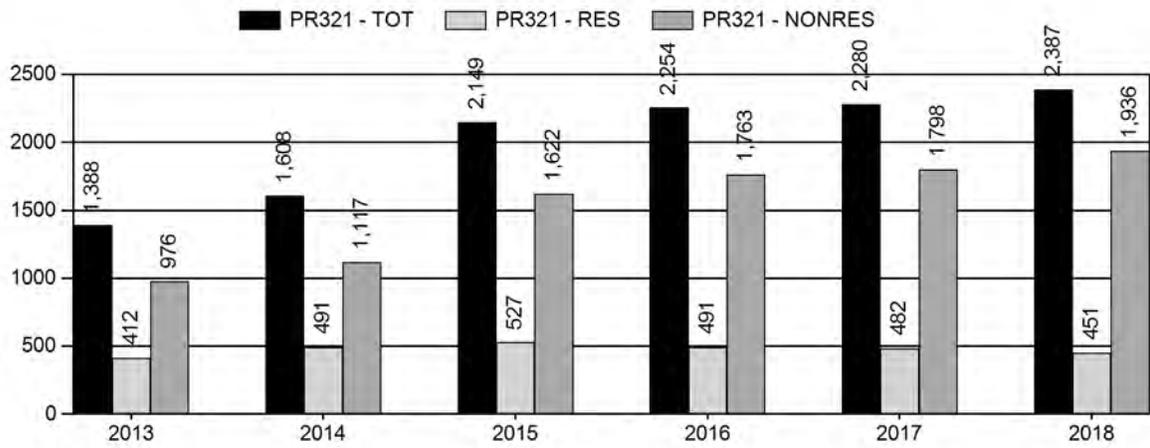
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Hunter Satisfaction Percent	80%	83%	80%
Landowner Satisfaction Percent	63%	43%	60%
Harvest:	1,643	2,019	1,870
Hunters:	1,936	2,387	2,200
Hunter Success:	85%	85%	85%
Active Licenses:	2,154	2,602	2,400
Active License Success:	76%	78%	78%
Recreation Days:	6,470	7,534	7,100
Days Per Animal:	3.9	3.7	3.8
Males per 100 Females:	57	50	
Juveniles per 100 Females	72	65	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			3%
Number of years population has been + or - objective in recent trend:			2



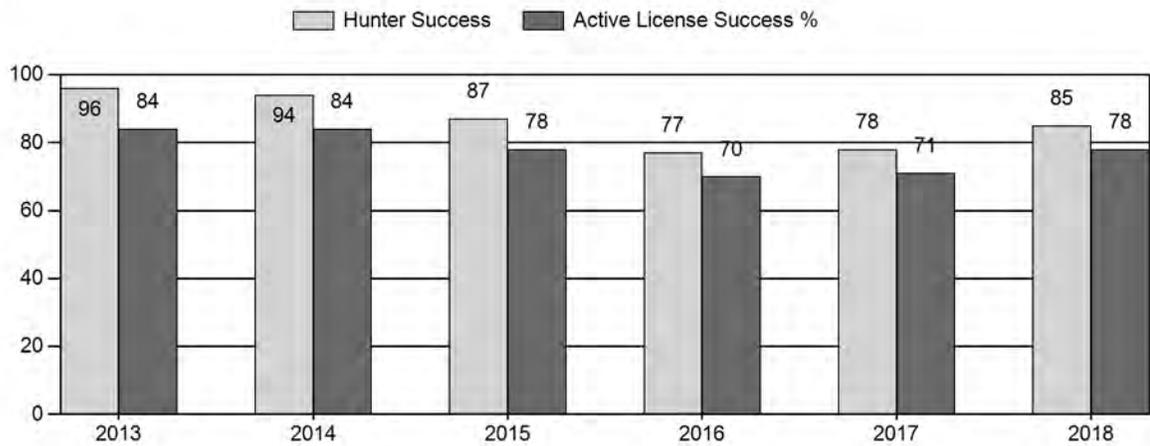
Harvest



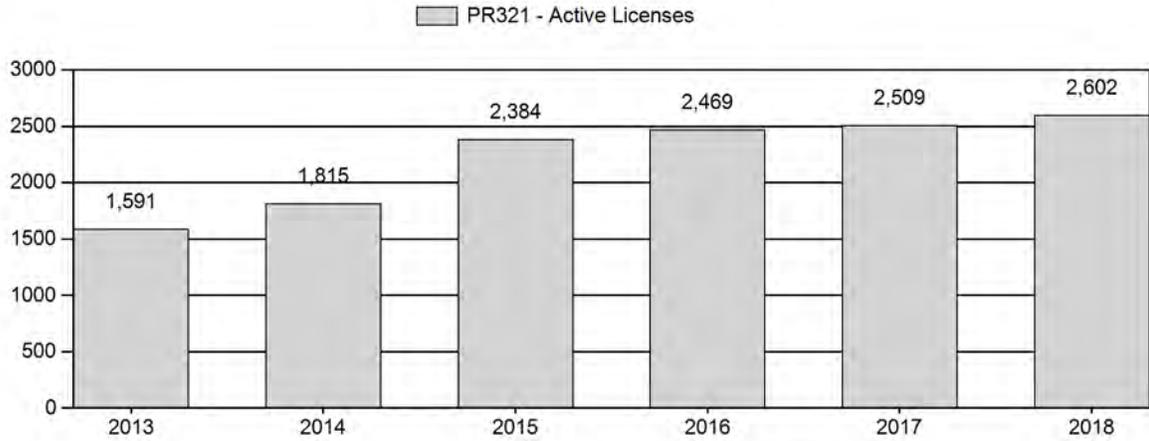
Number of Active Licenses



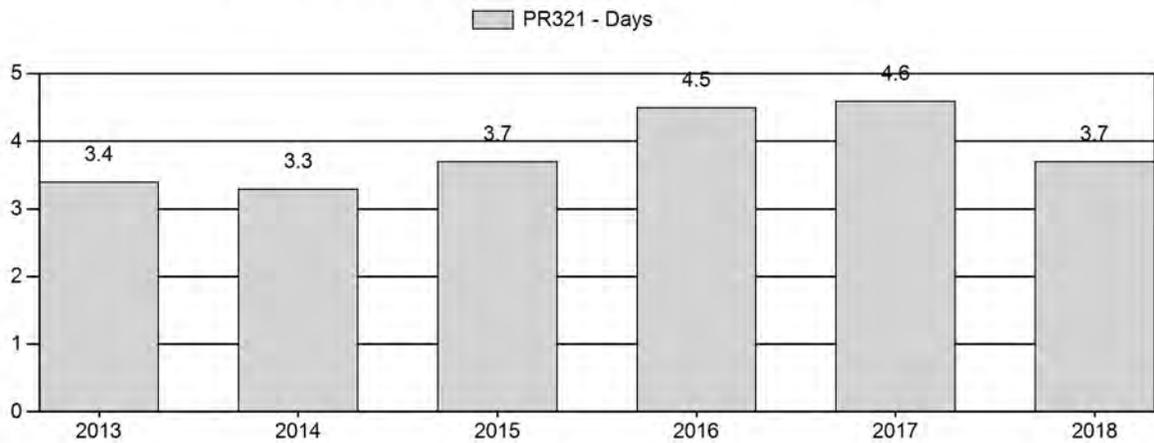
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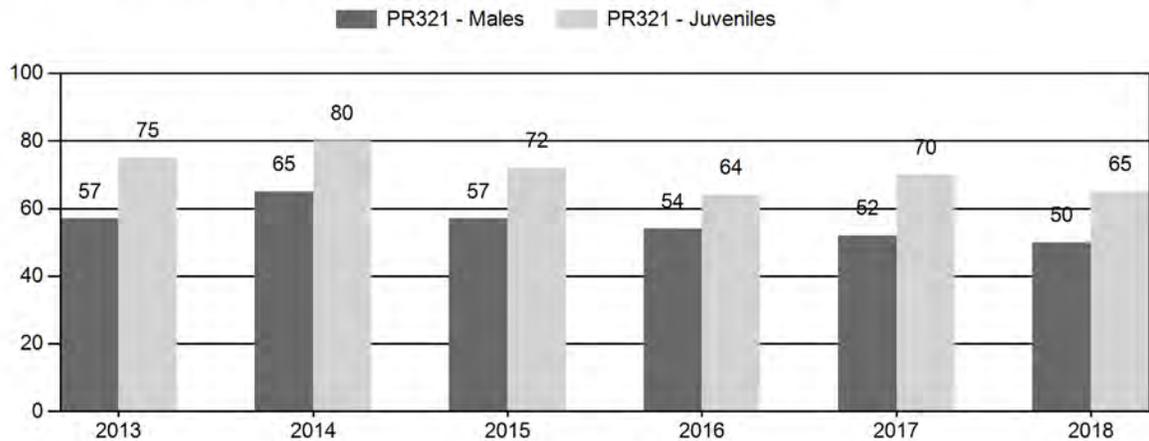
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



**2013 - 2018 Preseason Classification Summary
for Pronghorn Herd PR321 - LEITER**

Year	Pre Pop	MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%	Tot	Cls	Yng	Adult	Total	Conf	100 Fem	Conf Int	100 Adult
										Cls	Obj				Int			
2013	6,789	130	263	393	24%	694	43%	522	32%	1,609	4,498	19	38	57	± 16	75	± 19	48
2014	6,677	165	255	420	26%	650	41%	520	33%	1,590	3,783	25	39	65	± 17	80	± 21	49
2015	0	193	283	476	25%	832	44%	601	31%	1,909	2,534	23	34	57	± 0	72	± 0	46
2016	0	134	281	415	25%	763	46%	485	29%	1,663	1,983	18	37	54	± 0	64	± 0	41
2017	0	113	314	427	23%	829	45%	577	31%	1,833	2,194	14	38	52	± 0	70	± 0	46
2018	0	178	347	525	23%	1,045	46%	678	30%	2,248	1,928	17	33	50	± 0	65	± 0	43

**2019 HUNTING SEASONS
LEITER PRONGHORN HERD (PR321)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
10	1	Oct. 1	Oct. 14	300	Limited quota	Any antelope
	6	Oct. 1	Oct. 31	400	Limited quota	Doe or fawn
15	1	Oct. 1	Oct. 14	600	Limited quota	Any antelope
	6	Oct. 1	Nov. 30	800	Limited quota	Doe or fawn
16	1	Oct. 1	Oct. 14	600	Limited quota	Any antelope
	6	Oct. 1	Oct. 31	400	Limited quota	Doe or fawn

Special Archery Season Hunt Areas	Opening Date	Limitations
10, 15, 16	Aug. 15	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
	1	
	6	
Herd Unit Total	1	No Changes
	6	

Management Evaluation

Current Hunter / Landowner Management Objective: 60% Satisfaction

Secondary Management Objective: Observed ratio of 30 bucks:100 does minimum

Management Strategy: Private Land

2018 Hunter Satisfaction Estimate: 83%

2018 Landowner Satisfaction Estimate: 43%

Most Recent 3-year Running Average Hunters Satisfaction Estimate: 77%

Most Recent 3-year Running Average Landowner Satisfaction Estimate: 54%

Herd Unit Issues

The Leiter Pronghorn Herd Unit is located in north central Wyoming, east of Sheridan and Buffalo. Interstate Highway 90 is the western and southern boundary; the Powder River is the eastern boundary; and the Wyoming-Montana state line is the northern boundary. The herd unit contains the town of Clearmont and the communities of Arvada, Leiter, Ucross and Wyarno. It is mostly agricultural lands with some rural residential development near Sheridan and Buffalo, and along U.S. Highways 14 and 16. Three hunt areas – Areas 10, 15, and 16 – make up this herd unit.

The primary management objective for the Leiter Pronghorn Herd Unit is a Landowner and Hunter Satisfaction Objective at 60% or higher, with a secondary management objective of 30 or more

bucks observed per 100 does. The management strategy is Private Land Management. We created the Leiter Pronghorn Herd Unit (PR321) in 2014 when the Clearmont (PR308) and Ucross (PR353) Pronghorn Herd Units were combined. We revised the objectives and management strategy at that time (i.e. 2014). We conducted a 5-year evaluation of the objective and management strategies in 2019, with no changes.

The majority of land within this herd unit is either private fee title or landlocked public lands. The restricted access makes it difficult to attain adequate harvest to regulate pronghorn populations in portions of this herd. Public lands include State Trust Lands and federal lands administered by the U.S.D.I. Bureau of Land Management (BLM). There are very limited public land hunting opportunities. There are three AccessYes Walk-In Areas (Johnson County #3 in Hunt Area 16; and Sheridan County #1 and 4 in Hunt Area 15) that provide some antelope hunting opportunity.

The Wyoming Women's Antelope Hunt, sponsored by the Wyoming Women's Foundation, was started in 2013 to encourage female participation in hunting. This event is based at the Ranch at Ucross and occurs primarily within this herd unit. Participants can purchase a license for this hunt independent of the normal allocation process within provisions of state statute.

Herd Unit Objective Review

The herd unit objective and management strategy were last reviewed in 2014. We evaluated and considered population status, landowner and hunter satisfaction, observed buck to doe ratios and habitat data included in this report. The current object and strategy meet our management needs. We concluded a change is not warranted at this time. We will review the herd objective and management strategy again in 2024. If the situation arises that a change is necessary, we will review and submit a proposal as needed.

Weather

Temperature and precipitation data referenced in this section were collected at the Sheridan Field Station (#488160), Clearmont 5SW (#481816) and Leiter 9NE (#485506) weather stations located within this herd unit. Historical climate data are reported by the Western Region Climate Center (www.wrcc.dri.edu).

The 2018 spring was generally cool, with temperatures in March-April below normal, and decreased precipitation until May. May was warm and wet, resulting in a good start for forage production. Temperatures remained near normal to slightly below normal during the summer and early fall. Conditions were generally dry during June-August, with below normal precipitation. September and November saw below normal precipitation, while October saw near normal precipitation and cooler temperatures. December and January were open, with near normal precipitation and above average temperatures. February turned cold and snowy, with precipitation near normal and average temperature ~16°F below normal at the Leiter Station. There were several periods of 0°F or below during this time, with at least one -20°F day. March was generally colder than average with decreased precipitation while April was generally about normal for both temperature and precipitation. May was ~8°F below average, with a 50-100% increase in precipitation. Cool wet weather during parturition may adversely influence neonate survival.

While adult wildlife entered the winter in good condition, they faced severe weather conditions during February and early March. Fawns, being more susceptible to cold temperatures, likely saw

average overwinter survival. We received several reports of overwinter fawn mortality during late winter.

Habitat

This herd unit contains open rangeland dominated by short-grass prairie and big sagebrush, dry land and irrigated crop lands. In the northern part of the herd unit is the Badger Hills which provide limited habitat for pronghorn. As you approach the Powder River, the country becomes more broken and rugged, which is less suitable for pronghorn.

A new invasive annual grass – ventenata or wiregrass (*Ventenata dubia*) – has been found in this herd unit. This invasive annual, along with the already established exotic annuals cheatgrass or downy brome (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*), reduce habitat quality over time by out competing more desirable forage plants. Also, fire frequency often increases with the presence of annual grasses, decreasing shrub components, such as big sagebrush, on the landscape. This could have long-term repercussions for pronghorn.

There are three historic habitat transects located in this herd unit. All of the habitat transects monitor annual growth and utilization of Wyoming big sagebrush communities. These transects have not been read in since at least 2014.

Field Data

During August, biologists and wardens conducted herd classification surveys using ground survey techniques. Designated routes were driven along county roads and all observed pronghorn were classified by gender and relative age cohort. Starting in 2011, we moved away from aerial classification surveys to ground classification surveys in this herd unit to reduce risk for employees and eliminate aircraft charter costs. In 2018, we classified 2,248 pronghorn, the highest classification count since switching exclusively to ground surveys. The count was above the desired sample size of 1,928 pronghorn at the 90% confidence level. This is the first time since 2001 that we have met our desired sample size in this herd unit. Even when conducting aerial surveys we seldom met the desired sample size at the 90% confidence level.

This year, we observed 65 fawns:100 does, a slight decrease from 2017 (70 fawns:100 does) and below the previous 5-year average of 72 fawns:100 does. A decline in fawns was not unexpected due to severe winter conditions during parts of the 2017-18 winter. Due to the fact we only classify pronghorn in a relatively small portion of the herd unit visible from county roads, our survey may be biased and not truly representative of the actual population dynamics.

We observed 50 bucks:100 does, a decrease from the most recent 5-year average of 56 bucks:100 does. Restricted access to private lands, and limited accessible public lands, limits our ability to obtain additional buck harvest, which could easily be sustained based on the observed buck to doe ratio. Since bucks are often segregated in bachelor groups prior to breeding season in September, we may be under estimating the actual buck:doe ratio in this herd unit. Based on observed buck:100 doe ratios, we are meeting our secondary management objective for this herd unit.

Hunter satisfaction increased in 2018, with 83% of surveyed hunters (n=334) satisfied (37%) or very satisfied (45%). This is the highest hunter satisfaction in four years. Both resident and nonresident hunter satisfaction increased in 2018, with resident satisfaction increasing from 63%

to 71% and nonresident satisfaction increasing from 74% to 84%. The increase in hunter satisfaction could be correlated to the increased hunter success and decreased effort required to harvest an antelope in 2018. Successful hunters tend to be satisfied hunters.

Hunter satisfaction increased the most in Area 10 (68% to 80%). In 2017, one landowner booked several groups of hunters on a relatively small property, resulting in a number of complaints and likely a function of low satisfaction that year. Hunter satisfaction was highest in Area 15 (86.5%), which is slightly surprising as there is limited public access in this hunt area. This area does have some public access for hunting, including two AccessYes Walk-In Areas.

Harvest Data

In 2018, we essentially sold all allocated licenses, except for 82 Type 6 licenses in Area 10. While we maintained licenses quotas for 2018, we again saw an increase in demand for antelope licenses, especially for leftover licenses.

In 2018, an estimated 2,387 hunters harvested an estimated 2,019 pronghorn, the highest harvest in 35+ years. This was the first year hunters harvested over 2,000 pronghorn. Hunter numbers increased 5% while harvest increase 14% compared to 2017. Pooled hunter success was 85%, the highest in three years, and similar to the previous 5-years success rate of 84%. Success measured by individual license was 78%. Hunter effort, as measured by the number of days hunted per animal harvested, was 3.7 days/animal, almost a full day less than in 2017 (4.6 days/animal), and slightly less than the previous 5-year average of 3.96 days/animal.

These data suggest pronghorn were relatively available for harvest in 2018, especially compared to 2017. Weather conditions were generally conducive to hunting during the 2018 season, so likely played a role in hunter success. While simulation modeling suggests this population is declining, we have had record pronghorn harvest the past four years. Landowners are about evenly split on having the desired number of pronghorn or having too many.

Population

The 2018 postseason population estimate was ~6,300 pronghorn, with the population trending downward, likely influenced by the high harvest in recent years. This population likely peaked in about 2014 at an estimated ~13,900 pronghorn. The population is thought to have declined over the past 3-4 years, likely due to record harvest levels. A line transect survey was conducted during June 2013, which resulted in an end-of-biological-year population estimate of 13,256 pronghorn. The current model estimates a population below the LT point estimate.

The “Time-Specific Juvenile – Constant Adult Survival Rate” (TSJ,CA) spreadsheet model was chosen to estimate the post-season population for this herd. This model had the highest relative Akaike information criterion (AIC) value (158) but the best fit (39) of the three possible models. The population dynamics of this model appear reasonable and consistent with the dynamics observed in the field. The model aligns well with all but one line transect estimate. While we have limited population dynamic data available for this herd, the model does align well with most of the line transect estimates, so we consider this a “good” model. The estimated percentage of males harvest the past 4 years seems unrealistically high, which suggests this model is underestimating the true population.

Of landowners who responded to an annual survey (n=30), an equal number (n=13; 43%) indicated the population was at or near desired levels or above desired levels. Most (n=16; 53%) suggested similar season strategies for 2019. For the first time in several years, at least one landowner in each hunt area (n=4; 13%) thought they had fewer than desired numbers of pronghorn.

Management Summary

Since the 2003 season, the regular hunting season has ran two weeks (October 1 – 14) for Type 1 licenses, and four weeks (October 1 – 31) for Type 6 licenses. An archery pre-season runs August 15 – September 30. In response to requests from landowners in Hunt Area 15, we extended the Area 15 - Type 6 (doe or fawn antelope) season to November 16th for 2016 and to November 30th for 2017.

Hunters are able to purchase two Type 1 (any antelope) licenses and four Type 6 (doe or fawn antelope) licenses, if available. This allows hunters with access the opportunity to harvest multiple animals. There is limited pronghorn hunting on scattered State Trust and BLM lands, as well as three Walk-In Areas. We observe high buck numbers, as measured by buck:doe ratios, observing 50 bucks:100 does during this year's classification survey. High buck to doe ratios are likely a function of limited access to private lands where the majority of pronghorn occur.

Due to very limited access for pronghorn hunting, we strive to balance license allocation between providing enough licenses to meet landowner desires and hunter demand, and having too many leftover licenses, which may give prospective hunters the impression there are abundant hunting opportunities. We have seen an increase in demand for non-resident license since 2014, with a lot of naïve hunters looking for an opportunity to hunt big game in Wyoming. This can result in frustrated hunters who purchase leftover licenses prior to learning about access issues in herd units such as this one.

We project a harvest of approximately 1,870 pronghorn in 2019, resulting in an estimated post-season population of about 6,000 pronghorn. These predictions assume about average fawn survival, similar license sales and lower success rates as seen during the 2018 hunting season.

2018 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2018 - 5/31/2019

HERD: PR339 - NORTH BLACK HILLS

HUNT AREAS: 1-3, 18-19

PREPARED BY: ERIKA PECKHAM

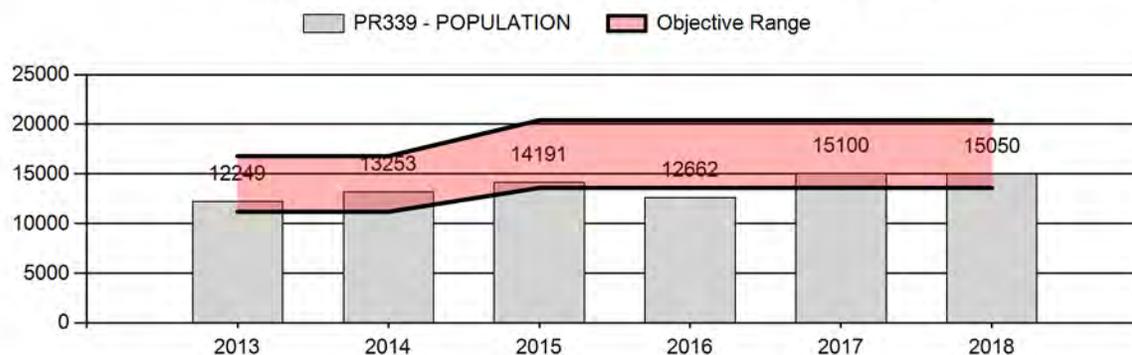
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	13,491	15,050	14,870
Harvest:	1,049	1,382	1,425
Hunters:	1,157	1,516	1,550
Hunter Success:	91%	91%	92 %
Active Licenses:	1,309	1,711	1,760
Active License Success:	80%	81%	81 %
Recreation Days:	4,016	4,630	4,700
Days Per Animal:	3.8	3.4	3.3
Males per 100 Females	43	43	
Juveniles per 100 Females	79	71	

Population Objective (± 20%) :	17000 (13600 - 20400)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-11.5%
Number of years population has been + or - objective in recent trend:	1
Model Date:	5/20/2019

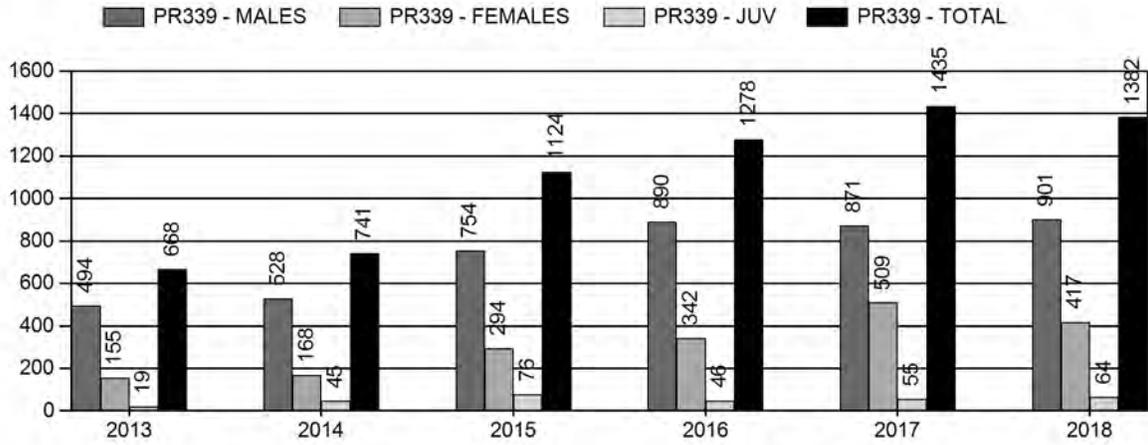
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	7.1%	6.4%
Males ≥ 1 year old:	24.9%	31.4%
Total:	8.2%	-9.8%
Proposed change in post-season population:	2.2%	-1%

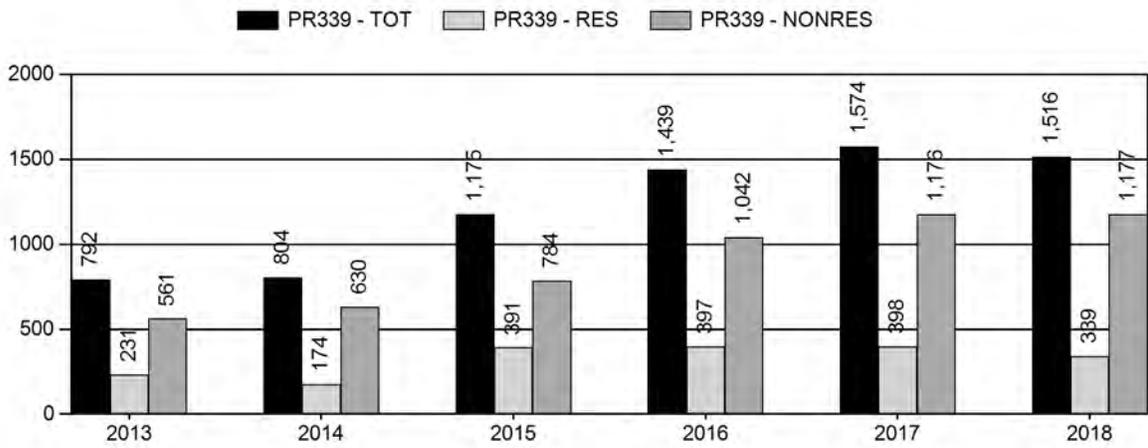
Population Size - Postseason



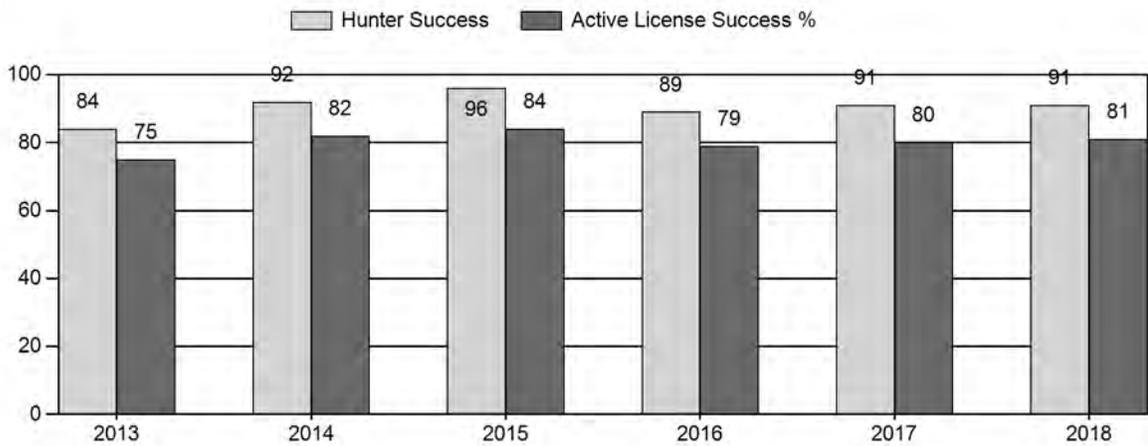
Harvest



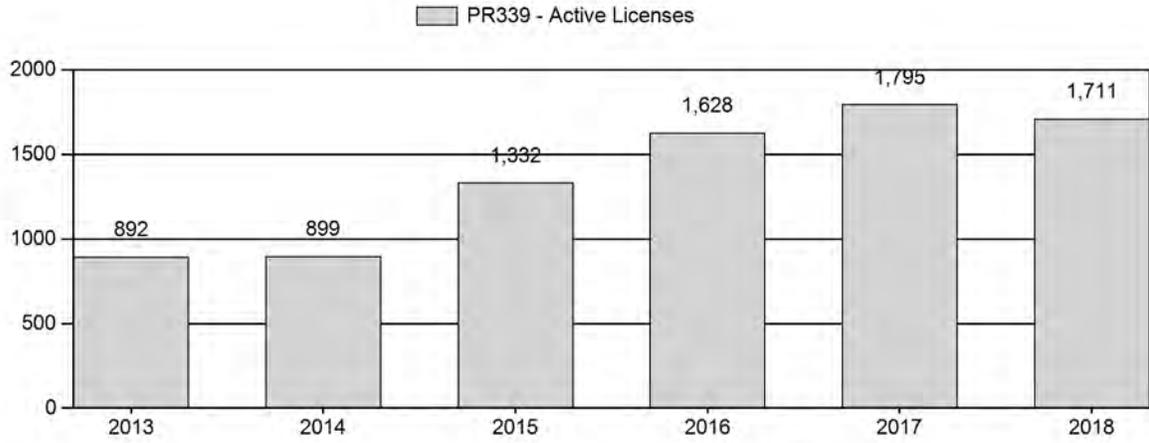
Number of Active Licenses



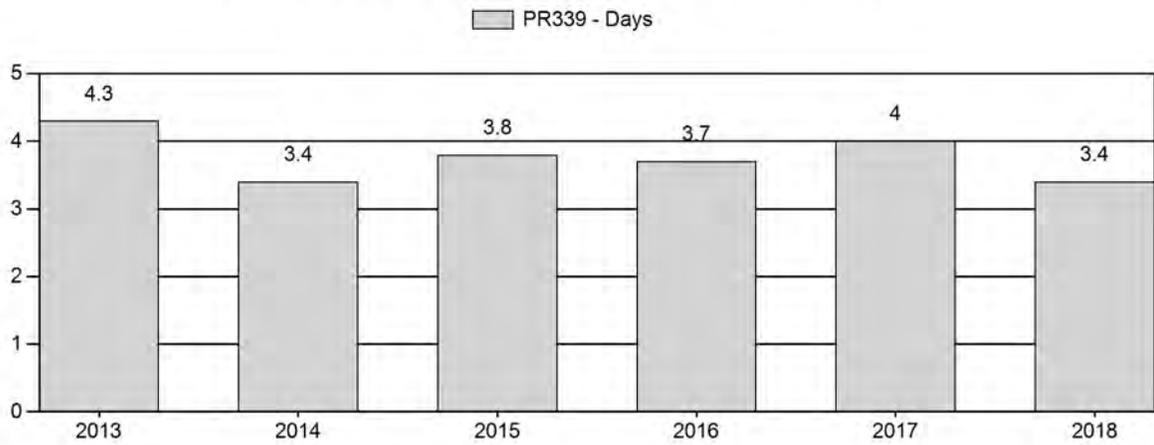
Harvest Success



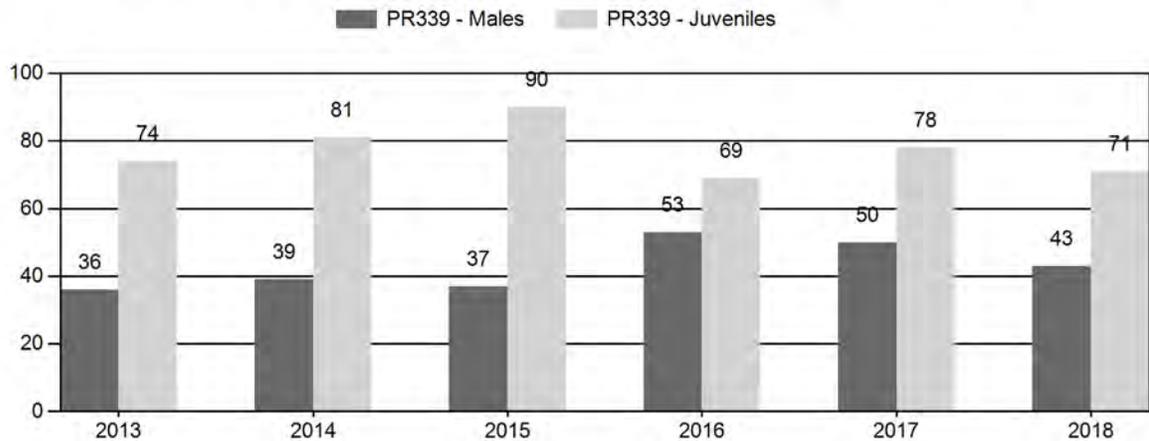
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR339 - NORTH BLACK HILLS

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	12,984	75	229	304	17%	841	48%	621	35%	1,766	1,878	9	27	36	± 4	74	± 6	54
2014	14,069	125	258	383	18%	993	45%	808	37%	2,184	2,247	13	26	39	± 4	81	± 6	59
2015	15,427	143	271	414	16%	1,118	44%	1,004	40%	2,536	2,673	13	24	37	± 3	90	± 6	66
2016	13,998	182	378	560	24%	1,056	45%	730	31%	2,346	2,755	17	36	53	± 4	69	± 5	45
2017	16,700	177	459	636	22%	1,284	44%	996	34%	2,916	3,099	14	36	50	± 4	78	± 5	52
2018	16,550	211	442	653	20%	1,505	47%	1,076	33%	3,234	2,841	14	29	43	± 3	71	± 4	50

**2019 HUNTING SEASONS
NORTH BLACK HILLS PRONGHORN HERD (PR339)**

Hunt Area	Type	Dates of Opens	Seasons Closes	Quota	License	Limitations
1	1	Oct. 1	Nov. 20	250	Limited quota	Any antelope
1	6	Oct. 1	Nov. 20	150	Limited quota	Doe or fawn
2	1	Oct. 1	Nov. 20	200	Limited quota	Any antelope
2	6	Oct. 1	Nov. 20	200	Limited quota	Doe or fawn
3	1	Oct. 1	Nov. 20	300	Limited quota	Any antelope
3	6	Oct. 1	Nov. 20	250	Limited quota	Doe or fawn
18	1	Oct. 1	Oct. 20	200	Limited quota	Any antelope
18	6	Oct. 1	Oct. 20	50	Limited quota	Doe or fawn
19	1	Oct. 1	Oct. 20	300	Limited quota	Any antelope
19	7	Oct. 1	Oct. 20	150	Limited quota	Doe or fawn valid on private land

Hunt Special Archery Season Hunt Areas	Opening Date	Limitations
1-3	Sep. 1	Refer to Section 2 of this Chapter
18, 19	Aug. 15	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
1	1	No Change
1	6	No Change
2	1	No Change
2	6	No Change
3	1	No Change
3	6	No Change
18	1	+50
18	6	No Change
19	1	No Change
19	6	No Change

Herd Unit Total	1	+50
	6	No Change

Management Evaluation

Current Postseason Population Management Objective: 17,000

Management Strategy: Recreational

2018 Postseason Population Estimate: ~15,050

2019 Proposed Postseason Population Estimate: ~14,870

2018 Hunter Satisfaction: 86% Satisfied, 8% Neutral, 6% Dissatisfied

Herd Unit Issues

The management objective for the North Black Hills Pronghorn Herd Unit is a post-season population of 17,000 pronghorn. The management strategy is recreational management. The objective and management strategy were last reviewed in 2015.

The 2018 post-season population estimate was about 15,050 pronghorn. Currently, the population is estimated to be 12% below the management objective. Beginning around 2007 this population started declining. Issues related to adverse winter and spring weather, and low fawn production were observed, particularly from 2009-2011. Heavy spring snows and cold spring temperatures in 2009 and 2010 likely reduced fawn and adult survival, particularly in Hunt Areas 18 and 19. Although conditions have been favorable the last few years, certain hunt areas have not had very good fawn production and have not seen numbers rise to what they have been in the past.

Weather

Weather throughout 2018 was optimal for overall rangeland conditions. Precipitation was favorable resulting in good forage availability. The winter of 2018-2019 started out fairly mild with minimal amounts of snow as winter commenced. As February approached, much colder temperatures were experienced as winter progressed. In addition to the prolonged cold temperatures, numerous snow events were experienced in much of this herd unit. Over winter survival was impacted with numerous reports and subsequent confirmation of pronghorn in poor condition or dying.

The Palmer Drought Index indicates that all months of 2018 experienced “normal” conditions in the Powder River drainage. Additionally, looking at historic temperature information for November and December 2018, mean temperatures were very close to the 30-year normals.

Habitat

The North Black Hills Herd Unit is comprised of various habitat and therefore, differing densities of pronghorn. The dominant habitat types are sagebrush-grassland and ponderosa pine. There are stands of juniper found throughout the area as well. Pronghorn are found at fairly high densities in the sagebrush-grassland habitat type. This herd unit contains portions of the

Wyoming Black Hills. The Black Hills are dominated with ponderosa pine stands and steep topography interspersed with grassland parks.

Within the Black Hills Herd Unit, Rapid Habitat Assessments (RHA) were conducted on public land in Hunt Area 18. This information consists of basic plant community inventory and an overall picture of rangeland health. It is not an in-depth analysis, but includes photo points at different locations. A total of seven RHA's were conducted comprised of four upland and three riparian assessments. Within each allotment where a RHA was conducted, the area was walked and plants and habitat conditions were inventoried and assessed to get an overall assessment of the allotment/pasture condition. This information could prove helpful in planning future habitat projects.

Field Data

Classification surveys in 2018 showed a decrease in the observed fawn to doe ratio (71:100), down from 78:100 in 2017. This is lower than the preceding 5-year average of 78:100. Fawn ratios varied throughout the five hunt areas, ranging from 58 to 89 fawns per 100 does. Given favorable precipitation patterns during the 2018 growing season, these low observed fawn ratios are puzzling. Buck to doe ratios ranged from 36 to 50 the preceding five years. The 2018 buck ratio of 43 bucks per 100 does was down from 50 per 100 in 2017, but comparable to the 5-year average. A postseason landowner survey is conducted which provides another perspective of the population and hunting seasons. The 2018 survey indicated that 64% of respondents felt the herd was currently at an acceptable level. The Hunter Satisfaction Survey responses indicated that 86% of hunters were either "very satisfied" or "satisfied" with their hunting experience.

In February of 2019 a landowner report was received regarding numerous antelope mortalities within Hunt Area 19. Upon investigation, it was found that around 60 antelope succumbed to disease within a small area. All antelope present in this area eventually expired. Lab testing indicated that this was an outbreak of *Mycoplasma bovis*, which had not be documented in pronghorn prior to this event. Although the outbreak appeared to be localized, it will be important to continue monitoring this potential issue.

It should also be noted that numerous reports were received and verified of pronghorn dying beginning Mid-April and into May. This was typically one in a group and they would present with symptoms associated with overconsumption of green grass. The Wyoming State Veterinary Lab came to the area to attempt to assess the cause. It seems that some years are worse than others for this occurrence and the spring of 2019 seemed to be exceptionally bad throughout portions of this and adjacent herd unit.

Harvest

In 2018 there were 2,000 licenses available, 1,200 Type 1 any antelope and 800 Type 6 doe/fawn antelope licenses. With the exception of the area 19 Type 7 license, all licenses sold out before the hunting season. Only four Type 7 licenses were unsold. Overall, hunter success was 91%, identical to the 5-year average. Hunters averaged 4.0 days to harvest an animal, which was lower than 2017 and comparable to the preceding 5-year average of 3.8 days per harvest.

Population

The “Semi-Constant Juvenile – Semi-Constant Adult” (SCJ-SCA) spreadsheet model was chosen for the post season population estimate. This model aligns very well with the independent line transect survey estimates. Although this model did not have the lowest relative AIC (204), it did appear to most accurately represent what was occurring on the ground (Fair Model). We conducted line transect surveys in 1995, 1997, 1999, 2002, 2004, 2008, 2012, and 2014, which provided independent population estimates. The model aligns very well to the line transect estimates and predicts stable 2018 post-season population. A line transect survey is planned for the Spring of 2019.

Management Strategy

The traditional season has been the entire month of October and part of November in Hunt Areas 1, 2 and 3, and October 1 to October 20 in Hunt Areas 18 and 19. The season time and length seem to be adequate to allow a reasonable harvest and aligns well with the current deer season. Area 18 is the only hunt area that has a reasonable amount of accessible public land. This area appears to be slowly recovering from a sharp decline in pronghorn several years ago. This area can accommodate a slight increase in Type 1 licenses given the hunter success rate of 91%. With the change in license quotas, this herd will have 50 more Type 1 licenses as compared to 2018.

Overall, the population appears to be trending upwards with slight variability within hunt areas. If we attain the projected harvest of 1,425 pronghorn and near normal fawn recruitment, the population is predicted to decrease slightly. Based on the population model, we predict a 2018 post-season population of about 15,050 pronghorn.

2018 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2018 - 5/31/2019

HERD: PR351 - GILLETTE

HUNT AREAS: 17

PREPARED BY: ERIKA PECKHAM

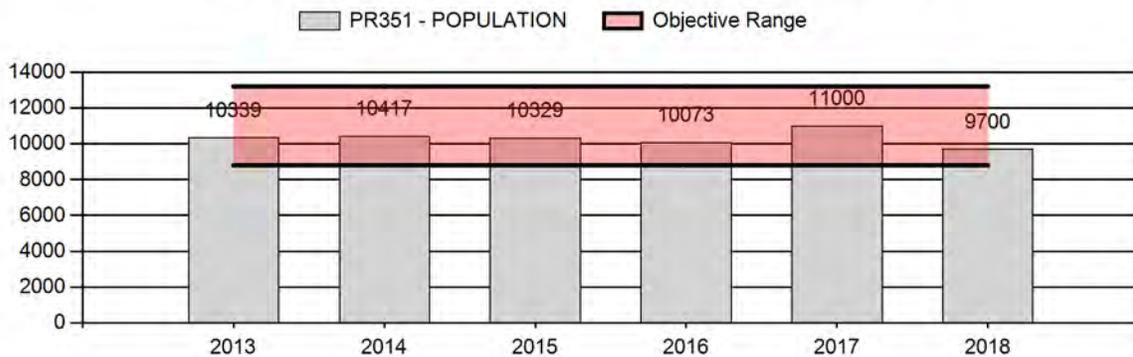
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	10,432	9,700	9,300
Harvest:	1,077	1,081	1,070
Hunters:	1,254	1,220	1,225
Hunter Success:	86%	89%	87%
Active Licenses:	1,326	1,299	1,300
Active License Success:	81%	83%	82%
Recreation Days:	4,378	3,371	3,380
Days Per Animal:	4.1	3.1	3.2
Males per 100 Females	49	40	
Juveniles per 100 Females	61	52	

Population Objective (± 20%) :	11000 (8800 - 13200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-11.8%
Number of years population has been + or - objective in recent trend:	4
Model Date:	1/29/2019

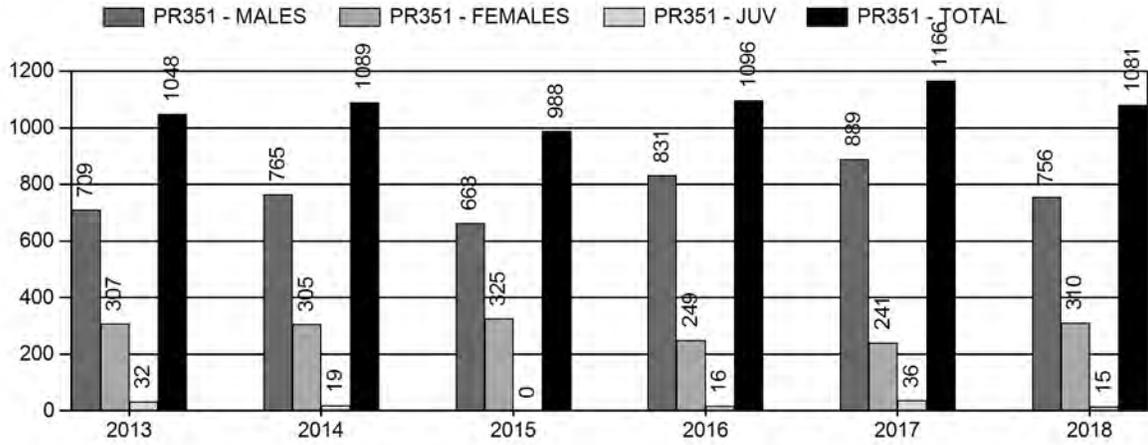
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	4.5%	6.1%
Males ≥ 1 year old:	36.4%	37.8%
Total:	9.7%	10.25%
Proposed change in post-season population:	-8.5%	-5.2%

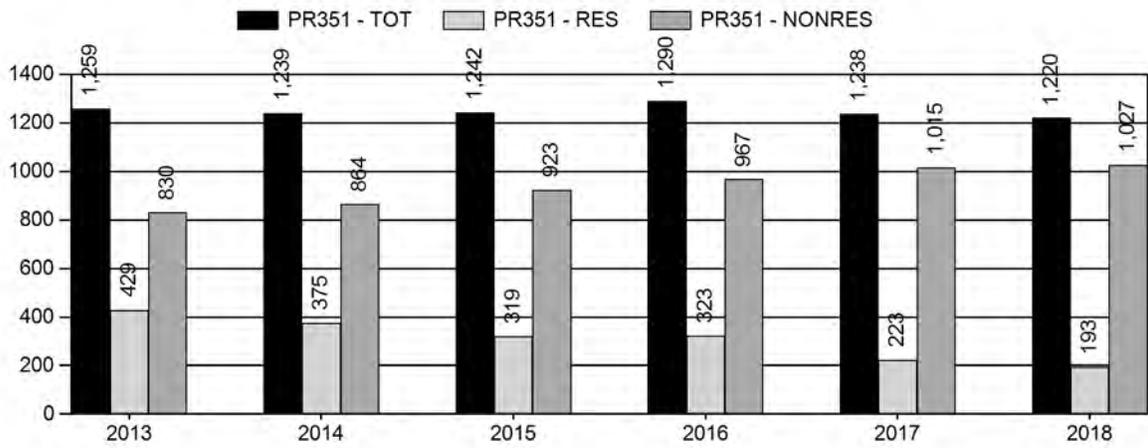
Population Size - Postseason



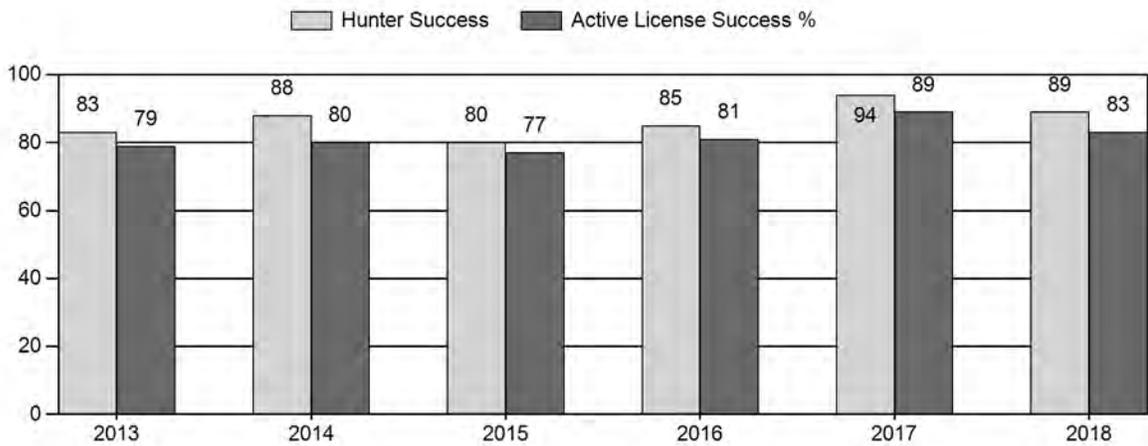
Harvest



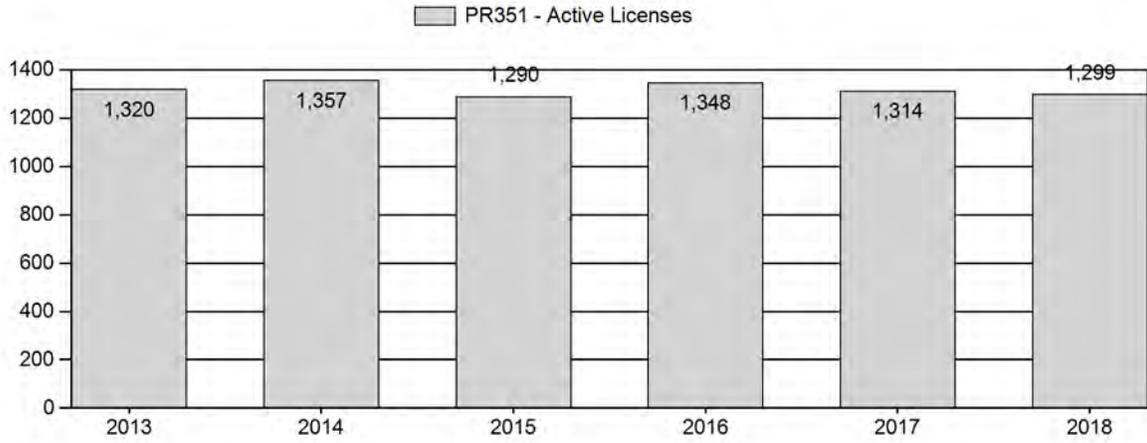
Number of Active Licenses



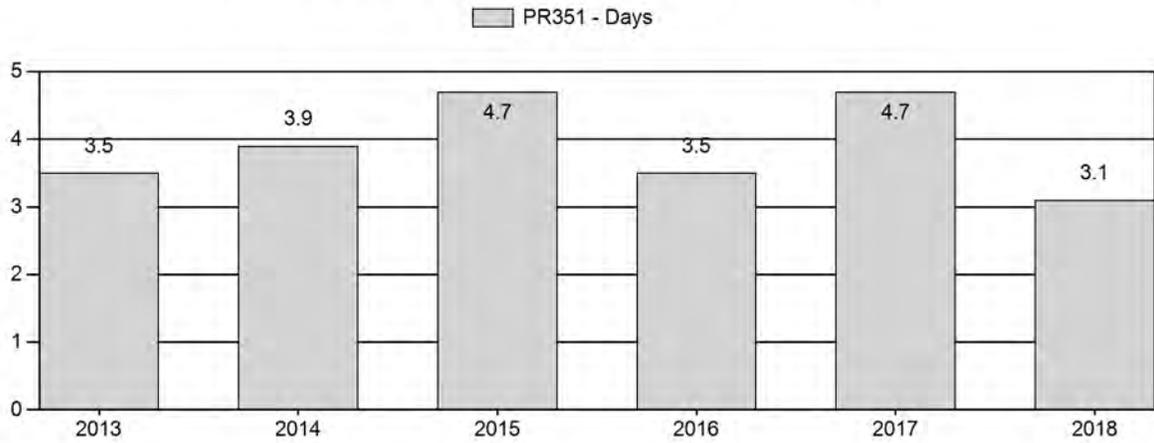
Harvest Success



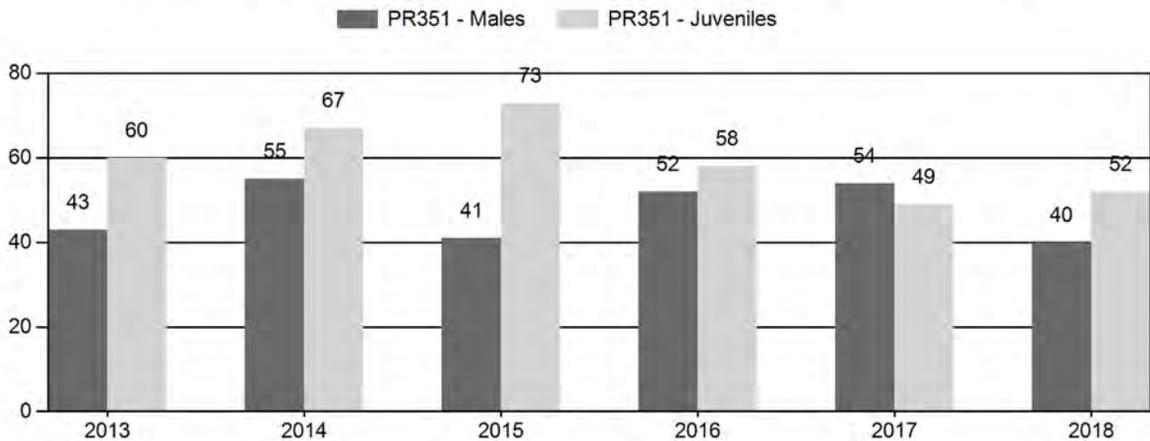
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR351 - GILLETTE

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	11,492	175	235	410	21%	950	49%	574	30%	1,934	1,758	18	25	43	± 4	60	± 5	42
2014	11,615	245	299	544	25%	983	45%	661	30%	2,188	1,811	25	30	55	± 4	67	± 5	43
2015	11,416	174	226	400	19%	971	47%	706	34%	2,077	2,297	18	23	41	± 4	73	± 5	51
2016	11,279	121	317	438	25%	835	48%	481	27%	1,754	2,434	14	38	52	± 5	58	± 5	38
2017	12,300	249	490	739	26%	1,376	49%	678	24%	2,793	2,468	18	36	54	± 4	49	± 3	32
2018	10,900	164	345	509	21%	1,258	52%	651	27%	2,418	1,821	13	27	40	± 3	52	± 4	37

**2019 HUNTING SEASONS
GILLETTE PRONGHORN HERD (PR351)**

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
17	1	Oct. 1	Oct. 31	1,100	Limited quota	Any antelope
17	6	Oct. 1	Oct. 31	400	Limited quota	Doe or fawn

Hunt Special Archery Season Hunt Areas	Opening Date	Limitations
17	Sep. 1	Refer to Section 2 of this Chapter

SUMMARY OF CHANGES IN LICENSE NUMBERS

Hunt Area	Type	Quota change from 2018
17	1	No Change
17	6	No Change

Management Evaluation

Current Postseason Population Management Objective: 11,000

Management Strategy: Recreational

2018 Postseason Population Estimate: ~9,750

2019 Proposed Postseason Population Estimate: ~9,250

2018 Hunter Satisfaction: 82% Satisfied, 10% Neutral, 8% Dissatisfied

Herd Unit Issues

The postseason population objective for the Gillette Pronghorn Herd Unit is 11,000 pronghorn. The management strategy is recreational management. The objective and management strategy were last reviewed in 2015.

In years when pronghorn numbers are above objective, the largest issue with achieving adequate harvest in this herd is hunter access. There is very little publicly accessible land. Additionally, with increased hunting pressure, the limited public lands experience overcrowding. As surrounding hunt areas have gone to limited numbers of licenses valid on public land, it seems that this herd unit has become particularly crowded.

In the past, this herd unit experienced fairly intensive coal bed methane development. In recent years, development and associated activity has tapered off substantially. The more pressing issue is proper reclamation. Roads and structures associated with methane production remain. Currently, energy development and associated activity is limited.

Weather

Weather throughout 2018 was optimal for overall rangeland conditions. Precipitation was favorable resulting in good forage availability. The winter of 2018-2019 was fairly mild with minimal amounts of snow as winter commenced. As February approached, much colder temperatures were experienced as winter progressed; however, the timing of the snow and conditions still allowed animals to access residual forage. Over winter survival was likely slightly impacted with some reports of pronghorn in poor condition or dying. The amount of winter kill will likely not adversely affect this population.

The Palmer Drought Index indicates that all months of 2018 experienced “normal” conditions in the Powder River drainage. Additionally, looking at historic temperature information for November and December 2018, mean temperatures were very close to the 30-year normals.

Habitat

This herd unit is comprised of a mix of various habitat types, as such; pronghorn densities vary greatly throughout this area.

Areas supporting pronghorn are largely comprised of Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) and silver sagebrush (*Artemisia cana*) interspersed with mid-prairie grasses such as wheatgrasses (*Agropyron* spp.), grama grasses (*Bouteloua* spp.), and needle grasses (*Stipa* spp.). These areas of dense sagebrush cover are scattered throughout this hunt area and typically have pronghorn densities.

Agricultural fields, most often consisting of alfalfa and grass hay mix, support high numbers of pronghorn in late summer and early fall when rangeland forage cures. Ponderosa pine occurs in steeper terrain with sandstone outcroppings. Pronghorn generally do not use this habitat type.

It has been noted that in some areas there has been chemical control of sagebrush which can influence where pronghorn winter.

There is currently no formal habitat monitoring occurring in this herd unit.

Field Data

This herd has hovered around the population objective over the last several years. In 2018, the fawn to doe ratio came in at a surprising low 52 fawns per 100 does. This herd was not impacted by drought this year, therefore the fawn ratio was much lower than anticipated. Low fawn ratios the past three years are not readily explained given the favorable rangeland conditions.

As this is a private lands dominated herd, it is no surprise this herd has high observed buck ratios. Over the last 6 years, ratios have ranged from 40-55 bucks per 100 does.

An annual landowner survey is conducted which provides another perspective of the population and hunting seasons. The 2018 survey indicates that the majority (59%) of respondents were satisfied with the current number of antelope. Hunters' response to the Hunter Satisfaction Survey indicate that 82% were either "very satisfied" or "satisfied", influenced by the 89% hunter success rate.

It should also be noted that numerous reports were received and verified of pronghorn dying beginning Mid-April and into May. This was typically one in a group and they would present with symptoms associated with overconsumption of green grass. The Wyoming State Veterinary Lab came to the area to attempt to assess what the exact cause was. It seems that some years are worse than others for this occurrence, and the spring of 2019 seemed to be exceptionally bad throughout portions of this herd unit.

Harvest Data

In 2018 there were 1,500 licenses available, 1,100 Type 1 any antelope and 400 Type 6 doe/fawn antelope licenses. All licenses sold in the initial draw. This herd has been hovering around objective, and it seems that this number of licenses is aligned with what this herd can support, particularly considering the last two years of observed fawn ratios (49:100 and 52:100, respectively). Reviewing the harvest history, 1,100 Type 1 licenses and 400 Type 6 licenses are around the maximum number of licenses issued. Population estimates indicate that the herd is trending slightly downward, but is still within 20% of the herd unit objective of 11,000 pronghorn. Hunter success averaged 86% over the preceding 5 years. The overall success rate in 2018 was 89% and hunters averaged 3.1 days to harvest an animal, down from 4.7 in 2017. The total harvest of 1,081 pronghorn was down slightly from the 2017 when 1,166 total antelope were harvested. It is felt that this area has received more pressure from hunters unfamiliar with the area the past several years. A high volume of non-resident hunter phone calls were received, with numerous people stating they did not draw their preferred hunt area. Additionally, numerous callers stated that it is becoming increasingly difficult to find access to hunt pronghorn.

Population

The "Constant Juvenile – Constant Adult Mortality Rate" (CJCA) spreadsheet model was chosen for the post season population estimate. Although this model did not have the lowest relative AIC (228), this model appeared to most accurately represent what was occurring on the ground, and made best use of the available information. The model is considered a "fair" model as there are no survival estimates for this herd. Although the SCJ, SCA model had the lowest AIC, there were years in which the estimates dipped into negative values. We conducted line transect surveys in 1995, 1998, 2000, 2002, 2008, 2013 and 2016 which provided independent population estimates. With the exception of the 2016 estimate, the model aligns within the confidence intervals of the estimates.

The 2018 post-season population estimate is about 9,700 pronghorn, a 4% decrease from the 2017 post-season estimate. The observed fawn:doe ratios for 2016 was 58:100 and 49:100 in 2017. The 2018 fawn ratio was also low at 52:100. As stated previously, although drought conditions occurred in 2016 and 2017, the fawn ratios were not expected in either of those years, and certainly not in 2018, given the favorable range conditions. Although there is some variability in observers, the variation from neighboring areas should not be this drastic. Classifications are conducted from

the ground using established routes every year. As such, the total number of pronghorn classified can give an idea of trends through the years. The total number of pronghorn classified in 2017 was close to 2,800, the highest number observed since 1983. The 2018 classification total was 2,400 pronghorn suggesting this population is remains high.

Management Strategy

Having adequate licenses available is imperative to achieve harvest objectives when this population is at objective. In 2018 there were 1,500 licenses available, 1,100 Type 1 and 400 Type 6. Both Type 1 and Type 6 licenses sold out in the initial draw. In speaking with hunters, it seemed many people who had historically drawn licenses in other hunt areas did not draw this year. This has been occurring for the past few years. This may have contributed to increased license demand in recent years.

The traditional season has been the entire month of October. This season timing and length seems adequate to allow for a reasonable harvest. The number of licenses available for 2019 was unchanged. The majority (64%) of landowners responding to the annual landowner survey state they would like to see the same season as 2018.

Due to landowner comments, hunter comments and the visible overcrowding of limited public lands, some hunt areas in this region have recently added a private lands only license type and restricted the number of licenses available for public lands. This strategy is being evaluated for the Gillette Herd Unit.

If we attain the projected harvest of 1,070 pronghorn and similar fawn recruitment, the population is anticipated to decrease slightly but remain within 12% of the objective. Based on the population model, we predict a 2019 post-season population of about 9,300.

2018 - JCR Evaluation Form

SPECIES: Pronghorn

PERIOD: 6/1/2018 - 5/31/2019

HERD: PR352 - MIDDLE FORK

HUNT AREAS: 21

PREPARED BY: CHEYENNE STEWART

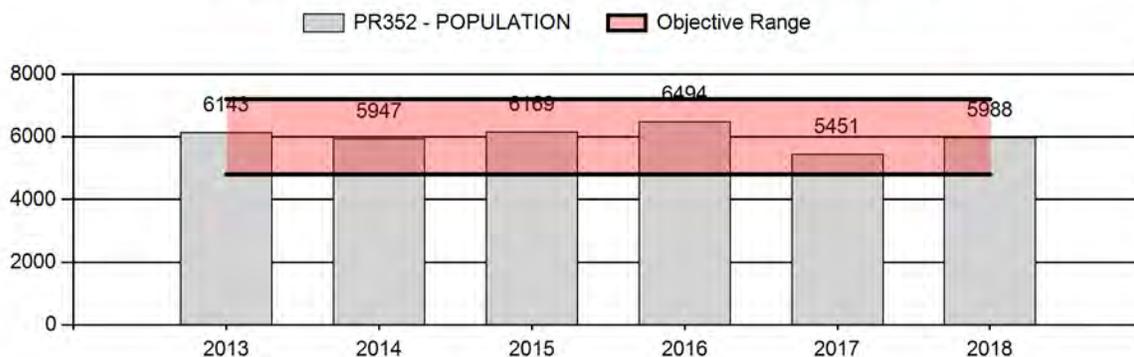
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	6,041	5,988	6,202
Harvest:	641	705	675
Hunters:	771	746	760
Hunter Success:	83%	95%	89 %
Active Licenses:	846	825	846
Active License Success:	76%	85%	80 %
Recreation Days:	3,195	2,600	2,800
Days Per Animal:	5.0	3.7	4.1
Males per 100 Females	60	44	
Juveniles per 100 Females	86	72	

Population Objective (± 20%) :	6000 (4800 - 7200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-0.2%
Number of years population has been + or - objective in recent trend:	0
Model Date:	2/13/2019

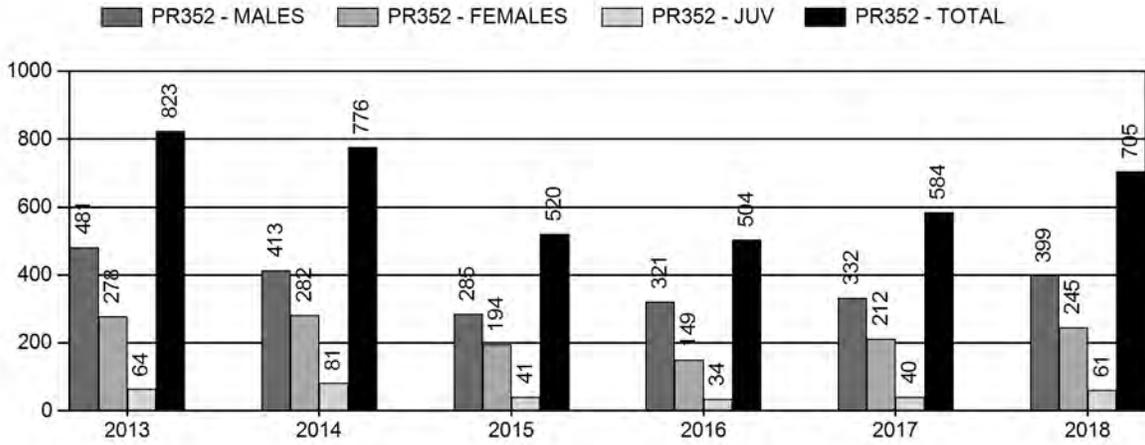
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	8%	7%
Males ≥ 1 year old:	25%	23%
Total:	10%	9%
Proposed change in post-season population:	+9%	+3%

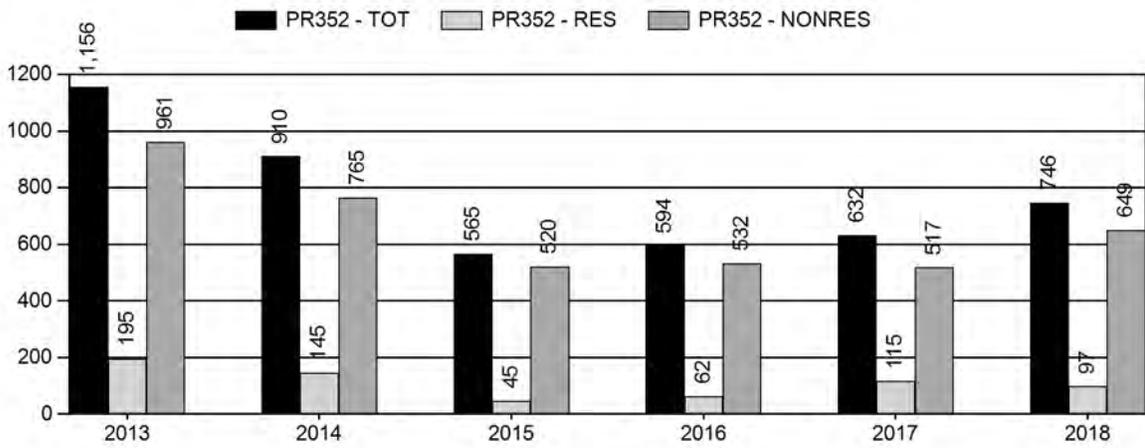
Population Size - Postseason



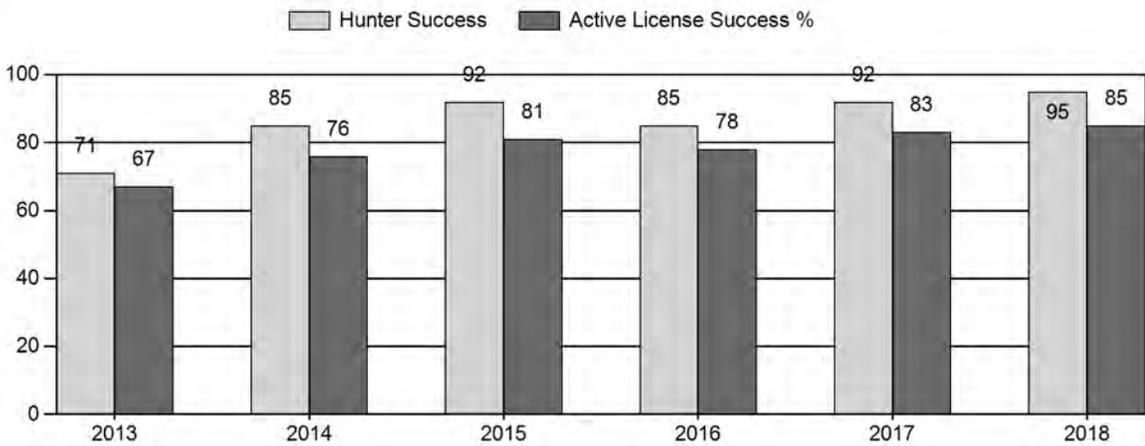
Harvest



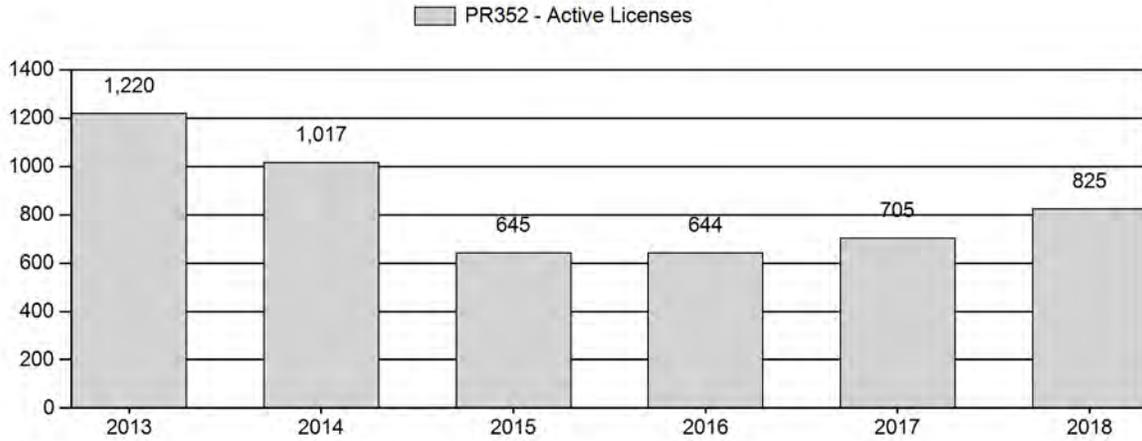
Number of Active Licenses



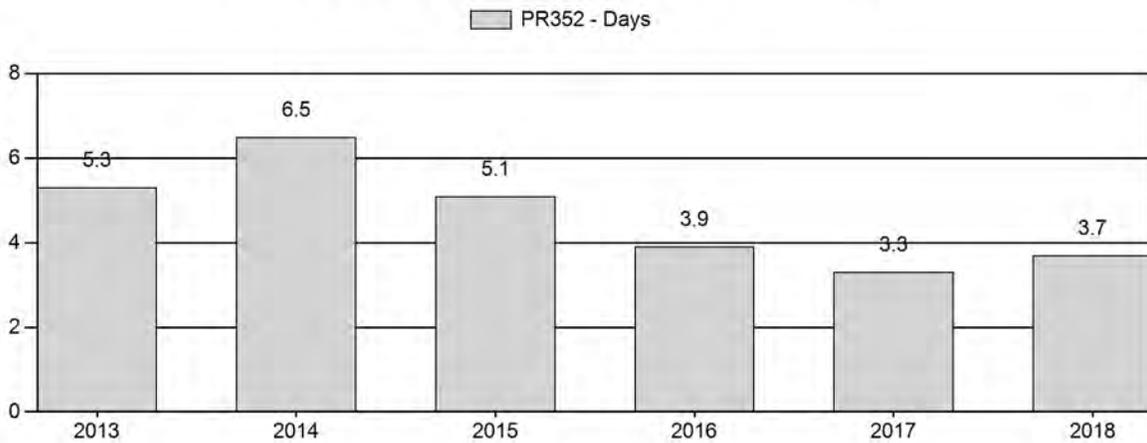
Harvest Success



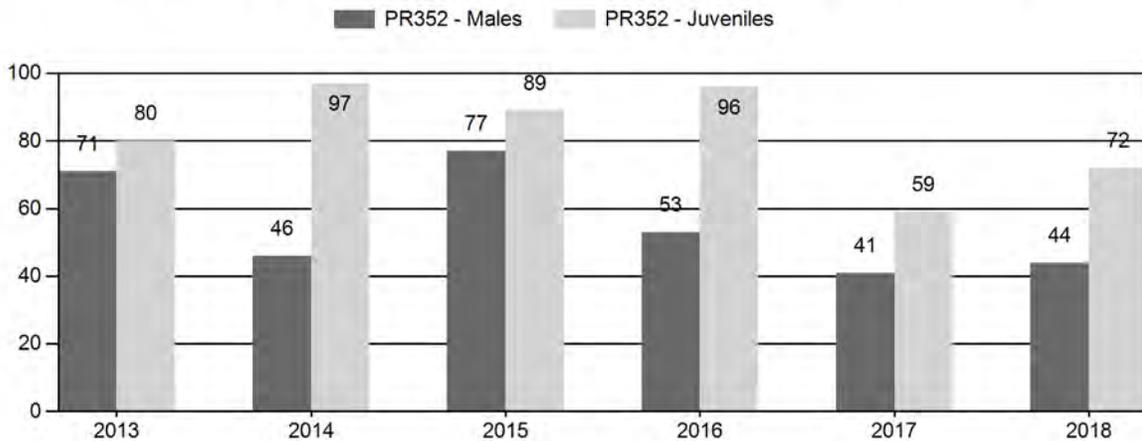
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR352 - MIDDLE FORK

Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	7,048	85	280	365	28%	513	40%	412	32%	1,290	2,490	17	55	71	± 7	80	± 8	47
2014	6,801	43	122	165	19%	355	41%	346	40%	866	3,317	12	34	46	± 7	97	± 11	67
2015	6,741	96	162	258	29%	336	38%	298	33%	892	3,123	29	48	77	± 10	89	± 11	50
2016	7,048	74	118	192	21%	364	40%	349	39%	905	3,546	20	32	53	± 7	96	± 11	63
2017	6,093	21	73	94	21%	227	50%	134	29%	455	0	9	32	41	± 8	59	± 10	42
2018	6,764	24	90	114	20%	260	46%	186	33%	560	2,795	9	35	44	± 8	72	± 11	50

**2019 HUNTING SEASONS
MIDDLE FORK PRONGHORN HERD (PR352)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
21	1	Oct. 15	Oct. 31	500	Limited quota	Any antelope
21	6	Oct. 15	Oct. 31	400	Limited quota	Doe or fawn

Special Archery Season Hunt Area	Season Dates	
	Opens	Closes
21	Aug. 15	Oct. 14

SUMMARY OF CHANGES IN LICENSES NUMBERS

Hunt Area	Type	Quota change from 2018
21	1	No change
	6	No change
Herd Unit Total		No change

Management Evaluation

Current Postseason Population Management Objective: 6,000

Management Strategy: Recreational

2018 Postseason Population Estimate: ~5988

2019 Proposed Postseason Population Estimate: ~6202

2018 Hunter Satisfaction: 83% Satisfied

Herd Unit Issues

The Middle Fork Pronghorn Herd Unit consists of hunt area 21 and is managed by the Buffalo Wildlife Biologist. The management objective is a post-season population of 6,000 pronghorn, which was increased from 2,100 in 2013. The management strategy is recreation management, with the goal of a pre-hunt buck:doe ratio of 30 – 59 bucks:100 does. The herd objective was last reviewed in 2018 and no changes were made.

Pronghorn densities are highest in the eastern section of the hunt area and lower on the mountain slope. The southeast corner of the hunt area and the mountain slope have large amounts of public land but the majority of the hunt area is private. Many public lands are inaccessible to the public due to landownership patterns and hunting on private land is predominantly controlled by outfitters. Conversely, the Natrona 16 walk-in area provides excellent access and connectivity to public land in prime pronghorn habitat. In general, there is a disproportionate amount of hunting pressure on accessible public lands. Often, the outfitted hunting which takes place on private land limits the ability to achieve adequate doe/fawn harvest to manage the population.

Weather

Weather conditions are summarized from Natural Resources Conservation Services Applied Climate Information System (www.wcc.nrcs.usda.gov) data from the Kaycee and Midwest stations (Station IDs 5055 and 6195, respectively) for precipitation and SNOTEL data from the Grave Springs station (Station ID 501) for precipitation and temperature data. The Palmer Drought Index (www.ncdc.noaa.gov) from Climate Division 5 (Powder, Little Missouri and Tongue drainages) was used to assess drought conditions.

The 2018 biological year began with a very wet June, with 150-297% average precipitation, but was followed by a dry summer (July - Sept) reported in Kaycee (58% average precipitation) and at Grave Springs (58% average precipitation) with no data available from Midwest. Fall (Oct – Dec) precipitation returned to average conditions and ranged from 88% to 119% of average. Winter (Jan-Apr) had lower than average precipitation at Grave Springs and Midwest (46-80%) in contrast to Kaycee which had higher than normal moisture (130%). Averages of mean monthly temperatures in 2018 did not vary greatly from the 20-year averages, however February 2019 had persistent colder than average temperatures. Prior to the 2018 biological year, winter (Jan – Mar 2018) varied from greater than average precipitation (123%) in Kaycee to less than average (58-87%) reported at Midwest and Grave Springs. Conversely, spring (Apr – May) was dryer than average (38-52% precipitation). Even though weather patterns vary greatly within the herd unit, the generally average local weather conditions were corroborated by the broader-scale climate data, which classified all of 2018 as having “mid-range” climate conditions in 2018.

Habitat

The Middle Fork herd unit ranges from low elevation sagebrush grassland with small drainages and breaks in the eastern portion of the unit to higher elevation forested areas with large areas of mountain mahogany and grassland parks. Pronghorn habitat is primarily limited to the eastern portion of the unit, with low densities of pronghorn found in the higher elevation grassland parks.

There is one permanent habitat transect in this herd unit. This transect is in a Wyoming Big sagebrush stand near Tisdale Mountain in the eastern end of the herd unit. Leader growth, hedging class, and age class were measured in fall 2018. Leader production was 2.5cm, which was slightly lower than the ten-year average for that site and may indicate lower forage quality over winter. Hedging class was scored at 1.54, which was lower than the ten-year average and is indicative of high utilization over time. The age class score (2.02) was slightly lower than the ten-year average, which could indicate the recruitment of new seedlings or the death of old decadent plants. Shrub utilization (3.6%) was measured during spring 2018, prior to the biological year, and was markedly lower than the ten-year average. Spring utilization is consistently low, and expected to be light during the spring 2019 survey. Although leader growth was slightly depressed in 2018, indices for hedging, age, and utilization may indicate a general improvement of range conditions; with new younger plant production and reduced browse levels.

Field Data

The pre-season classification was conducted in September of 2018 via ground classifications and resulted in 560 pronghorn being classified. The 2018 classification objective was approximately

2,800 pronghorn. We have failed to achieve an adequate sample size for the past ten years. Low sample sizes are due to limited road access and limited viewsheds from those roads due to terrain.

Classifications in 2018 yielded a fawn:doe ratio of 72:100, which is a notable increase from the 2017 ratio (59:100) but still below the five-year average (84:100 from 2013-2017). Sample sizes of pronghorn classified in 2017 (455 pronghorn) and 2018 were the lowest samples observed in the last ten years and could explain the lower fawn:doe ratios in those years.

The 2018 buck:doe ratio was 44:100 which is lower than the previous five-year average (58:100 from 2013 – 2017). The large variation (41-77 from 2008 to 2018) and lack of trend is likely due to inadequate classification samples. Furthermore, multiple personnel changes in the last ten years may be contributing to inconsistencies in the survey.

Post-season landowner surveys had some conflicting responses. While 14 landowners responded to the survey, some did not answer all of the questions. Forty-five percent of the respondents ($n = 11$) noted that the population was at desired levels, while 36% responded the population was above desired levels and 18% responded that it was below. When asked if landowners were satisfied with management, 92% ($n = 13$) were neutral, satisfied, or very satisfied. Seventy-one percent ($n = 14$) of respondents would keep the 2019 season the same as in 2018. Overall, there was no overwhelming response that would suggest major management changes are necessary.

Harvest Data

Total harvest in 2018 (705 pronghorn) was notably higher than the previous three years (504 – 584) and slightly higher than the previous five-year average (641 from 2013 to 2017). Hunter success (95%) and active license success (85%) were well above the previous five-year averages (85% and 77%, respectively).

The Type 1 and Type 6 license quotas were each reduced by 200 licenses in 2015 due to lower pronghorn numbers, low hunter success, and an increasing trend in hunter effort. The Type 1 and Type 6 quotas were increased by 50 and 100 licenses, respectively in 2018 in response to impressively high hunter success (92%) and active license success (83%) in 2017. Success rates increased in 2018 even with the increase in licenses available. Hunter effort increased slightly in 2018 (3.7 days per animal harvested) from 2017 (3.3 days) but is markedly lower than the previous five-year average (4.82 days from 2013 – 2017). Both license types sold out in the draw.

The hunter satisfaction survey showed 83% of hunters in 2018 were either satisfied or very satisfied. Hunter satisfaction decreased from 2017 (91%), which is surprising given the high success rates but could be explained by the increase in effort. Hunter satisfaction was more similar to that reported in 2015 (83%) and 2016 (82%). Hunter satisfaction is likely affected by access and we do not know how the satisfaction rates and success rates vary between public and private land hunters. Multiple hunter comments complained about overcrowding on public land, which is expected in hunt areas with difficult public access. We also received complaints about illegal off-road vehicle use on Bureau of Land Management property, which Wyoming Game and Fish does not enforce.

In general, the high hunter success and satisfaction suggest that the 2015 license reductions paired with the high productivity of this herd are providing a better hunting experience. The moderate

increase in licenses in 2018 appears to have provided additional hunting opportunity without diminishing the hunting experience.

Population

We used integrated population models, referred to as Excel Spreadsheet Models, based on White and Lebow (2002) to estimate the pronghorn population. Model parameters and input follow the “User’s Guide: Spreadsheet Model for Ungulate Population Data” (Morrison 2012).

The semi-constant juvenile/semi-constant adult (SCJ/SCA) model out-performed the other models and produced the lowest AIC value (132). Classification data, harvest data, and line transect surveys inform the model. Line transect (LT) surveys provide end-of-year population estimates. Eight LT surveys have been conducted over the last 20 years, with the most recent occurring in 2018.

The 2018 LT survey was analyzed using the program Distance. Final analysis used a Uniform Cosine model with no stratification and five observation bins adjusted by average altitude relative to 300 feet. Model selection was based on lowest AIC (670) while maintaining maximum degrees of freedom. Uniform Cosine models with the five observation bins combined into four observation bins provided lower AIC values, however they were not selected because they reduced the power of the analysis (i.e. degrees of freedom) and did not meet the model assumptions as well as the five bin model. The final model met the assumption of higher detection rates (i.e. detection probability) of pronghorn closer to the aircraft (Figure 1) and resulted in reasonable percent coefficient variation (5.4 – 12.9%, with the goal of less than 15%). The model estimated pronghorn density to be 8.4 pronghorn per square mile, resulting in a population estimate of 5,284 pronghorn with a standard error of 1.1 pronghorn per square mile (± 680 pronghorn).

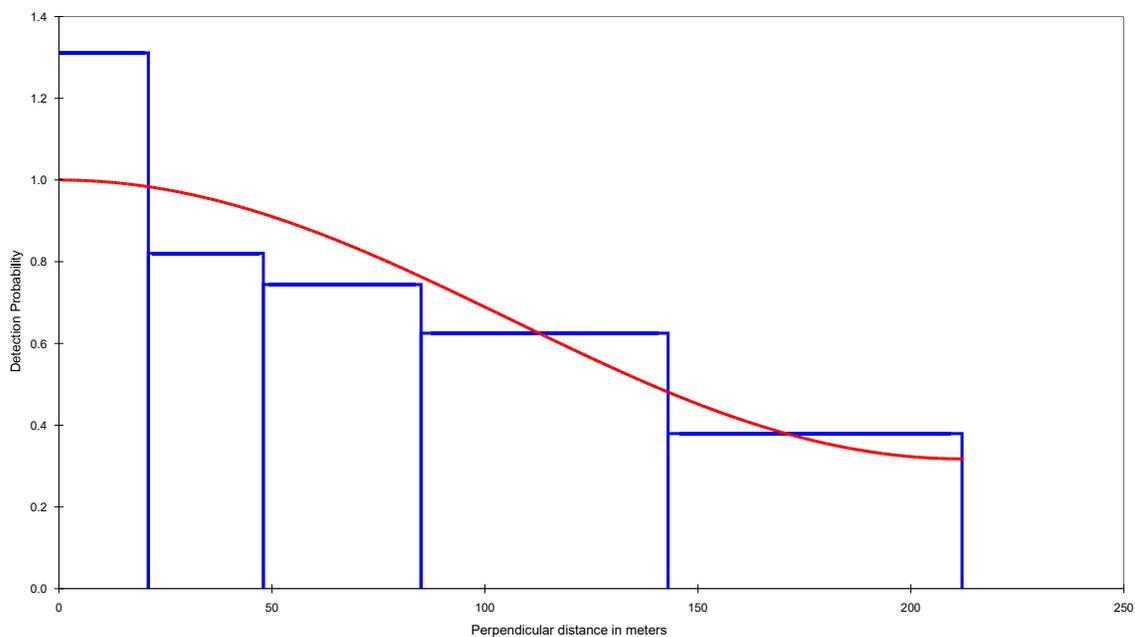


Figure 1. Detection probability plot with five observation distance bins for Line Transect survey analysis.

The excel spreadsheet population model estimate for 2018 was 5,988 pronghorn. This model result fell slightly outside of the upper limit of the 2018 LT confidence interval (5,284 - 5,964 pronghorn). The 2012 population estimate (5,041) also exceeded that years' LT population estimate (3,564 – 4,824). The excel model does track the same population increase as observed in the differences between the 2012 and 2018 LT population estimates. The model shows a fluctuating but relatively stable population trend that has been within objective since the objective was increased to 6,000 in 2013. Better classification data with an increase in sample size would provide much higher quality data to inform the model. The model does appear to be tracking general population trends and provides reasonable population estimates as compared with the last two LT surveys. This model is therefore considered fair.

Management Summary

This herd unit is at objective and we do not expect excessive winter mortality or reductions in fawn:doe and yearling male:doe ratios in 2019.

After increasing the Type 1 and Type 6 licenses in 2018, hunter success (95%) and hunter satisfaction (83%) were both extremely high. It is challenging to determine quotas in this area that provide enough harvest opportunity for population management, while minimizing crowding on public lands and maintaining high harvest rates. Population management goals are to maintain the current population, which requires high harvest rates due to high productivity (fawn:doe ratios) according to the excel spreadsheet model.

A harvest of 617 pronghorn is projected for the 2019 hunting season. We do not expect hunter success to remain over 90%, however we do not expect success or satisfaction to change significantly. We continue to anticipate comments expressing frustration about access issues given land ownership patters. If we maintain the population at objective, it seems reasonable that most landowners will continue to be satisfied with the population, while a smaller portion will think the numbers are too high or too low.

We will continue to attempt to increase our sample size for classifications and plan on conducting another line transect survey during spring 2021. We are hopeful that the Natrona 16 walk-in area continues enrollment in the Access Yes program because of the access and opportunity it provides to public land hunters.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet model for ungulate population data. Wyoming Cooperative Fish and Wildlife Research Unit. Unpublished. 41 pp.

White, G.C. and B.C. Lubow. 2002. Fitting population models to multiple sources of observed data. *Journal of Wildlife Management* 66:300-309.

2018 - JCR Evaluation Form

SPECIES: Pronghorn

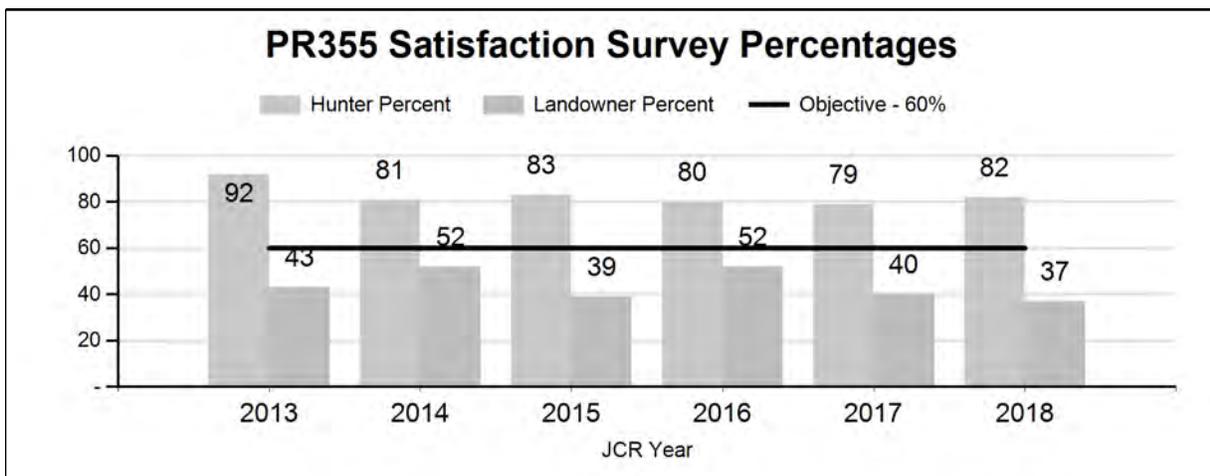
PERIOD: 6/1/2018 - 5/31/2019

HERD: PR355 - BECKTON

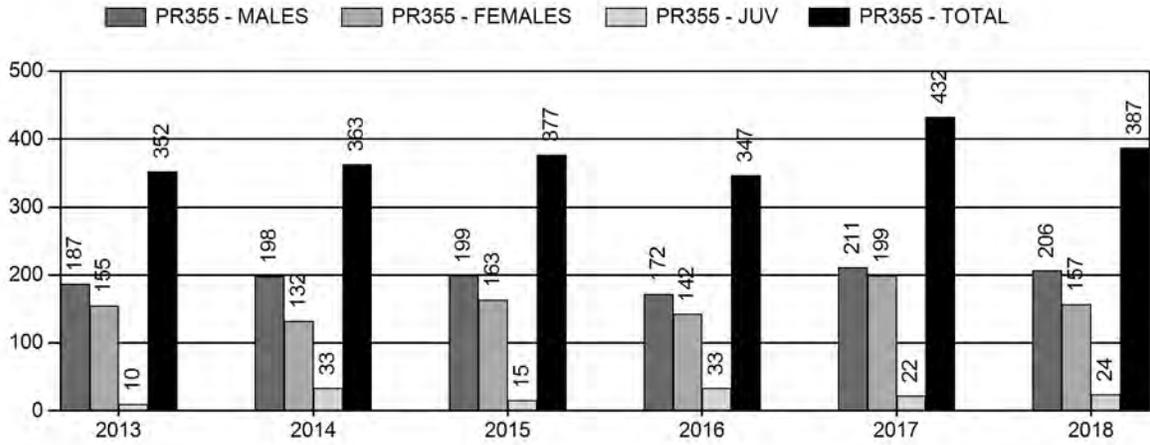
HUNT AREAS: 109

PREPARED BY: TIM THOMAS

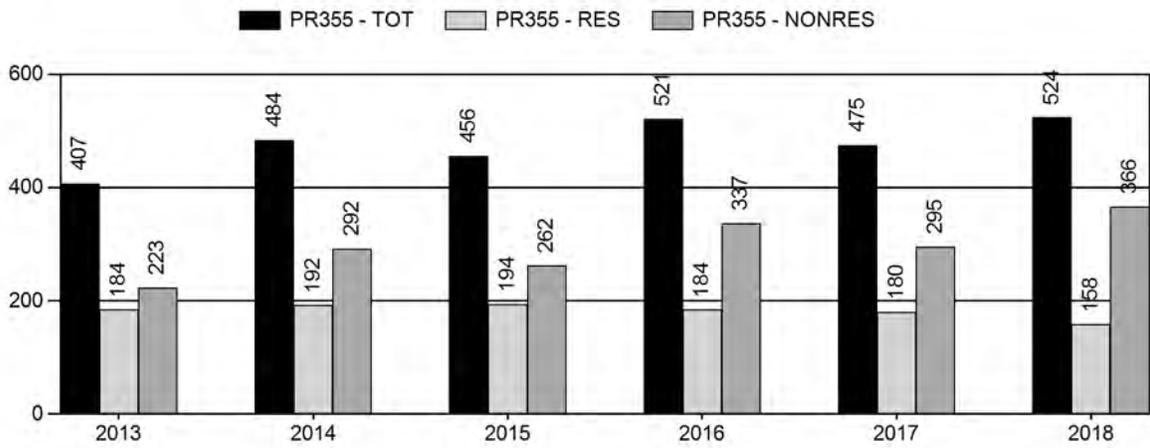
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Hunter Satisfaction Percent	82%	82%	80%
Landowner Satisfaction Percent	45%	37%	60%
Harvest:	374	387	400
Hunters:	469	524	500
Hunter Success:	80%	74%	80%
Active Licenses:	523	600	575
Active License Success:	72%	64%	70%
Recreation Days:	1,753	1,887	1,750
Days Per Animal:	4.7	4.9	4.4
Males per 100 Females:	35	31	
Juveniles per 100 Females	55	61	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			0%
Number of years population has been + or - objective in recent trend:			2



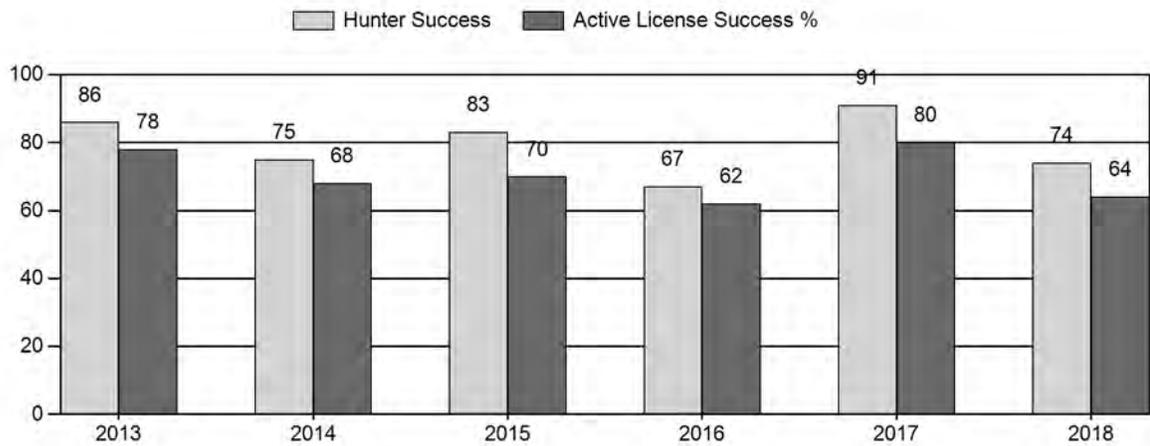
Harvest



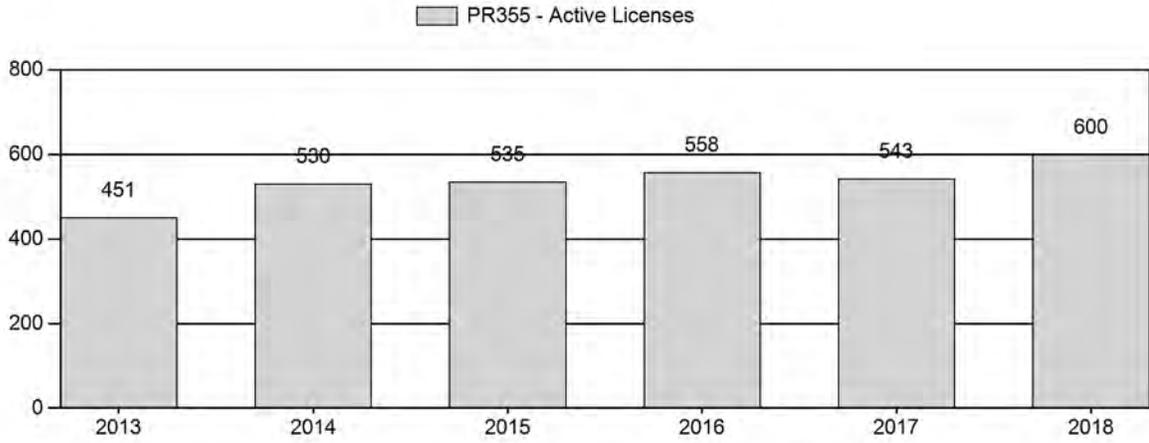
Number of Active Licenses



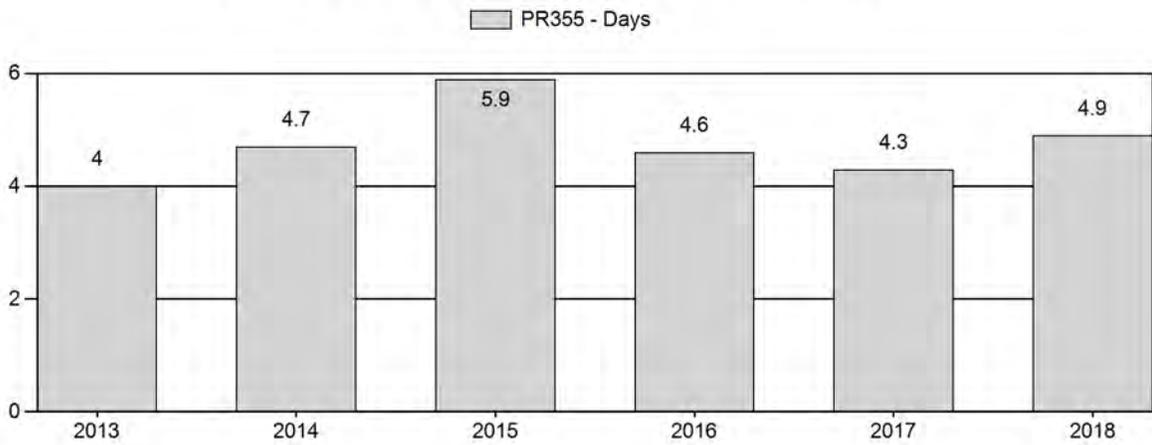
Harvest Success



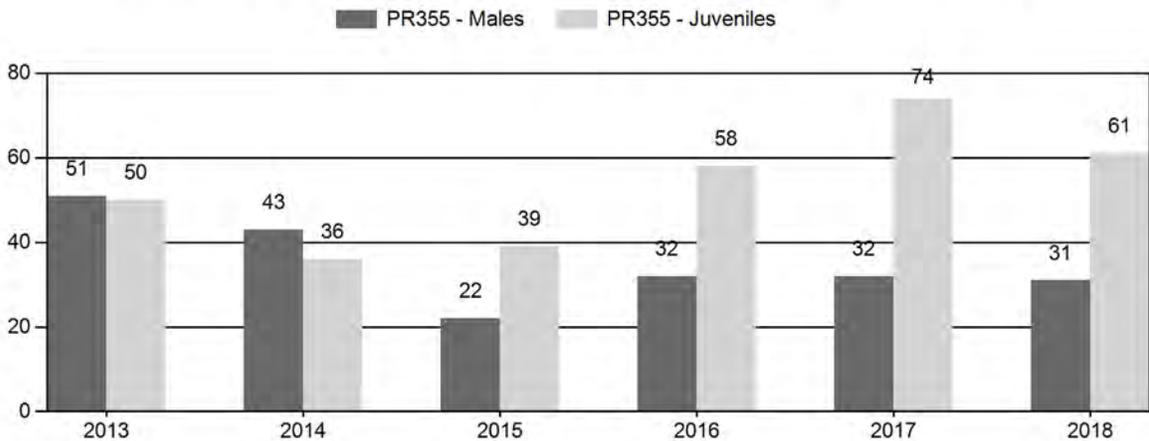
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



**2013 - 2018 Preseason Classification Summary
for Pronghorn Herd PR355 - BECKTON**

Year	Pre Pop	MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%	Tot	Cls	Ying	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
										Cls	Obj							
2013	1,851	16	38	54	25%	105	50%	53	25%	212	792	15	36	51	± 13	50	± 13	33
2014	1,521	7	16	23	24%	53	56%	19	20%	95	815	13	30	43	± 17	36	± 15	25
2015	0	8	12	20	14%	92	62%	36	24%	148	660	9	13	22	± 0	39	± 0	32
2016	0	25	45	70	17%	221	53%	128	31%	419	992	11	20	32	± 0	58	± 0	44
2017	0	14	21	35	16%	108	48%	80	36%	223	1,405	13	19	32	± 0	74	± 0	56
2018	0	19	32	51	16%	167	52%	102	32%	320	1,187	11	19	31	± 0	61	± 0	47

**2019 HUNTING SEASONS
BECKTON PRONGHORN HERD (PR355)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
109	1	Sep. 15	Nov. 30	350	Limited quota	Any antelope
	6	Sep. 15	Nov. 30	400	Limited quota	Doe or fawn

Special Archery Season Hunt Areas	Opening Date	Limitations
109	Aug. 15	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
109	1	
	6	+ 50
Herd Unit Total		+50

Management Evaluation

Current Hunter / Landowner Management Objective: 60% Satisfaction

Secondary Management Objective: Observed ratio of 30 bucks:100 does minimum

Management Strategy: Private Land

2018 Hunter Satisfaction Estimate: 82%

2018 Landowner Satisfaction Estimate: 37%

Most Recent 3-year Running Average Hunters Satisfaction Estimate: 80%

Most Recent 3-year Running Average Landowner Satisfaction Estimate: 43%

Herd Unit Issues

The Beckton Pronghorn Herd Unit is located in northcentral Wyoming, west of Sheridan. The herd unit is west of Interstate Highway 90, north of South Piney Creek and off national forest, along the eastern foothills of the Bighorn Mountains. This herd unit contains the towns of Sheridan, Ranchester and Dayton, and the communities of Story and Big Horn. There is also significant rural-residential development throughout the herd unit. This herd unit contains one antelope hunt area, Area 109.

The primary management objective for the Beckton Pronghorn Herd Unit is a Landowner and Hunter Satisfaction Objective at 60% or higher, with a secondary management objective of 30 or more bucks observed per 100 does. The management strategy is Private Land Management. The objectives and management strategy were last revised in 2014. We conducted a 5-year evaluation of the management objective and strategies in 2019, resulting in no changes.

The majority of this herd unit is private fee title lands, with much of it developed as rural residential areas or small acreage ranchettes. There are few public land hunting opportunities available. The restricted access has made it difficult to attain adequate harvest to regulate pronghorn numbers in portions of this herd unit. Rural residential development limits safe hunting opportunities in several

areas. Outfitting on some larger ranches also limits non-outfitted hunting opportunity, and hence harvest. There are several AccessYes Walk-In Areas and one Hunter Management Area that provide some limited public hunting opportunity.

Herd Unit Objective Review

The herd unit objective and management strategy were last reviewed in 2014. We evaluated and considered population status, landowner and hunter satisfaction, observed buck to doe ratios and habitat data included in this report. The current object and strategy meet our management needs. We concluded a change is not warranted at this time. We will review the herd objective and management strategy again in 2024. If the situation arises that a change is necessary, we will review and submit a proposal as needed.

Weather

Temperature and precipitation data referenced in this section were collected at the Sheridan Co Airport (#488155) weather station located within this herd unit. Historic climate data are reported by the Western Region Climate Center (www.wrcc.dri.edu).

The 2018 spring cool, with below normal temperatures in March and April, and near normal precipitation. May was warmer than normal and wet, with over an inch of precipitation above normal. This allowed for a good start for grasses and forbes, providing high quality forage just prior to and during parturition. Temperatures remained near normal during the summer and early fall. Conditions were dry during June, but above average precipitation in July and August. September and November were near normal for temperature and precipitation, while October saw above normal precipitation and cooler temperatures. December and January was generally open, with slightly below average precipitation and above average temperatures. February turned cold, with average temperature ~14°F below normal. There were several periods of 0°F or below, with at least one -20°F day. March was generally colder than average with decreased precipitation while April was generally about normal for both temperature and precipitation. May was ~5°F below average, with a 2.5 times increase in precipitation. Cool wet weather during parturition may adversely influence neonate survival.

While adult wildlife entered the winter in good condition, they faced severe weather conditions during periods February and early March. Fawns, being more susceptible to cold temperatures, likely saw average over-winter survival. We received some reports of over-winter fawn mortality this year.

Habitat

There are no habitat transects within or near this herd unit. This herd unit is located along the foothills of the Bighorn Mountains and contains open rangeland dominated by short-grass prairie and big sagebrush, dry land and irrigated crop lands, mountain shrub draws and numerous rural subdivisions.

Two new invasive annual grasses – medusahead (*Taeniatherum caput-medusae*) and ventenata or wiregrass (*Ventenata dubia*) – have been found in this herd unit. These invasive annuals, along with the already established exotic annuals cheatgrass or downy brome (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*), reduce habitat quality over time by out competing more

desirable forage plants. Also, fire frequency often increases with the presence of annual grasses, decreasing shrub components, such as big sagebrush, on the landscape. This could have long-term repercussions for pronghorn.

Field Data

During August, biologists and wardens conduct herd classification surveys using ground survey techniques. Designated routes are driven along county roads and all observed pronghorn are classified by gender and relative age cohort. This is generally considered a low priority herd unit when prioritizing workloads, often resulting in low sampling effort and small sample sizes. In 2018 we classified 320 pronghorn, the second highest classification count since 2006 but still well below the desired sample size of 1,187 at the 90% confidence level.

Fawn production, as measured by the observed fawn:doe ratio, has exceeded 60 fawns per 100 does only twice (i.e. 2010; 2017; 2018) in the past 15 years, suggesting this herd is not likely to grow quickly, even with limited harvest. In 2018, we observed 61 fawns per 100 does, a substantial decrease from the observed fawn:doe ratio of 74 fawns:100 does in 2017. Fawn production at that level should result in a stable population. With small sample sizes, low effort and associated biases, it can be difficult to draw reasonable conclusions based on these data. While harvest has continued to increase in this herd unit, the population appears to have at least remained stable and distribution continues to expand. This suggests the consistently low observed doe:fawn ratio may be biased and not representative of the true population.

The observed buck to doe ratio can be highly variable between years, likely due to bias associated with small sample sizes and low sampling effort. This year, we observed 31 bucks:100 does, similar to the past two years. Over the past 10 years, the observed buck to doe ratio has varied from 22-61 bucks:100 does, with an average of 38 bucks:100 does. Based on the 3-year running average (i.e. 32 bucks:100 does) we are just above the minimum of 30 males:100 females to satisfy the secondary management objective. We will monitor buck numbers over the next few years and make efforts to maintain or increase samples size during future classification surveys to monitor this objective.

Hunter satisfaction has remained high, with 82% of surveyed hunters (n=110) satisfied or very satisfied in 2018. The relatively high hunter satisfaction level may reflect Department personnel efforts to advise prospective hunters of the limited access opportunities and the need to make arrangements for access prior to purchasing a license.

Nonresident hunter (n=85) satisfaction this year (85%) increased from 2017 (80%) and was similar to previous years (2016 - 85%; 2015 - 85%). We saw a continued increase in the demand for leftover antelope licenses, which started in 2014. Seventy-two percent of resident hunters (n=25) were satisfied or very satisfied with their hunting experience in 2018, a decrease from 76% in 2017.

Harvest Data

An estimated 524 hunters harvested an estimated 387 pronghorn, the second highest harvest ever. Harvest decreased 10% compared to 2017, despite a 10% increase in hunters and active licenses. Pooled hunter success was 74%, the lowest in three years and below the previous 5-year average success rate of 78%. Hunters with a Type 1 (any antelope) license had a higher success rate (72%)

than Type 6 (doe or fawn) license holders (57%). Hunter success by license type was below the reported statewide harvest success for both license types (Type 1 72% vs. 87%; Type 6 57% vs. 84%). Hunter effort, as measured by the number of days hunted per animal harvested, was 4.9 days/animal, an increase from 2017 (4.3 days/harvest) and the same as the most recent 5-year average. This is considerably above the statewide effort rate of 3.2 days hunted per antelope harvested.

We continue to harvest relatively high buck numbers, with 206 bucks harvested this year, the second highest ever. During the past 10 years, we have averaged 176 bucks harvested annually, and 1,756 bucks total. We may be reducing buck numbers below desired levels with the current rate of buck harvest. Observed buck ratios and buck harvest will be monitored to assure we maintain at least 30 bucks per 100 does.

Population

We changed the management objective for this herd unit from a postseason population objective to a hunter / landowner satisfaction objective. Due to this herd's small size, both in numbers and geographically, we have never flown a line transect survey in this herd unit. A trend count was last conducted in May 1999, when 382 pronghorn were counted, resulting in an estimated ~1,500 pronghorn (25% sightability estimated).

We have a spreadsheet population simulation model constructed with only harvest and classification data to align the model. Classification data are collected somewhat sporadically and is likely biased due to low sampling effort, small sample sizes, and sampling protocol (i.e., sampling only along public roads). Modeling parameters, specifically adult and juvenile survival rates, are set wider than recommended to make this model work reasonably.

The "Time-Specific Juvenile – Constant Adult Survival Rate" (TSJ,CA) spreadsheet simulation model was chosen to estimate the post-season population. This model had the highest relative Akaike information criterion (AIC) value (135), but had the best fit (31) of the three possible models. It also seemed to better model manager's perceptions of population dynamics. Since we have limited management data, small survey sample size, sporadic data collection, and no independent population estimate, we consider this a "poor" population model. As such, managers have little faith in the actual estimate.

Landowners who responded (n = 19) to an annual survey indicated pronghorn populations where 'at' (37%) or 'above' (63%) desired levels (Fig 1); and suggested similar (58%) or more liberal (37%) hunting season strategies as in recent years. This annual survey reflects relative pronghorn numbers based on landowner's perceptions and tolerance for pronghorn. Even with record pronghorn harvest each of the past six years, the majority of landowners responding to this survey have higher pronghorn numbers than desired (Fig. 1).

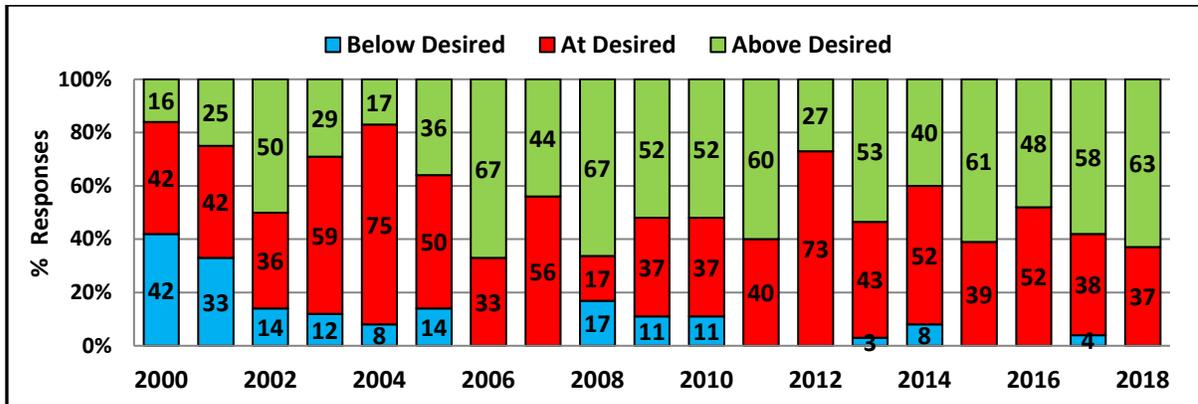


Figure 1. Relative landowner perceptions of pronghorn antelope populations on their property in the Beckton Pronghorn Herd Unit, by percentage. Desired level is a subjective expression of individual landowner tolerance of pronghorn. Respondent sample size varies, with some years as low as 6 responses.

Management Summary

The regular hunting season traditionally runs 10 weeks (September 15 – November 30) for both Type 1 and Type 6 licenses, with an archery pre-season August 15 – September 14. Hunters are able to purchase two Type 1 (any antelope) licenses and four Type 6 (doe or fawn antelope) licenses, if available, which allows hunters the opportunity to harvest multiple animals. There is limited pronghorn hunting on scattered State Trust Lands, as well as three Walk-In Areas and one Hunter Management Area. We commonly observe high buck numbers, as measured by buck:doe ratios, averaging 42 bucks:100 does over the long-term (n=34 years). This is likely a function of limited access to private lands where the majority of pronghorn occur. We may be reducing buck numbers due to high harvest rates in recent years. The most recent 5-year average is 32 bucks:100 does. This could be a function of low sample size and sampling design also.

We project a harvest of approximately 400 pronghorn in 2019, resulting in an estimated post-season population of about 2,700 pronghorn. These predictions assume average fawn survival, as well as similar license sales and similar success rates as the 2018 hunting season. Due to our inability to successfully place hunters on private land where a lot of pronghorn live, our ability to manage this population towards desired objectives (i.e. higher landowner satisfaction) with hunting is very limited.

We increased Type 6 (doe or fawn) licenses by 50 for the 2019 season. This was in response to requests from some landowners who desire to increase pronghorn harvest. We maintained Type 1 (any antelope) license numbers for 2019. We have some concern about the current level of buck harvest as well as our ability to place additional buck hunters. We are concerned with low participation rate on these licenses. We will make an effort to better place hunters with landowners for this coming season.

MULE DEER

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2018 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2018 - 5/31/2019

HERD: MD319 - POWDER RIVER

HUNT AREAS: 17-18, 23, 26

PREPARED BY: ERIKA PECKHAM

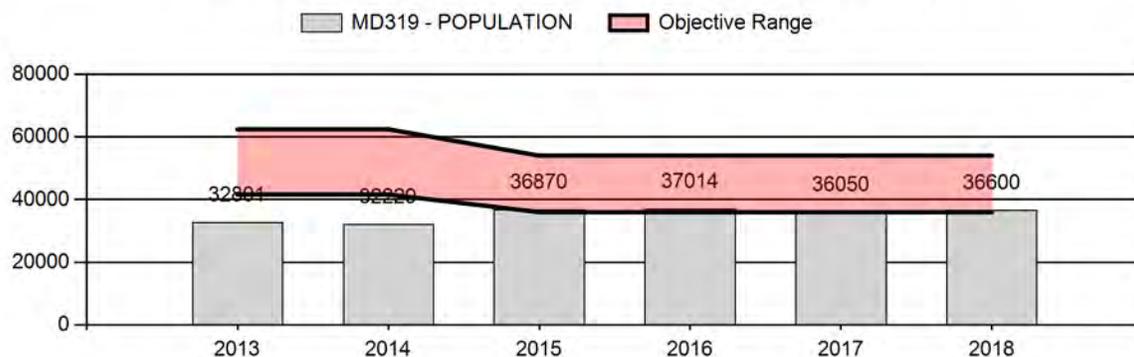
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	34,993	36,600	37,750
Harvest:	2,804	2,828	3,000
Hunters:	3,979	4,074	4,275
Hunter Success:	70%	69%	70 %
Active Licenses:	4,130	4,216	4,400
Active License Success:	68%	67%	68 %
Recreation Days:	14,885	15,522	16,500
Days Per Animal:	5.3	5.5	5.5
Males per 100 Females	44	49	
Juveniles per 100 Females	74	56	

Population Objective (± 20%) :	45000 (36000 - 54000)
Management Strategy:	Private Land
Percent population is above (+) or below (-) objective:	-18.7%
Number of years population has been + or - objective in recent trend:	4
Model Date:	3/3/2019

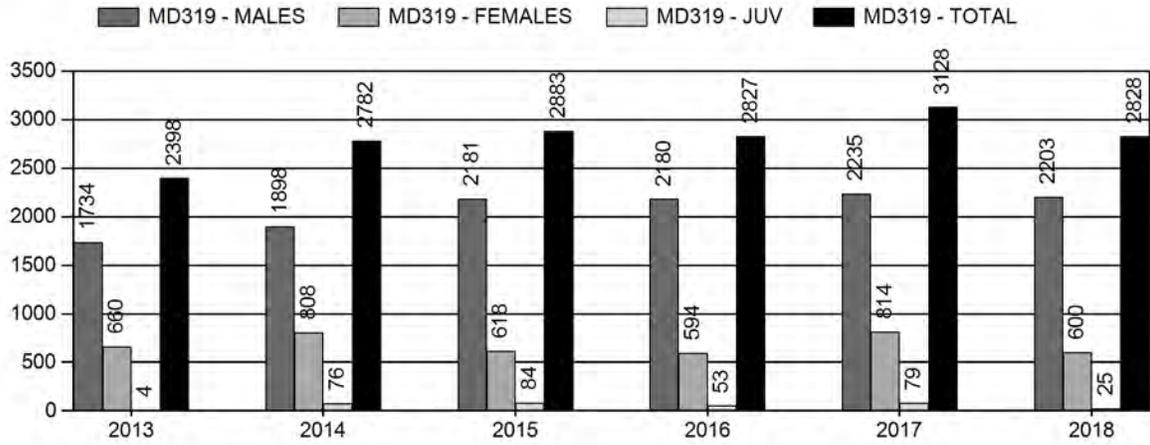
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	5.2%	3.7%
Males ≥ 1 year old:	25.4%	24.5%
Total:	8.2%	-8%
Proposed change in post-season population:	.8%	3.2%

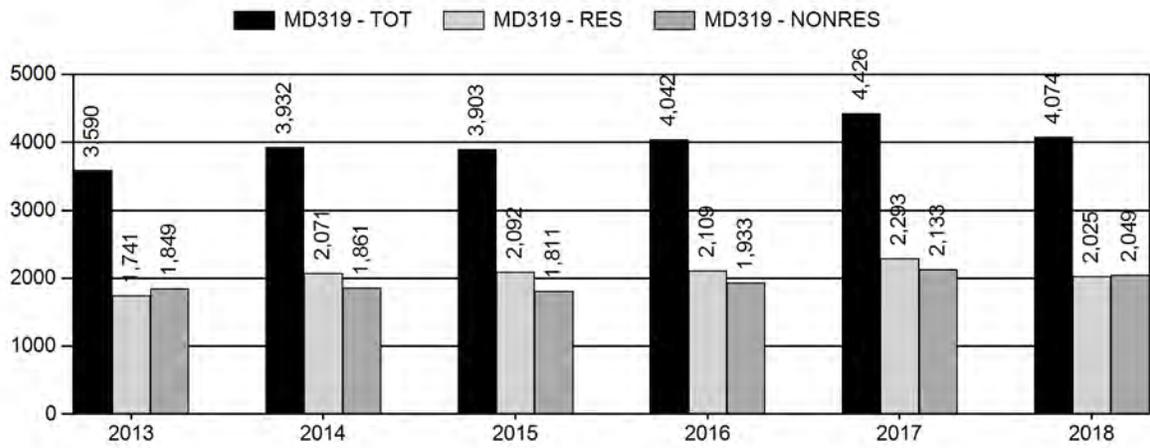
Population Size - Postseason



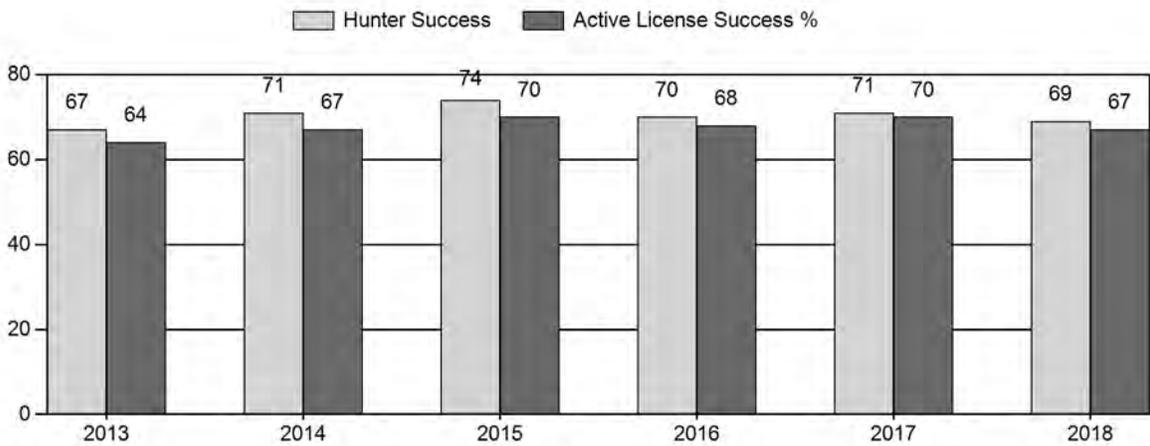
Harvest



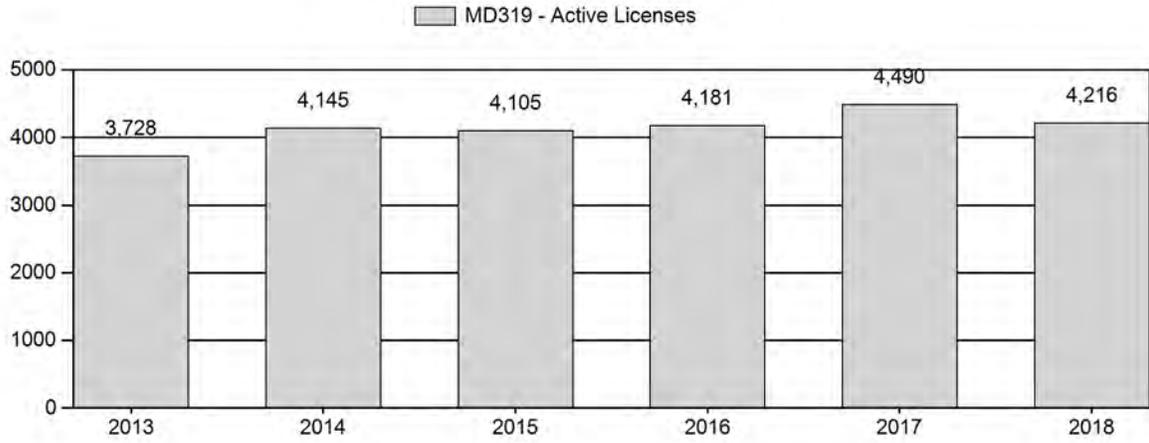
Number of Active Licenses



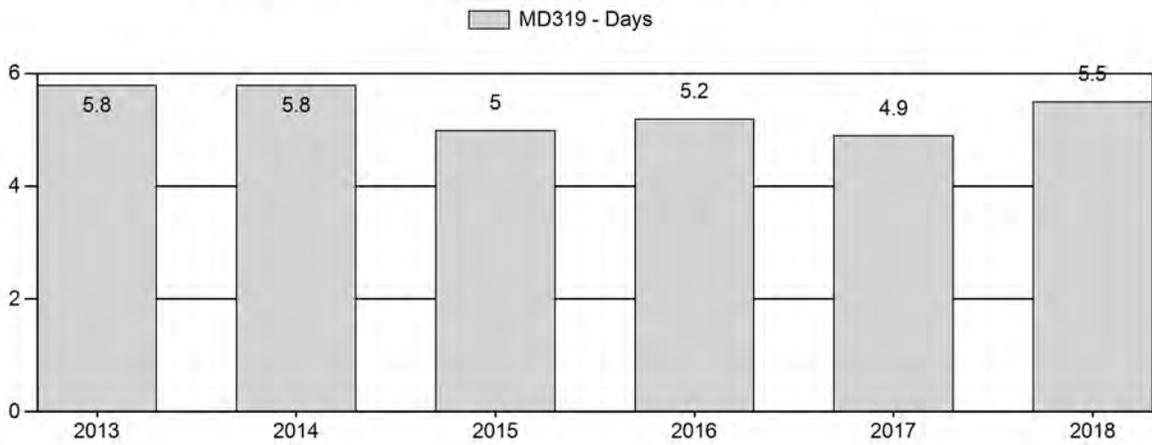
Harvest Success



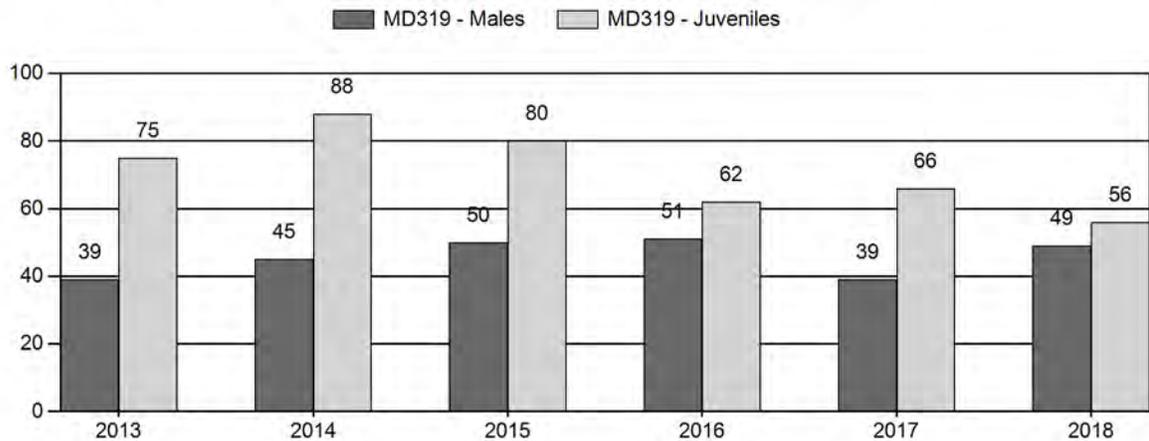
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Mule Deer Herd MD319 - POWDER RIVER

Year	Post Pop	MALES							FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%			Yng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	32,801	168	0	0	0	488	656	18%	1,665	47%	1,247	35%	3,568	1,594	10	29	39	±2	75	±3	54
2014	32,229	230	0	0	0	534	764	19%	1,714	43%	1,508	38%	3,986	1,556	13	31	45	±2	88	±4	61
2015	36,870	185	0	0	0	435	620	22%	1,234	43%	987	35%	2,841	2,056	15	35	50	±3	80	±4	53
2016	37,014	235	196	91	0	209	731	24%	1,447	47%	891	29%	3,069	2,059	16	34	51	±3	62	±3	41
2017	36,050	147	134	11	0	261	553	19%	1,414	49%	934	32%	2,901	1,455	10	29	39	±2	66	±3	47
2018	36,600	319	497	155	28	181	1,180	24%	2,409	49%	1,358	27%	4,947	1,571	13	36	49	±2	56	±2	38

**2019 HUNTING SEASONS
POWDER RIVER MULE DEER HERD (MD319)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
17		Oct. 1	Oct. 20		General	Antlered mule deer or any white-tailed deer
17	7	Oct. 1	Oct. 20	50	Limited quota	Doe or fawn valid on private land
18		Oct. 1	Oct. 20		General	Antlered mule deer or any white-tailed deer
18	7	Oct. 1	Oct. 20	100	Limited quota	Doe or fawn valid on private land
23		Oct. 1	Oct. 14		General	Antlered deer off private land, any deer on private land
26		Oct. 1	Oct. 14		General	Antlered deer off private land, any deer on private land
23, 26	7	Oct. 1	Dec. 15	2,000	Limited quota	Doe or fawn valid on private land

Special Archery Season Hunt Areas	Season Dates	
	Opens	Closes
17, 18, 23, 26	Sep. 1	Sep. 30

Region	Deer Hunt Areas	Quota
C	17-19, 23, 26, 29, 31	2500

SUMMARY OF CHANGES IN LICENSE NUMBERS

Hunt Area	Type	Quota change from 2018
Herd Unit Total		No Change
Region C Quota		+200

Management Evaluation

Current Postseason Population Management Objective: 45,000

Management Strategy: Private Lands

2018 Postseason Population Estimate: ~36,600

2019 Proposed Postseason Population Estimate: ~37,750

2018 Hunter Satisfaction: 74% Satisfied, 18% Neutral, 8% Dissatisfied

Herd Unit Issues

The postseason population objective for the Powder River Mule Deer Herd is 45,000 mule deer. The management strategy is private lands management. The objective and management strategy were last reviewed and updated in 2015.

Issues associated with this herd include difficult hunter access to private land and trying to balance private and public land use. Nearly all landowners charge access fees or outfit for buck hunting, and tend to cater to non-resident hunters. This results in nonresidents comprising the majority of the hunters. The majority of public land hunters utilize GPS technologies, which help them to locate smaller pieces of unmarked public lands; however, this accessibility has increased the complaints of trespass and congestion by neighboring landowners. On any given day, hunters are utilizing most parcels of public land.

Extensive coal bed methane development resulted in a network of roads and other development associated with the infrastructure required to support coal bed methane extraction. This development has tapered off substantially and in certain areas wells are being plugged and abandoned. Proper reclamation will be integral in keeping the habitat intact going into the future.

This herd has been well below about 20% below objective since the objective was lowered in 2015. The 2018 post-season population estimate is about 36,600 deer, which is still below the objective of 45,000. Around 2008, the population experienced a declining trend and poor fawn recruitment, likely influenced by weather factors. This was especially true in Hunt Areas 17 and 18. Observed fawn ratios in 2016 and 2017 were only in the 60's. The observed fawn ratio in 2018 did not improve (56:100).

Weather

Weather throughout 2017 resulted in sub-optimal rangeland conditions due to drought conditions. The winter of 2017-18 was average. In contrast, weather in 2018 was ideal for rangeland conditions with favorable precipitation resulting in good forage availability. The winter of 2018-2019 was moderate with minimal amounts of snow as winter commenced. February was much colder; however, the limited snow allowed animals to access residual forage. Over winter survival was likely slightly impacted with some reports of deer in poor condition or dying. The amount of winter kill will likely not adversely affect this population. May 2019 precipitation was more than double the normal resulting in excellent growing conditions.

The Palmer Drought Index indicates that all months of 2018 experienced “normal” conditions in the Powder River drainage. Additionally, looking at historic temperature information for November and December 2018, mean temperatures were very close to the 30-year normals.

Habitat

This herd unit contains open rangeland dominated by short-grass prairie and big sagebrush, dry land and irrigated crop lands. Portions Hunt Area 18 have had habitat monitoring occurring in the

form of Rapid Habitat Assessments. This information consists of basic plant community inventory and an overall picture of rangeland health. It is not an in depth analysis, but contains photo points in different locations. A total of seven RHA's were conducted, comprised of four upland and three riparian assessments. Within each allotment where a RHA was conducted, the area was walked and plants and habitat conditions were inventoried and assessed to get an overall assessment of the allotment/pasture. An estimated four acres of riparian habitat and 750 acres of upland/shrubland were assessed. This information could prove helpful in planning future habitat projects.

It should be noted that various stands of sagebrush, primarily east of the Powder River, appear stressed with overall low vigor. The cause may be related to the previous prolonged drought. These areas are being monitored to see if die-off is imminent or if plants will recover.

Field Data

In the past there were several years of poor fawn production which likely played a part in setting this herd on a steep decline. Although 2014 and 2015 experienced good fawn production, 2016 and 2017 fawn ratios were 62 and 66, respectively, below what is necessary to increase deer numbers. The observed fawn ratio in 2018 was the lowest for the six-year period at 56:100. Hunt Areas 17 and 18 fawn ratios were 51 and 55, respectively whereas Hunt Areas 23 and 26 were 66 and 60, respectively. The low fawn ratios were not expected given rangeland conditions and overall moderate winters the last few years.

Over the past several years, the buck ratio has remained high. The preceding 5 year average was 45 bucks per 100 does, ranging from 39-51. The 2018 buck ratio of 49:100 is well within the normal range of buck ratios. The herd's private land management strategy is appropriate given that high buck ratios result from landowner and outfitter conservative hunting strategies.

In 2018, incisors from hunter harvested bucks were collected during hunter checks to obtain lab ages to determine age distribution of the harvest and antler width correlated to age. The average age of adult bucks was 5.4 years with age ranging from 2.5 years to 11.5 years (Figure 1). Bucks aged 4.5 years and 5.5 years comprised 47% of the sample. No deer > 11.5 years old were aged. Deer up to 14 years of age were harvested from other hunt areas across the state. This analysis only includes deer >1-year old.

The combined age information as it relates to antler spread was plotted. Antler width ranged from 10" (2.5 year old buck) to 28.75" (5 year old buck) with an average width of 20.3". Average antler width increased up to 7.5 years with 14 bucks averaging 22.3". Median width of all bucks was 21.0" with bucks aged 5.5 years having the highest median antler width at 22.5".

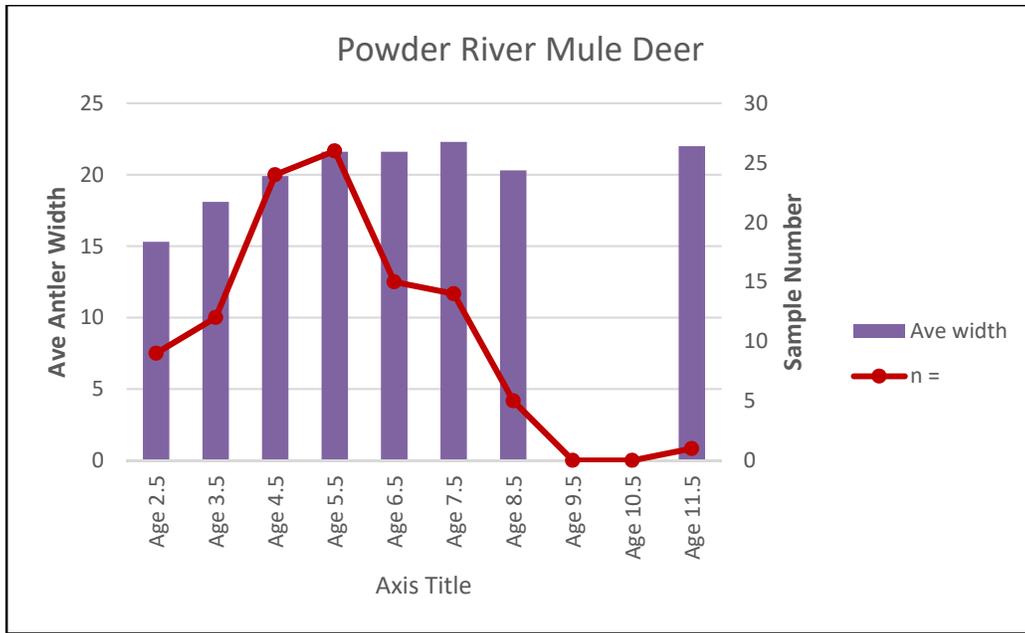


Figure 1. Age of harvested mule deer bucks, by percentage, from the Powder River Mule Deer Herd Unit in relation to antler spread. Deer were harvested during 2018 hunting season. Yearling harvest is excluded as managers don't consistently collect teeth or record yearlings during field checks.

As this is a predominantly private land area, postseason landowner surveys are also considered. In 2018, the majority of respondents (62%) felt that deer were at desired levels. Only 12% of respondents felt that there were more deer than desired. This is similar to perceptions in 2017, although people seem to feel there is a slight increase in deer compared to 2017. The past several years there has been a disparity in what the landowners east and west of the Powder River think; however, it appears that there is less of a discrepancy in opinions in 2018. The majority of landowners in Hunt Areas 23 and 26 (67%) feel that the deer are at objective. A small portion of respondents feel that the deer are below objective (22%). Concerning Hunt Areas 17 and 18, the majority (59%) feel that deer numbers are where they would like to see them, with only a few respondents feeling that there are too many, and 29% believing that there are still too few deer. In general, landowner perceptions of deer numbers have improved compared to the 2017 survey results.

Harvest Data

The 2018 harvest survey indicated 2,828 deer were harvested, including 2,203 bucks and 625 does and fawns. Buck harvest was similar to 2017 while doe/fawn harvest declined 30% with unchanged Type 7 quotas. The majority of the doe/fawn harvest occurs in Hunt Area 23. Hunter success averaged 71% over the preceding 5 years, with 2018 experiencing an overall success rate of 69%, comparable to the statewide average of 71% success. Days per harvest rarely fluctuates from 5-6 days, and 2018 was no exception, with hunters averaging 5.5 days to harvest a deer.

Hunter satisfaction was reported at 74% indicating hunters were “very satisfied” or “satisfied”. As Game and Fish personnel talk to hunters, they advise people to obtain private land access in this portion of the state as there is limited public land hunting opportunity. Hunters that hunt private

land usually enjoy high success, which is typically correlated to satisfaction. In 2018, comments received from public land hunters were overall positive, particularly compared to the recent past, with many indicating they were pleased with deer numbers.

Population

This herd is estimated at ~36,600 mule deer, which is around 20% below objective. The “Semi-Constant Juvenile –Semi-Constant Adult Mortality Rate” (SCJ-SCA) spreadsheet model was chosen for the post season population estimate. This model had the lowest AIC value (155) and seemed to best represent what has been occurring on the ground (fair model). There is no independent population estimate or survival estimates for this herd. The model indicates that in 2008 the population peaked, followed by a sharp decline and then began a gradual increase in 2011. The model suggests that the herd leveled out the last few years; however, anecdotal observations indicate deer numbers are likely trending upwards, albeit slowly. This model appears to reasonably track field observations and management data.

Although classification surveys are utilized to obtain herd ratios, it is of interest that the total number of deer classified is the highest on record (~4,950). The preceding 5-year average of number of deer classified was around 3,270. Although this information is not statistically significant, the same routes are driven and areas flown and the number of deer classified can illustrate a trend over time.

Management Summary

Antlerless harvest has been maintained in Hunt Areas 23 and 26 to address landowner concerns with crop depredation. Type 7 licenses in Hunt Areas 17 and 18 were issued in 2018 and seemed to adequately address concerns in the targeted areas. Private landowners typically allow access based on the number of hunters that can be accommodated for the harvest they believe is appropriate for their ranch. If we attain the projected harvest of 3,000 deer and experience similar fawn recruitment as the last few years, it is anticipated that the population will slightly increase. Based on the population model we predict a 2019 post-season population of about 37,750 mule deer.

Nonresident Region C contains Hunt Areas 17, 18, 23 and 26 of the Powder River Herd and Hunt Areas 19, 29 and 31 of the Pumpkin Buttes Herd. The quota has been increased 200 licenses since 2015. Given hunter success and hunter effort has remained favorable and buck ratios remain high, an increase of 200 licenses was made for 2019.

2018 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2018 - 5/31/2019

HERD: MD320 - PUMPKIN BUTTES

HUNT AREAS: 19, 29, 31

PREPARED BY: CHEYENNE STEWART

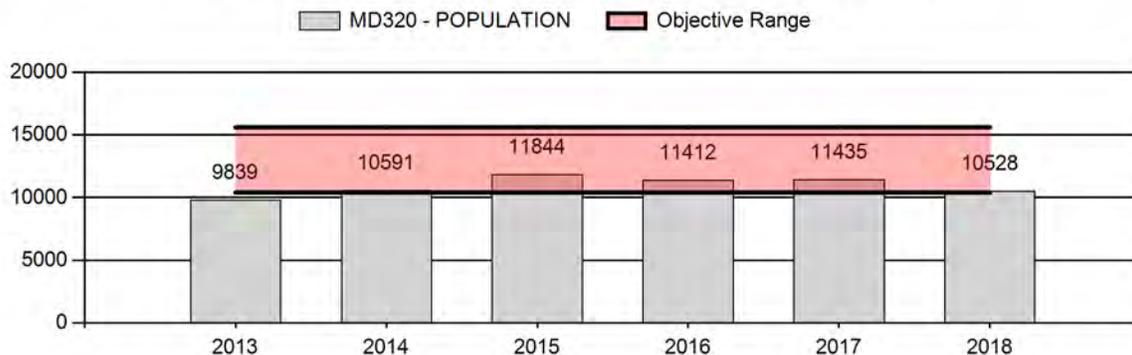
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	11,024	10,528	11,373
Harvest:	643	633	644
Hunters:	1,000	974	980
Hunter Success:	64%	65%	66 %
Active Licenses:	1,013	991	1,000
Active License Success:	63%	64%	64 %
Recreation Days:	3,694	3,626	3,650
Days Per Animal:	5.7	5.7	5.7
Males per 100 Females	43	43	
Juveniles per 100 Females	68	53	

Population Objective (± 20%) : 13000 (10400 - 15600)
 Management Strategy: Private Land
 Percent population is above (+) or below (-) objective: -19.0%
 Number of years population has been + or - objective in recent trend: 0
 Model Date: 2/20/2019

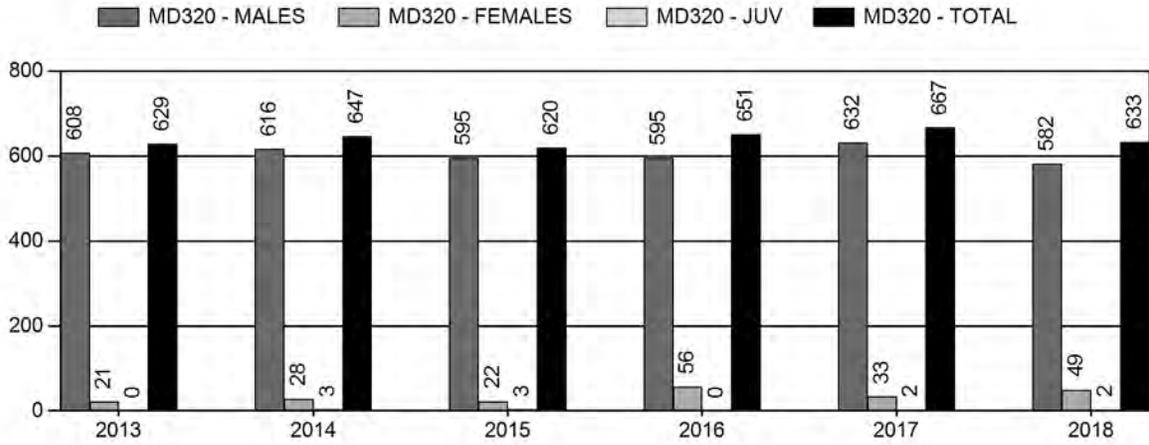
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	1%	1%
Males ≥ 1 year old:	20%	20%
Total:	6%	5%
Proposed change in post-season population:	-1%	+1%

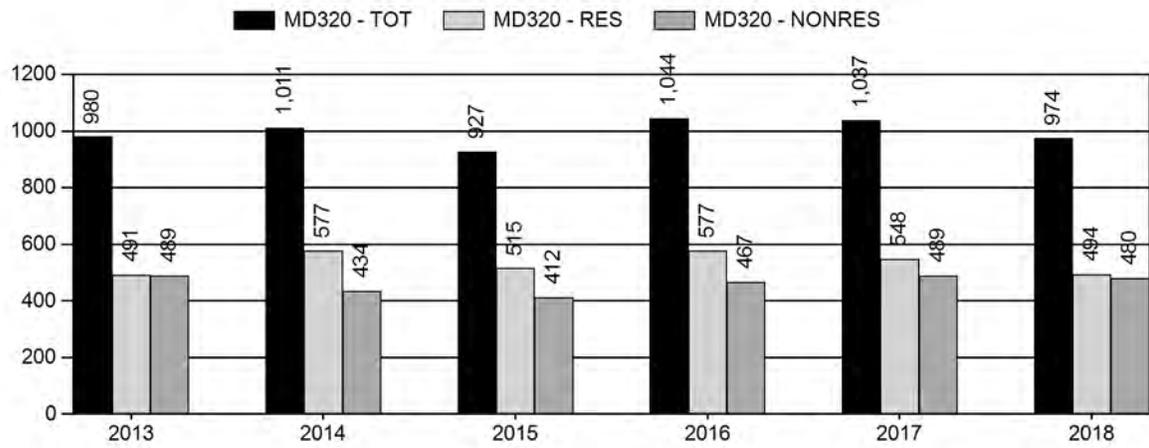
Population Size - Postseason



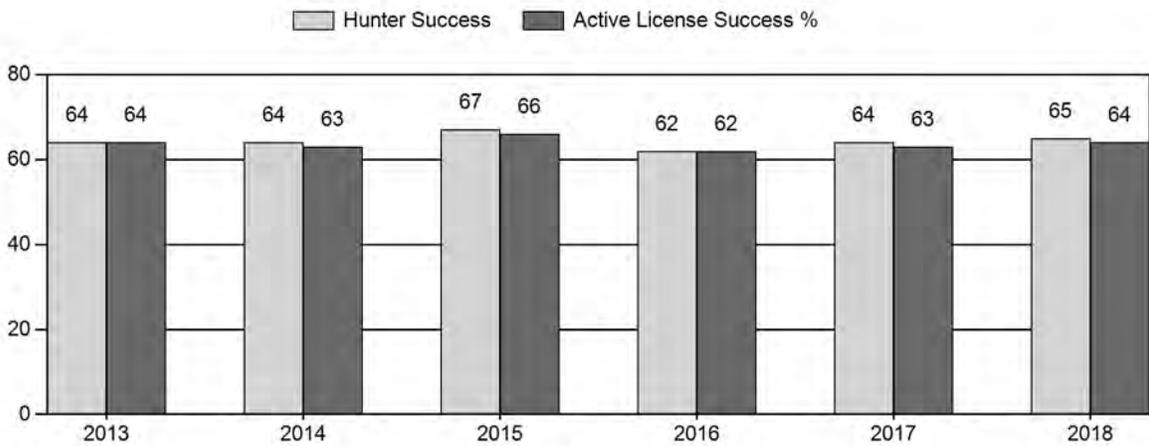
Harvest



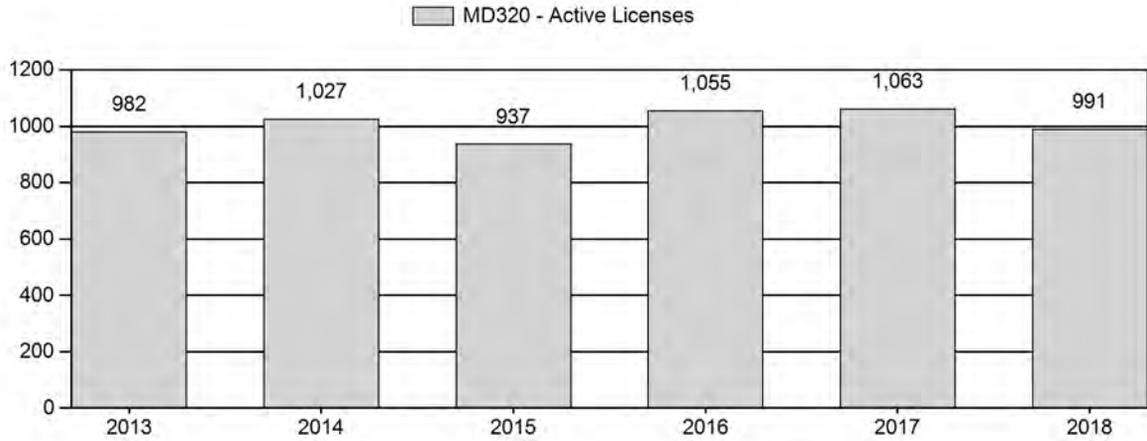
Number of Active Licenses



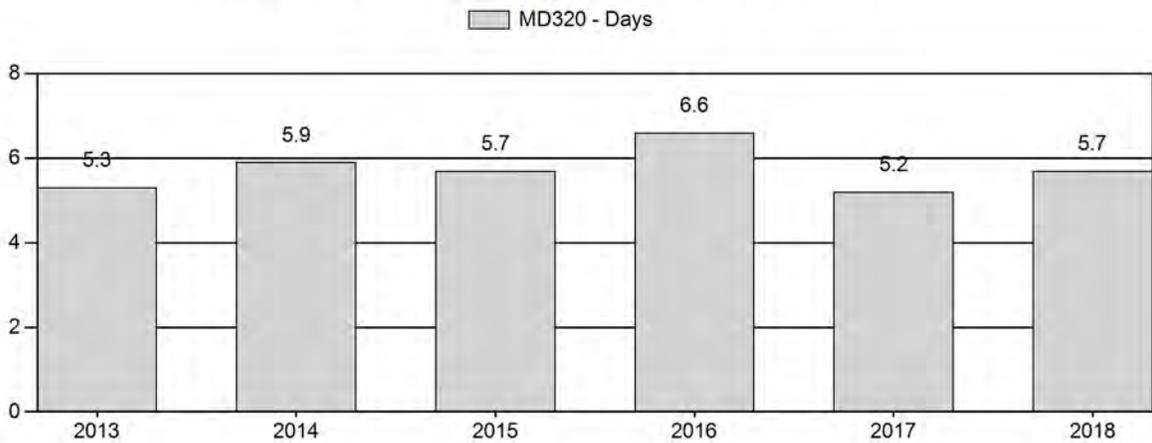
Harvest Success



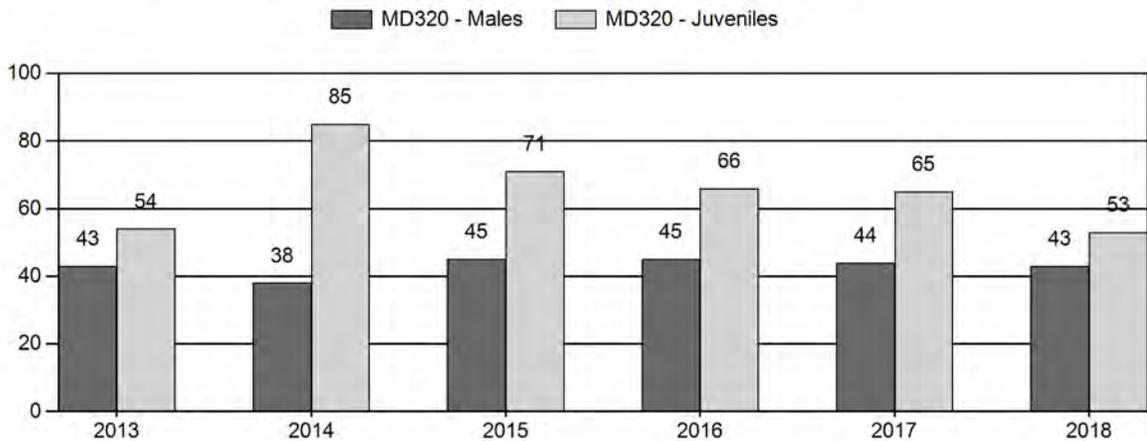
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Mule Deer Herd MD320 - PUMPKIN BUTTES

Year	Post Pop	MALES								FEMALES		JUVENILES		Tot CIs	CIs Obj	Males to 100 Females				Young to		
		Ylg	2+ CIs 1	2+ CIs 2	2+ CIs 3	2+ UnCIs	Total	%	Total	%	Total	%	YIng			Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult	
2013	9,839	96	201	121	2	0	420	22%	977	51%	525	27%	1,922	979	10	33	43	± 3	54	± 3	38	
2014	10,591	81	182	58	3	0	324	17%	849	45%	721	38%	1,894	1,942	10	29	38	± 3	85	± 5	61	
2015	11,844	139	180	62	6	23	410	21%	903	46%	642	33%	1,955	1,521	15	30	45	± 3	71	± 4	49	
2016	11,412	160	204	88	8	0	460	21%	1,027	47%	677	31%	2,164	1,365	16	29	45	± 3	66	± 4	46	
2017	11,435	122	215	95	3	0	435	21%	989	48%	647	31%	2,071	1,329	12	32	44	± 3	65	± 4	45	
2018	10,528	72	251	134	9	0	466	22%	1,074	51%	564	27%	2,104	1,422	7	37	43	± 3	53	± 3	37	

**2019 HUNTING SEASONS
PUMPKIN BUTTES MULE DEER HERD (MD320)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
19		Oct. 1	Oct. 20		General	Antlered deer
19	7	Oct. 1	Oct. 20	50	Limited quota	Doe or fawn valid on private land
29		Oct. 1	Oct. 14		General	Antlered deer off private land; any deer on private land
31		Oct. 1	Oct. 10		General	Antlered deer

Special Archery Season Hunt Areas	Season Dates	
	Opens	Closes
19, 29, 31	Sep. 1	Sep. 30

Region	Deer Hunt Areas	Quota
C	17-19, 23, 26, 29, 31	2500

SUMMARY OF CHANGES IN LICENSES NUMBERS

Hunt Area	Type	Quota change from 2018
19		No change
29		No change
31		No change
Herd Unit Total		No change
Region C		+200

Management Evaluation

Current Postseason Population Management Objective: 13,000

Management Strategy: Private Lands

2018 Postseason Population Estimate: 10,500

2019 Proposed Postseason Population Estimate: 11,400

2018 Hunter Satisfaction: 74% Satisfied, 18% Neutral, 8% Dissatisfied

Herd Unit Issues

The Pumpkin Buttes Mule Deer Herd Unit consists of hunt areas 19, 29, and 31. The herd unit is managed by the Buffalo and Gillette Wildlife Biologists, with the Buffalo Biologist having reporting responsibility. The management objective is a post-season population objective of

13,000 deer. During the 2013 herd unit review, the objective was increased from 11,000 deer and the management strategy was changed from recreational to private lands management. No changes were made during the 2018 objective review. In 2016, Hunt Area 20 was incorporated into Hunt Area 19 to simplify the deer hunt area map and more closely match the antelope Hunt Area 23 boundary.

This herd unit is largely private land with limited areas of accessible public lands.

Weather

Weather conditions are summarized from Natural Resources Conservation Services Applied Climate Information System (www.wcc.nrcs.usda.gov) data from the Kaycee and Midwest stations (Station IDs 5055 and 6195, respectively) for precipitation and the Palmer Drought Index (www.ncdc.noaa.gov) from Climate Division 5 (Powder, Little Missouri and Tongue drainages) for drought conditions.

The beginning of the 2018 biological year had much higher precipitation than average for the month of June, however it was followed by a dry summer and average fall and winter. The previous winter had average precipitation; however it was colder than normal. This winter has had locally variable precipitation levels, with the Powder River basin averaging below average precipitation. February had unusually persistently cold temperatures. Severe winter conditions may have affected fawn recruitment of the 2017 cohort (see Field Data below). Timing of precipitation in summer 2018 followed by cold February temperatures may similarly affected fawn recruitment of the 2018 cohort.

Habitat

The herd unit consists of sagebrush and sage-grassland with small breaks. Grazing regimes for sheep and cattle can vary annually and impact utilization, particularly in dry years. Coalbed methane gas development was fairly extensive in hunt area 19 and the northeast portion of hunt area 29. Recently, as methane wells are plugged and abandoned, the BLM is working to remove infrastructure and eliminate and reclaim well pads and unneeded roads.

Spring 2018 precipitation provided for average shrub growth and good herbaceous forage production. Dry summer conditions may have negatively impacted the mule deer forage growing seasons, however. Winter conditions were normal with some colder temperatures, however large-scale deer winter mortality was not expected or observed.

Field Data

The post-season classification survey was conducted in November and December via ground and aerial classifications. The classification resulted in 2,104 deer classified, achieving an adequate sample size of $\geq 1,422$ deer.

Classifications in 2018 resulted in a fawn:doe ratio of 53:100, the lowest ratio in the past five years. The yearling male:doe ratio (7:100) was very low, following a higher 2017 fawn:doe ratio of 65:100. These results indicate that the 2017-2018 winter may have resulted in higher fawn mortality than expected. In addition, timing of 2018 precipitation and dry summer conditions have resulted in poorer habitat conditions than expected, leading to poor fawn recruitment in 2018.

The 2018 buck:doe ratio was 43:100, which is equivalent to the previous five-year average. High buck ratios in this herd unit are attributed to the private land status of this herd unit and the conservative hunting philosophy of outfitters and landowners.

The annual landowner survey results show landowners continue to desire a higher deer population. Of the 17 respondents, 41% think the population is at desired levels and 47% believe the population is below desired levels.

Harvest Data

Total harvest (633) was slightly below the previous five-year average (643 from 2013 to 2017). Hunter success (65%) is very consistent and higher than the statewide success rate for general license areas (41%). Hunter numbers increased in 2016 and 2017, due in part to a 100 license increase in the 2016 and 2018 Region C quotas. Resident hunters have outnumbered non-residents since 2014, which is unexpected given the large percentages of private land.

Hunters were very satisfied with the 2018 hunting season with 74% expressing satisfaction with their hunt, showing virtually identical results to the 2017 survey. Satisfaction was notably higher for non-residents (85%) as compared to residents (64%). We do not know how satisfaction varies between public and private land hunters and expect non-residents to have higher satisfaction because they are more likely to pay for access to private lands.

Population

We used integrated population models, referred to as Excel Spreadsheet Models, based on White and Lebow (2002) to estimate the population. Model parameters and input follow the “User’s Guide: Spreadsheet Model for Ungulate Population Data” (Morrison 2012).

The Time-Specific Juvenile & Constant Adult Survival (TSJ, CA) model was selected because it out-performed the Semi-Constant Juvenile & Semi-Constant Adult Survival model based on AIC ranking and because the Constant Juvenile & Adult Survival model appears to have grossly over-estimated population estimates. The TSJ, CA estimates produced results that align with the landowner survey, classification data, and harvest data.

The 2018 post-season population estimate of 10,500 deer maintains this population at the low end of objective. The model estimates indicate the population has been at objective since 2014. The population estimates show the population increasing from 2011 to 2015 and remaining stable with annual fluctuations since 2015. The model predicts an increase in the 2019 population, which could be due the population rebounding after low fawn and yearling male ratios observed in 2018; decreased the 2018 population estimate.

The three models produced very similar population trends, however the population estimates were grossly different. This leads to some confidence in the general trend of population stability in recent years, however leads to uncertainty in the credibility of the model’s ability to produce population estimates. Additionally, independent survival estimates are lacking so the user manual suggested starting values were applied. This model is therefore considered a fair model.

Management Summary

This herd unit is at objective and we do not expect excessive winter mortality to affect the 2019 hunting season.

The herd unit continues to have high hunter success (65%). Seasons continue to be very conservative, with less than one percent of the estimated pre-hunt doe population being harvested; so harvest strategies are not limiting the growth of this herd. Weather is the most significant factor influencing fawn ratios and fawn ratios and recruitment are the major population drivers. Dry summer conditions in 2018 resulted in low fawn survival and may have impacted deer nutritional condition coming into the 2018/2019 winter. Average winter precipitation may combat the effects of colder February temperatures of wintering deer, however.

The 2019 seasons are unchanged. Increasing the nonresident Region C quota by 200 licenses to 2,500 licenses is expected to provide additional opportunity to nonresidents, given that nonresident success and satisfaction continue to be very high. The population is expected to increase slightly in 2019.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet model for ungulate population data. Wyoming Cooperative Fish and Wildlife Research Unit. Unpublished. 41 pp.

White, G.C. and B.C. Lubow. 2002. Fitting population models to multiple sources of observed data. *Journal of Wildlife Management* 66:300-309.

2018 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2018 - 5/31/2019

HERD: MD321 - NORTH BIGHORN

HUNT AREAS: 24-25, 27-28, 50-53

PREPARED BY: TIM THOMAS

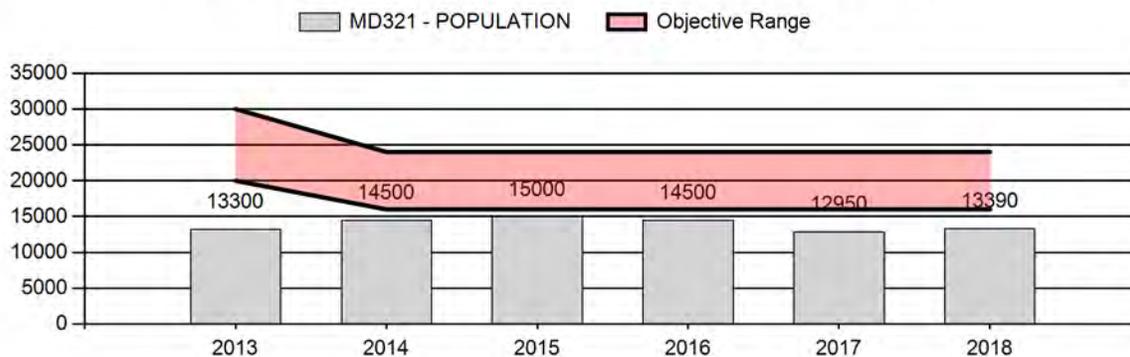
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	14,050	13,390	14,100
Harvest:	1,419	1,150	1,220
Hunters:	3,351	2,867	3,000
Hunter Success:	42%	40%	41%
Active Licenses:	3,459	3,003	3,100
Active License Success:	41%	38%	39%
Recreation Days:	16,367	14,551	14,000
Days Per Animal:	11.5	12.7	11.5
Males per 100 Females	31	30	
Juveniles per 100 Females	74	66	

Population Objective (\pm 20%) :	20000 (16000 - 24000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-33.0%
Number of years population has been + or - objective in recent trend:	2
Model Date:	2/28/2019

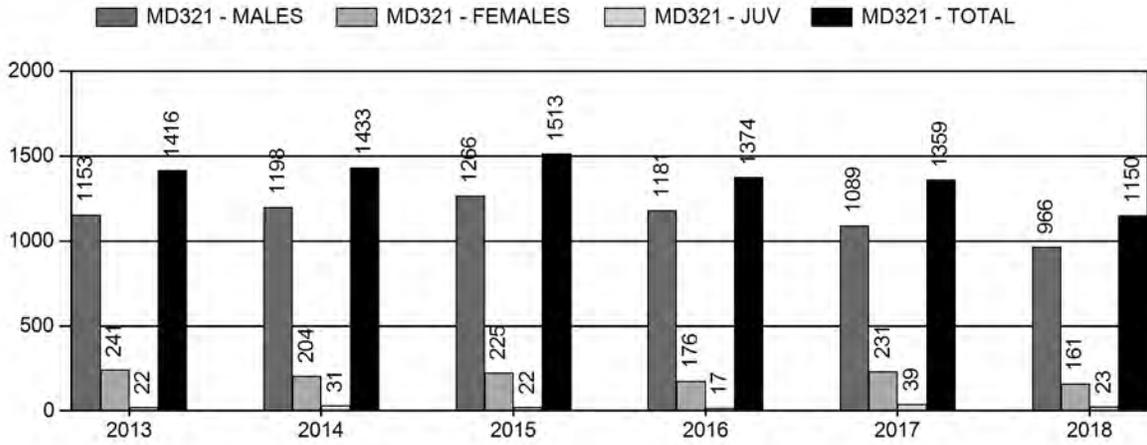
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females \geq 1 year old:	3%	3%
Males \geq 1 year old:	34%	33%
Total:	9%	9%
Proposed change in post-season population:	2%	2%

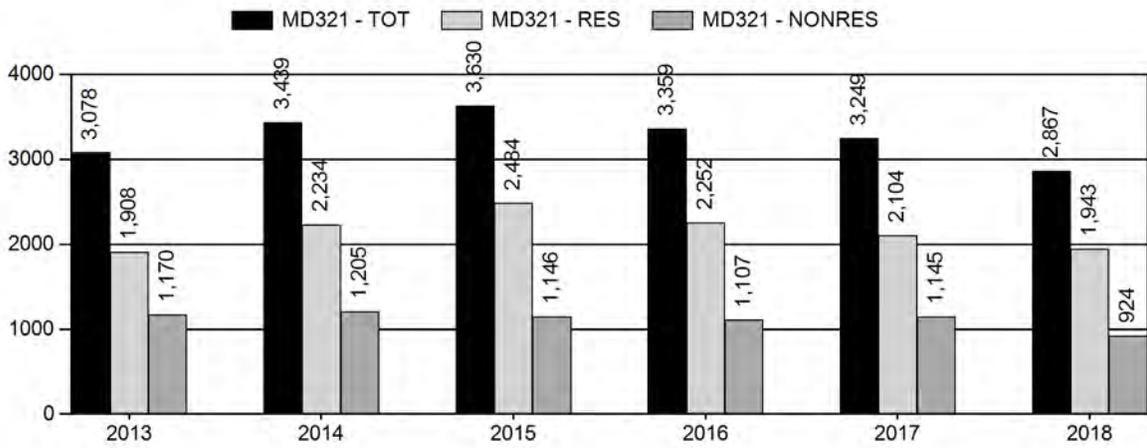
Population Size - Postseason



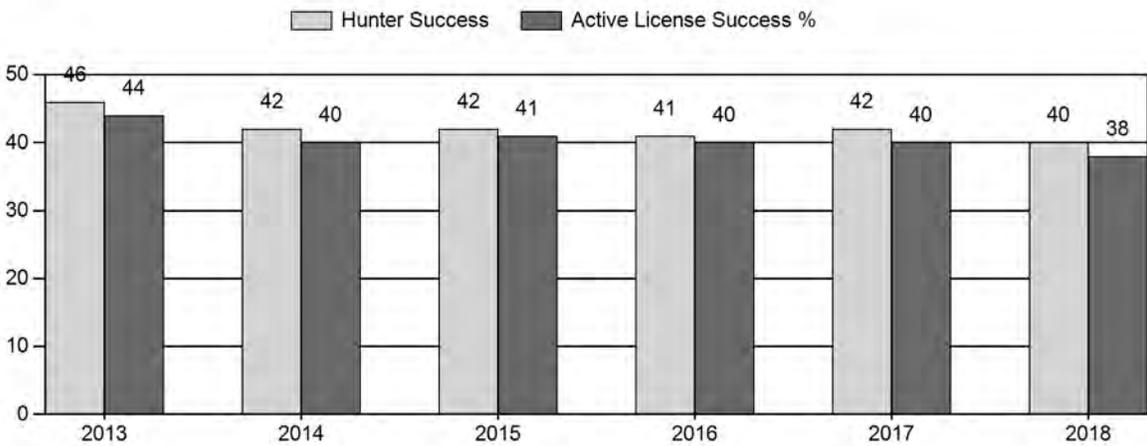
Harvest



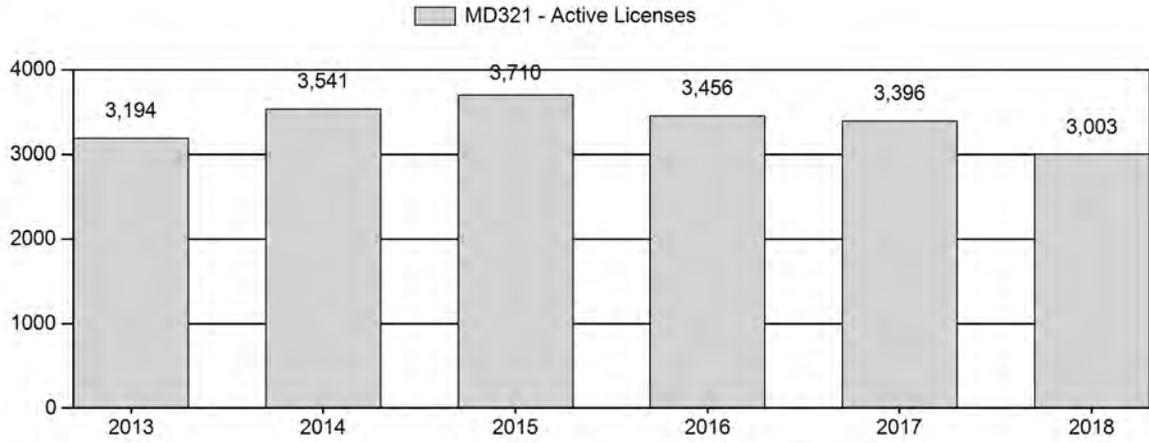
Number of Active Licenses



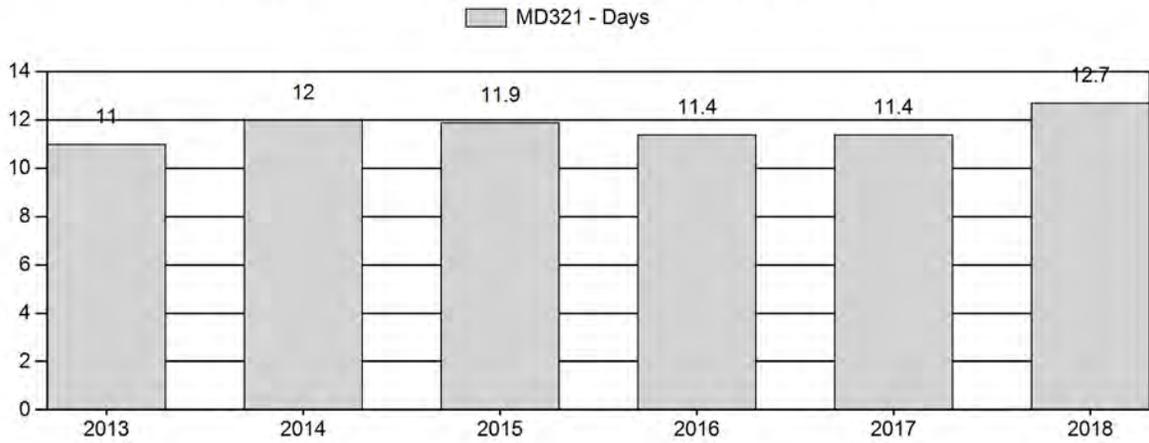
Harvest Success



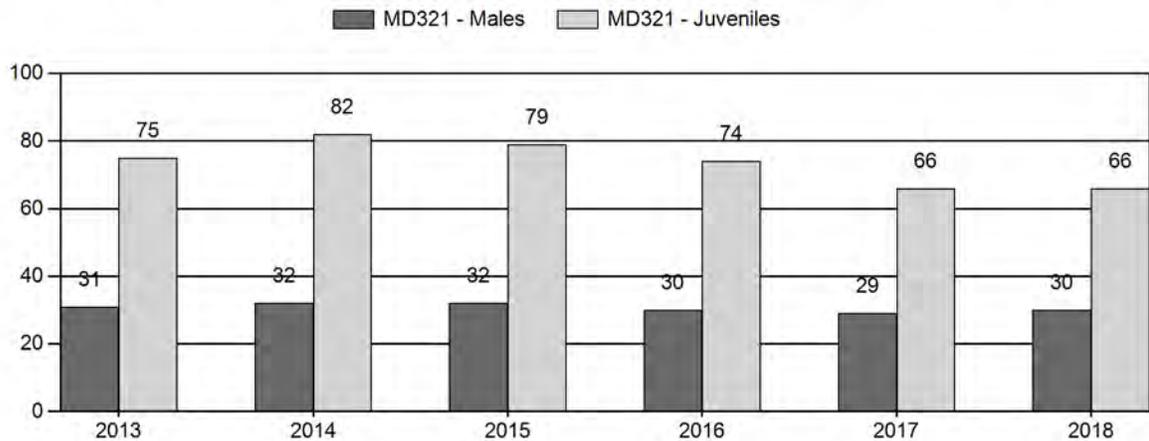
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary for Mule Deer Herd MD321 - NORTH BIGHORN																			
Year	Pre Pop	MALES				FEMALES		JUVENILES		Males to 100 Females			Young to						
		Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult	
2013	14,841	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0	
2014	16,000	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0	
2015	16,650	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0	
2016	16,000	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0	
2017	14,500	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0	
2018	14,655	20	63	83	26%	160	50%	80	25%	323	979	12	39	52	± 0	50	± 0	33	

2013 - 2018 Postseason Classification Summary for Mule Deer Herd MD321 - NORTH BIGHORN																					
Year	Post Pop	MALES							FEMALES		JUVENILES		Males to 100 Females			Young to					
		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
2013	13,300	128	0	0	0	190	318	15%	1,012	49%	754	36%	2,084	1,409	13	19	31	± 2	75	± 4	57
2014	14,500	91	0	0	0	187	278	15%	878	47%	718	38%	1,874	1,834	10	21	32	± 3	82	± 5	62
2015	15,000	155	138	36	2	34	365	15%	1,130	47%	894	37%	2,389	1,734	14	19	32	± 2	79	± 4	60
2016	14,500	116	38	28	4	132	318	15%	1,044	49%	771	36%	2,133	1,544	11	19	30	± 2	74	± 4	57
2017	12,950	122	60	35	4	160	381	15%	1,302	51%	859	34%	2,542	1,267	9	20	29	± 2	66	± 3	51
2018	13,390	114	157	56	6	0	333	15%	1,096	51%	728	34%	2,157	1,278	10	20	30	± 2	66	± 4	51

**2019 HUNTING SEASONS
NORTH BIGHORN MULE DEER HERD (MD321)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
24		Oct. 15	Oct. 31		General	Antlered mule deer or any white-tailed deer
	7	Sep. 1	Dec. 15	250	Limited quota	Doe or fawn valid on private land
25		Oct. 15	Oct. 24		General	Antlered mule deer or any white-tailed deer
27		Oct. 15	Oct. 31		General	Antlered mule deer or any white-tailed deer
28		Oct. 15	Oct. 24		General	Antlered mule deer or any white-tailed deer
50		Oct. 15	Oct. 24		General	Antlered mule deer or any white-tailed deer
51		Oct. 15	Oct. 24		General	Antlered mule deer or any white-tailed deer
	6	Oct. 15	Nov. 15	50	Limited quota	Doe or fawn valid on or within one-half (1/2) mile of irrigated land
	7	Oct. 15	Nov. 15	100	Limited quota	Doe or fawn valid within one (1) mile of Shell Creek
52		Oct. 15	Oct. 24		General	Antlered mule deer or any white-tailed deer
	6	Oct. 15	Nov. 30	25	Limited quota	Doe or fawn valid on or within one-half (1/2) mile of irrigated land
53		Oct. 15	Oct. 24		General	Antlered mule deer or any white-tailed deer

Special Archery Season Hunt Areas	Season Dates	
	Opens	Closes
24, 25, 27, 28, 50, 51, 52, 53	Sep. 1	Sep. 30

Region	Deer Hunt Areas	Quotas
R	41, 46, 47, 50-53	600
Y	24, 25, 27, 28, 30, 32, 33, 163, 169	1,800

Hunt Area	Type	Quota change from 2018
24	7	+ 50
Herd Unit Total	7	+ 50
Region Y		No Change
Region R		No Change

Management Evaluation

Current Postseason Population Management Objective: 20,000

Management Strategy: Recreational

2018 Postseason Population Estimate: ~ 13,400

2019 Proposed Postseason Population Estimate: ~ 14,100

2018 Hunter Satisfaction: 66% Satisfied; 19% Neutral; 15% Dissatisfied

Herd Unit Issues

The North Bighorn Mule Deer Herd Unit is located in north central Wyoming. It basically covers the northern portion of the Bighorn Mountains and associated foothills. The Sheridan and Cody Regions share management, with the Sheridan wildlife biologist having herd unit reporting responsibility. Three wildlife biologists and five game wardens have management responsibility.

This herd unit contains eight hunt areas. Areas 24, 25, 27 and 28 are on the east side of the Bighorn Mountains and Areas 50-53 are on the west side. Areas 24, 27, 51 and 52 contain predominately private lands while areas 25, 28, 50 and 53 contain mostly public lands.

We manage the North Bighorn Mule Deer Herd Unit for a post-season population objective of 20,000 mule deer, with a recreational management strategy. We revised the objective and management strategy for this herd in 2014. We conducted a 5-year herd unit evaluation in 2019, resulting in no recommended changes.

This mule deer herd has been below the management objective for many years, despite limited doe harvest and relatively conservative seasons. There are other factors limiting this herd from reaching the desired management objective, which likely include, but are not limited to, habitat quality and competition from other ungulates for preferred forage. We do not think predation is a significant limiting factor most years, although we recognize predation is a contributing factor to mule deer mortality.

Herd Unit Review

The herd unit objective and management strategy were revised in 2014. This year, we evaluated and considered population status, hunter satisfaction, observed buck to doe ratios and habitat data included in this report. There is significant concern by hunters and managers about the population status and buck quality. We have collected age and antler measurements from hunter harvested

deer during 2015-2018. Most bucks harvested are ≤ 4 years old, which isn't unexpected in an area managed for recreational opportunity. Hunters have requested an increase in the age and number of bucks on the public lands portions of this herd. Since most deer migrate off the national forest prior to post-season classifications surveys, we initiated pre-season classifications surveys in 2018 in Hunt Areas 25, 28, 50 and 53 to better understand this portion of the population.

The current object and strategy meet our management needs. We concluded a change is not warranted at this time. We will review the herd objective and management strategy again in 2024. If the situation arises that a change is necessary, we will review and submit a proposal as needed.

Weather

Temperature and precipitation data referenced in this section were collect at the Burgess Junction (#481220), Shell (#488124) and Sheridan Airport (#488155) weather stations located within this herd unit. These data were reported by the Western Region Climate Center on their website (www.wrcc.dri.edu).

Spring 2018 was generally warm and wet, with slightly above normal temperatures and above normal precipitation, resulting in a good start for forage production in the Bighorn Mountains. Precipitation during May was almost twice the long-term mean. Precipitation was near normal (June and July) to above normal (August) during the summer. Temperatures through the summer were near or slightly above normal. During the fall of 2018, precipitation was below normal (September), well above normal (October) or near normal (November), with temperatures slightly below normal. Precipitation was 50% of normal during December and near normal for January. Temperatures were above average in December and January, turning cold in February. Average monthly temperature was 12⁰F - 15⁰F below average during February. March was slightly colder than average while April was near normal for temperature and precipitation. May was 3⁰F - 5⁰F colder than normal, with precipitation 1.6-2.5 times normal. Wet cool weather during parturition could negatively influence neonate survival.

Adult deer appeared to have entered the winter in good condition, allowing them to survive the winter fairly well. We received numerous reports of dead or dying fawns during late winter. Fawns are more susceptible to adverse effects of cold temperatures due to limited body reserves and small body size. Cold temperatures, as low as -17⁰ F, and crusted snow in February and early March likely resulted in at least normal overwinter fawn mortality.

Habitat

Habitats in this herd unit range from mountain foothills to alpine. Lower elevations contain short-grass prairie, sage-brush steppe, mountain shrub communities as well as converted rangeland land and cultivated crop lands. As you progress upward in elevation into the Bighorn Mountains, communities change to conifer forests with some quaking aspen stands, and open parks. Willow riparian habitats occur along streams and rivers. Higher elevation habitats transition from spruce and subalpine fir to alpine habitats.

We do not have established habitat transects in this herd unit. Most deer migrate to higher elevations in the Bighorn Mountains during the spring and spend summer months on Forest Service lands. These deer return to the foothills of the Bighorn Mountains in the fall and spend the

winter at lower elevations, often on private lands, especially on the east side of the Bighorn Mountains. Some deer remain at lower elevations year round.

Field Data

In order to gain better understanding about the mule deer that spend part of the year on the Bighorn National Forest, we initiated summer classification surveys in 2018. During August, field personnel conducted pre-season classifications in Hunt Areas 25, 28, 50 and 53 using ground survey techniques. Managers drove assigned routes, classifying all observed mule deer. We plan to refine our survey protocol during 2019 to increase sample size and distribution of samples.

A total of 323 deer were classified, with 52% ($n=167$) of the sample from Area 25. We observed 52 bucks per 100 does and 50 fawns per 100 does. The buck to doe ratio seems reasonable and about what we would expect pre-season. Of the 63 adult bucks observed, 78% ($n=49$) were classified as Class I bucks based on antler width ($\leq 19''$). The low fawn to doe ratio concerns managers. If this sample is truly representative of the population, this level of fawn production is not sufficient to maintain this segment of the population.

During November and December, field personnel classified mule deer using both aerial (helicopter; Areas 50-53) and ground (Areas 24 and 27) survey techniques. Hunt Areas 25 and 28 are not surveyed as deer migrate out of these areas during October and are not present during the survey period. We classified 2,157 mule deer, a decrease from 2017 but still well above the desired sample at the 80% confidence level ($n=1,278$). We observed 66 fawns:100 does, the same as in 2017, but still the second lowest observed fawn to doe ratio since 2009 (66:100). Fawn production, based on observed fawn to doe ratios, has been fair to good the past five years (66-82 fawns:100 does; mean = 73 fawns:100 does). This level of production should be sufficient to maintain or slowly grow this population towards the management objective.

The observed buck to doe ratio was 30 bucks:100 does, similar to recent years. A lot of these bucks appear to be young aged animals. Mature bucks seem to be lacking in this population, resulting in smaller antlered animals generally available for harvest. Of bucks assigned to an antler class during classification surveys ($n=219$), 72% were Class I ($<19''$ wide) bucks; 26% were Class II ($19''$ - $26''$ wide) bucks, and only 3% were Class III ($>26''$ wide) bucks. Even though the management strategy for this herd unit is recreational hunting, some hunters - both resident and non-resident - have consistently requested better quality (i.e. larger antlered) deer. Starting in 2015, we collected antler measurements and teeth for age analysis from hunter harvested deer. This is an effort to correlate antler development with age.

Preliminary analysis suggests we harvested younger bucks (i.e. 2-4 year old bucks) at a similar or higher proportion in the North Bighorn Herd Unit compared to other hunt areas of the state where teeth were collected during 2018 (Fig. 1). This could be reflective of the true proportions these cohorts occur in this population or a function of small sample size and associated variance. No deer > 10 years old were aged from the North Bighorn Herd Unit. Deer up to 14 years of age were harvested from other hunt areas across the state. This analysis only includes deer >1 -year old.

Based on field check data, hunters appear to select for deer with at least three antler points on one side. In 2015, 81% of checked deer >1 year of age ($n=99$) had at least three antler points. In 2016, 86% of deer >1 year of age ($n=100$) had at least three antler points. In 2017, 89% of the deer >1

year of age ($n=82$) had at least three antler points. In 2018, 89% of the deer > 1 year of age ($n=64$) had at least three antler points. In 2017, hunters appeared to select for deer with at least four antler points on one side (Fig. 2). Only field checked deer with both tooth age and antler measurements were included in this analysis.

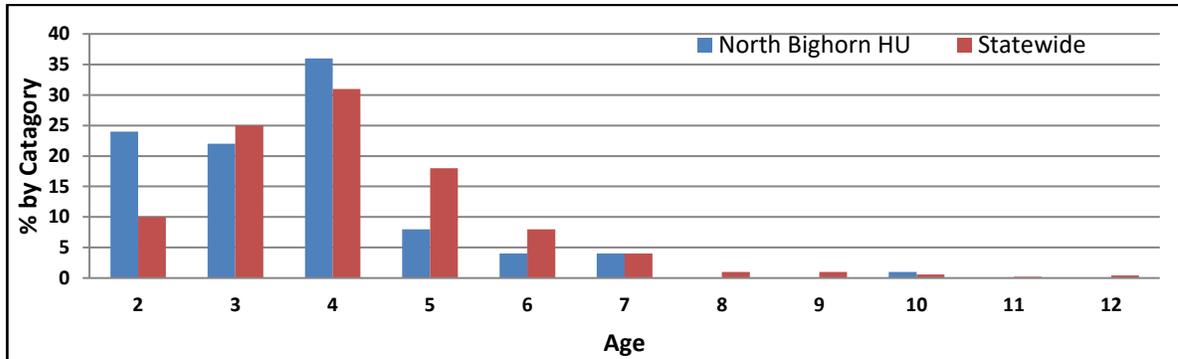


Figure 1. Age of harvested mule deer bucks, by percentage, from the North Bighorn Mule Deer Herd Unit compared to statewide tooth age data. Deer were harvested during 2018 hunting season. Yearling harvest is excluded as managers don't consistently collect teeth or record yearlings during field checks.

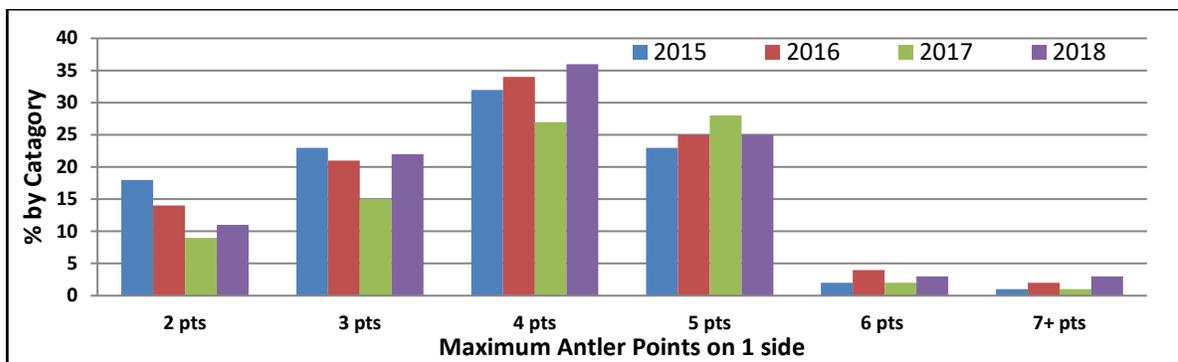


Figure 2. Antler point development of mule deer bucks, by percentage, from the North Bighorn Mule Deer Herd Unit during the 2015 - 2018 hunting seasons. Deer were categorized by largest number of antler points on one side. Yearling bucks are excluded due to inconsistency of data collection.

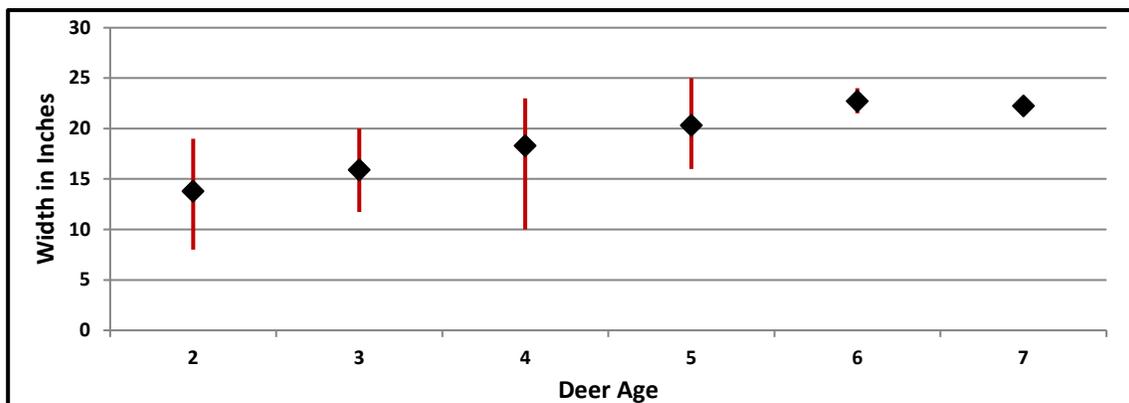


Figure 3. Average mule deer antler width, with maximum and minimum width, by age class for deer harvested from the North Bighorn Herd Unit during the 2018 hunting season. Sample collected during field checks of successful hunters.

Antler width development by age class in 2018 is about what would be expected from harvested mule deer in the North Bighorn Herd Unit (Fig. 3). As a deer ages, antler width tends to increase, leveling off around 6 years old, and dropping off for older aged animals (i.e. 8+ years). There is a lot of variation within cohorts, as is expected. It is interesting to note that most variation for 4-year old deer occurs below the average width while most variation for 5-year old deer occurs above the average width, and the variation for 6-year old deer is less and more evenly centered around the average. Average antler width did not exceed 25 inches for any age class. This could suggest there is a nutritional factor limiting larger antler development.

According to the hunter satisfaction survey attached to the harvest survey, deer hunters were generally satisfied with their hunt. Of 873 hunters who responded to the satisfaction survey, the majority (66%) were satisfied or very satisfied, while only 15% indicated they were dissatisfied or very dissatisfied. The balance of responses (19%) were neutral. Statewide, this herd unit ranked 20th out of 37 mule deer herd units for satisfaction (i.e. satisfied or very satisfied), down two place from 2017. The statewide average hunter satisfaction was 66% (range=43%-86%).

Non-resident hunters ($n=264$) were generally more satisfied (74%) than resident hunters ($n=609$; 62%). Hunter satisfaction was similar on the east side (61.6%; Hunt Areas 24, 25, 27, and 28) compared to the west side (62.4%; Hunt Areas 50-53) of the Bighorn Mountains. Hunt Areas 28, 50 and 53 had the lowest satisfaction rates (44%, 51%, and 58% respectively) while Hunt Areas 24, 52 and 51 had the highest satisfaction rates (75%, 71% and 70% respectively). Deer usually migrate early from Hunt Area 28, resulting in reduced opportunities and low hunter success rates during the October hunting season, likely influencing satisfaction responses.

Overall, hunter satisfaction in 2018 was similar to the 2017 hunting season. Hunter satisfaction increased in some hunt areas and decreased in others. Hunter satisfaction is generally higher in private land areas (i.e. Areas 24 and 51) and lower in public land areas (i.e. Areas 53 and 28).

Harvest

In 2018, an estimated 2,867 hunters harvested an estimated 1,150 mule deer, a 15% decrease from the 2017 harvest and 19% below the previous 5-year (2013-2017) average harvest ($n=1,419$). This was the lowest harvest in at least 40 years. This is the first time since at least 1982 that hunter numbers were under 3,000. Poor weather conditions likely contributed to few hunters going afield.

Harvest consisted of an estimated 966 bucks (84%), 161 does (14%), and 23 fawns (2%). Buck harvest declined about 11% while doe harvest decreased 30%. Buck harvest was the lowest ever recorded (i.e. 37 years). While general licenses were basically restricted to antlered deer, doe/fawn licenses were decreased for the 2018 season, accounting for the decreased doe harvest. A significant snowfall on October 13th, two days before the opening day, likely contributed to the reduced harvest.

Hunter success was 40%, slightly down from recent years. Hunters spent an estimated 12.7 days hunting per deer harvested, an increase from 11.4 days in 2017 and above the 5-year average of 11.5 days/harvest. Statewide, hunters spent 9.1 days hunter per deer harvested and hunter success was 54%. These harvest statistics suggest deer were generally difficult to find during 2018.

In 2018, approximately 31% of the hunting pressure and 42% of the harvest occurred in west side hunt areas (Hunt Areas 50-53) while 69% of the hunting pressure and 58% of the harvest occurred

in east side hunt areas (Hunt Areas 24, 25, 27, & 28). Archery hunters are generally more successful in this herd unit compared to statewide success (Fig. 4). This is especially evident in Hunt Area 25 where the archery hunters harvested an average of 56% of the mule deer from 2011-2018.

Hunt Area 24 saw the highest total harvest ($n=359$; 31%), as well as buck harvest ($n=249$; 26%). Hunt Area 28 saw the lowest deer harvest ($n=37$; 3%). Hunt Area 51 had the highest success rate (66%) and Hunt Area 28 had the lowest success rate (13%). Hunt Area 51 saw the lowest effort rate (5.8 days/animal), while Hunt Area 28 had the highest effort rate (36.6 days/animal). These harvest statistics are generally similar to those from the 2017 season.

Population

The 2018 post-season population estimate is about 13,400 mule deer, about 33% below the management objective of 20,000 deer. This population most recently peaked around 2006, then decreased, and now appears to have stabilized at around 13,000 - 14,000 deer. From 2005-2012, hunters harvested an average of 581 does annually, which likely contributed to a decline in this population. Hunters and field personnel have noticed a decline in this deer population over the past decade. The population stabilized and has started to slowly increase with lower doe harvest, good fawn production and mild environmental conditions in recent years.

We use integrated population models in an Excel spreadsheet format, based on White and Lebow (2002), to estimate the mule deer population. Model parameters and input follow the “User’s Guide: Spreadsheet Model for Ungulate Population Data” (Morrison 2012). Classification and harvest data are the only empirical data available to input in the model.

The “Time-Specific Juvenile – Constant Adult Survival Rate” (TSJ,CA) model was chosen to estimate the postseason population. This simulation model had the lowest relative Akaike information criterion (AIC) value of the three models (87 compared to 107 or 110), and had the lowest fit (5 compared to 71 or 101). This model also appeared to reasonably simulate the perceived population dynamics of this herd. Since we do not have an independent population estimate or age specific survival data for this herd, we consider this simulation model to be of “fair” quality.

Management Summary

Hunting strategies on public land, primarily the Bighorn National Forest, have generally been conservative. Hunting strategies on private lands have generally been more liberal, often designed to address damage complaints to stored or cultivated crops. Several larger ranches outfit for mule deer, which generally results in limited harvest. Hunting seasons traditionally run the last two weeks of October, opening on October 15 and closing on different dates, depending on the hunt area and year. Season length is generally 10-17 days long.

An archery pre-season occurs the entire month of September. Archery hunting accounted for 16% of the 2018 harvest (18% of buck harvest), including 60% of the Hunt Area 25 harvest ($n=161$). Statewide, archery hunters harvested an estimated 5% of the mule deer harvest (Fig. 4).

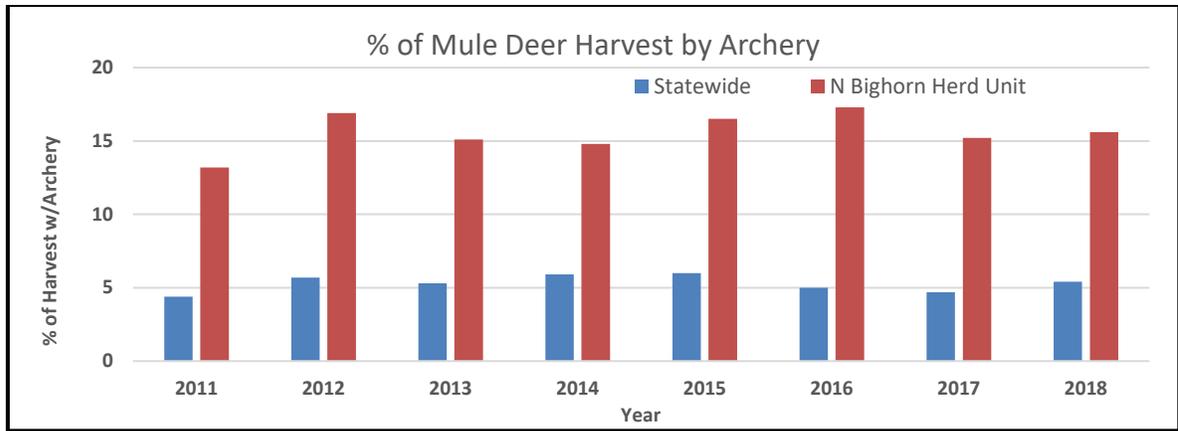


Figure 4. Percentage of mule deer harvest by archery hunters from 2011-2018 for North Bighorn Mule Deer Herd Unit and Statewide.

We standardized the general license limitations in all hunt areas to “Antlered mule deer or any white-tailed deer”, eliminating antlerless harvest on this license. Doe/fawn harvest will be limited to hunt areas with Type 6 or 7 licenses. During 2018, hunters harvested 34 does and fawns on a general licenses, all in Hunt Area 24.

In Area 24, we increased Type 7 licenses from 200 to 250 for the 2019 season to offset the change in general license limitations. These licenses are valid only on private land, protecting the limited public lands in this hunt area from over harvest. In 2018, 59% of the harvest ($n=129$ total) on this license type was mule deer ($n=76$). This license allows some landowners the opportunity to address localized problems of higher than desired mule deer numbers.

We maintained doe/fawn license quotas in Hunt Areas 51 and 52 for the 2019 season. These licenses are provided to address damage issues on agricultural croplands.

We estimate a harvest of about 1,200 mule deer for 2019. With average recruitment, stable fawn production and similar proposed harvest, we estimate a 2019 post-season population of about 14,000 mule deer, below the management objective but stable.

We maintained the nonresident Region Y deer quota at 1,800 licenses for 2019. Region Y contains Hunt Areas 24, 25, 27, 28 of the North Bighorn Herd Unit and the Upper Powder River Herd Unit (Hunt Areas 30, 32, 33, 163 and 169). Hunters in the North Bighorn portion of Region Y (Hunt Areas 24, 25, 27 and 28) accounted for 47% of the total mule deer harvest in Region Y during 2018 and 38% of the mule deer harvested by nonresident hunters in this region.

We maintained the nonresident Region R deer quota at 600 licenses for the 2019 season. Region R contains Hunt Areas 50-53 from the North Bighorn Herd Unit and the Paint Rock Herd Unit (Hunt Areas 41, 46 and 47). This quota is set by Cody Region personnel. Nonresident hunters in that portion of Region R in the North Bighorn Herd Unit (Areas 50-53) are significantly more successful at harvesting mule deer than resident hunters. Three hundred thirty-four nonresident hunters harvest 254 mule deer (53% success) while 636 resident hunters harvested only 234 mule deer (32% success). Hunt Areas 50-53 accounted for 47% of the total mule deer harvest in Region R (Hunt Areas 41, 46, 47, 50-53) and 43% of the mule deer harvested by nonresident hunters in Region R.

Since 1978, when the WGFD started testing for chronic wasting disease (CWD), there have been 27 mule deer and 32 white-tailed deer that tested positive within this herd unit. Sampling effort has not been consistent between years. There has been at least one positive deer in Hunt Areas 24, 27, 28, 51 and 52. We have yet to detect CWD positive deer in Hunt Areas 25, 50 or 53. In 2018, there were 20 deer (6 mule deer and 14 white-tailed deer) that tested positive for CWD in this herd unit.

The Sheridan Region will be a focus area for CWD sampling during the 2019 season. Increased sample sizes should give us a better idea of current distribution and prevalence rates for CWD in this deer population.

Special Projects

During 2018, we sent surveys to 1,587 hunters who reported hunting in Hunt Areas 25, 28, 50 and/or 53 at least once during the 2015-2017 seasons. Three hundred-twenty hunters responded, including 128 nonresident and 192 resident hunters.

Forty-eight percent of respondents indicated they were very satisfied (10.6%) or satisfied (37.2%), compared to 53.9% reported from the hunter harvest survey satisfaction. Respondents were similarly dissatisfied (29.1%) compared to the hunter harvest survey response (23.9%). Neutral responses were similar between both surveys (23.1% vs. 22.3%).

The number one reason for hunter dissatisfaction was “too few deer” (22.3%), followed by “few trophies” (15.9%) and “too crowded” (13.3%). The primary reasons for hunter satisfaction were “enjoy hunting” and “enjoy family/friends” (both at 14.9%), “enjoy outdoors” (14%) and “good location” (13.5%).

When asked how satisfied they were with the number of deer, 36.6% responded as satisfied, 28.7% as neutral, and 34.7% as dissatisfied. When asked specifically about the number of bucks, only 29.1% responded as satisfied, 25.6% as neutral and 45.4% were dissatisfied. This was not a surprise as managers have heard concern about buck numbers and total deer numbers for several years.

Based on the concerns expressed, 42.3% of respondents would support limiting the number of hunters. Yet 82.4% indicated it was somewhat important (31.6%) or very important (50.8%) to be able to hunt every year.

The full survey results are attached as Appendix A of this report.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet model for ungulate population data. Wyoming Cooperative Fish and Wildlife Research Unit. Unpublished. 41 pp.

White, G.C. and B.C. Lubow. 2002. Fitting population models to multiple sources of observed data. *Journal of Wildlife Management* 66:300-309

Appendix A

**North Bighorn Mule Deer
Hunter Survey**

2018

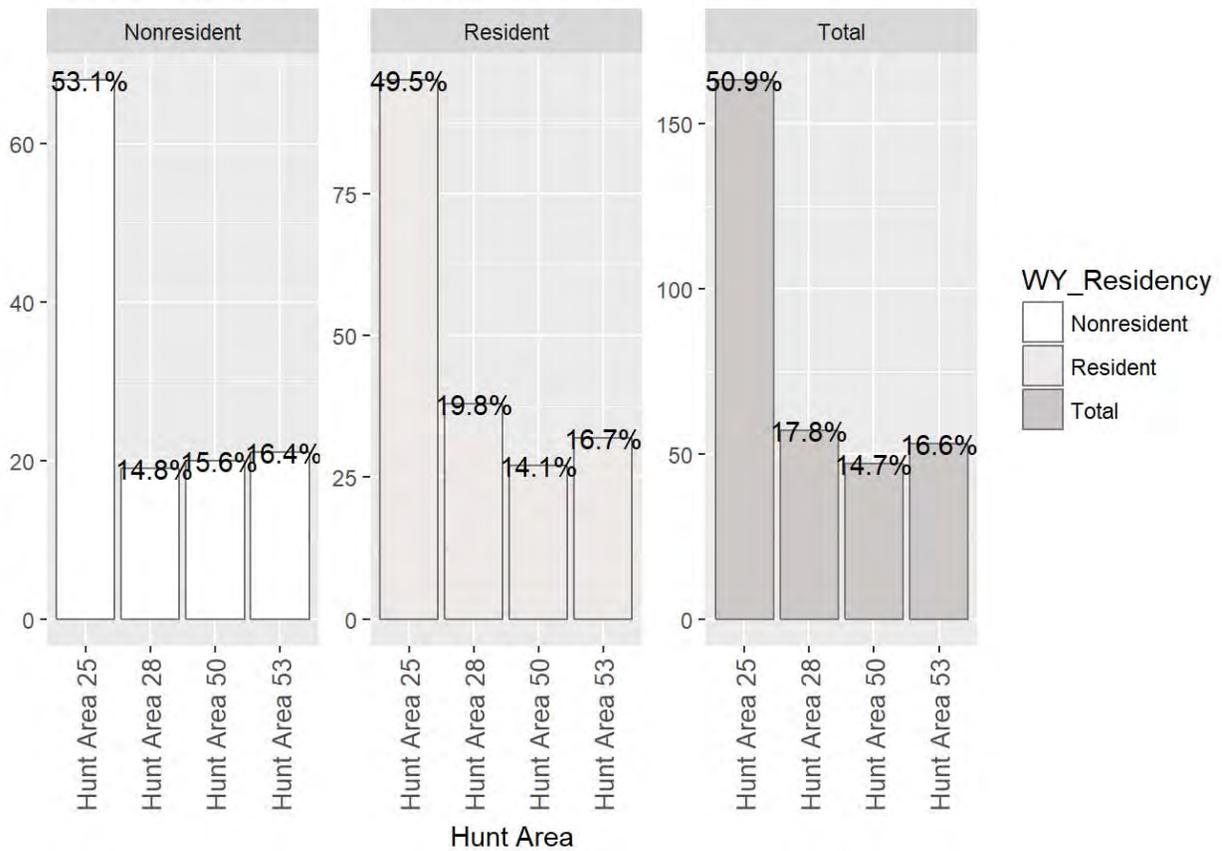
**Conducted and Compiled by
Emily Gates
Statewide Wildlife and Habitat Management Section
Wildlife Division
Wyoming Game and Fish Department**

Noth Bighorn Mule Deer Hunter Survey

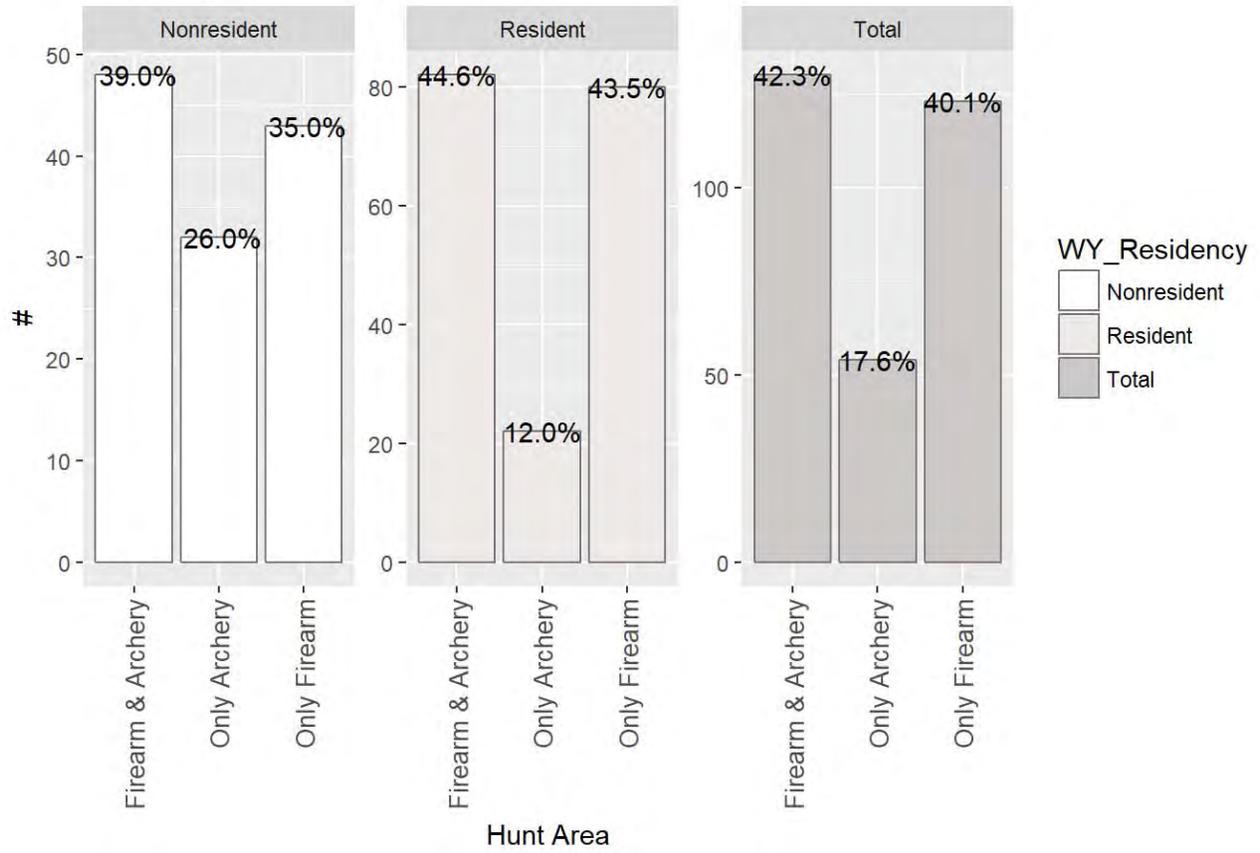
Responders:

WY_Residency	#
Nonresident	128
Resident	192
Total	320

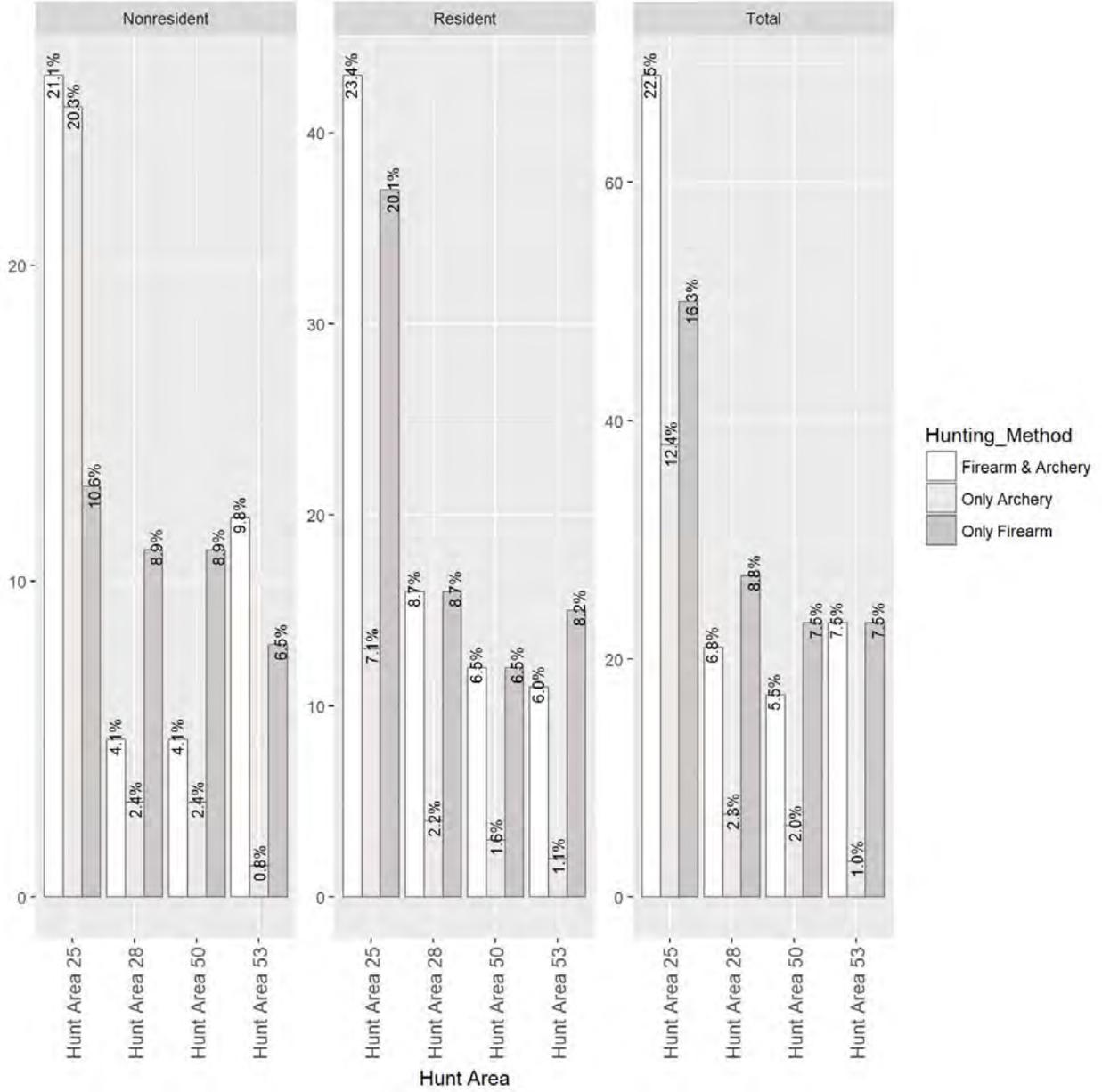
What hunt area have you hunted most?



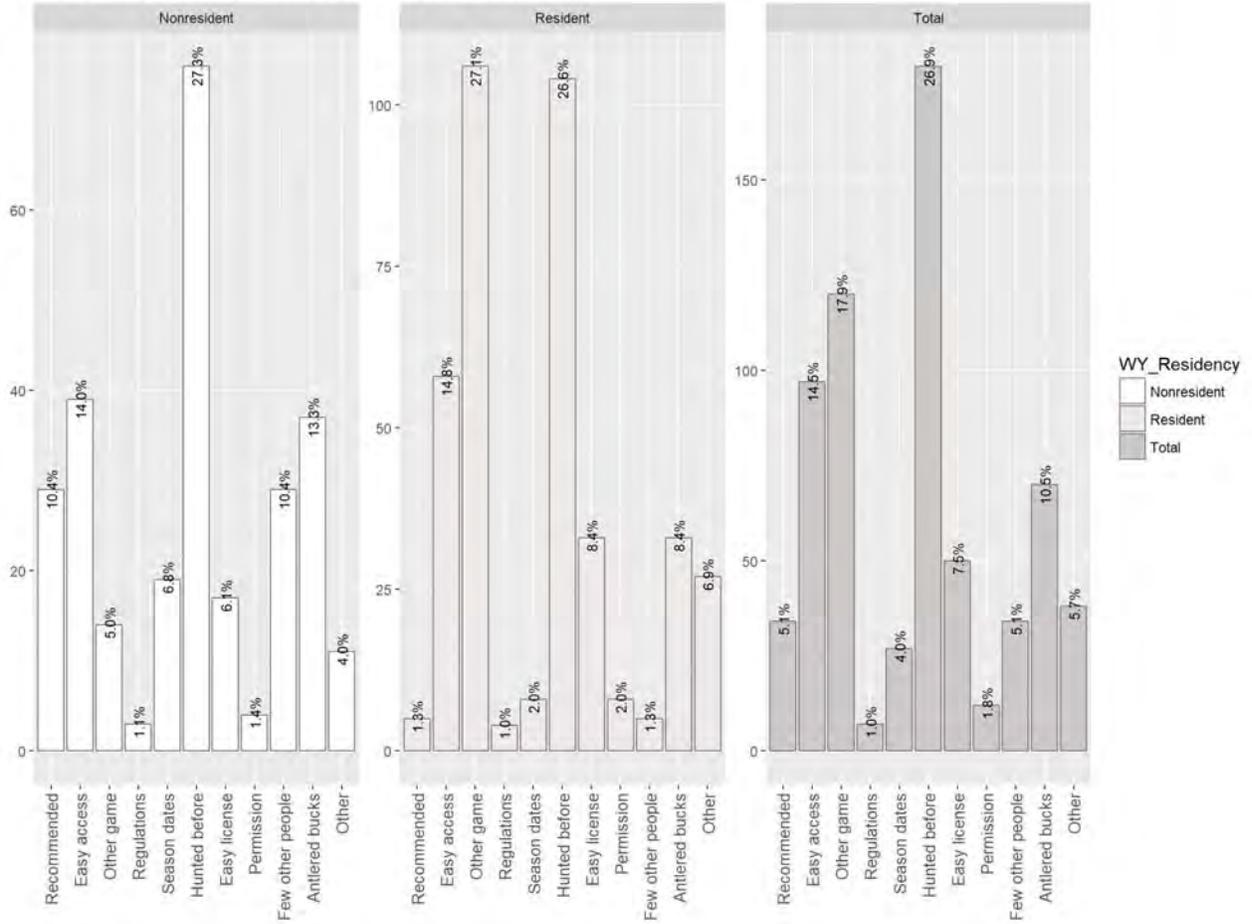
How do you usually hunt for deer?



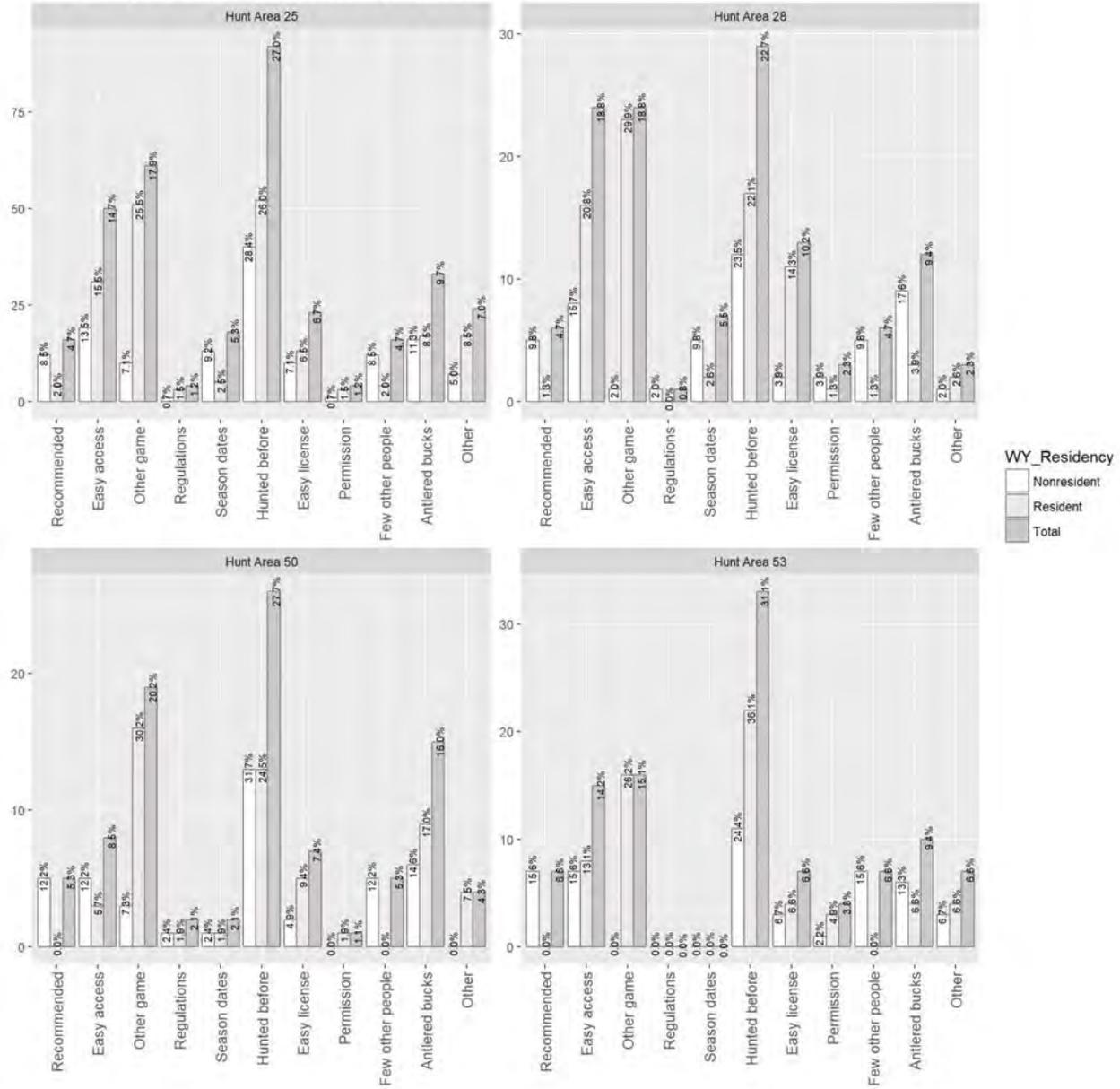
How do you usually hunt for deer?



What were your main reasons for choosing this area?



What were your main reasons for choosing this area?



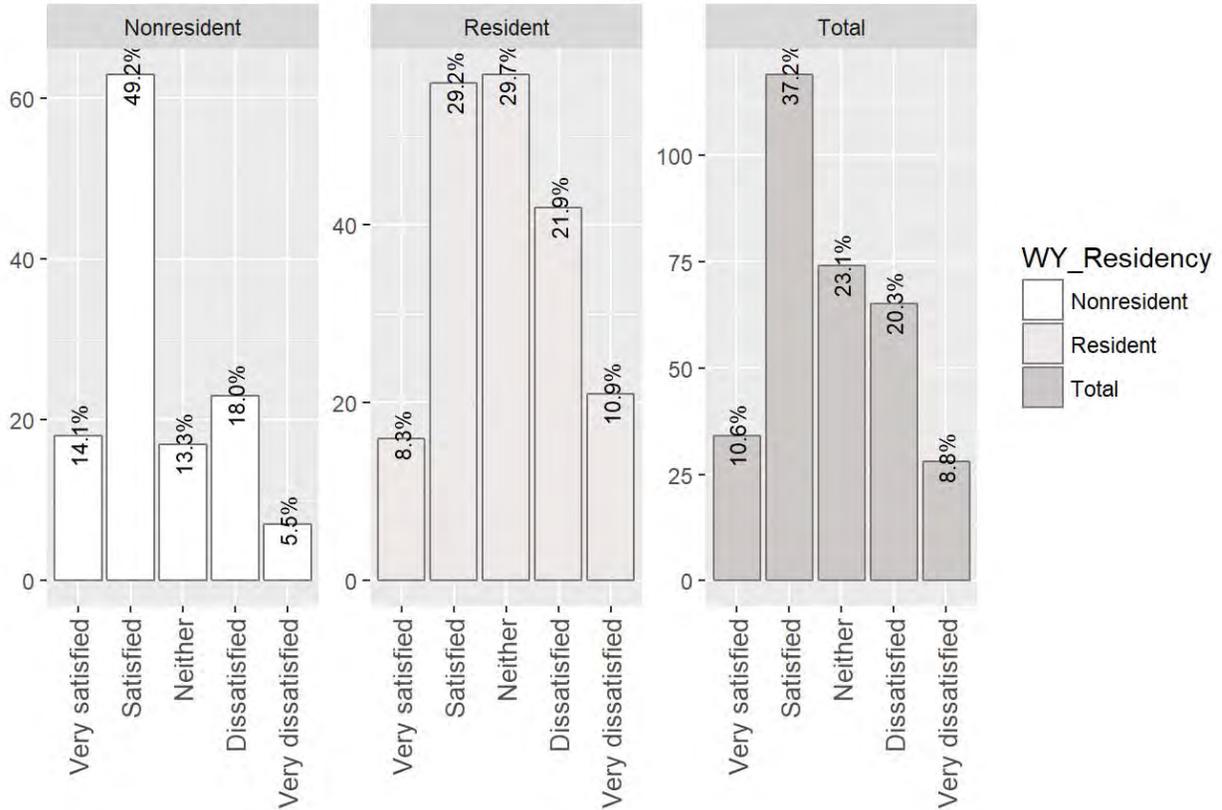
Other:

WY_Residency	Hunt_Area	Main_Reasons_Other..please.specify.
Resident	Hunt Area 25	Close to home
Resident	Hunt Area 25	Close to home
Resident	Hunt Area 25	Proximity to home
Nonresident	Hunt Area 25	Did not hunt Muley. Hunted whitetails
Resident	Hunt Area 53	It is the closest area to my home
Resident	Hunt Area 25	No grizzlies

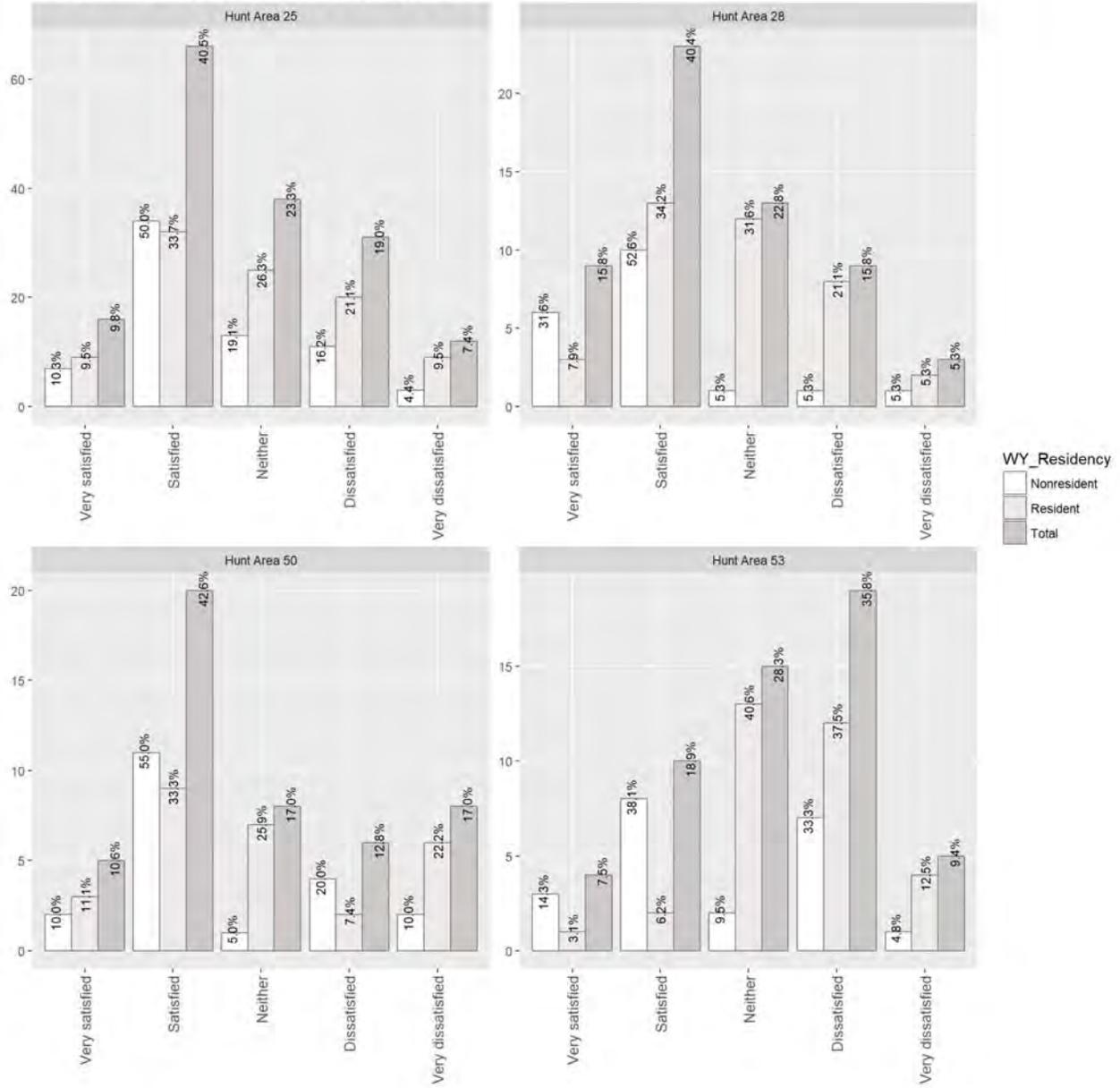
WY_Residency	Hunt_Area	Main_Reasons_Other..please.specify.
Nonresident	Hunt Area 25	Learning the area for a future elk hunt
Resident	Hunt Area 25	Elk
Resident	Hunt Area 25	I mostly hunr for whitetail
Resident	Hunt Area 50	Need make a 3 point better to harvest
Resident	Hunt Area 28	Generally do not hunt this area havent in 3 years
Resident	Hunt Area 50	2017 had a good population of deer, 2016 and 2015 there were low numbers and I was dissappointed.
Resident	Hunt Area 25	Close to residence
Nonresident	Hunt Area 25	Also saving for Elk points for this area
Resident	Hunt Area 25	public land, national forest, close to where i live
Resident	Hunt Area 50	Great place to backpack hunt with kids - no grizzly bears.
Nonresident	Hunt Area 53	Saw more deer in that area
Resident	Hunt Area 25	Close to home
Resident	Hunt Area 25	close to my home in Sheridan,and in the forest.
Resident	Hunt Area 25	Close to home
Nonresident	Hunt Area 25	Lots of wildlife to see, and the landscape is awesome to hunt and witness
Nonresident	Hunt Area 25	FIRST TIME
Resident	Hunt Area 28	I hunt on Forest service Land
Nonresident	Hunt Area 25	High altitude non wilderness
Resident	Hunt Area 50	Unable to draw a tag in other areas
Resident	Hunt Area 53	I've hunted the area for 35 yrs and liked the old regulations
Resident	Hunt Area 25	Close to sheridan
Nonresident	Hunt Area 53	Just picked it
Resident	Hunt Area 25	We camp up there alot
Resident	Hunt Area 25	Its close to home
Nonresident	Hunt Area 53	I like Wyoming High Country Lodge
Resident	Hunt Area 25	I live close by. Dayton, Wy
Resident	Hunt Area 53	Close to home. Not a great chance at mature deer anymore though.
Nonresident	Hunt Area 28	I had an elk permit for this area

WY_Residency	Hunt_Area	Main_Reasons_Other..please.specify.
Resident	Hunt Area 53	Grew up in Lovell
Resident	Hunt Area 25	My out of state father can draw a tag regularly
Nonresident	Hunt Area 25	Like the area,views camping in mountains,visit with friends and maybe get to try for a very big buck.
Resident	Hunt Area 25	Close to my home and I love the country up there!

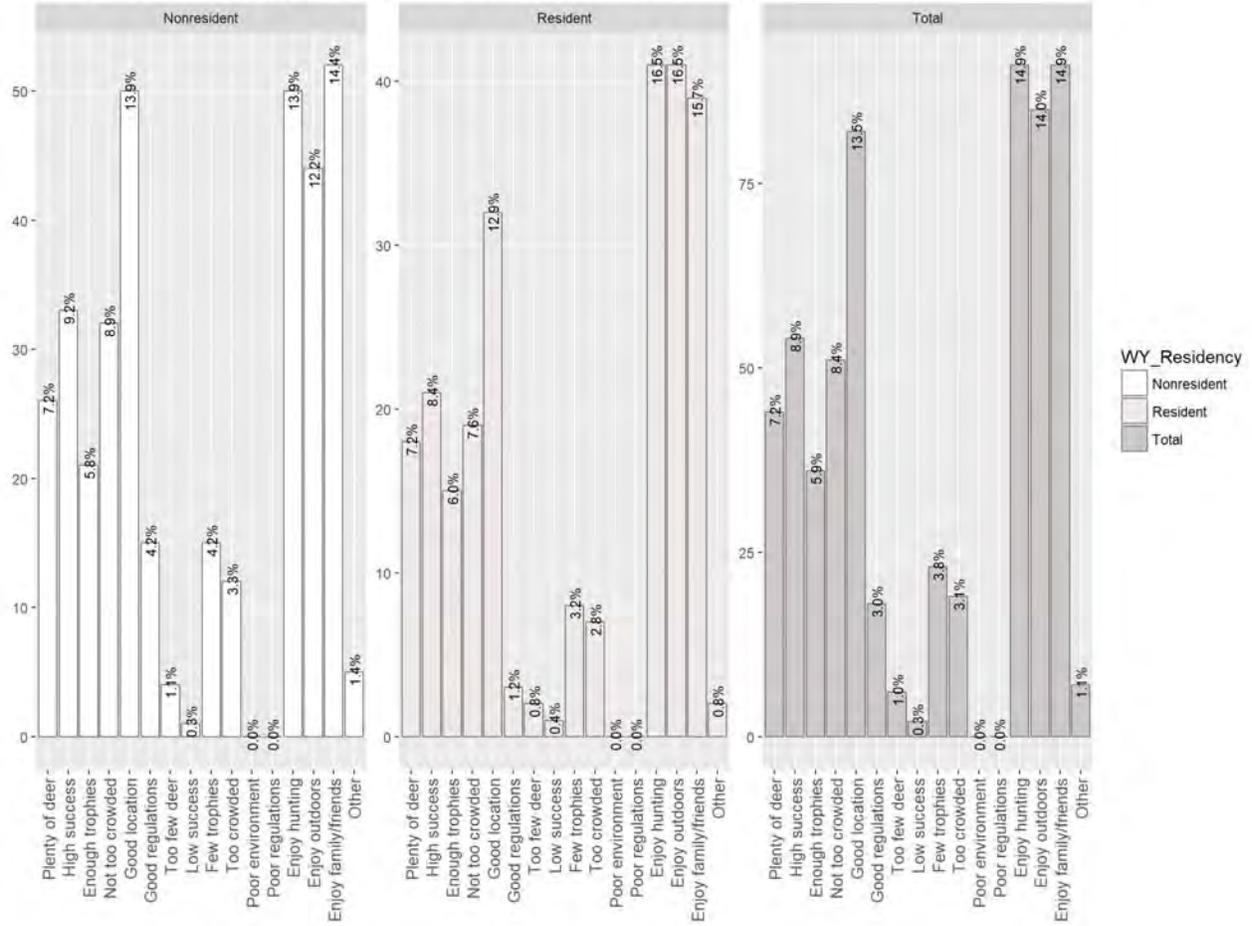
How satisfied were you with the overall quality of the hunt?



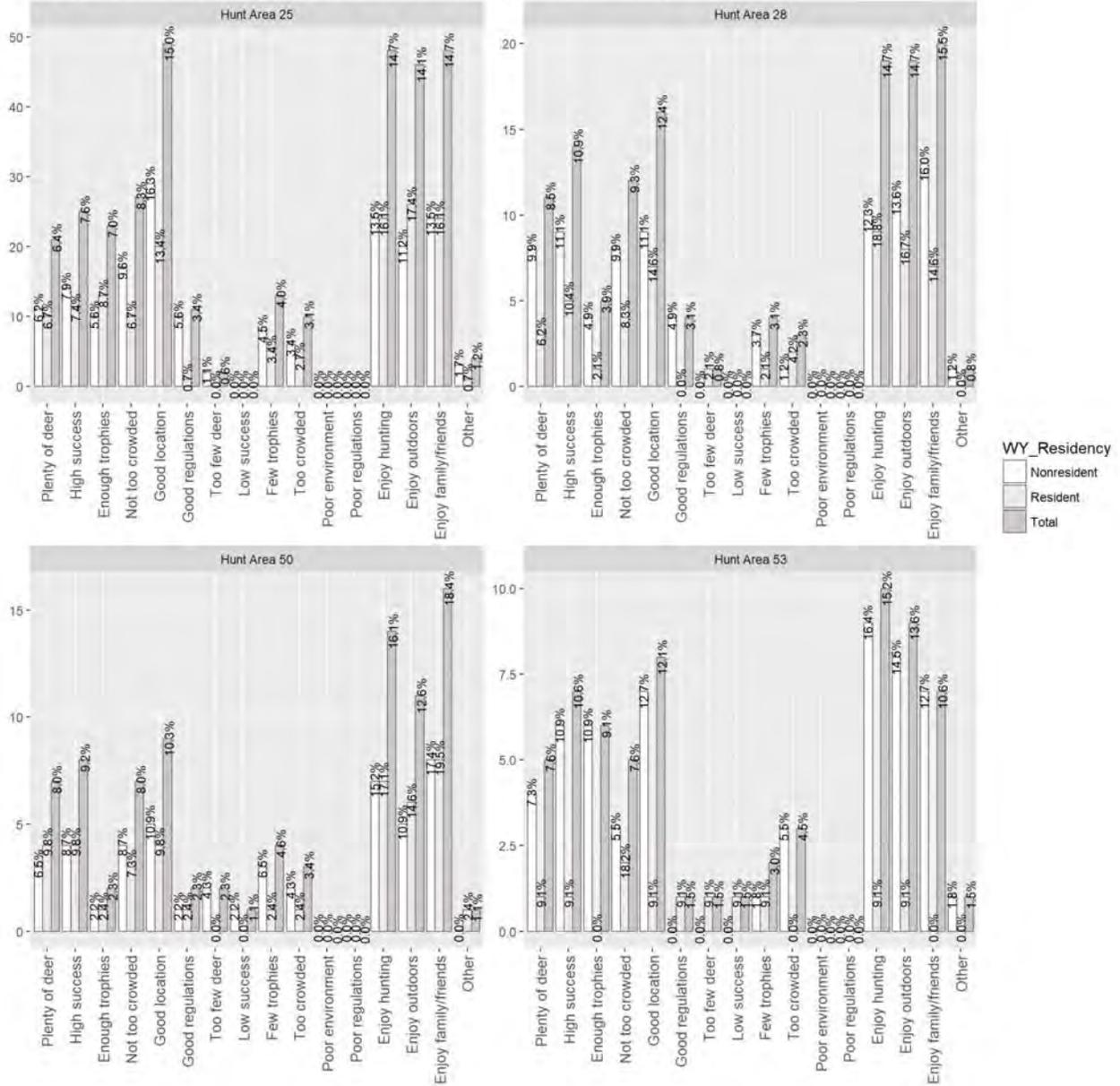
How satisfied were you with the overall quality of the hunt?



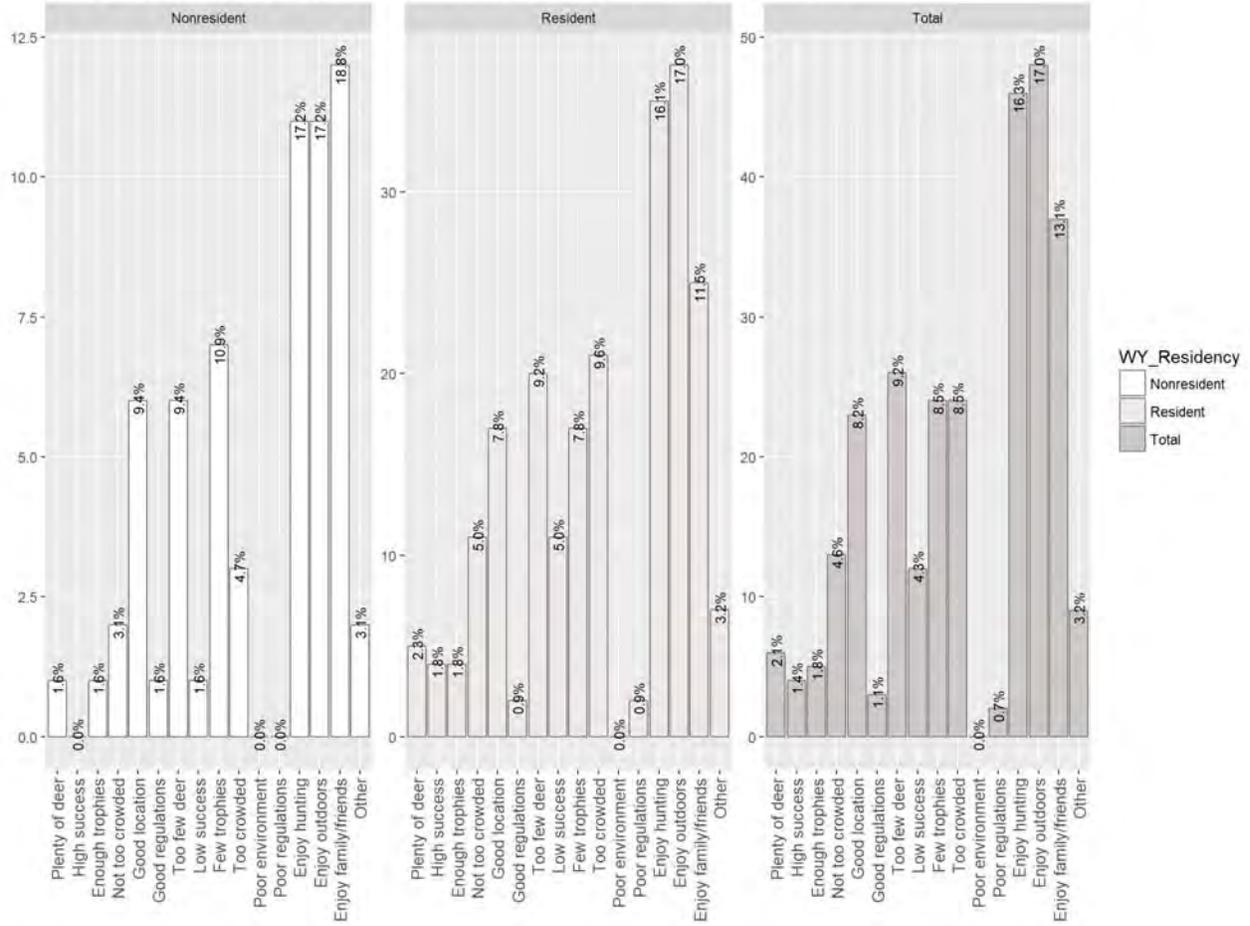
What were the reasons for your level of satisfaction? (Very satisfied-Satisfied)



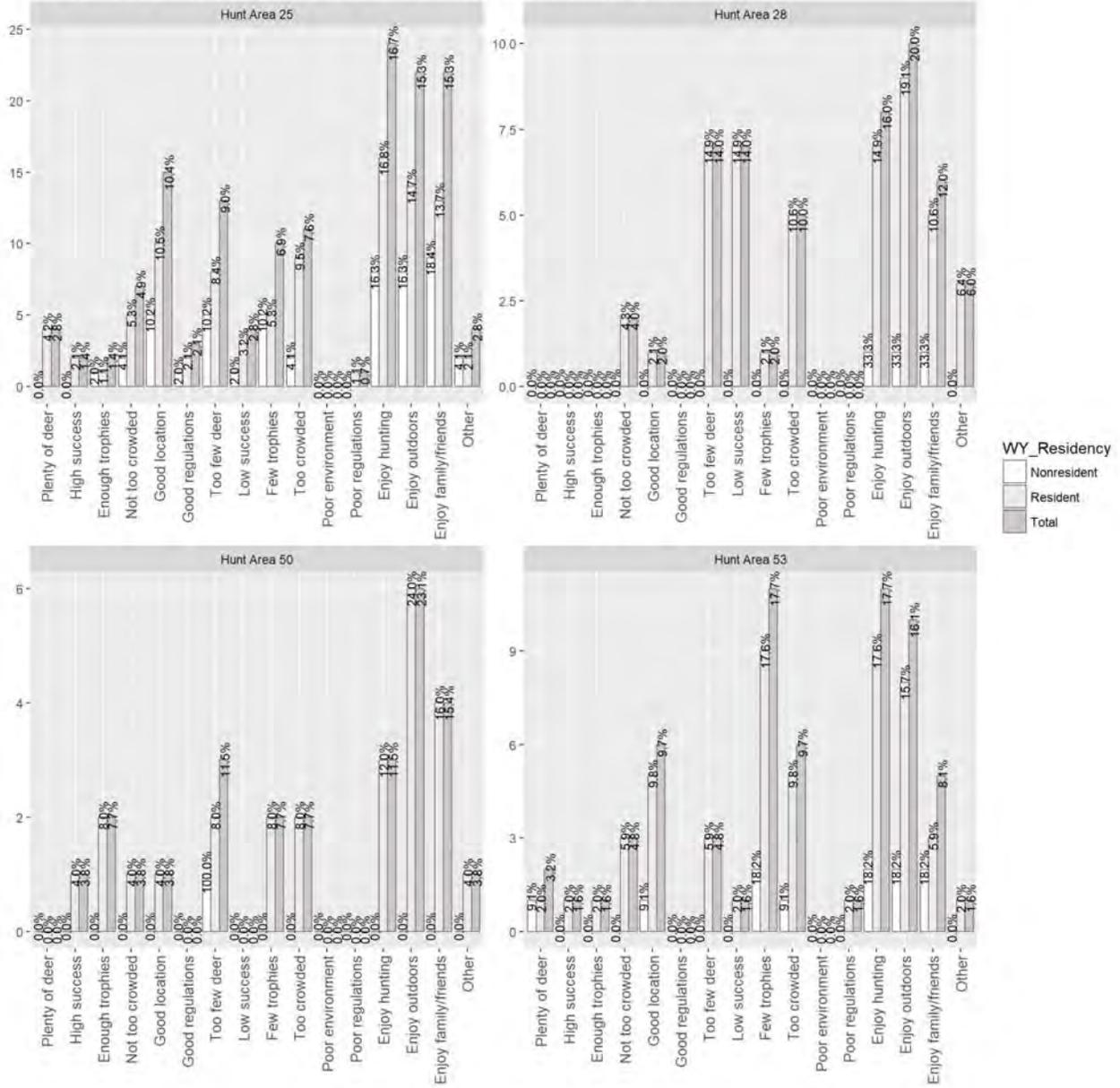
What were the reasons for your level of satisfaction? (Very satisfied-Satisfied)



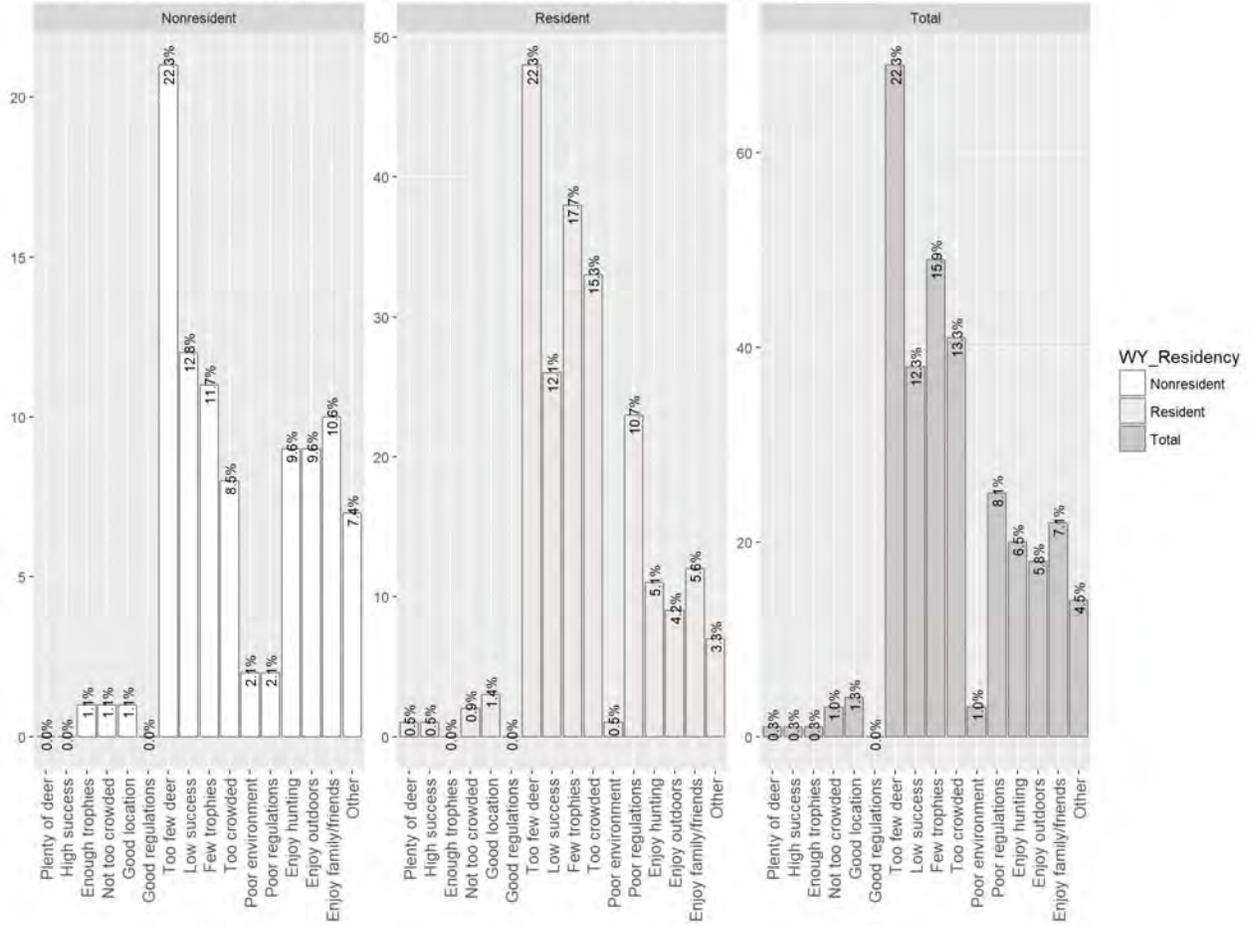
What were the reasons for your level of satisfaction? (Neither satisfied nor dissatisfied)



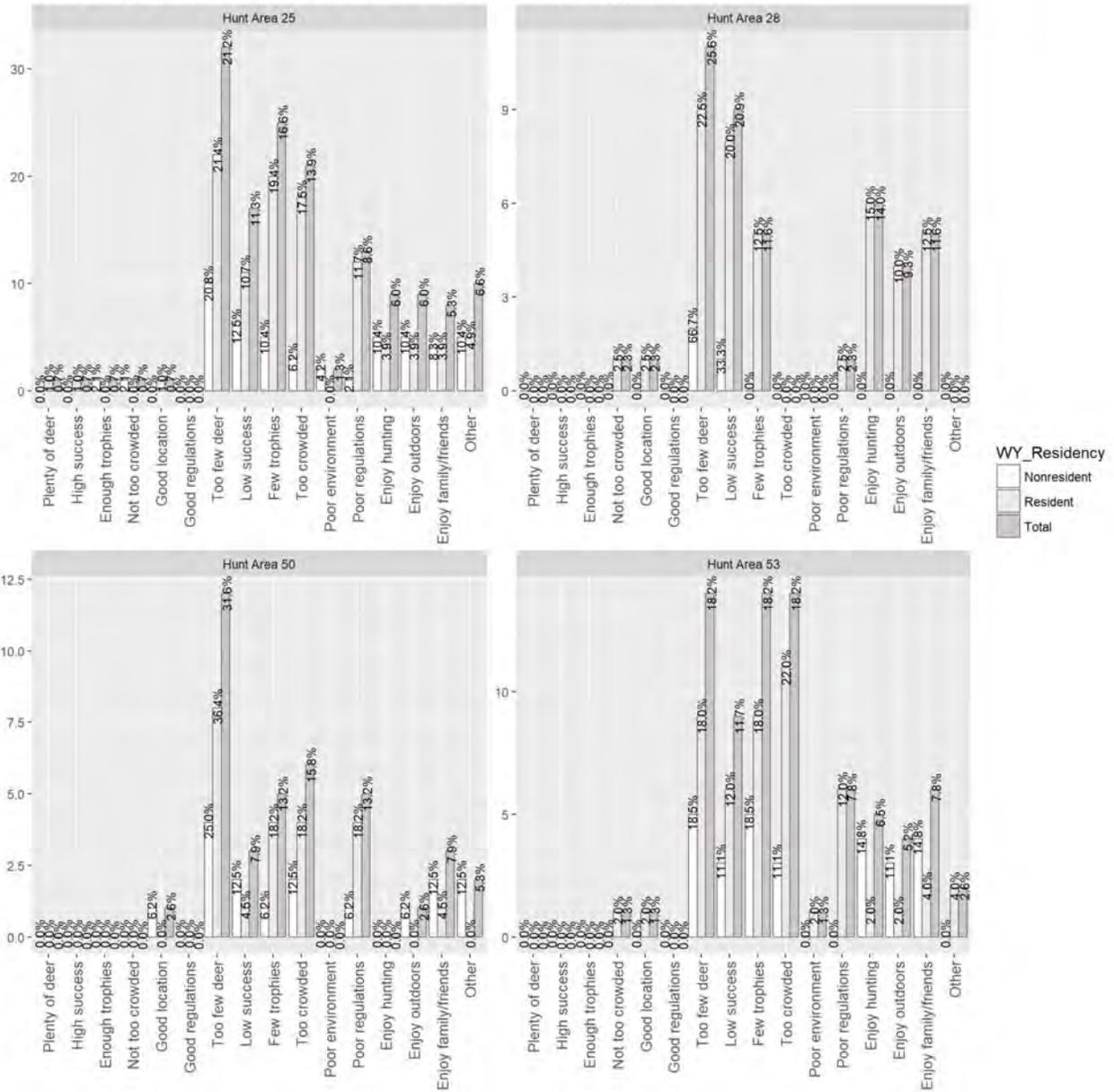
What were the reasons for your level of satisfaction? (Neither satisfied nor dissatisfied)



What were the reasons for your level of satisfaction? (Dissatisfied-Very dissatisfied)



What were the reasons for your level of satisfaction? (Dissatisfied-Very dissatisfied)



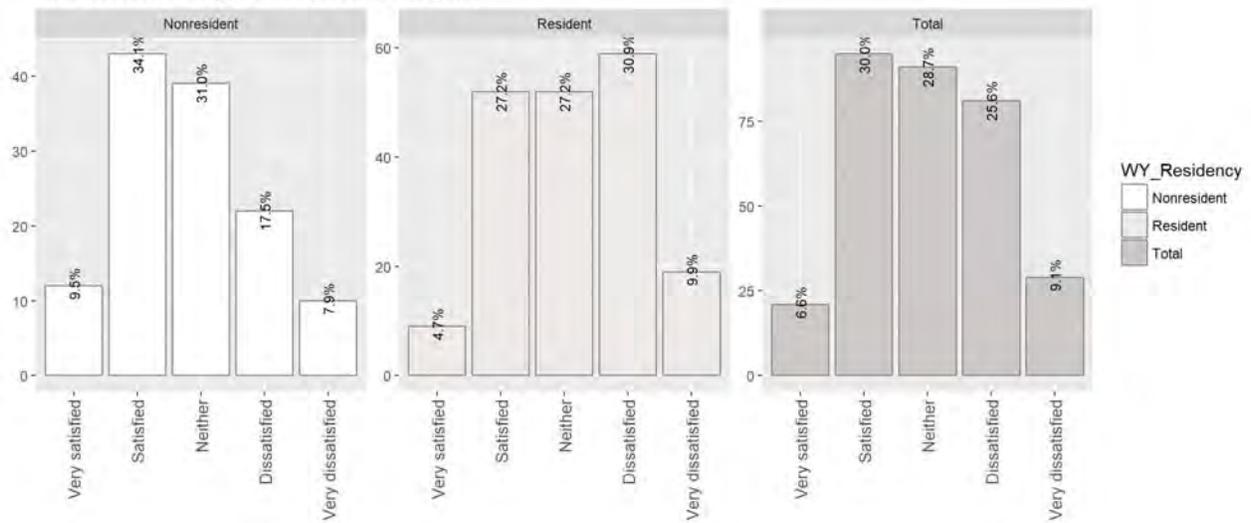
Other:

WY_Residency	Hunt_Area	Satisfaction_Overall	Satisfaction_Reasons_Other..please.specify.
Nonresident	Hunt Area 25	Dissatisfied	All the game was already spooked off the area
Resident	Hunt Area 28	Neither satisfied nor dissatisfied	I hunt elk primarily and only hunt mule deer coincidentally.
Resident	Hunt Area 53	Neither satisfied nor dissatisfied	It is a short time frame
Resident	Hunt Area 25	Dissatisfied	More out of state hunters than in state hunters. They were everywhere!

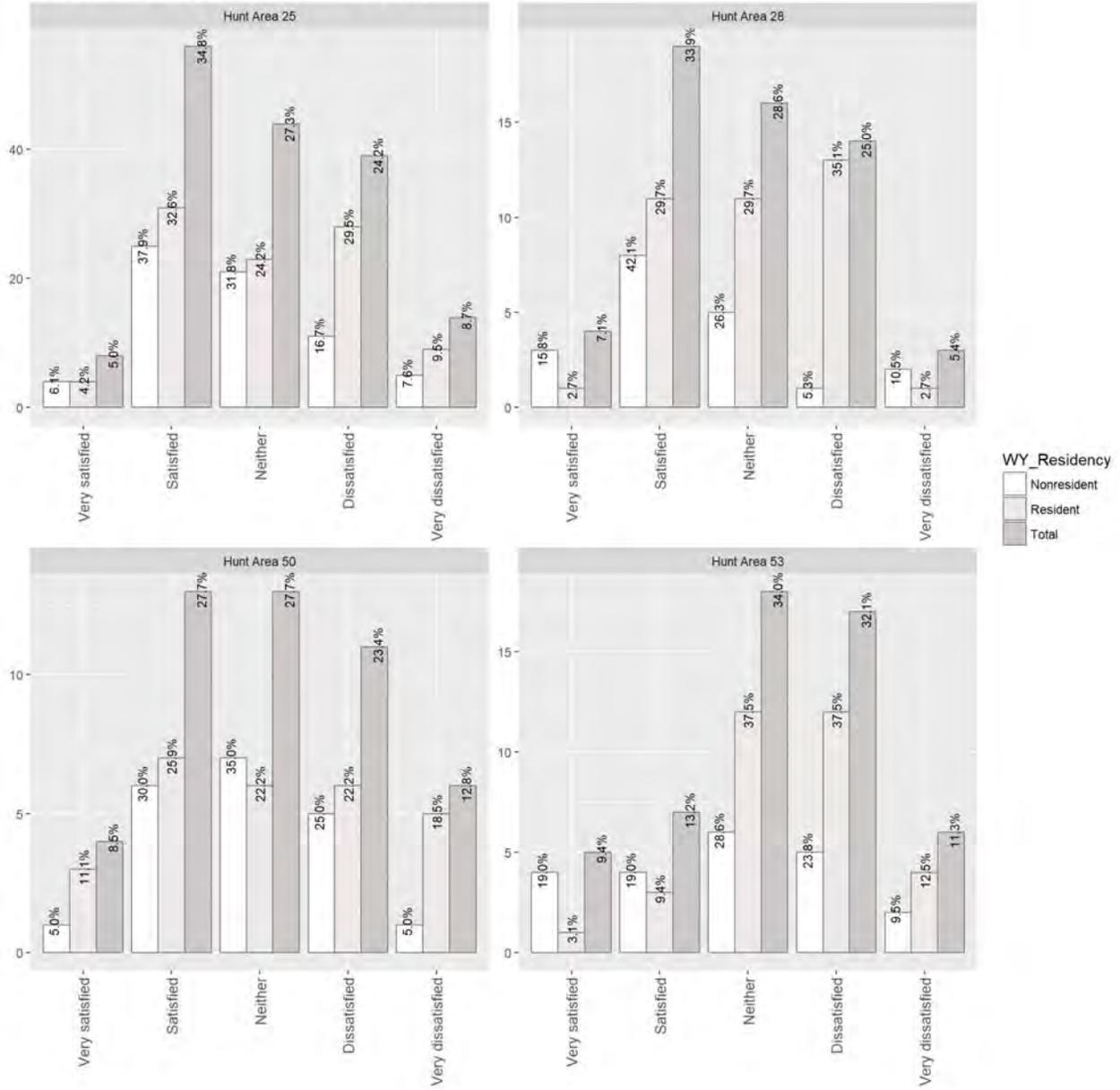
WY_Residency	Hunt_Area	Satisfaction_Overall	Satisfaction_Reasons_Other..please.specify.
Nonresident	Hunt Area 25	Satisfied	Deer numbers do appear to be down and hunter numbers were up in my area
Resident	Hunt Area 25	Very satisfied	Good whitetail numbers where I hunt
Nonresident	Hunt Area 25	Dissatisfied	The overall population seems to have dropped over the past few years and appears to be a bit more hunting pressure.
Resident	Hunt Area 25	Very dissatisfied	poor managment
Resident	Hunt Area 50	Satisfied	2017 had a good population of deer, previously 2015, 2016 the population was low.
Resident	Hunt Area 28	Neither satisfied nor dissatisfied	Elk first, deer is just a bonus
Resident	Hunt Area 25	Very dissatisfied	hardly see any deer, not quality hunt, feew does and little bucks it u see any
Nonresident	Hunt Area 25	Satisfied	Bucks are present not a high number of mature/trophy bucks
Resident	Hunt Area 25	Neither satisfied nor dissatisfied	Too many non-residents hunting mule deer specifically
Nonresident	Hunt Area 25	Dissatisfied	TOO EARLY IN SEASON
Nonresident	Hunt Area 25	Very dissatisfied	Too many predators, way too many black bears.
Resident	Hunt Area 25	Dissatisfied	The Season has gotten too short!!! Not enough time to harvest/hunt.
Resident	Hunt Area 25	Neither satisfied nor dissatisfied	People harvesting young bucks
Nonresident	Hunt Area 25	Neither satisfied nor dissatisfied	to many small bucks harvested. Especially now with crossbows.
Nonresident	Hunt Area 53	Satisfied	Mature bucks are not very numerous most years, but 2.5-3.5 year old bucks are there in o.k. numbers
Nonresident	Hunt Area 28	Satisfied	Good area to hunt when waiting to draw a limited quota license
Nonresident	Hunt Area 25	Satisfied	more trophy bucks are starting to show up still not like 1995
Resident	Hunt Area 53	Dissatisfied	Too many young deer getting harvested.
Resident	Hunt Area 28	Neither satisfied nor dissatisfied	I hunt with a camera now, even though I purchase a license.

WY_Residency	Hunt_Area	Satisfaction_Overall	Satisfaction_Reasons_Other..please.specify.
Nonresident	Hunt Area 25	Neither satisfied nor dissatisfied	I was mainly elk hunting but was dissapointed in the number of deer
Resident	Hunt Area 53	Very dissatisfied	The hunt season has been shortened too short, no snow=no bucks
Nonresident	Hunt Area 50	Dissatisfied	The deer numbers seem to be dropping
Resident	Hunt Area 50	Neither satisfied nor dissatisfied	This area has gone down hill over the last few years. A four point buck was average 5 years ago now its rare
Nonresident	Hunt Area 25	Dissatisfied	Saw very few mule deer. 6 total in 6 days of hunting and no antlered bucks. Lots of elk and moose though.
Nonresident	Hunt Area 50	Dissatisfied	A
Resident	Hunt Area 25	Very dissatisfied	Managed too much for elk. I'd like to see some limited quota deer units in the Bighorns.

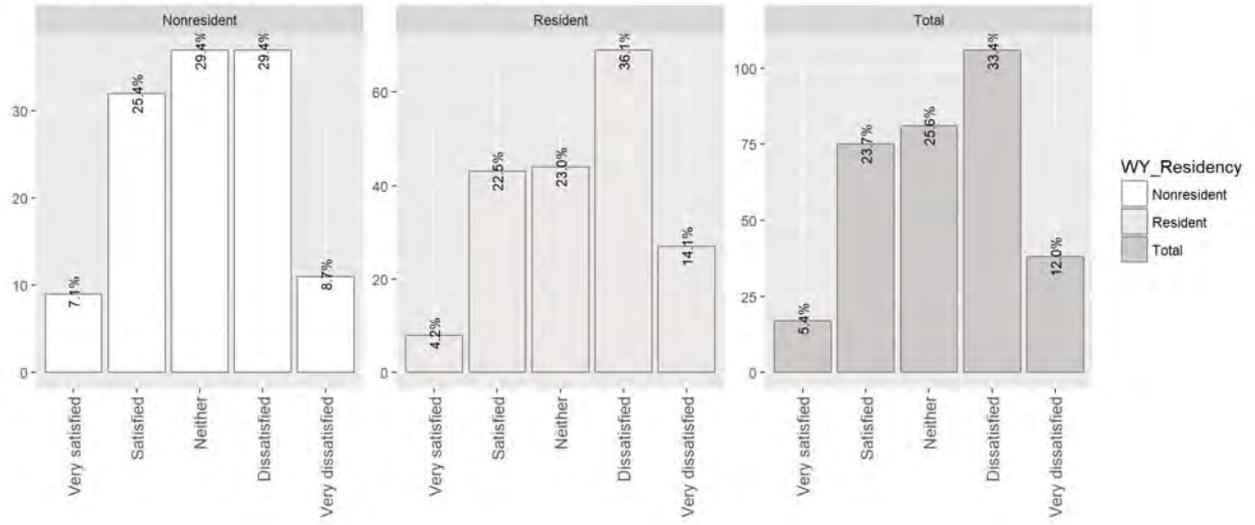
How satisfied were you with the number of deer?



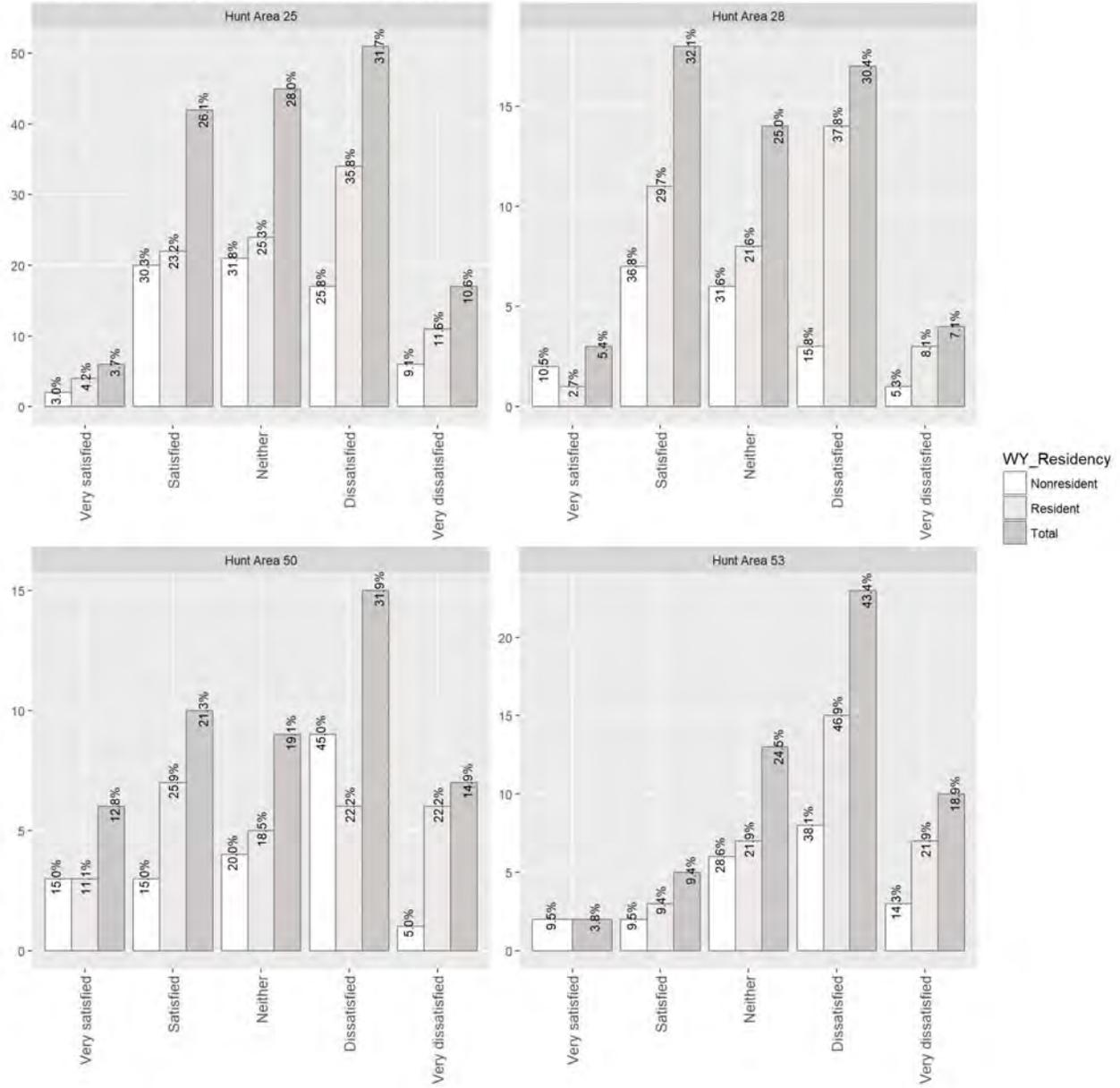
How satisfied were you with the number of deer?



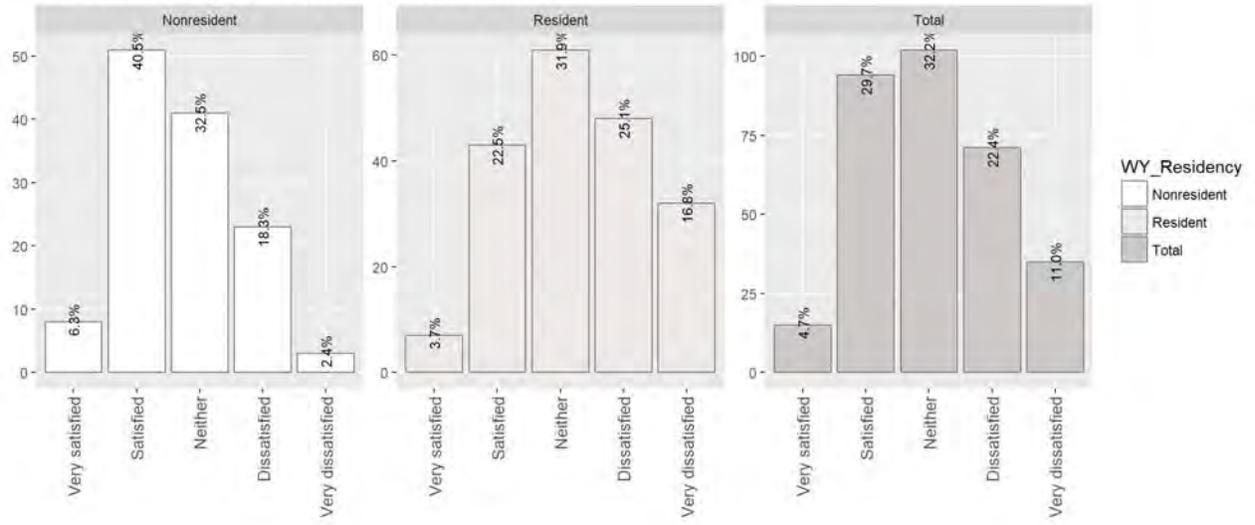
How satisfied were you with the number of bucks?



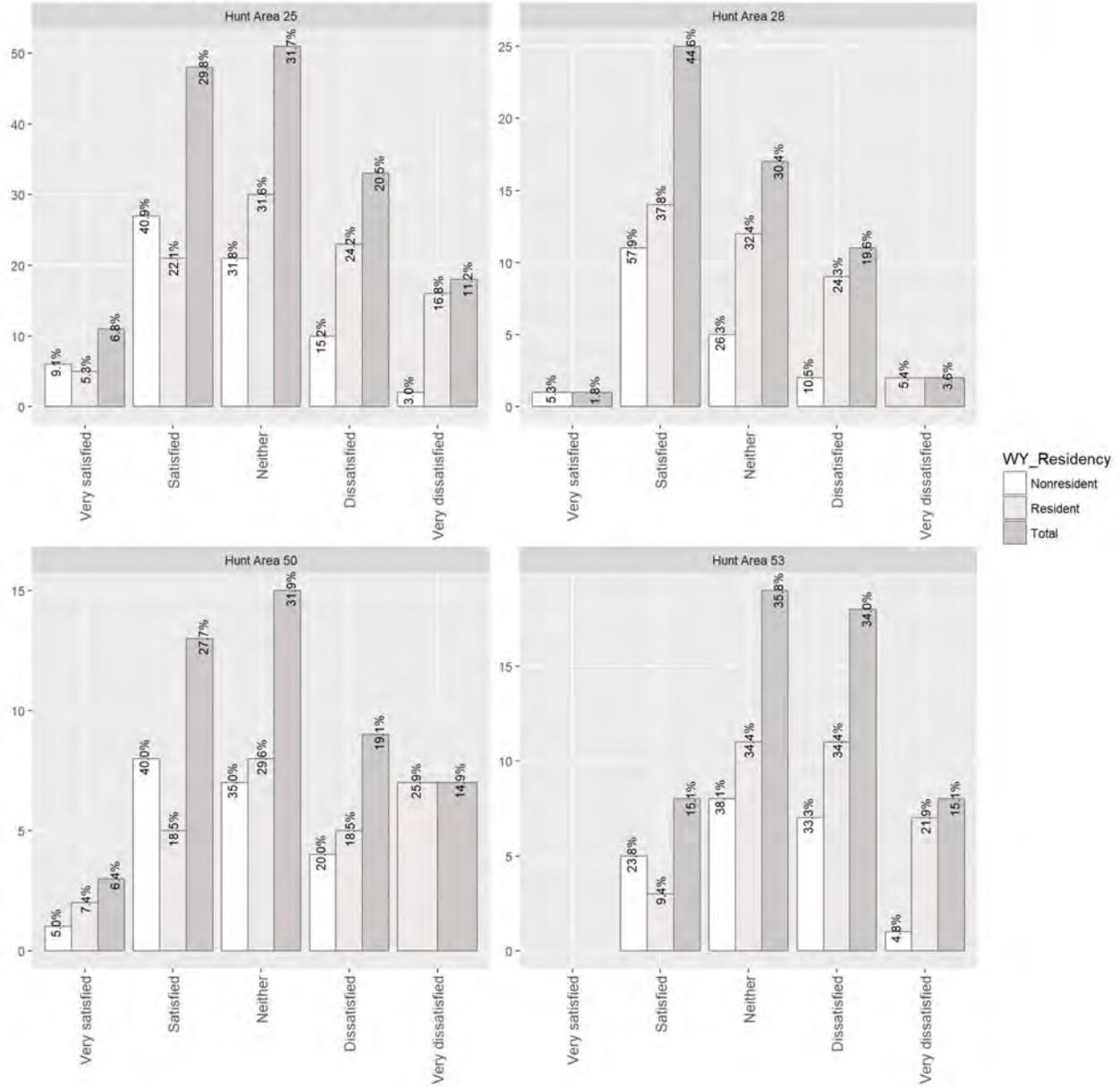
How satisfied were you with the number of bucks?



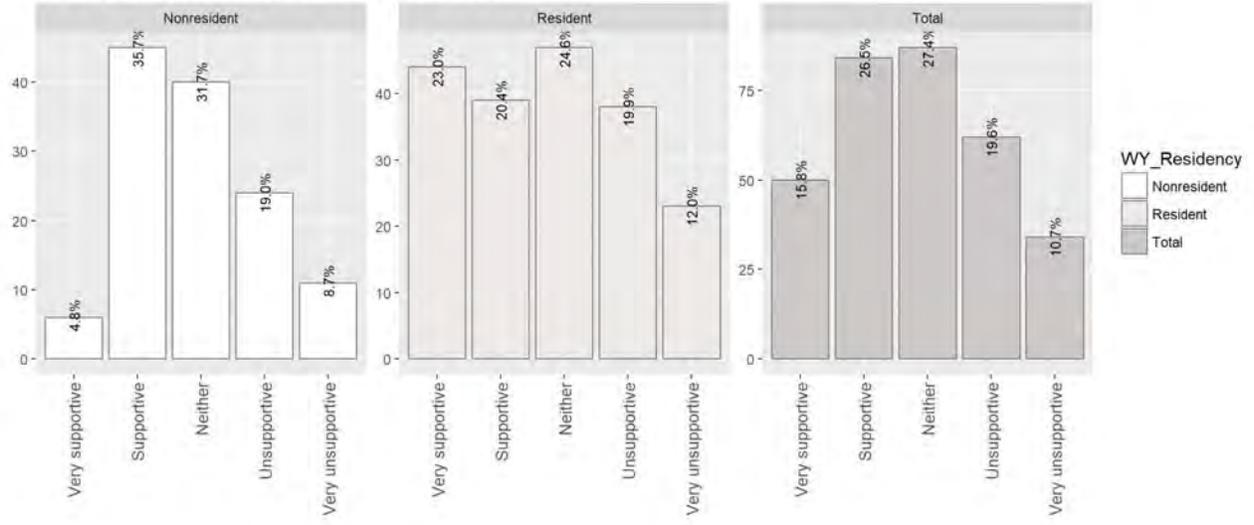
How satisfied were you with the number of other hunters?



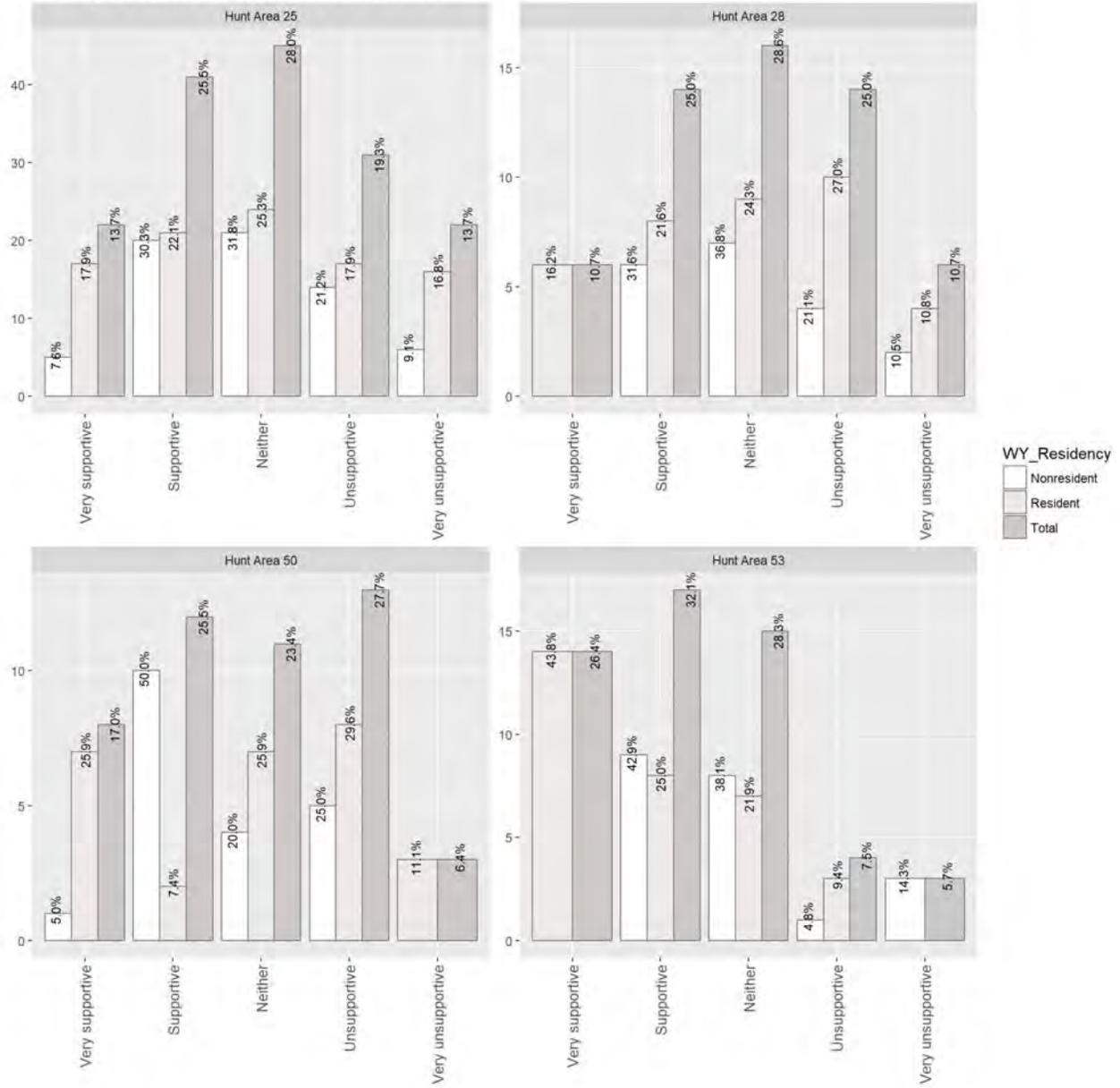
How satisfied were you with the number of other hunters?



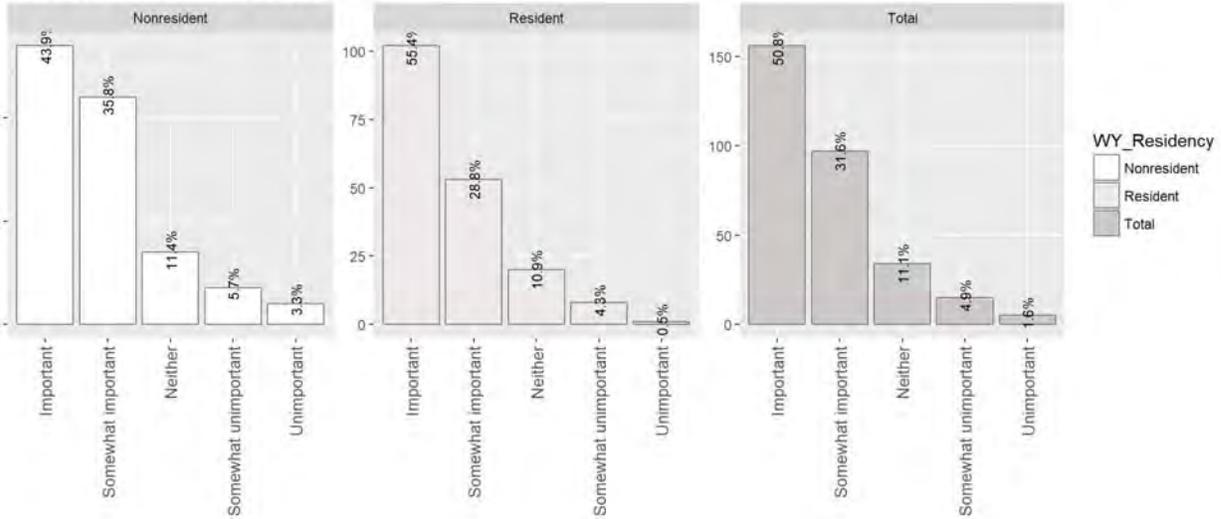
Would you support limiting the number of hunters?



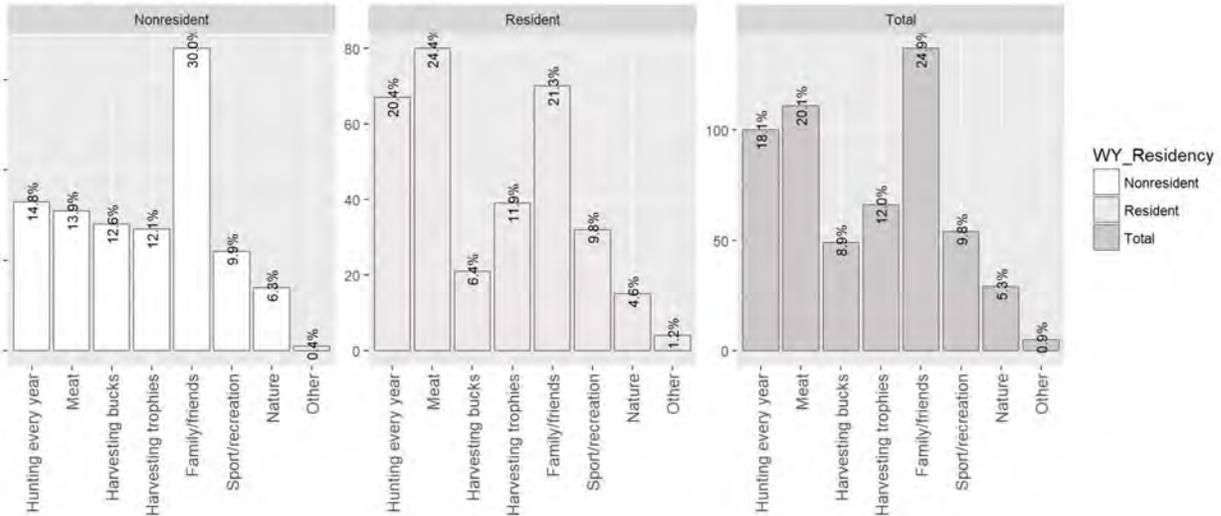
Would you support limiting the number of hunters?



How important is it to hunt every year?



What aspect of hunting is most important to you?



Other:

WY_Residency	Hunt_Area	Hunting_Aspects_Other..please.specify.
Resident	Hunt Area 50	Hunting on public land
Resident	Hunt Area 25	having a quality hunt, with a healthy herd. the deer numbers are so low that in my opinion g&f needs to have limited quota, in order to have any deer. everybody has a deer license and shots the few deer we have.. sad sad deer population. i would reather hunt less but when i did draw have a quality hunt and see deer in the feild then hunt every year and see nothing....
Nonresident	Hunt Area 25	I love the challenge that you get hunting in the mountains, the weather, the terrain, and the challenge of finding a specific animal and exclusively hunting it...its this challenge that brings my friends together, provides great meals for our bodies, and puts me in the environment that I get to see and watch many awesome things in nature we wouldnt normally see

WY_Residency	Hunt_Area	Hunting_Aspects_Other..please.specify.
Resident	Hunt Area 25	More elk tags and less out of staters
Resident	Hunt Area 25	A chance for a trophy and hunting with grand kids and family seeing deer at least even if to small to shoot

Comments:

WY_Residency	Hunt_Area	Comments
Resident	Hunt Area 25	Limit the number of hunters, especially archery
Resident	Hunt Area 50	Have a longer limited quota season with a 4 point restriction
Resident	Hunt Area 25	Maybe open a doe season and restrict buck harvest.
Resident	Hunt Area 25	Quit giving out so many doe tags in this area
Resident	Hunt Area 53	I'd like to see this area be general for archery but a draw for rifle. Archery puts little pressure on.
Resident	Hunt Area 28	Need to harvest more white-tailed deer in this area.
Resident	Hunt Area 25	The current regulations allow too many young bucks to be harvested. You should try a 4 point season restriction.
Resident	Hunt Area 53	Time to go to limited quota here. It will be unpopular, but its time.
Resident	Hunt Area 53	Yes, go to a draw.
Resident	Hunt Area 28	Too many hunters. Go to quota.
Resident	Hunt Area 28	I've never got a muley buck here
Resident	Hunt Area 25	Areas a bit difficult due to private land
Resident	Hunt Area 53	Too many nonresidents
Resident	Hunt Area 25	Every one I talk to would like to see fewer hunters
Resident	Hunt Area 25	Maybe try doe/fawn only for a few years.

WY_Residency	Hunt_Area	Comments
Resident	Hunt Area 25	Limiting tags is an obvious choice
Nonresident	Hunt Area 28	Game wardens were very helpful showing us where public access was
Nonresident	Hunt Area 53	Would be nice if there were more places to camp
Nonresident	Hunt Area 25	Save the little bucks for later
Nonresident	Hunt Area 50	Put in a point restriction
Nonresident	Hunt Area 25	This was the first year we didn't get to hunt in this area. Would like to be able to hunt in the same area every year.
Resident	Hunt Area 28	Would like to see better access
Nonresident	Hunt Area 28	Regulations are good right now. Why change it?
Resident	Hunt Area 25	Restrict to 3 points or better
Resident	Hunt Area 25	Restrict to 3-4 points
Nonresident	Hunt Area 25	I think there are a lot of white-tails in this area
Nonresident	Hunt Area 50	Restrict harvest of small bucks
Nonresident	Hunt Area 25	Deer chased off the mountain by early snow fall
Resident	Hunt Area 25	Increased cat populations seem to be impacting the deer population
Nonresident	Hunt Area 25	Deer end up on the private property
Resident	Hunt Area 25	Too many people, fewer deer every year.
Nonresident	Hunt Area 25	2 out of 7 of our party harvested bucks.
Nonresident	Hunt Area 25	We need a few general areas with high deer numbers to engage the hunting community.
Nonresident	Hunt Area 25	Some of the problems might have to do with the weather

WY_Residency	Hunt_Area	Comments
Resident	Hunt Area 25	manage for larger bucks
Nonresident	Hunt Area 28	Doing a good job!
Resident	Hunt Area 28	No.
Nonresident	Hunt Area 28	I think Wyoming does a good job in animal management for the state.
Resident	Hunt Area 53	Start limited quota in these areas. This would give the population a chance to possibly recover. It would cut down on hunting pressure. Due to relatively easy access to a good portion of these areas there are a lot of hunters in the field. A high percentage of these hunters shoot the first animal they see, unfortunately this is most often the younger animals. I would whole-heartedly support a limited quota hunt in these areas even though my possibility to hunt deer in these area would be very limited. I believe the deer population would greatly benefit from this option.
Resident	Hunt Area 25	Open mule deer doe for harvest. Ive seen a ridiculously healthy mule deer doe population and believe they should be open for harvest. Type 9 all the way!
Nonresident	Hunt Area 50	More quality bucks would make this a great place.
Resident	Hunt Area 25	More effort on habitat on the winter range.
Resident	Hunt Area 50	Separate seasons for elk and deer.
Resident	Hunt Area 28	Limiting the number of hunters is fine if the chance of success goes up accordingly.
Nonresident	Hunt Area 53	For the most part, I think that the Wyoming fish and game do a fine job at managing there deer herd, however as much as I want to hunt every year, I do think a decline in buck tags is necessary.
Resident	Hunt Area 53	Restrict harvest to 4 points or better as is being done in other areas in SW Wyoming.
Nonresident	Hunt Area 25	Notably fewer deer in 2018, but was still able to find some good bucks. But doe numbers seemed to be way down.
Resident	Hunt Area 25	Reduce the number of hunters or put a point restrictions in place so your not shooting all of the yearling bucks.
Nonresident	Hunt Area 25	Try to eliminate the rampant road hunting taking place. Gives hunting a black eye.
Resident	Hunt Area 50	3 point or larger to havest.
Nonresident	Hunt Area 50	Encourage the Forest Service to maintain major access roads like Hunt Mountain to improve hunter distribution.

WY_Residency	Hunt_Area	Comments
Resident	Hunt Area 25	I believe if we went to a harvest for bucks based on the number of points it would generate a more mature deer population. I see many out of state deer hunters that don't get off the beaten path and harvest spike or 2 point bucks. I try for 4 points on a side or bigger in the hopes that the younger buck I passed up will become a trophy animal at a later date in time. As well as pass on favorable genetics.
Resident	Hunt Area 25	Decrease the amount of hunters allowed to hunt each area
Resident	Hunt Area 50	Limit out of state tags. 4 point antler restrictions.
Resident	Hunt Area 53	Less non-resident deer licenses & a 4-point or better regulation.
Nonresident	Hunt Area 28	more regeneration to support more deer food sources could be better if you cut more trees
Resident	Hunt Area 53	Four points on one side rule
Resident	Hunt Area 50	No
Resident	Hunt Area 28	Based on my one year of hunting deer in this area I would suggest limiting the number of licenses in these areas to increase the population. There are other areas with bigger population we could hunt.
Resident	Hunt Area 28	No
Nonresident	Hunt Area 25	Do what you are doing
Resident	Hunt Area 25	Area 25 used to have a lot of mature mule deer bucks. They are few and far between now. Put a point to system in for harvesting bucks, 4 point on at least one side or better. The bucks aren't getting a chance to grow, when every out of state Hunter and some locals I assume, shoot the little guys right off the roads. They never get a chance to mature.
Resident	Hunt Area 53	put the 4 point or bigger rule back in
Resident	Hunt Area 25	Get rid of nonresident hunters. I know you won't because they are game and fish cash cow.
Resident	Hunt Area 50	I don't know what happened but numbers had been down for several years, last year they seemed to come up and I was seeing more deer and more bucks. I wouldn't mind making these areas a 3pt or better area when gun hunting, so those first year 2pts can live through the season until they turn 2 1/2.
Resident	Hunt Area 50	Limit the bucks killed and give out some doe tags would help.
Nonresident	Hunt Area 25	I have hunted area 25 for 7 years now. I have seen a decline in deer numbers each year. The buck population is slowly following that number. The overcrowded statement has to do more with road hunting in that unit more than anything, vehicle traffic makes it tough with roads running on top of good deer basins. I really think having the deer up there separated into type 9 archery tags and type 1 rifle tags would help a lot. I am not sure if the idea of starting the archery season even later than Sept 1st would benefit that area or you guys when it comes to non resident sales. I love the area I hunt in and would love to see the numbers back to where it was in 2012-2016. Type 9 and 1 tags are the way to go I believe.

WY_Residency	Hunt_Area	Comments
Resident	Hunt Area 25	plan and simple limited quota and build the heard up and keep it that way to sustane a healthy herd. you cant have a general area on public land, to much pressure.. bows shot farhter and guns shot farther. the deer dont stand a chance, other than limit the number of hunters to have a good population and a quality hunt when u do draw.
Resident	Hunt Area 50	As a whole, I feel the state of Wyoming does an excellent job of balancing general deer areas with limited quota areas. Any change that moves towards more limited quota areas on the premise of reducing hunter crowding would forever reduce opportunities for the average hunter. Tell me the last time a hunt area for deer, elk, or antelope went from limited quota to general. Please do not go down the slippery slope of fewer general areas un less a herd is in serious jeopardy. The north bighorn deer herd is below objective in terms of total deer numbers. It is my understanding buck to doe ratios are within the range of 20-30 bucks per 100 does. I encourage Game and Fish to address fawn recruitment and survival to the best of their ability before any regulatory change to hunting is made. I really hope Game and Fish leaves the north bighorn deer herd as general deer areas. My son and I hiked in 2 miles into one of the rare roadless areas in deer area 50 last season. In one day of hunting we saw zero hunters, 5 bucks, including one very respectable buck that we failed to get within 300 yards of for an ethical shot. Keep up the good work and stand up to the vocal minority - not every hunter is a trophy hunter! Thanks!
Resident	Hunt Area 28	no
Resident	Hunt Area 50	I would love to see a point restriction, even if it is 3-points or better. There are far to many 2-points killed each year when they are young and dumb. Let them get a year older. I understand this may mean some people will walk away from a 2-point they shoot, but it still saves a ton of other 2-points from almost certain death by lazy hunters shooting the first legal buck they see.
Resident	Hunt Area 25	If WG&F does not actively support passing legislation to give Residents preference points for elk, deer and antelope I am going to stop buying general licenses when I do not draw a license. It is patently unfair for non-residents to get pref points and not give them to residents.
Resident	Hunt Area 28	Consider having livestock removed from the National Forest earlier and reduce the amount of non-resident licenses.
Resident	Hunt Area 53	these areas need to be limited quota. To many people and not enough deer
Nonresident	Hunt Area 25	Limited licenses or impose size requirements
Resident	Hunt Area 53	Point restrictions or limited quota on bucks
Nonresident	Hunt Area 25	no
Resident	Hunt Area 25	Move the beginning of bird season to September 15th. Give the Archery hunters both deer and elk a chance to hunt with out gun shots going off. In the past 4 years I have had bird hunters shoot way to close to me while I was stalking a deer.
Resident	Hunt Area 25	Make deer tags area specific, not just general. Seems most non-residents hunt the northern Bighorn mtns. Limit non-resident tags per individual hunt area. No, multi area, general tags to non-residents
Resident	Hunt Area 25	None at this time.

WY_Residency	Hunt_Area	Comments
Nonresident	Hunt Area 50	Well, my group and I hunted out there twice. The first trip we didn't get anything, and the second trip we tagged out. Which is the way it goes. But we stopped applying because the draw rate is so low. I believe it was only 25 percent of the people that apply get a tag. At least that was the last time I looked.
Resident	Hunt Area 25	1. Three points or better for a few years
Resident	Hunt Area 25	Put in an antler restrictions 3 points or more
Resident	Hunt Area 25	Put an antler point regulation on the bucks to be harvested to improve heard qualitys and larger buck numbers.
Resident	Hunt Area 53	change buck regulations to 4 pointer or better for several years to increase number of mature bucks.
Resident	Hunt Area 25	no
Resident	Hunt Area 53	Perhaps limit non resident licencing since a majority of the people I had contact with were from out of state.
Nonresident	Hunt Area 53	judging by the doe and fawn numbers I seen I would think the herd is doing good. lack of bigger bucks could be due to lots of reasons Maybe a point restriction on bucks ? Just a thought as i have no real knowledge on the number of quality bucks, they can get pretty sneaky when under pressure. I do feel the game and fish is doing a good job with the deer and elk.
Resident	Hunt Area 53	The local managers in the past have had some good ideas and then someone in Cheyenne stops them. Trust your wildlife managers!
Resident	Hunt Area 25	limit the amount of non resident hunters
Nonresident	Hunt Area 50	The last few years we have noticed very few bucks. Weather seems to be playing a large role in the dear moving down low where we cant hunt. Maybe have every other season so the young bucks have a chance to mature.
Nonresident	Hunt Area 25	I have hunted unit 25 since 2010, the deer numbers have always made my hunts enjoyable. I have seen some very big mature bucks over the years up there, some that may have even stretched the tape measure near 200. I supported the descion made to eliminate the hunting of antlerless mule deer. I also think this survey is great, I hope positive changes come from the information gathered from it. I think the Wyoming game and fish does a great job managing this unit and hope they continue doing so. If I could make changes or recommendations to its management, I would suggest implementing a limited tag quota unit with a type 1 season rifle only and a type 9 season archery only, and would not allow type 1 tag holders archery hunt. Years ago I thought point restrictions would have been the way to go, but after many hours of talks with my hunting partners I think we all feel the type 1 type 9 is the best way to approach this
Nonresident	Hunt Area 50	Stop giving out tags for does to the meat hunters who shoot anything to fill tags when the deer numbers are too low to start with. In the 10 years we have hunted,the deer numbers have plummeted.We are considering hunting other states if it continues this way with low deer numbers.
Resident	Hunt Area 53	Go to 3 points or better
Nonresident	Hunt Area 28	no

WY_Residency	Hunt_Area	Comments
Nonresident	Hunt Area 53	no
Resident	Hunt Area 25	Go to a four point or better rule.
Resident	Hunt Area 25	Add days to the season and closer to the rut
Nonresident	Hunt Area 25	Let wild fires burn much farther, controlled burns, focus on habitat quality, increase winter ranges, acquire more habitat, keep all public land and buy more, use different money sources for land acquisition and wild life management, control wolves and Mt lions, if needed have open archery deer seasons to allow more hunting which is low kill, increase price of licenses, increase wildlife studies including migration and safeguard migrations and winter range, restriction of land divisions and subdivisions below the Bighorns, strengthen sage grouse habitat which would improve deer habitat, elect politicians who are pro wildlife politicians unlike most Wyoming politicians who have only business interests, strengthen USFS and BLM land control, increase funding to Wyoming fish and game Dept. Thank you.
Resident	Hunt Area 53	I think we should make it to where if you harvest a buck it has to be at least maybe a 3 or 4 point to let them grow and let the gene pool build up.
Resident	Hunt Area 28	To many hunters. See more hunters than bucks.
Resident	Hunt Area 28	I am strictly a meat hunter and I am more about the hunt and being outdoors. As far as changing anything my suggestion would be for a longer season so that everyone would have more time to hunt and maybe the quality of bucks would increase due to people passing on the little bucks in my mind that increase the numbers of larger bucks and possibly more. I have only harvested small bucks and spend most of my days hunting area 28. Thank you for including me in your survey.
Nonresident	Hunt Area 25	Let nonresidents hunt wilderness. Ive hunted around the world including humans in Viet Nam. Dont tell me Im not competent to survive in federally held lands witout a minder. Overall deer management plan seems to be working, thank you.
Resident	Hunt Area 25	The survey only allowed me to choose one hunt area. However, the answers provided above can be applied to each of the hunt areas associated with this survey. The one aspect that I feel could use improvement across the entire North Bighorn herd is the overall number of bucks (especially 4+). Shortened seasons or incorporating an antler point restriction will not necessarily provide a long term increase in age structure of the herd. However, limiting the number of hunters can. Look at deer hunt area 87 as an example.
Resident	Hunt Area 50	It would be nice if the WGF was honest with sportsmen. G&F says bowhunters harvest most of the deer taken and we need to cut the archery season. I agreed assuming that was the case, until I looked up the statistics and found that non-residents kill by far the most archery killed deer. And you want to limit the residents too? I was misled by at least 2 G&F people by far. (No, Dustin you weren't one of them) You biologists keep saying the habitat in the Bighorns is so bad the deer are doing poorly. That is the biggest bunch of BULLSHIT I or any other sportsmen have ever heard of. If you guys would tear yourselves away from those computers and actually drive up on that hill and look around from time too time It would help everyone out a lot. Perhaps you could cite me some studies you have done on the browse. I contacted the USFS and asked them about the browse for deer specifically and was told it is better than it has ever been. Perhaps if the WGF would quit selling a gazillion licenses just to make money at the expense of the resident sportsmen it would be a start. By the way, why don't you stop people in the backcountry and ASK them their opinions instead of these cheesy computer questions. You are sitting at your computers doing the work you should be doing on foot or from a pickup.
Nonresident	Hunt Area 25	season should start later. Too many predators. Don't know why there needs to be so many Black Bears. We also see a lot of coyote and Mountain Lion tracks when there is snow.

WY_Residency	Hunt_Area	Comments
Resident	Hunt Area 28	Leave it as a general zone. There are large numbers of deer in the archery season and deer timber up in the rifle season. Good chances of harvesting a trophy buck no need for a limited quota
Resident	Hunt Area 25	Please carefully consider some sort of point rule for mature mule deer. The # of mature deer does not seem to lineup with the reduction in season dates.
Nonresident	Hunt Area 25	my experience in area 25 is limited but we saw bucks almost every day from 9/1 to about 9/15. there were bucks of various ages. my hunting partners did say that the overall number of bucks seemed lower than in previous years.
Resident	Hunt Area 25	To many non residence are shooting immature small mule bucks. I will not shoot a small mule buck, would rather shoot a whitetail deer. Non residence will shoot any mule deer just to fill their tag because they don't have mule deer where they come from. This is one reason I feel there are a lack of quality buck mule deer in all of these units listed in this survey
Resident	Hunt Area 50	People need a place to go hunting. Not drawing a tag for several years has forced me to hunt General Areas. Without that opportunity I can see how people would lose interest in hunting all together if drawing tags continues to be this difficult. I love hunting, but if was forced to sit out for several years because I could not draw a tag, I would find a new hobby. Many friends feel the same way and some have even abandoned hunting General Areas.
Resident	Hunt Area 28	Not sure why the numbers are down, but if less pressure would help to bring back the herd I'm all for it.
Resident	Hunt Area 25	No comment
Nonresident	Hunt Area 25	You should open up doe hunting in region Y
Nonresident	Hunt Area 53	The reason i was unsatisfied with the hunter numbers was because an elk season opened the same day.
Resident	Hunt Area 53	without much thought, doe/fawn tags when necessary and allow younger bucks to mature if possible. Go back to Nov 4 close date and less nonresident tags.
Resident	Hunt Area 53	Consider going to limited quota in 53 but go back to the longer season with a little bit of rut hunting. I hate to see the general season go but the quality of the hunt has been poor.
Resident	Hunt Area 25	Eliminate all the whitetail that have ruined the mule deer habitat. I've been here for nearly 50 years, and the maggots have taken over everywhere. I rode nearly to the head of the south fork of the Shoshone and all whitetail up the river.
Resident	Hunt Area 25	Not at this time
Nonresident	Hunt Area 53	I think having a antler-point restriction for Mule deer would help give younger bucks a better chance to mature in these units. Possibly imposing a restriction of 4 points or more on one side.
Nonresident	Hunt Area 53	Add an antler point restriction
Resident	Hunt Area 25	Issue fewer Non-Resident licenses for the units!
Resident	Hunt Area 25	Maybe limiting buck harvest by making it 4 point or better, but keeping it general. This would limit the number of young bucks that are being harvested and improve trophy quality.

WY_Residency	Hunt_Area	Comments
Nonresident	Hunt Area 25	Been hunting deer there for 15 years , the deer population has dropped every year don't know why. But I see elk population getting bigger.
Nonresident	Hunt Area 25	No
Nonresident	Hunt Area 25	I would like to see a point restriction. And all bows cased in a automobile , and no shooting on roads.
Resident	Hunt Area 50	do away with domestic livestock grazing, insure closed roads are indeed closed and enforced
Resident	Hunt Area 50	4 point or better for 5 years
Nonresident	Hunt Area 25	Been going to bear lodge for 25+ years and seen the ups and downs. The hunting went from great to poor and now it has been getting pretty good again. This year none of our group of 16 people drew a tag so now were all talking about finding another place to hunt. Poss Colorado or Montana. We love the bighorn mTns but it is getting too costly for the average hunter. Dont make it a rich mans sport
Nonresident	Hunt Area 53	No
Nonresident	Hunt Area 50	I think the predator pop should be controlled Saw 8to10 Coyotes a day and saw a couple of Cougars. Benn hunting in that area for over 30 years off and on and never saw that many predators
Nonresident	Hunt Area 53	I think moderately reducing motorized traffic access would have a very positive impact on allowing for more animals to reach older age classes. This would also improve the hunting experience for those willing to work a little harder to hike away from the roads.
Resident	Hunt Area 25	I believe the winter had a big affect on the deer herd last year so it was a little hard but this year so far while camping we have seen more than last year
Resident	Hunt Area 28	Do not leave pets unattended in camp sites..
Resident	Hunt Area 50	The number of groups of out-of-state hunters in this area is the only downside. I hunt in Shell Canyon, when there is early snow they all end up in the same place, which interferes with all hunting.
Resident	Hunt Area 25	Dont let the niners kill little bucks. If they want to kill little ones, shoot the doggone white tails on the farm ground
Resident	Hunt Area 25	I don't hunt deer only elk.I buy a deer tag in case I run into a nice buck. But you guys only give out elk tags to out of staters.
Nonresident	Hunt Area 25	Stop the early shooters. Stop the late night hunting. Stop poaching all together.
Nonresident	Hunt Area 53	Keep grizzly's out. Control wolves
Resident	Hunt Area 25	2 days any antlered deer then four point or more on one side rest of season. It will allow meat hunters to do there thing first couple days then allow a chance to still hint and get a chance for trophies. Gives deer a chance to grow up but also lets some young dumb ones to get killed. Makes non residents decide early if they are going to take home meat or take a chance on something bigger. Locals will squeal but after a couple years they will see more deer and in my opinion and will get over it pretty quick.

WY_Residency	Hunt_Area	Comments
Resident	Hunt Area 25	The quality of mature mule deer bucks in the northern bighorns has been in a downward spiral for 20 years. 10 years ago you could still find and see some great bucks. I outfit in the unit for elk and spend upwards of 100 days in the field. In the last 2 years I have not seen a single buck that is old think of harvesting but the meatless at the lodoes are really full of 2 point (1.5 year old deer). It's time you restrict harvest by point restrictions or limiting nonresident tags.
Nonresident	Hunt Area 25	Maybe make a 4 point restriction on bucks so the age of the Mule deer will get older. then the stronger older bucks will do the breeding and hopefully build a strong herd to make it through winters
Resident	Hunt Area 53	I have made suggestions in the past and they seemed to be over looked. I have continued to fight for something to be done in these areas, and now 5 years later Im glad we can ALL see there is a problem. In my opinion start but cutting even more non resident tags, or go strictly to a limited quota area. Limit a select few tags to a late season. This would help the success of the early season draw percentage. Also we must somehow apply a 4 point of better rule. Then a big thing to me is stop killing the does!!!
Resident	Hunt Area 28	Let hunters get one license. Choose if you want to hunt with a bow or gun. I am relatively certain there are more deer than it appears during gun season. Bow hunters have been chasing them for a month, and the smart ones are farther in.
Nonresident	Hunt Area 28	No
Resident	Hunt Area 53	Limit the amount of out of state licenses, enforce a horn minimum, extend the deer season to coincide with the elk season for that area
Resident	Hunt Area 25	The number of resident hunters in the area has risen dramatically since we started hunting the area 15 years ago.
Resident	Hunt Area 25	I have grown up in Sheridan and this unit used to be a great unit with good populations of deer, a solid buck to doe ratio and some outstanding bucks in the mix. In the past 10-15 years this area gets so much out of state and resident pressure, with harvest of the young bucks and a steadily declining deer herd, that it has become nearly a fantasy to see good bucks anymore. I would fully support this unit adopting a 4-point minimum, shorter season and much more limited access. I would like to see it as a limited quota unit to help the herd recover. It is so over-run with out of state hunters that you cannot ever expect the herd to rebound. A minimum point restriction would solve that problem. The short, almost non-existent season has done nothing to help the problem. As a resident and hunter, I would support any measure that might make this unit great again.
Resident	Hunt Area 28	Point limit. 4 or better on one side
Resident	Hunt Area 25	No.
Resident	Hunt Area 50	It seems like more nonresidents are in the area hunting on limited time. They dont see or get a chance at a mature buck and since they came so far and paid NR fees they feel they need to kill a young buck ruining the quality of the herd
Resident	Hunt Area 25	Reduce the number of non resident tags. Many non residents simply want "any buck" and thus shoot the first buck they see regardless of size. Initiate a limited entry late buck hunt in November to pull some pressure away from the general October season. Reduce livestock grazing to provide more forage for mule deer. Lengthen the general deer season to October 31. Combining this with fewer non resident tags should increase the hunting experience as with the current 7-9 day season the pressure remains high the entire time, and if weather does not cooperate to move the deer, then success is quite limited.

WY_Residency	Hunt_Area	Comments
Nonresident	Hunt Area 25	I've hunted this area off and on since 2000 and the number of deer is dramatically less now around the Hunt Mountain Rd and north of Alt 14. Elk area 40 (not sure the deer unit #) should also be have a significant tag reduction as well since that where a large number of deer go when the first big snow hits at or before hunting begins.
Nonresident	Hunt Area 50	Not at the moment .
Nonresident	Hunt Area 50	Point restrictions may be an improvement, there seems to be good genetics
Nonresident	Hunt Area 25	When the number of #'s of deer are down, the # of hunters should be down or shorter seasons to get the herd #'s up, maybe both at the same time or close the area for a year or 2 if need be.
Nonresident	Hunt Area 50	Limit residents
Nonresident	Hunt Area 25	Open the gated roads to ATVs for retrieval of harvested game only. All of the road closures are age discrimination against older hunters who no longer can pack out animals.
Resident	Hunt Area 50	Limit the bucks killed and give out some doe tags good for National Forest.
Resident	Hunt Area 25	Split the archery and rifle its time to choose your weapon species and state wide
Resident	Hunt Area 25	I believe there is a BIG problem with our neighbors to the north, that think they are entitled to whatever they want. Both deer and elk. I also think wolves starting to show up in the Bighorns will devastate the populations.
Resident	Hunt Area 25	To have a 3 or 4 point rule in place. Pretty disheartening watching people shoot spikes or fork and horn bucks.
Nonresident	Hunt Area 25	I would like to see some way to limit the harvest of young bucks. I do not support antler point restrictions as I have seen first hand the reduction of the best genetics in an area when it is used. It would benefit everyone if we could have rules more inline with sheep hunting where they need to count growth rings. Perhaps something like a mass measurement or tine length could be used.
Nonresident	Hunt Area 25	Must have 4 points or better, give less rifle tags and cater to the archers. Archers are more sportsman than rifle hunters. Archers have better edicate and respect for animals.
Resident	Hunt Area 53	It would not go over well but, I think these areas are in need of going limited quota or something. There are so many people hitting and shooting the first buck they see that numbers are not like they were in the past. Plenty of deer in areas of the mtn that are general areas.
Resident	Hunt Area 25	Overall the Bighorns have huge potential for quality trophy mule deer hunting. The habitat and landscape is amazing and the historical records show the great deer hunting that used to exist. I'd rather see some of the current elk units be changed to general and those same units be changed from general deer to limited quota. I feel the Bighorns can be managed for both species, but in different units due to the fact that mule deer and elk don't coexist in high numbers in the same area. More general units for elk and more limited quota units for deer is my wish. Thank you!
Resident	Hunt Area 50	We need to limit harvest either through 4 point or better or limited quota regs. Also quit hunting the does down on the lower lands so hard.
Resident	Hunt Area 25	Season is way to short. There are plenty of mulie does, let us harvest them in public land.

2018 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2018 - 5/31/2019

HERD: MD322 - UPPER POWDER RIVER

HUNT AREAS: 30, 32-33, 163, 169

PREPARED BY: CHEYENNE STEWART

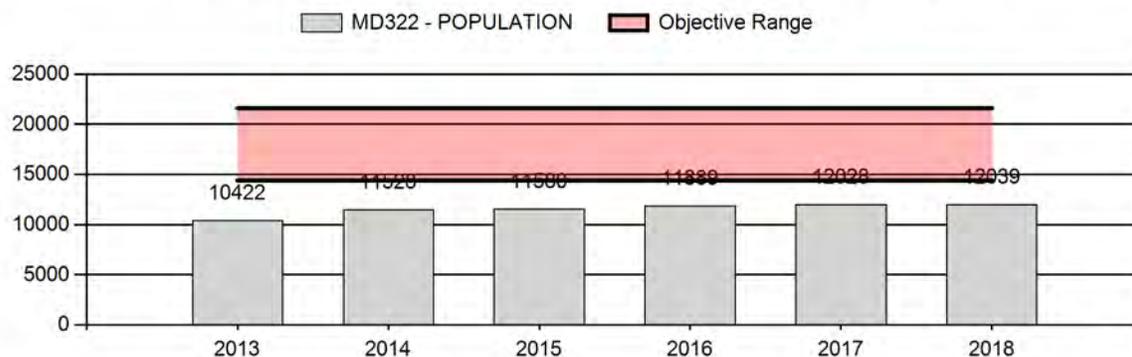
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Population:	11,489	12,039	12,495
Harvest:	886	749	817
Hunters:	1,448	1,327	1,400
Hunter Success:	61%	56%	58%
Active Licenses:	1,461	1,340	1,400
Active License Success:	61%	56%	58%
Recreation Days:	5,916	5,341	5,500
Days Per Animal:	6.7	7.1	6.7
Males per 100 Females	43	40	
Juveniles per 100 Females	71	64	

Population Objective (± 20%) :	18000 (14400 - 21600)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-33.1%
Number of years population has been + or - objective in recent trend:	15
Model Date:	2/19/2019

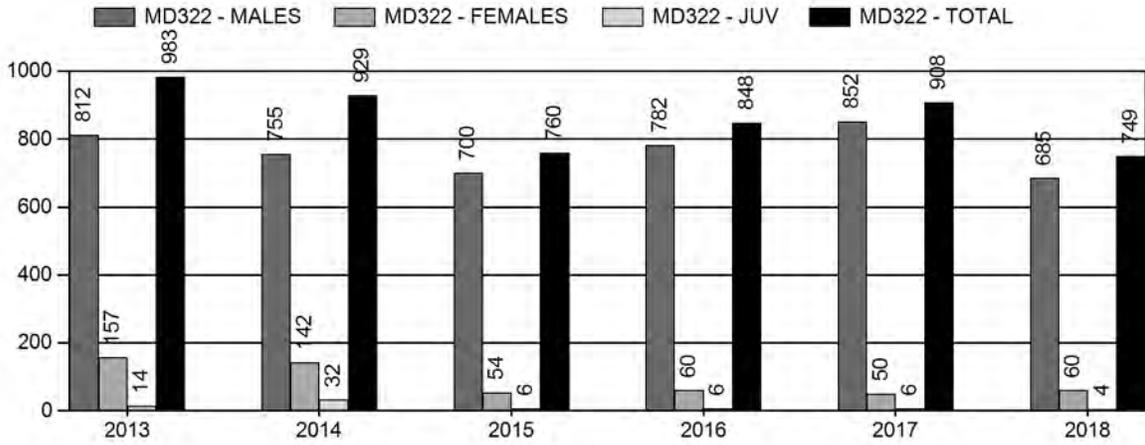
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	1%	1%
Males ≥ 1 year old:	22%	23%
Total:	6%	6%
Proposed change in post-season population:	0%	+4%

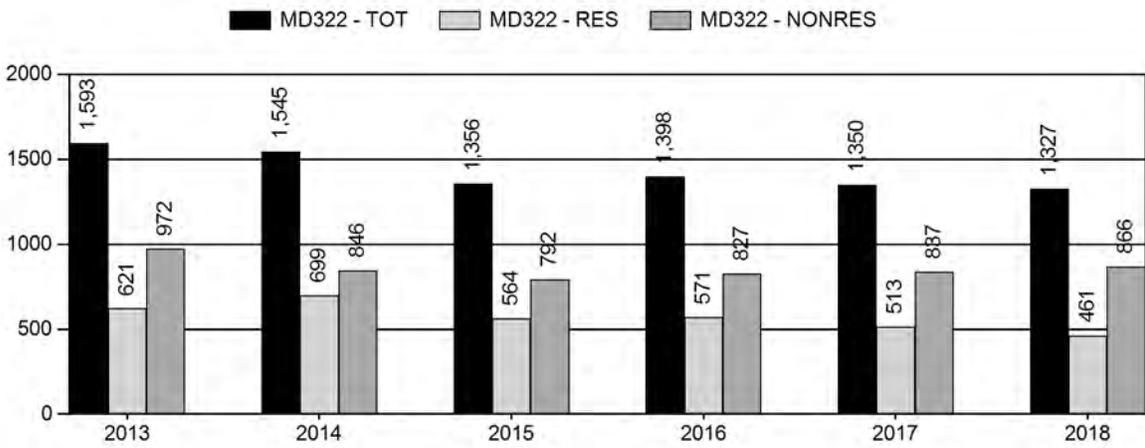
Population Size - Postseason



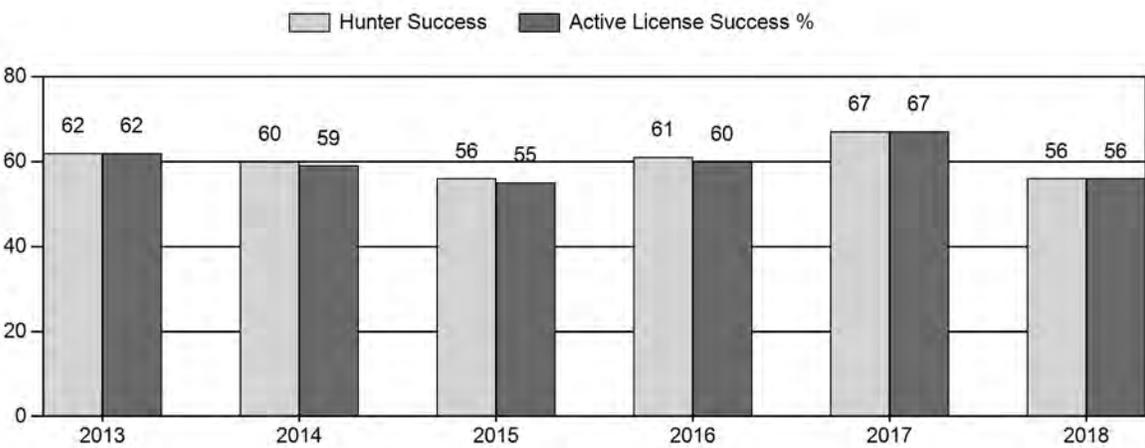
Harvest



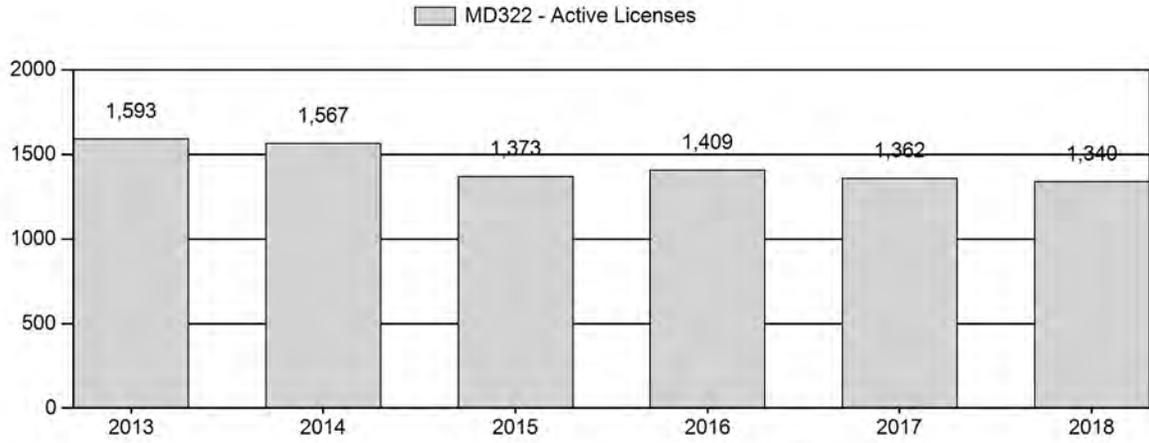
Number of Active Licenses



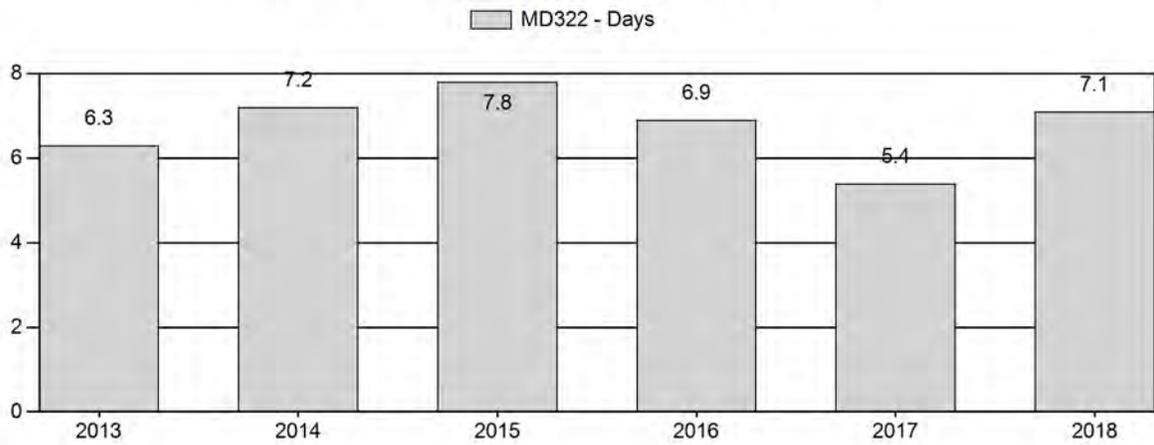
Harvest Success



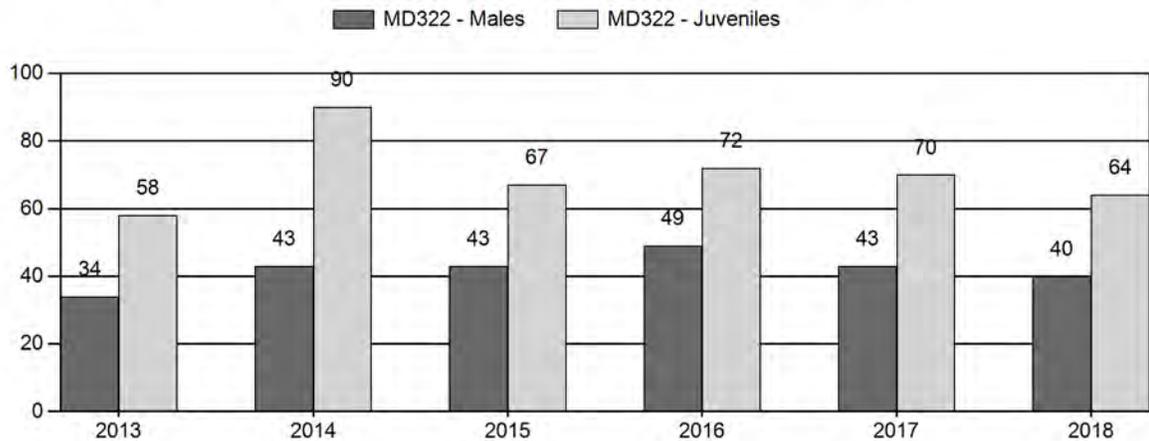
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Mule Deer Herd MD322 - UPPER POWDER RIVER

Year	Post Pop	MALES							FEMALES		JUVENILES		Tot CIs	CIs Obj	Males to 100 Females			Young to			
		Ylg	2+ CIs 1	2+ CIs 2	2+ CIs 3	2+ UnCIs	Total	%	Total	%	Total	%			Yng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	10,422	135	166	47	1	0	349	18%	1,013	52%	586	30%	1,948	1,046	13	21	34	± 2	58	± 3	43
2014	11,528	150	172	39	2	0	363	19%	840	43%	755	39%	1,958	2,177	18	25	43	± 3	90	± 5	63
2015	11,580	170	188	48	2	0	408	21%	940	47%	632	32%	1,980	1,369	18	25	43	± 3	67	± 4	47
2016	11,889	185	263	50	0	0	498	22%	1,021	45%	734	33%	2,253	1,562	18	31	49	± 3	72	± 4	48
2017	12,028	126	141	86	0	0	353	20%	822	47%	573	33%	1,748	1,440	15	28	43	± 3	70	± 4	49
2018	12,039	87	169	80	0	0	336	20%	832	49%	531	31%	1,699	1,474	10	30	40	± 3	64	± 4	45

2019 HUNTING SEASONS

UPPER POWDER RIVER MULE DEER HERD (MD322)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
30		Oct. 15	Oct. 31		General	Antlered deer off private land, any deer on private land
32		Oct. 15	Oct. 31		General	Antlered deer
33		Oct. 15	Oct. 31		General	Antlered deer off private land, any deer on private land
	6	Oct. 15	Oct. 31	25	Limited quota	Doe or fawn valid on private land
163		Oct. 15	Oct. 21		General	Antlered deer
169		Oct. 15	Oct. 21		General	Antlered deer

Special Archery Season Hunt Areas	Season Dates	
	Opens	Closes
30, 32, 33, 163, 169	Sep. 1	Sep. 30

Region	Deer Hunt Areas	Quota
Y	24, 25, 27, 28, 30, 32, 33, 163, 169	1,800

SUMMARY OF CHANGES IN LICENSES NUMBERS

Hunt Area	Type	Quota change from 2018
30, 32, 33, 163, 169		No Change
Herd Unit Total		No Change
Region Y		No Change

Management Evaluation

Current Postseason Population Management Objective: 18,000

Management Strategy: Special

2018 Postseason Population Estimate: 12,000

2019 Proposed Postseason Population Estimate: 12,500

2018 Hunter Satisfaction: 69% Satisfied / 17% Neutral / 14% Dissatisfied

Herd Unit Issues

The Upper Powder River Herd Unit consists of hunt areas 30, 32, 33, 163, and 169 and is managed by the Buffalo Wildlife Biologist. The management objective is a post-season population objective of 18,000 deer. The management strategy is special management, with the post-hunt buck-to-doe ratio goal of 30 – 45 bucks:100 does. The management strategy was changed from recreational to

special management in 2013. The herd unit was reviewed in 2018 and no changes were made. In 2014, this herd was selected as the Sheridan Region’s Mule Deer Initiative herd (WGFD 2019).

Accessible public lands are limited in the northern portion of the herd unit, but are more prevalent to the south, which receive heavy hunting pressure. Areas 163 and 169 contain relatively large areas of accessible public lands and are managed with more conservative hunting seasons. Outfitted and trespass fee hunting of private lands limit hunter access resulting in nonresidents comprising a slight majority of the hunters in this herd unit. GPS mapping technology is assisting hunters to navigate small and scattered public land areas.

Weather

Precipitation (extrapolated from PRISM Climate Group, Oregon State University, <http://prism.oregonstate.edu>, created 4 Feb 2004) from October 2017 through September 2018 (water year) was slightly higher than the 30 year average. Precipitation during the growing season (April through June) was higher than the 30 year average while the growing season precipitation for high elevation SSF seasonal ranges (May - July) lower than the 30 year average. The majority of the precipitation came during the months of May and June. Overall and precipitation accumulation was comparable to long term averages for the area (Figure 1).

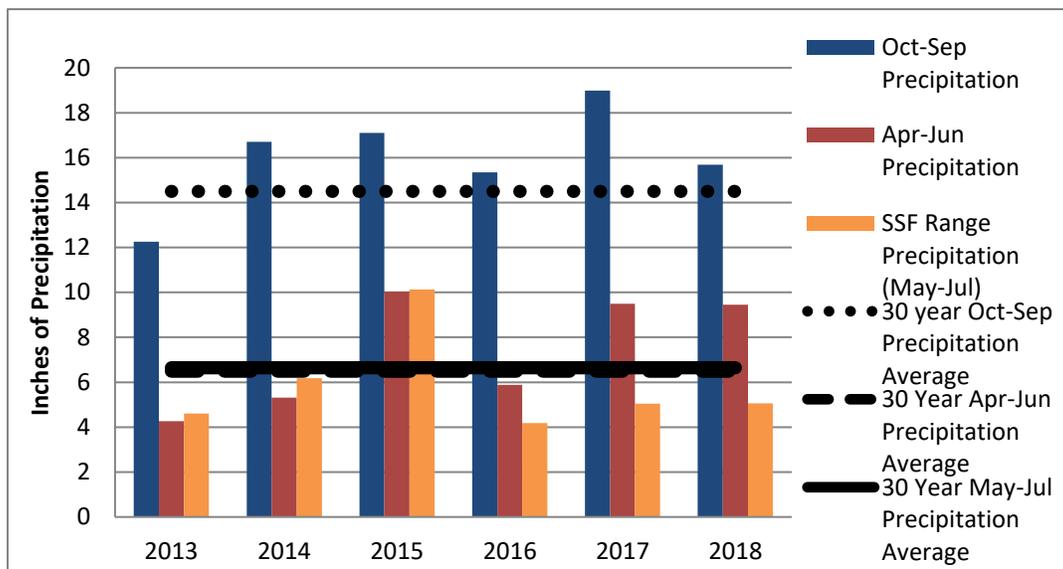


Figure 1. Water year precipitation and 30-year average for MD322 from 2013 through 2018.

Early 2018-2019 winter was warmer than previous winters, with the temperatures averaging 28.7°F during the months of November through January as recorded in Kaycee, WY. This is 1.8 degrees warmer than the 30-year average for Kaycee. February, however was much colder than average (25.0°F) with an average temperature of 14.1°F. March and April temperatures were more similar to long-term averages. Moisture accumulation recorded in Kaycee during this time-period was 1.22 inches of precipitation (30-year average is 0.99 inches) and 16 inches of snow (30-year average is 16.06 inches). The snow water equivalent measured at Powder River Pass, Beartrap Meadow, Middle Powder, and Grave Springs Snotel sites recorded February 10th, 2019 was 53%, 84%, 55%, and 62% of the official mean for those respective sites. From this data, it appears that winter conditions will have minimal impacts on wintering mule deer, given average winter temperatures and precipitation. Drier conditions at higher elevations however, may

provide less than normal moisture and could have negative impacts on spring forage productivity.

Habitat

The growing season (April – June) precipitation in the Upper Powder River mule deer herd unit appeared higher than average but didn't appear till later in the growing season (May). Mule deer Spring, Summer, Fall seasonal range (May - July) experienced a drier than average season, with precipitation 76% of average (Figure 1). It is possible these climatic conditions had an effect on habitat quality for mule deer. Due to late arrival of spring precipitation, plant phenology could have been delayed, and early green up forage could have been lacking due to the absence of April moisture. Habitat quality may also been lower than normal in the upper elevations of the deer herd, due to the drier than normal conditions observed in the Spring, Summer, Fall mule deer seasonal range. This could have effected nutritional quality of migratory mule deer that summer at upper elevations.

Two permanent shrub transects are measured in this herd unit. While the long-term trend data is informative, it is important to note that weather and habitat conditions vary greatly throughout this herd unit and two transects are not sufficient to summarize conditions for the entire area. One transect is located in a Curl-leaf mountain mahogany stand near Outlaw Cave, and the other is located in a Wyoming big sagebrush stand near Tisdale Mountain. Leader growth, hedging class, and age class were recorded in Fall of 2018. Leader production was 2.3 cm at Outlaw Cave and 2.5 cm for Tisdale Mountain. Leader production at Outlaw Cave was comparable to the ten year average (2.30 cm) while leader production at Tisdale Mountain was slightly lower than the ten year average (3.2 cm). Hedging class scores for Outlaw Cave and Tisdale Mountain were 1.5 and 1.54, respectively. Both of the scores are lower than the ten-year average those respective sites (1.71 for Outlaw Cave; 1.65 for Tisdale Mountain). Age class scores for Outlaw Cave and Tisdale Mountain were 1.98 and 2.02, respectively. Both of the scores are slightly lower than the ten-year average for those respective sites (2.12 for Outlaw Cave; 2.18 for Tisdale Mountain). Shrub utilization measurements were also recorded at these sites during spring 2019. Shrub utilization was 26% at Outlaw Cave and 10% at Tisdale Mountain. Outlaw Cave utilization was higher than the 10-year average for that site (3.38), while utilization was comparable than the 10-year average for Tisdale Mountain (11.49).

During the months of April through July of 2016 and 2017, mule deer habitat conditions were assessed using the Rapid Habitat Assessment (RHA) framework developed by the Wyoming Game and Fish Department (WGFD). Overall, habitat conditions were meeting mule deer habitat objective guidelines in the spring-summer-fall seasonal range. Alternatively, fawning and parturition habitats assessed either partially met, or did not meet, habitat requirements. The majority (64%) of winter/yearlong habitat assessed was meeting habitat objectives, while 14% partially met objectives and 21% did not meet objectives. Results indicate that riparian areas in winter/yearlong seasonal ranges are the biggest limiting factor for mule deer. Invasive species, historic over-utilization by livestock, and anthropogenic manipulation are the biggest factors that have led to the degradation of these habitats. Detailed analysis of the findings from this assessment can be found in "Upper Powder River Mule Deer Rapid Habitat Assessments, 2016-2017" (Appendix 1).

A number of mule deer habitat improvement projects have been completed with WGFD funding. One treatment type includes the removal of undesirable or encroaching species. In 2016, 702 acres of cheatgrass was treated. The removal of conifers encroaching on curl-leaf mountain

mahogany stands occurred on 1,098 acres from 2016 to 2017, with 870 additional acres planned for treatment in 2019. Conifer removal has also occurred in 22 acres of conifer encroached aspen stands, with 328 additional acres planned for treatment in 2019. Another treatment type includes establishing desirable plant species. Forty and 30 curl-leaf mountain mahogany plantings occurred in 2016 and 2018, respectively, in an experimental effort to establish new stands. Planting of deciduous browse trees has also occurred experimentally, starting with ten plants in 2016 with a goal of planting more if the initial plants are successful. Dixie harrowing was conducted on 14 acres in 2015 to remove decadent silver sagebrush and was followed with planting native grasses and forbs. For more detailed information about these projects, please refer to the WGFD's Strategic Habitat Plan annual reports (WGFD 2018).

Field Data

The post-season classification was conducted in November and December of 2018 via ground and aerial surveys. The classification resulted in 1,699 deer being classified, achieving an adequate sample size of $\geq 1,474$ deer.

Classifications in 2018 resulted in a fawn:doe ratio of 64:100, the lowest ratio since 2013. The yearling male:doe ratio (10:100) was also very low, following a higher 2017 fawn:doe ratio of 70:100. These results indicate that the 2017-2018 winter may have resulted in higher fawn mortality than expected. In addition, timing of 2018 precipitation and dry summer conditions have resulted in poorer habitat conditions than expected, leading to poor fawn recruitment in 2018.

The total buck:doe ratio was 40:100, which is slightly lower than the previous five-year average (42:100) and remains at objective. Buck ratios have remained ≥ 30 per 100 does every year since the change in management strategy to special management in 2013. In 2018, the percent of Class II (20"-25" outside antler width) bucks relative to all bucks classified (24%) was the same as in 2017 and higher than the previous five-year average (14%). The percent of Class I (≤ 19 ") bucks relative to all buck classified has varied annually from 40% to 53% in the last six years, with 50% classified in 2018. High buck ratios are influenced by the herd unit's rugged topography and conservative hunting strategies on private land.

Thirty-seven landowners responded to the post-season landowner survey. Most landowners responded that deer were below desired levels (62%), while 35% believe that deer numbers are at desired levels. One landowner noted that deer were above desired levels, which corresponds to a localized area where wildlife damage occurs. The postseason landowner survey reflects the trend of a stabilizing and potentially slowly increasing population, but low overall deer numbers.

Harvest Data

Total harvest (749) was the lowest it has been in over 30 years and continues the decreasing trend of total harvest. Historically, harvest was always greater than 1,000 deer, which has not occurred since 2011. Decreased harvest in 2018 was a result of decreased buck harvest, given that doe (8% of total harvest) and fawn (<1% of total harvest) harvest were nominal and similar to previous year's harvest. Hunter success (56%) had decreased from the previous five year average (61%) and there was fairly average hunter effort (7.1 days to harvest as compared with the previous five-year average of 6.7). Since 2014, non-resident hunters outnumber resident hunters by an increasing margin each year.

Hunter satisfaction was high, with 69% responding positively to the hunter satisfaction survey. The satisfaction rate was slightly lower than 2017 (78%), which is likely due to decreased success.

Resident and non-resident hunter responses were identical, which is surprising given the high quantities of private lands in the unit.

Hunting dynamics in this herd could be explained by hunters being highly selective for larger deer, resident hunters avoiding this herd unit due to population concerns, a decreased population, and/or non-residents primarily hunting on private lands with outfitters.

Due to public concerns about a lack of quality bucks, incisors from field checked adult bucks were collected from 2015 - 2017 to determine harvested buck ages via cementum annuli techniques at the Wyoming Game and Fish Lab. Lab ages provide insight into the distribution of the age cohorts in the harvest as well as corresponding antler sizes. Despite inter-annual variation in the data, two general trends became apparent. The first observation is that 3.5-year-old deer are the most highly represented cohort of harvested deer, and the harvest rate decreases with increasing age cohort. The second trend is that antler size increases steadily from an average of 13.7 inches in 2.5 year old deer to an average of 19.8 inches in 5.5 year old deer and increases at a slower rate after that, resulting in an average of 21.8 inches in 7.5 year old deer. The limited sample size of deer over 5.5 years old makes it difficult to draw too many conclusions from the older deer cohort, other than there being fewer deer of that age that are available in the population for harvest (Figure 2).

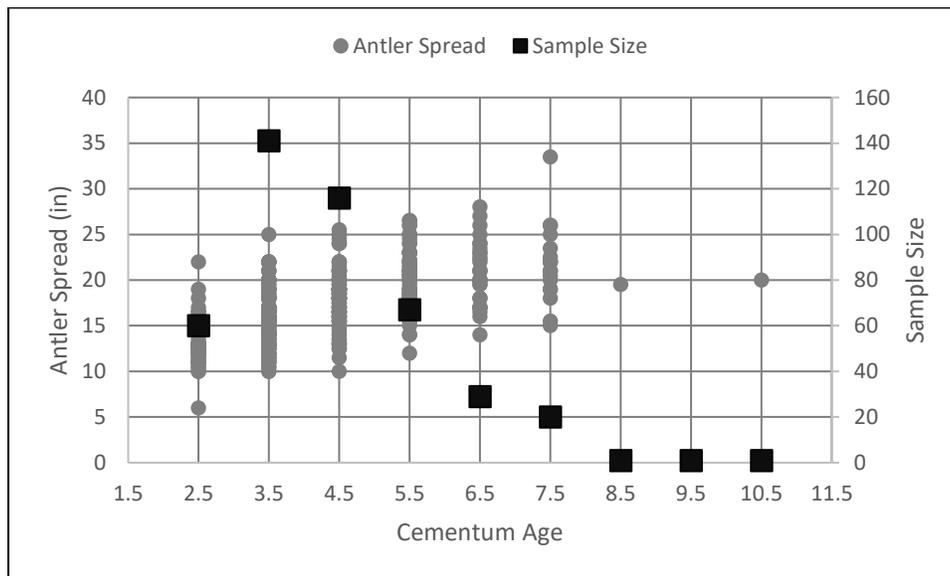


Figure 2. Cementum age of harvested deer with corresponding antler spread and sample sizes from 436 mule deer sampled from 2015 to 2018.

Population

We used integrated population models, referred to as Excel Spreadsheet Models, based on White and Lebow (2002) to estimate the population. Model parameters and input follow the “User’s Guide: Spreadsheet Model for Ungulate Population Data” (Morrison 2012).

The Semi-Constant Juvenile/Semi-Constant Adult (SCJ/SCA) survival model out-performed the other models and produced the lowest AIC value (106). The 2018 post-season population estimate of 12,039 deer continues the trend of a relatively stable and slowly increasing population that is below objective.

All three models showed a similar trend of population stability since the late 2000's, with inter-annual variation. Conversely, there were major discrepancies between the population estimates for each model over that time. The selected model provides reasonable results that correspond well with management data and field observations. Since independent survival estimates are lacking, this model is considered a fair model.

Special Projects

In December of 2018, 70 adult doe mule deer were captured, marking the initiation of the Upper Powder River (UPR) Mule Deer Initiative (MDI) research project. The goal of the project is to better understand the population dynamics that may be influencing this herd's productivity. At the completion of the study, we hope to determine 1) cause-specific mortality, 2) sources of variation in nutritional status, 3) habitat use and movement strategies, 4) parturition ranges and habitat use, 5) CWD dynamics, 6) barriers to movement, and 7) migration routes.

Deer capture locations were distributed across the herd unit. Biological samples and measurements were collected from each deer, including blood and fecal samples, rectal CWD biopsies, lactation status, and morphometric and ultrasonic rump fat measurements. Each deer was outfitted with a radio-collar that stores GPS locations at two-hour intervals and transmits locations at six-hour increments via satellite transmissions. During December 2019, 2020, and 2021 we plan to re-capture radio-collared deer as well as re-deploy collars from mortality events to maintain a sample size of 70 deer for the duration of the three-year study. Re-captured deer will have their biological measurements re-sampled each year.

Deer captured were in very poor condition coming into winter, with low or no sub-cutaneous fat measured. As of May 21, 13 mortalities have occurred and cause of death determinations are pending. In February, six deer were captured to deploy recovered radio-collars from mortalities. The poor nutritional condition and high mortality rate was unexpected, highlighting the importance of this study. The study would not be possible without funding from the Buffalo Bureau of Land Management Field office, Wyoming Sportsman's Group and WGFD Mule Deer Initiative funding and collaboration from Dr. Kevin Monteith at the University of Wyoming and the WGFD Veterinary Services.

In 2018, pilot data was collected to address wildlife mortalities on Interstate 25, on the eastern boundary of the herd unit. Trail cameras were set and monitored at existing highway crossing structures with the goal of monitoring wildlife use of the structures. These structures were not designed for wildlife but provide permeability to the road corridor and include underpasses, culverts, and bridges for intersecting roads, draws, and rivers. Wildlife crossing structures are often prohibitively expensive to build, however if wildlife are documented using existing structures, the hope is that implementing wildlife fencing would funnel wildlife to the existing structures. If effective, this would reduce highway wildlife mortalities, increase driver safety, and save millions of dollars that would be spent constructing wildlife-specific crossing structures. Data collected during the pilot study indicated that 13 species passed through the structures at least once and mule deer were observed using every passage to cross the interstate except for one. From the pilot study, we learned that the workload is manageable for WGFD personnel, with an intern's help for data entry. Data collection of wildlife use officially began January 1, 2019 and will continue for two years to provide data prior to potential fence construction.

Management Summary

This herd was identified as a MDI herd in 2015. In 2018, the herd unit population persisted below objective while the buck:doe ratio is at objective. Preliminary mortality rates from the UPR MDI study suggest that 2018 weather did not produce favorable habitat conditions for mule deer. Winter fawn survival will likely be impacted even though we have not experienced severe winter conditions.

Long-term concerns over this herd have resulted in management actions including liberal mountain lion, elk, and white-tail seasons, and extremely limited doe mule harvest. Public comments noted high concern that mountain lion densities have had long-term impacts on this deer herd. Extremely high white-tailed deer numbers may be causing competition for more productive habitats in and adjacent to riparian corridors and irrigated alfalfa meadows. Elk numbers remain above objective, which may be causing heavier browse levels than native forage plants can sustain. Mule deer doe harvest is limited to private land in hunt areas 30 and 33 with a General license as well as with 25 Type 6 doe/fawn licenses valid on private land in hunt area 33. Doe mule deer harvest averaged less than one percent (.95%) of the pre-hunt doe population over the last four years, which provides high confidence that doe harvest is not having population level impacts. In addition, doe mule deer are primarily harvested on private lands where densities are high enough to cause damage to irrigated hay meadows. In these situations, doe harvest may be an appropriate herd management strategy in order to reduce large concentrations of deer and slow the spread of Chronic Wasting Disease (CWD).

In 2004, CWD was discovered in this herd. Since then, the disease has been confirmed in all of the hunt areas, including the first detections in hunt areas 32 and 169 in 2018. In 2018, efforts were made to sample over 100 adult mule deer bucks to estimate prevalence for the herd. These increased efforts resulted in a sample size of 119 adult bucks and a prevalence rate of 15%. From 2014 to 2018, a total of 244 adult bucks have been sampled resulting in a prevalence estimate of 14%.

Hunting seasons continue to address public concerns identified with the continuing Mule Deer Initiative efforts and management of this herd. No changes were made for the 2019 season. Discussion of the non-resident Region Y quota resulted in conflicting arguments. Increasing the quota may be useful in early prevention of high CWD prevalence rates in this and surrounding herd units. Decreasing the quota, however, helps mitigate hunter crowding, success, and satisfaction in areas with limited public land. No changes in the Region Y quota are made this year.

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APPENDIX #1

Upper Powder River Mule Deer Rapid Habitat Assessments, 2016-2017

Introduction

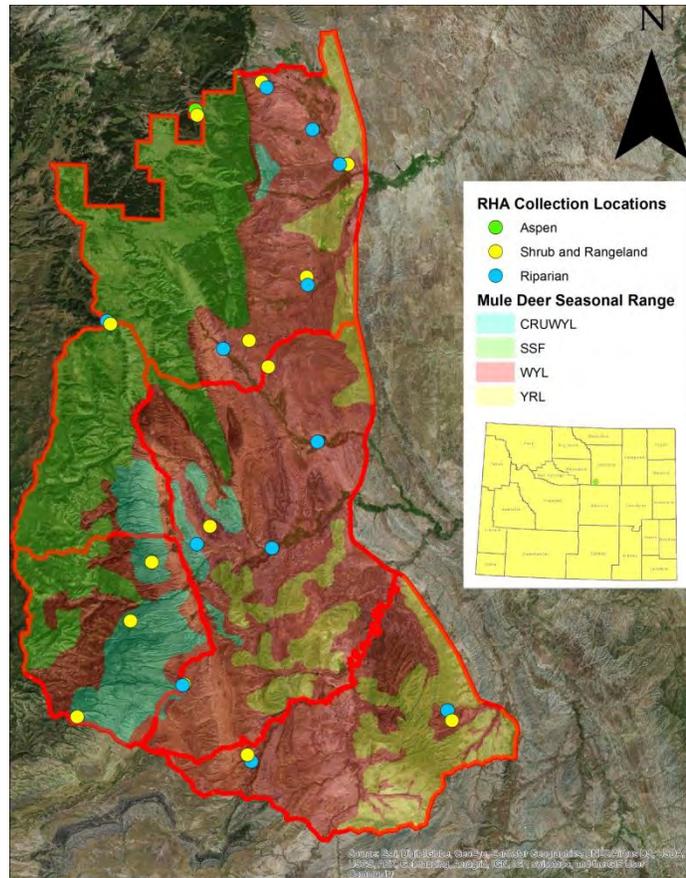
During the months of April thru July of 2016 and 2017, mule deer habitat conditions were assessed in the Upper Powder River (UPR) mule deer herd unit using the Rapid Habitat Assessment framework developed by the Wyoming Game and Fish Department (WGFD). The Rapid Habitat Assessment (RHA) framework is a qualitative assessment designed to evaluate the current habitat conditions in a given herd unit are meeting mule deer habitat needs. A total of 27 RHA's were completed in three habitat types (aspen, shrub and rangeland, and riparian) across four seasonal ranges (crucial winter (CRUWYL), yearlong (YRL), spring-summer-fall (SSF), winter yearlong (WYL) (Figure 1). Site selection for RHA's was based on perceived important habitats for mule deer based on casual observations and big game surveys by WGFD staff, distribution across multiple seasonal ranges, and accessibility due to landownership (private land with permission granted and public land).

Mule deer in the UPR herd appear to be split between two different life history strategies. One segment of the herd migrates to upper elevations of the southern Bighorn

Mountains during the spring, summer, and fall seasons, and then migrates to lower elevations for winter. The other segment of the population stays at the lower elevations year around.

Parturition/fawning habitat of the migratory segment of the population is believed to be comprised of mesic mountain meadows/grasslands, riparian areas, and aspen forests. Parturition/fawn rearing habitat for the non-migratory portion herd occurs throughout rangelands and agricultural areas that provide adequate cover and high quantity/ quality nutrition. Mule deer are thought to dependent on riparian areas in the non-migratory segment for fawn rearing habitat. Due to drier conditions in the lower elevations during later summer/early fall, riparian areas provide high quality nutrition to lactating does as the uplands grass and shrublands dry out. Winter range habitat used by both population segments appears to be dominated by either large stands of Wyoming Big sagebrush or Curl-leaf mountain mahogany.

Figure 1



Parturition/Fawn Rearing Habitat

Six RHA's were conducted within spring, summer, fall seasonal range fawning habitat thought to be used by the migratory portion of the herd (four shrub and rangeland assessments, one aspen assessment, and one riparian assessment). Overall, habitat conditions met habitat objectives for spring, summer, fall seasonal range. Plant diversity was high in surveyed habitats, indicating that a variety of different forages were available to meet reproductive needs. Plant communities mostly appeared to be in a mid seral state, with only two of the six assessments exhibiting plant communities in a late seral state.

Herbivory appeared to be low on all surveyed habitats except for the aspen assessment, in which herbivory was evaluated as moderate, which is expected for aspen habitats (Figure 2).

In addition to RHA data collected by the WGFD, the Bureau of Land Management (BLM) collected rangeland health data on grazing allotments during the same time period that WGFD conducted RHA's. Thirty rangeland health assessments were conducted in allotments occurring in mule deer spring, summer, and fall seasonal range. Data from these assessments indicated that rangelands were generally stable and functioning properly, based on the Rangeland Health Protocol (Pellant et. al 2005). Soil and site stability appeared stable, with only 3% of the assessments ranking slight to moderate in departure from expected conditions and the remaining (97%) falling into the slight to no departure from expected climax plant communities. Hydrologic function also appeared to be stable, with only 12% of the assessments falling into the slight to moderate departure from expected conditions, and the remaining (88%) falling into the slight to no departure category. Biological integrity was split between none to slight departure (56%) category or slight to moderate (41%) category (Figure 3). Rangelands that exist in a state of slight to moderate departure from climax biological integrity typically represent optimal mule habitat. As rangelands get closer to climax plant communities, they lack early seral species and younger plant age classes, which often provide desirable mule deer forage. The BLM rangeland health assessments indicate that mule deer habitat conditions may be limited in some areas by late seral plant communities trending towards climax.

Figure 2 – UPR Mule Deer Spring, Summer, Fall seasonal range habitat attributes

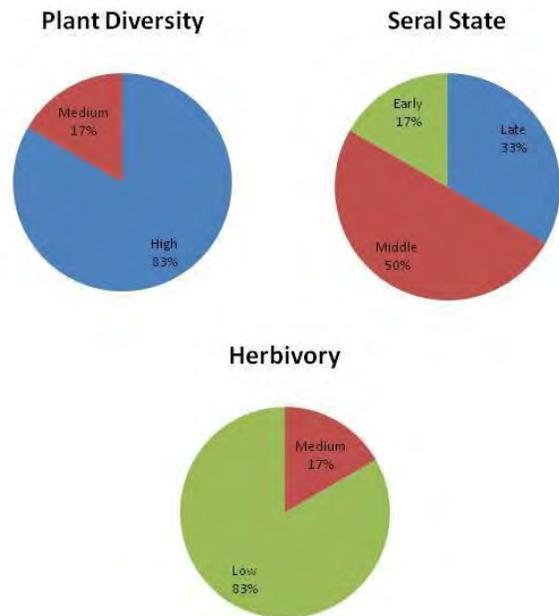
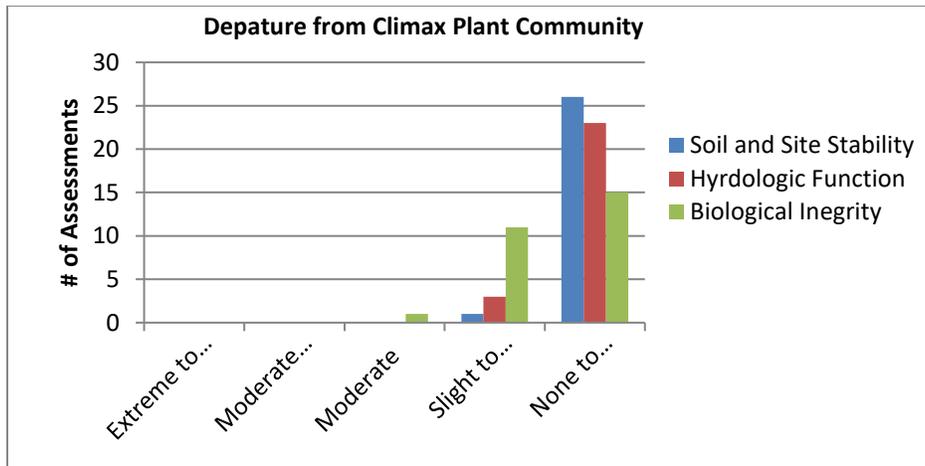


Figure 3-UPR Spring, Summer, Fall seasonal range BLM rangeland health assessments



For the non-migratory portion of the herd, parturition/fawning habitat is thought to be highly dependent on riparian areas. To assess parturition/fawning habitat in the non-migratory portion of the population, 11 riparian RHA's were completed throughout mule deer winter/yearlong range. Overall, parturition/fawning habitats assessed either partially met or did not meet mule deer habitat requirements. Plant diversity was either average (64%) or lower than expected (27%). Plant diversity was limited by invasive weeds and grasses that were dominating riparian areas. Many of the riparian areas assessed were dominated by smooth brome and/or Kentucky Bluegrass, which are both known to inhibit the production of desirable forage and cover species. Other invasive species that were commonly recorded were Canadian thistle, Houndstongue, and Russian Olive. The majority of the areas assessed appeared to have mid seral successional plant communities, mostly due to lack of deciduous woody cover and lack of native plant species diversity. Herbivory levels appeared to be light throughout most of the assessed areas (Figure 4). One of the biggest concerns identified was lack of cover from woody plant species. Typical vertical structure was composed of either short (<3 feet in height) or tall (>15 feet in height) woody plant species cover (or a mixture of short and tall). Mid level woody cover (3-15 feet in height) was lacking in the majority of the riparian species assessed. Mid level woody plant cover was only found in 40% of the riparian areas assessed (see figure 5).

Figure 4 - UPR Winter/Yearlong Seasonal Range Riparian Habitat Attributes

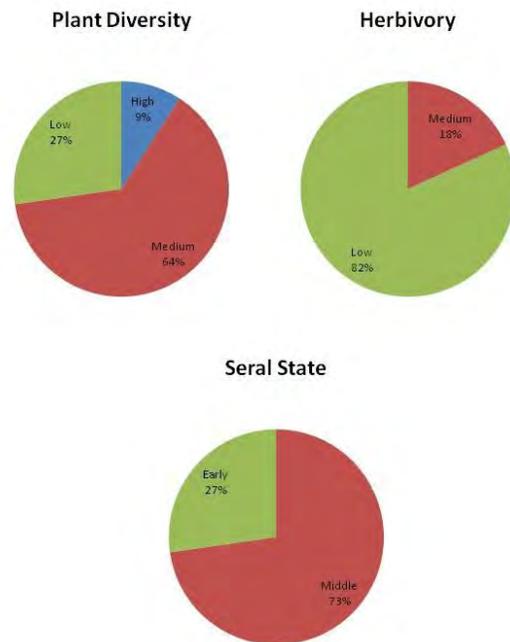
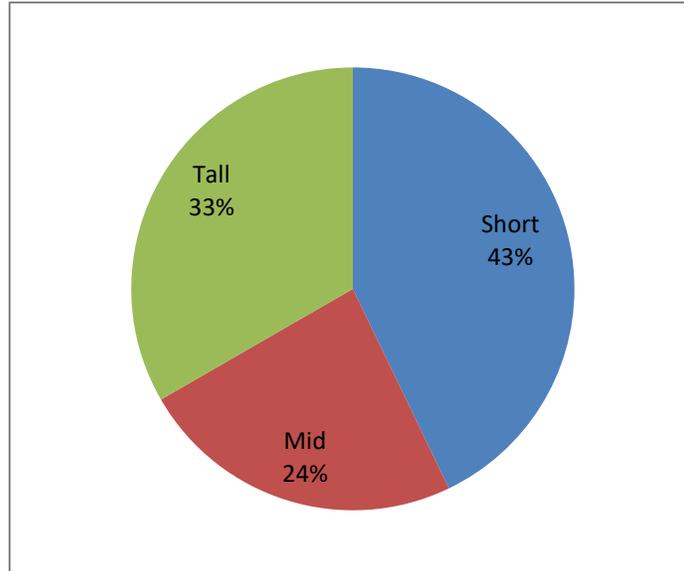


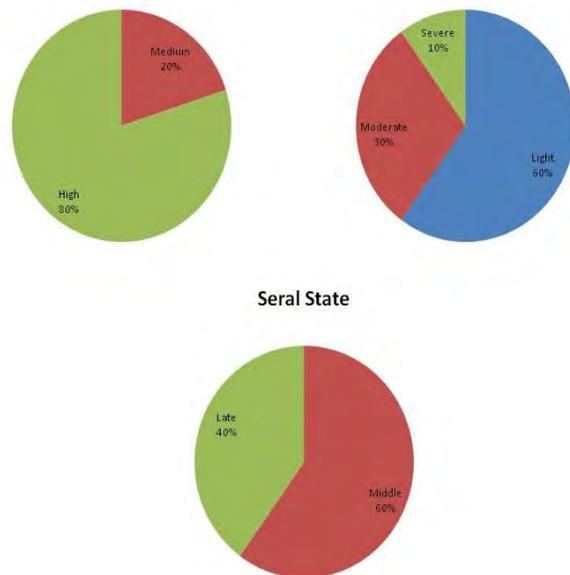
Figure 5-Vertical Structure Classifications in Riparian Areas in UPR Winter/Yearlong Seasonal Range



Winter/Yearlong Habitat

Seven rangeland and shrubland RHA’s were collected on mule deer winter/yearlong range. The majority of the habitat assessments (64%) met mule deer habitat objectives while 14% partially met objectives, and 21% did not meet objectives. Completed rangeland and shrub RHA’s showed the majority of the assessed plant communities were in a mid seral state (60%), with 40% trending towards late seral plant communities. Herbivory was highly variable between areas assessed, with some sites receiving light use on shrubs and herbaceous plants, and others exhibiting high use on shrubs and herbaceous plant communities, by both livestock and wildlife. Plant diversity appeared fairly high in all of the areas assessed, indicating fairly stable rangelands with minor invasive plant concerns (Figure 6).

Figure 6-Figure 4 – Rangeland and Shrub Habitat Attributes in UPR Winter/Yearlong seasonal range



The BLM conducted 44 rangeland health assessments in mule deer winter/yearlong habitat. Soil and site stability of rangelands was good, with the majority of the sites assessed falling into the slight to no departure from expected category (81%) and only a few sites assessed falling into the slight to moderate (14%) and moderate (5%) categories. Hydrologic function appeared to be more impaired than desired,

with only 64% of assessed rangelands falling into the “slight to none” category. 30% of the allotments assessed fell into the “slight to moderate” category and 7% in the “moderate” category. Biological integrity of the majority of the rangeland assessments (84%) fell within the moderate to slight or slight to no departure from climax range conditions, which indicates relatively stable resilient rangelands. Stable and resilient rangelands are ideally preferred for mule deer winter/yearlong habitat. These habitats are more resistant to conversion in the event of disturbance and if present, shrublands are healthy and capable of providing adequate winter browse (Figure 7). Some (16%) of the assessed rangelands had a biological integrity rating of “Moderate”, which indicates that a portion of the rangelands exhibit signs that the plant community is showing signs of degradation. Typical indicators ranking a rangeland lower in rangeland health assessments include lack of expected plant species, depressed rangeland production from expected conditions, and presence of invasive weed species (Figure 8).

Figure 7-Figure 3-UPR Winter/Yearlong Seasonal Range BLM Rangeland Health Assessments

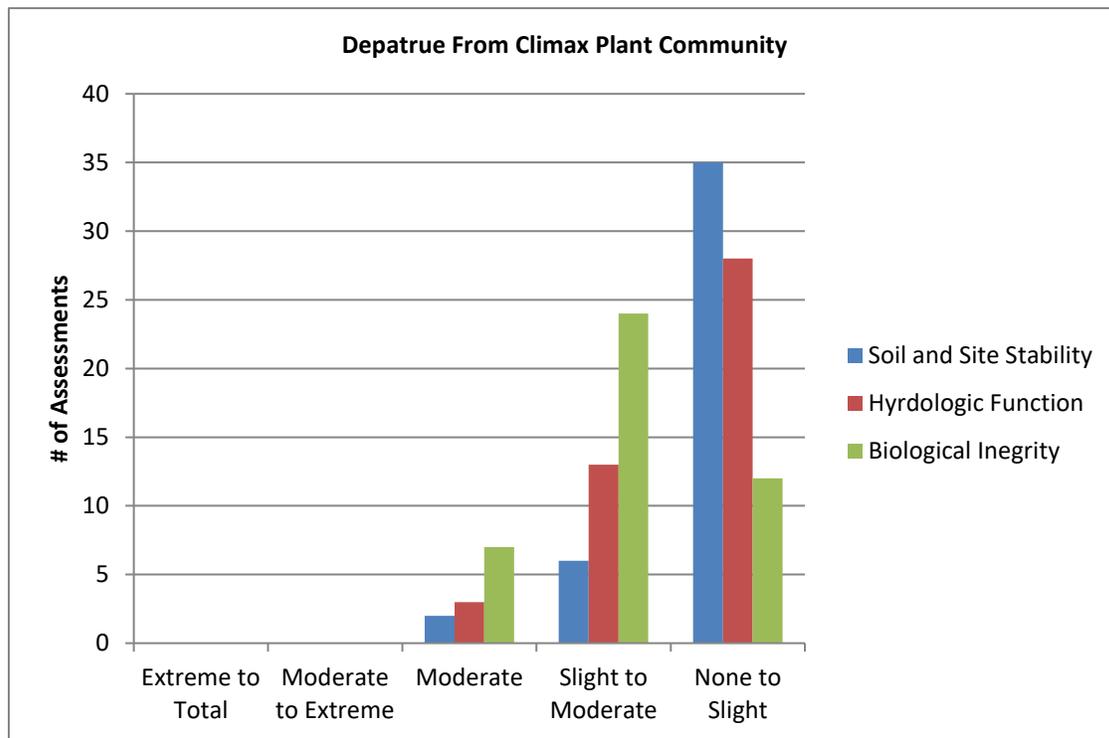
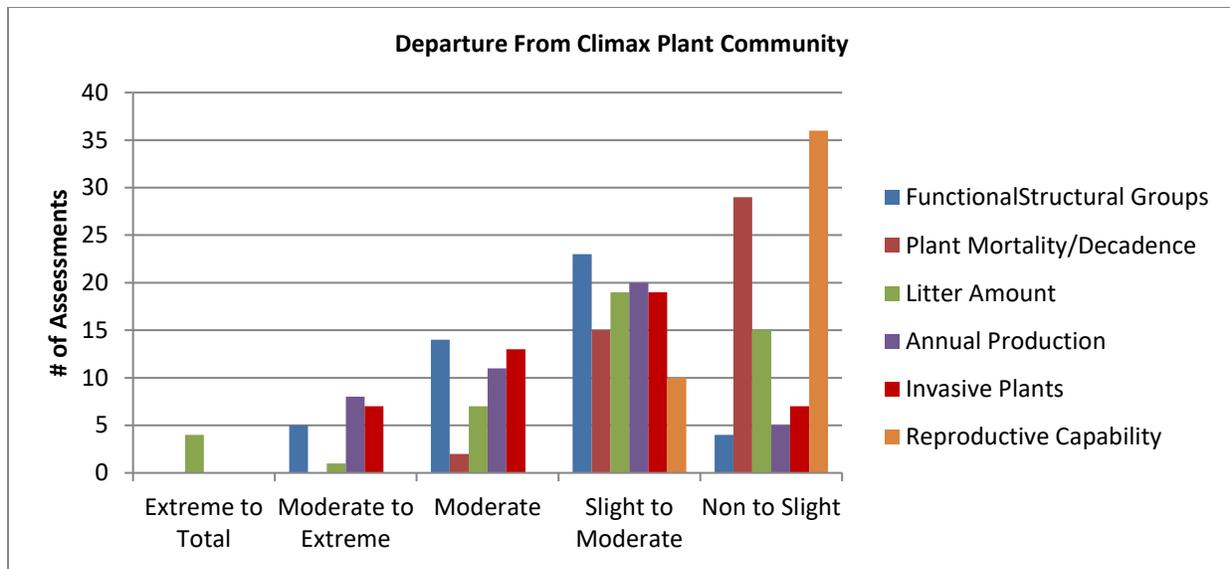


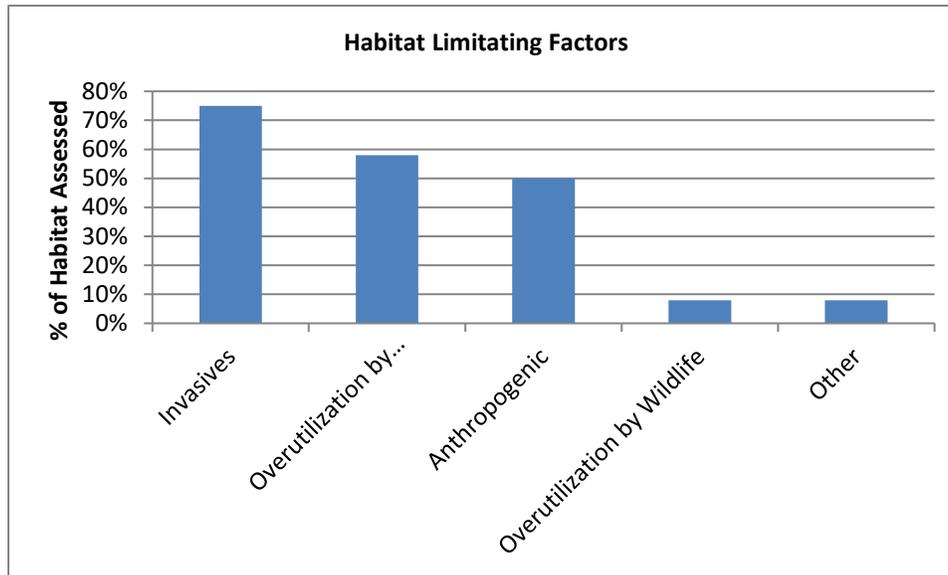
Figure 8-Rangeland Health Indicators relating to Biological Integrity



Summary

The WGFD RHA's and the BLM rangeland health assessments provide insight to the mule deer habitat conditions in the UPR herd unit in 2016 and 2017. From these assessments, the largest concern is the condition of riparian habitat in the non-migratory portion of the mule deer herd. Parturition/fawn rearing habitat for the non-migratory portion of the mule deer herd is thought to rely substantially on riparian habitat. Of all the habitats assessed, this habitat appeared to be the most heavily degraded and least likely to meet mule deer habitat needs. Not one riparian RHA found riparian habitat fully meeting mule deer habitat needs. The biggest issues identified in these assessments was the lack of adequate hiding cover by woody plant species and lack of plant diversity in relation to mule deer forage species. The causes of these issues is attributed to invasive plant species, overuse by livestock, and lack of riparian function due to anthropogenic alteration of riparian areas (Figure 9). Invasive and non-native plant species were identified in the majority of the riparian areas (75%) assessed, with the most common species identified being smooth brome and Kentucky bluegrass. Although both of these grass species are palatable to mule deer, they are non-native and tend to dominate riparian areas, thus competing with desirable deciduous browse and forb species for moisture, sunlight, and space. In addition, invasive weed species such as thistles and Russian olive were identified as limiting potential mule deer habitat in some of the assessed areas. Overutilization by livestock was observed in 67% of the assessed riparian areas, reflecting livestock overutilization at some point in time affecting mule deer habitat conditions (Figure 9). It is to be noted that in many of the riparian areas assessed, however, present grazing impacts were typically low, with 83% having light levels of herbaceous herbivory. The lack of younger age classes of deciduous browse tree and shrub species in addition to the incision of stream banks in riparian areas assessed indicated at one time in the last 30 to 50 years, these areas had been heavily over-utilized by livestock. As a result, riparian function was limited due to deep stream incision and cover was lacking due to lack of recruitment of deciduous woody plant species, which provide both cover and forage for reproducing mule deer.

Figure 9-UPR Winter/Yearlong Seasonal Range Riparian Habitat Limiting Factors



Parturition/fawn rearing habitat for the migratory portion of the UPR mule deer herd appeared to be in good condition overall. The only concern was that a good portion of the assessed habitat appeared to be reaching a late seral plant community (56% of BLM allotments and 33% of WGFD RHA's), which has limited value to reproducing mule deer. Late seral habitats typically lack early seral plant species (i.e. forbs) and age classes (i.e. younger age class browse). As plant communities trend towards late seral plant communities, desirable mule deer forage declines in quantity and nutrition quality.

Winter/yearlong habitat for mule deer appeared to be in good condition and met mule deer habitat objectives. The majority of the concerns related to habitat assessed in winter/yearlong range were related to shrub communities lacking recruitment and/or overutilization by either livestock or wildlife on the primary browse plant species. Only 35% of the RHA's indicated concerns with overutilization or lack of shrub recruitment, while the majority of the assessments showed that the habitat was meeting mule deer objectives for winter/yearlong habitat. Similarly to the WGFD RHA's, the rangeland health assessments conducted by the BLM indicated that the majority of the rangelands surveyed were stable, healthy, and therefore likely meeting mule deer needs for winter/yearlong habitat. The biggest issues documented in the BLM rangeland health assessments were the lack of plant annual production, lack of/abundance of expected rangeland plant communities, and invasive plants. These issues are often the result of past/current overutilization, disturbance, and/or invasive annual grass establishment. These concerns were documented on less than 10% of the rangelands assessed.

Management Implications

Mule deer habitats assessed by RHA's indicated that one of the biggest limiting factors affecting mule habitat needs is in riparian areas in Winter/Yearlong seasonal ranges. Riparian areas, occupy a minor amount of acreage compared to other habitats, and are important for mule deer in the northern Great

Plains. Riparian areas provide high quantities of high quality forage due to the mesic nature of these habitats. The high quantity of vegetation that grows in riparian habitats also provides ample cover for mule deer. The high proximity of quality forage and cover provide excellent fawning habitat for mule deer in relation to the adjacent xeric, open uplands. Riparian areas in winter/yearlong seasonal ranges are in poor condition, and may be affecting fawn recruitment. One of the biggest issues identified in the RHA's related to riparian habitat was invasive and non-native plant species. An assortment of different invasive weed species were found in riparian areas surveyed. In some areas, these invasive plant species could be managed with active weed management. The majority of the non-native plant issues revolved around the presence of smooth brome. Smooth brome is an introduced perennial grass that has taken over many riparian areas in the northern Great Plains and tends to form monocultures. As riparian areas become dominated by smooth brome, native plant diversity is reduced, resulting in less forage and diversity of cover. Improving riparian habitats dominated by smooth brome is difficult, due to the perennial life cycle and highly aggressive nature of the grass. Management options are limited to improve mule deer habitat in smooth brome dominated riparian areas. One option is to plant deciduous woody plant species to improve lateral cover diversity. It is difficult for deciduous woody plant species to become established in smooth brome dominated communities naturally due to competition, but with direct planting, establishment of deciduous woody plant cover is possible.

Another factor affecting riparian areas in winter/yearlong mule deer seasonal range was over utilization by livestock and anthropogenic manipulation. Most of the riparian areas identified as degraded by over utilization by livestock was not result of current grazing management, but rather long term alteration of riparian hydrology due to past heavy livestock use. Most of the riparian areas surveyed were well vegetated with herbaceous vegetation, and recent signs of heavy livestock overutilization were not present. Most of the riparian areas surveyed in the RHA in mule deer winter/yearlong seasonal range were incised and lacking deciduous woody vegetation, which is thought to be the result of past heavy utilization by livestock. There was little to no floodplain available to trap sediment, which is important for riparian areas to be able to retain water in high flows and establish deciduous woody plant species. It is thought that heavy past livestock use and possibly past neglectful herbicide treatment removed vegetation from the banks of these riparian areas, which led to increase downcutting of the stream channel. The result of these actions was a deeply incised channel that is unable to stabilize and collect sediment due to lack of vegetation on the banks to slow water movement into the riparian area. Although many of the streams surveyed had good herbaceous component present, there was little to no deciduous woody vegetation present. It is thought that woody deciduous riparian plant roots are needed to retain soil during high flows. Although herbaceous vegetation does hold soil in place to a degree, herbaceous plant root systems are not as effective at holding soil during high flows observed during high runoff. As a result, many of the riparian areas are either not able to redevelop a floodplain or are slow in recovering the floodplain. In some of the riparian areas surveyed, past irrigation infrastructure had altered stream hydrology, creating similar conditions as observed with heavy past livestock use. Stream channels were altered by the creation of ditches and/or banks were altered to divert water, which resulted in stream hydrology downcutting and stream incision. Solutions to mitigate this issue include re-establishing woody deciduous plant species and possibly introduction of beaver or Beaver Dam Analogs (BDA's) to help these riparian areas trap sediment and redevelop floodplains.

The majority of the rangeland habitat assessed in winter/yearlong mule deer seasonal ranges was meeting mule deer habitat needs. Overutilization by livestock, lack of shrub recruitment, invasive annual grasses, and decreased production of desired plant communities were some of the issues identified as limiting mule deer habitat in winter/yearlong season range. These issues were very specific to certain areas, and can be addressed through working on grazing management improvements with landowners/permitees, annual grass herbicide treatments, and preservation of shrub stands.

The majority of the rangeland habitats assessed in spring/summer/fall (SSF) seasonal ranges appeared to be meeting mule deer habitat needs. The biggest concern identified in these habitats was related to the late seral vegetative communities. These plant communities appeared to be intact ecologically, but lacked early seral vegetation, which is preferred by mule deer. Setting back succession in these habitats has the potential to improve mule deer production. This can be achieved through mechanical conifer removal and prescribed burns.

WHITE-TAILED DEER

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2018 - JCR Evaluation Form

SPECIES: White tailed Deer

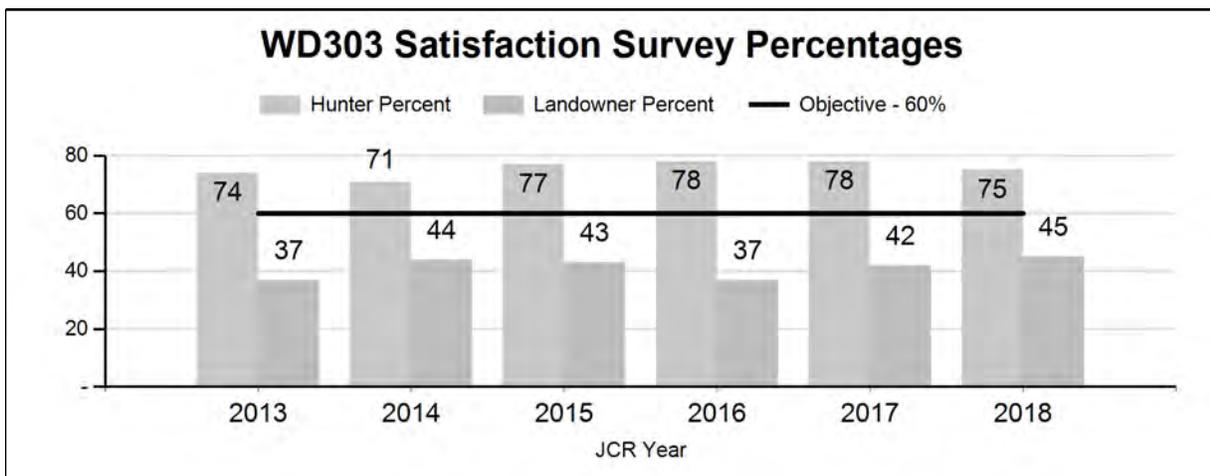
PERIOD: 6/1/2018 - 5/31/2019

HERD: WD303 - POWDER RIVER

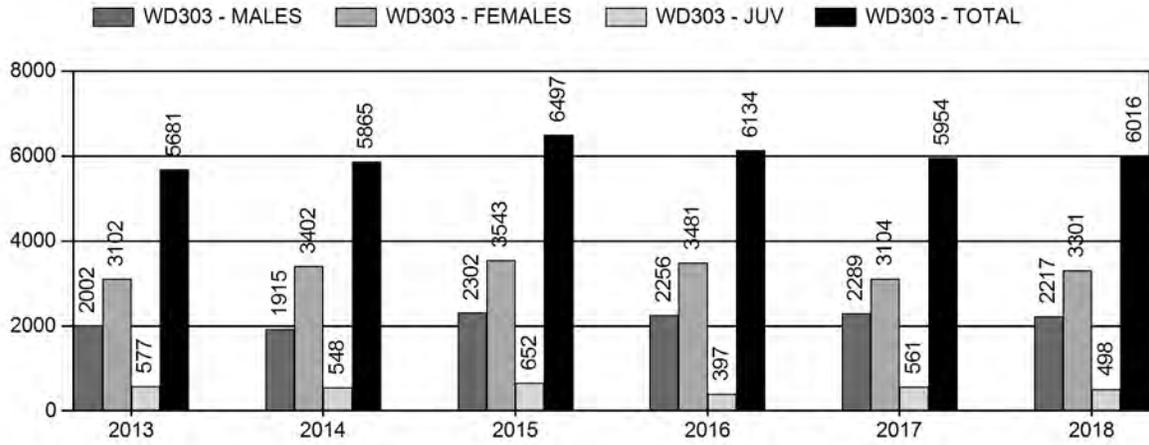
HUNT AREAS: 17-20, 23-33, 163, 169

PREPARED BY: TIM THOMAS

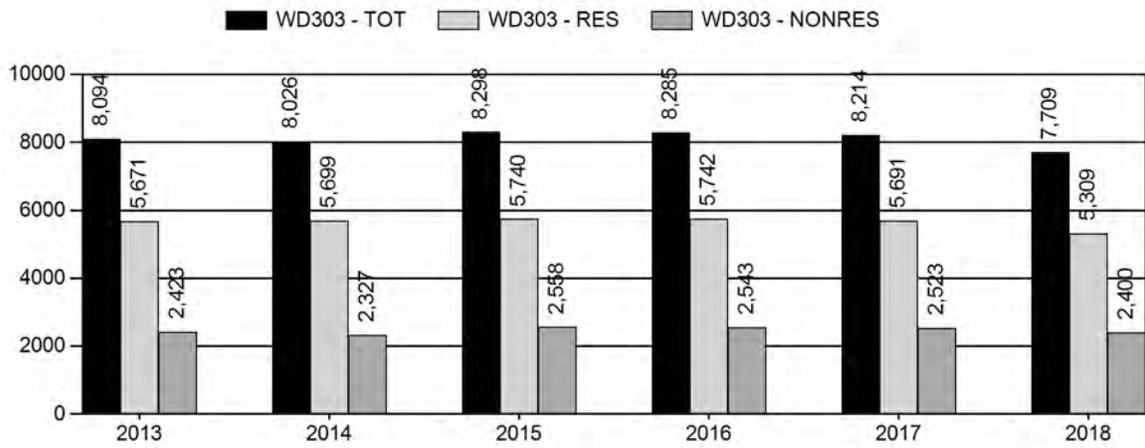
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Hunter Satisfaction Percent	75%	75%	75%
Landowner Satisfaction Percent	41%	45%	60%
Harvest:	6,026	6,016	6,000
Hunters:	8,183	7,709	7,900
Hunter Success:	74%	78%	76%
Active Licenses:	9,459	9,143	9,250
Active License Success:	64%	66%	65%
Recreation Days:	37,169	34,688	36,000
Days Per Animal:	6.2	5.8	6
Males per 100 Females:	37	39	
Juveniles per 100 Females	68	71	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			0%
Number of years population has been + or - objective in recent trend:			6



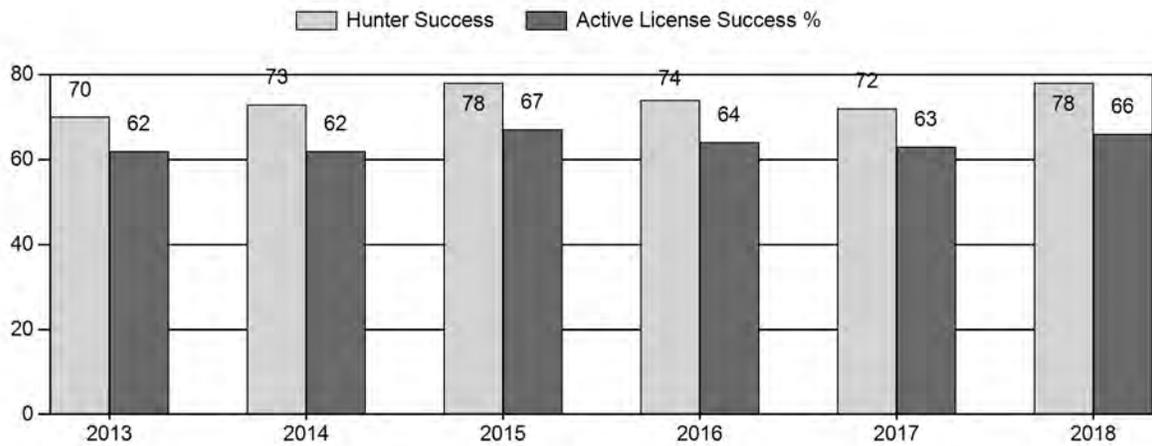
Harvest



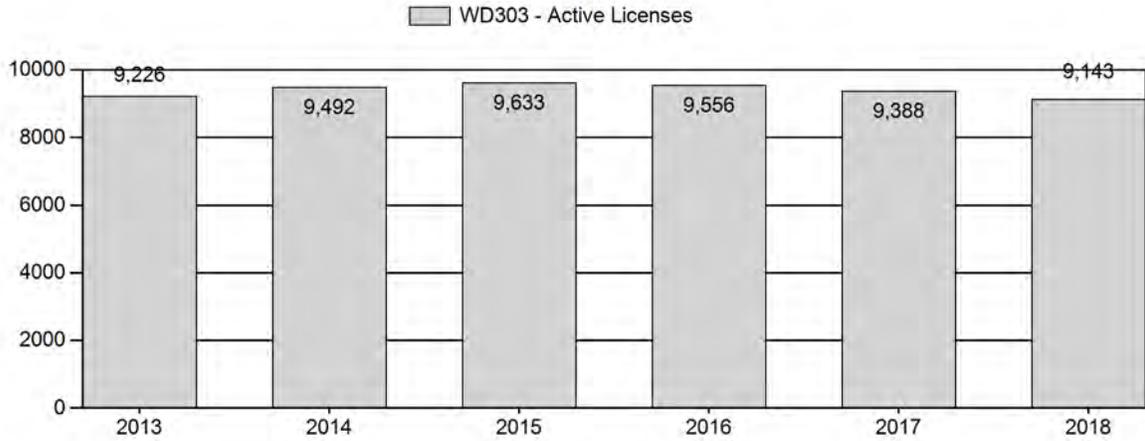
Number of Active Licenses



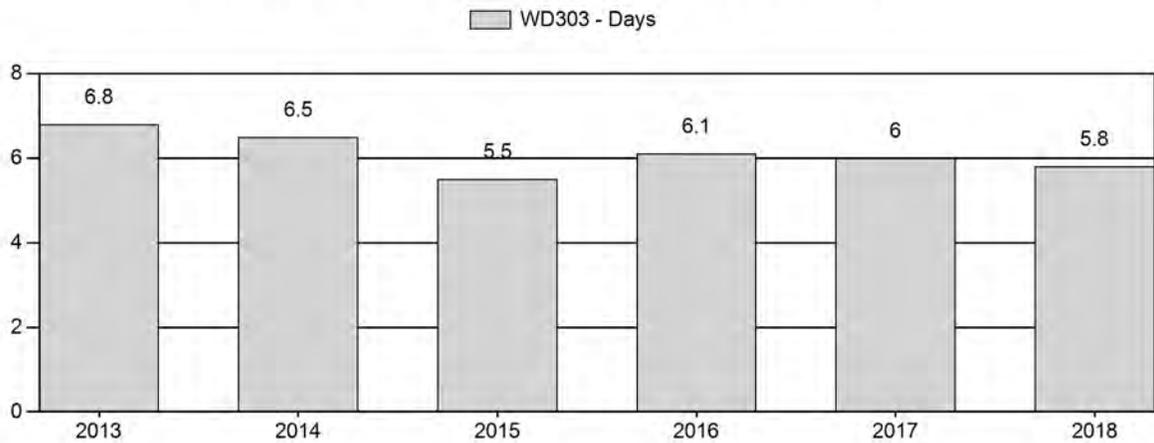
Harvest Success



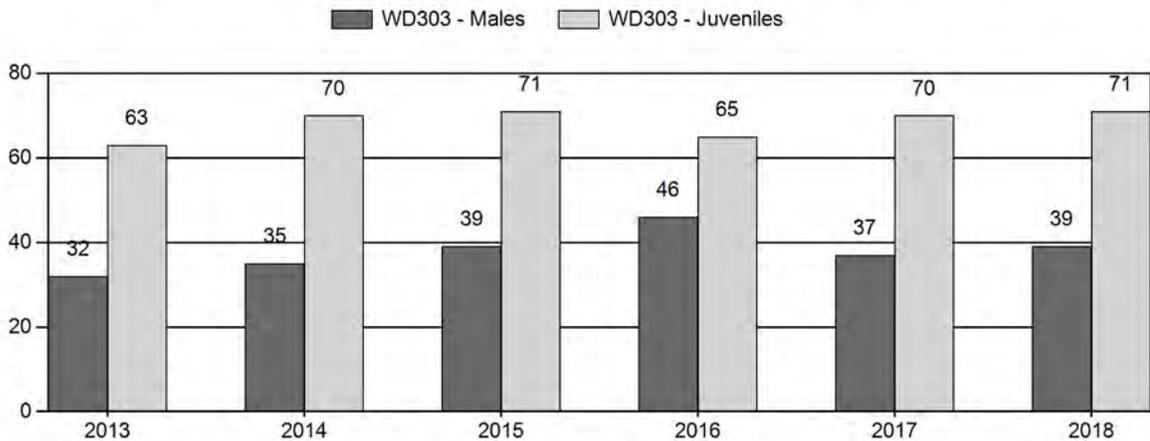
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary																		
for White tailed Deer Herd WD303 - POWDER RIVER																		
Year	Post Pop	MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	18,000	150	303	453	16%	1,437	51%	907	32%	2,797	1,211	10	21	32	± 2	63	± 3	48
2014	20,000	235	401	636	17%	1,839	49%	1,296	34%	3,771	1,484	13	22	35	± 2	70	± 3	52
2015	0	206	375	581	19%	1,483	48%	1,058	34%	3,122	1,554	14	25	39	± 0	71	± 0	51
2016	0	247	379	626	22%	1,364	47%	884	31%	2,874	1,429	18	28	46	± 0	65	± 0	44
2017	0	192	446	638	18%	1,706	48%	1,198	34%	3,542	1,457	11	26	37	± 0	70	± 0	51
2018	0	244	536	780	18%	2,019	48%	1,426	34%	4,225	1,579	12	27	39	± 0	71	± 0	51

**2019 HUNTING SEASONS
POWDER RIVER WHITE-TAILED DEER HERD (WD303)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
17		Oct. 1	Oct. 20		General	Antlered mule deer or any white-tailed deer
		Nov. 1	Nov. 30		General	Any white-tailed deer
	7	Oct. 1	Oct. 20	50	Limited quota	Doe or fawn valid on private land
	8	Oct. 1	Nov. 30	250	Limited quota	Doe or fawn white-tailed deer
18		Oct. 1	Oct. 20		General	Antlered mule deer or any white-tailed deer
	7	Oct. 1	Oct. 20	100	Limited quota	Doe or fawn valid on private land
	8	Oct. 1	Oct. 31	50	Limited quota	Doe or fawn white-tailed deer valid on private land
19		Oct. 1	Oct. 20		General	Antlered mule deer or any white-tailed deer
		Nov. 1	Nov. 15		General	Any white-tailed deer
	7	Oct. 1	Oct. 20	50	Limited quota	Doe or fawn valid on private land
	8	Nov. 1	Nov.15	75	Limited quota	Doe or fawn white-tailed deer
23		Oct. 1	Oct. 14		General	Antlered deer off private land; any deer on private land
		Nov. 1	Nov. 30		General	Any white-tailed deer
23, 26	3	Nov. 1	Nov. 30	250	Limited quota	Any white-tailed deer
	7	Oct. 1	Dec. 15	2,000	Limited quota	Doe or fawn valid on private land
24		Oct. 15	Oct. 31		General	Antlered mule deer or any white-tailed deer
		Nov. 1	Nov. 30		General	Any white-tailed deer
	3	Nov. 1	Nov. 30	400	Limited quota	Any white-tailed deer
	7	Sep. 1	Dec. 15	250	Limited quota	Doe or fawn valid on private land
	8	Sep. 1	Dec. 15	Unlimited	Limited quota	Doe or fawn white-tailed deer
25		Oct. 15	Oct. 24		General	Antlered mule deer or any white-tailed deer

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
26		Oct. 1	Oct. 14		General	Antlered deer off private land; any deer on private land
		Nov. 1	Nov. 30		General	Any white-tailed deer
27		Oct. 15	Oct. 31		General	Antlered mule deer or any white-tailed deer
		Nov. 1	Nov. 30		General	Any white-tailed deer
	8	Sep. 1	Sep. 30	1,200	Limited quota	Doe or fawn white-tailed deer valid on private land
	8	Oct. 15	Dec. 15		Limited quota	Doe or fawn white-tailed deer valid in the entire area
28		Oct. 15	Oct. 24		General	Antlered mule deer or any white-tailed deer
		Oct. 25	Nov. 30		General	Any white-tailed deer
29		Oct. 1	Oct. 14		General	Antlered deer off private land; any deer on private land
		Nov. 1	Nov. 30		General	Any white-tailed deer
		Dec. 1	Dec. 15		General	Antlerless white-tailed deer
	8	Sep. 1	Sep. 30	700	Limited quota	Doe or fawn white-tailed deer valid on private land
	8	Oct. 1	Dec. 15		Limited quota	Doe or fawn white-tailed deer valid in the entire area
30		Oct. 15	Oct. 31		General	Antlered deer off private land; any deer on private land
		Nov. 1	Nov. 30		General	Any white-tailed deer
		Dec. 1	Dec. 15		General	Antlerless white-tailed deer
	8	Sep. 1	Sep. 30	500	Limited quota	Doe or fawn white-tailed deer valid on private land
	8	Oct. 15	Dec. 15		Limited quota	Doe or fawn white-tailed deer valid in the entire area
31		Oct. 1	Oct. 10		General	Antlered deer
32		Oct. 15	Oct. 31		General	Antlered mule deer or any white-tailed deer
		Nov. 1	Nov. 15		General	Any white-tailed deer
32, 163	8	Oct. 15	Nov. 15	50	Limited quota	Doe or fawn white-tailed deer

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
33		Oct. 15	Oct. 31		General	Antlered deer off private land; any deer on private land
		Nov. 1	Nov. 15		General	Any white-tailed deer
		Nov. 16	Dec. 15		General	Antlerless white-tailed deer
	6	Oct. 15	Oct. 31	25	Limited quota	Doe or fawn valid on private land
	8	Sep. 1	Sep. 30	500	Limited quota	Doe or fawn white-tailed deer valid on private land
	8	Oct. 15	Dec. 15		Limited quota	Doe or fawn white-tailed deer valid in the entire area
163		Oct. 15	Oct. 21		General	Antlered mule deer or any white-tailed deer
		Nov. 1	Nov. 15		General	Any white-tailed deer
169		Oct. 15	Oct. 21		General	Antlered mule deer or any white-tailed deer
		Nov. 1	Nov. 15		General	Any white-tailed deer

Special Archery Season Hunt Areas	Season Dates	
	Opens	Closes
17-19, 23-33, 163, 169	Sep. 1	Sep. 30

Region	Deer Hunt Areas	Quotas
C	17-19, 23, 26, 29, 31	2,500
Y	24, 25, 27, 28, 30, 32, 33, 163, 169	1,800

Hunt Area	Type	Quota change from 2018
23,26	3	+ 100
24	3	+ 100
Herd Unit Total	3	+ 200
Region C		+ 200
Region Y		No Change

Management Evaluation

Current Hunter / Landowner Management Objective: 60% Landowner / Hunter Satisfaction

Secondary Management Objective: 20 bucks:100 does observed minimum

Management Strategy: Private Land

2018 Hunter Satisfaction Estimate: 75%

2018 Landowner Satisfaction Estimate: 45%

Most Recent 3-year Running Average Hunters Satisfaction Estimate: 77%

Most Recent 3-year Running Average Landowner Satisfaction Estimate: 41%

Herd Unit Issues

The Powder River White-tailed Deer Herd Unit is located in north central Wyoming. This herd unit contains 16 hunt areas; 17-19, 23-33, 163 and 169. Hunt areas 19 and 20 were combined into one (HA 19) in 2016. Area 20 still appears on the evaluation form so historic data are captured from the JCR database at the herd unit level. The herd unit overlaps all biologist and warden districts in the Sheridan Region. The Sheridan biologist has herd unit reporting responsibilities while each biologist and warden retains management authority in their respective hunt areas.

The primary management objective for the Powder River White-tailed Deer Herd Unit is Hunter and Landowner Satisfaction at 60% or above, with a secondary postseason classification objective of 20 or more bucks observed per 100 does. The management strategy is Private Land Management. We revised the objective and management strategy in 2014. We conducted a 5-year evaluation of the objective and management strategy in 2019, with no changes recommended.

We do not have a reliable population estimate at this time for this herd. The spreadsheet simulation model developed for white-tailed deer populations with postseason classification data does not function with the limited empirical data available.

Most white-tailed deer occur on private lands. There is substantial rural development in portions of this herd unit that act as refuges for white-tailed deer, allowing them to quickly repopulate surrounding areas that receive harvest. Our ability to control this deer population with hunting is limited and localized due to limited access to private lands, and the presence of refuges where harvest isn't allowed. Mortalities due to deer-vehicle collisions and disease (i.e. viral hemorrhagic diseases) help keep this population from being even higher than it is.

White-tailed deer depredation of standing and stored agricultural crops, especially alfalfa, is a significant problem in localized areas. Game wardens and damage technicians spend considerable amounts of time and effort to address damage concerns. The WGFD pays damage payments to some landowners to compensate them for damage caused by high numbers of white-tailed deer.

Weather

Temperature and precipitation data referenced in this section were collected at the Buffalo (#481165), Gillette 4SE (#483855) and Sheridan Airport (#488155) weather stations located within this herd unit. Data were reported by the Western Region Climate Center (www.wrcc.dri.edu).

The 2018 spring cool, with below normal temperatures in March and April, and near normal precipitation. May was warmer than normal and wet, with over an inch of precipitation above

normal. This allowed for a good start for grasses and forbes, providing high quality forage just prior to and during parturition. Temperatures remained near normal during the summer and early fall. Conditions were dry during June, but above average precipitation in July and August. September and November were near normal for temperature and precipitation, while October saw above normal precipitation and cooler temperatures. December and January was generally open, with slightly below average precipitation and above average temperatures. February turned cold, with average temperature ~14°F below normal. There were several periods of 0°F or below, with at least one -20°F day. March was generally colder with below average precipitation. April was about normal for both temperature and precipitation. May was about 5-8°F colder than average with precipitation ~1.5-2.5 times normal. Cool wet weather during parturition could adversely influence neonate survival.

While adult wildlife entered the winter in good condition, they faced prolonged severe weather conditions during February and early March. Fawns, being more susceptible to extremely cold temperatures, likely saw at least average over-winter survival.

Habitat

White-tailed deer in this herd unit occur primarily along river and stream corridors as well as the foothills of the Bighorn Mountains. Agricultural lands along drainages provide a high quality reliable food source for deer. Mountain shrub communities along the east face of the Bighorn Mountains in Hunt Area 24 provide excellent white-tailed deer habitat. White-tailed deer are occasionally found in more arid sage-brush steppe / short grass prairie habitats. White-tailed deer appear to be expanding into the Bighorn Mountains.

We do not have established habitat transects to monitor white-tailed deer use. Monitoring of other habitat programs, such as Conservation Reserve Program (CRP) riparian buffers, indicate high white-tailed deer populations have done extensive damage to native deciduous woodlands and riparian areas. Irrigated croplands and private land refuge areas allow these populations to be maintained at levels higher than native habitats would normally support. Woody species such as native plum and serviceberry, as well as desirable forbs such as sunflowers, are being severely suppressed or eliminated in some woody draw communities along the Bighorn Mountains due to excessively high browsing pressure.

Field Data

Field personnel conducted post-season classification surveys during mid-November through mid-December using ground survey techniques. Personnel classified a small number of white-tailed deer while conducting aerial surveys for mule deer. Personnel surveyed designated routes. We classified 4,225 white-tailed deer, a 19% increase from 2017 and the highest classification ever recorded.

Fawn production, as measured by the observed fawn to doe ratio, was 71 fawns:100 does, similar to 2017 (70 fawns:100 does). The long-term (n=37 years) average fawn to doe ratio is 75:100. Relatively low fawn production, especially for a prolific species like white-tailed deer, under favorable environmental conditions could be a density dependent response. Reduced fawn production could slow the growth of this herd, which has likely declined in recent years in response

to increased harvest. There may be a nutritional component to the low fawn production or another factor such as higher than usual predation.

Field personnel observed 39 bucks:100 does, an increase from 2017 and similar to the previous five year average of 38 bucks:100 does. Due to the secretive nature of male white-tailed deer, we likely under observe bucks compared to does and fawns. We likely maintain a higher buck:doe ratio than observed due to the increased harvest of females and restricted access for harvesting bucks. We are observing sufficient males in this population to meet our secondary postseason classification management objective of a minimum of 20 bucks:100 does.

During the 2018 season, 75% of hunters ($n=1,596$) who completed a harvest survey indicated they were satisfied (32%) or very satisfied (47%) with their hunting experience. At the hunt area level, excluding Hunt Areas 31, 32, 163 and 169 due to low samples sizes (range=2-9), satisfaction levels varied from 57% (Hunt Area 25; $n=42$) to 83% (Hunt Area 18; $n=91$). Hunt areas with higher densities of white-tailed deer tended to have higher satisfaction levels, even in predominately private land hunt areas.

Nonresident hunters were generally more satisfied (80%) than resident hunters (73%). Access to private lands through trespass fees or outfitted hunts, which is common, cater more to nonresident than resident hunters.

We surveyed landowners to gauge their level of satisfaction with white-tailed deer numbers. One hundred forty eight landowners completed the white-tailed deer portion of their survey. Of these landowners, 43% ($n=63$) indicated white-tailed deer numbers were higher than desired and 45% ($n=66$) believed numbers were at or near desired levels (Fig. 1). Most respondents (53%, $n=78$) suggested similar or more liberal (35%, $n=52$) season strategies for 2019.

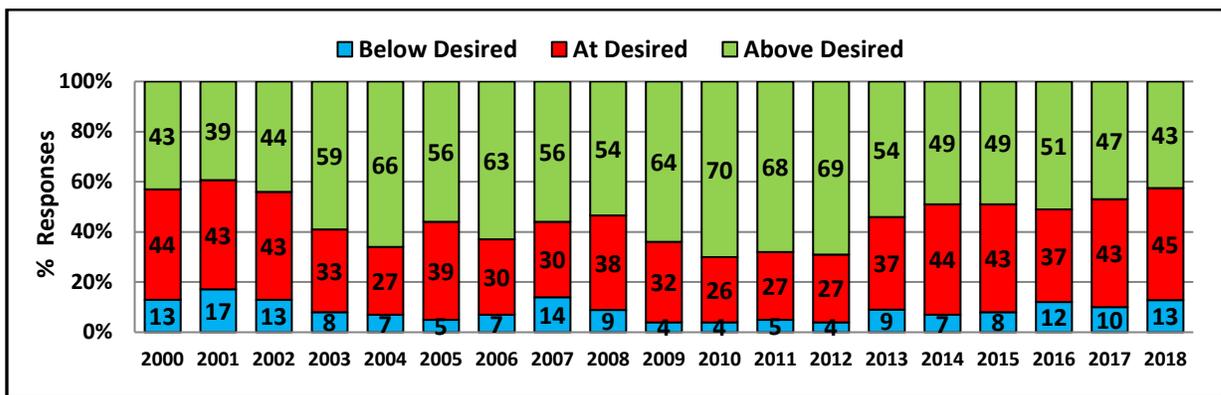


Figure 1. Relative landowner perceptions of white-tailed deer populations on their property in the Powder River White-tailed Deer Herd Unit, by percentage. Desired level is a subjective expression of individual landowner tolerance of white-tailed deer.

Harvest

An estimated 7,709 hunters (5,309 resident hunters; 2,400 nonresident hunters) harvested an estimated 6,016 white-tailed deer in 2018, an increase of ~1% from 2017 and similar to the previous 5-year mean (2013-2017; $n=6,026$). This is the fourth highest harvest ever. Hunters harvested an estimated 2,217 bucks (37%), 3,301 does (55%) and 498 fawns (8%). Buck harvest

decreased slightly (3%) compared to 2017 while doe harvest increased 6% and fawn harvest decreased 11%.

Of total hunters, 69% were resident and 31% were nonresident hunters. Resident hunters harvested 67% of the total deer harvested and 78% of the bucks harvested, a slight decrease in both total and buck harvest from 2017. Nonresident hunters harvest 32% of the total harvest and only 22% of the buck harvest.

Hunter success was 78%, an increase from 2017 (72%) and above the 5-year average of 73%. Hunter effort, as measured by days hunted per deer harvested, was 5.8 days/harvest, basically the same as in 2017 (6.0 days/harvest). Effort was slightly below the 5-year average of 6.2 days/harvest. Hunter effort seems high for the amount of antlerless animals harvested as well as the relatively high success rate. This could be a function of each harvest being considered independent of other harvest. Our survey protocol may not account for multiple harvests per day per hunter which would result in a higher than actual estimated effort rate.

In summary, fewer hunters were more successful and harvested more white-tailed deer with similar effort than the year before. This suggests deer in general were relatively available for harvest. Weather conditions during the hunting season were generally favorable and likely didn't hamper harvest efforts.

White-tailed deer harvest is a significant source of high quality protein for hunters. Statewide, this herd unit accounts for 31% of all white-tailed deer harvest. Assuming an average yield of 45 lbs. of meat from a buck, 30 lbs. from a doe and 12 lbs. from a fawn, hunters were able to harvest over 200,000 lbs. of deer meat from this herd unit alone in 2018 (Fig. 2). Statewide, hunters harvested almost 690,000 lbs. of meat from white-tailed deer hunting.

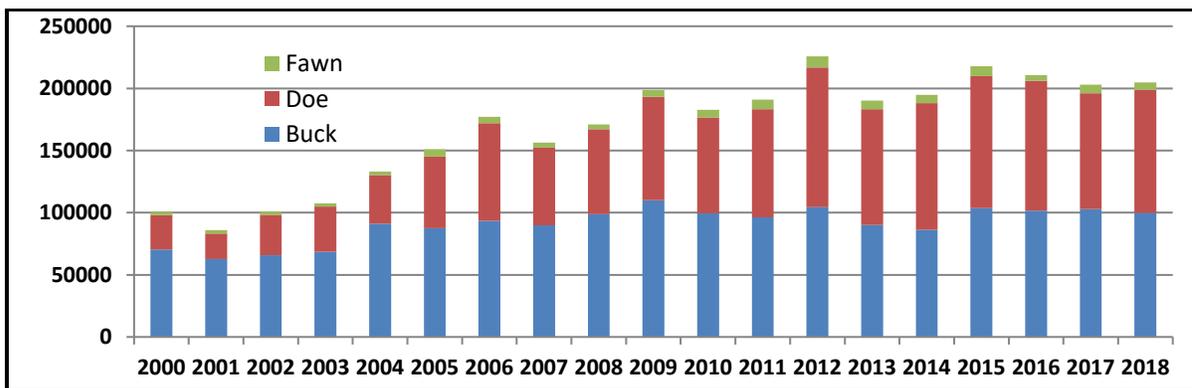


Figure 2. Estimated amount of deer meat harvested from this herd unit from 2000-2018. Assumes an average yield of 45 lbs. of meat per buck, 30 lbs. per doe and 12 lbs. fawn harvested.

Population

High white-tailed deer harvest in recent years (2014-2018; 5-year mean=6,093) suggests this population continues to be robust. The integrated population spreadsheet models developed for white-tailed deer populations with postseason classification data does not work with the available data. Under all three possible model scenarios, it simulates a negative population. As such, we don't have a functioning population simulation model.

Assuming hunters harvest approximately 30% of the total population in recent years, this population would be near 20,000 deer postseason (Fig. 3). Assuming hunters harvested 10% of the available bucks, this population would be about 22,200 white-tailed deer postseason based on 2018 buck harvest (Fig. 3). These are relatively broad, generic harvest based estimates but demonstrate that this white-tailed deer population is doing very well.

We believe we have at least stabilized this population through increased harvest over the past decade. Hunters harvested almost 60,000 white-tailed deer over the past 10 years, with an average of 5,959 white-tailed deer annually (mean = 2,210 bucks; 3,192 does; 557 fawns) during the 2009-2018 hunting seasons. Statewide, this herd unit accounts for 31% of all white-tailed deer harvest.

Periodic outbreaks of viral hemorrhagic diseases have also contributed to reduced numbers. We documented a significant outbreak of epizootic hemorrhagic disease (EHD) in 2013, resulting in white-tailed deer mortality across the herd unit. Based on landowner and hunter reports, the level of mortality was localized, and likely varied from ~10% - 70% of local populations. This is supported by the 17% decrease in the 2013 harvest under similar hunting seasons.

Chronic wasting disease (CWD) is present in this herd unit. With high deer densities, CWD may have population level effects in the relatively near future. We believe adult (age 4+) bucks will be the cohort most adversely affected.

Other mortality factors influencing population dynamics include deer-vehicle collisions, predation, fences and weather.

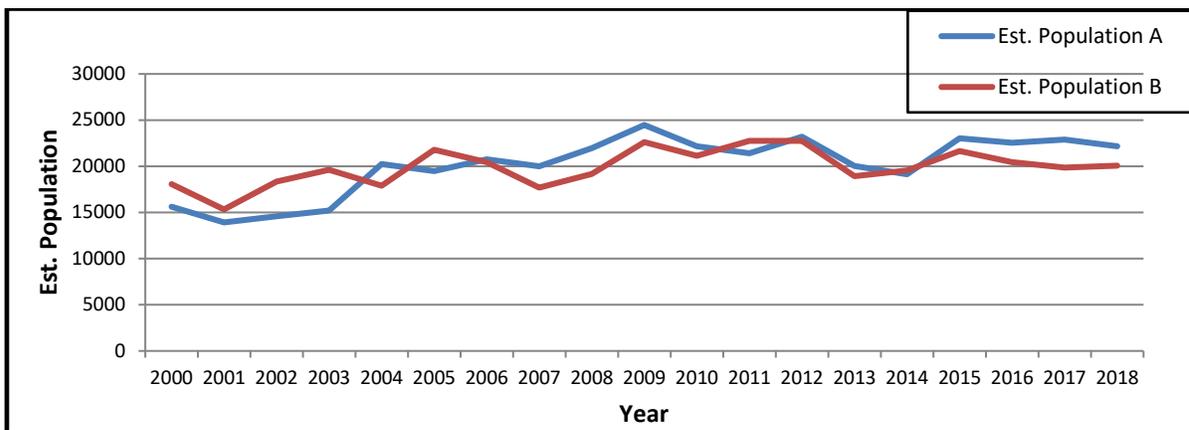


Figure 3. Estimated Powder River white-tailed deer population based on estimated harvest rates during the 2000-2018 hunting seasons. The estimated Population A (blue line) is based on harvesting 10% of available bucks. The estimated Population B (red line) is based on total harvest being 15-30% of total population.

Management Summary

The regular hunting season for white-tailed deer has generally been concurrent with mule deer seasons during October, as well as continuing for white-tailed deer through November. An archery pre-season runs the month of September in all hunt areas. Firearm seasons for antlerless white-tailed deer have been extended as early as September 1 and as late as December 15 to provide additional opportunities to harvest deer as well as address damage concerns of landowners.

Most white-tailed deer hunting is on private land. Access for antlered harvest is generally through payment of a trespass fee or outfitted hunts, especially for nonresident hunters. Access for antlerless harvest is generally easier, with several landowners on a publically available list allowing free access. Resident hunters seem to rely on various personal relationships (e.g., work, church, family) with landowners to gain access. Many landowners have developed a group of trusted hunters who return annually. This limits opportunities for new hunters looking to harvest deer.

We increased doe/fawn licenses (Type 7 or 8) in Areas 17, 18, and 19 for the 2018 season to address landowner concerns about deer numbers on private lands. This level of licenses, and subsequent harvest, has seemed to satisfied landowners. There were no changes in doe/fawn license quotas for 2019.

We increased Type 3 licenses in Areas 23,26 and Area 24 by 100 each. Whitetail buck numbers have recovered from the last EHD outbreak (2013). Whitetail deer hunting in these hunt areas has become popular in recent years and there is relatively high demand for these licenses. By encouraging hunters targeting white-tailed deer to apply for this license type, we will also reduce competition for Region C and Region Y non-resident licenses.

We estimate a harvest of about 6,000 white-tailed deer in 2019, similar to recent years. Buck deer have recovered well following the 2013 EHD outbreak. Landowners and hunters report a lot of m mature bucks in the population. Antlerless harvest continues to be strong. We may be near our maximum harvest level. Several landowners have developed a core group of hunters and are not taking new hunters. Hunters new to this region are having a harder time finding access, even for antlerless hunts. Increasing CWD prevalence may discourage hunters from harvesting deer.

We are likely lowering this population in some areas through harvest, but with the numerous private land refuges that do not allow hunting, it will be difficult to bring the overall population down to desired levels though hunting. Managers will continue to work with individuals and subdivisions to develop safe hunting opportunities.

We increased the nonresident Region C deer quota by 200 to 2,500 licenses for the 2019 season. Region C contains Hunt Areas 17-19, 23, 26, 29 and 31. Nonresident deer hunters often target mule deer as most can hunt white-tailed deer in their home state. White-tailed deer harvest ($n=1,984$) in Region C hunt areas accounted for about 33% of the total harvest in this herd unit in 2017.

We maintained the nonresident Region Y general license deer quota at 1,800 licenses for 2019. Region Y contains Hunt Areas 24, 25, 27, 28, 30, 32, 33, 163 and 169. These hunt areas accounted for 67% of the white-tailed deer harvest ($n=4,032$) in this herd unit during 2018. Hunt Area 24 alone accounted for 72% ($n=2,886$) of the white-tailed deer harvest (Fig. 4) in Region Y. Hunt Area 24 had the second highest white-tailed deer harvest in Wyoming. Only Hunt Area 2 in the Black Hills Herd Unit had more white-tailed deer harvest.

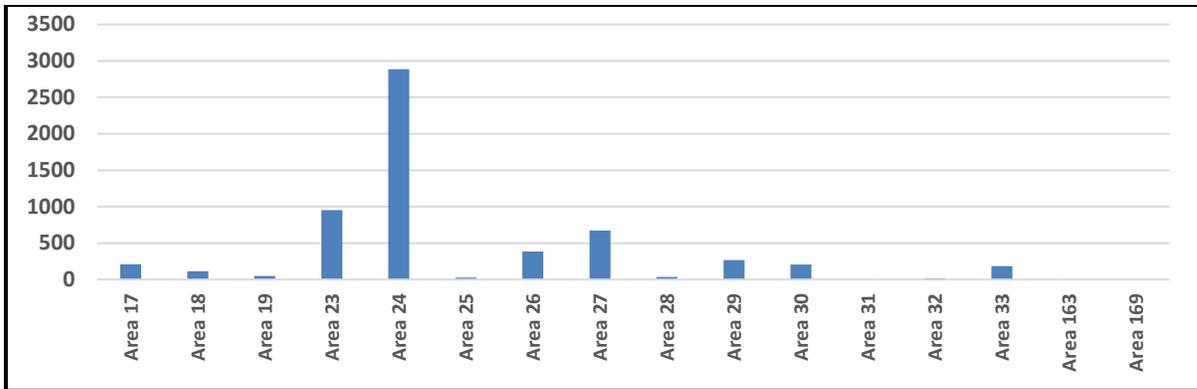


Figure 4. Estimated 2018 harvest by hunt area in the Powder River white-tailed deer herd unit.

Chronic Wasting Disease (CWD) was first detected in this herd unit in 2002. In 2018, 101 white-tailed deer were tested with 23 positives (22.8%) and 158 mule deer were tested with 19 positives (12%). CWD prevalence appears to be increasing in both deer species in the Sheridan Region. This could have population level affects in coming years.

The Department proposes to designate focus herds annually, in which to emphasize CWD monitoring. This will result in each deer and elk herd being intensively sample every four or five years. Increased sample sizes should give us a better idea of current distribution and prevalence rates for CWD within sampled populations.

ELK

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2018 - JCR Evaluation Form

SPECIES: Elk
 HERD: EL320 - FORTIFICATION
 HUNT AREAS: 2

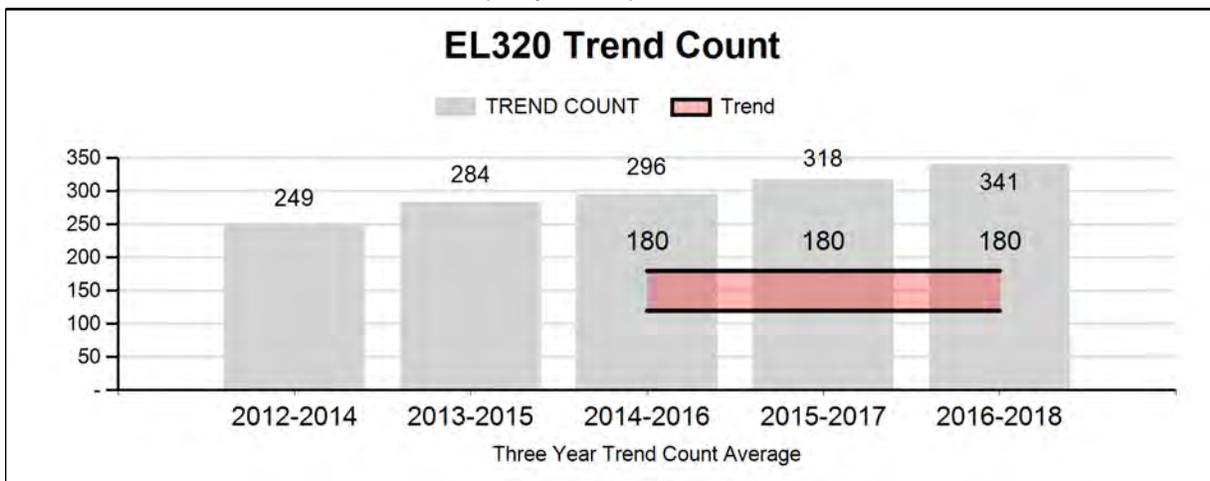
PERIOD: 6/1/2018 - 5/31/2019
 PREPARED BY: ERIKA PECKHAM

	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Trend Count:	299	378	350
Harvest:	90	91	48
Hunters:	118	145	70
Hunter Success:	76%	63%	70 %
Active Licenses:	120	156	68
Active License Success	75%	58%	72 %
Recreation Days:	437	504	250
Days Per Animal:	4.9	5.5	5.1
Males per 100 Females:	48	22	
Juveniles per 100 Females	68	57	

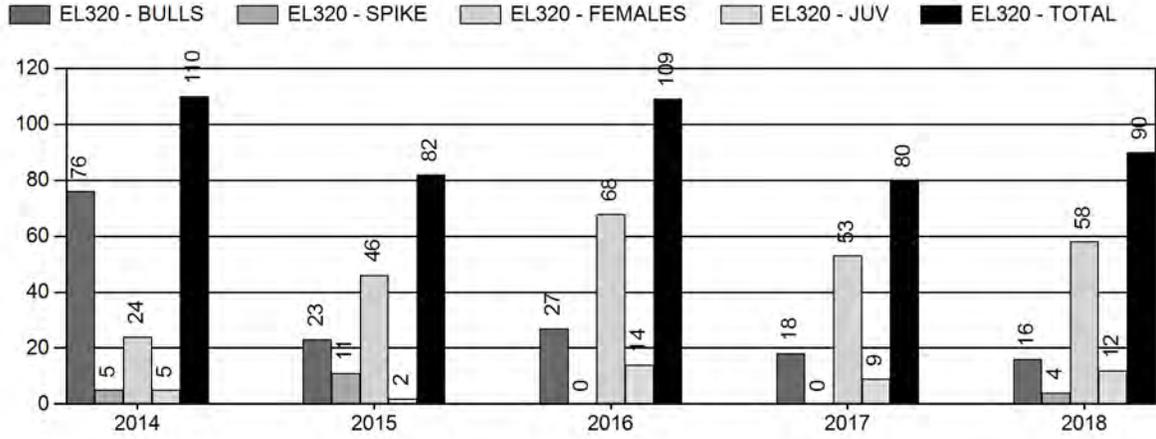
Trend Based Objective ($\pm 20\%$) 150 (120 - 180)
 Management Strategy: Private Land
 Percent population is above (+) or (-) objective: 152%
 Number of years population has been + or - objective in recent trend: 2

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

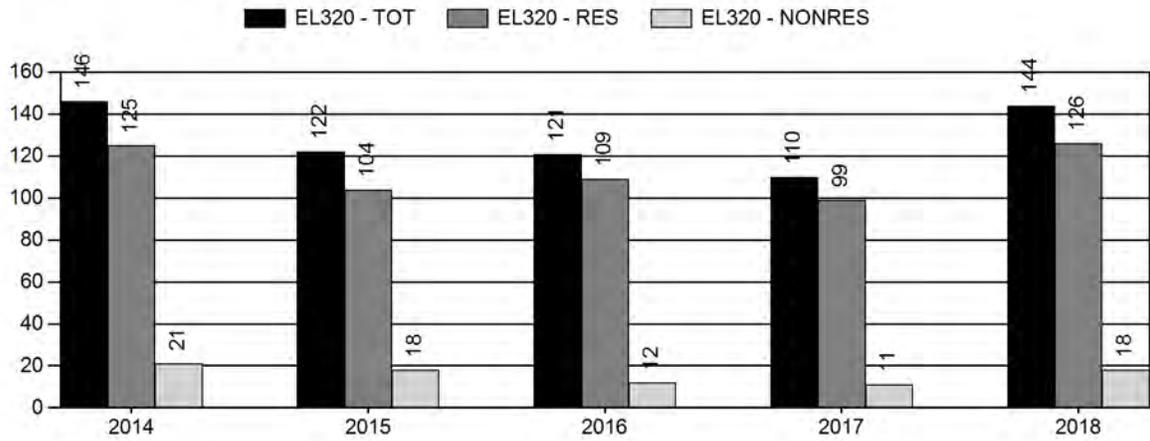
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	29.5%	12.6%
Males ≥ 1 year old:	8%	0%
Juveniles (< 1 year old):	1%	4%



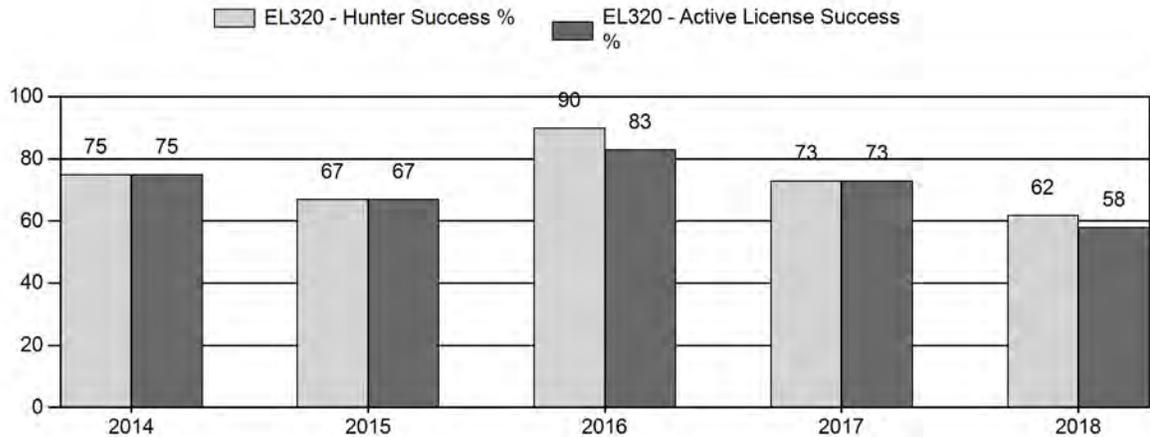
Harvest



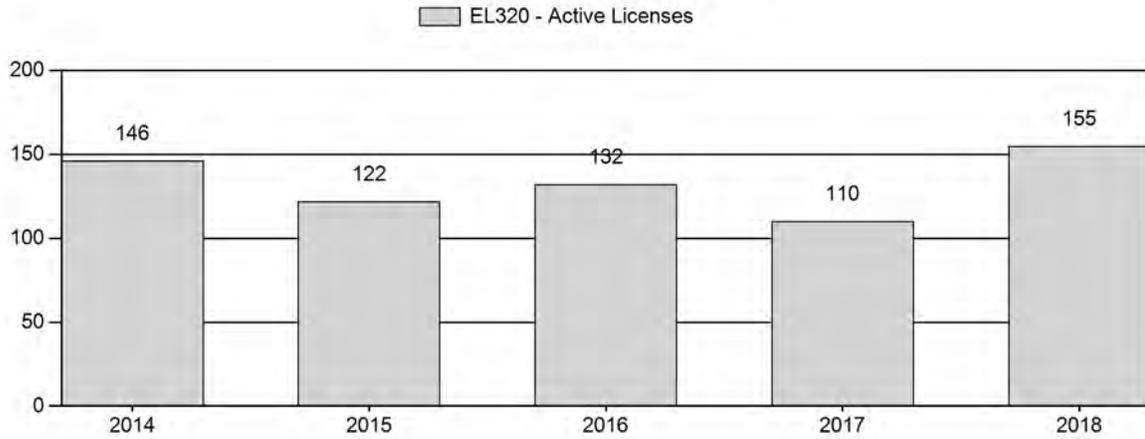
Number of Hunters



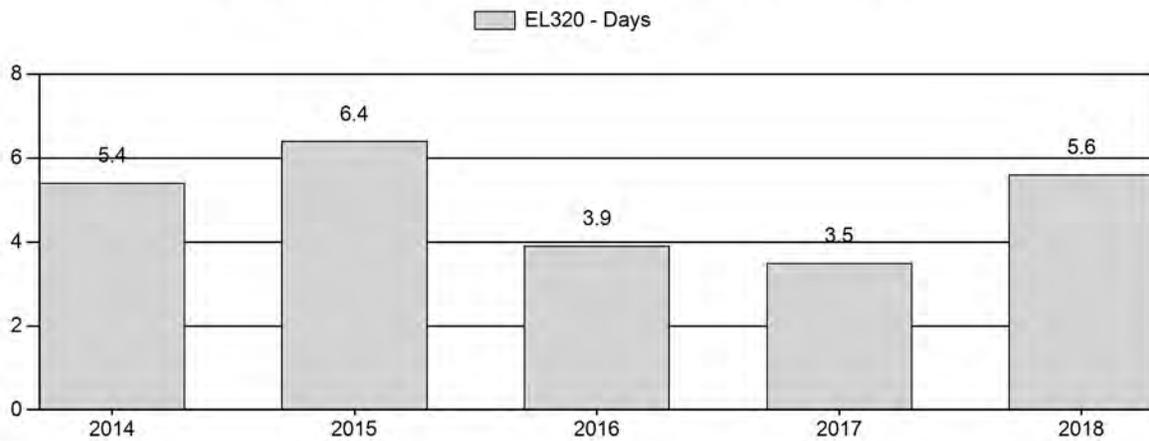
Harvest Success



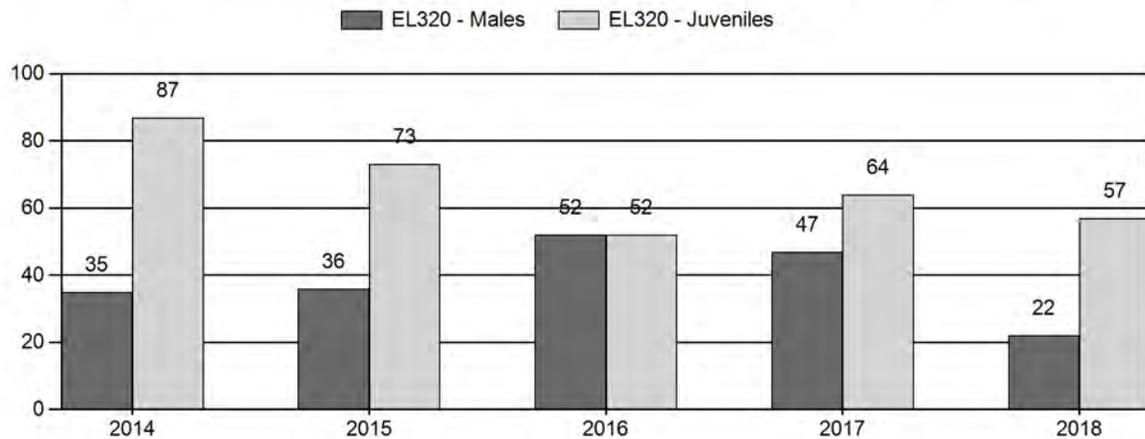
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL320 - FORTIFICATION

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	CIs Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	23	63	86	31%	114	41%	75	27%	275	438	20	55	75	± 10	66	± 9	38
2014	0	25	17	42	16%	121	45%	105	39%	268	0	21	14	35	± 6	87	± 11	64
2015	0	31	22	53	17%	148	48%	108	35%	309	0	21	15	36	± 6	73	± 9	54
2016	0	43	36	79	25%	153	49%	80	26%	312	517	28	24	52	± 7	52	± 7	34
2017	0	29	45	74	22%	157	47%	101	30%	332	483	18	29	47	± 0	64	± 0	44
2018	0	20	27	47	12%	217	56%	123	32%	387	537	9	12	22	± 0	57	± 0	47

**2019 HUNTING SEASONS
FORTIFICATION ELK HERD (EL320)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
2	4	Oct. 21	Nov. 3	50	Limited quota	Antlerless elk
2	6	Oct. 21	Nov. 3	20	Limited quota	Cow or calf

Hunt Area	Type	Quota change from 2018
2	1	-35
2	4	+10
2	6	-20
2	7	-50

Management Evaluation

Current Trend Count Objective: 150

Management Strategy: Private Land

2018 Trend Count: 387

2019 Proposed Trend Count: 350

2018 Hunter Satisfaction: 72% Satisfied, 15% Neutral, 13% Dissatisfied

Herd Unit Issues

The Fortification Elk Herd Unit has a mid-winter trend count objective of 150 elk. The management strategy is private land management. The objective and management strategy were last reviewed and revised in 2017. Prior to this change, this herd had a population objective of 150 animals. The mid-winter trend count objective of 150 elk was correlated with a time period when landowners were satisfied with the number of elk they were seeing. During the time period when satisfaction with the number of elk was high, there were around 150 elk being detected in the postseason survey. The objective will be difficult to attain, as this herd is likely over 800 elk and increasing due to limited hunter access. As hunter access to this herd is dependent on private landowner willingness and ability to accommodate hunters, the private land management strategy is appropriate.

This herd has great potential for growth if hunter access does not improve. Much of the occupied range includes land administrated by the Bureau of Land Management. Private land is scattered, but also surrounds the occupied habitat, resulting in a tightly controlled access situation. The opinions of landowners controlling hunting access thus have a great impact on how this herd is

managed. At this time, several landowners allowing hunting access seem to be relatively satisfied with the management direction and have allowed access to the current number of license-holding hunters. A few landowners have opted to enroll in the Access Yes program for 2019 and it is hoped that this will facilitate things and potentially neighboring ranches will see the benefit of the program. However, some landowners do not take any hunters, thereby providing refuge areas for elk.

Coal bed methane (CBM) development has occurred in the herd unit and has resulted in a network of roads and other development associated with the infrastructure required to support CBM extraction. A phased development plan was implemented when extensive CBM development was projected in core elk habitat. This reduced impacts to elk. Increased traffic was an issue with hunting in the past, however in recent years, development and activity has tapered off substantially. There has been increased conventional oil exploration, however, at this time it also has slowed with little development planned in the immediate future.

The mid-winter trend count resulted in 387 elk observed. This is well above the objective of 150 and is also the highest on record. The 2018 post-season population estimate from the spreadsheet model was about 775 elk, which is likely a realistic estimate. Field data and observations indicate this herd has steadily trended upwards since 2003. The field estimate is currently around 800 elk.

Weather

Weather throughout 2017 resulted in sub-optimal rangeland conditions due to moderate drought conditions. In contrast, weather in 2018 was ideal for rangeland conditions with favorable precipitation resulting in good forage availability. The Palmer Drought Index indicates that all months of 2018 experienced “normal” conditions in the Powder River drainage. Additionally, looking at historic temperature information for November and December 2018, mean temperatures were very close to the 30-year normals.

The winter of 2018-2019 was fairly mild with minimal amounts of snow as winter commenced. The month of February brought prolonged cold temperatures and an increase in snowfall. However, over winter survival was likely not negatively impacted.

Habitat

There is currently no formal habitat monitoring occurring in this herd unit. It should be noted that various stands of sagebrush appear to be stressed with overall low vigor. The cause may be related to prolonged drought. These areas are being monitored to see if die-off is imminent or if plants will recover. To date it appears that sagebrush stands are persisting. The BLM has plans to conduct targeted timber thinning within this area. Game and Fish has also been involved in this effort with treatments continuing over the next few years.

Field Data

This herd is classified aerially via a helicopter with about four hours required to conduct the survey. Usually the elk are found in their preferred locations and these areas are systematically searched. If there is additional time, outlying areas are searched. The 2018 survey effort yielded an additional group of around 50 elk in an area that is not typically surveyed.

In general, the number of elk observed has been increasing since 2005. Survey conditions during the November 2018 classification flight were moderate with poor snow cover and cool temperatures. Elk were scattered throughout the area. A total of 387 elk were observed and classified, resulting in postseason calf to cow ratio of 57, down slightly from the 2017 ratio of 64:100. The 2018 bull ratio was 22:100, down substantially from the 47:100 observed in 2017. It should also be noted that beginning a few years ago elk have been sighted increasingly in the areas adjacent to this herd unit. They are regularly spotted south of I-90, west of the Powder River and also east of Echeta Road suggesting elk have exceeded carrying capacity and are expanding into adjacent areas.

Classifications of Fortification Elk Herd 2004-2018

	Total	Juv	YrlgMale	AdultMale	Female
2004	66	13	3	9	41
2005	62	12	7	12	31
2006	173	56	21	15	81
2007	113	21	17	6	69
2008	135	40	12	14	69
2009	59	12	1	17	29
2010	164	36	13	31	84
2011	177	54	18	18	87
2012	204	63	32	27	82
2013	275	75	23	63	114
2014	268	105	25	17	121
2015	331*	108	31	22	148
2016	312	80	43	36	153
2017	332	101	29	45	157
2018	387	123	20	27	217

*Total is different, as there were 22 that were not classified

As this is a small herd, the ratios can very quickly become skewed when harvest emphasis is placed on either males or females. Historically, harvest strategies alternate with a focus on cows to keep the herd in check, and bulls the following year to keep a high bull ratio. Although there were some bull licenses available in 2018, cow harvest was again emphasized to control herd growth.

One difficulty associated with the management of this herd is achieving adequate sample sizes during trend-count surveys. Elk can be difficult to locate under dense juniper cover and frequently

they do not run when disturbed by survey flights. This contributes to reduced sightability, which is estimated to be 50%. Additionally, weather conditions are also a factor with lack of snow cover and warm temperatures making it difficult to spot elk. The Fortification Herd Unit might be a candidate to attempt using infa-red survey techniques to estimate the population.

Harvest

In 2018 there were 165 licenses available, 35 Type 1 any elk licenses, 40 Type 4 antlerless elk licenses, 40 Type 6 cow or calf licenses and 50 Type 7 cow or calf licenses that were designated for a December season. This was the first time in a number of years trying a late cow season. This number of licenses was in line with the number of hunters and was proportionate to the number of participating landowners allowing access. It should be noted that the conditions during the season were very favorable. Snow can result in roads being closed and decreased access to elk. In 2018, the overall success rate was 63% for the initial season, which is slightly lower than typical. The reported success rate seems higher than what field observations and landowner coupons indicate. The late season cow hunt yielded a reported success rate of 46%. During both seasons, elk seemed to be in the more rugged terrain and not in the more accessible areas where they typically can be found. This was confirmed during the post-season aerial trend survey. Days per harvest was estimated at 5.6 days, comparable to the preceding 5-year average of 4.8 days and far below the statewide average of 17.4 days per harvest.

Population

Although this herd has moved away from management by population objective, the model appears to capture the trend and provides a reasonable estimate. The “Constant Juvenile – Constant Adult Mortality Rate” (CJCA) spreadsheet model was chosen to use for the post season population estimate. This model equals the SCA-CJ model with the lowest AIC value (102) and appears to depict the observed postseason trend count. The efficacy of the spreadsheet model can be affected by several factors. One factor that comes into play is the herd size. These models work better with larger herds. The Fortification herd is a relatively small herd, and therefore the accuracy of the model likely decreases. None of the other models appeared to be accurate, and due to the hardiness of elk, it is unlikely that they were negatively impacted in the more difficult winters from 2008-2010. Other methods of estimating population may be looked into in the future. Observations on the ground indicate that elk numbers are increasing and are expanding their distribution.

Management Summary

Both BLM and Game and Fish staff have dedicated efforts to studying the behavior and movements of elk with an ongoing radio-collar study. In January of 2014, 35 cow elk were fitted with GPS collars. These collars are no longer functioning and currently there are no individuals with working collars. In the past, collaring efforts were funded in part by Anadarko Petroleum. Currently there is funding in place for 35 more collars. The anticipated collaring date is December of 2019.

Several nongovernmental organizations have taken a keen interest in the area and elk herd in particular. The viewpoint of many of these groups is that elk should be given greater consideration with competing interests. Coal bed methane development has reduced the total amount of effective elk habitat. Conventional oil development is anticipated to increase at some point in the Powder River Basin and could be a factor in the Fortification Elk Herd Unit. However, even with past and current development, the population is well over the management objective. Reducing elk numbers to objective would help reduce risks of overcrowding and degradation of remaining suitable habitat. A high priority is being placed upon maintaining habitat quality during development so that the area can continue to support a healthy elk herd after energy development has ceased.

In 2018 there were 165 licenses issued. During the annual landowner meeting held in January 2019, concern was expressed regarding the harvest and it was felt that higher license quotas hurt hunter success, reducing the harvest. The late cow season was discussed and was believed to be ineffective, given the distribution of elk at the time of the season.

The 2019 hunting season will have reduced Type 4 and Type 6 quotas. The Type 1 season will be closed to increase bull quality. Furthermore, the Type 7 season will be discontinued after one year. Department employees voiced concern at the landowner meeting that the season would be inadequate in controlling elk numbers, but landowners were unwilling to commit to increased hunter access. If we attain the projected harvest of 48 cows or calves, the population is projected to increase slightly.

2018 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2018 - 5/31/2019

HERD: EL321 - NORTH BIGHORN

HUNT AREAS: 35-40

PREPARED BY: TIM THOMAS

	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Trend Count:	5,797	5,599	5,500
Harvest:	1,489	1,816	1,900
Hunters:	4,441	4,982	5,200
Hunter Success:	34%	36%	37%
Active Licenses:	4,657	5,240	5,400
Active License Success	32%	35%	35%
Recreation Days:	33,694	36,842	38,000
Days Per Animal:	22.6	20.3	20
Males per 100 Females:	22	31	
Juveniles per 100 Females	45	37	

Trend Based Objective (± 20%) 4,350 (3480 - 5220)

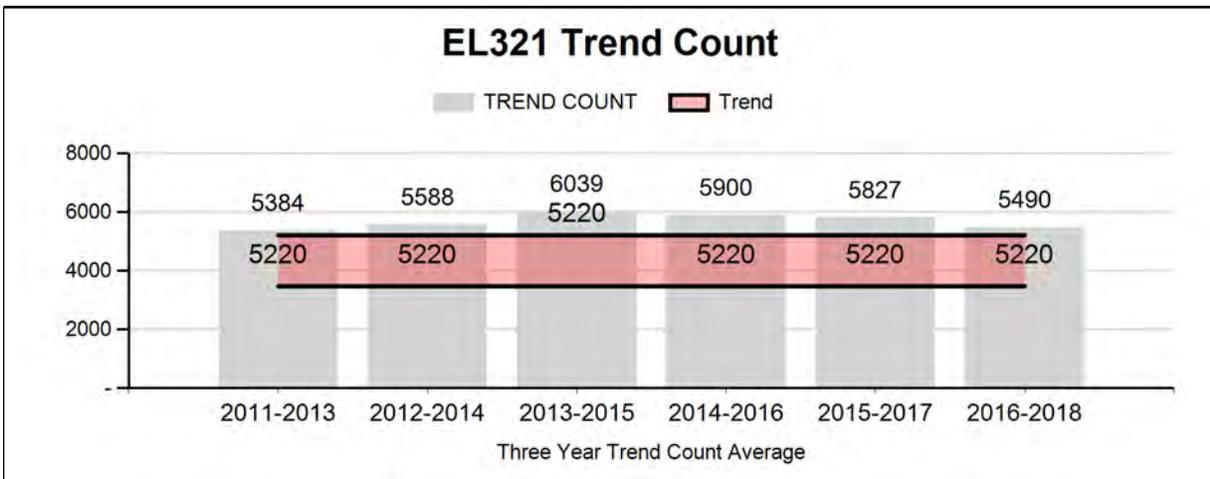
Management Strategy: Special

Percent population is above (+) or (-) objective: 29%

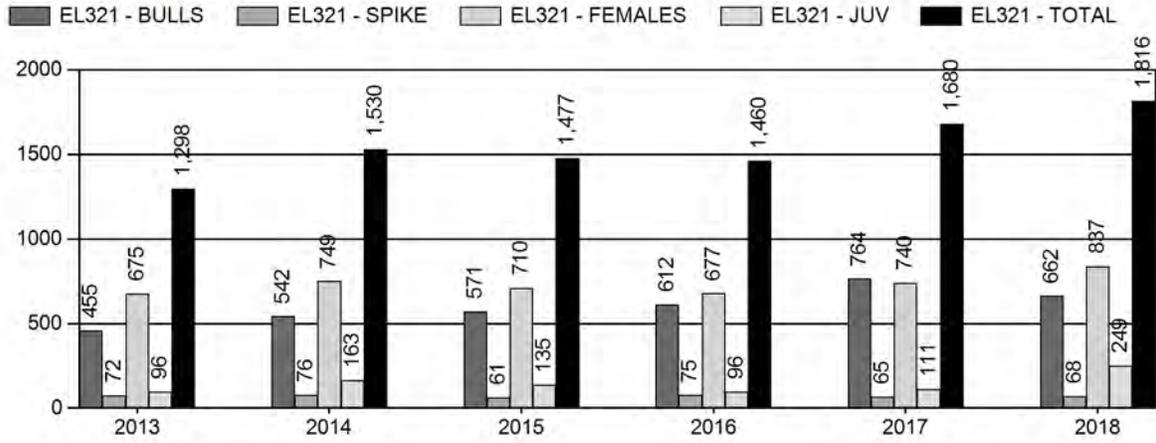
Number of years population has been + or - objective in recent trend: 4

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

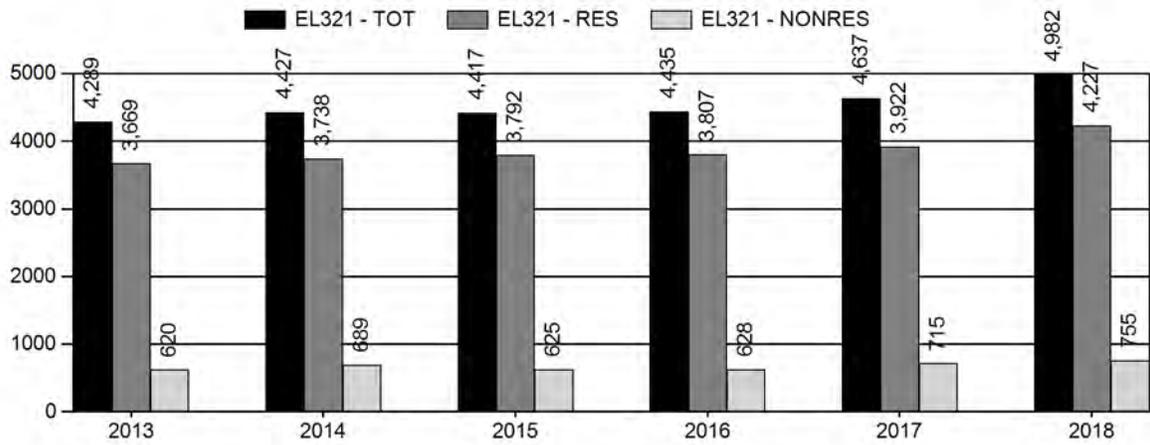
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	20%	20%
Males ≥ 1 year old:	38%	35%
Juveniles (< 1 year old):	5%	5%



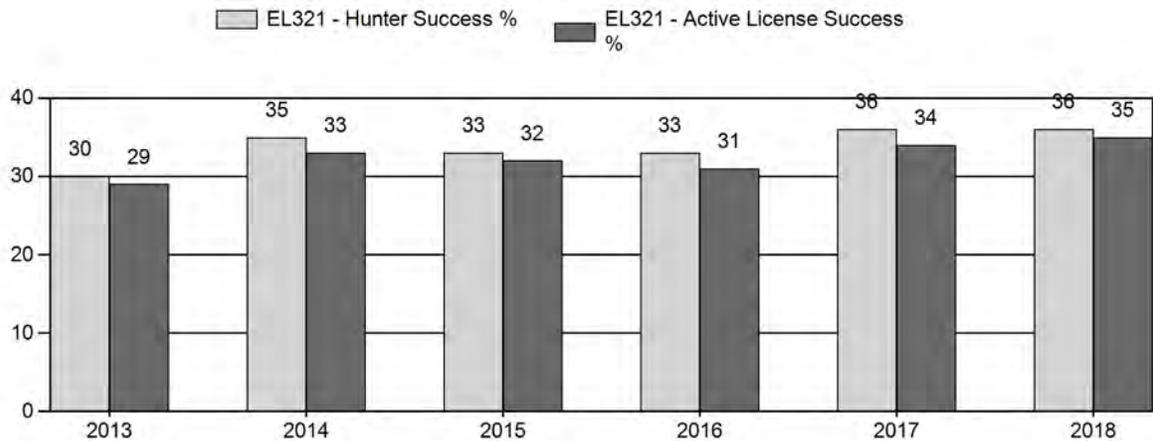
Harvest



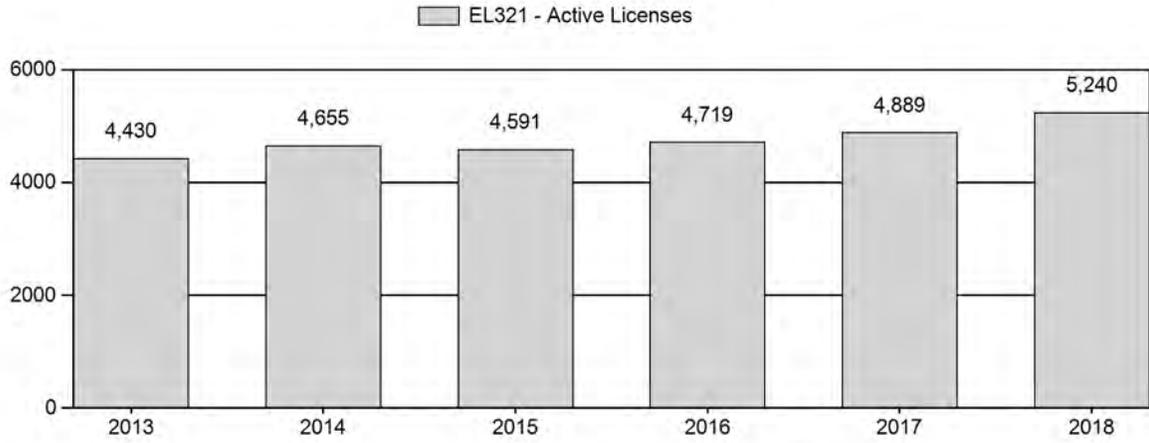
Number of Hunters



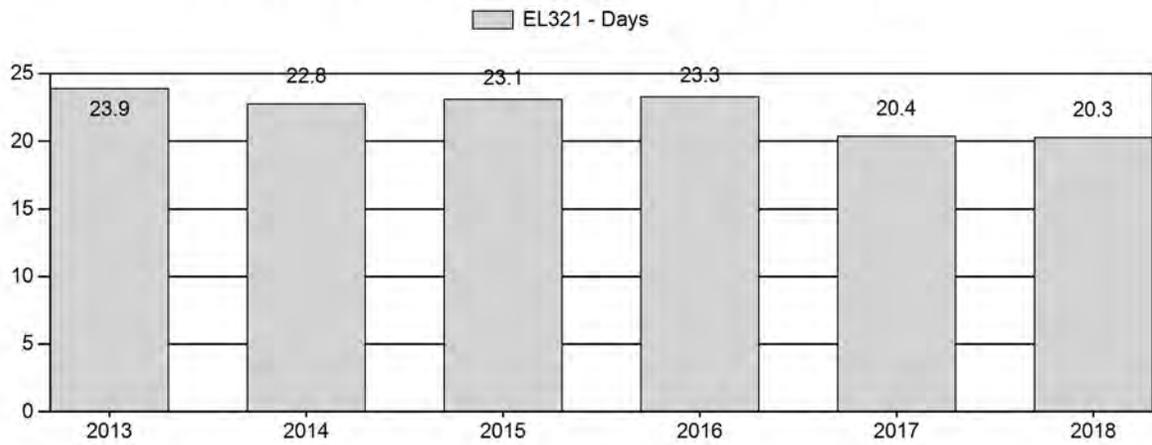
Harvest Success



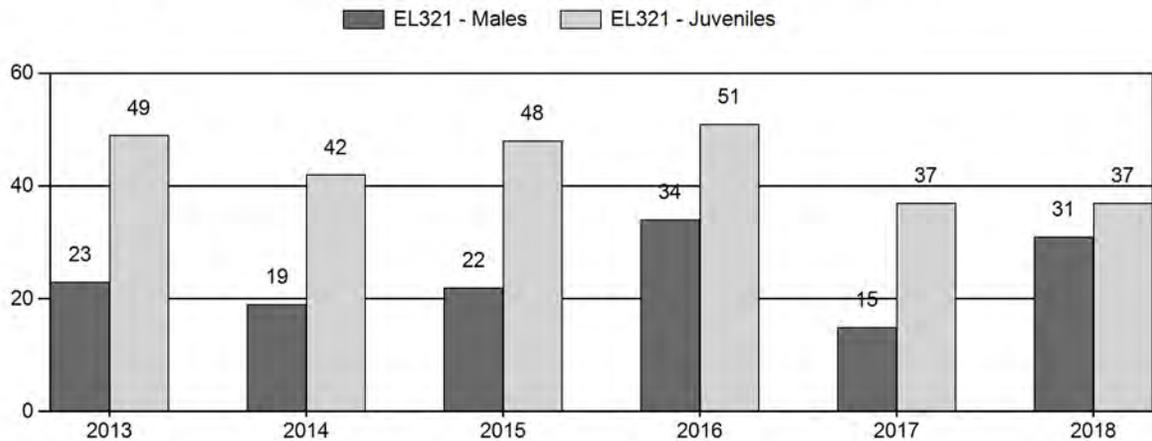
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary for Elk Herd EL321 - NORTH BIGHORN																		
Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	CIs Obj	Males to 100 Females			Young to			
		Ylg	Adult	Total	%	Total	%	Total	%			Ying	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	103	43	146	13%	643	58%	312	28%	1,101	736	16	7	23	± 0	49	± 0	40
2014	0	146	88	234	12%	1,221	62%	514	26%	1,969	504	12	7	19	± 0	42	± 0	35
2015	0	74	101	175	13%	787	59%	377	28%	1,339	709	9	13	22	± 0	48	± 0	39
2016	0	137	115	252	19%	734	54%	372	27%	1,358	801	19	16	34	± 0	51	± 0	38
2017	0	105	30	135	10%	871	66%	319	24%	1,325	474	12	3	15	± 0	37	± 0	32
2018	0	77	150	227	19%	721	59%	264	22%	1,212	509	11	21	31	± 0	37	± 0	28

2013 - 2018 Trend Count Summary for Elk Herd EL321 - NORTH BIGHORN				
Year	Count Dates	Flight Time		Number Counted
		Hours	Minutes	
2013	JANUARY 2014, FEBRUARY 2014	10	0	5,437
2014	JANUARY 2015,	1	0	6,069
2015	JANUARY 2016, FEBRUARY 2016	0	0	6,610
2016	JANUARY 2017,	0	0	5,021
2017	JANUARY 2018, FEBRUARY 2018	10	0	5,849
2018	JANUARY 2019, FEBRUARY 2019	3	50	5,599

**2019 HUNTING SEASONS
NORTH BIGHORN ELK HERD (EL321)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
35	1	Oct. 15	Nov. 5	150	Limited quota	Any elk
	4	Oct. 15	Dec. 31	250	Limited quota	Antlerless elk
	6	Oct. 15	Dec. 31	250	Limited quota	Cow or calf elk valid off national forest
36	9	Sep. 1	Sep. 30	75	Limited quota	Any elk, archery only
		Oct. 15	Nov. 5		General	Antlered elk
	4	Oct. 15	Dec. 31	300	Limited quota	Antlerless elk
	6	Oct. 1	Oct. 14	250	Limited quota	Cow or calf valid off national forest north of Rock Creek
	6	Oct. 15	Nov. 5			Cow or calf valid in the entire area
37	9	Sep. 1	Sep. 30	50	Limited quota	Any elk, archery only
		Oct. 15	Nov. 5		General	Any elk
	6	Sep. 15	Sep. 30	700	Limited quota	Cow or calf valid off national forest
	6	Oct. 1	Dec. 31			Cow or calf valid in the entire area
	9	Sep. 1	Sep. 30	150	Limited quota	Any elk, archery only
38	1	Oct. 15	Nov. 5	400	Limited quota	Any elk
	1	Nov. 6	Nov. 15			Antlerless elk
	4	Oct. 1	Oct. 10	550	Limited quota	Antlerless elk
	4	Oct. 15	Nov. 15			Antlerless elk
	6	Nov. 16	Dec. 31	50	Limited quota	Cow or calf valid off national forest; the Wyoming Game and Fish Commission's Kerns and Amsden Creek Wildlife Habitat Management Areas shall be closed
39	9	Sep. 1	Sep. 30	250	Limited quota	Any elk, archery only
	1	Oct. 15	Nov. 4	200	Limited quota	Any elk
	1	Nov. 5	Nov. 15			Antlerless elk
	4	Oct. 1	Oct. 10	75	Limited quota	Antlerless elk
	4	Oct. 15	Nov. 15			Antlerless elk
	9	Sep. 1	Sep. 30	75	Limited quota	Any elk, archery only

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
40	1	Oct. 15	Nov. 4	225	Limited quota	Any elk
	4	Oct. 15	Nov. 30	200	Limited quota	Antlerless elk
	5	Oct. 1	Oct. 10	50	Limited quota	Antlerless elk
	5	Oct. 15	Nov. 30			Antlerless elk
	6	Sep. 1	Oct. 14	100	Limited quota	Cow or calf valid off national forest
	6	Oct. 15	Nov. 30			Cow or calf valid in the entire area
	9	Sep. 1	Sep. 30	100	Limited quota	Any elk, archery only

Special Archery Season Hunt Areas	Type	Season Dates		Limitations
		Opens	Closes	
36, 37	All	Sep. 15	Sep. 30	Valid in the entire area(s)
35	1, 4	Sep. 15	Sep. 30	Valid in the entire area(s)
35	6	Sep. 15	Sep. 30	Valid off National Forest

Hunt Area	Type	Quota change from 2018
38	1	+ 50
	9	+ 50
Herd Unit Total	Type	Quota change from 2018
	1	+ 50
	4	No Change
	5	No Change
	6	No Change
	9	+ 50

Management Evaluation

Current Mid-Winter Trend Management Objective: 4,350

Management Strategy: Special

2018 Winter Trend Count: 5,599

Most Recent 3-year Running Average Winter Trend Count: ~ 5,500

2018 Hunter Satisfaction: 62% Satisfied; 19% Neutral; 19% Dissatisfied

Herd Unit Issues

The North Bighorn Elk Herd Unit is located in north central Wyoming. It covers the northern portion of the Bighorn Mountains and associated foothills. The Sheridan and Cody Regions share management, with the Sheridan wildlife biologist having herd unit reporting responsibility. This herd unit contains six elk hunt areas, specifically Hunt Areas 35-40.

The management objective for the North Bighorn Elk Herd Unit is a mid-winter trend count of 4,350 elk ($\pm 20\%$; 3,480-5,220). The management strategy is special management overall, with special management emphasis in limited quota hunt areas (Areas 35, 38, 39 and 40) and recreational management emphasis in general license hunt areas (Areas 36 and 37). We revised the management objective and strategy in 2012. We conducted the objective and management strategy 5-year evaluation in 2017 with no changes recommended.

There are several areas, consisting primarily of private lands, within the various hunt areas that act as refuge for elk, providing a safe harbor from harvest. This limits managers' ability to maintain these groups within desired population levels, leading to frustration for the general hunting public as elk move from publically accessible areas to refuge areas. Landowners are also frustrated as elk move off these refuge areas once hunting season is closed and cause damage to stored and standing crops. This problem has grown over the past 25+ years, especially on the eastside of this herd unit - specifically Hunt Areas 35, 36 and 37 - as larger ranches have changed ownership and views on elk management and hunter access have changed.

During four of the last seven hunting seasons (2012, 2013, 2014 and 2016), hunters harvested elk from this herd unit that tested seropositive for exposure to the bacterium *Brucella abortus*. *B. abortus* is the bacterium that causes the disease brucellosis in livestock, elk and bison, and undulant fever in humans. In 2012, hunters collected and submitted blood samples from harvested elk in Hunt Area 40 on the west side of the Bighorn Mountains during routine statewide monitoring for brucellosis. Two of these samples tested seropositive for exposure to *B. abortus*. In response to this finding, an enhanced brucellosis surveillance effort was initiated in all elk hunt areas in the Bighorn Mountains in 2013 and has occurred every year since then.

Weather

Temperature and precipitation data referenced in this section were collected at the Buffalo (#481165), Burgess Junction (#481220), Shell (#488124) and Sheridan Airport (#488155) weather stations located within this herd unit. Historic climate data are reported by the Western Region Climate Center on their website (www.wrcc.dri.edu).

Spring 2018 was generally warm and wet, with slightly above normal temperatures and above normal precipitation, resulting in a good start for forage production in the Bighorn Mountains. Precipitation during May was almost twice the long-term mean. Precipitation was near normal (June and July) to above normal (August) during the summer. Temperatures through the summer were near or slightly above normal. During the fall of 2018, precipitation was below normal (September), well above normal (October) or near normal (November), with temperatures slightly below normal. Precipitation was 50% of normal during December and near normal for January. Temperatures were above average in December and January, turning cold in February. Average monthly temperature was between 5⁰F and 15⁰F below average for February. March was generally

below normal and April was near normal for both temperature and precipitation. May saw below average temperatures (~5 - 15⁰F lower) and 1.7-2.5 times average precipitation. Cool wet weather during parturition could negatively influence neonate survival. Late snow fall during May kept elk from calving in some higher elevation parturition areas. On May 26, only six female elk were observed in the Garden of the Gods area, a historic parturition area.

Adult elk appeared to have entered the winter in good condition, allowing them to survive the winter fairly well. Cold temperatures, as low as -20⁰ F, in early February through early March resulted in elk movements to non-traditional areas. Elk damage to stored crops in some areas increased during this time period. While calves are more susceptible to adverse effects of cold temperatures due to limited body reserves and small body size, over-winter mortality probably wasn't significant due to the otherwise open winter conditions.

Field Data

Biologists and wardens conduct winter trend counts during January – February using aerial survey techniques with rotary and fixed-wing aircraft. Good snow cover and favorable flying conditions dictate the timing of these surveys annually. Managers on the west side (Areas 39 and 40) usually also classify elk during these surveys.

We counted 5,599 elk on winter ranges during January-February 2019, which is ~29% above the established mid-winter count objective of 4,350 (Table 1). This is the fourth highest winter count, but it is below the previous five year (2013-2017) average of 5,797 elk. The slightly declining trend in trend counts suggests we may have stopped the growth of this herd and may be finally decreasing it towards objective.

Table 1. Desired elk distribution and actual winter trend counts in North Bighorn Elk Herd Unit.

Hunt Area	Winter Count Objective	2016 Winter Count	2017 Winter Count	2018 Winter Count	2018 # Over / Under Objective	3-year (2016-18) Running Mean
35	400	148	360	528	+128	345
36	800	905	652	510	-290	689
37	800	1,668	2,108	1,822	+1,022	1,866
38	1,000	942	1,404	1,527	+527	1,291
39	500	452	451	527	+27	477
40	850	906	874	685	-165	822
	4,350	5,021	5,849	5,599	+1,249	5,490 (+29%)

Winter trend counts are similar to previous years. Recent research demonstrated female elk can winter on different winter ranges between years, accounting for some annual variation in surveys. In recent years, we have also seen elk movements not previously documented. Elk that historically wintered in Area 35 have started wintering in the northern portion of Area 34 in the South Bighorn Herd Unit.

Upwards of 1,500 elk winter in Garvin Basin, MT annually. Based on previous research, these elk return to Wyoming during the summer months. Due to the fact these elk are outside Wyoming, we do not survey these elk during our trend counts and are not included in our management objective. We have liberalized season strategies, resulting in an increase in harvest in recent years to reduce

elk to more desired levels. Limited access to private lands along the foothills of the Bighorns makes attaining harvest goals difficult.

We classified 1,212 elk during January 2019, down slightly from recent years but still above the desired sample size at the 90% confidence level. All elk classified were on the west side (Areas 39 and 40) of the Bighorn Mountains. We observed 37 calves:100 cows, that same as in January 2018 and the lowest calf:cow ratio since 2002. Assuming this ratio accurately reflects the true population dynamics, this could be a function of unfavorable environmental conditions last winter. It could also be a density dependent response to high elk numbers.

We observed 31 bulls (11 yearling; 21 adult):100 cows. This is only the third time we have observed over 30 bulls:100 cows. The observed yearling bull to cow ratio suggests average recruitment of bulls in 2018. This level of recruitment should be sufficient to maintain current levels of bull harvest. Due to the winter behavior of mature bulls (> 2 yrs old), which tend to winter away from cow/calf/young bull groups, is often difficult to assess the true bull to cow ratio. Over the past 10 years, the observed bull:cow ratio has fluctuated from 15-34 bulls:100 cows. We did locate several wintering bulls groups in some hunt areas that are not included in the above ratio because the corresponding cow/calf groups weren't classified. For example, we observed at least 178 branched antlered bulls in Area 37 and 158 branched antlered bulls in Area 38. In 2018, 91% of the reported bull harvest was branch antlered bulls, suggesting adequate bulls in the population.

According to the 2018 hunter satisfaction survey, 62% of 1,276 hunters were satisfied with their elk hunting experience, 19% were dissatisfied, with the balance ($n=20%$) being neutral. Satisfaction decreased slightly compared to the 2017 season, possibly due to poor weather conditions during much of the hunting season. Hunters were more satisfied in the limited quota hunt areas (70%) compared to the general license areas (53%) which is expected. Limited quotas areas tend to be less crowded, have higher success and generally have better quality bulls, factors that likely influence hunter satisfaction levels. Nonresident hunters ($n=1$) tended to be more satisfied (65%) than resident hunters (61%, $n=1,034$), although the difference is not as pronounced as it has been in previous years. Hunter satisfaction is subjective and based on individual values, perceptions and success.

Harvest Data

An estimated 4,978 hunters harvested an estimated 1,792 elk in 2018, an 7% increase over the 2017 harvest (Fig. 1). This is the highest estimated harvest recorded. Cow and calf harvest were the highest ever while bull harvest was the second highest ever.

During 2009-2013, hunters harvested an average of 575 total bulls compared to an average of 695 bull elk during 2014-2018. Adult bull harvest averaged 478 during 2009-2013 compared to an average 626 during 2014-2018. Estimated branched antlered bull harvest was over 500 bulls six of the past seven years. With an emphasis on special management in the limited quota hunt areas, we are concerned with the level of bull harvest in recent years. We will continue to monitor bull quality and hunter satisfaction. Yearling bull harvest has remained relatively stable over the past five years, ranging from 61 to 76. This is actually a decline from the previous decade, suggesting a shift in hunter selection for branched antlered bulls (Fig. 2). This shift could be a result of more branched antlered bulls being available in the population for harvest.

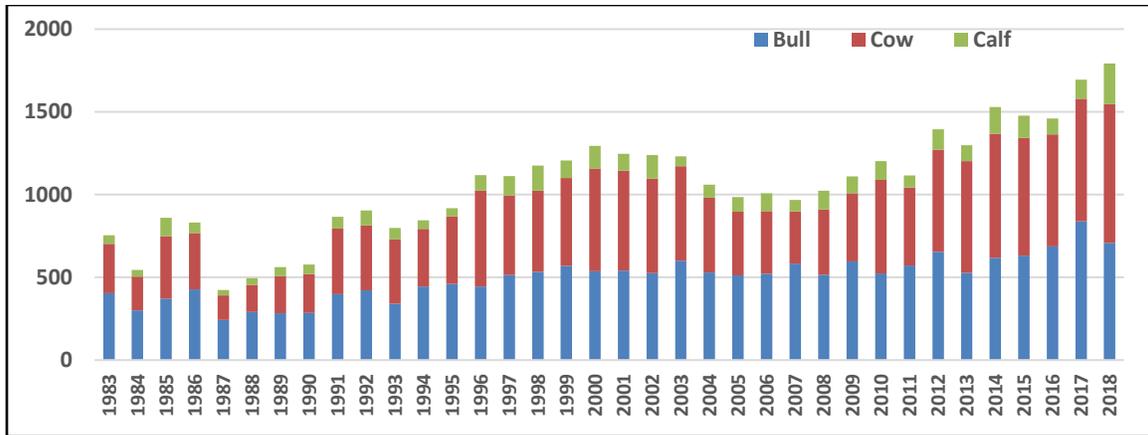


Figure 1. Estimated elk harvest from 1983 – 2018 by bull, cow and calf.

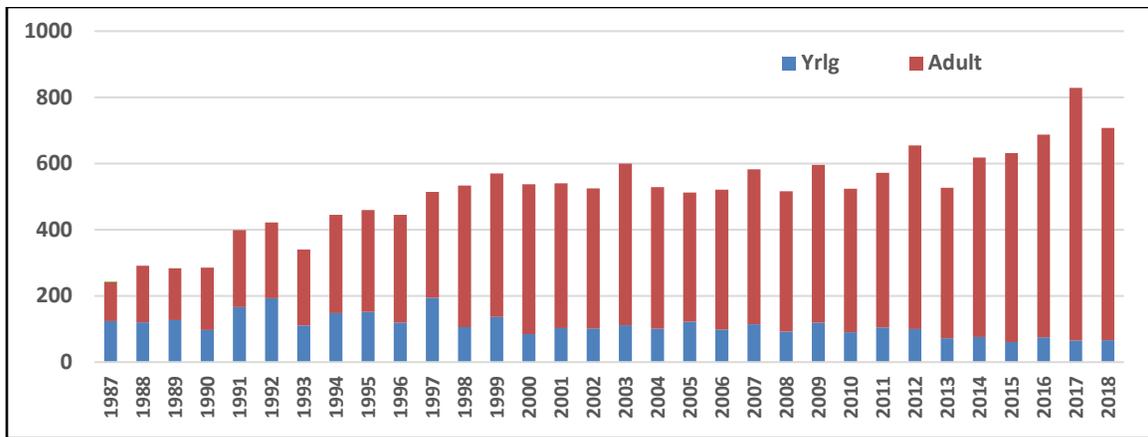


Figure 2. Estimated bull elk harvest from 1987 – 2018 by yearling and adult bulls.

Hunter success was estimated at 36%, the same as in 2017 and highest success rate since 1997. Effort, as measured by the number of days hunted to harvest an elk, was 20.6 days/harvest, similar to 2017. Relatively open weather conditions during late October and early November kept elk scattered across most of the herd unit. The open conditions allowed good access resulting in good success. Extended hunting season strategies helped provide opportunity for antlerless harvest.

Archery hunters harvested an estimated 260 elk in this herd unit, a 6% increase from the 2017 archery harvest (n=251) and 15% of the total harvest. Statewide, archery hunts harvested ~11% of the elk harvested in 2018. Archers are particularly successful on bull elk, harvesting an estimated 243 bulls (33% of total bull harvest), consisting of 234 adult bulls (≥ 2 years old) and 9 yearling bulls. Several hunt areas in this herd unit are generally considered some of the best opportunities for trophy elk archery hunting in Wyoming. This level of bull harvest, by either archery or firearm hunters, may not be sustainable over time to maintain special management objectives and will be monitored.

Population

We do not have an integrated spreadsheet model developed for this herd unit because: 1) we do not manage this herd based on a post-season population objective; 2) this is an interstate elk herd;

and 3) up to 25% of this herd migrates onto the Crow Indian Reservation in Montana each fall, where harvest is unregulated and unmonitored. We manage this herd based on mid-winter trend counts. Elk generally winter in traditional areas within this herd unit where they are reasonably visible, and we likely count 70-90% of wintering elk in any given year.

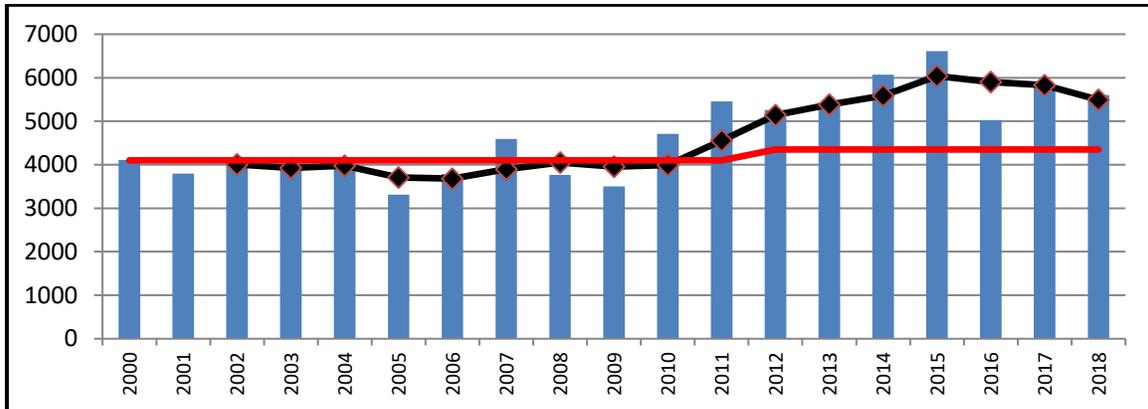


Figure 2. Elk numbers, with 3-year running average (black line), observed during trend and classification surveys compared to the management objective (red line).

While a trend count is not a complete census, it does provide a minimum known annual population. We have not developed a correction factor so it is difficult to accurately estimate a population above the known trend count. Based on elk winter trend counts, it appears this population may have peaked about 2015 and may be slowly decreasing (Fig. 2). It is difficult to know how much of this is an actual decrease in the population and how much is variation inherent in wildlife surveys. Also, shifts in elk wintering in Wyoming versus Montana due to varying winter conditions and Area 35 elk wintering in Area 34 can affect winter trend counts independent of actual population changes. Efforts are being made, through liberalized hunting season strategies, to reduce this population towards objective. Harvest the past five years has been the highest five years ever, averaging over 1,588 elk harvested each year (Fig. 1).

Management Summary

In general, bull elk hunting runs from October 15th thru November 4th or 5th. With four of the six hunt areas managed under limited quota strategies, we have been successful to date in maintaining trophy quality hunting opportunities throughout the herd unit. Recent increases in bull harvest may reduce average age and subsequent bull quality, and will be closely monitored. Antlerless harvest, either on full price antlerless licenses or reduced price cow or calf licenses, varies among hunt areas based on local management desires and concerns.

Archery hunting is allowed during the month of September. In Hunt Areas 35, 36, and 37, Type 9 (archery only) license holders can hunt the entire month, while other license holders (i.e. General, Type 1, Type 4 or Type 6 license holders) can hunt starting September 15. In Hunt Areas 38, 39, and 40, archery hunting is by Type 9 license only. These areas are extremely popular, with draw odds of around 29% for residents in these three areas (2018 resident draw odds for Type 9 license: Area 38 = 23%; Area 39 = 32%; Area 40 = 49%). Non-resident hunters needed 9+ preference points to draw an Area 38 Type 9 license, five points for a 39 Type 9 license and 8+ preference points to draw an Area 40 Type 9 license in 2018 (regular preference points draw).

A significant number of elk in Area 35 move to private lands south of U.S. Highway 16 in September to forage on alfalfa meadows. The Area 35 Type 6 season was implemented to target these private land elk, which may account for 75% of the winter count for this hunt area. In 2016, the Wyoming Office of State Land and Investments completed the Bull Creek Ranch #1 exchange which secured 5,235 deeded acres into State ownership with managed public access. This acquisition, along with existing BLM and State leases, provided access for significant public hunting opportunity which resulted in numerous elk being harvested. The Bull Creek Ranch #2 land exchange completed in February 2018 secured acquisition of the remaining 3,200 deeded acres of the Bull Creek Ranch into State ownership. This property provides crucial elk and deer winter range, and provides an opportunity to increase elk harvest to manage this sub-population. Type 4 (antlerless elk), Type 6 (cow or calf elk) and Type 9 (any elk, archery only) were all increased slightly in Area 35 for the 2018, resulting in record harvest. License numbers will remain the same for 2019.

Type 6 (cow or calf elk) licenses in Area 36 were increased for the 2018 season, resulting in the highest harvest levels in nearly 20 years. For 2019, license numbers will remain the same. An early October (October 1-14) season is designed to address elk damage on irrigated meadows in the Shell Creek drainage.

There is a split in the antlerless elk seasons in Hunt Areas 38, 39, and 40. These seasons run for 10 days, are closed for four days, and reopen in conjunction with other license types. This split is in response to feedback from antlered elk hunters worried that hunting pressure up to the opening day of their season could impact harvest opportunities. This split has seemed to pacify most hunters while providing opportunity to increase antlerless harvest. Based on reported day of harvest in 2018, an estimated 29% of the cow harvest in these hunt areas occurred during this early October season. This early October season has become very popular with hunters.

For the 2019 season, we propose increasing Area 38 Type 1 and Type 9 licenses by 50 licenses each. We reduced these license types in 2015 to reduce harvest on bulls. At the time, we were experiencing high legal and illegal bull harvest. These are highly desirable licenses and we have had requests to return to previous license numbers.

A late season Type 6 (cow or calf) license was created in 2015 in Area 38 to address damage issues on private lands. This season was designed to harvest elk that have become habituated to leaving the Amsden and Kerns WHMAs and feeding on stored hay crops. Weather conditions were fairly mild during the 2015 season and hunters harvested only five elk. In 2016, hunters harvested 11 elk on this license, in 2017 hunters harvested 12 elk, and in 2018 hunters harvested 20 elk. While we will use this season strategy again in 2019, some landowners have indicated they no longer support this late season. We will evaluate this license type and may remove it for the 2020 season.

The existing season structure and license allocation seems to be working well in Areas 39 and 40, and will be maintained for the 2019 season.

With continued liberal seasons and favorable hunting conditions, we anticipate a similar harvest (~1,900 elk) in 2019. Sustained harvest, especially on cows, should help bring some segments of this herd where winter counts exceed management objectives down to desired levels. Until access to key private lands improves in some areas, our ability to reach desired harvest, and hence

populations, will be limited. We continue to investigate possible access agreements to facilitate harvest.

Since brucellosis was first detected from a hunter harvested elk in Hunt Area 40 in 2012, we have tested 3,915 blood samples, primarily from hunter harvested elk in the Bighorn Mountains. There have been a total of 11 seropositives to date. There were no seropositive blood samples collected during 2017 and 2018.

Table 2. Usable blood samples collected during enhanced Brucellosis surveillance in Bighorn Mountains during 2018 hunting season. The North Bighorn Elk Herd Unit hunt areas (Areas 35-40) are in bold and highlighted. There were no seropositive samples in 2018.

Hunt Area	Usable Samples	Seropositive	Hunt Area	Usable Samples	Seropositive
033	25	0	040	88	0
034	48	0	041	102	0
035	45	0	045	101	0
036	16	0	047	14	0
037	47	0	048	52	0
038	104	0	049	93	0
039	62	0	120	28	0
			Total	825	0

In 2018, we collected and tested 825 blood samples, with 362 samples from the North Bighorn Elk Herd Unit (Table 2). Our lab has increased the useable sample rate by developing techniques allowing testing of hemolyzed samples. We initiated an enhanced brucellosis surveillance program starting in 2013, which will continue during the 2019 season. This involves mailing sample kits to hunters, placing collection coolers at exit points, field contacts and check stations.

In response to finding seropositive elk in the Bighorn Mountains, we developed a research proposal and solicited funding from the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS). The study objectives are:

1. Evaluate movement of possible source herds to determine if elk are migrating into/near the Bighorn Mountains.
2. Evaluate movement/dispersal of migratory elk in the Bighorn Mountains with a focus on Hunt Area 40.
3. Evaluate movement and interactions of elk herds in the northern Bighorns to determine how brucellosis may spread if it becomes established.
4. Perform a landscape genetics study to further evaluate relatedness of elk herds in and around the Bighorns.

Using Native Range Capture Service, we captured 58 elk in February, 2016. Elk were captured via a net-gun fired from a helicopter. Once entangled, elk were hobbled, blood samples were taken, ear tags attached, and an Advanced Telemetry System's (ATS) GPS collar attached. Elk were then released on-site. Of the 58 captured, 46 were within the North Bighorn Herd Unit. We captured another 53 elk in February, 2017, with 29 of those elk in this herd unit. We captured another 61 elk in February, 2018, with 20 of those elk in this herd unit. We captured 24 elk in February, 2019, with 13 of those elk in this herd unit.

We currently have ~72 elk with active satellite collars in the Bighorn Mountains. The Cody disease biologist oversees and coordinates this project.

In 2018, we collected retropharyngeal lymph nodes from 59 elk to test for chronic wasting disease (CWD). Two elk, one from Hunt Area 35 and one from Hunt Area 37, tested positive for CWD. White-tailed deer from overlapping areas have previously tested positive.

2018 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2018 - 5/31/2019

HERD: EL322 - SOUTH BIGHORN

HUNT AREAS: 33-34, 47-49, 120

PREPARED BY: CHEYENNE STEWART

	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Trend Count:	4,244	4,892	5,000
Harvest:	1,751	1,822	1,800
Hunters:	3,670	3,888	3,800
Hunter Success:	48%	47%	47 %
Active Licenses:	3,812	4,059	4,000
Active License Success	46%	45%	45 %
Recreation Days:	26,513	27,676	27,500
Days Per Animal:	15.1	15.2	15.3
Males per 100 Females:	25	41	
Juveniles per 100 Females	34	26	

Trend Based Objective (± 20%) 3,300 (2640 - 3960)

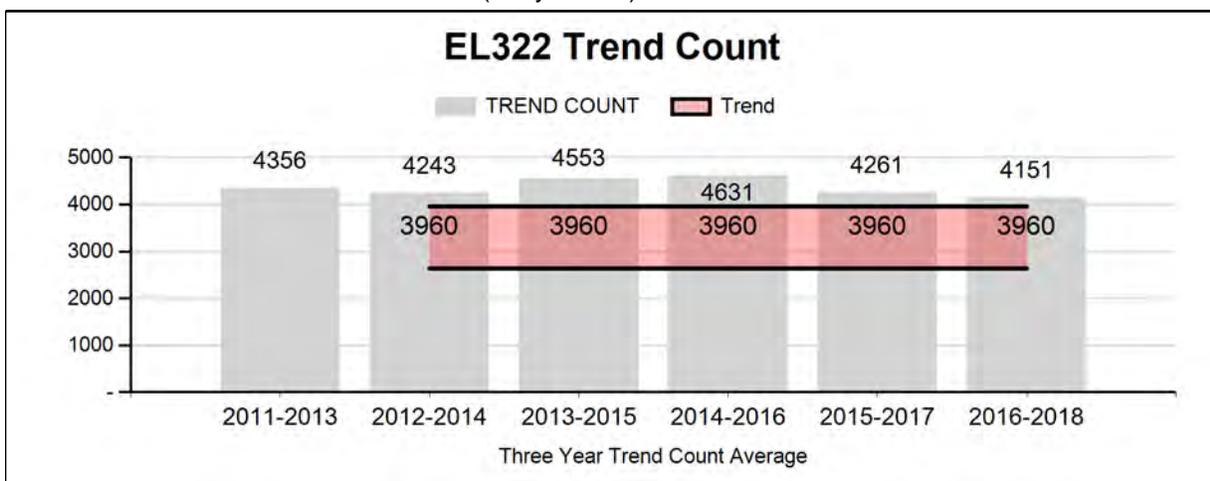
Management Strategy: Private Land

Percent population is above (+) or (-) objective: 48%

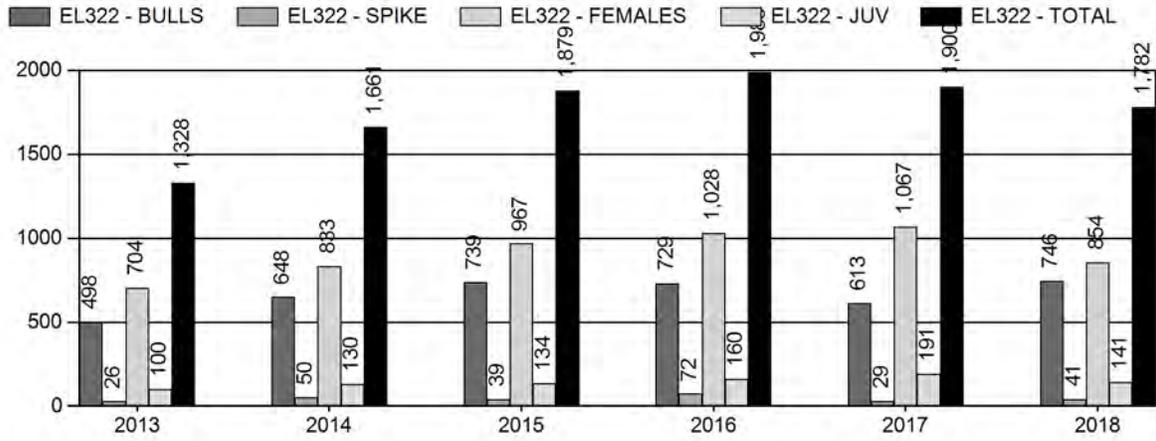
Number of years population has been + or - objective in recent trend: 6

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

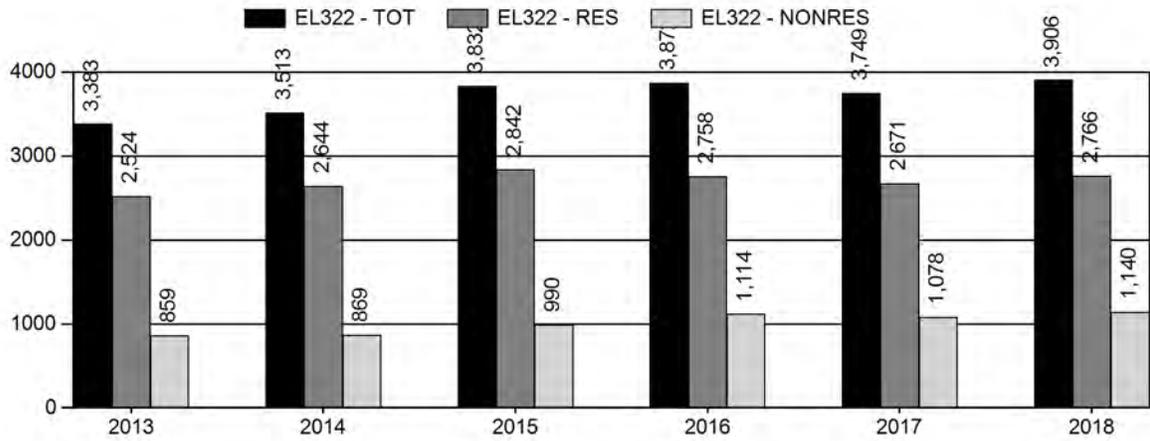
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	na%	na%
Males ≥ 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%



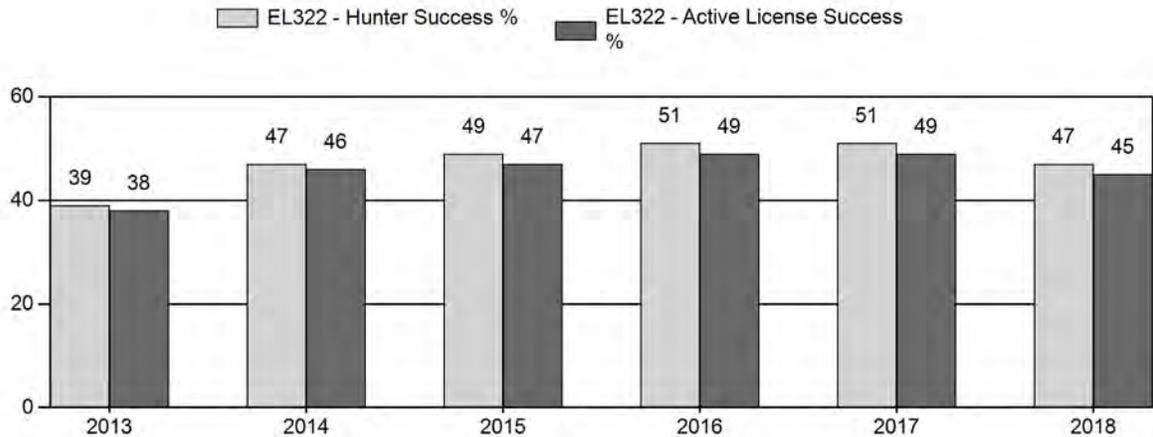
Harvest



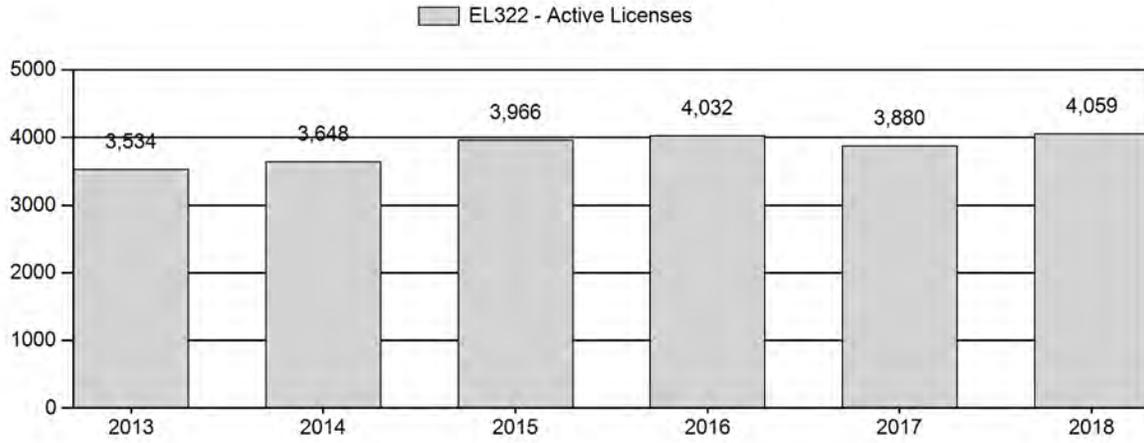
Number of Hunters



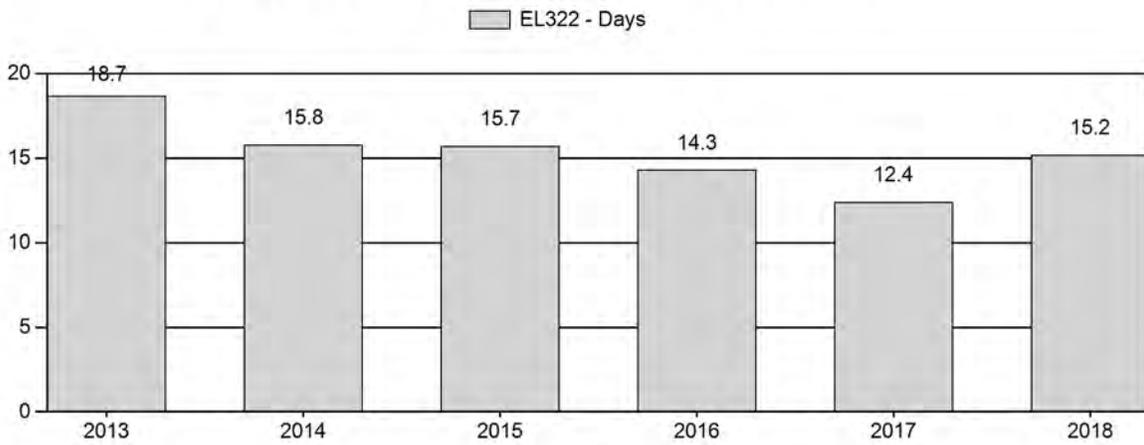
Harvest Success



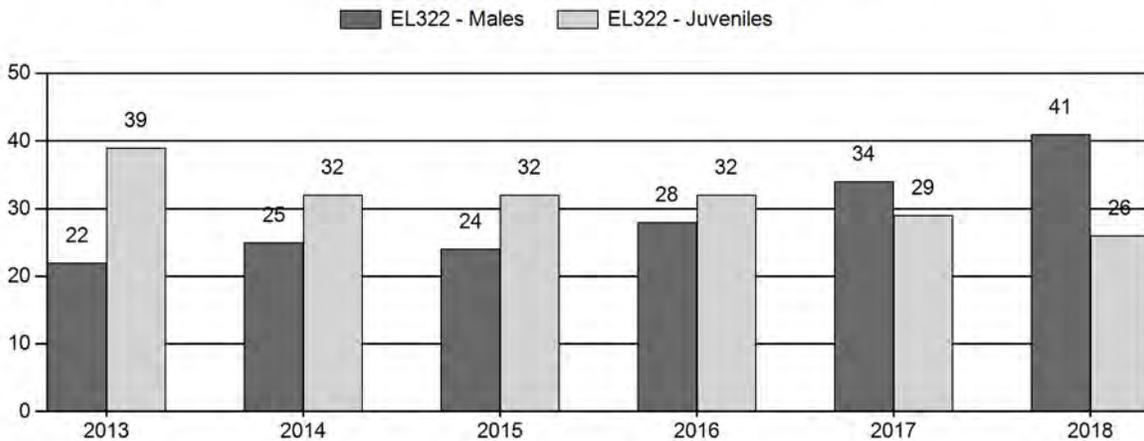
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL322 - SOUTH BIGHORN

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	CIs Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	5,490	290	207	497	14%	2,224	62%	878	24%	3,599	521	13	9	22	± 1	39	± 1	32
2014	5,060	104	114	218	16%	887	64%	281	20%	1,386	403	12	13	25	± 2	32	± 2	25
2015	6,525	125	137	262	16%	1,071	64%	345	21%	1,678	405	12	13	24	± 2	32	± 2	26
2016	6,000	164	128	292	17%	1,054	63%	338	20%	1,684	415	16	12	28	± 2	32	± 2	25
2017	0	92	165	257	21%	754	61%	222	18%	1,233	449	12	22	34	± 0	29	± 0	22
2018	0	60	124	184	25%	446	60%	117	16%	747	0	13	28	41	± 0	26	± 0	19

2013 - 2018 Trend Count Summary
for Elk Herd EL322 - SOUTH BIGHORN

Year	Count Dates	Flight Time		Number Counted
		Hours	Minutes	
2013	MARCH 2014, JANUARY 2014	0	0	4,392
2014	JANUARY 2015	0	0	4,047
2015	JANUARY 2016	0	0	5,221
2016	JANUARY 2017, FEBRUARY 2016, FEBRUARY 2017	6	0	4,626
2017	JANUARY 2017, JANUARY 2018, FEBRUARY 2018, FEBRUARY 2017	9	9	2,935
2018	FEBRUARY 2019, JANUARY 2018, FEBRUARY 2018	4	30	4,892

2019 HUNTING SEASONS
SOUTH BIGHORN ELK HERD (EL322)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
33	1	Oct. 9	Oct. 31	200	Limited quota	Any elk
33	1	Nov. 1	Dec. 31			Antlerless elk
33	4	Aug. 15	Sept. 30	150	Limited quota	Antlerless elk valid on private land east of Buffalo Creek and the Bar C Road (BLM Road 6214)
33	4	Oct. 9	Dec. 31			Antlerless elk valid in the entire area
33	6	Nov. 1	Dec. 31	300	Limited quota	Cow or calf
34	1	Oct. 15	Nov. 15	800	Limited quota	Any elk
34	1	Nov. 16	Dec. 31			Antlerless elk
34	6	Aug. 15	Sep. 30	700	Limited quota	Cow or calf valid on private land north of the North Fork Powder River
34	6	Oct. 15	Dec. 31		Limited quota	Cow or calf valid off National Forest
47	1	Oct. 9	Oct. 31	200	Limited quota	Any elk
47	1	Nov. 1	Nov. 30			Antlerless elk
47	6	Oct. 9	Nov. 30	150	Limited quota	Cow or calf
48	1	Oct. 9	Oct. 31	350	Limited quota	Any elk
48	1	Nov. 7	Dec. 15			Antlerless elk
48	4	Oct. 9	Oct. 31	100	Limited quota	Antlerless elk
48	4	Nov. 7	Dec. 15			Antlerless elk
48	6	Oct. 9	Oct. 31	600	Limited quota	Cow or calf
48	6	Nov. 7	Dec. 15			Cow or calf
49	1	Oct. 9	Oct. 31	350	Limited quota	Any elk
49	1	Nov. 7	Dec. 21			Antlerless elk
49	4	Oct. 9	Oct. 31		Limited quota	Antlerless elk
49	4	Nov. 7	Dec. 21	100		Antlerless elk
49	6	Aug. 15	Oct. 31	850	Limited quota	Cow or calf
49	6	Nov. 7	Dec. 21			Cow or calf
120	1	Oct. 9	Oct. 31	125	Limited quota	Any elk
120	1	Nov. 1	Dec. 15			Antlerless elk

120	4	Oct. 9	Dec. 15	75	Limited quota	Antlerless elk
120	6	Oct. 9	Dec. 15	75	Limited quota	Cow or calf

Special Archery Season Hunt Areas	Season Dates	
	Opens	Closes
33, 34, 47, 48, 49, 120	Sep. 1	Sep. 30

SUMMARY OF CHANGES IN LICENSES NUMBERS

Hunt Area	Type	Quota change from 2018
48	4	+50
49	4	+50
49	6	-50
120	1	+25
Herd Unit Total	1	+25
	4	+100
	6	-50

Management Evaluation

Current Winter Trend Count Objective: 3,300

Management Strategy: Private Lands

2018 Postseason Population Estimate: 6,115

2016-18 Winter Trend Count Average (3 Yr): 4,151

2019 Proposed Postseason Population Estimate: 6,200

2018 Hunter Satisfaction: 68% Satisfied, 17% Neutral, 15% Dissatisfied

Herd Unit Issues

The South Bighorn Elk Herd unit consists of hunt areas 33-34, 47-49, and 120. Management of the herd is shared between the Sheridan, Cody, and Casper regions, with the Buffalo Wildlife Biologist having reporting responsibility. When the herd unit was reviewed in 2016, the objective was changed to a mid-winter trend count of 3,300 elk based on a three year running average and a private land management strategy was adopted. Hunt area sub-objectives were established to address elk distribution across the herd unit with 1,100 elk for Area 33, 1,000 elk for Area 34, 200 elk for Area 47, 400 elk for Area 48, 300 elk for Area 49 and 300 elk for Area 120. A private lands management strategy is well adapted to this herd as hunting access is largely dependent on private land access.

Since 1997, hunting seasons have been liberalized with increased license quotas for any elk and antlerless elk, the addition of cow/calf licenses, and extended hunting seasons. Harvest has increased significantly, although at less than desired levels because of the inability to sell antlerless and cow/calf licenses in some hunt areas. Last year, 5,050 total licenses were allocated for the six hunt areas comprising this herd unit. In the last three years, the number of unsold licenses has increased, from 200 in 2016 to over 300 in 2018. Restrictive private land access continues to hamper efforts to achieve harvest objectives.

Weather

Weather conditions are summarized based on Natural Resources Conservation Services Applied Climate Information System (www.wcc.nrcs.usda.gov) available data from the Bear Trap Meadow, Middle Powder, Grave Springs, Kaycee, Casper WSO AP, Black Mountain, and Worland FAA AP stations (Station IDs 325, 625, 501, 5055, 1570, 0778, and 9785, respectively) for precipitation and temperature. The Palmer Drought Index (www.ncdc.noaa.gov) from Climate Division 5 (Powder, Little Missouri and Tongue drainages) is used to summarize drought conditions.

June precipitation was greater than the period of record (POR) average (118-229%) on the southern and eastern portions of the unit and lower than the POR average (48-76%) in the northern and western portions of the unit. The average June temperature (52°F) was 3°F colder than the 20-year average. Summer (July – September) was dry across the entire unit (28-78% of POR average) with average temperatures (49-60°F) relative to the 20-year averages (51-61°F). Fall weather varied greatly, without any extreme wet or dry conditions (47-130%) and with a slightly warmer (+2°F) November. Winter has resulted in generally average precipitation at the higher elevations and dryer than average precipitation in the lower elevations (27-66%) with a notably colder than average February (-4°F) and overall slightly depressed snow water equivalent. Winter and spring conditions prior to the 2018 biological year (January – May 2018) were average across the unit (60-142%). Although some drier conditions occurred within the unit, the generally average conditions were corroborated by the broader-scale climate data, which classified all of 2018 as having “mid-range” climate conditions.

Habitat

There are no habitat transects for grass production in this herd unit. The South Bighorn Herd Unit is primarily private, state and BLM lands with a limited amount of U.S. Forest Service in Area 34. The unit has diverse habitat types ranging from high elevation timber, grasslands and mountain mahogany stands to low elevation sagebrush grasslands. Cattle and sheep grazing are common. Spring moisture and snow run-off conditions are key components to herbaceous forage production. The dry summer 2018 conditions may have impacted elk forage production and growing season. The varying conditions across the unit may also result in changes in elk movement behavior.

Field Data

The post-season trend counts were conducted in February 2019 and resulted in a total of 4,892 elk observed, which provides a minimum population for the herd unit. The 2018 results were notably higher from 2017 and the three-year running average for the herd unit ($n = 4,151$) is over the 3,300 elk objective (Figure 1).

In 2017, the main congregation of wintering elk in hunt area 33 was missed due to new personnel conducting the survey. This resulted in a significantly reduced herd unit trend count and three-year running average. Based on the 2016 and 2018 trend counts, this population is over the sub-objective. Over the past three years, elk that spend the majority of the year in hunt area 35 began wintering in the northern portion of hunt area 34. It is estimated that 1,055 of the elk counted in hunt area 34 in 2018 would more accurately be classified as hunt area 35 elk. This would result in the 2018 minimum population in hunt area 34 to be closer to 1,315. In 2017, it is estimated that 674 of the elk counted in hunt area 34 were hunt area 35 elk, however a large group of elk in the

Gardiner Mountain area was missed during the survey, so the minimum population would likely be close to 1,000 elk. Elk in hunt area 34 are over the sub-objective, given the three-year average of actual elk counted during the trend count survey (1,651) as well as when calculating the three-year average based on the estimated minimum population (1,168). The 2018 winter trend count resulted in only 750 elk being observed from areas 47, 48 and 49, the lowest number counted since 2008. Area 47 appears to have reached its winter count goal of 200 elk, while areas 48 and 49 are still over their winter count goals. Hunt area 120 was at the sub-objective during the 2018 trend count, but is below the sub-objective over the last three years (Table 1).

Figure 1. South Bighorn Elk Herd Unit Winter Trend Counts, 2000-2018.

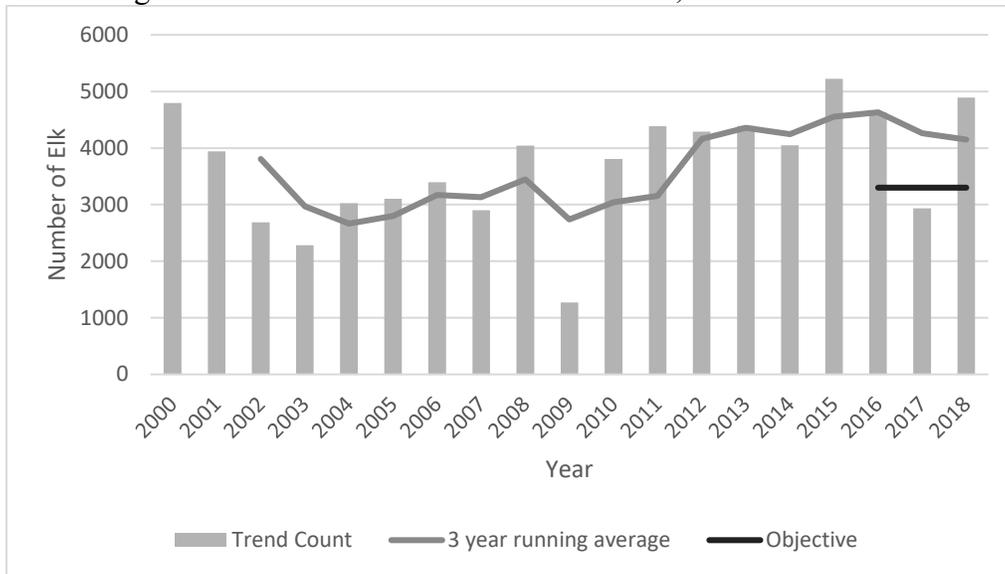


Table 1. Post-season trend count sub-objectives and results from 2016-2018.

Hunt Area	Objective	2016 Result	2017 Result	2018 Result	2016 - 2018 Average
33	1,100	1,354	101	1,466	974
34	1,000	1,189	1,394	2,370	1,651
47	200	118	193	160	157
48	400	964	495	360	606
49	300	659	545	227	477
120	300	342	207	309	286
Total	3,300	4,626	2,935	4,892	4,151

Post-season classifications have been limited to hunt areas 47, 48, and 49 since 2017 due to time constraints, limitations in fixed-wing aircraft, and inability to classify large herds in Areas 33, 34, and 120. The sample size for elk classified in 2018 was 747 elk, which was the lowest number of elk classified in over 20 years. The 2018 classifications resulted in herd ratios of 26 calves per 100 cows and 41 bulls per 100 cows. The low calf ratio is likely a result of poor sample size. Productivity in this herd is relatively low with the calf ratio averaging 33 per 100 for the previous five-year average. Calf ratios tend to be higher in Areas 33 and 34, where classifications are not

conducted. The bull ratio is believed to be higher based on hunter success and composition of the bull harvest (>90% adult bulls). Representative classifications are difficult to attain due to bulls wintering away from cow/calf herds.

The annual postseason landowner survey was conducted in hunt areas 33 and 34. Of the 29 respondents, 31% indicated the population was above desired levels while 55% thought the numbers were at desired levels. Four respondents thought there were too few elk. Seventy-two percent of respondents note that the 2019 seasons should be the same as the 2018 seasons. These responses are similar to those reported in 2017.

Harvest Data

Total harvest (1,782) was lower than the previous three years (1,879 in 2015, 1,989 in 2016, and 1,900 in 2017), but higher than the previous five-year average (1,751). Bull harvest (787) was higher than the previous five years, however antlerless harvest (995) was down. Hunter success (46%) and active license success (44%) matched the previous five-year averages. Hunter success at the hunt area level ranged from 41% in hunt area 49 to 67% in hunt area 120. Harvest composition showed 100% of the bull harvest was comprised of adult bulls indicating hunters could be selective and were successful in finding adult bulls. Hunter effort (15.5 days/animal) matches the five-year average.

Hunter numbers (3,906) and active license numbers (4,059) were higher than any of the previous five years and indicate continued hunter interest in these areas. Hunt areas 33, 34, and 47 continue to have unsold licenses, likely due to limited access. Hunter satisfaction responses were generally positive reflecting good hunter success, quality bulls and long seasons. At the herd unit scale, 68% of hunters responded positively about their hunting experience whereas 15% responded negatively and 17% provided a neutral response. These results have not changed notably in the past three years.

At the hunt area scale, satisfaction did not vary as much as it did in 2017. Hunt areas 49, 34, and 47 had satisfaction rates ranging from 57-65% and hunt areas 33, 48, and 120 had higher satisfaction rates (71-86%).

Hunter opportunity is largely contingent on private land access. Six Access Yes Walk-in Areas provided access to almost 38,000 acres of private lands plus adjacent BLM and state lands, most of which are located in Area 120. In addition, four Hunter Management Areas provide hunter opportunity in Areas 47 and 48.

Population

The mid-winter trend count objective is most appropriate for this herd, as opposed to a pre or post season population estimate objective. Quality classification data is essential to run population estimate models and since classifications are only possible for a small percentage of the herd (15% in 2018, for example), population models are completely unreliable.

A ball park population estimate can be made using the mid-winter trend count total adjusted for 80% sightability, resulting in a post-season estimate. With the 2018 trend count results of 4,892 elk counted, the post-season population estimate would be 6,115 elk. If you adjust the 2018 trend count based on the assumption that 1,315 of the elk counted in hunt area 34 were elk that spend the majority of the year in hunt area 35, then the population estimate would be 4,471 elk. The

three-year running average from the trend count data suggests that the population is fairly stable and above objective, with high annual variation due to the trend count as a sampling method (Figure 1). The population is expected to continue slow and steady growth unless hunter access improves markedly. The 2019 proposed post-season population estimate (6,200) is based on the assumption of moderate population increases and that hunt area 35 elk will be counted in hunt area 34.

Management Summary

This herd unit is above objective and we expect the population to continue population growth.

Hunt area 33 is above the sub-objective, with a reliable trend count survey conducted this year. Harvest success, hunter satisfaction, and landowner responses all indicate that management needs to continue to focus on maintaining or decreasing this segment of the herd. The liberal quota for Type 6 licenses to encourage cow/calf harvest did not sell out in 2018. The Type 4 Aug. 15 to Sept. 30 season was implemented to address damage situations on private land. Beginning in 2019, utilization of this season will be assessed annually to determine if the season is fulfilling the goal of obtaining measurable harvest to prevent damage. If the license type is not achieving the goal, we will propose the removal of the August/September season. We propose no changes to this season for 2019.

In hunt area 34, the trend count was more than double the sub-objective. This is the third year that elk from hunt area 35 have wintered in hunt area 34, and they moved into hunt area 34 earlier this year. Movement of these elk between herd units during the hunting season will be closely monitored during the 2019 hunting season. If these movements become an annual pattern, we will have to determine a long-term strategy to ensure that harvest objectives are met for both herd units and hunt areas. In the meantime, we continue to maintain liberal Type 6 quotas in hunt area 34, and with 176 unsold licenses in 2018, we expect to have leftover licenses available throughout the 2019 season as well. The mid-winter trend counts are severely affected by the elk movements between hunt areas 34 and 35, which will have to be addressed moving forward. The Type 4 Aug. 15 to Sept. 30 season was implemented to address damage situations on private land. Beginning in 2019, utilization of this season will be assessed annually to determine if the season is fulfilling the goal of obtaining measurable harvest to prevent damage. If the license type is not achieving the goal, we will propose the removal of the August/September season. We propose no changes to this season for 2019.

For the 2018 hunting season, a little over a 1,000 elk were harvested from areas 47, 48 and 49. The 2018 winter trend count resulted in only 750 elk being observed from areas 47, 48 and 49, the lowest number counted since 2008. Area 47 appears to have reached its winter count goal of 200 elk, while areas 48 and 49 are still over their winter count goals. Current and future management strategies will continue to focus on reducing elk numbers in this segment of the population. Only a slight adjustment in license quotas was made in areas 48 and 49. The increase in type 4 licenses will allow more type 4 (full priced) license holders the opportunity to buy multiple licenses, thus hopefully reducing the overall number of hunters in the field.

The Area 120 season resulted in a harvest of 152 elk and a hunter success rate of 72%. License quotas currently result in hunter densities that are approaching a level unacceptable to hunters, however success rates have increased every year since 2013. The three-year winter trend count

is averaging 286 elk, just below the hunt area sub-objective of 300 elk. A moderate increase in the Type 1 licenses was made for the 2019 hunting season.

2018 - JCR Evaluation Form

SPECIES: EIk

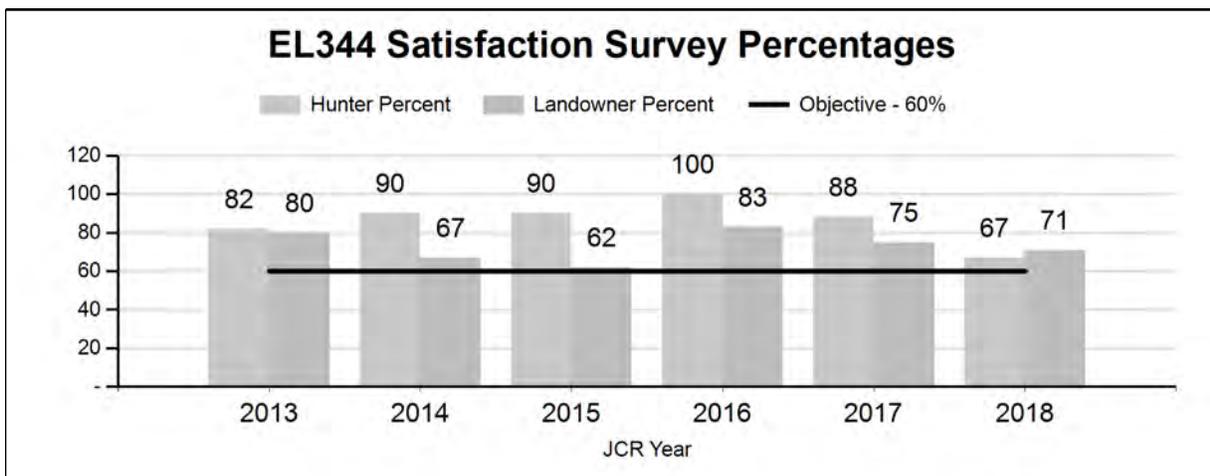
PERIOD: 6/1/2018 - 5/31/2019

HERD: EL344 - ROCHELLE HILLS

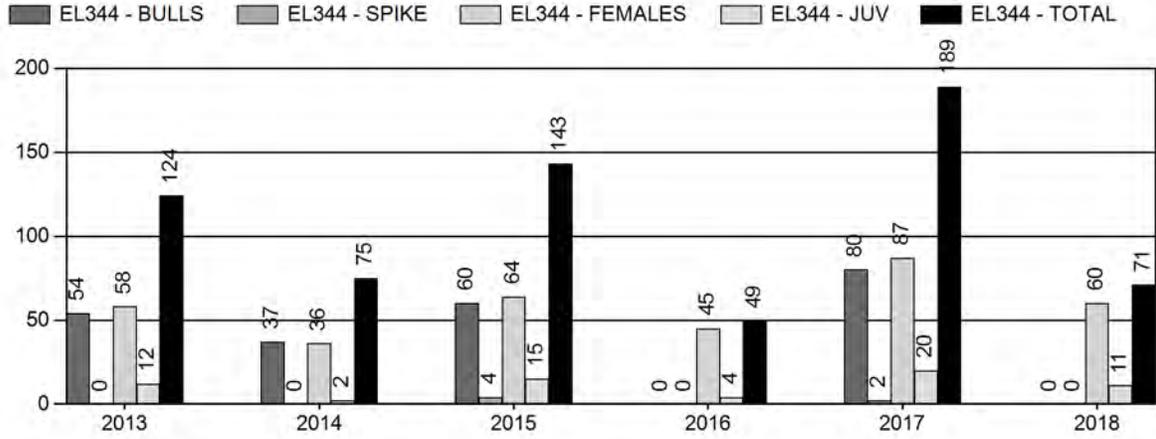
HUNT AREAS: 113, 123

PREPARED BY: ERIKA PECKHAM

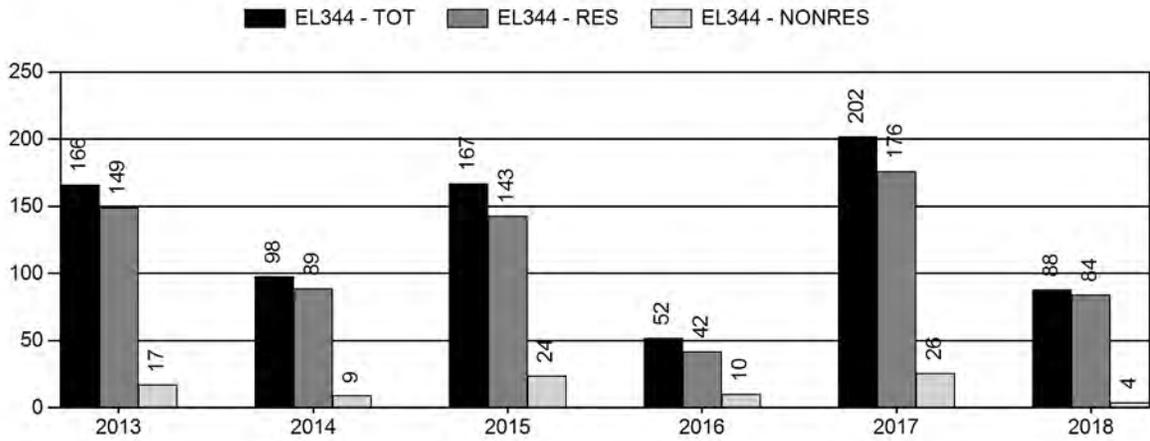
	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Hunter Satisfaction Percent	88%	67%	60%
Landowner Satisfaction Percent	70%	71%	60%
Harvest:	116	71	60
Hunters:	137	88	80
Hunter Success:	85%	81%	75%
Active Licenses:	145	93	78
Active License Success:	80%	76%	77%
Recreation Days:	631	296	250
Days Per Animal:	5.4	4.2	4.2
Males per 100 Females:	74	31	
Juveniles per 100 Females	50	39	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			9%
Number of years population has been + or - objective in recent trend:			6



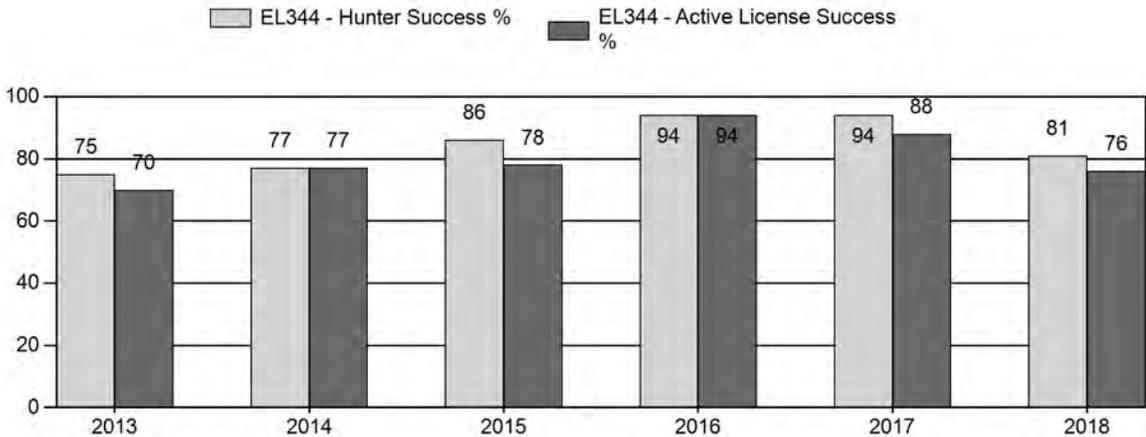
Harvest



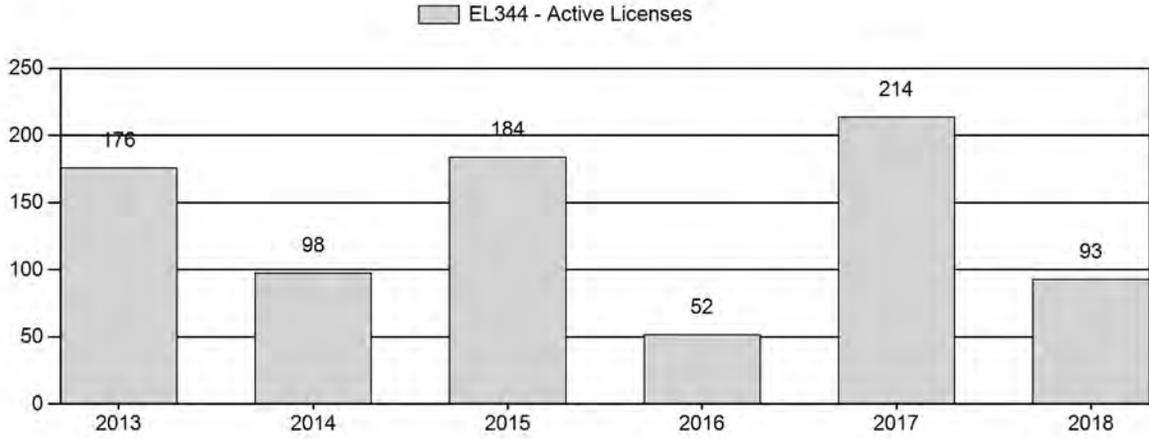
Number of Hunters



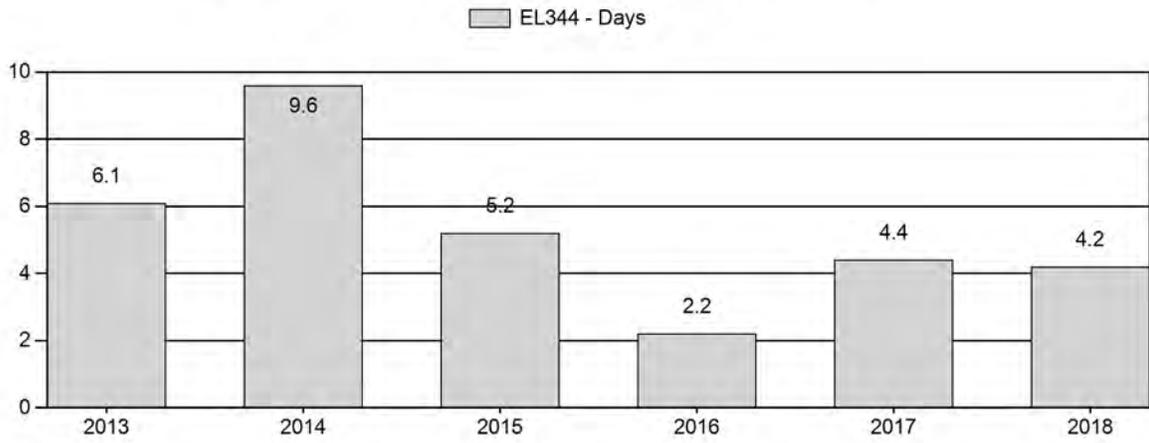
Harvest Success



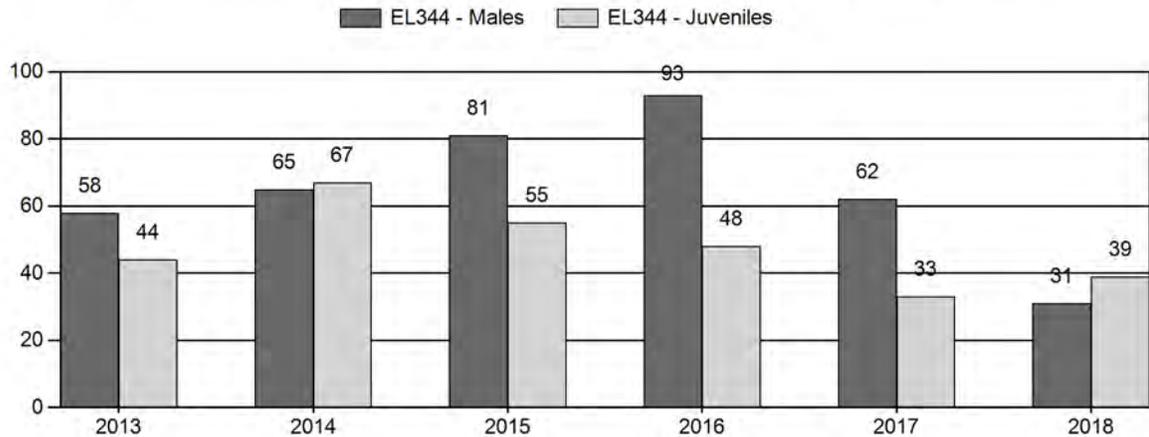
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL344 - ROCHELLE HILLS

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot CIs	CIs Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	26	30	56	29%	96	49%	42	22%	194	464	27	31	58	± 0	44	± 0	28
2014	0	22	29	51	28%	79	43%	53	29%	183	0	28	37	65	± 0	67	± 0	41
2015	0	61	47	108	34%	133	42%	73	23%	314	0	46	35	81	± 0	55	± 0	30
2016	0	43	72	115	38%	124	41%	60	20%	299	0	35	58	93	± 0	48	± 0	25
2017	0	20	18	48	32%	78	51%	26	17%	152	0	26	23	62	± 0	33	± 0	21
2018	0	82	59	141	18%	462	59%	181	23%	784	0	18	13	31	± 0	39	± 0	30

**2019 HUNTING SEASONS
ROCHELLE HILLS ELK HERD (EL344)**

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
113	1	Nov. 5	Nov. 30	40	Limited quota	Any elk
113	4	Nov. 5	Nov. 30	40	Limited quota	Antlerless elk

SUMMARY OF CHANGES IN LICENSE NUMBERS

Hunt Area	Type	Quota change from 2018
113	1	+40
113	4	+40
123	4	-50
123	6	-50
Herd Unit Total	1	+40
	4	-10
	6	-50

Hunt Special Archery Season Hunt	Opening Date	Limitations
113	Sep. 1-Sep. 30	Refer to Section 2 of this Chapter

Management Evaluation

Current Landowner/Hunter Satisfaction Management Objective: 60%

Management Strategy: Private Land

2018 Landowner Satisfaction Estimate: 71%

2018 Hunter Satisfaction: 64% Satisfied, 22% Neutral, 14% Dissatisfied

Herd Unit Issues

The management objective for the Rochelle Hills Elk Herd Unit is based on landowner and hunter satisfaction. The management strategy is private land. The objective and management strategy were last revised in 2012 and were reviewed in 2017.

A major difficulty with managing this herd is hunter access. The majority of the elk in Area 123 are found on private land and the opinions of landowners on the desired number of elk are varied. Elk tend to concentrate in certain areas at particular times of the year so perceptions differ on the number of licenses needed to manage harvest. Several landowners desire to keep large mature bulls on their property resulting in tightly controlled access. Those landowners who want more harvest often have the majority of the elk utilizing their lands outside of the hunting season.

Hunt Area 113 has significant amounts of publically accessible lands, especially on the Thunder Basin National Grasslands, and is a coveted elk hunt in this area of the state. However, when pressured, elk in this hunt area move to private lands where access to hunt is limited. Balancing hunter numbers with the number of elk available on public lands, while attempting to get adequate harvest in the entire hunt area is challenging when designing hunting seasons.

Weather

Moisture patterns were favorable for the 2018 growing season. Residual forage was readily available going into the winter of 2018-2019. The winter of 2018-2019 started out relatively mild, with minimal snow and average temperatures. As the winter progressed into February, temperatures became more severe. Conditions were not adverse enough to affect elk survival. The Palmer Drought Index indicates that overall moisture conditions were average or above average throughout 2018 in the Cheyenne-Niobrara drainage.

Habitat

This herd unit is comprised of various habitat types. Elk can be found in all of the habitat types in this area, however they do show preference for the timbered ponderosa pine hills that are scattered throughout this herd unit. Ponderosa pine hills are punctuated by sagebrush flats and various cottonwood galleries on a few different drainages.

There is no formal habitat monitoring occurring in this herd unit. Observations in 2017 and 2018 showed that there was decent production of cool season grass and forbs. This is in line with observed weather conditions.

Field Data

During the aerial classification survey in December of 2018 there were ~1,400 elk observed which is far greater than the ~670 elk observed during the 2017 survey.

There was one large herd observed in Hunt Area 123 in a location that they are typically found this time of year. Due to fences and the location of this herd, these elk were not classified and

instead the number of elk was estimated based on photographs. However, this group was substantially larger than in 2017 with an estimated number of ~700 elk, in contrast to the ~400 that were observed in 2017. This group of elk has been consistently increasing over the last several years. During the classification flight there were only a couple of other small groups of elk classified (n=13) found in Hunt Area 123 which were included in the classification results. The distribution of elk seemed to be typical for the time of year.

The number of elk classified in Hunt Area 113 totaled 378 elk located in small groups throughout the area. This number is also an increase from the 119 that were observed in 2017. The classification results for Hunt Area 113 indicated 48 calves per 100 cows, down from the 2017 ratio of 64 calves per 100 cows. The number of animals classified or counted has fluctuated over the past several years; however, the number of elk observed was notably higher in 2018. It is possible there is movement of Hunt Area 123 elk to Hunt Area 113.

One problem associated with the surveillance and management of this herd is achieving meaningful sample sizes during classification surveys. This is a large geographical area, with areas of steep, forested terrain, which makes it difficult to locate elk in the budgeted flight time. Additionally, the location where the large herd of elk is typically congregated in Hunt Area 123 makes it very difficult to classify. It is possible that there is a better time of year to survey these elk before they are in a large herd. Overall, elk numbers are increasing in Hunt Area 123, while harvest and range conditions in Hunt Area 113 have resulted in lower numbers, with the exception of 2018. It is possible that this portion of the herd is also starting to trend upwards.

This herd is managed for landowner and hunter satisfaction. We are striving for at least 60% of landowners and 60% of hunters to be satisfied. In 2018, Hunt Area 113 was closed and Hunt Area 123 was hunted with Type 4 and Type 6 licenses. The harvest survey indicated that 64% of hunters were either “very satisfied” or “satisfied”. The annual landowner meeting was held in January 2019 for Hunt Area 123. As this hunt area is predominantly private, it is crucial that a meeting is held to acquire feedback from landowners. At this meeting a general license season was proposed as this would provide maximum flexibility for each individual ranch to structure their hunting season. The overwhelming majority of those present were very opposed to a general license season structure; therefore this concept was abandoned. A common theme from landowners present at the meeting is this area is known for trophy bulls and they are not seeing the quality of bulls observed in past years. In Hunt Area 123, 78% of respondents were satisfied with elk numbers, with the remainder stating that they were neutral. In February, a meeting with Hunt Area 113 landowners found 88% of those responding were satisfied with the number of elk.

Harvest

Historically, this herd has been hunted conservatively, with Hunt Areas 113 and 123 being closed for up to two years at a time to produce trophy bulls. Additionally, when bulls are hunted, it is important to provide enough licenses so that it is not just a landowner hunt, but an opportunity for the hunting public. While this regimen of hunting seasons has had the potential to produce large mature bulls, it has also resulted in very high bull to cow ratios at times. In 2018, there were 50 Type 4 licenses and 50 Type 6 available in Hunt Area 123. The Hunt Area 113 season was closed. The harvest survey indicates an overall success rate of 81% with an average of 4.2 days to harvest

an animal, indicating that elk were plentiful and accessible. This is notably higher than the overall statewide success of 45%.

This herd has great potential for continued growth if hunter access cannot be improved, particularly in Hunt Area 123. In portions of Hunt Area 113 there is a fair amount of public land which allows for a reasonable harvest. Additionally, with the re-routing of county roads due to shifts in coal mining activity, some areas of public land are even more accessible than they have been in the past. The potential negative impact of the increased vehicle access is that elk may be displaced from public lands in this portion of the hunt area, although to date it seems that they are still relatively accessible.

Population

The 2018 field estimate is around 1,600 elk. This field estimate is based on the trend surveys, historic population model and estimates, field observations and landowner observations of elk throughout the year. The Rochelle Hills elk herd appears to have increased in recent years, particularly in Hunt Area 123. There is no working population model for this herd. Various factors contribute to not having a reliable model for this herd. First, there is known immigration and emigration to and from this herd because elk are not geographically or otherwise constrained to the herd unit boundaries. Secondly, this is a small population, relatively speaking, which also contributes to inaccuracies within the model. Alternating hunting seasons also results in inconsistent classification results. Although it would be preferable to have a working model, because the herd objective is non-numerical, it is less critical.

Landowner satisfaction is critical to managing this herd and some major landowners have indicated they are satisfied with the number of elk, or want even more. It is important to note that at the Hunt Area 123 landowner meeting, Game and Fish personnel stressed the fact that elk are increasingly substantially and rapidly in this area. It was reiterated at this meeting that the amount of harvest that has historically occurred in this hunt area is not nearly enough to mitigate herd growth. Even with all of this information, the vast majority of landowners would like to see more elk and are content with the number of elk that are present. Given landowners control hunter access, it is imperative that landowners are agreeable to proposed hunting seasons.

Although overall this population seems to be increasing, it should be noted that the majority of the increase has been observed in Hunt Area 123. The numbers of elk counted and classified in this portion of the herd have trended upward and 2018 was no exception. It appears that elk numbers in Hunt Area 113 declined and then recovered in recent years. In 2008, the number of elk observed peaked at 286 elk. The number of elk observed during the 2018 classification flight was 378, a substantial increase from 119 in 2017.

Management Summary

In 2018, Hunt Area 113 was closed. For the 2019 season there will be 40 Type 1 and 40 Type 4 licenses available. This season structure allows an adequate number of licenses to cover landowner license demand and still provide public hunting opportunity. Furthermore, alternating hunting seasons meet harvest objectives to manage elk numbers. In 2018 in Hunt Area 123 there were 50

Type 4 and 50 Type 6 licenses available. Hunting seasons in this hunt area are coordinated closely with landowners as hunter access is critical to achieving harvest objectives. For the 2019 season Hunt Area 123 will be closed. This is based on landowner willingness to take hunters. Without landowner cooperation there is little hunter access.

MOOSE

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2018 - JCR Evaluation Form

SPECIES: Moose

PERIOD: 6/1/2018 - 5/31/2019

HERD: MO313 - BIGHORN

HUNT AREAS: 1, 34, 42

PREPARED BY: TIM THOMAS

	<u>2013 - 2017 Average</u>	<u>2018</u>	<u>2019 Proposed</u>
Trend Count:	106	169	175
Harvest:	38	19	15
Hunters:	44	20	15
Hunter Success:	86%	95%	100 %
Active Licenses:	44	20	15
Active License Success	86%	95%	100 %
Recreation Days:	355	210	150
Days Per Animal:	9.3	11.1	10
Males per 100 Females:	83	322	
Juveniles per 100 Females (Preseason)	46	89	

Trend Based Objective (± 20%) 110 (88 - 132)

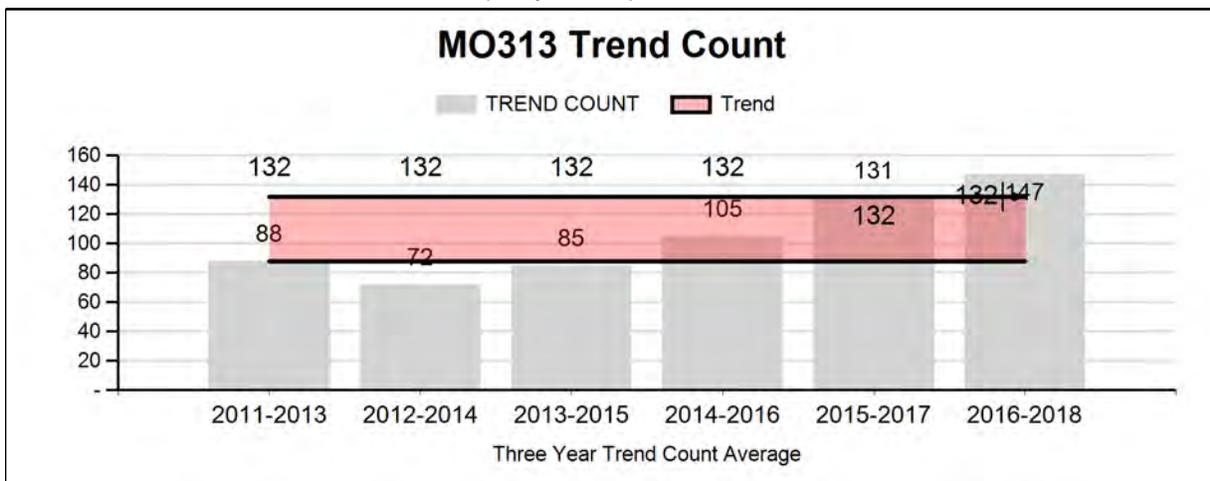
Management Strategy: Special

Percent population is above (+) or (-) objective: 54%

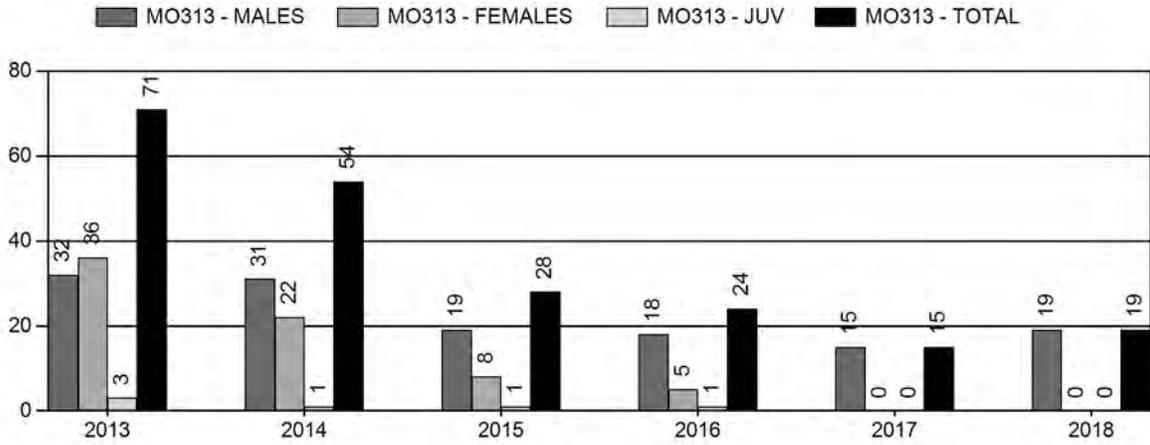
Number of years population has been + or - objective in recent trend: 2

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

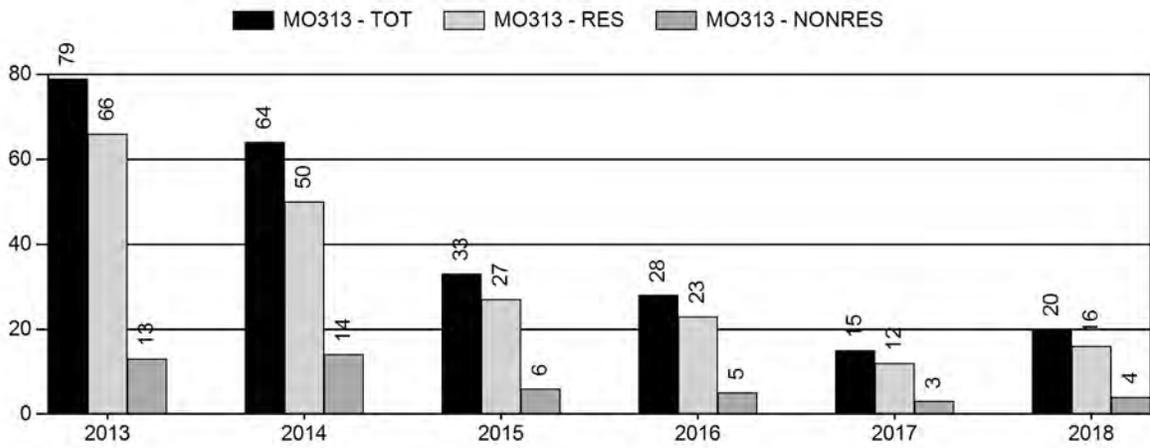
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	16%	14%
Juveniles (< 1 year old):	0%	0%



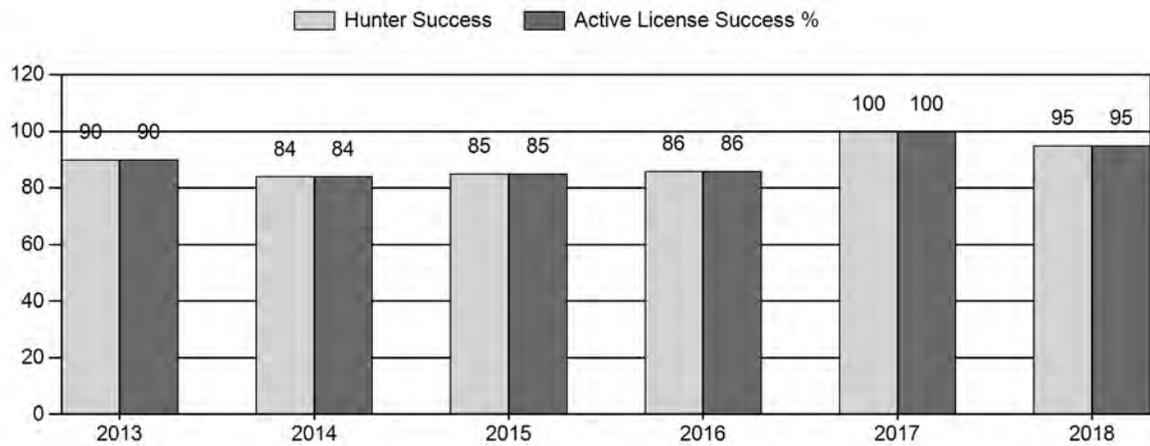
Harvest



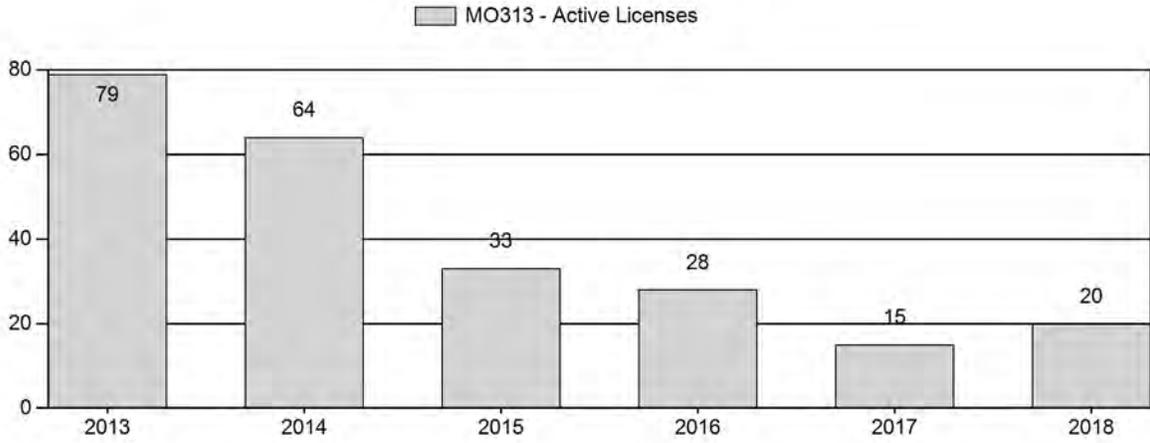
Number of Active Licenses



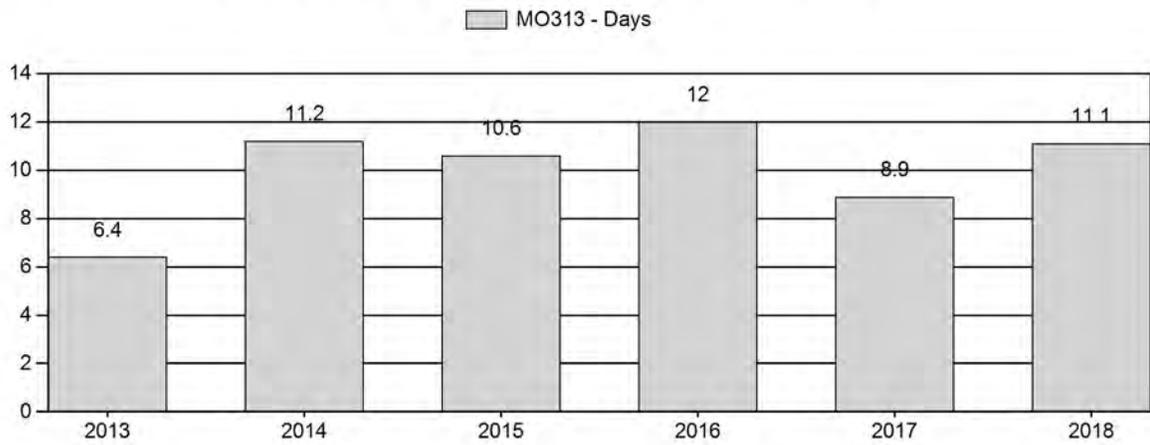
Harvest Success



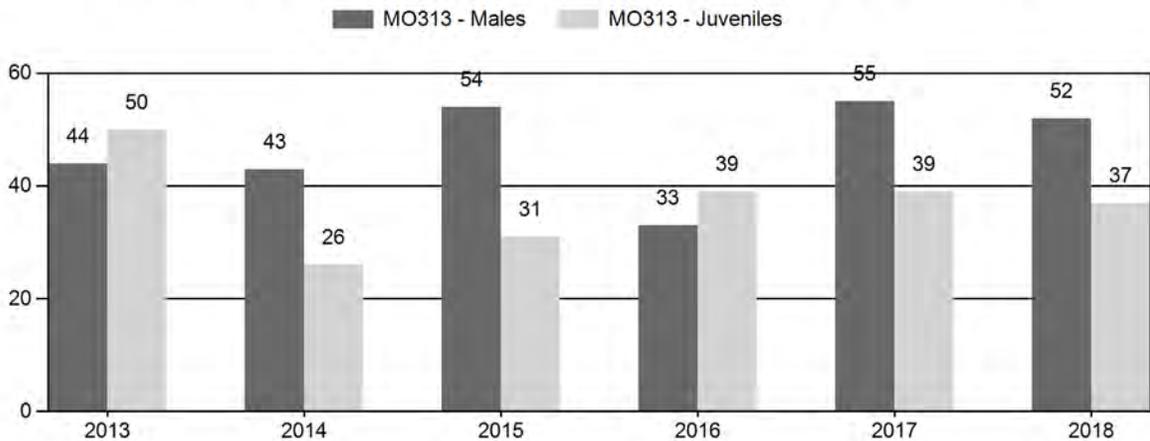
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary																				
for Moose Herd MO313 - BIGHORN																				
Year	Pre Pop	MALES				FEMALES		JUVENILES		Tot	Cls	Males to 100 Females			Young to					
		Ylg	Adult	Total	%	Total	%	Total	%			Cls	Obj	Ying	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	495	0	7	7	23%	16	52%	8	26%	31	326	0	44	44	± 0	50	± 0	35		
2014	360	2	8	10	26%	23	59%	6	15%	39	239	9	35	43	± 0	26	± 0	18		
2015	350	3	24	28	29%	52	54%	16	17%	96	248	6	46	54	± 0	31	± 0	20		
2016	0	5	13	18	19%	54	58%	21	23%	93	224	9	24	33	± 0	39	± 0	29		
2017	0	4	24	28	28%	51	52%	20	20%	99	235	8	47	55	± 0	39	± 0	25		
2018	0	9	25	34	28%	65	53%	24	20%	123	167	14	38	52	± 0	37	± 0	24		

2013 - 2018 Postseason Classification Summary																				
for Moose Herd MO313 - BIGHORN																				
Year	Post Pop	MALES				FEMALES		JUVENILES		Tot	Cls	Males to 100 Females			Young to					
		Ylg	Adult	Total	%	Total	%	Total	%			Cls	Obj	Ying	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	425	2	8	10	31%	13	41%	9	28%	32	0	15	62	77	± 40	69	± 37	39		
2014	300	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0		
2015	320	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	± 0	0	± 0	0		
2016	0	0	12	12	41%	14	48%	3	10%	29	0	0	86	86	± 0	21	± 0	12		
2017	0	0	16	16	36%	19	43%	9	20%	44	0	0	84	84	± 0	47	± 0	26		
2018	0	0	8	8	32%	9	36%	8	32%	25	0	0	89	89	± 0	89	± 0	47		

2013 - 2018 Trend Count Summary

for Moose Herd MO313 - BIGHORN

Year	Count Dates	Number Counted
2013	AUGUST 2013, DECEMBER 2013	63
2014	AUGUST 2014, DECEMBER 2014	72
2015	JUNE 2015, AUGUST 2015, DECEMBER 2015	120
2016	JUNE 2016, DECEMBER 2016, AUGUST 2016	123
2017	JUNE 2017, AUGUST 2017, FEBRUARY 2018	150
2018	JUNE 2018, AUGUST 2018, JANUARY 2019	169

**2019 HUNTING SEASONS
BIGHORN MOOSE HERD (MO313)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
1	1	Oct. 1	Oct. 31	5	Limited quota	Any moose, except cow moose with calf at side
34	1	Oct. 1	Oct. 31	5	Limited quota	Any moose, except cow moose with calf at side
42	1	Oct. 1	Oct. 31	5	Limited quota	Any moose, except cow moose with calf at side

Special Archery Season Hunt Areas	Season Dates		Limitations
	Opens	Closes	
1, 34, 42	Sep. 15	Sep. 30	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
34	1	- 5
Herd Unit Total		
	1	- 5
	4	None

Management Evaluation

Current Trend Count Management Objective: 110 (88-132)

Management Strategy: Special

2018 Trend Count: 169

Most Recent 3-year Running Average Trend Count: 147

Herd Unit Issues

The Bighorn Moose Herd Unit is located in north central Wyoming, centered on the Bighorn Mountains. Management is shared between the Sheridan and Cody regions with the Sheridan Wildlife Biologist having herd unit reporting responsibility. This herd unit contains three hunt areas – Areas 1, 34 and 42.

The primary management objective for the Bighorn Moose Herd Unit is a trend count objective of 110 moose ($\pm 20\%$), with a desired distribution of approximately 50 moose observed in Hunt Area 1, 30 moose observed in Hunt Area 34, and 30 moose observed in Hunt Area 42. The secondary management objectives are to maintain a median age of harvested bulls of ≥ 4 years and to have at least 40% of the harvested bulls be ≥ 5 years old (Thomas 2008).

The management strategy for all moose herd units in Wyoming is special management, emphasizing trophy quality hunting opportunities. The objectives and management strategies for this herd unit were last reviewed and updated in 2015 when the objective was changed to a trend count objective from a post-season population objective based on simulation modeling. We will conduct a 5-year objective evaluation in 2020.

Weather

Temperature and precipitation data referenced in this section were collected at the Burgess Junction (#481220) weather station located on the Bighorn Mountains in this herd unit. Historical climate data were reported by the Western Region Climate Center (www.wrcc.dri.edu).

Spring 2018 was generally warm and wet, with slightly above normal temperatures and above normal precipitation, resulting in a good start for forage production in the Bighorn Mountains. Precipitation during May was almost twice the long-term mean. Precipitation was near normal during the summer. Temperatures through the summer were near or slightly above normal. During the fall of 2018, precipitation was below normal (September), well above normal (October) or near normal (November), with temperatures slightly below normal. Temperatures were above average in December and January, turning cold in February. Precipitation was 50% of normal during December and well above normal for January. May was cooler than average and snow fall was twice normal. Cool temperatures and wet snow during parturition could adversely influence neonate survival.

Moose appear to have entered the winter in good condition, allowing them to survive the winter fairly well. Calves may have problems navigating deep snow during later winter months, requiring additional energy expenditures during a time of low body reserves.

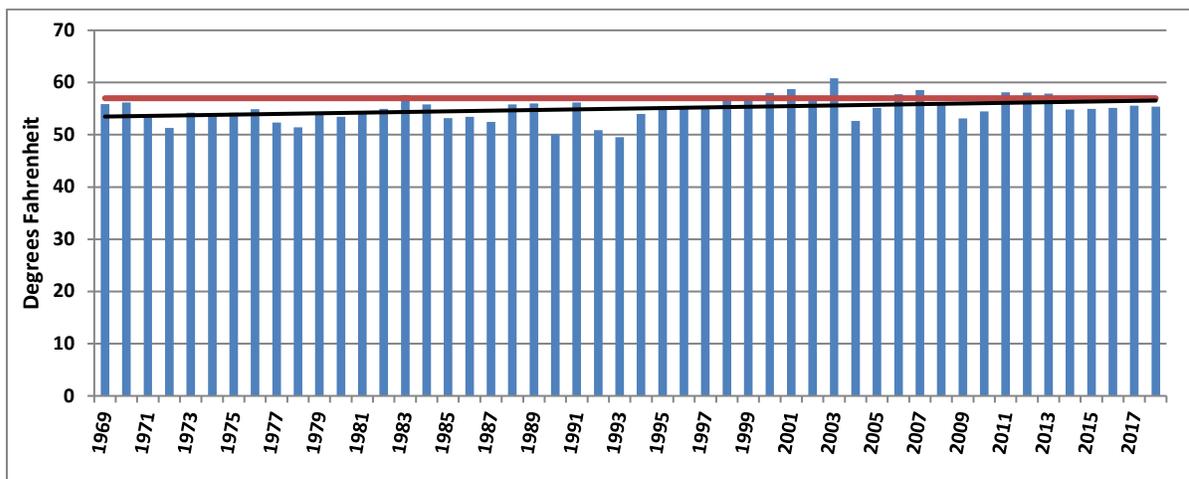


Figure 1. Average monthly summer (July-August) temperatures from 1969-2018 collected at the Burgess Junction weather station (#48122). The trend (black line) shows an increasing average summer temperature over time. Moose may be sensitive to summer temperatures above 57°F (red line).

Moose thrive in colder climates and appear to be sensitive to warmer temperatures, showing signs of increased heat stress at about 23° F during winter months and 57° F during summer months (Renecker and Hudson 1986, Schwarz and Renecker 1997). McCann et al. (2013) suggested a summer heat threshold of ~63° F. Recent research conducted in Massachusetts and Minnesota

suggests moose alter behavior and move to thermal cover to avoid heat stress during warm weather (Olson et al. 2014, Olson et al. 2016, Wattles and DeStefano 2013). This can potentially affect feeding and movement patterns. We currently do not have a good understanding of long-term consequences or effects on fitness of warming climates. Moose at the southern limit of moose distribution, like moose in Wyoming, may be more vulnerable to increasing temperatures as the normal ambient temperature is generally already higher than northern latitudes, leaving a narrower margin before temperatures exceed threshold levels. The average monthly temperatures recorded at the Burgess Junction weather station have shown an upward trend over the past 50 years for both summer (July-August; Fig. 1) and winter (January-February; Fig. 2) months.

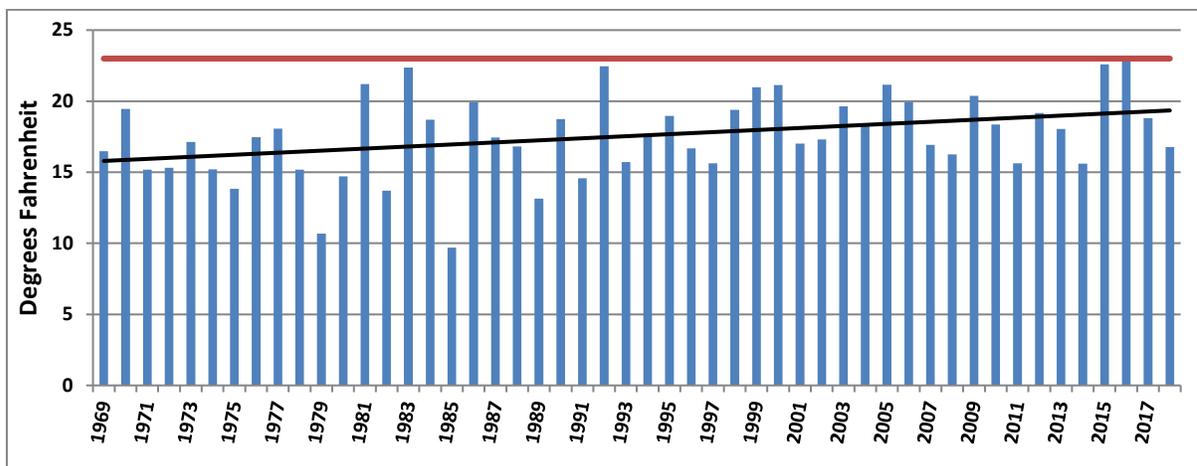


Figure 2. Average monthly winter (January-February) temperatures from 1969-2018 collected at the Burgess Junction weather station (#481220). The trend (black line) shows an increasing average winter temperature over time. Moose may be sensitive to winter temperatures above 23°F (red line).

Precipitation patterns are expected to change for Wyoming with a warming climate. We are expected to receive more moisture during late winter and less during summer months. This could negatively influence riparian systems and associated vegetation communities on which moose rely.

Habitat

The majority of moose habitat in this herd unit is located on the Bighorn Mountains, primarily on lands managed by the U.S. Forest Service Bighorn National Forest. Habitats include riparian willow, aspen, mixed conifer, open grassland and mountain shrub communities.

We do not have an established habitat transect in this herd unit. Range personnel with the Bighorn National Forest have collected willow transect information at various locations on the Bighorn Mountains, the primary range for moose in this herd unit. Some survey sites suggest high use (> 50% twig browsing) by wildlife, which could include moose, elk or mule deer. In general, taller willow species seem to be decreasing and shorter willow species seem to be maintaining or increasing. We believe taller willow species tend to be more desired browse species for big game such as moose. Taller willows also produce more biomass than smaller willows, generally increasing the amount of forage available for browsers such as moose. As such, there appears to have been a decline in both preferred forage plant composition and forage quantity over time, reducing the carrying capacity for moose. Some willow habitat is relatively linear, such as along drainages on the west side in Hunt Area 42, limiting moose distribution.

Field Data

Field personnel classify moose in all hunt areas annually. In recent years, surveys in Areas 1 and 34 were conducted using aerial survey techniques from a Bell 206B JetRanger III helicopter. Hunt Area 1 is surveyed in late August, and Hunt Area 34 is surveyed during late November – late January, depending on survey conditions, snow cover, and aircraft availability.

Systematically ground surveys were initiated in Hunt Area 42 in 2015 using designated count routes during mid-summer. The Greybull Wildlife Biologist established specific survey routes which are conducted by regional personnel.

Survey results can vary significantly between years, often without easily discernible rationale, making interpretation of data difficult at best (Fig. 3). Over time, trends in survey counts may provide insight on general population dynamics. We do obtain a known annual minimum population from these surveys.

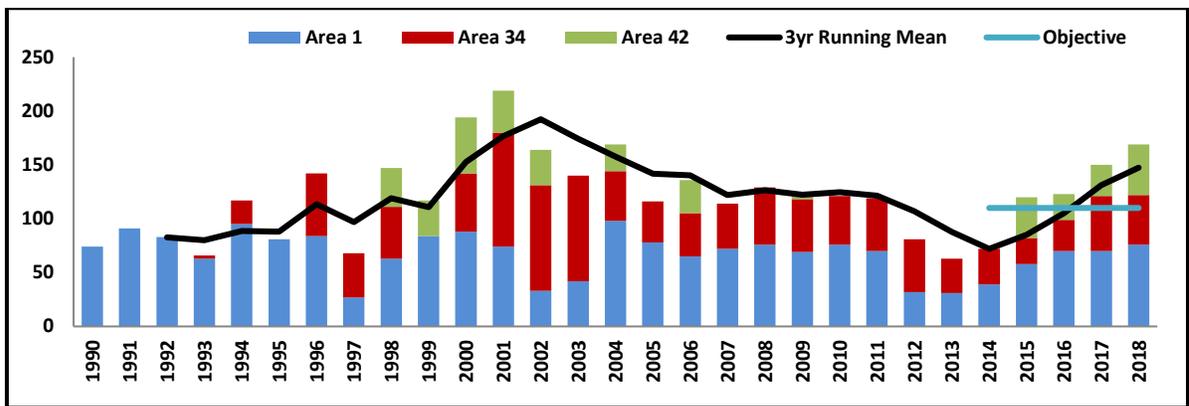


Figure 3. Moose classification/trend counts in Bighorn Herd Unit. Area 1 is surveyed in late August. Area 34 is surveyed in later November – January. Area 42 was periodically surveyed during mid-late summer incidental to other activities, and starting in 2015, using designated survey routes.

During 2018, we classified 76 moose in Area 1 (Fig. 4), an increase from 2017 and above the long-term ($n=29$ years) average count of 67 moose. We observed 38 bulls per 100 cows, similar to 2017 and well below the minimum desired level of at least 50 bulls:100 cows. The apparent lack of bulls could be a function of the survey technique or timing of survey. We observed 18 calves during the survey, for a ratio of 43 calves per 100 cows, similar as recent years and above the long-term ($n=37$ years) average of 38 calves per 100 cows. Field personnel noted at least two females with twin calves during the summer of 2018. In Alaska, twinning is considered a sign of good habitat quality.

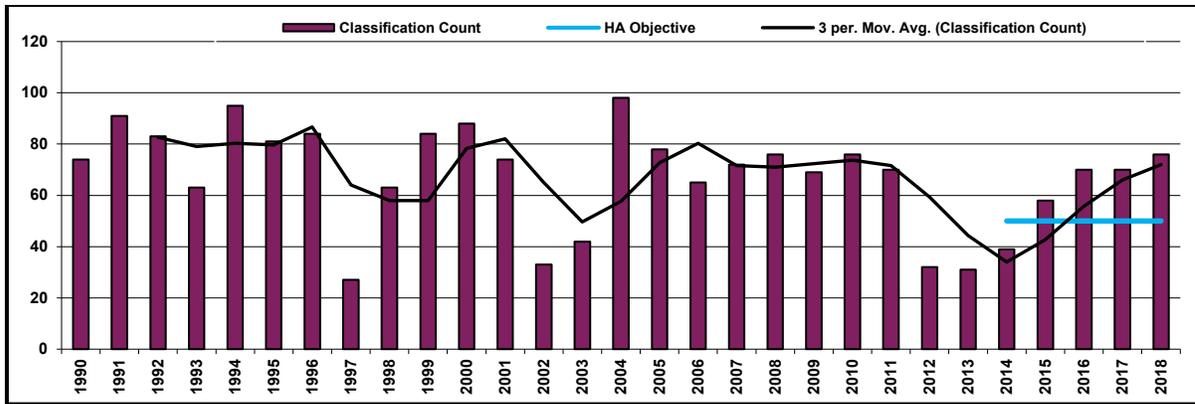


Figure 4. Moose classification/trend counts in Hunt Area 1 of the Bighorn Herd Unit. Area 1 is surveyed in late August of each year using aerial survey techniques. The sub-objective for Area 1 is 50 moose.

In Area 34, we observed 46 moose during a January 2019 survey, but were able to only classify 25 due to antler loss. This was a slight decrease from 2017 (n=51), but still higher than the desired level of 30 observed moose. We classified 89 bulls and 89 calves per 100 cows. The observed bull to cow ratio usually runs high in this hunt area. This could be a true representation of the male segment of this hunt area or could be a function of bulls being disproportionately visible during the survey period. Post-season calf to cow ratios may be skewed upward due to selective harvest of barren cows due to hunting regulations (i.e. cow without calf at side). Low sample size for all hunt areas makes it difficult to have confidence that ratios accurately reflect the population dynamics of this herd in any one specific year but likely provide an idea of population dynamics over time.

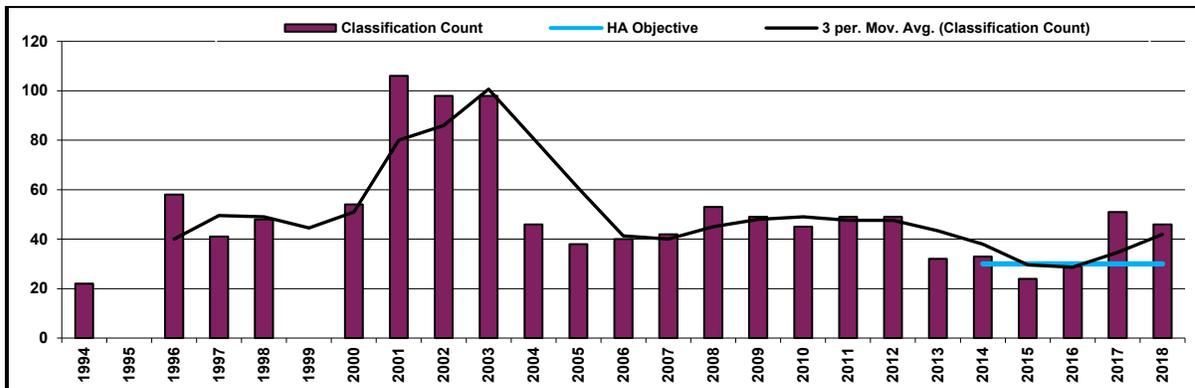


Figure 5. Moose classification/trend counts in Hunt Area 34 of the Bighorn Herd Unit. Area 34 has been surveyed during mid-November – January using aerial surveys techniques since 2001. This year’s survey occurred in late January. The sub-objective for Area 34 is 30 moose.

During 2018, Cody Region wildlife personnel counted 47 moose during ground surveys in late June (Fig. 6), substantially higher than 29 moose observed in 2017 and the highest count since 2000. We observed 78 males per 100 females and 26 calves per 100 females. The calf to cow ratio is significantly below desired levels. This could be a function of small sample size, survey design, survey timing or could be truly representative of the sub-population. We will get a better feel as we continue to collect annual survey data in this hunt area in future years.

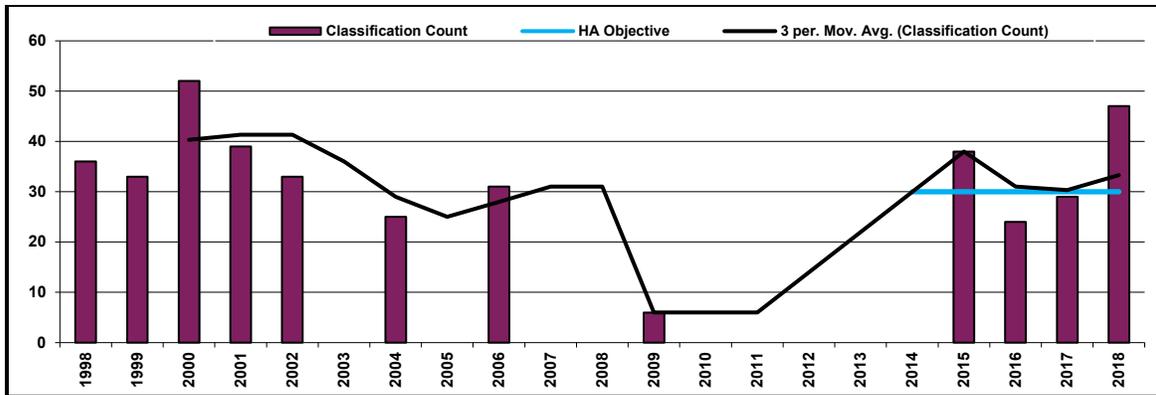


Figure 6. Moose classification/trend counts in Hunt Area 42 of the Bighorn Herd Unit. Area 42 was surveyed in mid-summer using ground survey techniques. The sub-objective for Area 42 is 30 moose.

Teeth were collected from hunter harvested moose, generally through voluntary submission by successful hunters. Teeth were aged at our Wildlife Forensic Laboratory in Laramie using standard cementum annuli analysis techniques. Median age of males harvested in 2018 was 4 years (mean = 5, n = 18, range = 1-12 yrs), the same as for moose harvested in 2017, and at the minimum desired median age threshold of ≥ 4 years (Fig. 7). One bull was aged at 12 years, the oldest male harvested from this herd unit since 2008. Forty percent of the harvested males were ≥ 5 years, at the minimum desired level (Fig. 8). Moose aged at 4 years represented the largest age class with six moose. This isn't surprising as moose tend to develop larger antlers starting at age 4.

Fourteen hunters reported antler width for harvested moose. Antler width averaged 39" and ranged from 21" – 49.5". Based on conversations with hunters and responses provided in the harvest survey, most hunters seemed happy with the moose they harvested. We do not correlate tooth age with antler width since we rely on hunter reported antler measurements, which aren't standardized or uniformly reported.

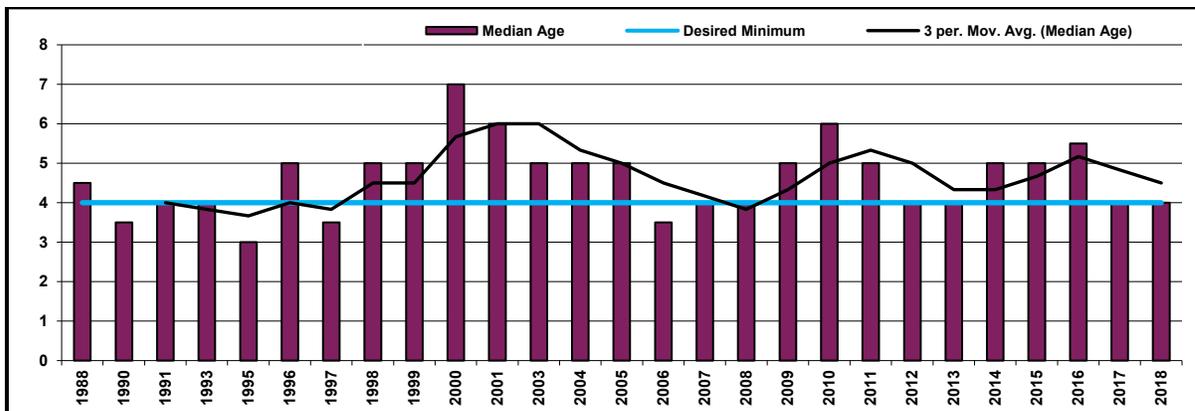


Figure 7. Median age of harvested bull moose in Bighorn Herd Unit. Teeth aged by cementum annuli analyses. Only male moose ≥ 1 years old included in analysis.

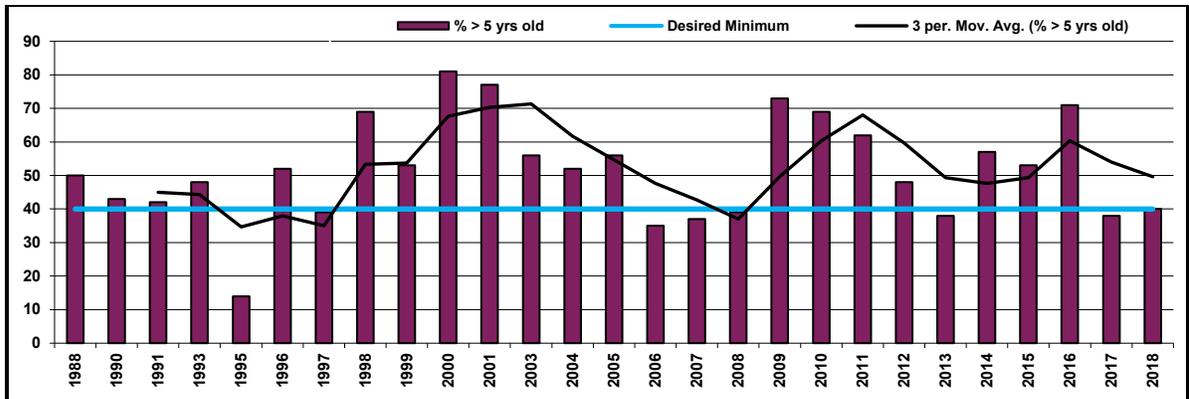


Figure 8. Percentage of harvested bull moose ≥ 5 years old by year. Teeth aged by cementum annuli analyses. Only male moose ≥ 1 years old included in analysis.

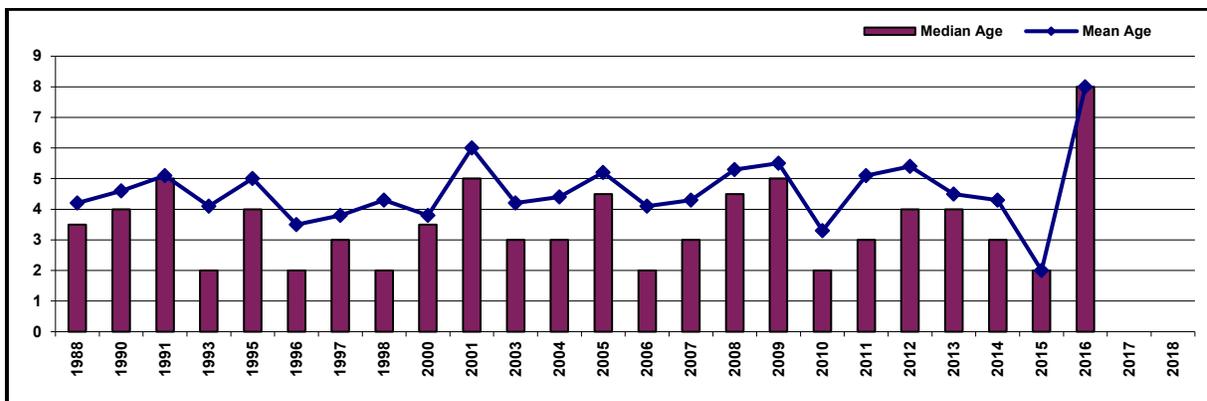


Figure 9. Median and mean age of harvested cow moose in Bighorn Herd Unit. Teeth aged by cementum analyses. Only female moose ≥ 1 years old included in analysis. There is no desired minimum threshold established for female moose age data. There was no female harvest during 2017-2018.

Harvest Data

Hunters harvested 19 moose in 2018, a 26% increase in harvest over 2017, but still well below the long-term (36 years) average harvest of 46 moose. Harvest increased as a direct result of increased license availability. We increased Type 1 (any moose) licenses in Area 34, to a total of 20 license in the herd unit. No Type 4 (antlerless moose) licenses were issued for 2017 or 2018 season. We initiated a moose study in 2017 with collared females. With the investment of time and money to capture and collar cow moose, we did not want these moose harvested during the course of the study.

Hunter success was 95%, with all but one hunter harvesting a moose. Hunter success was the second highest since 2004. Hunter effort increased in 2018 to 11.1 days hunted per harvested moose. This was the highest effort rate in four years and is higher than the 5-year average of 10.7 days/harvest. The increase was due to the Area 34 hunter effort of 13.6 days per animal.

These parameters suggest moose were relatively easy to find during the 2018 season. For some reason, moose seemed highly visible during the summer, with numerous individuals commenting on the number of moose they saw.

Since moose licenses are often a once-in-a-lifetime opportunity, especially in this herd unit, we try to balance license allocation with moose numbers to assure high (i.e. 85%+) success rates for license holders.

Most hunters checked in the field seemed generally satisfied with their hunting experience in this herd unit although we heard some comments about the difficulty finding mature bulls. Comments submitted with the harvest survey were somewhat variable and suggested most hunters were satisfied while a few were disappointed with their hunting experience.

Population

Due to difficulty obtaining meaningful vital rate data and limitations of population estimation for moose herds at this time, we have moved away from a post-season population management objective and have adopted a trend count as the primary management objective, with bull harvest demographics as a secondary management objective. Trend counts do provide a known minimum population at a specific point in time.

In Hunt Area 1, we have classification / trend counts going back to the 1970s. Aerial helicopter surveys were initiated in 1992 and have been flown every year since 1994. Surveys are conducted pre-season in this hunt area in habitats where moose are generally visible. The sub-objective for this hunt area is 50 moose (± 10). In 2018, we observed 76 moose, an increase from the previous two years. The 3-year running average is 72 moose, above the upper range of the management objective.

In Hunt Area 34, we have survey counts going back to the mid-1990s. We initiated aerial surveys in 2001. This area is surveyed post season each year in habitats where moose are most visible. The sub-objective for this hunt area is 30 moose (± 6). In 2018, we observed 46 moose, the second highest count since 2012, and significantly higher than 2015 (n=24) or 2016 (n=29). The 3-year running average is 42 moose, above the upper management objective limit. Management over the past decade was designed to reduce this segment of the population due to moose numbers being higher than the population sub-objective. Willow and aspen habitats are generally in poor condition with heavy browsing in this hunt area.

In 2015, mid-summer survey routes, utilizing ground survey techniques, were initiated in Hunt Area 42. The sub-objective for this hunt area is 30 moose (± 6). The 2018 survey resulted in 47 moose observed. We observed 24 moose in 2016 and 29 moose in 2017. The 3-year running average is 33 moose, within the desired management objective range.

Overall, we observed 169 moose during 2017 classification / trend count surveys, compared to our management objective of 110 moose (± 22). The 3-year running average is 147 moose, above the upper range of our management objective. We won't add antlerless tags to stabilize or reduce this population until the 2020 season so as not to bias current research with collared females. Harvest of antlered moose will continue.

Special Studies

The Wyoming Game and Fish Commission provided funding for a research project in the Bighorn Mountains starting in March 2017. Dr. Matt Kauffman, University of the Wyoming Fish and Wildlife Cooperative Research Unit, is the lead investigator. Additional funding was provided by

the Moose Committee of the Wyoming Governor's Big Game License Coalition. The project proposal is attached as Appendix A of the 2016 Bighorn Moose JCR.

As of February 1, 2019, 59 collars were deployed on adult female moose across all hunt areas. One collared moose died as a result of a vehicle collision in fall of 2018. That collar will be redeployed. Several collars (~8-10) are not functioning. We are working with the manufacturer to solve this problem. A graduate student has been hired to conduct this research over the next 2-3 years.

Management Summary

Moose licenses are limited quota in all hunt areas in Wyoming. The Bighorn Herd Unit is very popular based on the number of applications for available licenses. For all moose hunt areas in this herd unit, the regular hunting season runs October 1-31, with an archery pre-season from September 15-30. Archers often harvest up to 50% of the bulls taken in any given year. Most moose hunting is on the Bighorn National Forest with good access for hunters. Snow can limit access into some areas as the season progresses.

Some managers and certain publics are concerned we may have lowered this population more than desired. Moose no longer use some areas where they were common just 5-10 years ago. Reports of fewer moose, from both hunters and general wildlife viewers, have increased in recent years. The exception was the past two summers, when moose were much more visible and we received numerous comments on the number of moose observed. Classification counts generally increased in all areas over past couple years.

We estimate a harvest of 15 moose in 2019, a decrease compared to the 2018 harvest. We maintained Type 1 (any moose) licenses at five for Hunt Areas 1 and 42, and decreased Type 1 licenses in Hunt Area 34 from 10 to five. Licenses in Area 34 had been increased for the 2018 season. One two harvested bulls were aged over 5 years old. Reducing harvest should allow additional bulls to reach the 5+ age classes.

We eliminated Type 4 (antlerless moose) licenses in all hunt areas starting with the 2017 season to reduce the likelihood of a hunter harvesting a collared cow. We have substantial time, effort and money invested in each collared female and would prefer they are not susceptible to harvest during the study. We will not issue Type 4 licenses until at least the 2020 season.

Wyoming Governor's Complimentary moose licenses are only valid in hunt areas with >10 any or antlered moose (i.e. Type 1) licenses. As such, they are not currently valid in any hunt area in this herd unit.

This herd unit provides quality wildlife viewing opportunities, with moose visible from U.S. Highways 14, 14A and 16, as well as main forest service roads, throughout the spring and summer months.

Moose habitats, especially riparian and aspen communities, remain a concern on the Bighorn Mountains due to their relatively poor condition and heavy browsing pressure. We will continue to work with the Bighorn National Forest to address these concerns.

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APPENDICES

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Appendix A

**Summary of
2018 Landowner Survey**

**Perceived Status of Deer and Pronghorn Populations
And Suggested Hunting Season Strategies**

Gillette Biologist District

May 2019

Prepared by:

Erika Peckham
Gillette Wildlife Biologist
Wyoming Game & Fish Department

Overview

Questionnaire surveys of landowners within the Gillette Biologist District have been conducted after each hunting season from 1996 through 2018. Landowners completed the surveys and returned them with their coupon forms either separately or with their landowner coupons to their local game warden by March 1st of the following year.

The questions asked for each of the surveys were essentially the same with only slight variation between the first survey and subsequent surveys. Landowners were asked if the pronghorn and deer herds on their ranches were below desired levels, at desired levels, or above desired levels. They were also asked if they thought that next year's hunting season should be more conservative, about the same, or more liberal than the previous hunting season. Overall, it appears that the response rate is declining when comparing years past.

A brief summary of the 2018 responses relative to the 2019 hunting season is as follows.

Pronghorn Questionnaire Responses

Area 1

- 56% of respondents think that pronghorn are at desired levels with 30% stating they were above.
- 72% of respondents desire the same season for 2019.

Area 3

- 75% of respondents believe that numbers are below objective, 25% feel that they are above objective.
- 75% of landowners favor the same season for 2019

Area 17

- 68% of landowners feel that antelope numbers are where they should be.
- 64% of landowners favor the same season for 2019.

Area 18

- 80% of landowners think that pronghorn numbers on their property are at desired levels.
- 90% of landowners favor the same season for 2019.

Area 19

- 67% of respondents felt that antelope were at or above desired numbers.
- 100% of respondents wanted the same or a more liberal season for 2019.

Area 23

- 92% of landowners surveyed believe that pronghorn numbers on their property are at desired levels.
- 100% of landowners favor the same or more liberal season for 2019.

Area 24

- 50% of landowners surveyed believe that pronghorn numbers on their property are above desired levels with the remainder of respondents split on their opinion.
- 88% wanted the same season or a more liberal season for 2019.

Area 27

- The 2 respondents wanted the same or a more liberal season for 2019.

Overall Pronghorn Survey Results

- Sample size of 98 landowners answered the portion on pronghorn (some incomplete, only answering either the portion regarding population or season and not both, some not indicating hunt area).
- 65% of total respondents think that pronghorn numbers on their property are at desired levels with 13% indicating that pronghorn numbers on their property are below desired levels and 21% indicating that pronghorn numbers on their property are above desired levels.
- Most (74%) favor the same season for 2019 with 16% favoring a more liberal and 10% favoring a more conservative season for 2019. Responses were fairly similar as compared to the 2017 season responses.

Relationship to 2018 Post-season Population Estimate, Its Objective and Landowner Desires for the 2019 Hunting Season

- North Black Hills Herd Unit is estimated to be below objective. Overall, 64% of landowners think pronghorn are at the desired level and the majority (70%) want the same season for 2018.
- Gillette Herd Unit is estimated to be below objective. Respondents were equally split on where they believe the herd is; however most want a similar season for 2019.
- Pumpkin Buttes Herd Unit is estimated to be slightly below objective. 92% of all respondents want the same season for 2019.
- Winter conditions were mostly moderate with some severe weeks in the winter of 2018-2019. Winter commenced average temperatures and snowfall. In the month of February there were prolonged periods of cold couple with snowstorms. The 2019 seasons account for the winter and address the capacity of the public land in some hunt areas.

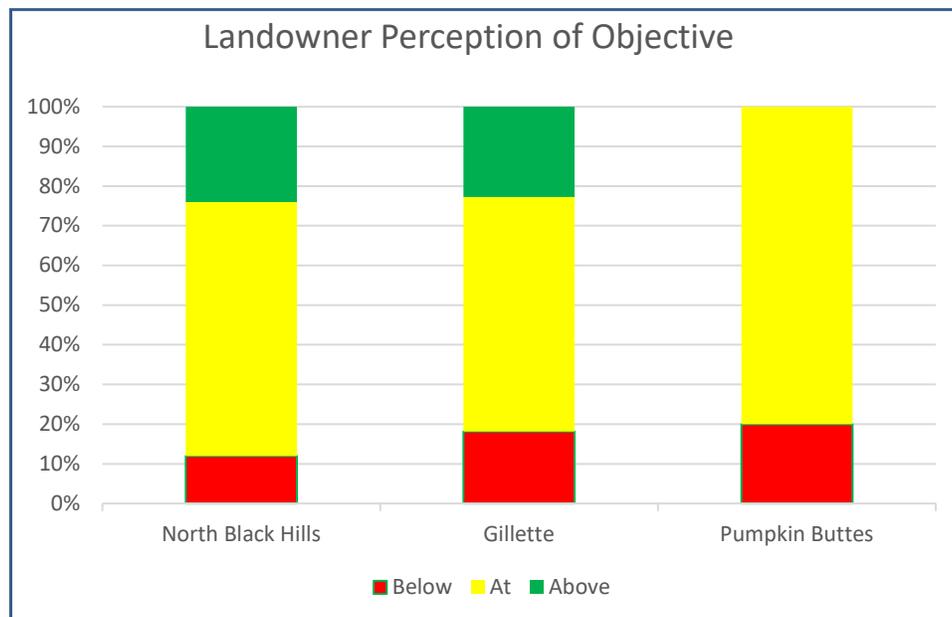


Figure 1. 2018 landowner survey results by herd unit regarding pronghorn herd size compared to herd objective.

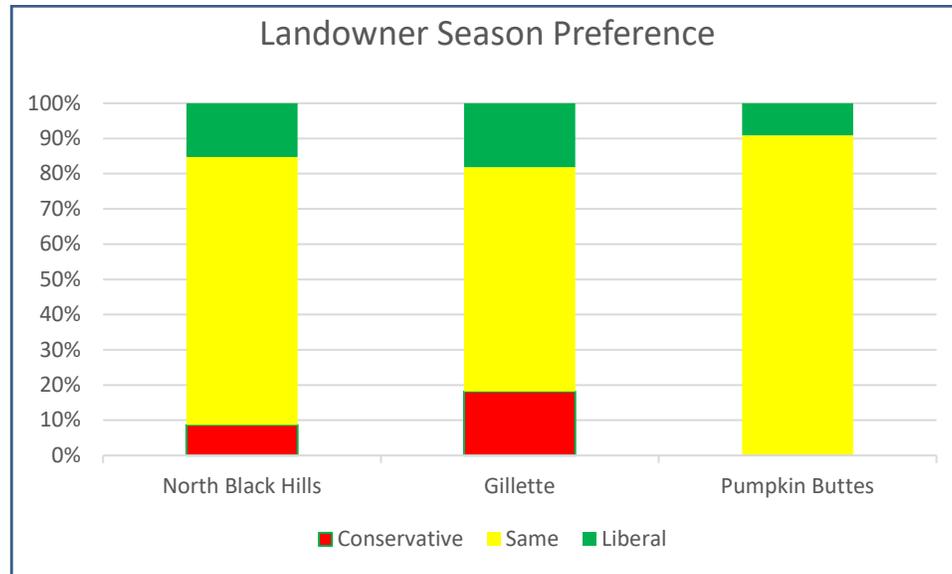


Figure 2. 2018 landowner survey results by herd unit regarding desired 2019 pronghorn hunting seasons.

Table 1. 2018 landowner survey results, and results by year 1997-2018

Hunt Area	Population			Season		
	Below Desired Level	At Desired Level	Above Desired Level	More Conserv Season	Same Season	More Liberal Season
1	4	15	8	3	18	4
3	0	3	1	0	3	0
17	4	13	5	4	14	4
18	2	8	0	1	9	0
19	0	6	3	0	5	3
23	0	12	1	0	10	1
24	2	4	2	1	5	2
27	0	1	1	0	1	1

YEAR						
*2018	13(13%)	64(65%)	21(22%)	9(10%)	68(74%)	15(16%)
2017	14(14%)	59(60)	26(26%)	9(9%)	64(66%)	24(25%)
2016	16(25%)	34(54%)	13(21%)	9(15%)	39(66%)	11(19%)
2015	20(29%)	42(62%)	6(9%)	8(12%)	53(79%)	6(9%)
2014	22(26%)	49(58%)	13(16%)	19(23%)	49(61%)	13(16%)
2013	31(47%)	29(44%)	6(9%)	32(48%)	29(44%)	5(8%)
2012	72(44%)	82(50%)	11(6%)	47(29%)	103(64%)	11(7%)
2011	30 (37%)	47 (57%)	5 (6%)	25 (32%)	49 (62%)	5 (6%)
2010	30 (33%)	45 (49%)	16 (18%)	21 (23%)	52 (57%)	18 (20%)
2009	19 (18%)	60 (56%)	29 (27%)	15 (14%)	72 (66%)	22 (20%)
2008	7 (6%)	55 (50%)	48 (44%)	9 (8%)	60 (56%)	39 (36%)
2007	7 (6%)	58 (48%)	55 (46%)	4 (3%)	69 (57%)	46 (39%)
2006	14 (11%)	58 (44%)	61 (46%)	6 (5%)	74 (56%)	53 (40%)
2005	6 (10%)	22 (35%)	34 (55%)	4 (7%)	31 (53%)	23 (40%)
2004	28 (16%)	86 (50%)	59 (34%)	12 (7%)	98 (57%)	63 (36%)
2003	30 (17%)	105 (60%)	43 (24%)	11 (6%)	109 (62%)	56 (32%)
2002	24 (18%)	78 (58%)	33 (24%)	17 (13%)	80 (59%)	38 (28%)
2001	27 (21%)	74 (59%)	25 (20%)	23 (18%)	73 (58%)	30 (24%)
2000	50 (40%)	58 (46%)	17 (14%)	33 (27%)	65 (52%)	26 (21%)
1999	48 (46%)	37 (35%)	20 (19%)	30 (29%)	47 (46%)	25 (25%)
1998	49 (37%)	64 (48%)	21 (16%)	31 (23%)	73 (54%)	31 (23%)
1997	68 (49%)	60 (43%)	11 (8%)	56 (41%)	63 (46%)	18 (13%)

*Note-Totals of Hunt Area may not equal total for 2018. This is due to some landowners not reporting what area they are in or answering only portions of the survey. Their opinions were factored into the total, but not by Hunt Area.

Deer Questionnaire Responses

Area 1

- 72% believe deer numbers on their property are at desired levels.
- 72% favor the same season for 2019.

Area 3

- 50% feel that deer are at desired numbers.
- 80% favor the same season for 2019.

Area 10

- There were 2 respondents and they both felt that deer were at numbers where they would like to see them.
- Both respondents favored the same season for 2019.

Area 17

- 64% of respondents felt that the deer were where they would like to see them.
- 73% favor a similar season for 2019.

Area 18

- 53% of respondents felt that deer were where they would like to see them.
- 58% favor the same season for 2019.

Area 19

- 85% believe deer numbers on their property are at or below desired levels.
- 50% favor a more conservative season for 2019.

Area 21

- Respondents were evenly split on the objective
- 50% of respondents desired the same season for 2019.

Overall Deer Survey Results

- 102 landowners answered the deer portion of the survey (some incomplete, only answering either the portion regarding population or season and not both, some not indicating hunt area).
- Most (59%) think that deer numbers are at desired levels with 25% of the respondents indicating that the herds are below desired levels and 16% indicating that herds are above desired levels.
- Most (65%) favor the same season for 2019, with 21% desiring a more conservative season, and the remaining 14% indicating the need for a more liberal season.

Relationship to 2018 Post-season Population Estimate, Management Objective and Landowner Desires for the 2019 Hunting Season

- Powder River Herd Unit is far below objective. Landowners generally desire a higher population of deer in the herd unit and prefer the same or more conservative season in 2019.
- Pumpkin Buttes Herd Unit is near objective. The annual landowner survey results show that landowners continue to desire a higher deer population. The majority of landowners would like to see more deer and desire a more conservative season for 2019.
- Black Hills Herd Unit is slightly above objective. In the Sheridan Region portion of the herd unit the majority of landowners (69%) indicate that the herd is at desired levels for mule deer. Most (74%) want to see the same season in 2019.
- Cheyenne River Deer herd unit is below objective. In the Sheridan Region portion of the herd unit the majority (62%) of landowners indicate that the herd is at or below desired levels and 88% favor the same or more liberal season for 2019.

Figure 3. 2018 landowner survey results by hunt area regarding deer herd size compared to herd objective.

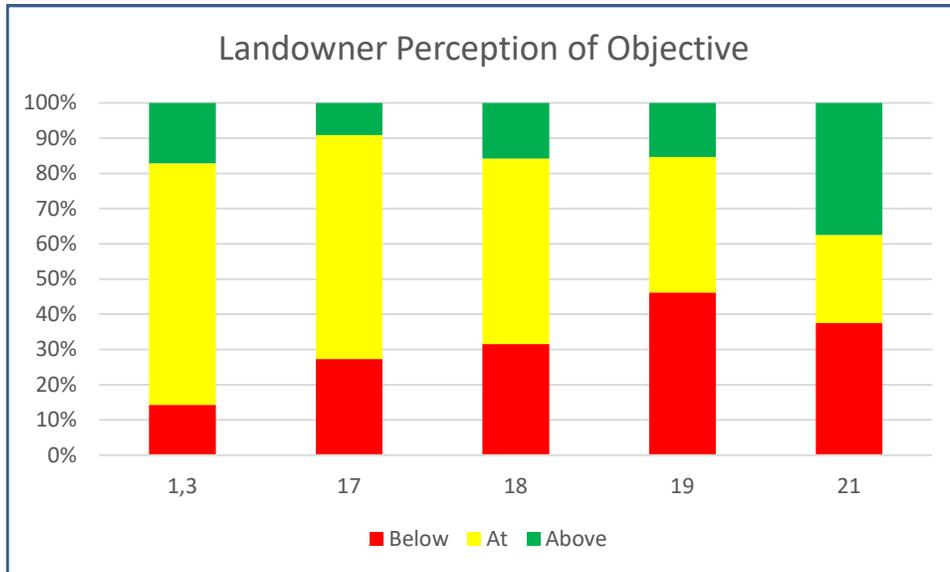


Figure 4. 2018 landowner survey results by hunt area regarding desired 2019 deer hunting seasons.

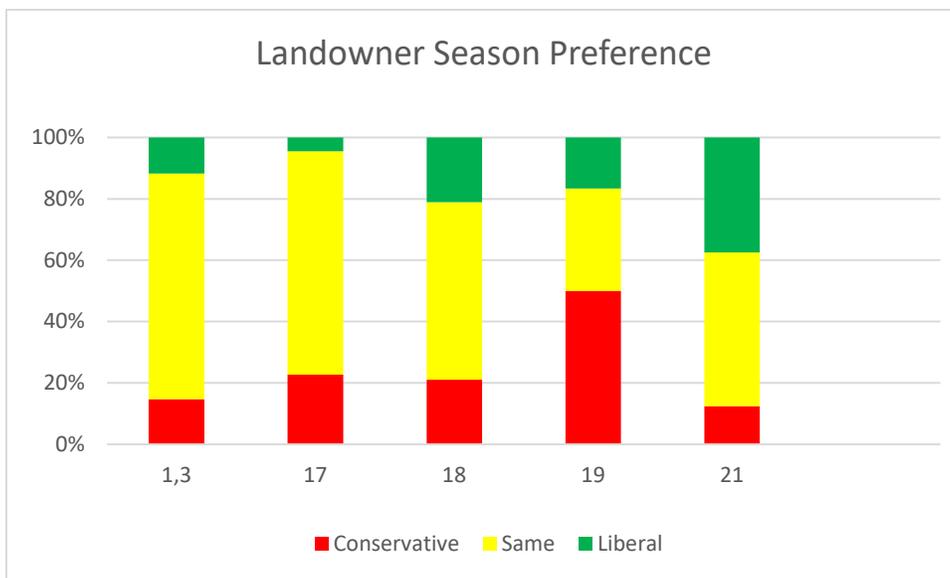


Table 2. Summary of responses by landowners regarding deer population levels and opinions for deer hunting seasons 1997– 2018 and summary of 2018.

Hunt Area	Population			Season		
	Below Desired Level	At Desired Level	Above Desired Level	More Conserv Season	Same Season	More Liberal Season
1	5	15	2	3	13	4
3	1	4	1	1	4	1
10	1	0	0	1	0	0
17	14	14	2	12	15	2
18	4	7	2	2	10	1
19	8	10	2	5	13	2
21	1	1	1	1	1	1
YEAR	Population			Season		
*2017	36(35%)	56(54%)	12(11%)	26(26%)	60(60%)	14(14%)
*2016	26(39%)	35(53%)	5(8%)	18(28%)	40(61%)	7(11%)
*2015	27(36%)	39(51%)	10(13%)	20(28%)	44(60%)	9(12%)
*2014	39(49%)	33(42%)	7(9%)	33(43%)	37(49%)	6(8%)
*2013	43(65%)	23(35%)	0	37(57%)	23(35%)	5(8%)
*2012	106(66%)	46(29%)	8(5%)	80(52%)	65(42%)	8(5%)
2011	52 (71%)	20 (28%)	1 (1%)	41 (59%)	27 (39%)	1 (1%)
2010	56 (57%)	38 (39%)	4 (4%)	40 (51%)	49 (41%)	8 (8%)
2009	64 (57%)	43 (38%)	5 (4%)	50 (45%)	58 (52%)	6 (5%)
2008	28 (26%)	72 (67%)	7 (7%)	17 (16%)	78 (72%)	13 (12%)
2007	22 (18%)	83 (66%)	20 (16%)	13 (10%)	88 (70%)	24 (19%)
2006	24 (18%)	75 (57%)	32 (24%)	14 (11%)	77 (58%)	41 (31%)
2005	18 (19%)	54 (56%)	25 (26%)	14 (14%)	60 (61%)	25 (25%)
2004	52 (29%)	98 (55%)	29 (16%)	30 (17%)	117 (67%)	29 (16%)
2003	57 (30%)	110 (58%)	23 (12%)	34 (19%)	108 (61%)	35 (20%)
2002	43 (32%)	76 (56%)	17 (13%)	30 (22%)	84 (62%)	22 (16%)
2001	44 (35%)	65 (52%)	17 (13%)	34 (27%)	74 (59%)	18 (14%)
2000	38 (29%)	73 (57%)	18 (14%)	34 (26%)	66 (51%)	30 (23%)
1999	30 (29%)	56 (55%)	16 (16 %)	26 (25%)	56 (55%)	20 (20%)
1998	60 (47%)	63 (49%)	6 (5%)	51 (39%)	65 (50%)	15 (11%)
1997	64 (47%)	56 (41%)	16 (12%)	57 (42%)	61 (45%)	18 (13%)

*Note-Totals of Hunt Area may not equal total for 2018. This is due to some landowners not reporting what area they are in or answering only portions of the survey. Their opinions were factored into the total, but not by Hunt Area.

APPENDIX B

2018 Buffalo / Kaycee Landowner Survey

May 31, 2019

Prepared by Cheyenne Stewart

Buffalo Wildlife Biologist
Wyoming Game & Fish Department

The 20th Buffalo/Kaycee landowner postseason survey was conducted following the 2018 hunting season. Surveys were mailed to 149 landowners in the Buffalo Wildlife Biologist district, asking for perceptions of pronghorn, mule deer, white-tailed deer and elk populations as well as what hunting season adjustments they recommend for the 2019 hunting seasons. Landowners were asked the following questions for each species that occupies their ranches (pronghorn, mule deer, white-tailed deer, and elk):

Overall for your area, is the (*species*) population:

- Below or less than desired levels
- At or about right at desired levels
- Above or higher than desired levels

For next year, would you like to see the (*species*) hunting seasons:

- More conservative with fewer licenses
- About the same as this year
- More liberal with more licenses

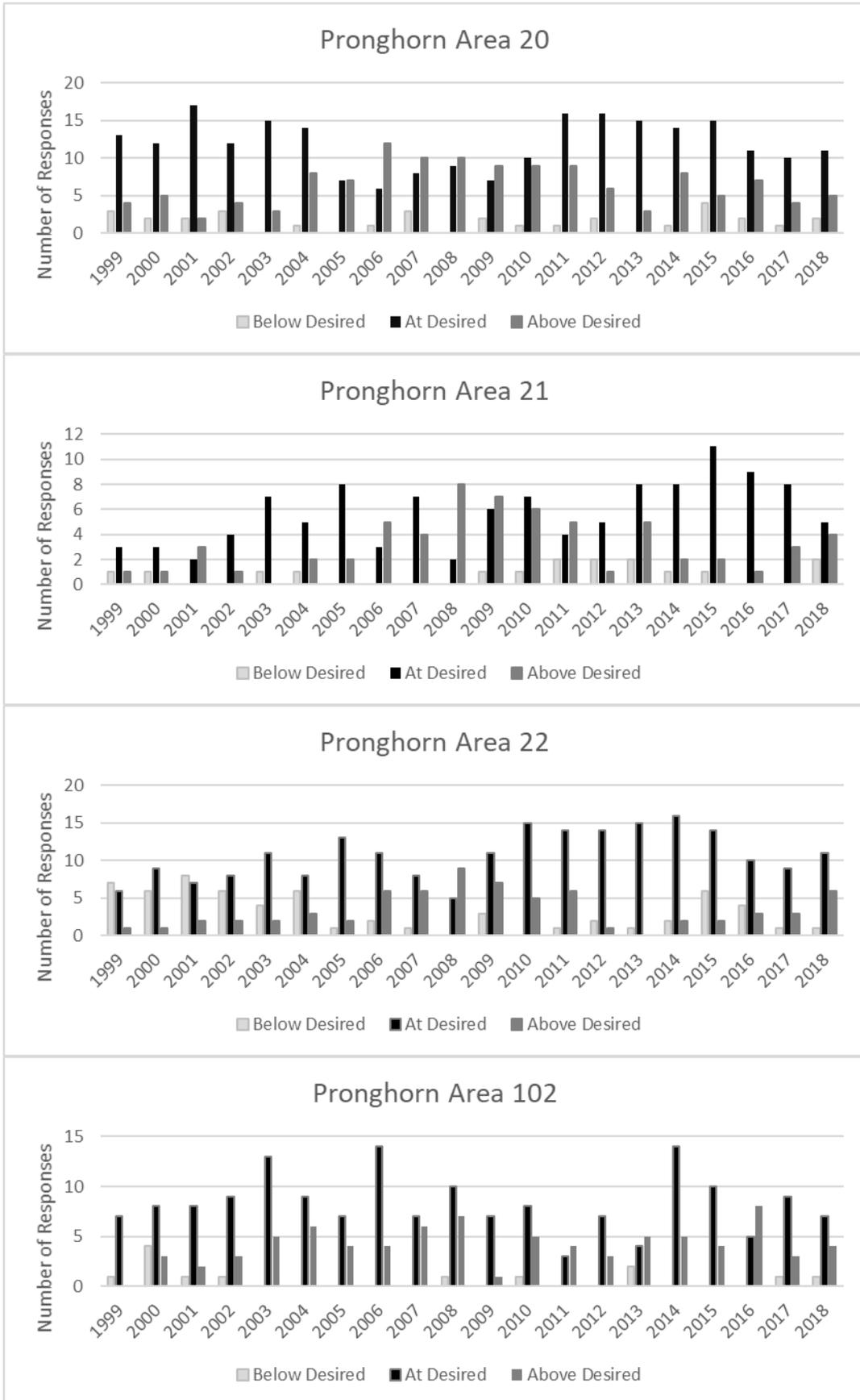
Landowners were also asked if they were interested in learning more information about our Access Yes programs. General comments were also requested.

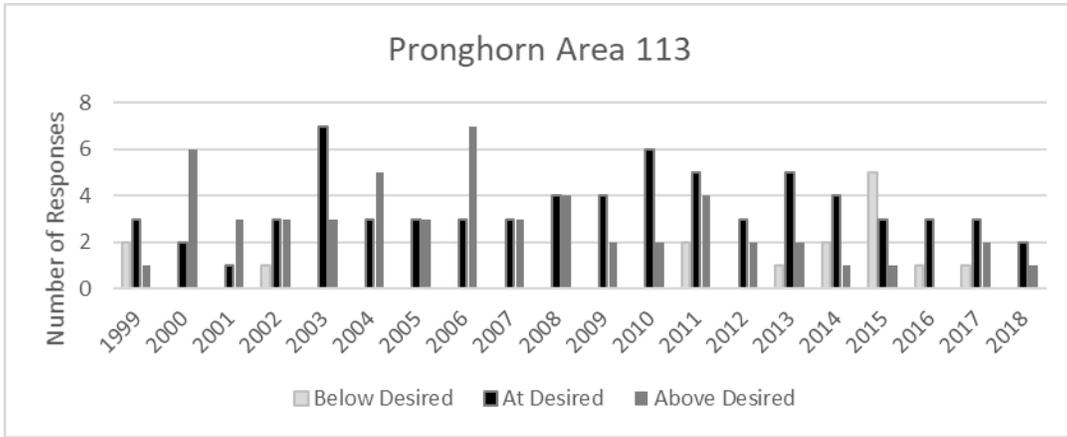
Sixty-two responses were received for a response rate of 42%. Response rates have ranged from 34% - 45% from 2011 to 2017. Results of the 2018 survey and 20-year trends are provided below. Not all landowners responded to each question or for each species. Some landowners are credited with a response in more than one hunt area because of landownership patterns. Therefore, total responses may exceed the number of actual survey returns. The total (*n*) references the number of landowners who responded for the respective species followed by the totals for all hunt areas. Samples are generally low at the hunt area level limiting the confidence in the results.

Some interpretation of survey responses was needed as some landowners responded for species they do not have, or have limited numbers of, on their property. For example, a landowner who has low potential for pronghorn on a ranch and responded they are below desired numbers was not included in the final results. Areas with less than 5 responses every year are not included.

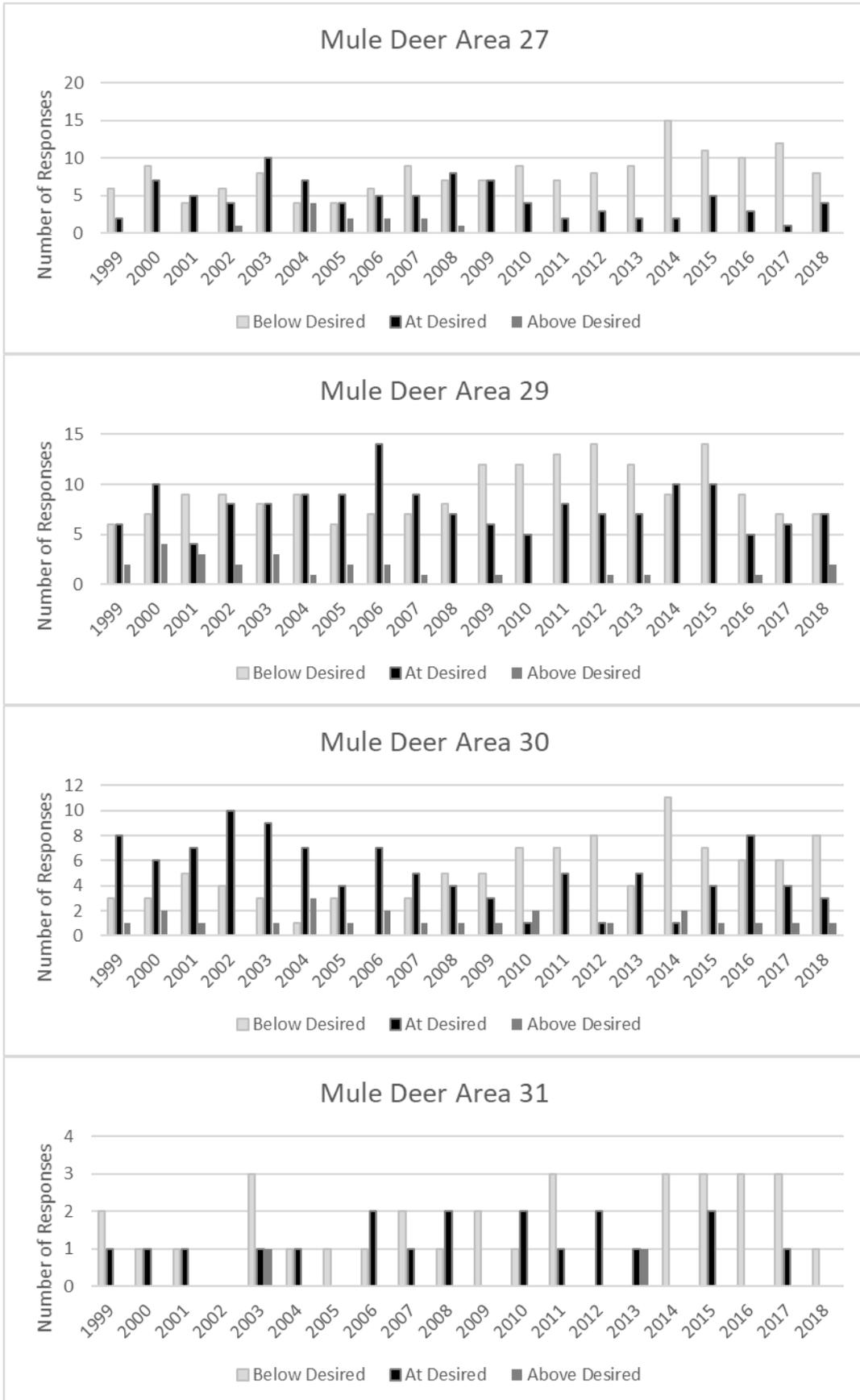
Eight landowners responded that they were interested in learning more about ways that Wyoming Game and Fish can help facilitate hunter/landowner coordination. Local Game Wardens and Access Yes Coordinator will follow-up with these landowners.

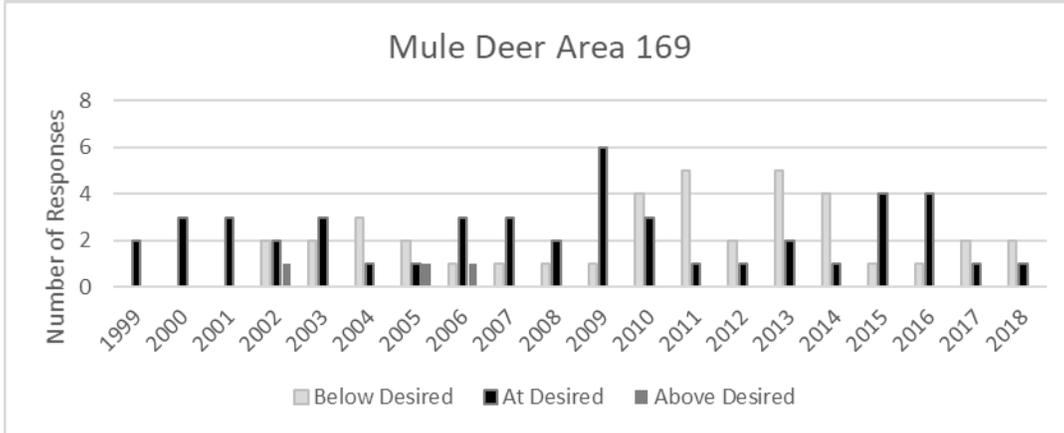
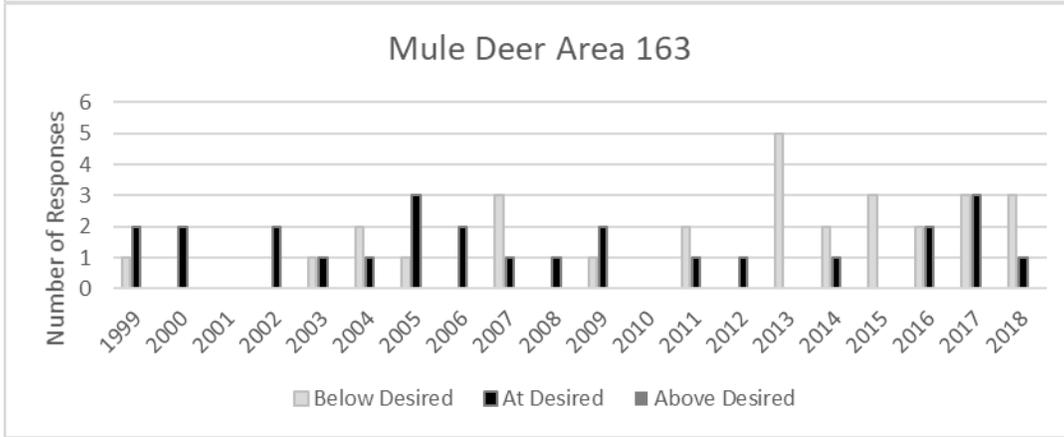
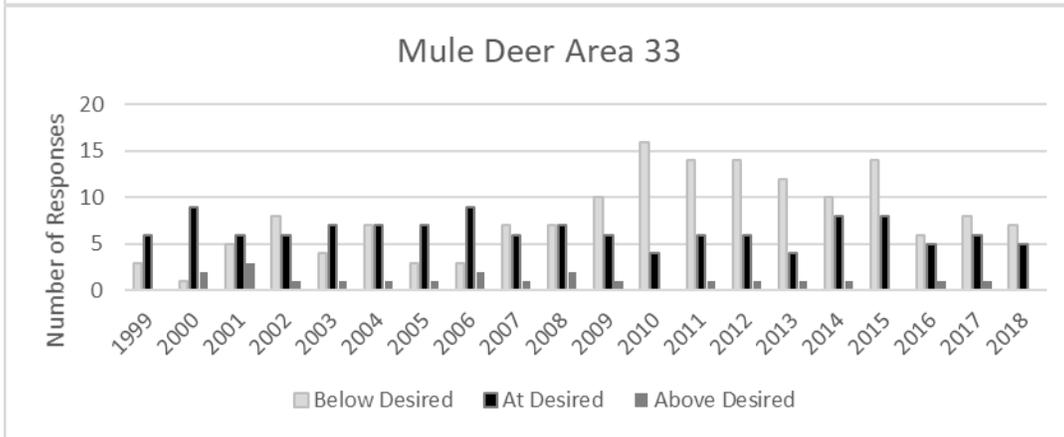
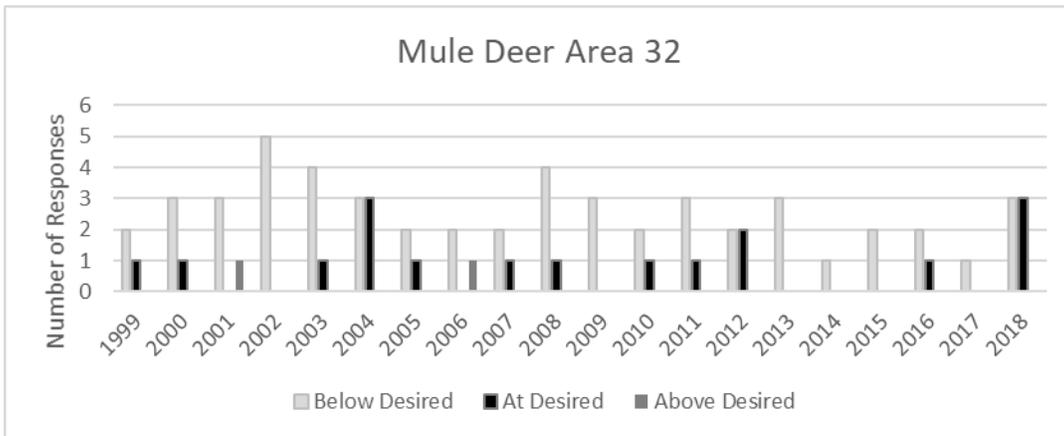
Pronghorn



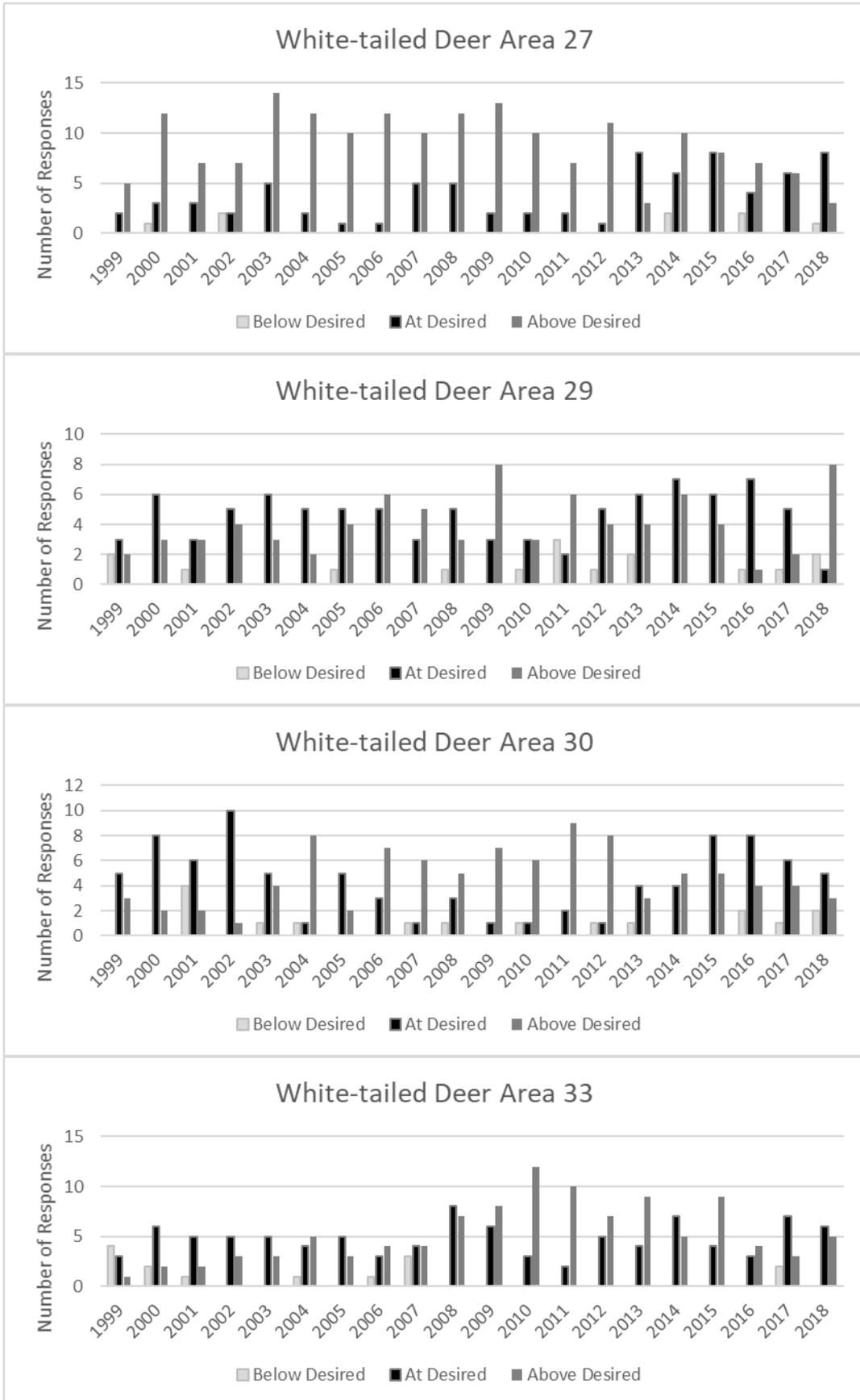


Mule Deer

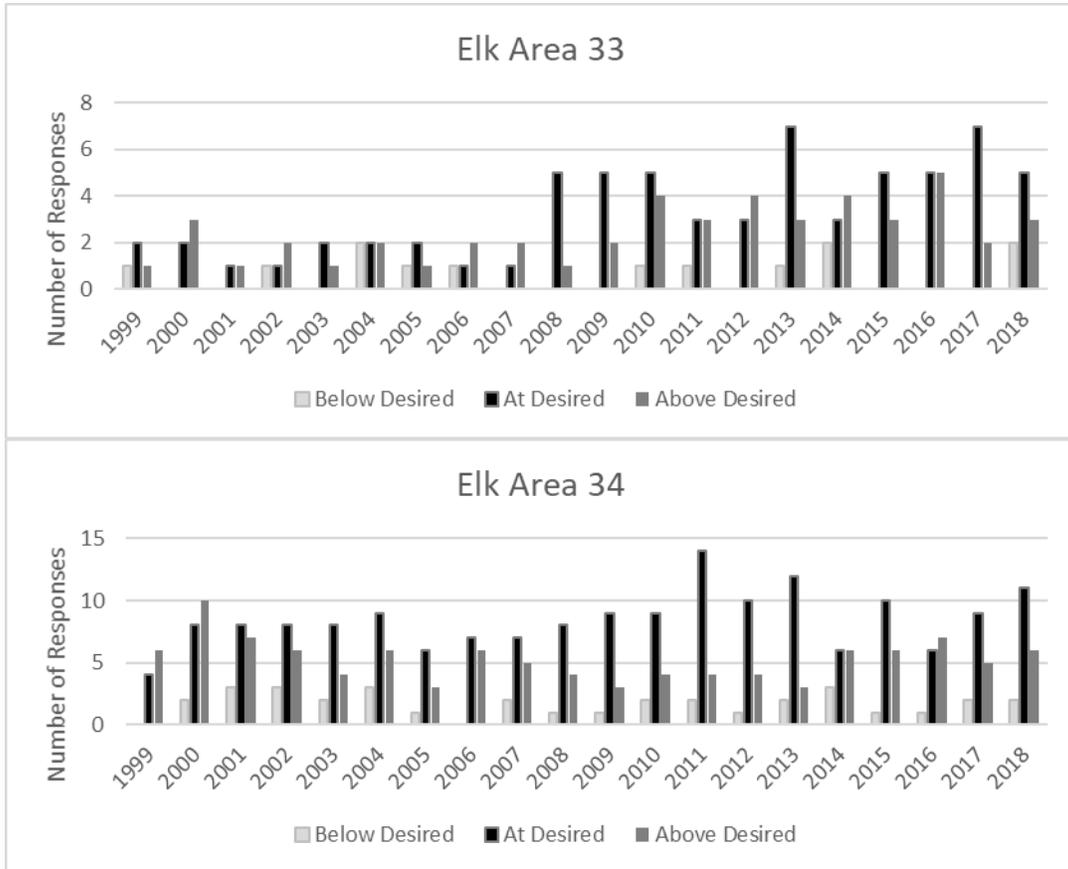




White-tailed Deer



Elk



APPENDIX C

CAMPBELL COUNTY HUNTER ASSISTANCE SERVICE 2018 SUMMARY OF ACTIVITIES

Operations

2018 was the 35th year for the Campbell County Hunter Assistance Service (here after “Service”). The program was started in 1983 as an effort to better coordinate private land availability with prospective hunters. The Service has since evolved to include both private land hunting coordination as well as public land hunting information.

In 2018, the Hunter Assistance Service was operated from the Campbell County Visitor’s Center (here after “Visitor’s Center”), located at Highway 59 and Interstate 90. Prior to 2000, the Service was conducted at both the Visitor’s Center and the Campbell County Chamber of Commerce in downtown Gillette. With a consolidated operation at one location, the Service is better able to maximize limited resources as well as provide better service to the hunting community, as all the information is located at one readily accessible and centrally located site.

Over the past 18 years, the Service has also provided information for the Department’s Walk-in Access areas. In 2000, a temporary position was funded by the Department to work at the Visitor’s Center from late September through early November. A Game and Fish Department Access Yes grant was used from 2003-2009 to fund the position. The focus of this position was to promote Walk-in Access areas within Campbell County, distribute Walk-in Access guides, to contact landowners in the Gillette District to find those ranches seeking additional hunters, and to keep an active list of those ranches available at the Visitor’s Center for hunters seeking hunting opportunities. In previous years, the temporary employee had spent considerable time contacting landowners to inquire about big game hunting opportunities on private land. Those with open dates to take additional hunters were kept on a calling list to be distributed to hunters seeking such opportunity. The hired employee also worked at the Visitor’s Center during peak visitation periods, answering hunter questions and recommending appropriate departmental publications.

For the 2018 hunting season, coverage was provided by the Gillette Wildlife Biologist and Game Wardens, the Sheridan Information and Education Specialist, and by employees of the Visitor’s Center. It is hoped that this position will be refilled in future seasons when funding is available, as it is a valuable addition to the Service and provides the hunting public with additional information.

The Service has greatly expanded during the past several years to become more than just an opportunity to provide hunter assistance during the peak fall season. The Visitor’s Center now fields hunter inquiries year-round. The permanent staff at the Visitor’s Center has become well-versed in hunting and fishing opportunities within the region and are able to provide this information to nonresident tourists and residents throughout the year. If unable to directly assist the public with hunting and fishing information, The Visitor’s Center forwards requests to either local Department personnel or the Regional Office in Sheridan. The Department has benefited greatly from this added service. The number of Department customers the Visitor’s Center has assisted points to the need for a permanent Game and Fish public office in Gillette, should funding become available.

Various Department publications were made available for free distribution during Service operations, including hunting regulations, fishing guides, and various specialty publications of the Department.

The Bureau of Land Management (BLM) land status maps (1:100,000) have been available at the Visitor's Center for the past ten years for resale to the hunting public. Sportsmen were assisted with understanding these maps by using a map display of Northeast Wyoming, which included marked public access roads. The display maps were updated to show changes in land ownership due to sales of state lands and exchanges of USFS and BLM lands. Display maps were located outside the building. Specific information on public lands hunting, map reading, and hunter ethics was also posted to the outside wall. The availability of critical hunting information along the outside wall of the Visitor's Center provided full-time support to the hunting community, even when the Visitor's Center was closed. The "big map" has become a popular stop for non-resident hunters. Hunters can update their own field maps and ask questions of WGFD and Visitor's Center staff before going into the field, and have mentioned that they appreciate and enjoy the service. Hunters also mention that they are very pleased with the "one-stop shopping" opportunity they have to purchase maps, reference the large map, and pick up regulations, and have their questions addressed at the Visitor's Center.

Results and Discussion

Personnel focused on fielding questions from the multitude of hunters that stopped in at the Visitor's Center and educating sportspersons about available public land and Walk-In Area hunting opportunities.

Visitor's Center personnel were very good in documenting hunter participation with the Service. During peak visitation periods when there were typically 10 to 15 hunters at the Visitor's Center at one time, it could be challenging to document detailed visitation information. Hunter information posted outside of the building meant that many hunters were never directly contacted by the Visitor's Center staff inside. Self-service information was very good for the customers, but the approach does not lend itself well to documenting actual total visitation and assistance provided. Additionally, some hunters were seen using the outside map and services during times when the Visitor's Center was closed. Overall, the Visitor's Center personnel did a commendable job in sampling the visiting hunter population; however the total numbers reported are recognized as being less than the actual total number of hunters using the Service in past years, due to the staffing limitations.

The recorded visitation in 2018 totaled approximately 257 hunters (Table 1). This total is likely lower than the actual total of visiting hunters, as some individuals that visited during September were not tallied by Visitor's Center staff and for reasons mentioned in the previous paragraph. It is conservatively estimated that at least 800 hunters actually used the Service in some fashion during the 2018 season. Additionally, the Visitor's Center fielded over 115 hunter phone calls and emails.

Table 1. Gillette Hunter Assistance Service summary from 1984 to 2018.

Year	Landowners	Total Hunters
1984	45	741
1985	36	554

1986	24	923
1987	24	1,131
1988	22	737
1989	28	501
1990	28	236
1991	43	442
1992	46	695
1993	31	727
1994	24	681
1995	33	701
1996	28	651
1997	19	626
1998	27	573
1999	19	620
2000	29	1,776
2001	22	1,316
2002	17	1,346
2003	29	1,237
2004	35	1,711
2005	18	845
2006	12	481
2007	17	1,034
2008	12	922
2009	10	600
2010	0	1,007
2011	0	903
2012	0	853
2013	0	593
2014	0	540
2015	0	476
2016	0	331
2017	0	288
2018	0	257

Peak visitation tends to occur just prior to the start of the rifle season and remains high following the October 1st season opener for about 3 to 7 days. Many nonresident hunters feel that they must hunt the opening days of a season despite efforts to inform them that such a strategy is not necessary for a successful Wyoming hunt. The Gillette Wildlife Biologist and Gillette Wardens were present at the Visitor’s Center for two days prior to opening day and fielded the majority of hunting questions. The Sheridan Information and Education Specialist was also present on one day to assist. If staff members were unable to answer a question for a visiting hunter, they would either contact the Wildlife Biologist via cell phone or would contact the Sheridan Regional Office for assistance. The employees of the Visitor’s Center did a commendable job in answering hunting questions this past year.

Sales of BLM Surface Management Maps were still popular, even with gps and phone apps assisting in orientation. Many non-residents read about the Service via the Campbell County

Hunting Guide – a mini magazine distributed by The Gillette News-Record in collaboration with Wyoming Game and Fish. The magazine is mailed annually to non-residents who draw an antelope license in Campbell County. It offers several news articles regarding the area’s hunting program and encourages use of the Hunter Assistance Service.

Recommendations for the 2019 Hunter Assistance Service

Overall, the 2018 Hunter Assistance Service accomplished the goals set in 2017. Operations ran efficiently and effectively as many sportsmen were greatly benefited by the Service. However, without a temporary employee to assist with contacting landowners, hunters were at a disadvantage this year when trying to find last-minute private land hunting opportunities. The following recommendations are offered to further refine and improve operations:

1. Consider using the Access Yes technician to assist with the Service. Time should be spent by this employee prior to the season contacting landowners to generate the initial hunting lists and re-doing maps as needed. Following the opening of local hunting seasons, time should also be dedicated to data summaries and report preparation. Clearly this project has proven to be of great benefit to the Department since there is no Game and Fish public office in Campbell County. The Visitor’s Center may request some form of compensation from the Department in future years now that it is under new management, considering the time spent by permanent staff, use of the facilities, and the savings provided to Department personnel time.
2. Department staffing by local permanent personnel is still needed early in the season to help train temporary and Visitor’s Center personnel. The presence of personnel helps greatly with answering hunter questions, as the beginning of the hunting seasons is the most congested time for the Visitor’s Center. The addition of a Sheridan WGFD staff member the weekend prior to opening day and over the first week of October is a great benefit and provides faster service to hunters with questions that Visitor’s Center staff may not be capable of answering.
3. Continue the sale of BLM and USFS maps at the Visitor’s Center. The availability of maps is well-received by hunters, and they consistently comment that they appreciate it each year. Providing maps for sale at the Visitor’s Center should be a top priority, so that hunters do not need to leave and return again with their questions.
4. It is recommended that the Point-of-Sale (IPOS) license technology be included as a resource for hunters at the Visitor’s Center. Sale of leftover licenses was very popular when it was offered in 2005 at the Visitor’s Center, and hunters who used this opportunity in 2005 mentioned that they appreciated the service and would like to see it offered again. Other hunters who were visiting the Service for the first time in 2016 inquired about whether they could purchase leftover licenses at the Visitor’s Center, along with their maps and other WGFD hunting documents. Offering improved “one stop shopping” rather than having to redirect hunters to a local license agent would greatly improve the efficiency of Hunter Assistance Service as a whole and would likely be very popular with visiting hunters.
5. The Department should continue to assist the Gillette News-Record with publishing the hunter information newsletter in 2019. These efforts greatly contribute to the effectiveness of the program and give hunters a head start by answering many common questions within the publication.

6. Update the display maps with new BLM maps as the maps become available. The new maps will include land ownership changes that are currently marked by hand on display maps. A new display map should be made at least every other year, as older maps become weathered and faded, and land exchanges need to be updated.
7. Disseminate information about the Service to landowners as much as possible prior to the 2019 hunting season. It has been noted that many local ranchers were unaware of the service, and it is not possible for the temporary staff of the Visitor's Center to contact all of the 500+ landowners in the region. Using direct letters or newsletters distributed to ranchers by the USDA and NRCS will facilitate communication and information between ranchers and the Department. The result will hopefully be an increase in participation by landowners in the Hunter Assistance Service program. Currently the visitor's center does not provide a list of landowners looking for hunters, as it was becoming difficult to accurately maintain.
8. Expand the availability of similar services to the towns of Sundance and Buffalo. Work with PLPW staff to set up large maps and public displays at accessible points in both Sundance and Buffalo. Staffing may not be immediately possible at these locations, but many questions can be answered with public displays that hunters can visit on their own. Consider working with USFS - Thunder Basin National Grasslands personnel to revamp the kiosk at Weston. The kiosk has been removed, although this would still be an excellent spot for information.