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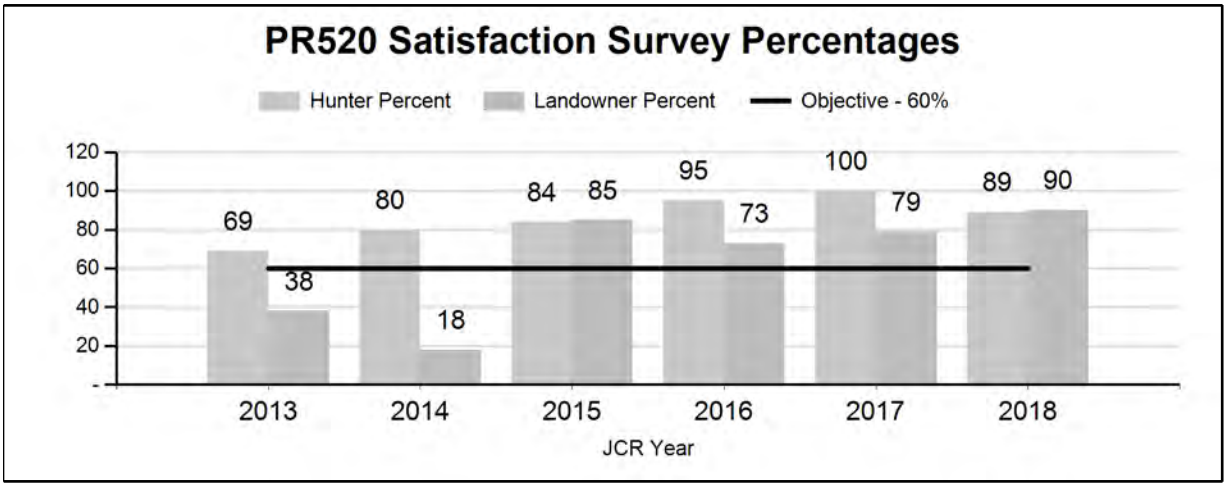
Acknowledgements

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

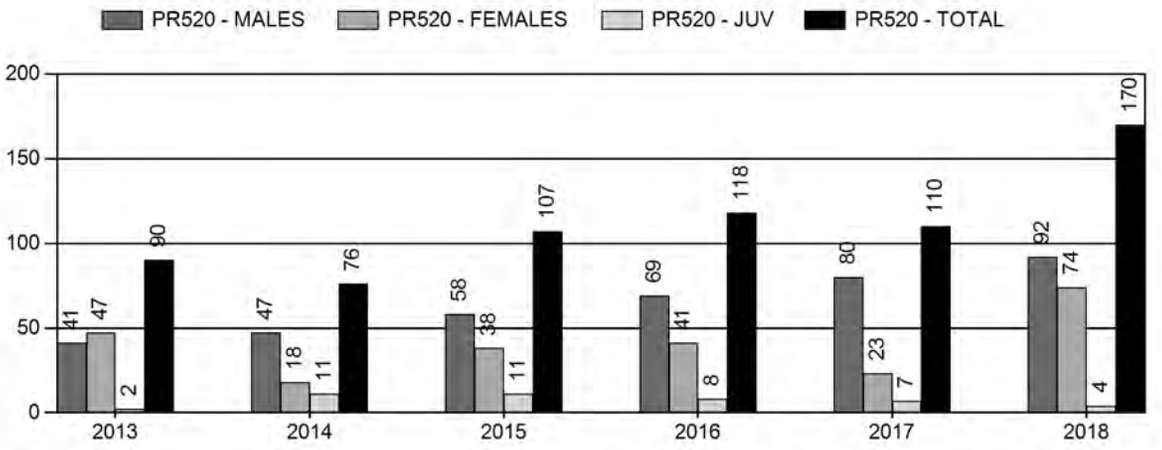
2018 - JCR Evaluation Form

SPECIES: Pronghorn
PERIOD: 6/1/2018 - 5/31/2019
HERD: PR520 - CHALK BLUFFS
HUNT AREAS: 111
PREPARED BY: MARTIN HICKS

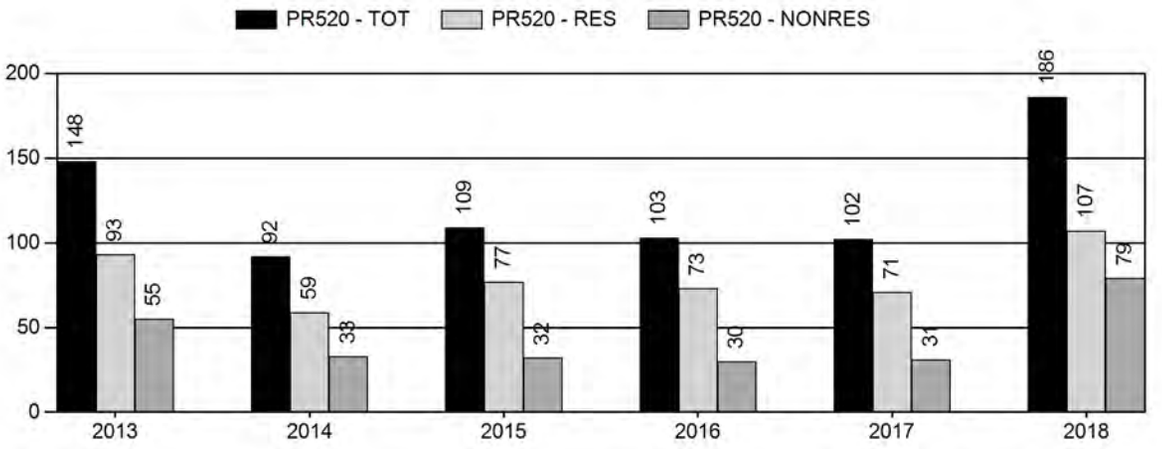
	2013 - 2017 Average	2018	2019 Proposed
Hunter Satisfaction Percent	85%	89%	85%
Landowner Satisfaction Percent	61%	90%	85%
Harvest:	100	170	150
Hunters:	111	186	180
Hunter Success:	90%	91%	83%
Active Licenses:	140	218	215
Active License Success:	71%	78%	70%
Recreation Days:	460	503	500
Days Per Animal:	4.6	3.0	3.3
Males per 100 Females:	26	67	
Juveniles per 100 Females	58	79	
Satisfaction Based Objective			60%
Management Strategy:			Private Land
Percent population is above (+) or (-) objective:			30%
Number of years population has been + or - objective in recent trend:			5



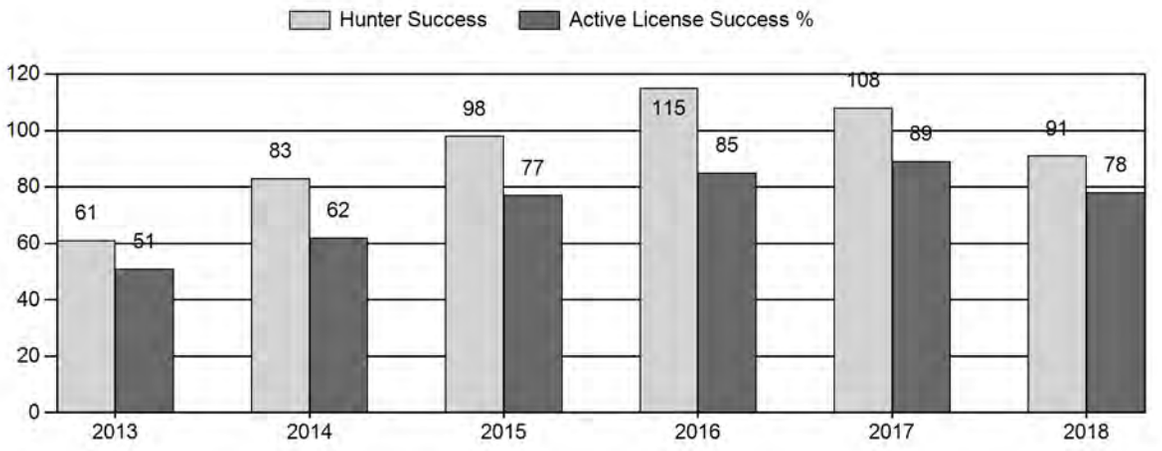
Harvest



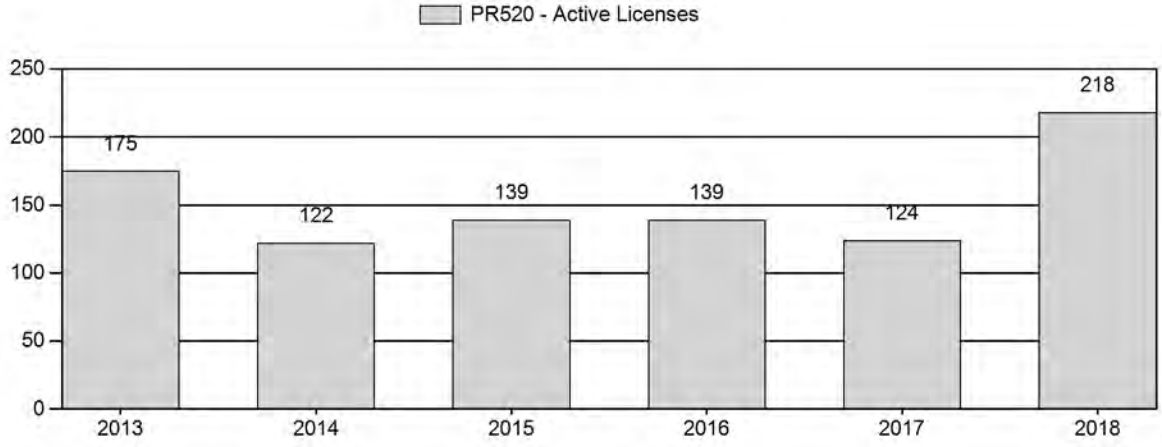
Number of Active Licenses



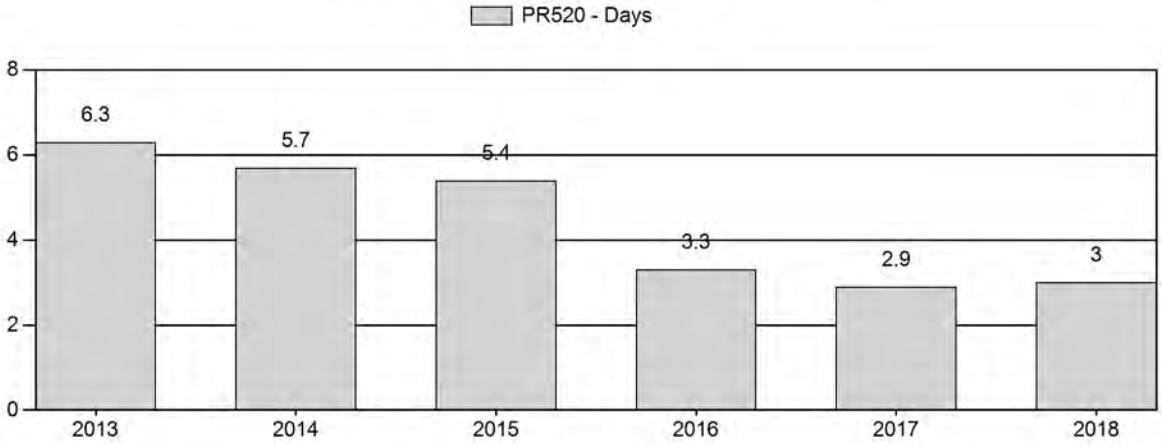
Harvest Success



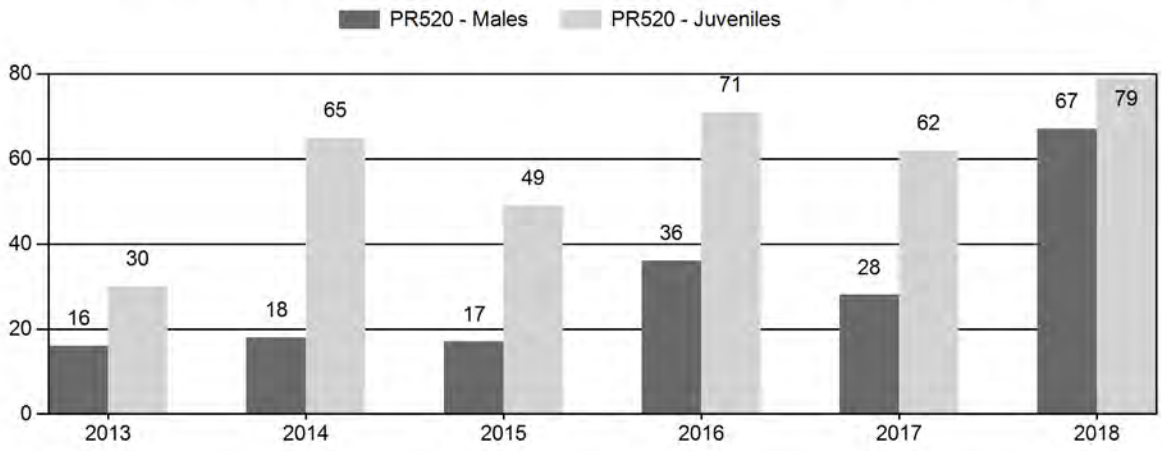
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR520 - CHALK BLUFFS

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	0	11	11	11%	69	68%	21	21%	101	357	0	16	16	± 0	30	± 0	26
2014	0	2	7	9	10%	49	54%	32	36%	90	0	4	14	18	± 0	65	± 0	55
2015	0	3	10	13	10%	75	60%	37	30%	125	283	4	13	17	± 0	49	± 0	42
2016	0	26	23	49	17%	138	48%	98	34%	285	367	19	17	36	± 0	71	± 0	52
2017	0	10	26	36	15%	129	53%	80	33%	245	367	8	20	28	± 0	62	± 0	48
2018	0	30	52	82	27%	122	41%	96	32%	300	313	25	43	67	± 0	79	± 0	47

2019 HUNTING SEASONS
CHALK BLUFFS PRONGHORN (PR520)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
111	1	Sept. 20	Oct. 14	150	Limited quota	Any antelope
111	1	Oct. 15	Dec. 31		Limited quota	Doe or fawn
111	6	Sept. 20	Dec.31	100	Limited quota	Doe or fawn
Archery		Aug. 15	Sept. 19			Refer to Section 3 in Antelope Regulations

Hunt Area	Type	Change from 2018
111	1	0
111	6	0
Herd Unit Totals	**1 & 6**	**0**

Management Evaluation

Current Hunter/Landowner Satisfaction Management Objective: Landowner and Hunter satisfaction; Target goal ≥ 60%
Management Strategy: Private land
2018 Hunter Satisfaction Estimate: 89%
2018 Landowner Satisfaction Estimate: 87% (28% response; minimum of 25% required)
Most Recent 5-Year Average Hunter Satisfaction Estimate: 89%; **3-Year:** 94%
Most recent 5-Year Average Landowner Satisfaction Estimate: 69%; **3-Year:** 80%

Herd Unit Issues

Historically, the management objective for the Chalk Bluffs Pronghorn Herd Unit was a numeric post-season population objective. Starting in the 2013 season, this was changed to a landowner and hunter satisfaction based objective with a private land management strategy. This change reflects public involvement during the 2013 herd objective review process. Currently, we do not generate a post-season population estimate for the following reasons: 1) open population with Colorado and Nebraska, 2) restricted access due to urban encroachment and industrial gas development, which constrains our ability to influence harvest, 3) herd unit comprised of predominantly private land. 4) poor classification data, which continues to be well below the adequate sample size and, 5) no reliable working model (i.e. low sample size for classification, no juvenile or adult mortality estimates, etc.). The expansion of oil, gas and rural development has become an increasing problem in the past 5 years. It appears this development shifted pronghorn movement and habitat occupation.

Weather
Weather in this herd unit was relatively normal during the past bio-year. Precipitation amounts were average at all elevations throughout southeast Wyoming during spring months, then became dry and hot from July through November, which is the typical pattern. For specific meteorological information for the Chalk Bluffs herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat
Forage availability was most likely similar to past years with average spring precipitation. Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500'. Its presence ties the hands of habitat managers limiting habitat enhancement options, and may result in reduced carrying capacities of rangelands if it is the predominant specie. This herd unit is comprised of a mix of native rangelands, CRP, dryland and irrigated croplands.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality. Consequently this data should not heavily influence population management for any particular big game species.

Field Data
Due to our inability to adequately collect field data (i.e. classification data) for this herd, there is little confidence in age/sex ratios derived from classification data. The number of pronghorn classified each August is always well below the adequate sample size needed to generate a reliable population estimate. Typically, the majority of the Chalk Bluffs pronghorn herd remains in Colorado during survey time, so it is difficult to infer any population parameters. Managers will continue to primarily utilize classification data to provide hunters anecdotal information (e.g. distribution, buck quantity and quality) for the upcoming hunting season, but not to establish a population estimate.

In the adjacent Hawk Springs Herd Unit, fawn ratios in 2018 were slightly below the 5-year average, but well below levels needed to sustain a population. The Hawk Springs herd has experienced a decrease in the population, and it is expected the same is true for the Chalk Bluffs herd unit. However, without a reliable population estimate, continued interstate movement with Colorado, and an increase in industrial and residential expansion, license numbers will remain relatively conservative, while continuing to provide opportunity for hunters.

Harvest Data
Type 1 license success in 2018 (81%) decreased compared to 2017 (93%), and was above the 5-year average of 75%. Effort in 2018 for the Type 1 license (3.1 days/harvest) was similar to 2017 (2.8 days/harvest), but well below the 5-year average of 4.9 days/harvest. The increase in Type 1 hunter success and decrease in hunter effort was most likely the result of increased pronghorn movement from Colorado into Wyoming.

Type 6 license success in 2018 (74%) was similar to 2017 (75%), but significantly higher than the five-year average (68%). Type 6 license effort in 2018 (2.7 days/harvest) was slightly lower than 2017 (3.4 days/harvest), significantly lower than the five-year average (4.4 days/harvest).

There could be several possibilities for the increase in overall hunter success and decreased effort required to harvest: 1) the population increased, and/or 2) there was increased movement into Wyoming from Colorado, and/or 3) landowner's may have provided increased access, and/or 4) hunters may have waited later in the season (Nov/Dec) to harvest, presumably when increased numbers of pronghorn moved into Wyoming from Colorado and access was easier to obtain.

Management Summary

Hunters and landowners (Appendix A) are satisfied with current pronghorn numbers and as a result there will not be any changes for the 2019 season. Based on harvest data from past seasons, we predict a 2019 harvest of 85 bucks, 60 does, and 5 fawns, for a total harvest of 150 pronghorn.

Appendix A

QUESTIONS 8

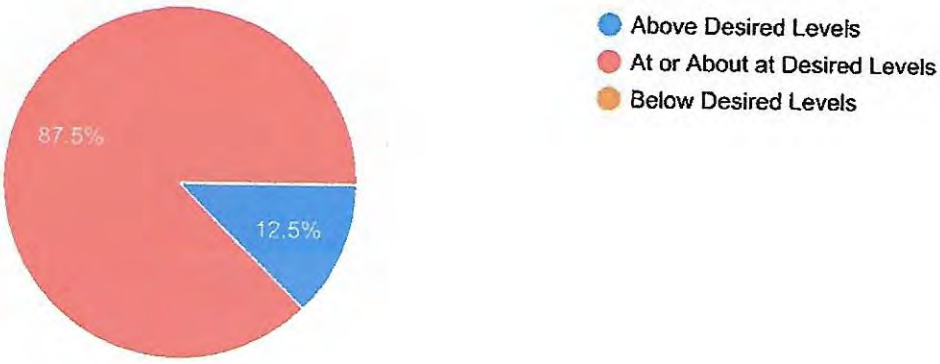
8 responses

SUMMARY | INDIVIDUAL

Accepting responses

lease indicate your level with the current pronghorn population

responses



omments

response

Very few goats and few hunters which is good as I can't redeem my coupons any more anyway and to the fact I have no desire to be registered vendor for the State of Wyoming just so I can sash in a wildlife coupon.

2018 - JCR Evaluation Form

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

HERD: PR521 - HAWK SPRINGS

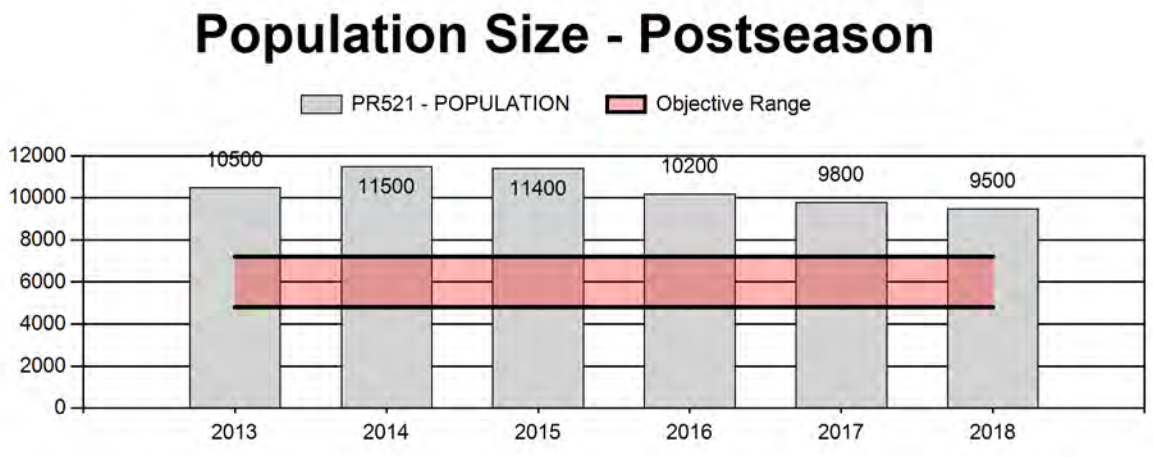
HUNT AREAS: 34
PREPARED BY: MARTIN HICKS

	2013 - 2017 Average	2018	2019 Proposed
Population:	10,680	9,500	8,800
Harvest:	1,147	1,107	1,100
Hunters:	1,373	1,248	1,250
Hunter Success:	84%	89%	88 %
Active Licenses:	1,452	1,320	1,320
Active License Success:	79%	84%	83 %
Recreation Days:	4,784	3,757	3,700
Days Per Animal:	4.2	3.4	3.4
Males per 100 Females	45	47	
Juveniles per 100 Females	51	44	

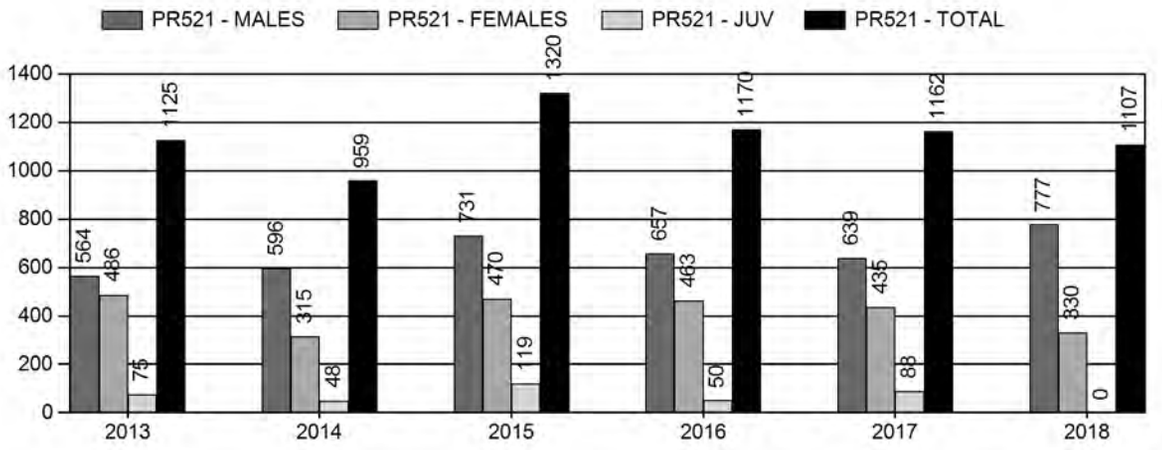
Population Objective (± 20%) :	6000 (4800 - 7200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	58%
Number of years population has been + or - objective in recent trend:	10
Model Date:	02/16/2019

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

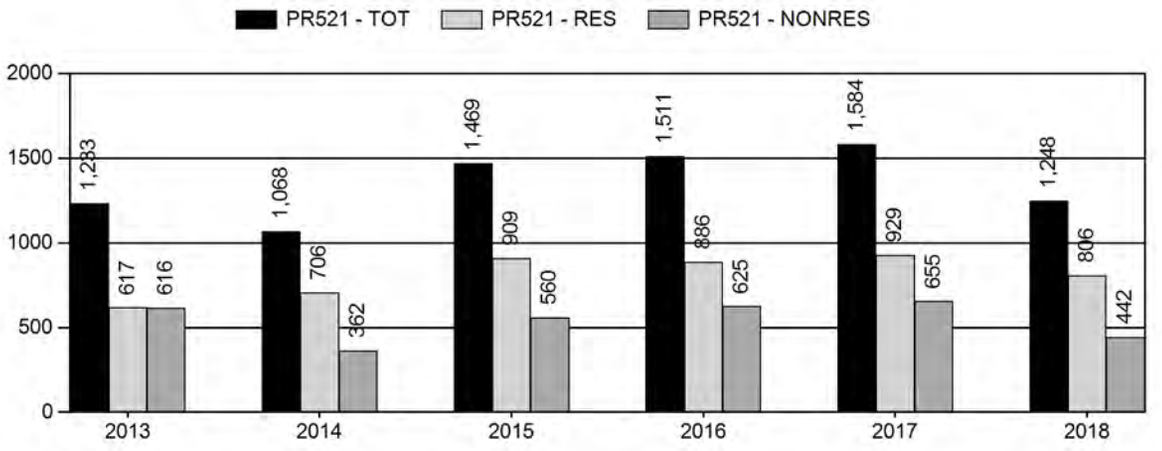
	JCR Year	Proposed
Females ≥ 1 year old:	6.3%	6.3%
Males ≥ 1 year old:	36%	39%
Total:	10%	11%
Proposed change in post-season population:	-5%	-8%



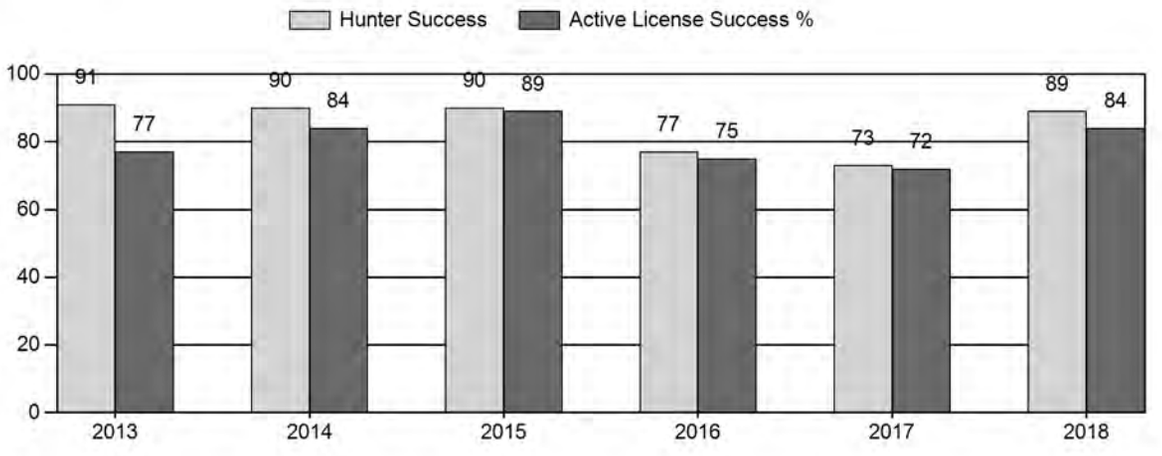
Harvest



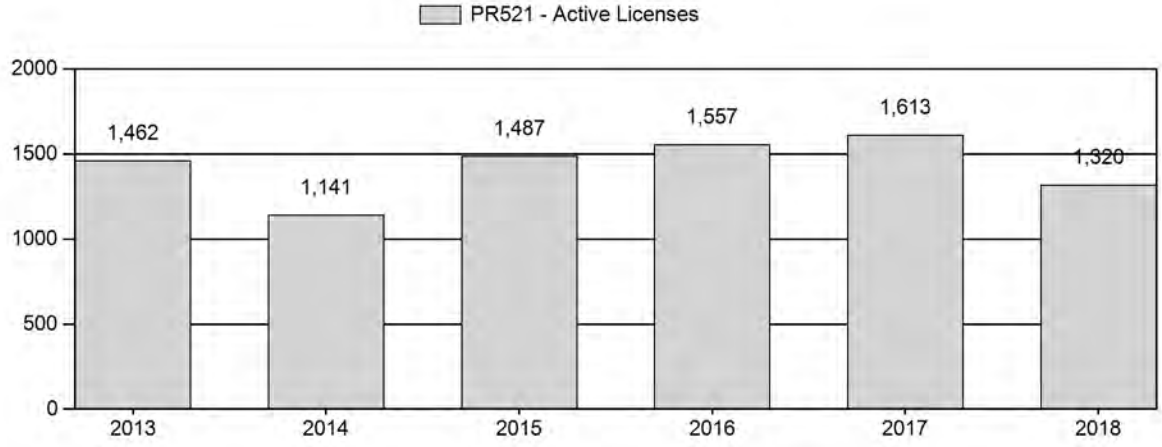
Number of Active Licenses



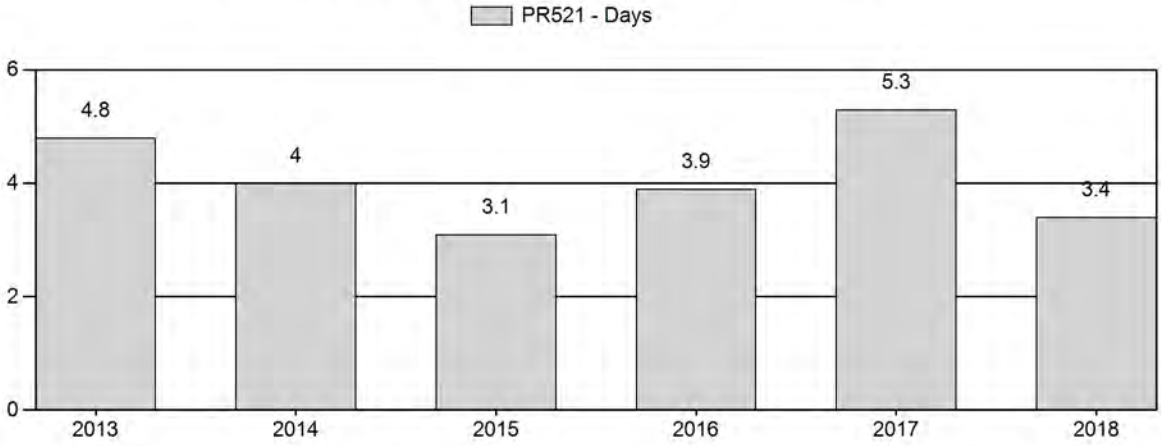
Harvest Success



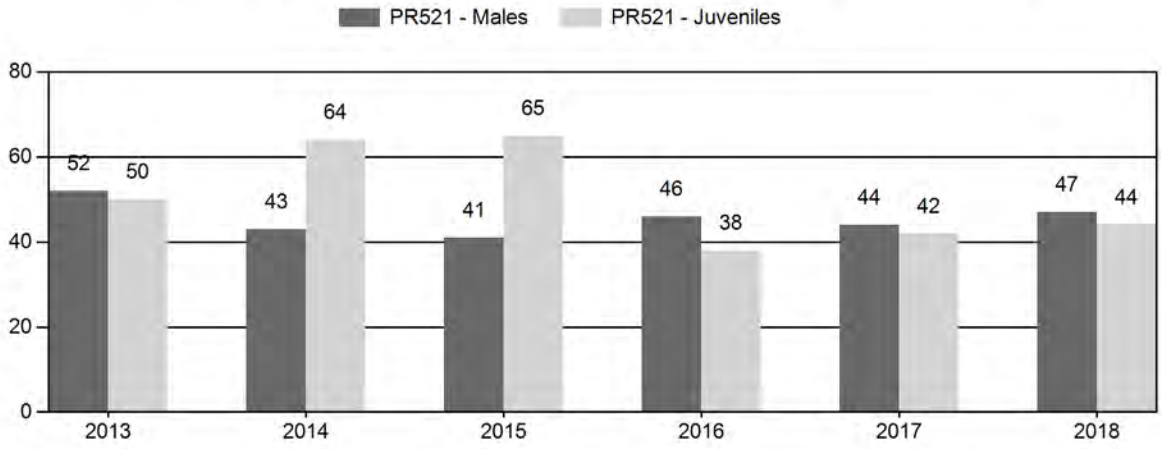
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR521 - HAWK SPRINGS

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	11,600	88	201	289	26%	558	50%	279	25%	1,126	1,184	16	36	52	± 6	50	± 6	33
2014	12,500	59	155	214	21%	498	48%	317	31%	1,029	1,151	12	31	43	± 6	64	± 7	45
2015	12,800	117	179	296	20%	729	49%	472	32%	1,497	1,849	16	25	41	± 4	65	± 6	46
2016	11,500	126	194	320	25%	696	54%	262	21%	1,278	1,243	18	28	46	± 5	38	± 4	26
2017	11,000	76	187	263	24%	603	54%	251	22%	1,117	1,409	13	31	44	± 5	42	± 5	29
2018	10,700	82	149	231	25%	490	52%	218	23%	939	1,227	17	30	47	± 6	44	± 6	30

2019 HUNTING SEASON
HAWK SPRINGS PRONGHORN HERD (PR521)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
34	1	Sept. 20	Oct. 14	1,000	Limited quota	Any antelope
	1	Oct. 15	Dec. 31			Doe or fawn
	6	Sept. 20	Dec. 31	700	Limited quota	Doe or fawn

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

Hunt Area	Type	Quota change from 2018
34	1	0
34	6	0
Total		**0**

Management Evaluation
Current Management Objective: 6,000 (4,800-7,200)
Management Strategy: Recreational
2018 Postseason Population Estimate: ~9,500
2019 Proposed Postseason Population Estimate: ~8,800
2018 Hunter Satisfaction: 80% satisfied, 16% Neutral, 4% Dissatisfied

Herd Unit Issues
The management objective for the Hawk Springs Herd Unit is a post-season population objective of 6,000 pronghorn. The objective was changed in 2014 from 7,000 to 6,000 and Hunt Areas 34-36 were combined into Hunt Area 34. These changes were a direct result of the herd unit objective review process in 2013. The management strategy is recreational management with a pre-season buck ratio range of 30-59 bucks:100 does.

The 2018 post-season population estimate was approximately 9,500 pronghorn after incorporating the 2018 end-of-the-year density estimated of 15,000 pronghorn, which was derived from the line-transect survey method. This puts the population well above the objective of 6,000 pronghorn and double the prior population estimate of 4,800. The quality of the line transect was subject based on the number of pronghorn misidentified in the A band but it did produce a percent coefficient of variation (CV) of 13.75. According to Guenzel (1997) CVs≤15% are considered good. However, given poor fawn production, poor habitat conditions, and loss of habitat this estimate is somewhat subject to interpretation and results should be taken

with caution. Population estimates for the five prior years were adjusted to account for the new density estimate.

The southern end of the herd unit along Interstate Highway 80 to U.S. Highway 85 has experienced an increase in urban and industrial development resulting in a decrease in usable habitat. The northern 2/3 of the unit is comprised of dryland farming, irrigated farming and land enrolled into the Conservation Reserve Program (CRP) and native rangeland. The majority of issues with landowners occur when there are high densities of pronghorn on irrigated and non-irrigated agricultural fields. This typically results in damage issues, which is the rationale behind the late season doe/fawn licenses.

A majority of this herd unit is comprised of private land (84%). Access is available through the Department's PLPW program and limited access to 350 square miles of state land.

Weather

Weather in this herd unit was relatively normal during the past bio-year. Precipitation amounts were average at all elevations throughout southeast Wyoming during spring months, then became dry and hot from July through November, which is the typical pattern. These patterns are starting to demonstrate a negative effect on fawn survival, based on pre-season classification surveys. Production in 2017 and 2018 was 21% and 16% below their respective five-year averages. For specific meteorological information for the Hawk Springs herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat

Forage availability was most likely similar to past years with average spring precipitation. Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500'. Its presence ties the hands of habitat managers limiting habitat enhancement options, and may result in reduced carrying capacities of rangelands if it is the predominant specie. This herd unit is comprised of a mix of native rangelands, CRP, dryland and irrigated croplands.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality. Consequently this data should not heavily influence population management for any particular big game species.

Field Data

The Hawk Spring Pronghorn Herd Unit has experienced a steady decline in population since 2014 as a result of increased harvest on the female segment of the population and average to below average fawn production (5-year average 44 fawns:100 does). Doe/fawn license issuance has fluctuated around 800 licenses for the past 5 years but were reduced by 100 to account for poor recruitment. The 2018 preseason buck ratio of 47 Bucks:100 Does was slightly higher compared to 2017 (44 Bucks:100 Does) and the 5-year average (45 Bucks:100 Does) and still within the upper recreational management range of 20-59 Bucks:100 Does. It was anticipated to see a decrease in yearling buck ratios in 2018 (17 Yearling Bucks:100 Does) based on poor fawn survival in 2017 but to the contrary they increased in 2018 when compared to 2017 (13 Yearling

Bucks:100 Does) and they were slightly higher than the five-year average of 15 Yearling Buck:100 Does. To accommodate observed buck ratios the model has been predicting adult survival rates on the upper level of the model's recommended range. For whatever reason once a fawn reaches one year of age they have a high probability of living to two years of age. Type 1 licenses remained at 1,000 for the 2018 season to take advantage of the surplus bucks. The sample size for field check tooth data collected in the field was too small to provide any relevancy for population parameters. Of the hunters surveyed in 2018, 80% were satisfied with their hunt, a slight increase from 2017's level of 77%. Based on comments in the field during the 2018 hunting season some hunters had a great hunt with no problem harvesting a pronghorn and other raised concerns about not enough pronghorn on accessible lands. This herd unit will continue to present problems for access as Southeast Wyoming's population expands.

Harvest Data

Active license success of 84% in 2018 increased compared to 2017 (72%) and the five-year average of 80%. Hunter effort of 3.4 days per harvest decreased significantly compared to 2017 (5.3 days per harvest) and was lower than the five-year average of 4.2 days per harvest. Access is still difficult to obtain in the southern portion of the herd unit. In the past, the Nimmo HMA and over several thousand acres of private land enrolled into walk-in areas has been enough to maintain adequate success. Trends in the harvest data, indicate there were more pronghorn available in 2018 than previous years. Given poor fawn production but high adult survival this may be somewhat of the case but probably more of a factor of pronghorn available on accessible lands, in other words they were in the right place at the right time.

Population

The "Constant Juvenile – Constant Adult Survival" (CJ,CA) spreadsheet model was chosen for the post season population estimate of this herd. Until survival data has been collected it will likely remain the model of choice. The 2018 end-of-the-year density estimate derived from Distance sampling provided somewhat of a new anchor point for the model, which simulates a population substantially higher than previously derived prior to the new LT estimate of 15,000 pronghorn. Even with the new population the model still predicts a decreasing trend since 2014; given poor fawn production from 3016-2018 and consistent harvest of around 450 doe pronghorn, this seems plausible. WGFD personnel observations indicate that pronghorn densities would support this trend, particularly the central and southern portions of the herd unit (basically old Hunt Areas 35 and 36). The model is trying to align with a slowly decreasing buck ratio which forces the model to simulate a decreasing population. With an increase in harvest and a decline in buck ratios this appears plausible. This model is ranked fair since the only data available is harvest and classification data and is trying to align with the 2018 line transect.

The 2018 line-transect calculated a density estimate of 15,000 pronghorn with a percent coefficient of variation (CV) of 13.75. According to Guenzel (1997) CVs$\leq$15% are considered good. Distance selected the Uniform Cosine Model after the A and B bands were combined to adjust for the high detection of the A band and the sudden drop to the B band. After this adjustment the shape of the histogram appears reasonable, with a "shoulder" near the line then somewhat declines. However, the line transect only met one out of the three basic assumptions to provide a reasonable population estimate (Buckland et al. 1993); distances and angles to

pronghorn were measured exactly, the other two assumptions it did not meet were pronghorn were seen on the line and pronghorn did not move before they were detected. Based on the high detection of the A band and sudden drop in the B band it was apparent that observers were misidentifying which band pronghorn were in as the plane flew over. This is somewhat concerning for the final estimate but by combining the A and B bands adjusts for the misclassification. The big question is whether the 300% increase in population is accurate? For managers that have been comfortable with a population running within the objective it is difficult to except. Managers continue to be surprised when LT estimates are greater than what the population was simulated regardless if POP II or the new Spreadsheet Model was used to simulate a population estimate. The question is how to manage the herd based on the new information. In this case, increasing licenses has already proven to be difficult based on the lack of access. For now we will do the best we can with what we know and what we can accomplish. By maintaining an adequate number of buck and doe licenses for the public which provides opportunity as well as addressing damage is the best we can do at this time to bring the population towards objective. A drastic increase in Type 1 and Type 6 licenses reduce success, increase effort, decrease hunter satisfaction, upset landowners and divide managers. A slow and steady approach to bring down the population is far more practical at this time to achieve management goals.

Management Summary

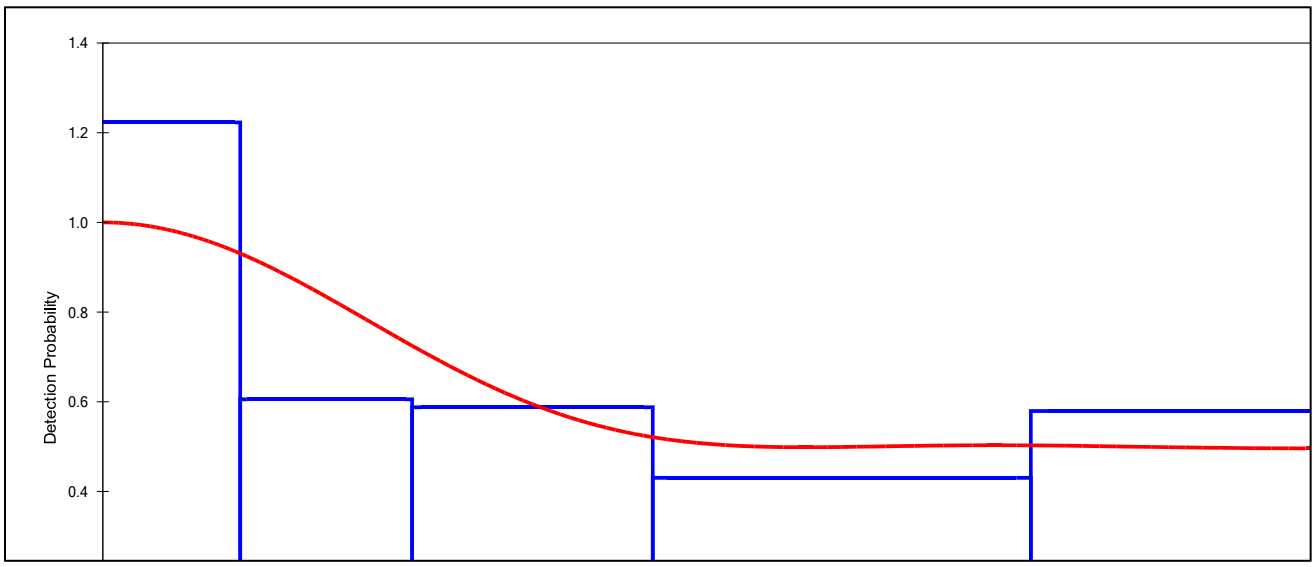
The 2019 season is designed to provide opportunity and slowly bring the population down towards objective. There will be 1,000 Type 1 and 700 Type 6 licenses available to achieve this goal. Given previous harvest rates and the 1,700 licenses available we expect to harvest approximately 1,100 pronghorn, resulting in a post-season population estimate of 8,800 pronghorn.

Literature cited:

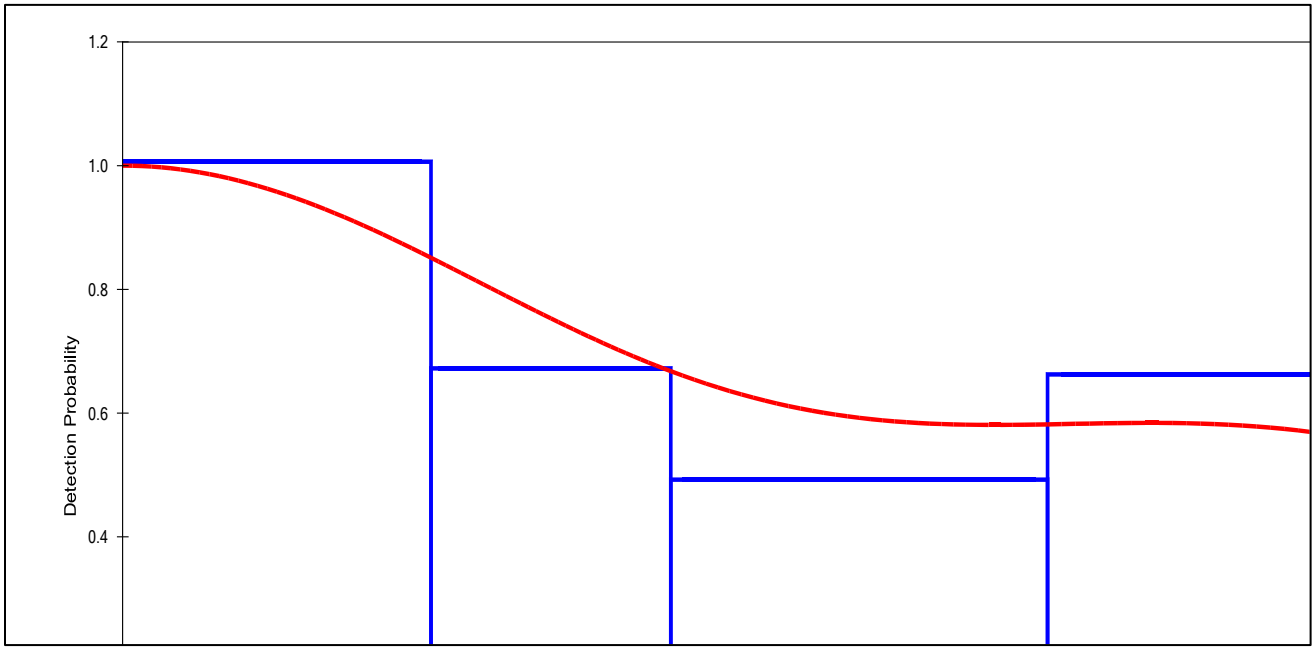
Buckland, S.T., D.R. Anderson, K.P. Burnham and J.L. Laake. 1993. Distance sampling: estimating abundance of biological populations. Chapman and Hall, New York. 446pp.

Guenzel, R.J. 1997. Estimating Pronghorn Abundance Using Aerial Line Transect Surveys. Wyoming Game and Fish Department, Cheyenne, 174 pp.

This is the best detection probability plot for the typical 5 distance intervals (Uniform Cosine model).



However, this model was selected to estimate the population. Band A and B were combined because of the high detection probability in the A band from above and the big drop to the B band (Half-normal cosine model).



Here are the estimates.

Point Parameter	Estimate	Standard Error	Percent Coef. of Variation	95% Percent Confidence Interval	
Density	5.6733	0.77994	13.75	4.3306	7.4323
Population Estimate	15,261	2098.0	13.75	11,649	19,993

2018 - JCR Evaluation Form

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

HERD: PR522 - MEADOWDALE

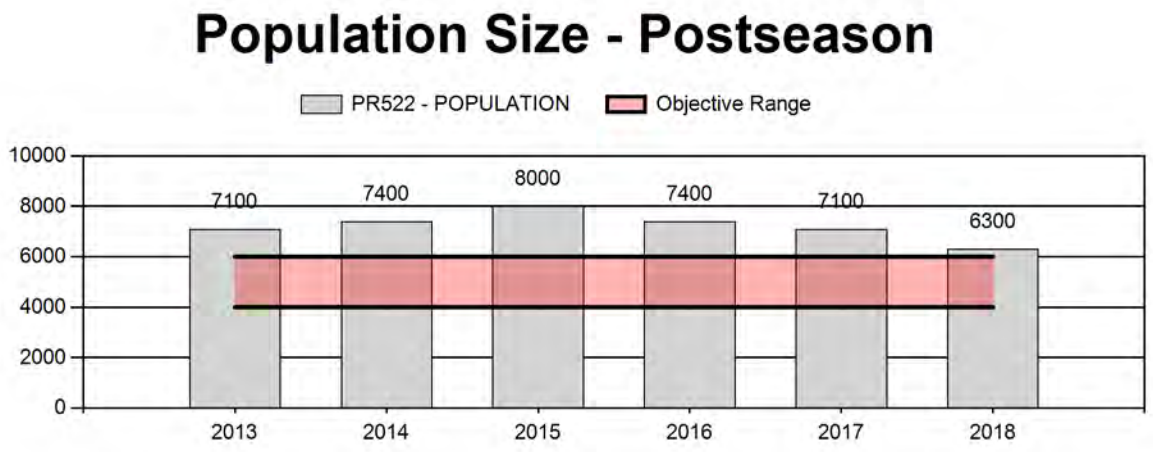
HUNT AREAS: 11
PREPARED BY: MARTIN HICKS

	2013 - 2017 Average	2018	2019 Proposed
Population:	7,400	6,300	6,200
Harvest:	487	826	785
Hunters:	553	900	900
Hunter Success:	88%	92%	87 %
Active Licenses:	607	958	950
Active License Success:	80%	86%	83 %
Recreation Days:	1,868	2,799	3,000
Days Per Animal:	3.8	3.4	3.8
Males per 100 Females	44	38	
Juveniles per 100 Females	57	36	

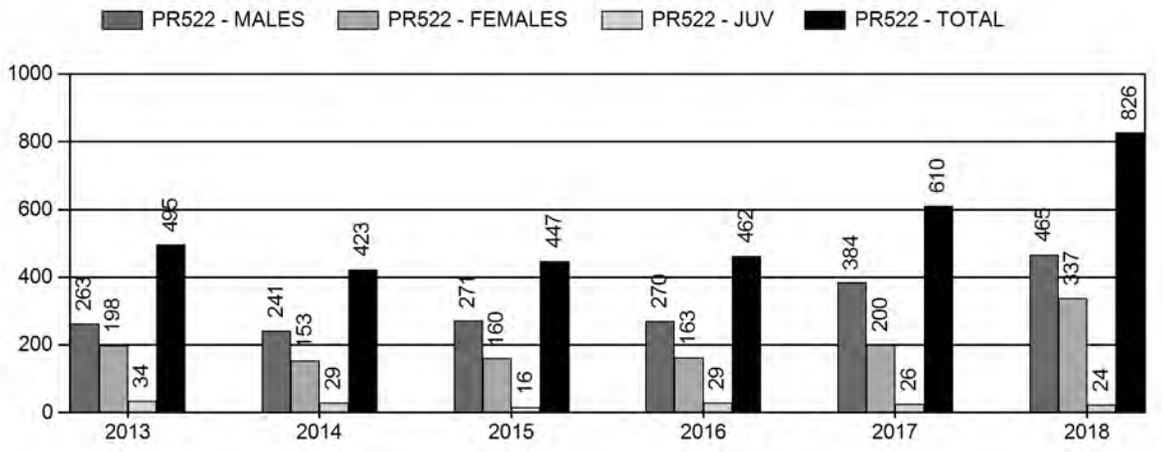
Population Objective (± 20%) :	5000 (4000 - 6000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	26%
Number of years population has been + or - objective in recent trend:	10
Model Date:	2/12/2019

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

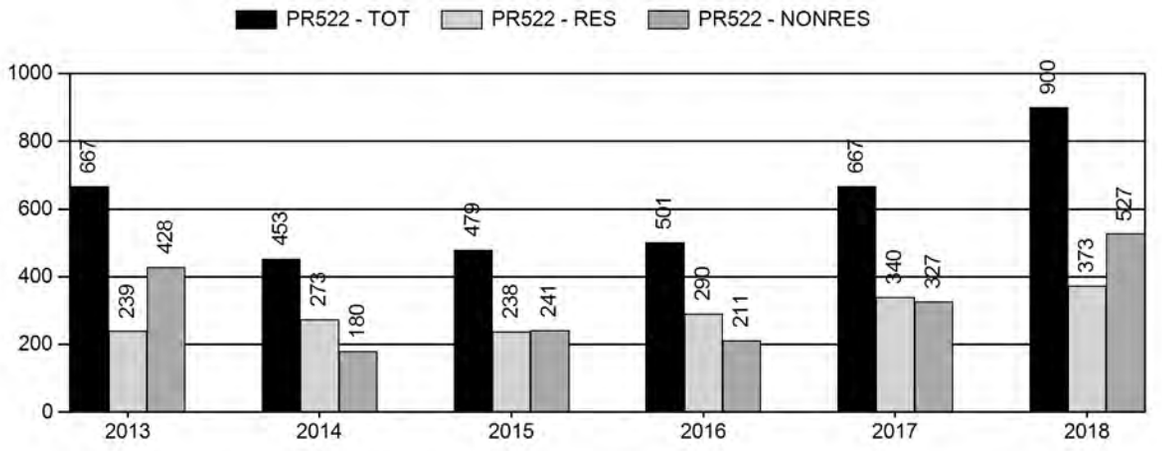
	JCR Year	Proposed
Females ≥ 1 year old:	9.1%	8.7%
Males ≥ 1 year old:	30.2%	36.7%
Total:	11%	11%
Proposed change in post-season population:	-12%	-4%



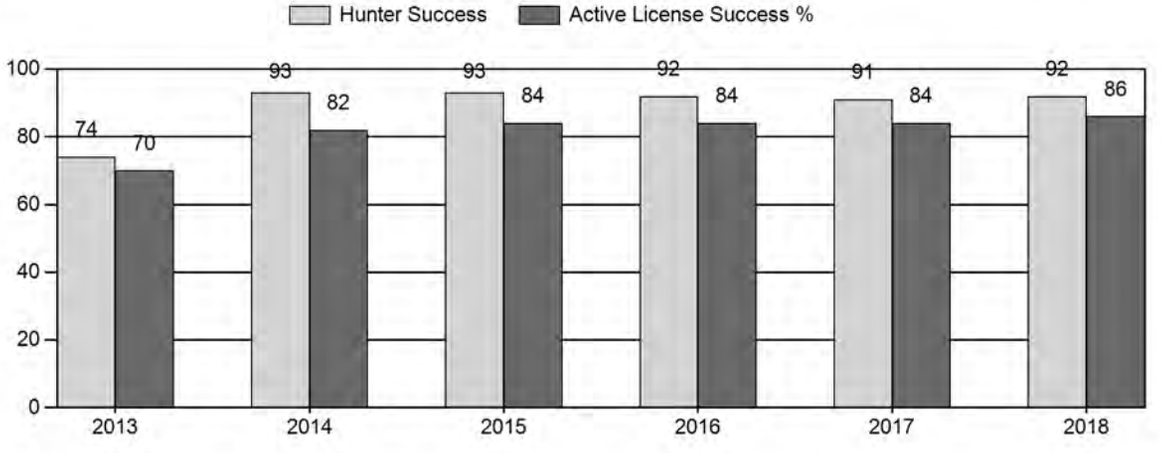
Harvest



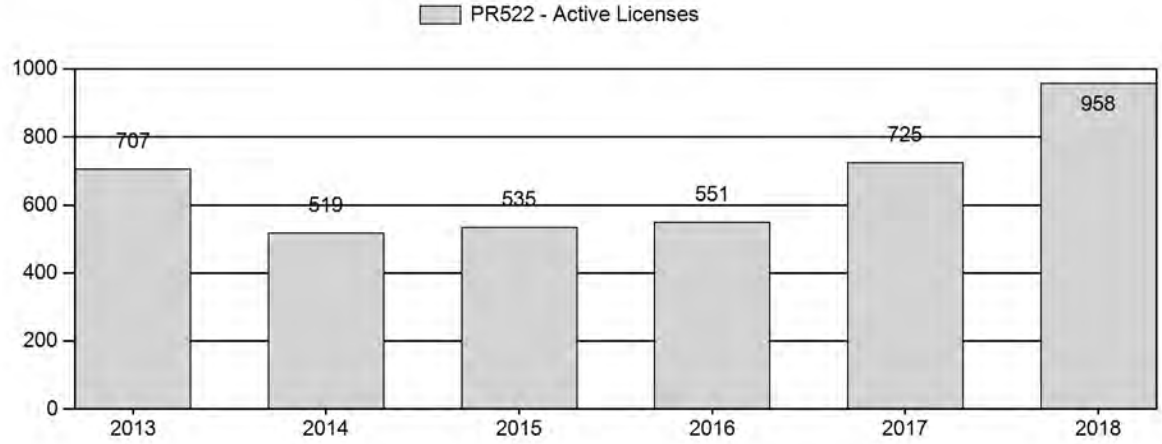
Number of Active Licenses



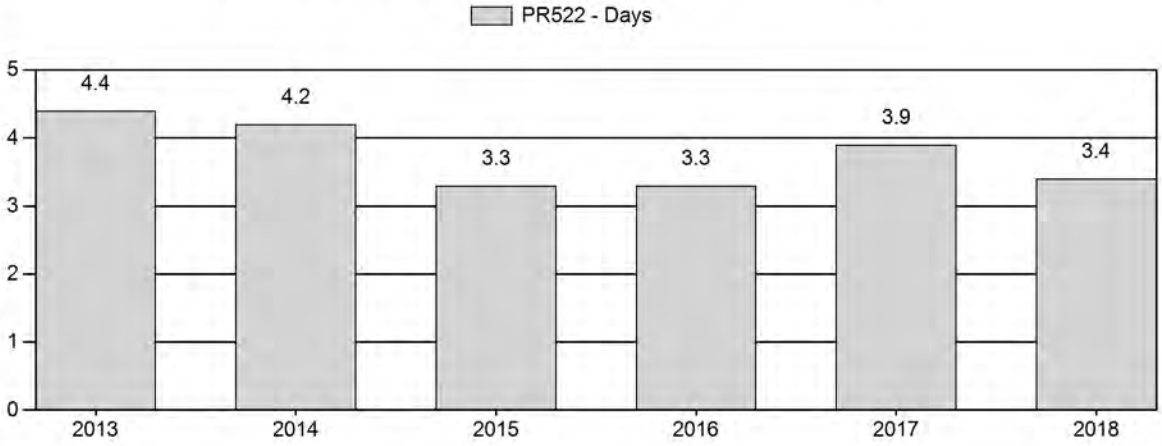
Harvest Success



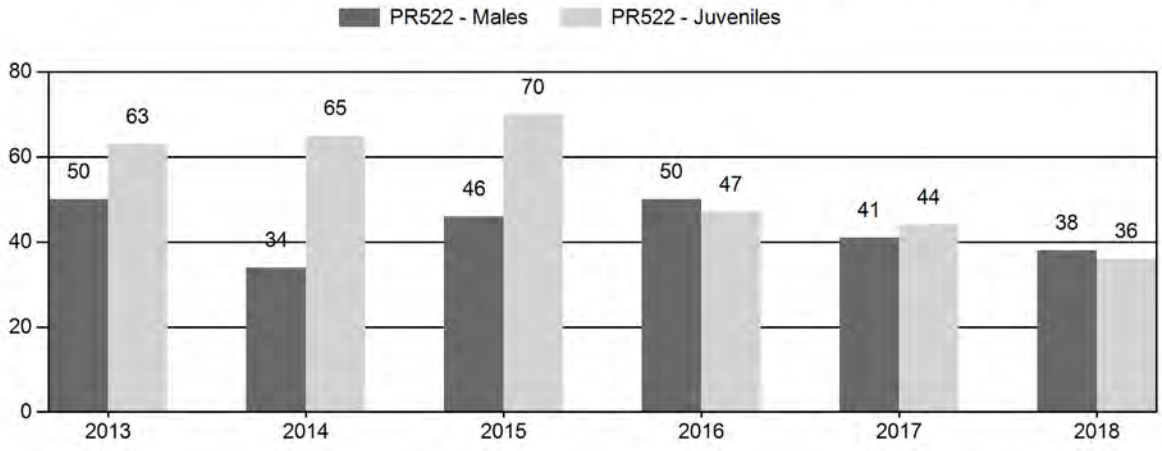
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR522 - MEADOWDALE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	7,600	60	139	199	23%	402	47%	252	30%	853	1,154	15	35	50	± 7	63	± 8	42
2014	7,900	49	169	218	17%	637	50%	411	32%	1,266	1,327	8	27	34	± 4	65	± 6	48
2015	8,400	104	165	269	21%	590	46%	412	32%	1,271	1,441	18	28	46	± 5	70	± 7	48
2016	7,900	142	251	393	25%	786	51%	368	24%	1,547	1,330	18	32	50	± 5	47	± 4	31
2017	7,800	48	158	206	22%	508	54%	223	24%	937	1,468	9	31	41	± 5	44	± 5	31
2018	7,200	56	150	206	22%	546	58%	197	21%	949	1,463	10	27	38	± 5	36	± 5	26

2019 HUNTING SEASONS
MEADOWDALE PRONGHORN HERD (PR522)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
11	1	Oct. 1	Oct. 31	550	Limited quota	Any antelope
11	6	Oct. 1	Oct. 31	400	Limited quota	Doe or fawn

Special Archery Season Hunt Areas	Opening Date	Closing Date	Limitations
11	Aug. 15	Sept. 30	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
11	1	0
11	6	0

Management Evaluation
Current Management Objective: 5,000 (4,000-6,000)
Management Strategy: Recreational
2018 Post-season Population Estimate: ~6,300
2019 Proposed Post-season Population Estimate: ~6,200
2018 Hunter Satisfaction: 81% Satisfied, 17% Neutral, 2% Dissatisfied

Herd Unit Issues
The management objective for the Meadowdale Pronghorn Herd Unit of 6,000 was decreased to 5,000 as a result of internal and public input received during the 2013 herd objective review process. The management strategy is recreational management, which is a 30-59 buck:100 doe range.

The 2018 post-season population estimate was approximately 6,300 pronghorn based on trying to simulate the population through the 2016 line-transect density estimate of 8,000. Previous population model estimates fluctuated around 5,000 pronghorn. In order to produce a reliable model the population was simulated for the past 15 years to include the previous line-transect that was completed in June of 2003, which resulted in an estimate of 5,800 pronghorn.

The northern portion of the herd unit continues to have the highest densities of pronghorn resulting in more acres of private lands enrolled into the Access Yes walk-in hunting program as well as landowners allowing access, particularly during the doe/fawn season.

Weather
Weather in this herd unit was relatively normal during the past bio-year. Precipitation amounts were average at all elevations throughout southeast Wyoming during spring months, then became dry and hot from July through November, which is the typical pattern. These patterns are starting to demonstrate a negative effect on fawn survival, based on pre-season classification surveys. Production in 2017 and 2018 was 22% and 37% below their five-year average respectively. For specific meteorological information for the Meadowdale herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat
Forage availability was most likely similar to past years with average spring precipitation. Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500'. Its presence ties the hands of habitat managers limiting habitat enhancement options, and may result in reduced carrying capacities of rangelands if it is the predominant specie. This herd unit is comprised of a mix of native rangelands, CRP, dryland and irrigated croplands.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality. Consequently this data should not heavily influence population management for any particular big game species.

Field Data
The Meadowdale population had been tracking around 7,500 pronghorn for the past 6 years. The 2016 line-transect density estimate of 8,000 suggests the population was higher than previously thought. To reflect how the population was performing, bio-years 2013-2018 were retrofitted to reflect the independent estimate derived from the 2016 end-of-the-year line transect. Since 2015 the population has been steadily declining as a result of poor fawn survival. Fawn production in 2016 (47 fawns:100 does), 2017 (44 fawns:100 does) and 2018 (36 fawns:100 does) was well below their respective five-year averages of 58, 56 and 58 fawns:100 does and well below levels needed to increase a population. Buck to doe ratios have fluctuated from a low of 34:100 to a high of 50:100 within the past 6 years. Above average fawn ratios in 2014 and 2015 help to increase buck ratios in 2015 and 2016, but the poor fawn production from 2016 to 2018 have resulted in fewer older age class bucks in the field in the coming years. As was evident given a recent decline in yearling buck ratios in 2017 (9 yearling bucks:100 does) and 2018 (10 yearling bucks:100 does) compared to their respective five-year averages of 14 and 13 yearling bucks:100 does. However, the data should be interpreted with some caution given the sample size was 36% below the 90% CI. During ground classification in August conditions were hot and dry with poor background cover which may explain the sudden decline in sample size. The sample size has been met only once out the past six years of surveys. Isolated hail events, along with average spring precipitation followed up by hot, dry conditions most likely resulted in an increase in fawn mortality.

Harvest Data
The 2018 active license success rate of 86 % was higher than the five-year average of 81%, and slightly higher than the 2017 success rate. Effort in 2018 was 3.4 days per harvest which was

lower than the five-year average of 3.8 days per harvest and the 2017 effort of 3.9 days per harvest. The recent 2016 line-transect density estimate indicates this population has increased by 40% since the last LT estimate in 2003. Harvest statistics (stable success and effort) for the past six years are somewhat supportive of the increase but there is concern on a continuous population decline if fawn survival does not increase. Harvest statistics for this herd unit can also be a reflection of limited access for the majority of the herd unit. The northern 1/3 portion of the herd does improve for access through the Department's Access Yes program but compared to other herd units in the western half of the state it is still very limited. License issuance did increase in 2018 in part on access opening up in the northern portion of the herd unit and buck ratios that were in the upper management level, which provided an additional 216 harvested pronghorn compared to 2017. The harvest rates on male pronghorn continue to increase as the population decreases in conjunction with poor fawn recruitment. Caution needs to be taken in the future that harvest rates do not exceed recruitment rates as seasons are set in 2020. The hunter satisfaction survey showed that 81% of the hunters were satisfied or very satisfied with their hunt, still within acceptable levels but a decline of 12% compared to 2017. Based on comments received from the field that densities appear to be decreasing in certain portions of the herd unit this is plausible.

Population

The "Constant Juvenile – Constant Adult Survival" (CJCA) spreadsheet model was chosen to use for the post-season population estimate of this herd and until there is survival data specifically for this herd unit will remain the model of choice. This model did have the lowest AIC score, the best fit and the population estimate appears reasonable. Line-transects (LT) were conducted in 1996, 1998, 2000 and 2003 and 2016. To have a better fit and more reliable population estimate the spreadsheet model was retrofitted to try and run through the 2003 and 2016 end-of-the-year line transect density estimate. Based on relatively consistent harvest regimes and classification surveys this population has been fluctuating around 7,500 pronghorn for the past 6 years. This model is ranked fair given it has 15 years of classification data and a LT that was done for the 2016 biological year. It is recommended to follow up with another LT within the next five years to improve population simulations and density estimates. The model also aligns well with male ratios. WGFD personnel, landowner and hunter observations indicate that pronghorn densities remain low in the southern portion of the hunt area and high in the northern portion.

Management Summary

The 2018 season is designed to maintain harvest on the female segment of the population to bring the population down and offer enough opportunity for the male segment of the population to maintain adequate buck ratios within the recreational parameters. Given previous harvest rates we expect to attain a harvest of around 785 pronghorn. We predict a 2019 post-season population estimate of 6,200 pronghorn, 24% above the objective of 5,000.

2018 - JCR Evaluation Form

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

HERD: PR523 - IRON MOUNTAIN

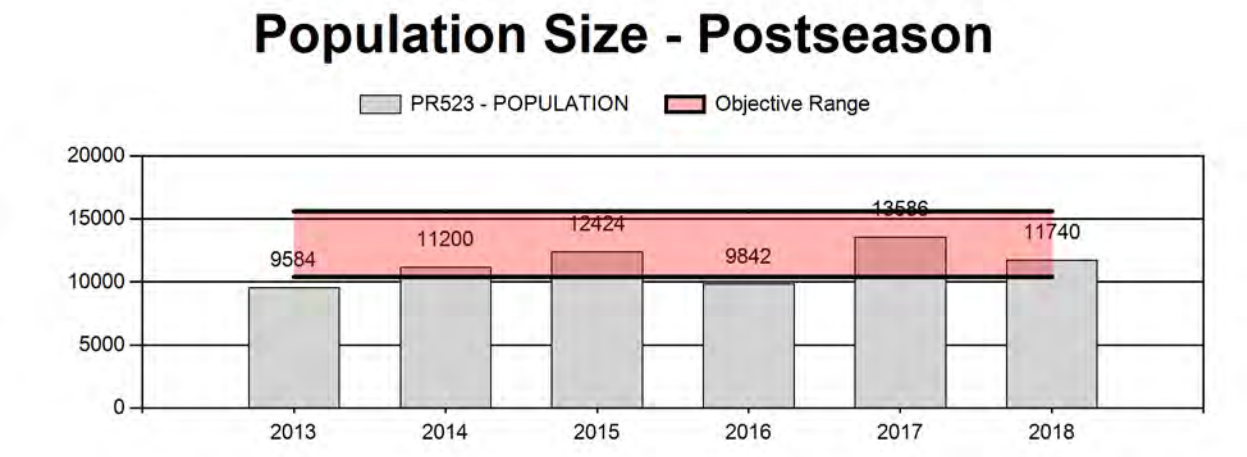
HUNT AREAS: 38
PREPARED BY: LEE KNOX

	2013 - 2017 Average	2018	2019 Proposed
Population:	11,327	11,740	11,184
Harvest:	1,535	1,233	1,220
Hunters:	1,758	1,565	1,500
Hunter Success:	87%	79%	81%
Active Licenses:	1,830	1,645	1,500
Active License Success:	84%	75%	81%
Recreation Days:	6,114	5,833	5,500
Days Per Animal:	4.0	4.7	4.5
Males per 100 Females	54	51	
Juveniles per 100 Females	68	53	

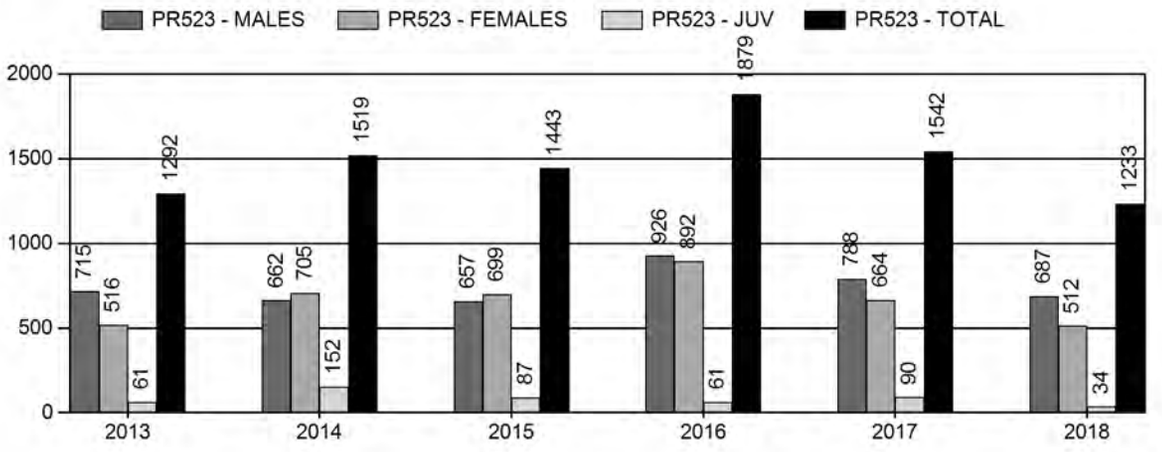
Population Objective (± 20%) :	13000 (10400 - 15600)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-9.7%
Number of years population has been + or - objective in recent trend:	1
Model Date:	2/4/2019

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

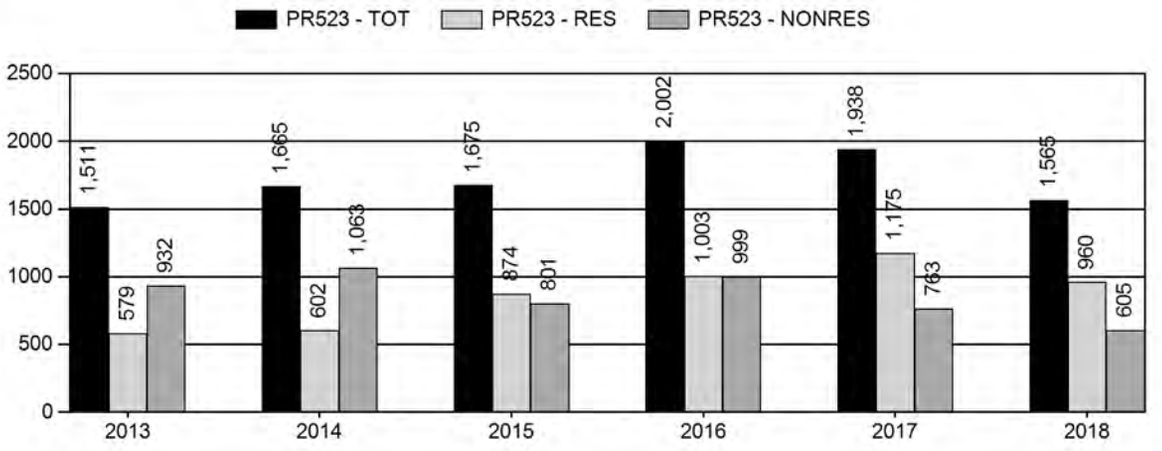
	JCR Year	Proposed
Females ≥ 1 year old:	8.8%	8%
Males ≥ 1 year old:	22%	27%
Total:	6%	6%
Proposed change in post-season population:	12%	5%



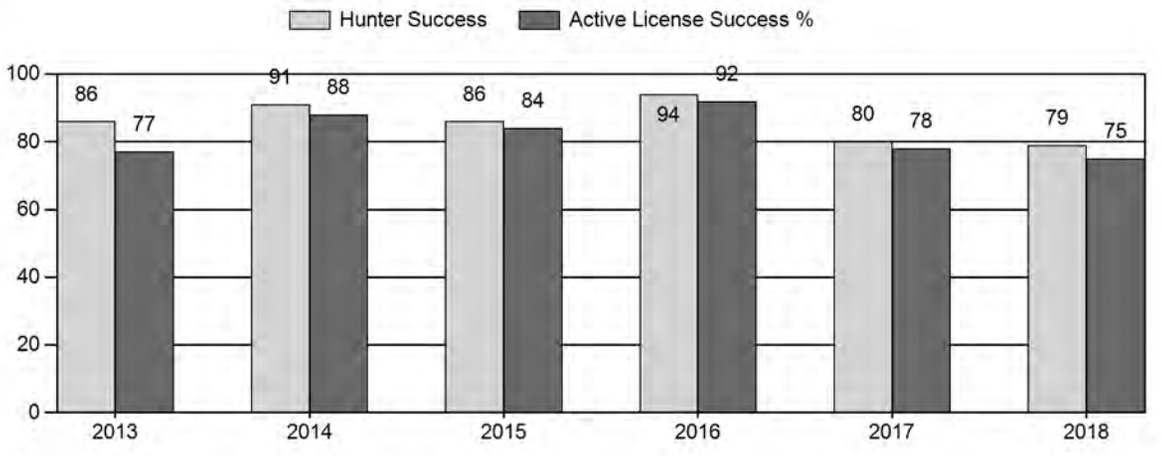
Harvest



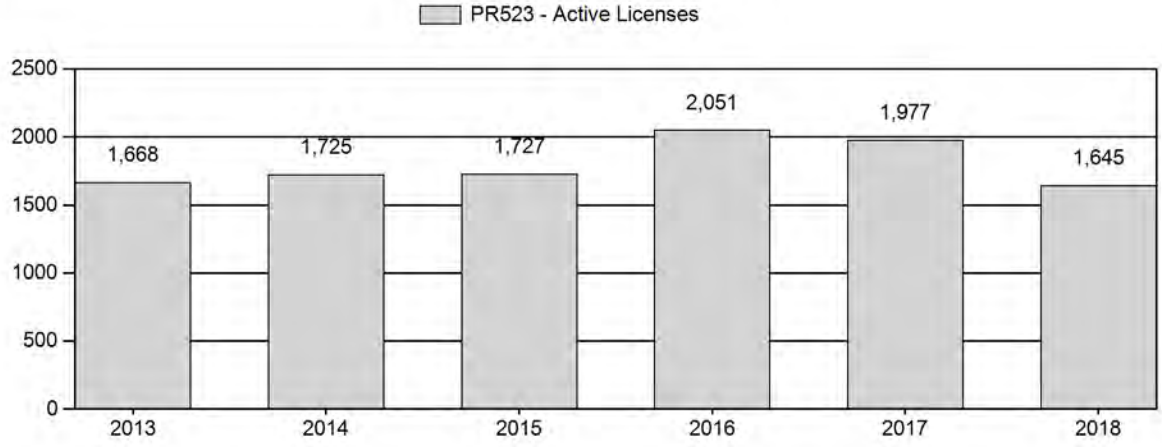
Number of Active Licenses



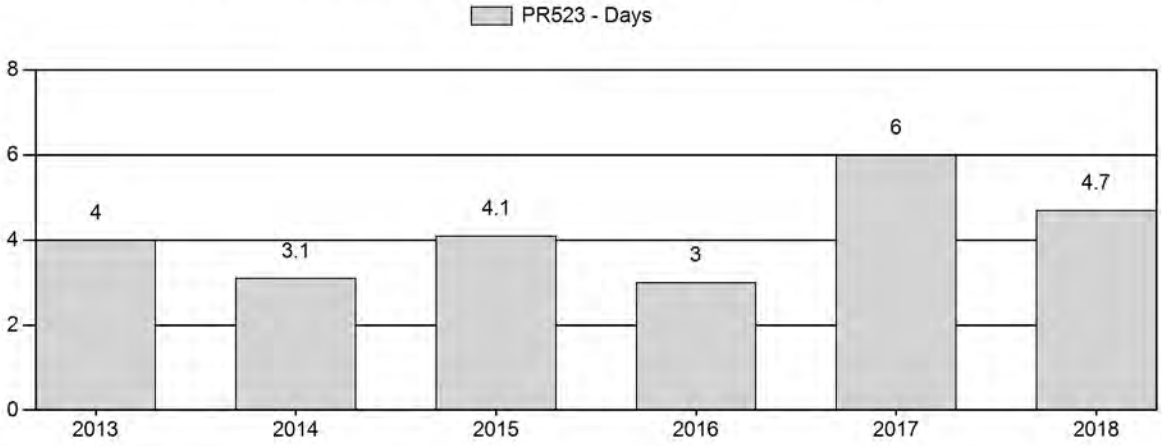
Harvest Success



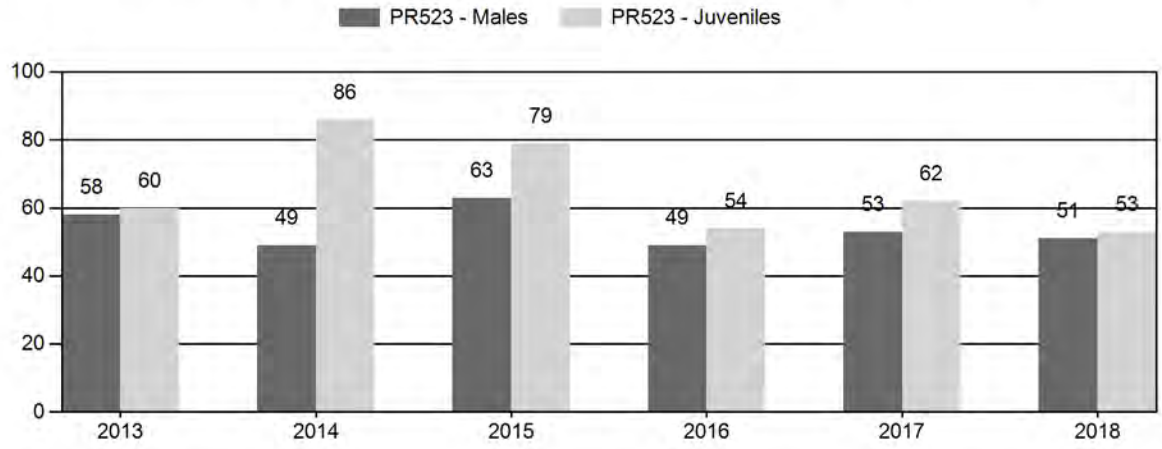
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2014 - 2018 Preseason Classification Summary

for Pronghorn Herd PR523 - IRON MOUNTAIN

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2014	12,870	145	276	421	21%	861	43%	737	37%	2,019	2,094	17	32	49	± 4	86	± 6	57
2015	14,011	212	217	429	26%	676	41%	536	33%	1,641	3,021	31	32	63	± 6	79	± 7	49
2016	11,909	162	259	421	24%	862	49%	463	27%	1,746	1,586	19	30	49	± 4	54	± 5	36
2017	15,282	157	387	544	25%	1,019	46%	630	29%	2,193	2,080	15	38	53	± 4	62	± 5	40
2018	13,100	142	296	438	25%	859	49%	451	26%	1,748	1,526	17	34	51	± 5	53	± 5	35

2019 HUNTING SEASONS
IRON MOUNTAIN PRONGHORN (PR523)

Hunt Area	Type	Date of Seasons Opens	Closes	Quota	License	Limitations
38	1	Oct. 5	Oct. 31	1,250	Limited Quota	Any antelope
	6	Oct. 5	Oct. 31	600	Limited Quota	Doe or fawn
		Nov. 1	Dec. 31			Unused Area 38 Type 1 and Type 6 licenses valid for doe or fawn
	Archery	Aug. 15	Oct. 4			Refer to Section 2 of this Chapter

Area	License Type	Quota change from 2018
38	6	-200
Herd Unit Total	**6**	**-200**

Management Evaluation
Current Postseason Population Management Objective: 13,000 (10,400-15,600)
Management Strategy: Recreational
2018 Postseason Population Estimate: 11,700
2019 Proposed Postseason Population Estimate: 11,200
2018 Hunter Satisfaction: 90% Satisfied, 6% Neutral, 4% Dissatisfied

The management objective for the Iron Mountain pronghorn herd unit is a post-season population of 13,000 pronghorn. The management strategy is recreational management that requires a pre hunt ratio of 30 to 59 bucks: 100 does.

Herd Unit Issues
The Iron Mountain pronghorn herd unit includes Hunt Area 38. The herd unit is predominately privately owned lands with traditional agricultural uses. Limited public access deterred hunters in the past, and licenses would go unsold. However, recently both resident and nonresident interest increased in hunting pronghorn Hunt Area 38, and licenses now sell out. The 2018 post-season population estimate was 13,700 with the population declining. We no longer conduct line transect surveys in this herd unit due to rugged terrain and erratic winds causing poor survey conditions.We are maintaining this herd at the current objective and management strategy based on internal discussions and conversations with our constituents. We evaluated and considered population status and habitat data included in this document and a change is not warranted at this time. We will review this herd objective again in 2024; however, if the situation arises that a change is needed, we will review and submit an updated proposal.

Weather

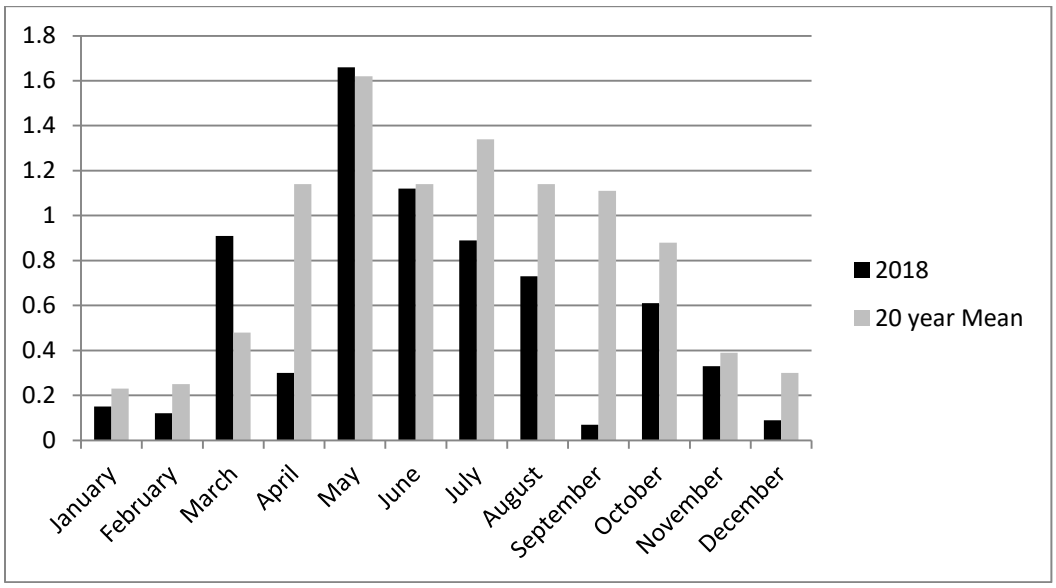


Figure 1**.** Monthly precipitation totals in inches for 2018 and the 20 year mean (1999-2019). Report was created at https://w2.weather.gov/climate/xmacis.php?wfo=cys using data collected at the Laramie Regional Airport.

Precipitation was similar to the 20 year mean during key growth periods for cool season grasses and preferred transitional range and winter range shrub species. While early season growing conditions were optimal, late summer and fall precipitation was lacking. The extreme cold and high winds experienced in early winter, as well as hot dry conditions in midsummer, likely increased the mortality in the younger cohort.

Habitat

Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500'. Its presence ties the hands of habitat managers limiting habitat enhancement options, and may result in reduced carrying capacities of rangelands if it is the predominant species.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality and consequently should not heavily influence population management for any particular big game species.

Field Data

A total of 1,748 pronghorn were classified, meeting the estimated classification sample size of 1,526. Fawn ratios declined in 2018 to 53:100 does, well below the 10 year average of 64:100 does. Fawn ratios have been very low for the past three years, especially on the eastern side of the herd unit, causing a noticeable decline in the population. The buck ratio remains high at

53:100 does, slightly above the 10 year average of 51:100 does. The hunter satisfaction survey showed an increase in hunter satisfaction by 6% from 2017 to 2018.

Harvest Data

Hunter success decreased again in both license types. Type 1 licenses decreased by 4% and type 6 licenses decreased slightly by 2 %. Hunter effort decreased by two days for type 6 licenses and one day in type 1 licenses. This herd has typically been a low priority area for resident hunters due to lack of public access and many of the licenses are purchased by nonresidents, typically 60% - 65% of the license holders. In 2018, nonresidents accounted for 39% of the licenses due to an increase in resident license holders, mainly in the Type 1 licenses. All licenses sold out in the draw, and have been for several years now. However, the percent of active licenses decreased by 10% from 2017 to 2018 for both license types, indicating hunters are having a difficult time finding pronghorn or getting access.

Population

The "Constant Juvenile – Constant Adult Survival Rate (CJCA)" spreadsheet model was chosen to use for the post-season population estimate of this herd. Because of issues with the herd data, the simplest model that relied on the fewest assumptions was determined to be the one that would provide the best population estimate. The model estimates the Iron Mountain pronghorn herd is declining. The 2018 post season population estimate is 11,700, and within 20% of the population objective. This is a poor model due to ratio data prior to 2000 being of poor quality, we are unable to survey the entire area, and we do not have adult and juvenile survival data for this herd unit. This model is not biologically defensible. We no longer conduct line transect surveys in this herd unit due to rugged terrain and erratic winds creating poor survey conditions.

Management Summary

The past 10 years, we have maintained a liberal license quota in the Iron Mountain herd unit to reduce the population to reach the desired objective. We cannot strictly rely on the model given it is of poor quality. We are seeing declines in hunter success and high hunter effort. Landowners report less pronghorn on their property. The east side of the herd unit provides the majority of the hunting opportunity and we have seen poor fawn ratios there the past three years. Type 6 doe fawn licenses will be decreased by 200 licenses to address the declining population. It is likely not enough to reverse the population decline, however given concerns with crop damage, it is as much as the landowners will allow. Type 1 license issuance will remain status quo, and we will maintain the extended season to address crop damage later in the year.

2018 - JCR Evaluation Form

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

HERD: PR524 - DWYER

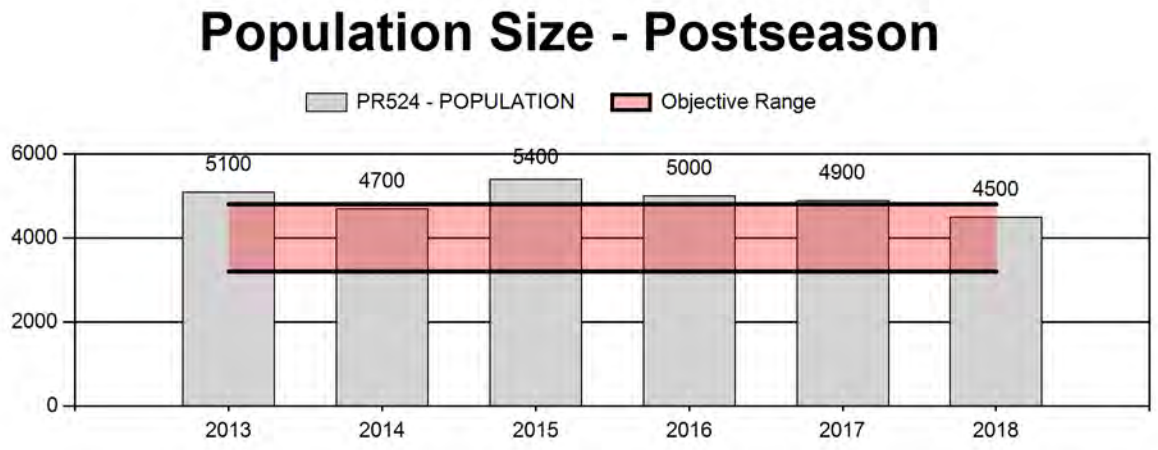
HUNT AREAS: 103
PREPARED BY: MARTIN HICKS

	2013 - 2017 Average	2018	2019 Proposed
Population:	5,020	4,500	3,500
Harvest:	615	787	785
Hunters:	673	833	830
Hunter Success:	91%	94%	95 %
Active Licenses:	746	903	900
Active License Success:	82%	87%	87 %
Recreation Days:	2,207	2,520	2,500
Days Per Animal:	3.6	3.2	3.2
Males per 100 Females	49	39	
Juveniles per 100 Females	44	53	

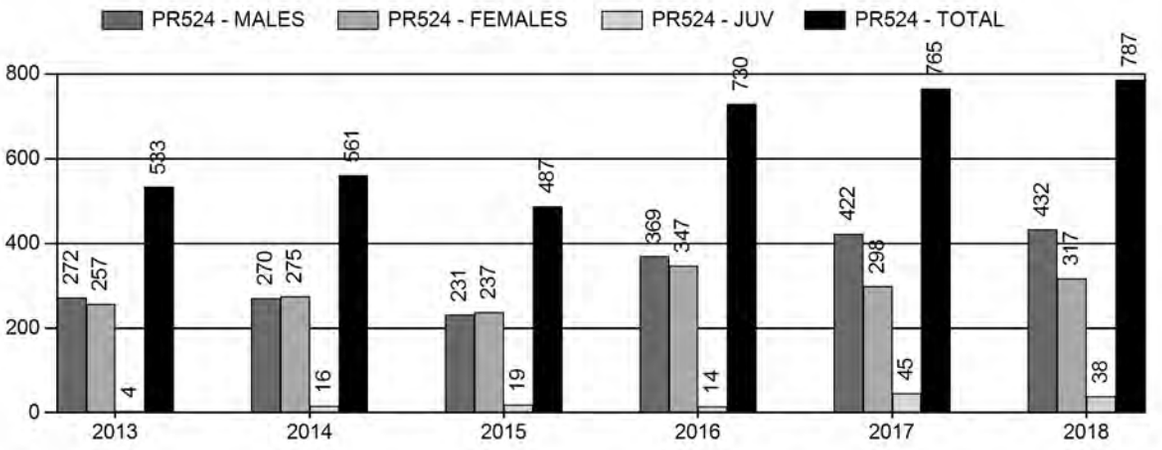
Population Objective (± 20%) :	4000 (3200 - 4800)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	12%
Number of years population has been + or - objective in recent trend:	10
Model Date:	02/14/2019

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

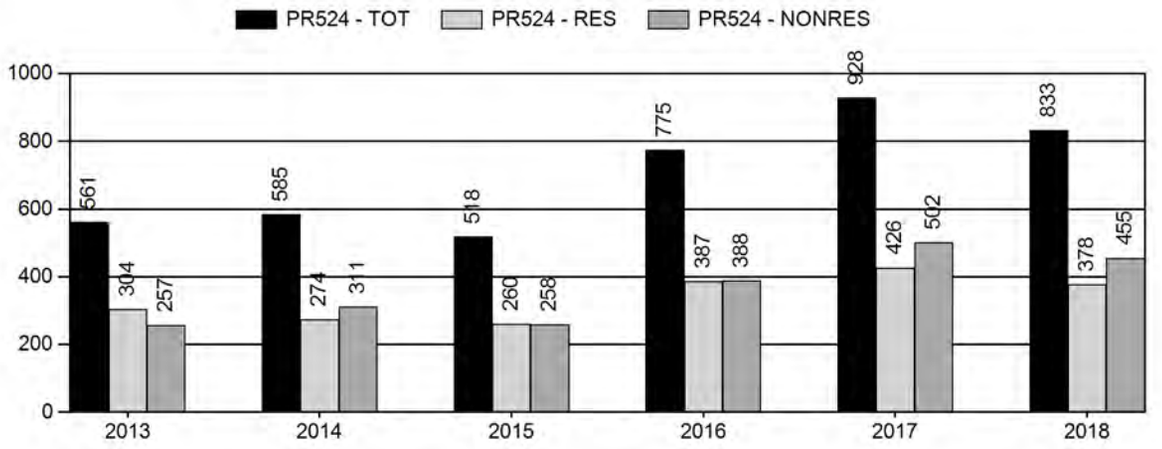
	JCR Year	Proposed
Females ≥ 1 year old:	13%	14%
Males ≥ 1 year old:	36%	46%
Total:	15%	17%
Proposed change in post-season population:	-9%	-25%



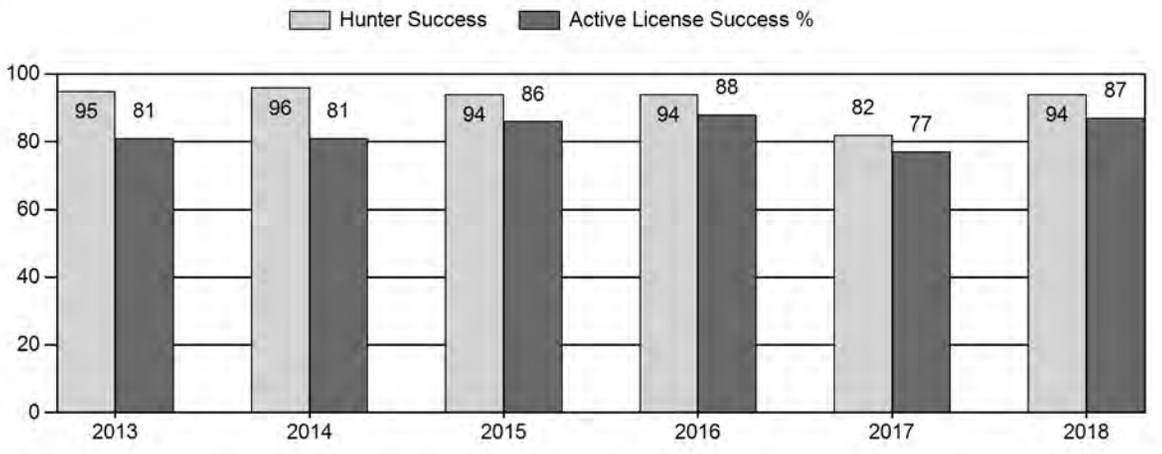
Harvest



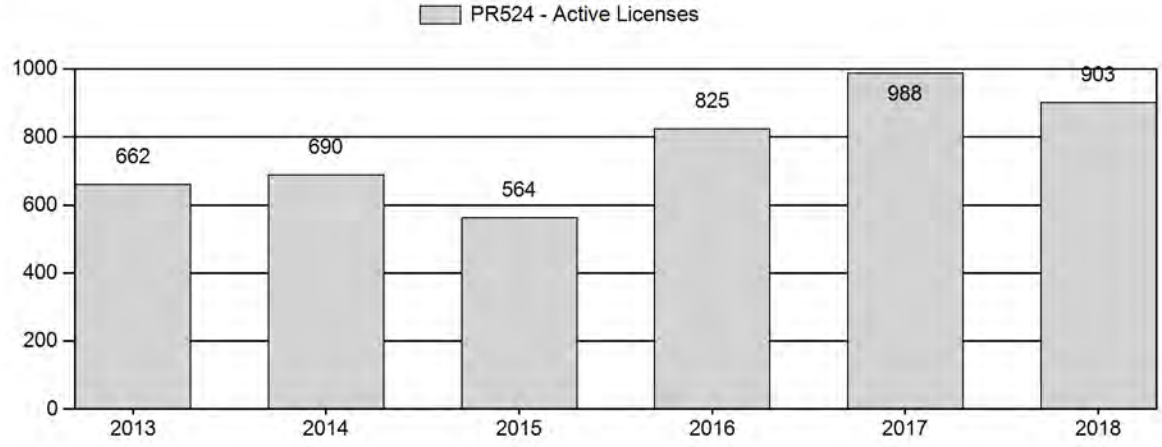
Number of Active Licenses



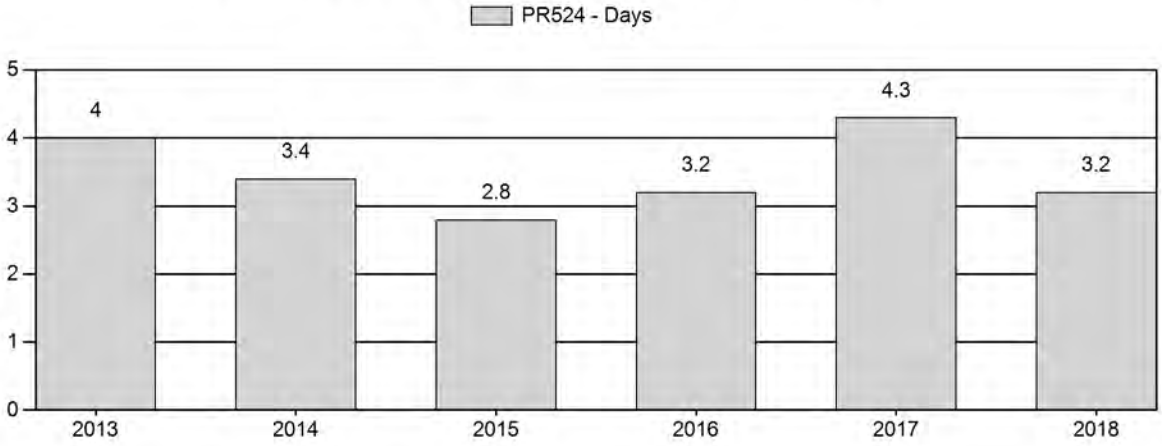
Harvest Success



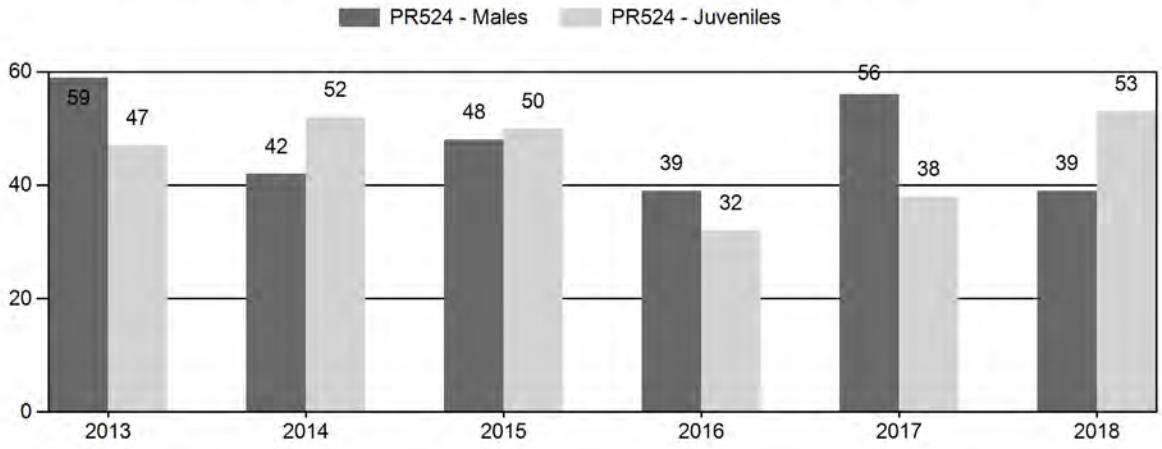
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR524 - DWYER

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	5,700	105	221	326	29%	552	49%	258	23%	1,136	1,146	19	40	59	± 6	47	± 5	29
2014	5,400	68	167	235	21%	566	52%	295	27%	1,096	1,362	12	30	42	± 5	52	± 5	37
2015	5,900	88	137	225	24%	466	50%	234	25%	925	1,091	19	29	48	± 6	50	± 6	34
2016	5,800	60	104	164	23%	416	58%	135	19%	715	1,257	14	25	39	± 6	32	± 5	23
2017	5,700	123	187	310	29%	553	52%	209	19%	1,072	1,072	22	34	56	± 6	38	± 5	24
2018	5,300	42	156	198	20%	503	52%	269	28%	970	1,044	8	31	39	± 5	53	± 6	38

2019 HUNTING SEASONS
DWYER PRONGHORN HERD (524)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
103	1	Oct. 5	Oct. 31	575	Limited quota	Any antelope
	6	Oct. 5	Dec. 31	450	Limited quota	Doe or fawn

Special Archery Season Hunt Areas	Opening Date	Closing Date	Limitations
103	Aug. 15	Oct. 4	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
103	1	0
103	6	0
Total		**0**

Management Evaluation
Current Management Objective: 4000 (3,200-4,800)
Management Strategy: Recreational
2018 Postseason Population Estimate: ~4,500
2019 Proposed Post-season Population Estimate: ~3,500
2018 Hunter Satisfaction: 81% Satisfied, 11% Neutral, 8% Dissatisfied

Herd Unit Issues
The management objective for the Dwyer Pronghorn Herd Unit is a post-season population objective of 4,000 pronghorn. The management strategy is recreational management with a 30-59 buck:100 doe ratio range. The herd objective and management strategy was reviewed in 2014 and to the decision was made to maintain the same population objective of 4,000 pronghorn and maintain recreational management. The herd objective was reviewed in 2019 and there were no changes.

There has been little urban and industrial development within this herd unit. The herd unit is comprised of 90% private land and some accessible state land. Land use is comprised of native range land, irrigated and dry land agriculture fields, and land enrolled into the Conservation Reserve Program (CRP). The majority of access is in the northern portion of the herd unit via the PLPW program and private land opened up address damage situations.

Weather
Weather in this herd unit was relatively normal during the past bio-year. Precipitation amounts were average at all elevations throughout southeast Wyoming during spring months, then became dry and hot from July through November, which is the typical pattern. These patterns

are starting to demonstrate a negative effect on fawn survival, based on pre-season classification surveys. Production did increase in 2018, however, it was still well below levels needed to increase a herd. For specific meteorological information for the Hawk Springs herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat
Forage availability was most likely similar to past years with average spring precipitation. Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500'. Its presence ties the hands of habitat managers limiting habitat enhancement options, and may result in reduced carrying capacities of rangelands if it is the predominant specie. This herd unit is comprised of a mix of native rangelands, CRP, dryland and irrigated croplands.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality. Consequently this data should not heavily influence population management for any particular big game species.

Field Data
Based on the 2014 line-transect density estimate of 5,400, the previous 5 years of population data was retrofitted to reflect population trends that are anchored to the 2014 end-of-the-year line-transect density estimate of 5,400 pronghorn. The model simulates a population that has experienced a steady decline since 2015. The sample size for pre-season classifications was met in 2017 but that was the only time in the previous 6 years, so herd composition data should be interpreted with caution. Fawn ratios have fluctuated around 45 fawns:100 does from 2013-2018, which is a level that does not grow a population. In 2018 fawn ratios (53 fawns:100 does) increased significantly from a low of 38 fawns:100 does in 2017, but still well below production needed to increase a herd. Buck ratios have fluctuated from a low of 39:100 to a high of 59:100 from 2013-2018 and are well within recreational management levels. In 2018 buck ratios (39 bucks:100 does) decreased compared to 2017 (56 bucks:100 does) and below the five-year average of 49 bucks:100 does. Buck ratios continue to fall within the recreation management range, which indicates that the fawns that do survive to adults have high survival rates. There is concern that as a result of consecutive years with poor fawn recruitment buck ratios will start to fall below recreational management levels. Once that happens Type 1 licenses will need to be adjusted, until then the prescribed number of Type 1 licenses does not appear to be reducing opportunities for hunters. Sample size for tooth data collected in the field is too small to infer any population dynamics.

Harvest Data
Active license success (87%) in 2018 increased compared to 2017 (77%) and the five-year average (83%). Effort (3.2 days per harvest) decreased compared to 2017 (4.3 days per harvest) and slightly decreased compared to the five-year average of 3.5 days per harvest. Based on field conversations, hunters had a difficult time finding pronghorn on accessible lands. Typically they would concentrate along Fish Creek which has the largest amount of public access, but in 201 they appeared to have been redistributed to irrigated fields to the south, which have limited

access. So the improvement in harvest statistics was somewhat surprising. Satisfaction remained the same compared to 2017 at 81%.

Population
The "Time Specific Juvenile- Constant Adult Survival" (TSJ, CA) spreadsheet model was chosen over the simpler Constant Juvenile-Constant Adult (CJ,CA) model, and resulted in a post-season population of 4,500 pronghorn. The simpler CJ,CA model tries to run through the previous LT's and underestimates the 2014 LT density estimate by 1,000 pronghorn. By allowing for a variation in juvenile survival the TSJ,CA model runs through the 2014 LT and provides a plausible population estimate. The CJ,CA's AIC score was slightly lower than the TSJ,CA score, but the TSJ,CA has a better fit than the CJ,CA model. This model is ranked fair since it runs through one sample-based population estimate and has ratio data for all simulated years.

Management Summary
Buck ratios continue to fall within the recreational management level so there is no proposal to decrease the Type 1 license at this time. Previous harvest efforts on the female segment of the population coupled with poor fawn production warranted a decrease in Type 6 licenses in 2018 and it appears this same number will maintain the population within the objective range so a further reduction is not warranted at this time.

We are maintaining this herd at the current objective and management strategy based on internal discussions and conversations with our constituents. We evaluated and considered population status and habitat data included in this document and a change is not warranted at this time. We will review this herd objective again in 2024; however, if the situation arises that a change is needed, we will review and submit an updated proposal.

If the projected harvest of 785 pronghorn is attained coupled with normal fawn recruitment the pronghorn population will decrease to 3,500, 12% below the objective of 4,000.

2018 - JCR Evaluation Form

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

HERD: PR525 - MEDICINE BOW

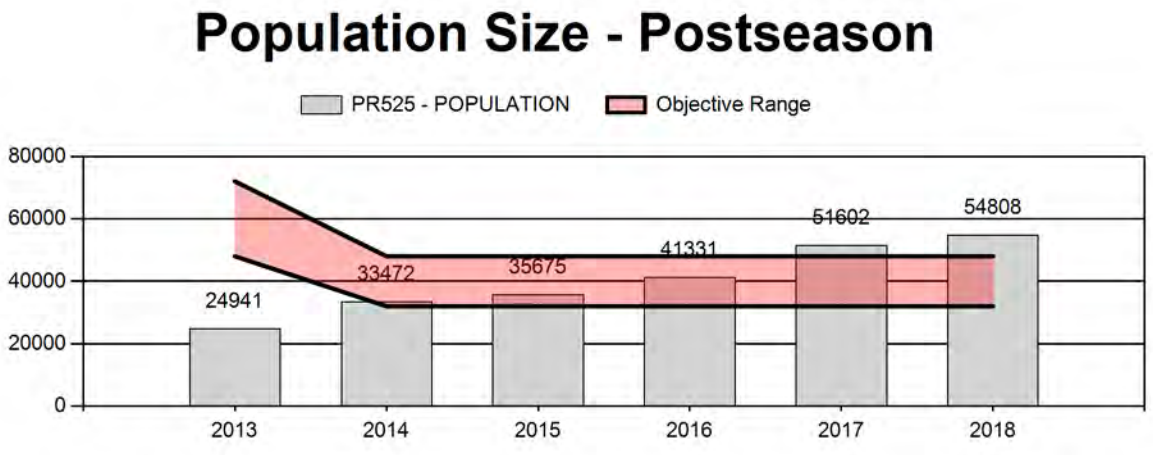
HUNT AREAS: 30-32, 42, 46-48
PREPARED BY: LEE KNOX

	2013 - 2017 Average	2018	2019 Proposed
Population:	37,404	54,808	55,577
Harvest:	2,735	3,636	3,800
Hunters:	3,060	3,823	4,000
Hunter Success:	89%	95%	95%
Active Licenses:	3,400	4,299	4,600
Active License Success:	80%	85%	83%
Recreation Days:	9,166	9,835	9,800
Days Per Animal:	3.4	2.7	2.6
Males per 100 Females	44	56	
Juveniles per 100 Females	70	68	

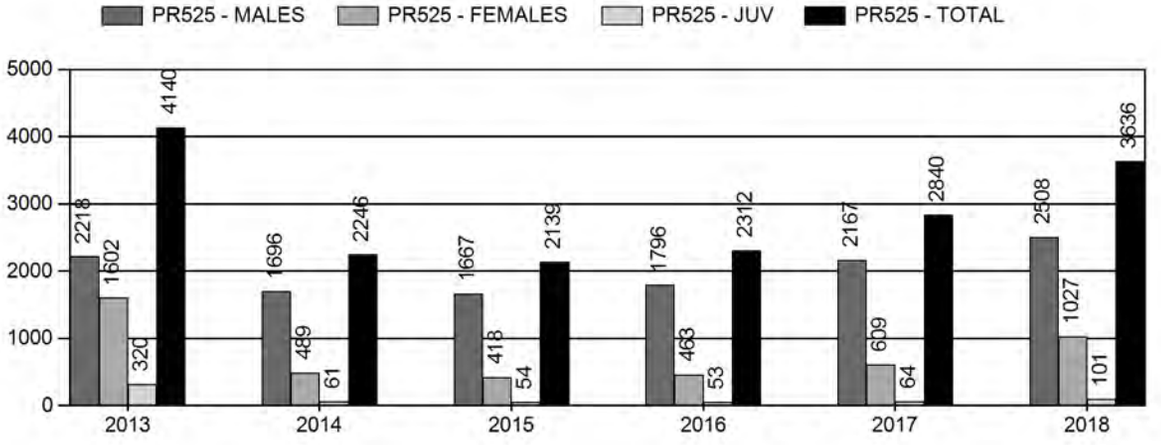
Population Objective (± 20%) :	40000 (32000 - 48000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	37%
Number of years population has been + or - objective in recent trend:	3
Model Date:	3/28/2019

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

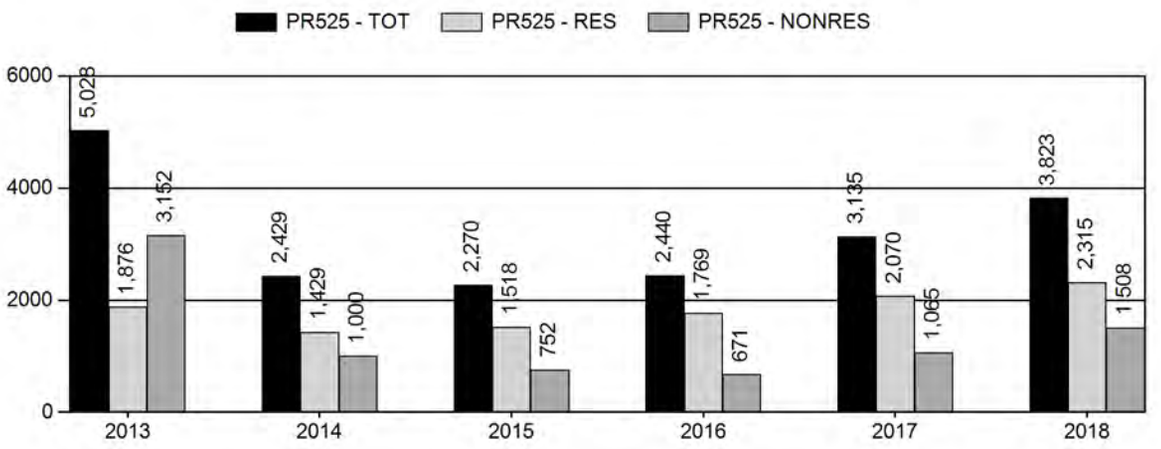
	JCR Year	Proposed
Females ≥ 1 year old:	4%	4%
Males ≥ 1 year old:	19%	19%
Total:	6%	6%
Proposed change in post-season population:	4%	4%



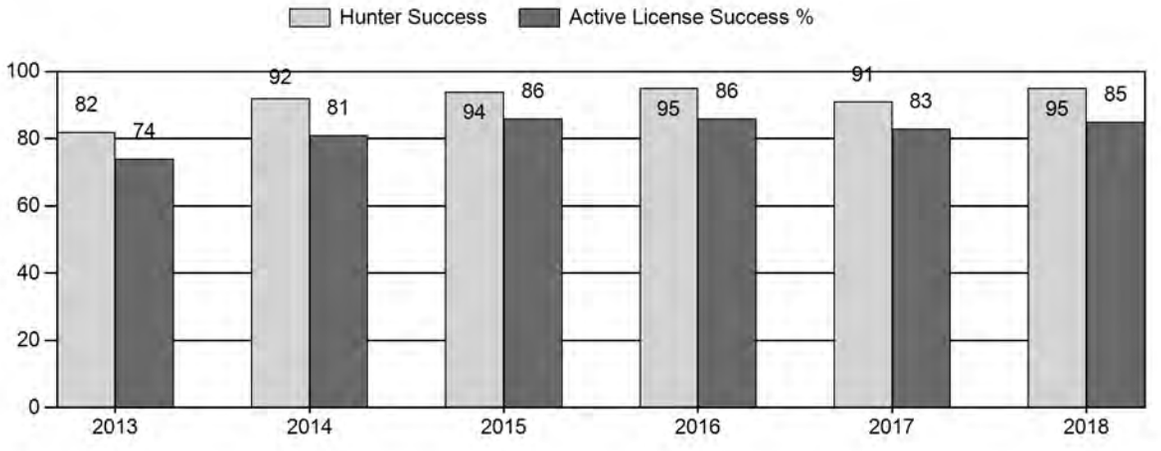
Harvest



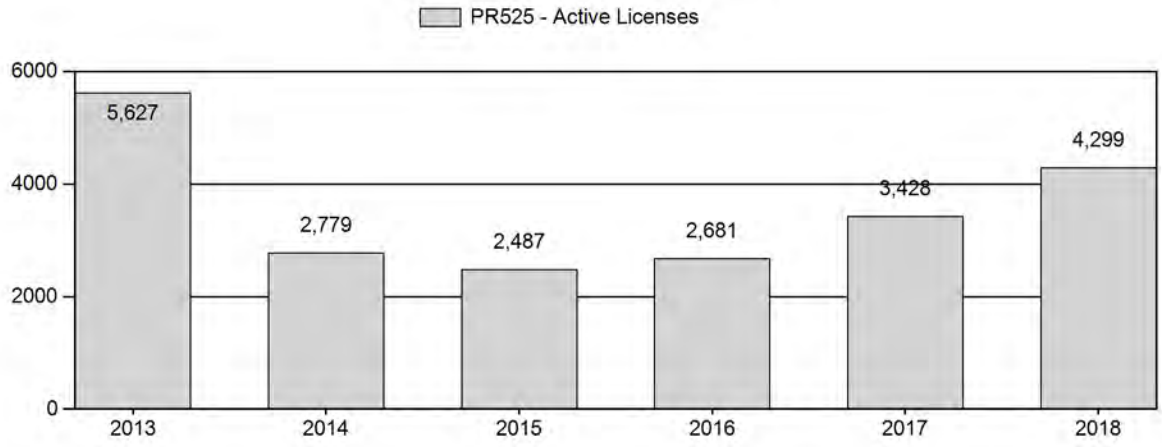
Number of Active Licenses



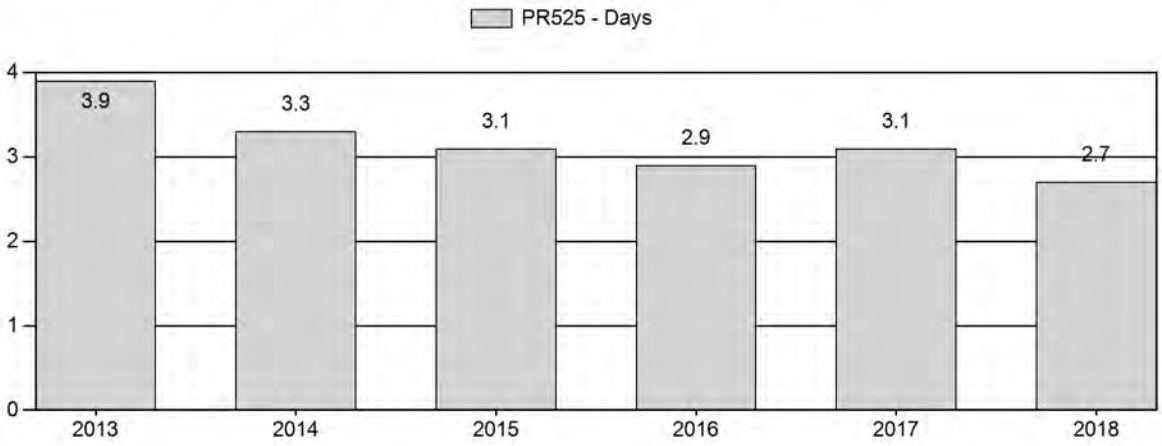
Harvest Success



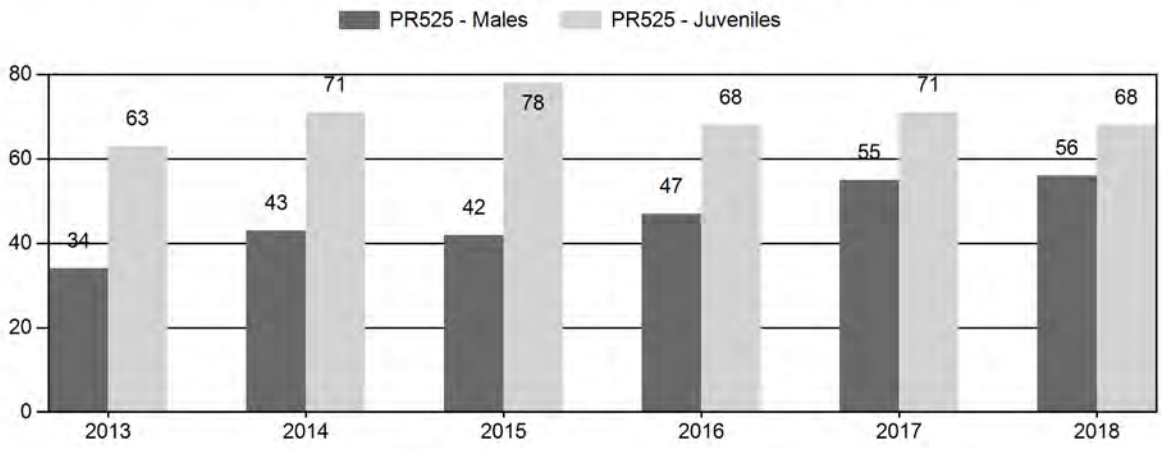
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR525 - MEDICINE BOW

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	29,495	301	614	915	17%	2,708	51%	1,698	32%	5,321	2,221	11	23	34	± 2	63	± 3	47
2014	35,942	514	617	1,131	20%	2,655	47%	1,882	33%	5,668	2,598	19	23	43	± 2	71	± 3	50
2015	38,028	424	529	953	19%	2,249	45%	1,747	35%	4,949	2,810	19	24	42	± 3	78	± 4	55
2016	43,874	614	806	1,420	22%	3,007	46%	2,046	32%	6,473	2,492	20	27	47	± 2	68	± 3	46
2017	54,726	516	996	1,512	24%	2,764	44%	1,962	31%	6,238	2,807	19	36	55	± 3	71	± 3	46
2018	58,808	537	1,186	1,723	25%	3,071	45%	2,073	30%	6,867	2,392	17	39	56	± 3	68	± 3	43

2019 HUNTING SEASONS
MEDICINE BOW PRONGHORN (PR525)

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
30	1	Oct. 5	Oct. 31	500	Limited quota	Any antelope
	6	Oct. 5	Oct. 31	100	Limited quota	Doe or fawn
31	1	Sep. 25	Oct. 31	250	Limited quota	Any antelope
	6	Sep. 25	Oct. 31	200	Limited quota	Doe or fawn
32	1	Sep. 25	Oct. 31	600	Limited quota	Any antelope
	6	Sep. 25	Oct. 31	400	Limited quota	Doe or fawn
	7	Sep. 25	Oct. 31	150	Limited quota	Doe or fawn valid on private land
42	1	Sep. 25	Oct. 31	600	Limited quota	Any antelope
	6	Sep. 25	Oct. 31	250	Limited quota	Doe or fawn
46	1	Sep. 25	Oct. 31	200	Limited quota	Any antelope
	2	Oct. 5	Oct. 31	250	Limited quota	Any antelope
	6	Sep. 25	Oct. 31	150	Limited quota	Doe or fawn
47	1	Sep. 25	Oct. 31	500	Limited quota	Any antelope
	2	Oct. 5	Oct. 31	300	Limited quota	Any antelope
	6	Sep. 25	Oct. 31	350	Limited quota	Doe or fawn
48	1	Sep. 25	Oct. 31	150	Limited quota	Any antelope
	2	Oct. 5	Oct. 31	150	Limited quota	Any antelope
	6	Sep. 25	Oct. 31	50	Limited quota	Doe or fawn
30,	Archery	Aug. 15	Oct. 4			Refer to Section 2 of this Chapter
31, 32, 42, 46, 47, 48	Archery	Aug. 15	Sept. 24			Refer to Section 2 of this Chapter

Hunt Area	License Type	Changes from 2018
31	1	+50
	6	+100
32	1	+100
	6	+100

	7	+75
Herd Unit Total	**1**	**+150**
	2	**0**
	6	**+200**
	7	**+75**
	TOTAL	**+400**

Management Evaluation

Current Postseason Population Management Objective: 40,000 (32,000 – 48,000)
Management Strategy: Recreational
2018 Postseason Population Estimate: ~ 54,800
2019 Proposed Postseason Population Estimate: ~ 54,400
2018 Hunter Satisfaction: 94% Satisfaction, 4% Neutral, 2% Dissatisfied

The management objective for the Medicine Bow pronghorn herd unit is a postseason population objective of 40,000. The management strategy is recreational management which prescribes for a buck ratio of 30 to 59:100 does. The objective and management strategy were last revised in 2015.

Herd Unit Issues

The Medicine Bow herd unit includes hunt areas 30, 31, 32, 42, 46, 47, and 48. These hunt areas vary between predominantly public lands and exclusively privately owned lands. Large scale wind farms and coal mining within this herd may be negatively impacting habitat and productivity. More wind farms are proposed. Currently the Wyoming Game and Fish is working with the University of Wyoming Cooperative Unit on studying the impacts wind farms may have on pronghorn in this herd unit. The project is a 6 year study and will be completed in 2024. The population saw a large decline from a high of 50,000 in 2004 to 25,000 in 2013. Most recently, the population has been increasing to the current estimate of 54,800. We are maintaining this herd at the current objective and management strategy based on internal discussions and conversations with our constituents. We evaluated and considered population status and habitat data included in this document and a change is not warranted at this time. We will review this herd objective again in 2024; however, if the situation arises that a change is needed, we will review and submit an updated proposal.

Weather

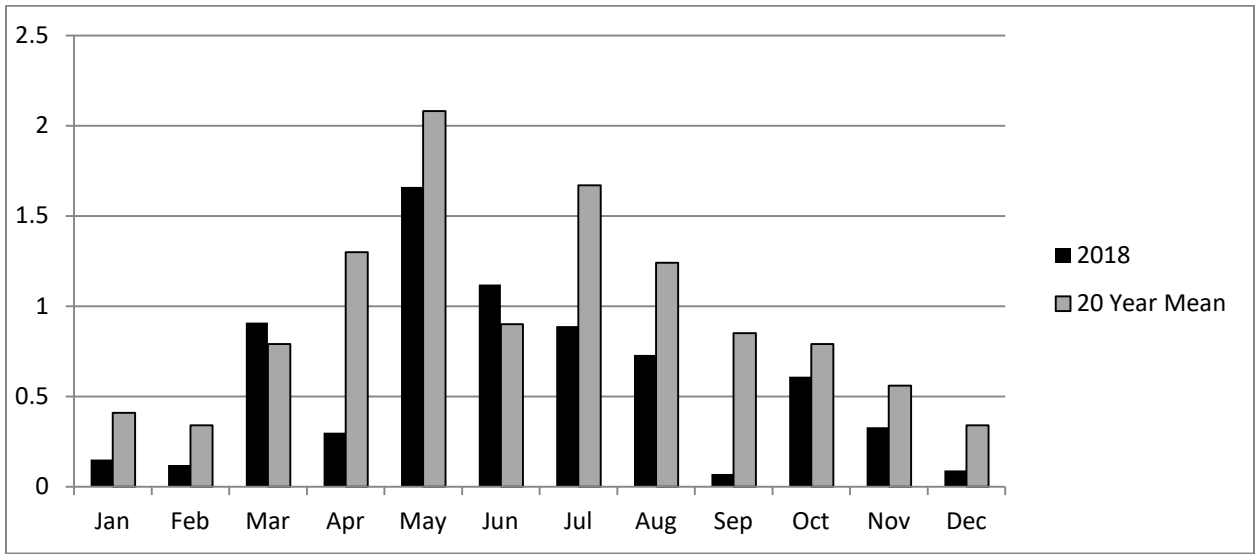


Figure 1. Monthly precipitation totals in inches for 2018 and the 20 year mean (1999-2019). Report was created at https://w2.weather.gov/climate/xmacis.php?wfo=cys using data collected at the Laramie Regional Airport.

Timing and quantity of precipitation was excellent during key growth periods for cool season grasses and preferred transitional range and winter range shrub species While early season growing conditions were optimal, late summer and fall precipitation was lacking. The extreme cold and high winds experienced in early winter, as well as hot dry conditions in midsummer, likely increased the mortality in the younger cohort in parts of the herd unit.

Habitat

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality. Data should not heavily influence population management for any particular big game species.

Field Data

A total of 6,867 pronghorn were classified in 2018, exceeding the estimated classification objective of 2,392. Buck ratios increased for the third straight year to 56 bucks: 100 does, 9 bucks: 100 does above the 10 year average of 47 bucks: 100 does. Yearling declined slightly at 17 bucks: 100; however, the adult buck ratio was the highest in 7 years at 39 bucks: 100 does. Fawn ratios continue to remain above the 10 year average of 66:100, at 68 fawns: 100 does in 2018. The hunter satisfaction survey shows 94% of hunters were either satisfied or very satisfied with their hunt, an increase of 11% from 2017, and 4% remaining neutral.

Harvest Data

Hunter success remains high at 95%, an increase of 4% from 2018. Hunter effort for the herd unit continues to remain near 3 days to harvest. We expected to have high success and lower effort with the current license issuance and a growing population. Licenses were increased by 950 in 2018, yielding a 28% increase in harvest.

Population

The spreadsheet model for this herd indicates the population is increasing with a post hunt population of 54,800. This estimate was derived using the Time-Specific Juvenile and Constant Adult Survival model which had a AIC score of 275 and a best fit score of 275. The last line transect was conducted end of bio year 2015 and estimated a postseason population of 36,250 with a standard error of 4,300. The model is of good quality. The predicted end of year population trends align well with past line transect estimates, and is comparable with what field personnel have noted from landowner and hunter comments. The model has quality data available for all years in model, and there is juvenile and adult survival estimates with standard errors available from three studies including the current research project, (Grogan et al and Taylor, 2014).

Management Summary

If the projected harvest of 3,800 is attained, using the 10 year average fawn ratio of 70 fawns: 100 does, the modeled population is predicted to start slowly declining. Population and harvest data indicate harvest could significantly increase to bring the population estimate in line with the objective. We are hesitant to increase in hunt areas 42, 46, 47, and 48 due to high mortalities from collared does in these hunt areas. Hunt area 30 has had several years of poor fawn ratios and does not warrant an increase at this time. Hunt Area 31 had high buck and fawn ratios as well as high hunter success indicating a robust pronghorn population with in the hunt area and opportunity for an increase in harvest. Type 1 licenses will be increased by 50 and type 6 by 100. We are not seeing as high of mortality in collared does in Hunt Area 32, and we are seeing a noticeable increase in the pronghorn population, warranting an increase in harvest. Hunt Area 32 type 1 licenses will be increased by 100, type 6 licenses by 100 and type 7 licenses by 75.

Bibliography of Herd Specific Studies

Grogan, R. Lindzey, F. *Pronghorn survival in Wyoming.* Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie, WY, 82071, USA

Taylor, K. L. 2014. Pronghorn (*Antilocapra americana*) Response to Wind Energy Development on Winter Range in South-Central, Wyoming. Master's Thesis. Department of Ecosystem Science and Management. University of Wyoming. Laramie. 141 pp.

2018 - JCR Evaluation Form

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

HERD: PR526 - COOPER LAKE

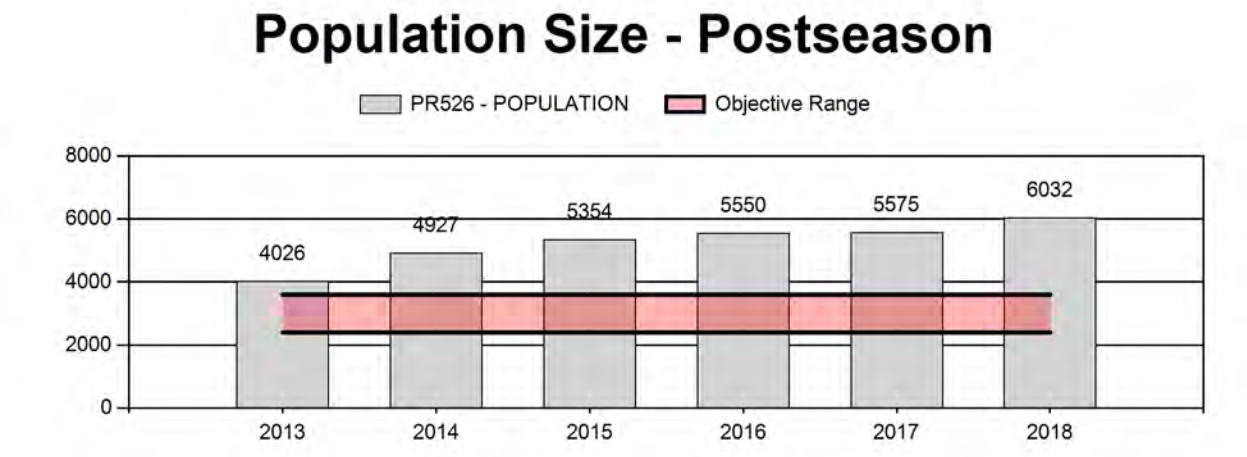
HUNT AREAS: 43
PREPARED BY: LEE KNOX

	2013 - 2017 Average	2018	2019 Proposed
Population:	5,086	6,032	5,757
Harvest:	707	878	1,000
Hunters:	793	1,067	1,200
Hunter Success:	89%	82%	83 %
Active Licenses:	848	1,138	1,300
Active License Success:	83%	77%	77 %
Recreation Days:	2,523	2,944	2,800
Days Per Animal:	3.6	3.4	2.8
Males per 100 Females	57	57	
Juveniles per 100 Females	87	86	

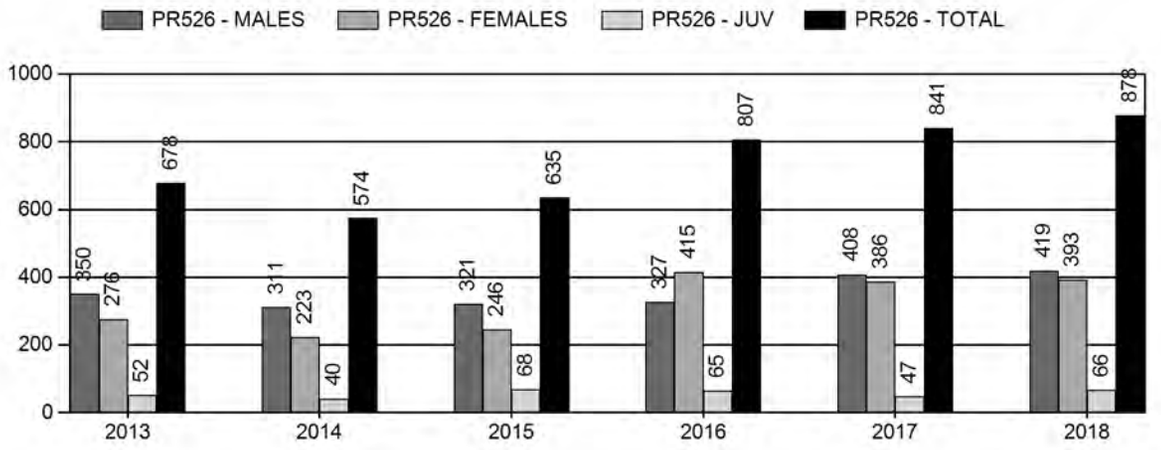
Population Objective (± 20%) :	3000 (2400 - 3600)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	101%
Number of years population has been + or - objective in recent trend:	20
Model Date:	2/14/2019

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

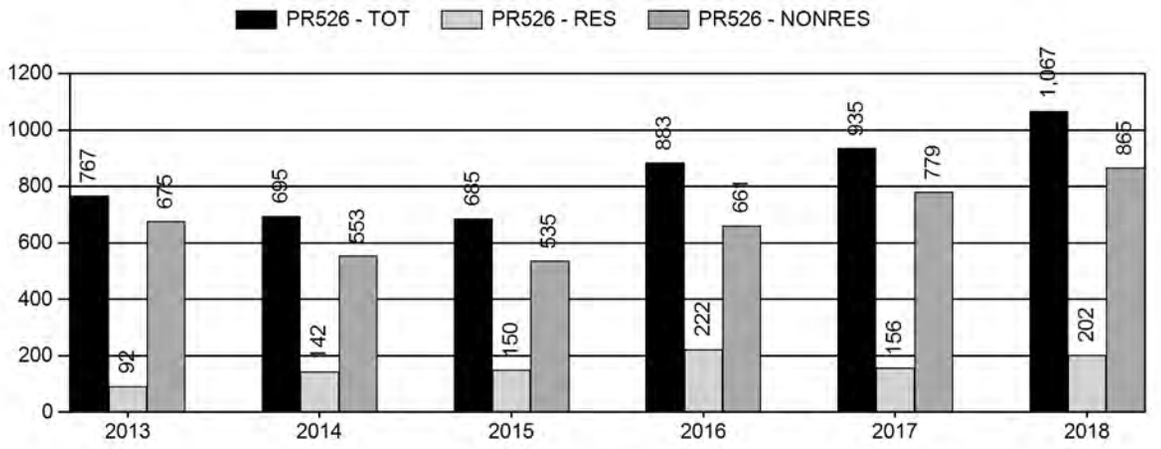
	JCR Year	Proposed
Females ≥ 1 year old:	15%	20%
Males ≥ 1 year old:	28%	20%
Total:	-14.5%	18%
Proposed change in post-season population:	4%	4%



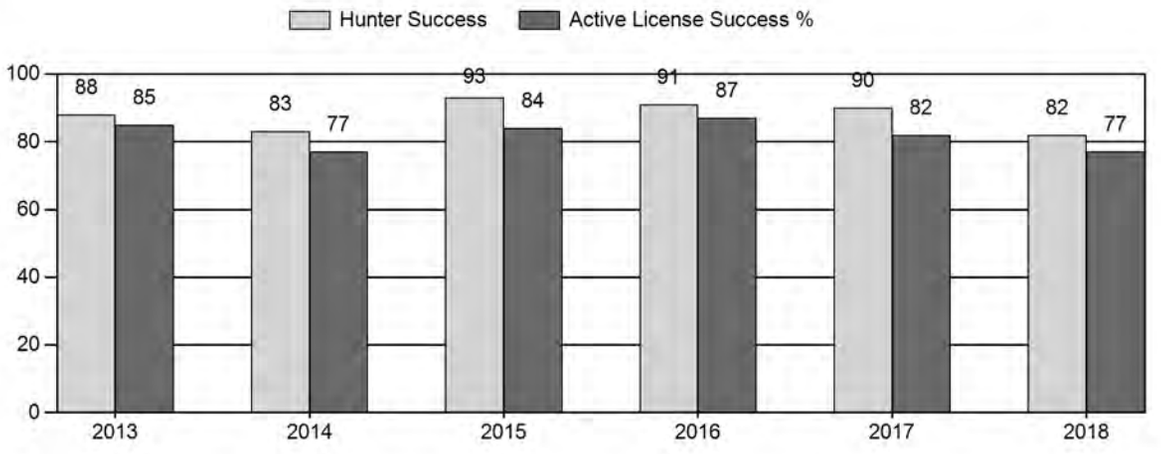
Harvest



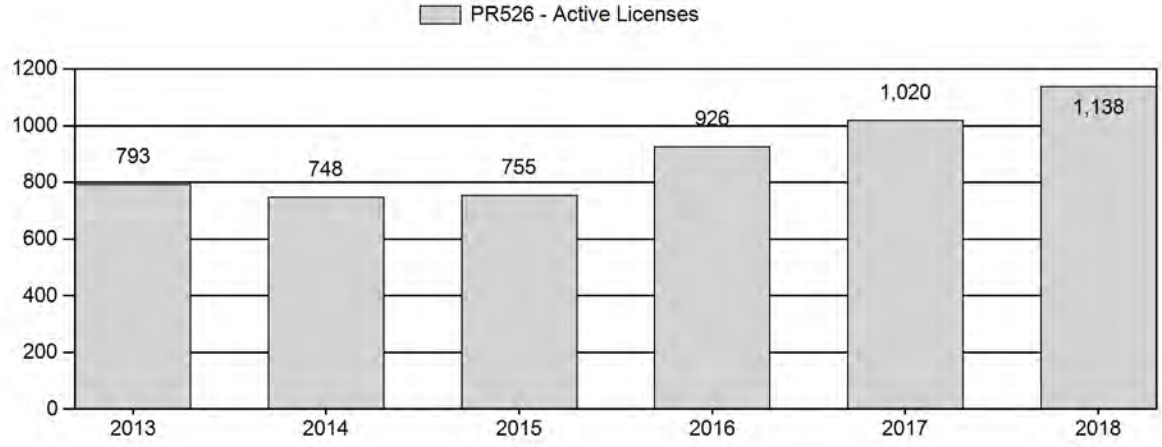
Number of Active Licenses



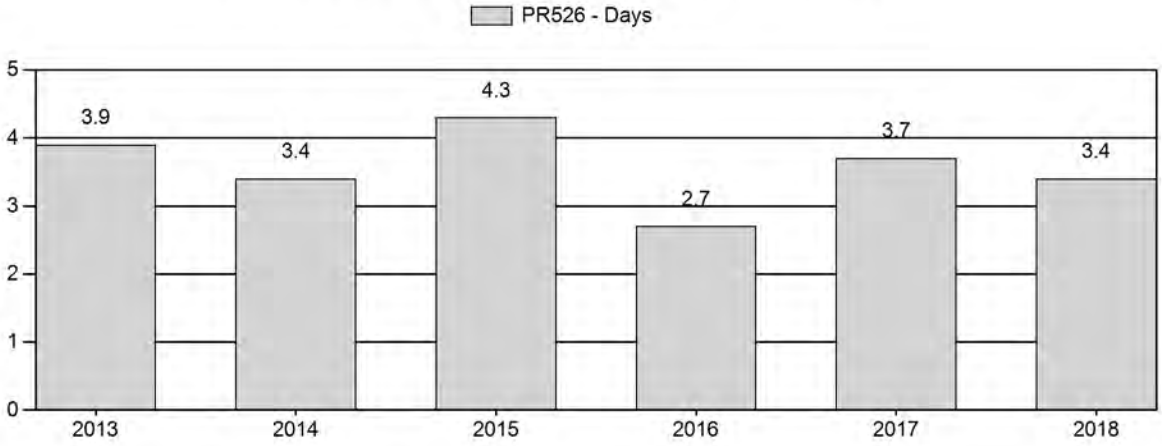
Harvest Success



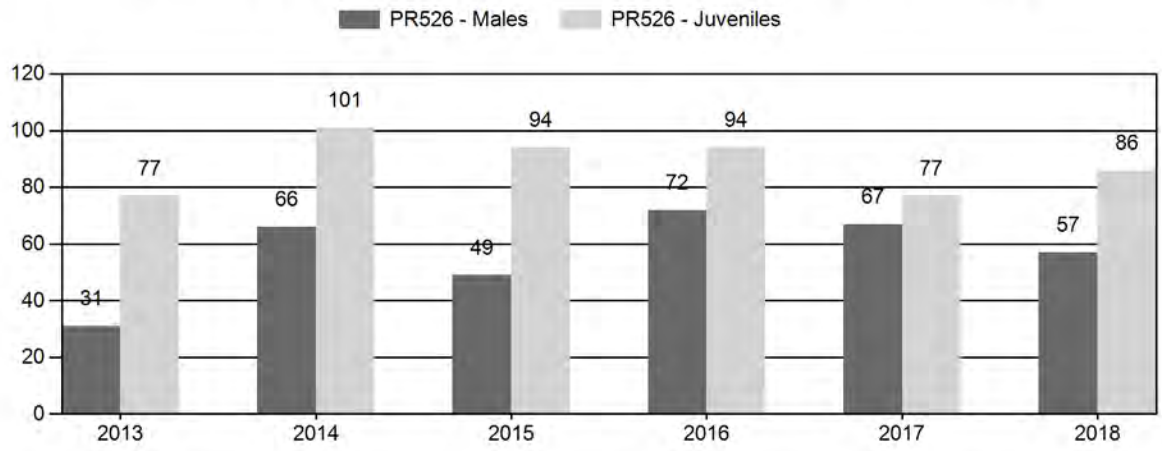
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR526 - COOPER LAKE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	4,772	45	82	127	15%	409	48%	314	37%	850	1,784	11	20	31	± 5	77	± 9	59
2014	5,558	101	96	197	25%	300	38%	303	38%	800	1,538	34	32	66	± 9	101	± 13	61
2015	6,052	68	92	160	20%	325	41%	307	39%	792	2,352	21	28	49	± 7	94	± 12	63
2016	6,367	109	139	248	27%	345	38%	324	35%	917	2,878	32	40	72	± 9	94	± 11	55
2017	6,500	135	243	378	27%	564	41%	437	32%	1,379	2,904	24	43	67	± 7	77	± 7	46
2018	6,998	52	88	140	23%	246	41%	211	35%	597	1,984	21	36	57	± 9	86	± 13	55

2019 HUNTING SEASONS
COOPER LAKE PRONGHORN (PR526)

Hunt Area	Type	Season Opens	Dates Closes	Quota	License	Limitations
43	1	Sept. 15	Oct. 31	600	Limited quota	Any antelope
43	6	Sept. 15	Oct. 31	700	Limited quota	Doe or fawn
Archery		Aug. 15	Sept. 14			Refer to Section 3 of the Antelope Regulations

Hunt Area	Type	Change from 2018
43	1	0
43	6	0
Herd Unit Totals	**1 & 6**	**0**

Management Evaluation

Current Post-Season Population Management Objective: 3,000 (2,400-3,600)
Management Strategy: Recreational
2018 Post-Season Population Estimate: ~6,000
2019 Proposed Post-Season Population Estimate: ~5,700
2018 Hunter Satisfaction: 90% **Neutral,** 9% **Dissatisfied,** 1%

The management objective for the Cooper Lake pronghorn herd unit is a post-season population objective of 3,000 pronghorn. The management strategy is recreational management with a buck ratio of 30 to 59:100 does. The objective and management strategy was last revised in 2018.

Herd Unit Issues

Recent trends show the population increasing from 4,300 in 2013 to the current population estimate of 6,000. The latest line transect survey was conducted in 2013, estimating 8,953 pronghorn with a standard error of 1,603. The Cooper Lake herd resides predominately within private lands as a result of increased urban sprawl near Laramie and large working ranches within the herd unit. A wind farm exists within the western portion of the herd unit and an additional wind farm is currently under review for possible development. Limited public access has hindered efforts to decrease the population of this herd through harvest. Currently, most public hunting is limited to the Diamond Lake and Laramie River Hunter Management Areas. Field staff documented Epizootic Hemorrhagic Disease (EHD) in the herd unit in 2012 and 2013, and this herd unit experienced a significant drought in 2012.

Weather

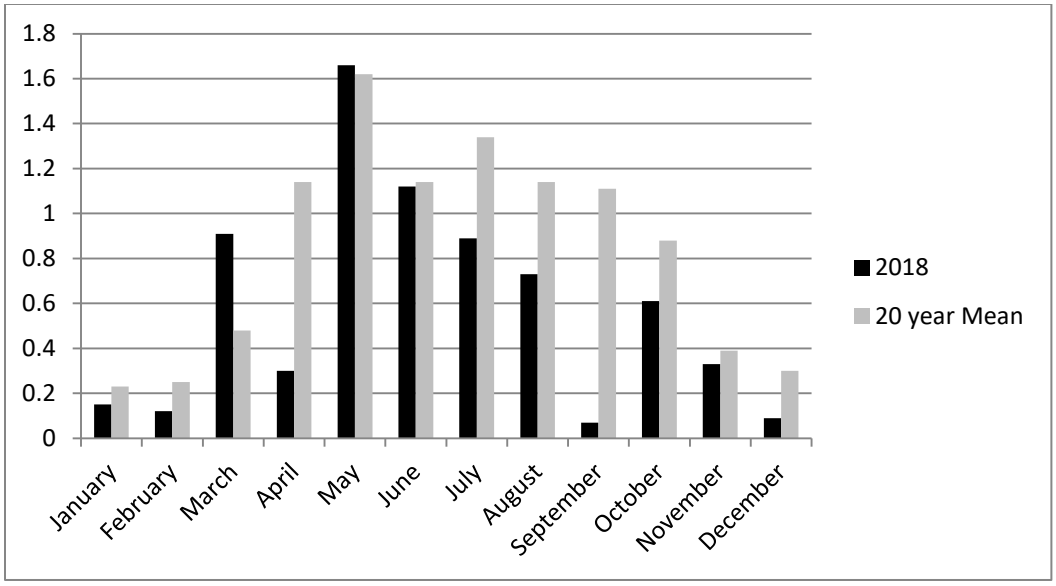


Figure 1. Monthly precipitation totals in inches for 2018 and the 20 year mean (1999-2019). Report was created at https://w2.weather.gov/climate/xmacis.php?wfo=cys using data collected at the Laramie Regional Airport.

Precipitation in 2018 was similar to the 20 year mean during key growth periods for cool season grasses and preferred transitional range and winter range shrub species. While early season growing conditions were optimal, late summer and fall precipitation was lacking.

Habitat

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality and consequently should not heavily influence population management for any particular big game species.

Field Data

In 2018, a total of 597 pronghorn were classified in the Cooper Lake pronghorn unit, which is well below the required estimated sample size of 1,984 needed to generate reliable population estimates. Since 2006, classification samples have been below the required estimated sample sizes. As a result of continued low sample sizes, in 2013, pre-season classification routes were established to enable inference to be made between classification samples from one year to the next. Increasing the length of classification routes may be necessary if required sample sizes are to be met. Pronghorn groups were difficult to find due drought conditions. Pronghorn were in large herds, and near what water had not dried up, likely causing us to miss many during classification counts. Fawn ratios increased by 9 fawns: 100 from 2017 to 2018 (86 fawns:100 does), although still high, this was a drop from 2015 and 2016, with both years at 94 fawns:100 does. Buck ratios decreased in both cohorts, but mostly in adult bucks, for a total buck ratio of 57:100 does. The total buck ratio in 2018 is 10 bucks: 100 less than 2017 (67:100), but still

above the previous 10 year average (50:100). The continuation of high juvenile and buck ratios suggests that the Cooper Lake herd remains very productive and offers additional opportunities for increased harvest.

Harvest Data

In 2018, 1,300 licenses (600 Type 1 and 700 Type 6) were issued, with non-residents accounting for 81% of the licenses sold and all licenses were sold in the initial draw. The number of active type 1 licenses was 83%, the lowest on record. The number of active type 6 licenses was comparable to past years, however there was a 5% decrease in hunter success, only harvesting an estimated 50 more does than in 2017. Starting in 2016, we have steadily increased licenses in the Cooper Lake herd unit to keep up with the exceptionally high fawn ratios, but harvest is correlated to access. There are two Hunter Management and Access (HMA) areas in the Cooper Lake herd unit. We would not be able to harvest the number of pronghorn we do without them, however we may have surpassed max hunter density for the highest harvest yield.

Population

The population model estimates the Cooper Lake herd near 6,000 pronghorn, and predicts it will remain stable to slightly declining to 5,800 in 2019. The Constant Juvenile-Constant Adult Mortality Rate (CJCA) spreadsheet model was used to generate the post-season population estimate for this herd. This model resulted in the lowest AICc score of the three models analyzed, and the post-hunt population estimate trends moderately well with line transect (LT) surveys conducted in 1999, 2002, and 2006. In June of 2013, a LT was conducted that estimated an end of bio-year population of 8,900 with a standard error of 1,600. The histogram for this survey shows that the E band is higher than the B, C, or D bands, and therefore breaks the first assumption of the line transect model. As a result of ratio data that is considered highly biased due to poor sample size, and the lack of adult and juvenile survival data for this herd, this population model (CJCA) would be described as a "poor" model and is not biologically defensible.

Management Summary

The Cooper Lake herd is very productive and has recovered quickly from the 2012 drought and EHD event. The current population estimate of ~6,000 is well above the post-season population management objective (3,000) and remaining stable, even with increased licenses. Good fawn production, high buck ratios, and landowner observations suggests the Cooper Lake pronghorn population continues to increase. Landowners would like the department to continue to make a concerted effort to manage the Cooper Lake pronghorn herd closer to the population management objective (3,000). We are concerned we have reached the threshold for hunters on the two HMAs. We will remain status quo for 2019 and evaluate if there are other ways we can increase harvest, like increasing the number of active licenses or increasing success.

2018 - JCR Evaluation Form

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

HERD: PR527 - CENTENNIAL

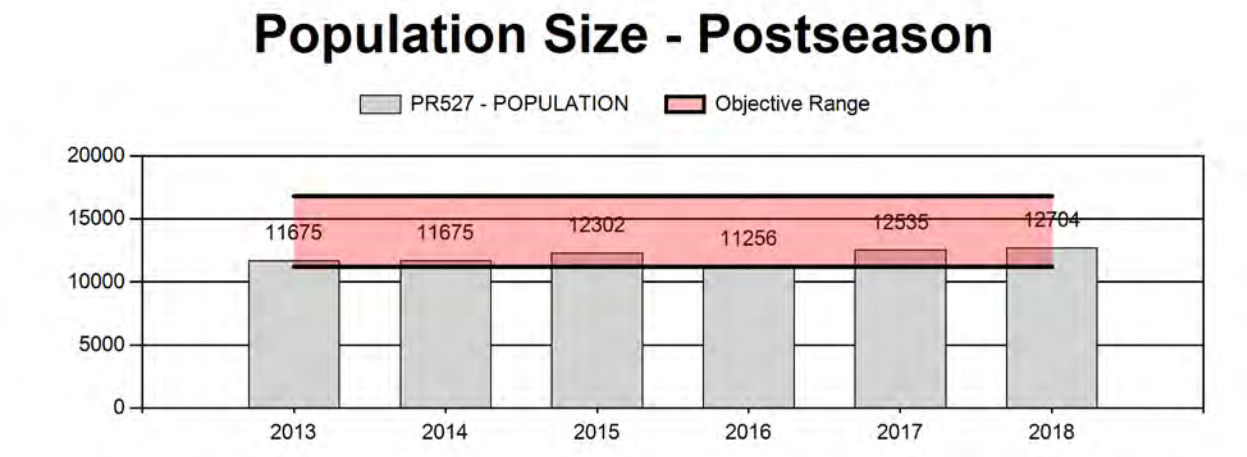
HUNT AREAS: 37, 44-45
PREPARED BY: LEE KNOX

	2013 - 2017 Average	2018	2019 Proposed
Population:	11,889	12,700	12,800
Harvest:	1,039	996	1,000
Hunters:	1,140	1,039	1,100
Hunter Success:	91%	96%	91 %
Active Licenses:	1,280	1,169	1,200
Active License Success:	81%	85%	83 %
Recreation Days:	4,078	3,370	4,000
Days Per Animal:	3.9	3.4	4
Males per 100 Females	44	47	
Juveniles per 100 Females	64	53	

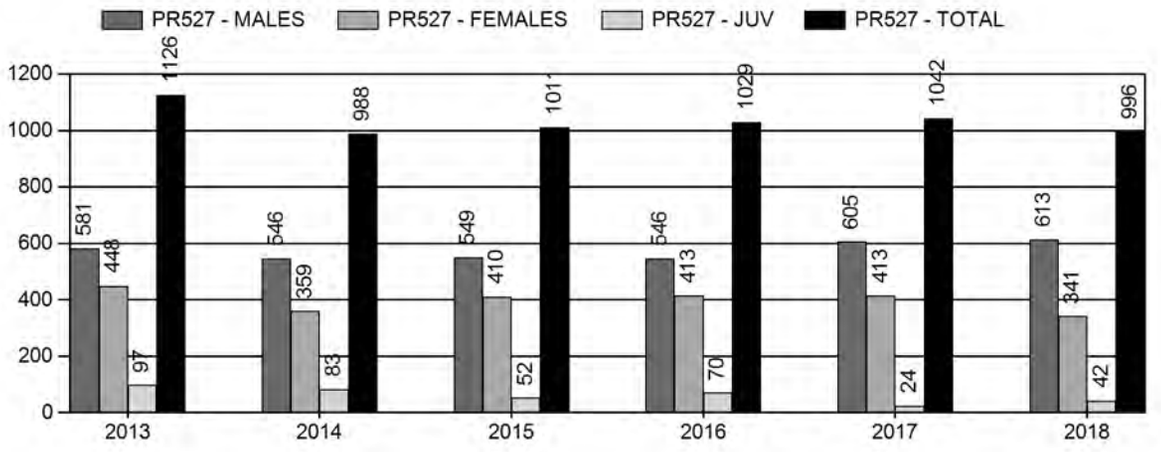
Population Objective (± 20%) :	14000 (11200 - 16800)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-9.3%
Number of years population has been + or - objective in recent trend:	2
Model Date:	2/4/2019

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

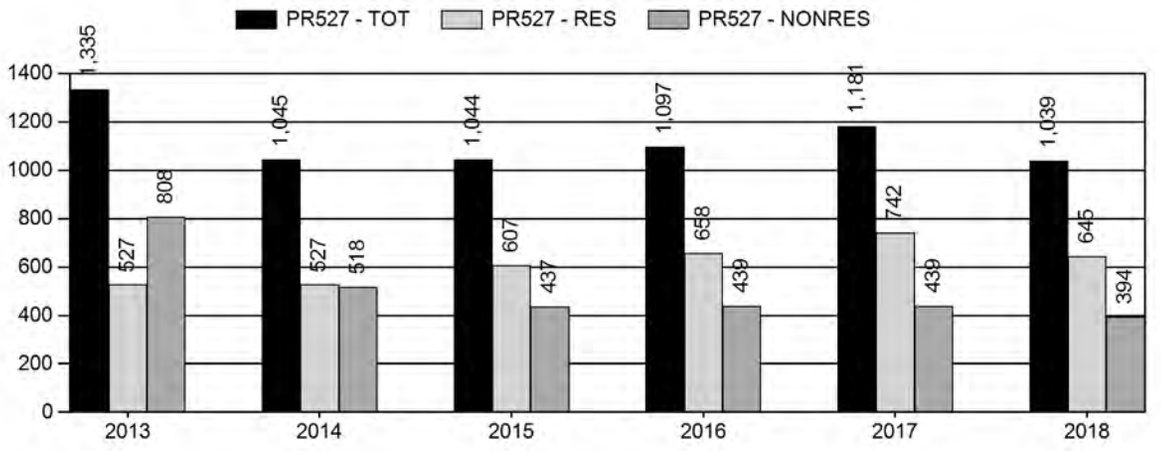
	JCR Year	Proposed
Females ≥ 1 year old:	6%	6%
Males ≥ 1 year old:	21%	21%
Total:	7%	7%
Proposed change in post-season population:	-1%	-1%



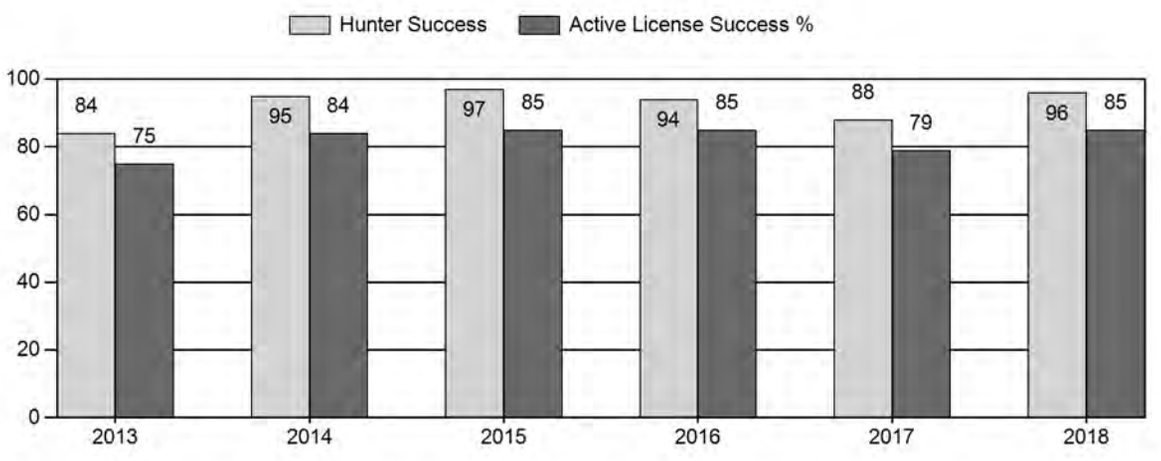
Harvest



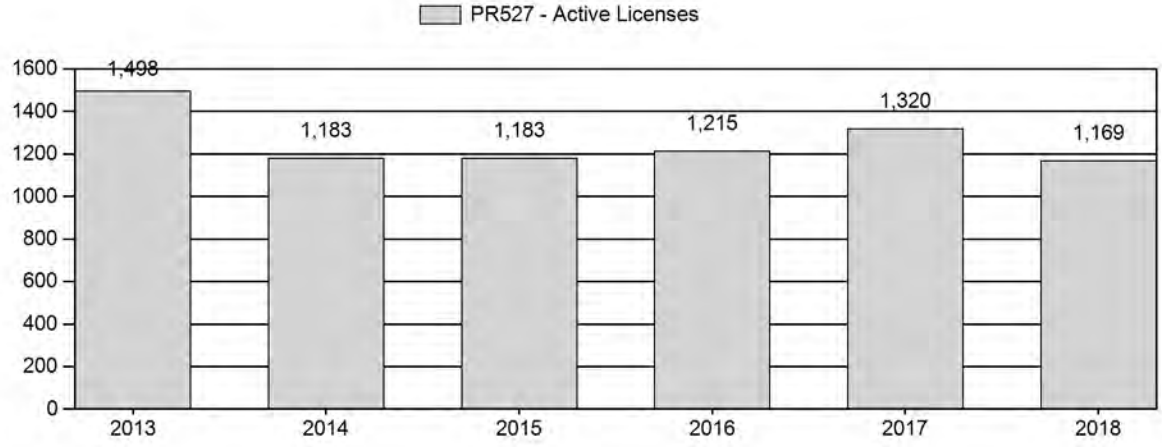
Number of Active Licenses



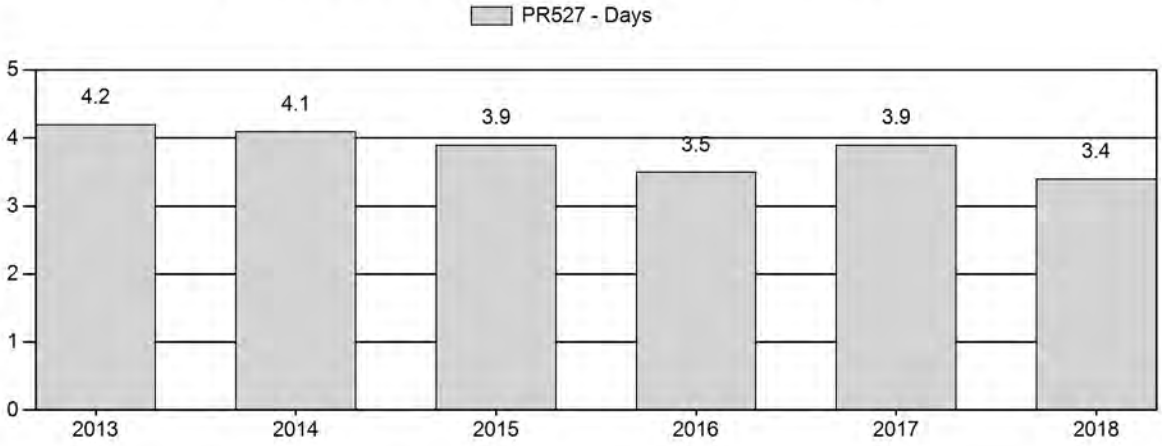
Harvest Success



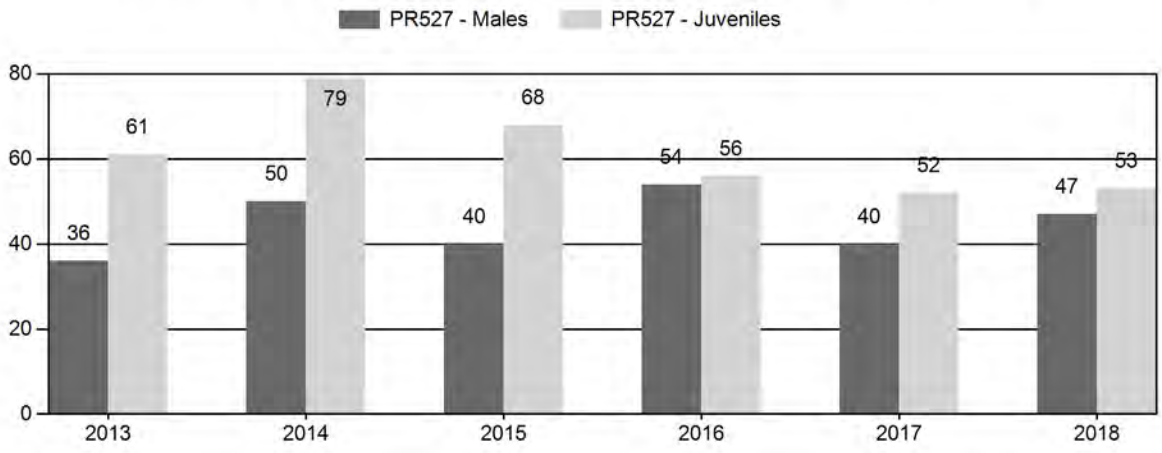
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR527 - CENTENNIAL

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	12,536	113	239	352	18%	975	51%	595	31%	1,922	1,832	12	25	36	± 3	61	± 5	45
2014	12,762	249	321	570	22%	1,149	44%	907	35%	2,626	2,149	22	28	50	± 4	79	± 5	53
2015	13,414	199	277	476	19%	1,181	48%	802	33%	2,459	2,207	17	23	40	± 3	68	± 5	48
2016	12,388	182	353	535	25%	1,000	48%	565	27%	2,100	1,724	18	35	54	± 4	56	± 4	37
2017	13,681	107	284	391	21%	972	52%	508	27%	1,871	2,039	11	29	40	± 4	52	± 4	37
2018	13,800	124	260	384	23%	823	50%	439	27%	1,646	1,532	15	32	47	± 4	53	± 5	36

2019 HUNTING SEASONS
CENTENNIAL PRONGHORN (PR527)

Hunt Area	Type	Date of Seasons		Quota	License	Limitations
		Opens	Closes			
37	1	Sep. 20	Oct. 14	150	Limited Quota	Any antelope
	6	Sep. 20	Oct. 14	25	Limited Quota	Doe or fawn
44	1	Sep. 15	Oct. 31	300	Limited Quota	Any antelope
	6	Sep. 15	Oct. 31	150	Limited Quota	Doe or fawn
45	1	Sep. 15	Oct. 31	400	Limited Quota	Any antelope
	6	Sep. 15	Oct. 31	350	Limited Quota	Doe or fawn
37	Archery	Aug. 15	Sept. 19			Refer to Section 2 of this Chapter
44,45	Archery	Aug. 15	Sept. 14			Refer to Section 2 of this Chapter

Hunt Area	License Type	Changes from 2018
Herd Unit Totals	**1**	**0**
	6	**0**

Management Evaluation
Current Postseason Population Management Objective: 14,000 (11,200 – 15,800)
Management Strategy: Recreational
2018 Postseason Population Estimate: ~ 12,700
2019 Postseason Population Estimate: ~ 12,800
2018 Hunter Satisfaction: 95% **Satisfied**, 3% **Neutral**, 2% **Dissatisfied**

The management objective for the Centennial pronghorn herd unit is a post-season population of 14,000 pronghorn. The management strategy is recreational management that requires a pre-hunt ratio of 30 to 59 bucks: 100 does. The objective and management strategy were last revised in 2018.

Herd Unit Issues
The 2018 post-season population estimate was approximately 12,700 pronghorn, with the population trending near objective. The last line transect survey for this herd unit was conducted at the end of bio year 2013, which estimated 13,800 pronghorn with a standard error of 1287. The Centennial pronghorn herd unit includes hunt areas 37, 44, and 45. The herd unit is predominately privately owned, with limited accessible public lands. Most public hunting opportunity is limited to five Hunter Management Areas (HMA). Interstate animals

further complicate management of this herd unit. There is significant population interchange with Colorado. Most, if not all, of the pronghorn in Hunt Area 37 winter in Colorado, while it is thought most of the pronghorn in the Laramie River Valley from Colorado winter in Hunt Area 44.

Weather

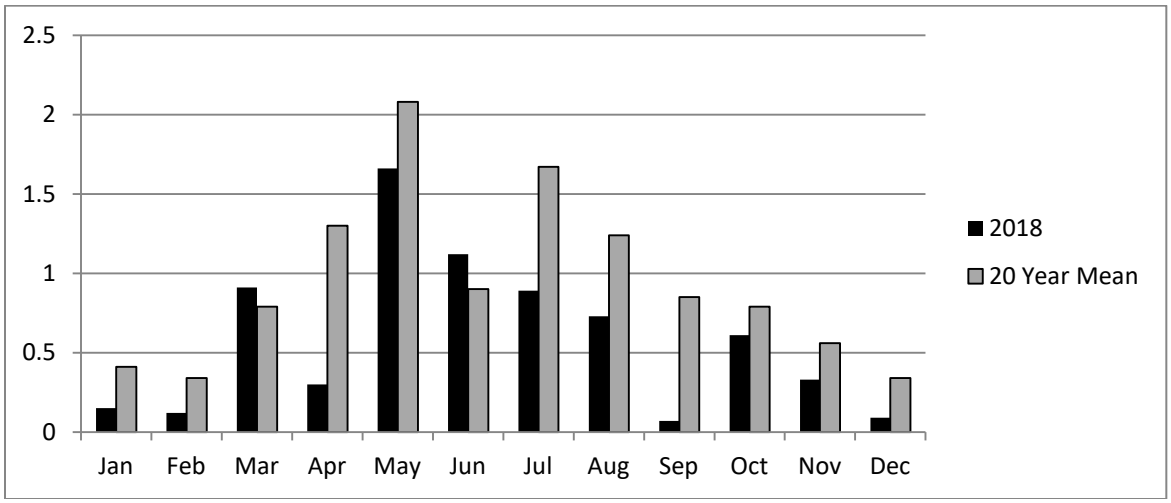


Figure 1**.** Monthly precipitation totals in inches for 2018 and the 20 year mean (1999-2019). Report was created at https://w2.weather.gov/climate/xmacis.php?wfo=cys using data collected at the Laramie Regional Airport.

Precipitation in 2018 was similar to the 20 year mean during key growth periods for cool season grasses and preferred transitional range and winter range shrub species. While early season growing conditions were optimal, late summer and fall precipitation was lacking.

Habitat

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality. Data should not heavily influence population management for any particular big game species.

Field Data

A total of 1,646 pronghorn were classified, exceeding the estimated classification objective of 1,532. Fawn production was again poor at 53 fawns: 100 does, and well below the ten year average of 70 fawns: 100 does. Fawn ratios have remained low the past three years, likely weather related. Buck ratios improved to 47 bucks: 100 does, well above the 10 year average of 43 bucks: 100 does, and in the middle of recreational management guidelines.

Harvest Data

Hunter success in 2018 remains high at 96%. Hunter effort decreased slightly, but remains below the ten year average of four days to harvest. The hunter satisfaction survey showed 95% of hunters were satisfied or very satisfied with their hunt, 3% of respondents were neutral. Overall the current season structure and license issuance is working well, it is reflected in the high hunter success and satisfaction. This herd unit is popular with

nonresidents who accounted for 38% of the licenses in 2018. Resident interest in this herd has increased, claiming more of their allocation of licenses, but this is most likely an effect of the statewide decrease in license issuance that occurred in 2014 that shifted residents to hunt areas with better draw odds.

Population

The "Constant Juvenile – Constant Adult Survival Rate (CJCA)" spreadsheet model was chosen to use for the post-season population estimate of this herd. Because of varying quality of classification data, the simplest model that relied on the fewest assumptions was determined to be the one that would provide the best population estimate. The model estimates the Centennial pronghorn herd has slowly decreased in number since 2004 when the population was estimated at 18,000. The 2018 post season population estimate is 12,700, and within 20% of the population objective. This is a poor model due to ratio data prior to 2000 being of poor quality, we are unable to survey the entire area, there is significant interchange with populations in Colorado, and we do not have adult and juvenile survival data for this herd unit. This model is not biologically defensible. We conducted a line transect survey for this herd at the end of bio year 2013, which estimated 13,800 pronghorn with a standard error of 1287. The 95% confidence interval (CI) is between 11,480 and 16,627 pronghorn.

Management Summary

The 2018 post-season population estimate is within 20% of the population objective. Current season dates are working well to provide more opportunity and spread out hunting pressure. If we attain the projected harvest of 1,000 pronghorn and have a fawn ratio near the three year average of 64, the population will continue to approximate the objective. We predict a 2018 post-season population of approximately 12,800 pronghorn.

2018 - JCR Evaluation Form

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

HERD: PR528 - ELK MOUNTAIN

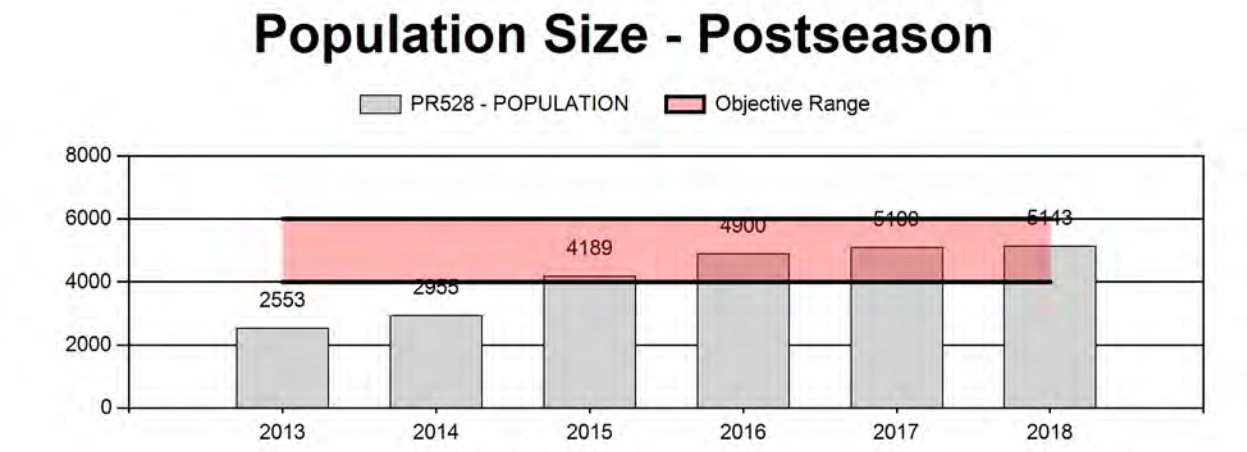
HUNT AREAS: 50
PREPARED BY: TEAL CUFAUDE

	2013 - 2017 Average	2018	2019 Proposed
Population:	3,939	5,143	4,911
Harvest:	399	376	435
Hunters:	430	364	430
Hunter Success:	93%	103%	101%
Active Licenses:	462	429	475
Active License Success:	86%	88%	92%
Recreation Days:	1,407	1,183	1,400
Days Per Animal:	3.5	3.1	3.2
Males per 100 Females	41	35	
Juveniles per 100 Females	54	53	

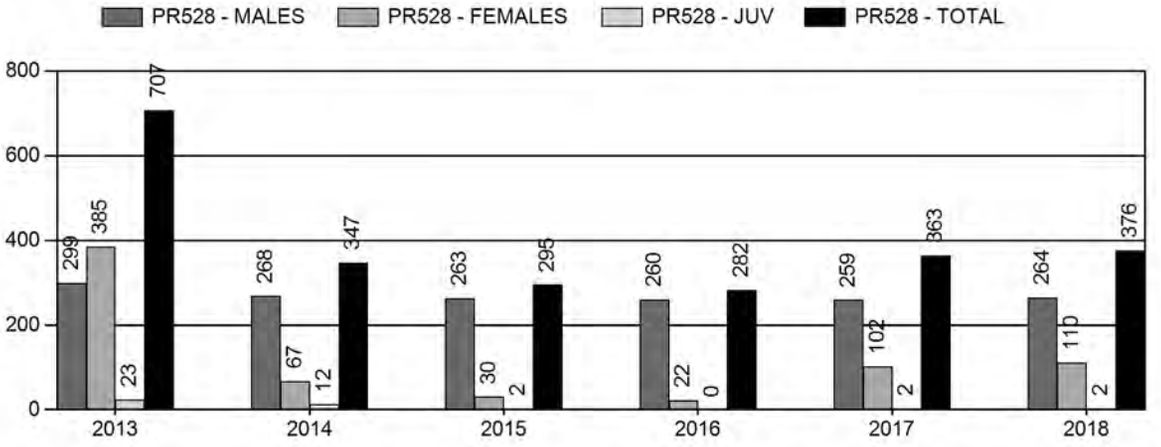
Population Objective (± 20%) :	5000 (4000 - 6000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	3%
Number of years population has been + or - objective in recent trend:	4
Model Date:	02/14/2019

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

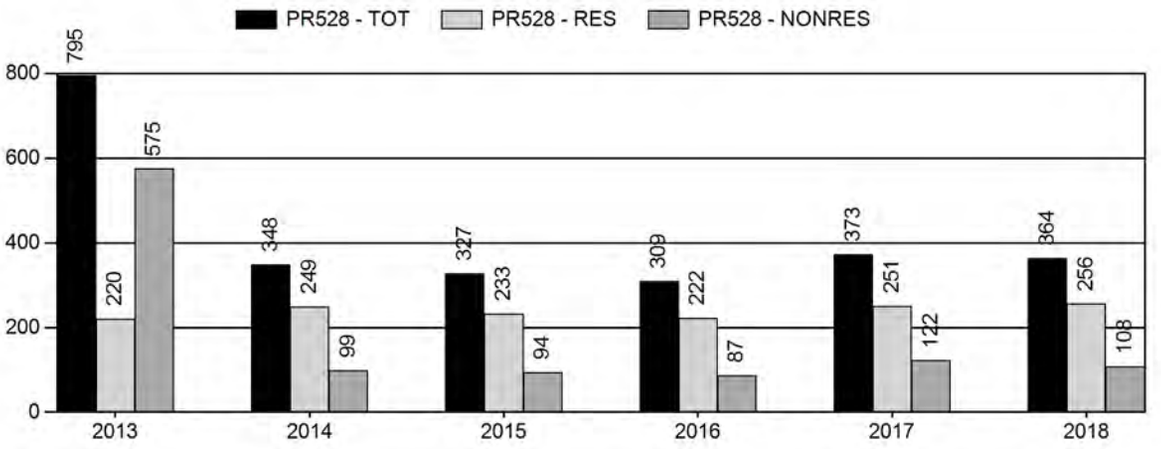
	JCR Year	Proposed
Females ≥ 1 year old:	4%	7%
Males ≥ 1 year old:	25%	38%
Total:	10%	10%
Proposed change in post-season population:	1%	-5%



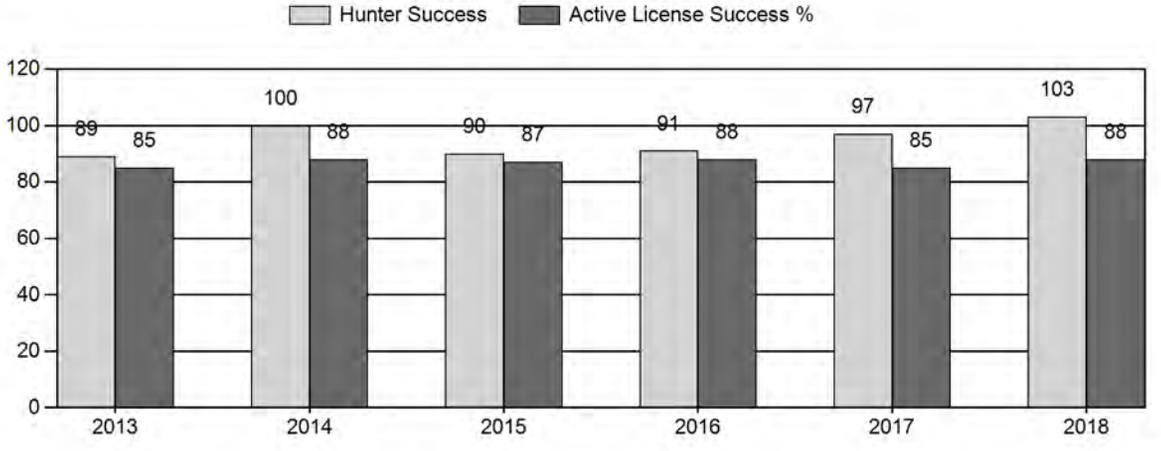
Harvest



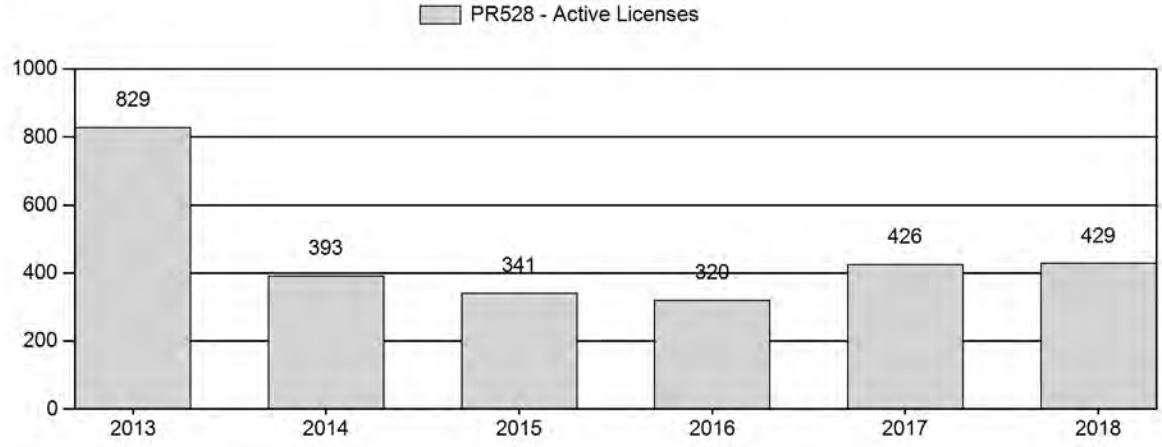
Number of Active Licenses



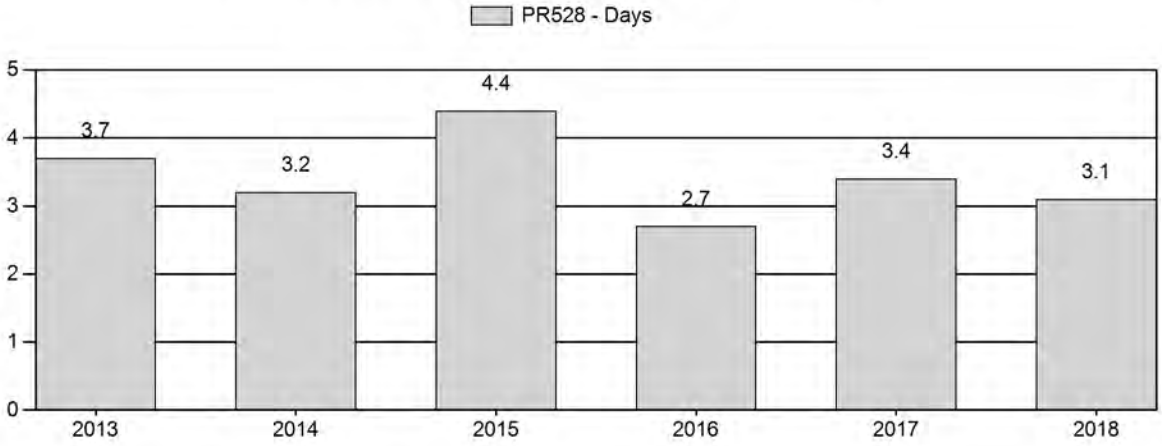
Harvest Success



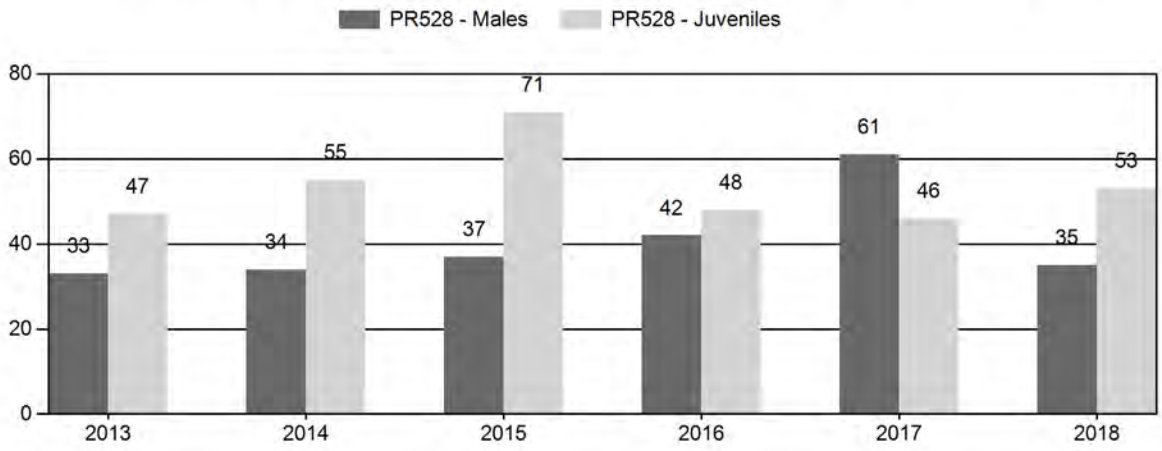
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR528 - ELK MOUNTAIN

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	3,331	75	95	170	18%	510	55%	239	26%	919	1,000	15	19	33	± 4	47	± 5	35
2014	3,337	64	111	175	18%	511	53%	280	29%	966	1,021	13	22	34	± 4	55	± 6	41
2015	4,502	118	108	226	18%	612	48%	437	34%	1,275	1,153	19	18	37	± 4	71	± 6	52
2016	5,200	80	83	163	22%	391	53%	189	25%	743	1,459	20	21	42	± 6	48	± 7	34
2017	5,500	157	152	309	30%	503	48%	230	22%	1,042	1,426	31	30	61	± 7	46	± 5	28
2018	5,557	74	111	185	19%	523	53%	276	28%	984	1,209	14	21	35	± 5	53	± 6	39

2019 HUNTING SEASON RECOMMENDATIONS
ELK MOUNTAIN PRONGHORN (PR528)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
50	1	Sep. 16	Oct. 31	300	Limited quota	Any antelope
	6	Sep. 16	Oct. 31	~~150~~ 200	Limited quota	Doe or fawn
	0	Sep. 1	Sep. 15	50	Limited quota	Any antelope, muzzle-loading firearms only
	Archery	Aug. 15	Aug. 31			Refer to license type and limitations in Section 3 of Chapter 5

Hunt Area	License Type	Quota change from 2018
Herd Unit Total	**6**	**+50**

Management Evaluation
Current Postseason Population Management Objective: 5,000 (4,000 – 6,000)
Management Strategy: Recreational
2018 Postseason Population Estimate: 5,100
2019 Proposed Postseason Population Estimate: 4,900
2018 Hunter Satisfaction: 92% Satisfied, 5% Neutral, 3% Dissatisfied

Pronghorn in the Elk Mountain herd unit are managed toward a postseason population objective of 5,000. The Elk Mountain herd unit is classified as a recreational management herd unit. This strategy directs Wyoming Game and Fish Department (WGFD) to manage harvest opportunity to maintain a preseason ratio of 30-59 bucks:100 does in the herd unit. The population was estimated using a spreadsheet model developed in 2012 and updated in 2018.

Herd Unit Issues
The Elk Mountain Pronghorn herd unit occurs entirely within Hunt Area 50, and contains 1,572.6 km^2 of occupied habitat. The occupied habitat consists primarily of sagebrush grassland and mountain shrub habitat types, with irrigated hay meadows occurring on private lands. The land status in this herd unit is predominantly private or land-locked public land. Hunter access to these lands is limited, particularly east of Elk Mountain, where most pronghorn in this herd unit are found during the hunting season. However, for the past 10 years Elk Mountain Ranch has

provided pronghorn hunting opportunities on two large Hunter Management Areas. The Pennock and Wick Wildlife Habitat Management Areas also provide hunting access.

The predominant land use in the herd unit is cattle grazing. Energy and urban development has been minimal in this herd unit. However, conversion of suitable pronghorn habitat to rural residential development has occurred east of the town of Saratoga in recent decades. Although pronghorn can be found throughout suitable habitat year-long, they tend to migrate to lower elevations in the western part of the unit to winter, and migrate to higher elevations in the east to summer. Traditional winter movements to lower elevations to the north have been blocked by US Interstate 80 since its construction in 1967 (Ward et al. 1976). There has been no documented use of the underpasses under US Interstate 80 by pronghorn in this herd unit. The western portion of the herd unit is intersected by Wyoming Highway 130, which impedes the semi-annual migration of these pronghorn.

We are maintaining this herd at the current objective and management strategy based on internal discussions and conversations with our constituents. We evaluated and considered population status and habitat data included in this document and a change is not warranted at this time. We will review this herd objective again in 2024; however, if the situation arises that a change is needed, we will review and submit an updated proposal.

Weather

The 2017-18 winter was mild with below average snowpack and was relatively favorable to wildlife. The spring of 2018 was dry, resulting in slow plant growth and green-up of rangelands. The majority of the summer and fall were extremely dry, causing much of the available forage to cure. However, fawn production was similar to past years, most likely due to the availability of agriculture fields that provided female pronghorn the necessary diet needed for lactation. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided pronghorn with a valuable boost in nutrition prior to the winter of 2018-19. While there have been several notable snow storms and cold snaps during the winter of 2018-19, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Fairly average pronghorn survival is expected for the winter of 2018-19.

Temperature and precipitation data was obtained for the National Oceanic and Atmospheric Administration (NOAA), https://w2.weather.gov/climate/xmacis.php?wfo=cys to illustrate weather conditions thus far, during bio-year 2018 (Figures 1 and 2). These figures also include data from January-May of bio-year 2017 to describe the weather conditions immediately preceding bio-year 2018.

Figure 1. January 2018 - January 2019 mean monthly temperatures and 20-year monthly means for Rawlins, Wyoming.

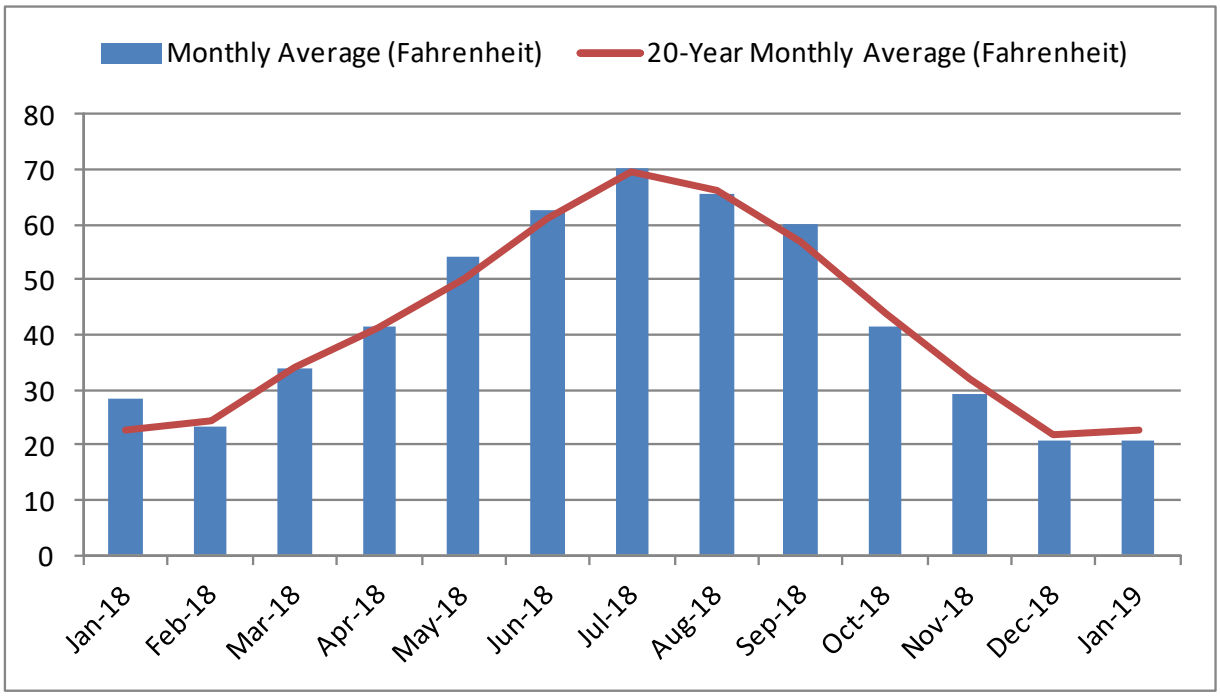
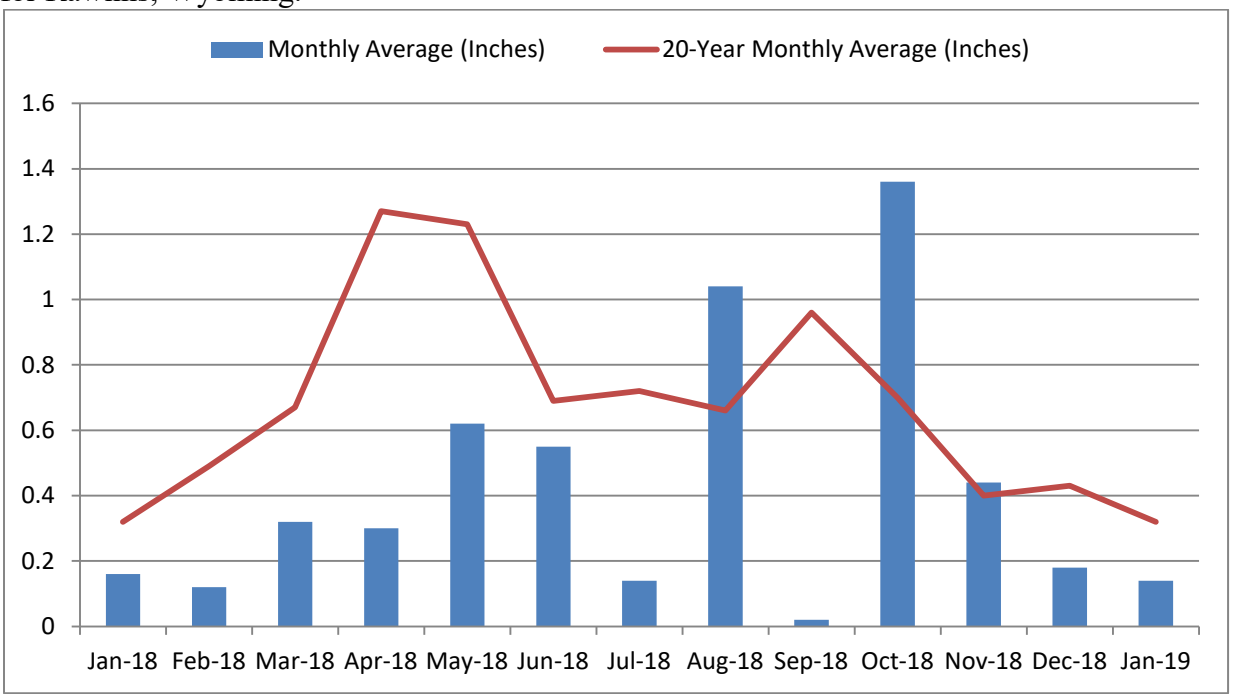


Figure 2. January 2018 - January 2019 mean monthly precipitation and 20-year monthly means for Rawlins, Wyoming.



Habitat
This herd unit has a limited number of established habitat transects to measure production and/or utilization on shrub species that are preferred browse for pronghorn. However, these transects have not provided sufficient data to make reliable inferences about habitat quality. Anecdotal observations indicate growth and moisture during the spring of 2018 was poor, and summer and early fall of 2018 were quite dry and hot. Pronghorn became more concentrated in areas where moisture and green forage persisted during this time period, and may have over browsed preferred plant species in some cases. October precipitation resulted in a late fall green-up of forage that likely benefited pronghorn nutritionally prior to the winter of 2018-19. Most shrub-steppe habitat in this herd unit is decadent and in need of treatments designed to improve the nutritional value of sagebrush and other plants.

Field Data
Preseason classification sample size increased in 2018. The total preseason classification sample (n=1003) was below the statistically desired sample size. Due to changes in survey technique in recent years (i.e. changed from aerial to ground surveys), preseason pronghorn sex and age classification survey sample sizes have been less than adequate for producing estimates with acceptable 90% confidence intervals. The preseason buck:doe ratio decreased in 2018 to 35:100, and was below the five-year average. The buck:doe ratio was significantly less than the ratio observed in 2017. The higher buck ratio in 2017 may have been the result of sampling biases which are difficult to overcome when conducting classifications from the ground along public roads. The preseason fawn:doe ratio increased from 46:100 in 2017, to 53:100 in 2018, which is in the normal range for this herd unit.

Seven pronghorn line transect (LT) surveys have been conducted in this herd unit. The most recent LT was conducted in 2012. In 2010, 35 adult female pronghorn were collared in this herd unit and the Medicine Bow herd unit as part of a study examining the response of pronghorn to wind energy development near the Dunlap Ranch wind energy facility north of Medicine Bow. Survival analyses were conducted for these 35 collared pronghorn during winter 2010, winter 2010-11 and winter 2011-12 (Taylor 2014). Density estimates from the LTs and adult survival field estimates (2010 and 2011) were incorporated into the spreadsheet model to improve the population estimate's accuracy.

Harvest Data
The 2018 harvest survey indicated a total of 376 pronghorn were harvested; 264 bucks, 110 does, and 2 fawns. Overall harvest success increased to 103%, above the five-year average success. This high overall harvest success was likely attributed to many of the successful hunters possessing both Type 1 and Type 6 licenses. The average number of days hunted for each pronghorn harvested decreased to 3.1 days, and was below the five-year average (3.5 days). Hunter satisfaction remained high, with 92% of hunters reporting they were satisfied with their hunt.

Population
Spreadsheet model estimates indicated the Elk Mountain herd is currently above the management objective of 5,000 pronghorn. The CJ, CA model was selected again for the Elk Mountain herd unit in 2018. The model's population estimates are plausible and match trends in harvest and

preseason classifications. The model's end-of-year estimates are less than the corresponding year Line-Transect survey density estimates conducted in 2007, 2010, and 2012. This model is rated as fair, and biologically defensible in our evaluation. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model (Morrison 2012).

Management Summary

In 2019, Type 1 licenses quotas will remain the same as 2018. Type 6 licenses will be conservatively increased (+50) to allow for more doe/fawn harvest in the herd unit. This rate of harvest should allow for stabilizing pronghorn numbers in this herd unit. The popular muzzleloader only season will continue to be offered in 2019.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet Model for Ungulate Population data Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 41 pp.

Ward, A. L., J. J. Cupal, G. A. Goodwin and H. D. Morris. 1976. Effects of highway construction and use on big game populations. Rept. No. FHWA-RD-76-174, Federal Highway Administration, Washington, D.C, USA.

Bibliography of Herd Specific Studies

Taylor, K. L. 2014. Pronghorn (*Antilocapra americana*) Response to Wind Energy Development on Winter Range in South-Central, Wyoming. Master's Thesis. Department of Ecosystem Science and Management. University of Wyoming, Laramie. 141 pp.

2018 - JCR Evaluation Form

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

HERD: PR529 - BIG CREEK

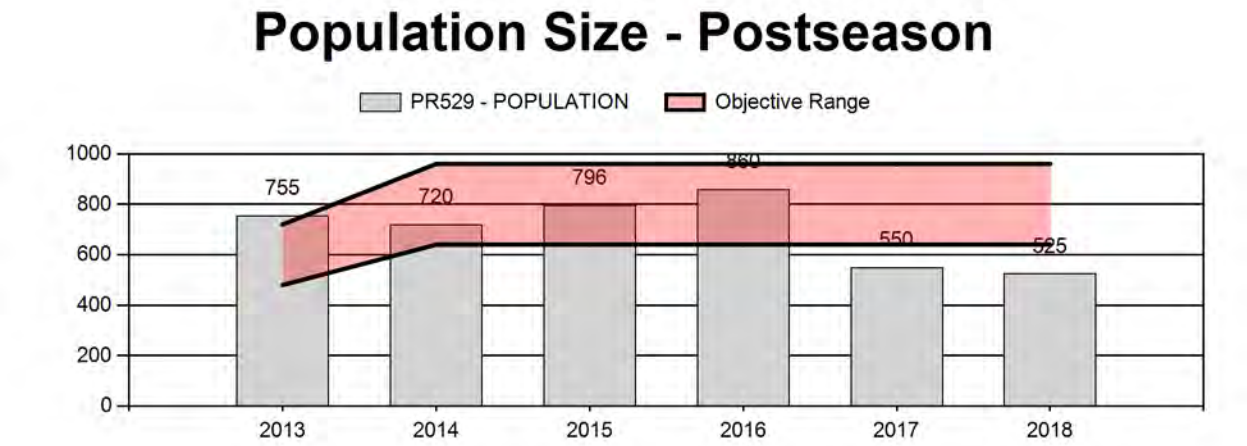
HUNT AREAS: 51
PREPARED BY: TEAL CUFAUDE

	2013 - 2017 Average	2018	2019 Proposed
Population:	736	525	388
Harvest:	92	147	145
Hunters:	89	161	160
Hunter Success:	103%	91%	91 %
Active Licenses:	104	185	175
Active License Success:	88%	79%	83 %
Recreation Days:	301	535	475
Days Per Animal:	3.3	3.6	3.3
Males per 100 Females	54	67	
Juveniles per 100 Females	52	53	

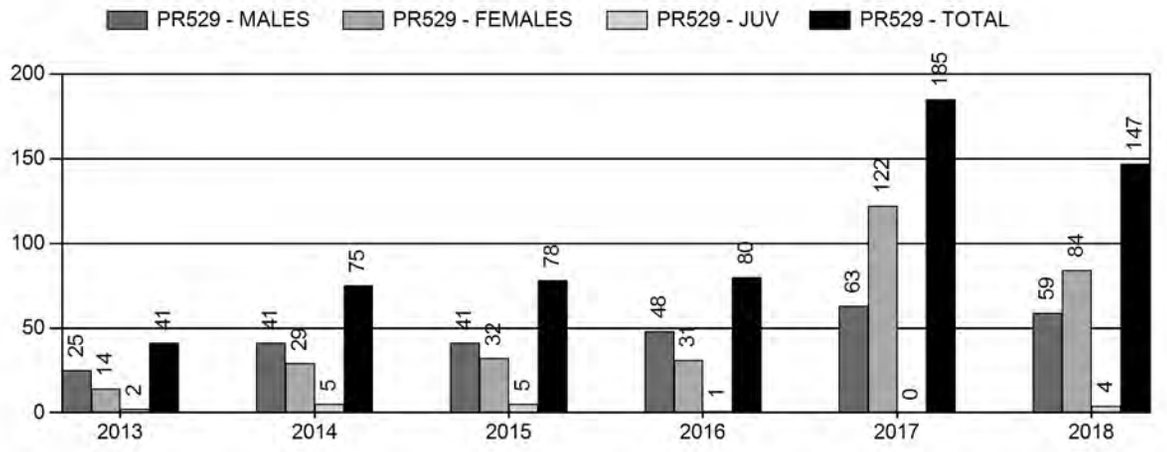
Population Objective (± 20%) :	800 (640 - 960)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-34.4%
Number of years population has been + or - objective in recent trend:	2
Model Date:	2/14/2019

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

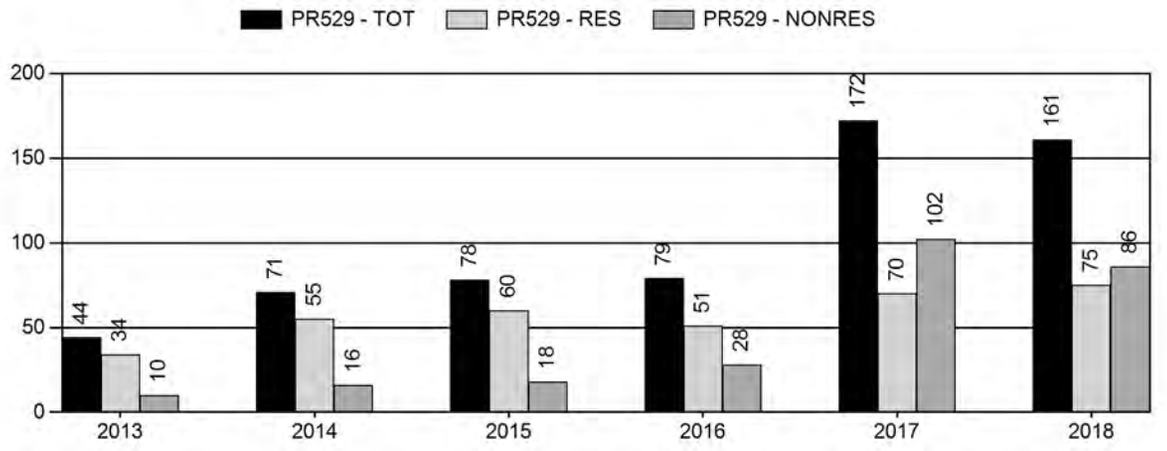
	JCR Year	Proposed
Females ≥ 1 year old:	40%	57%
Males ≥ 1 year old:	50%	71%
Total:	31%	42%
Proposed change in post-season population:	-10%	-35%



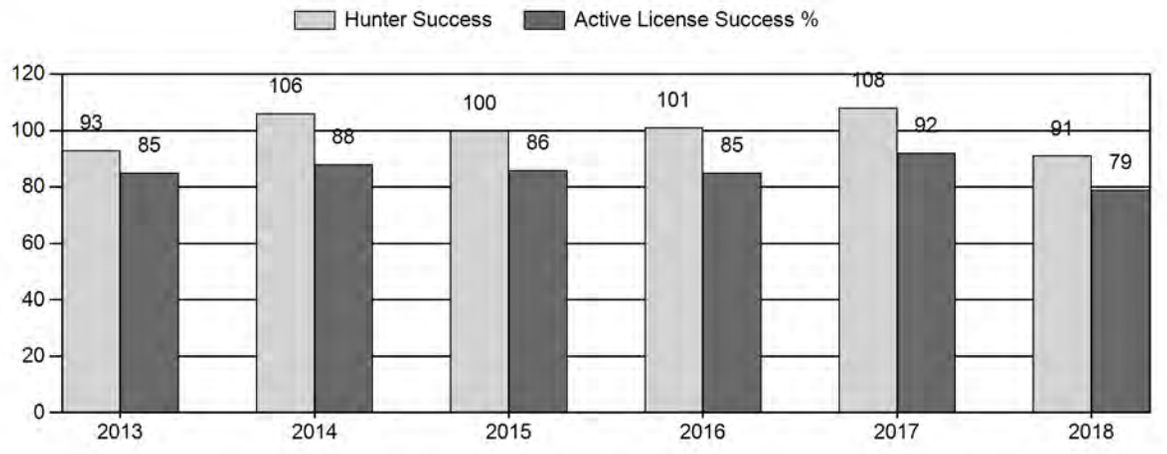
Harvest



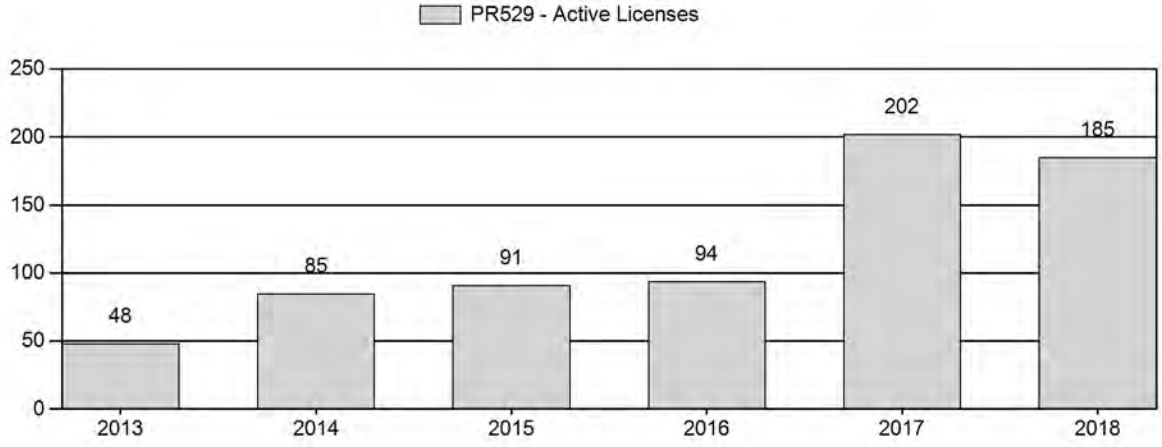
Number of Active Licenses



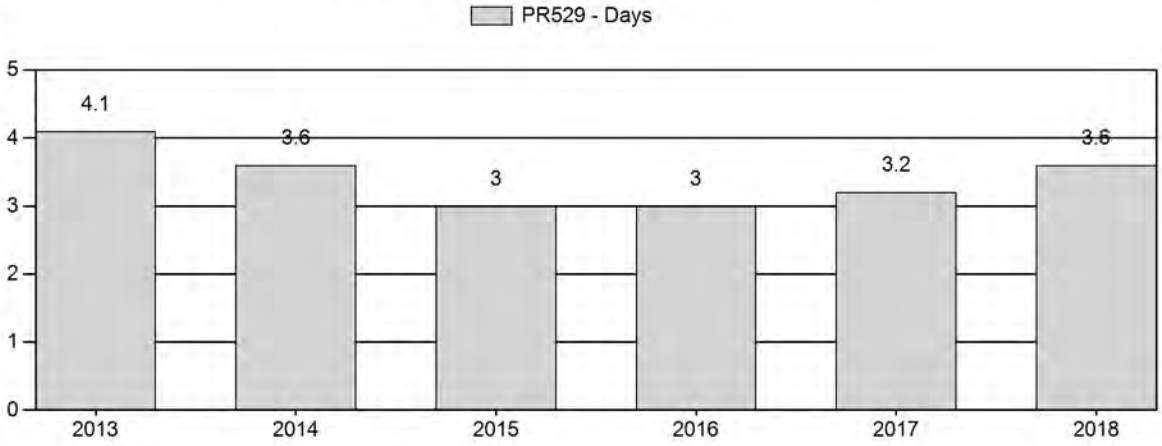
Harvest Success



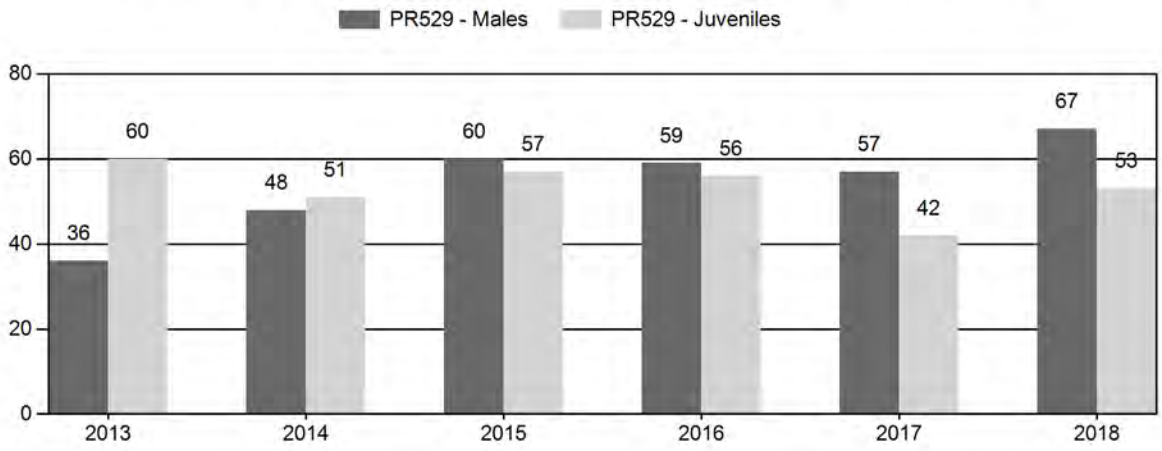
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



2013 - 2018 Preseason Classification Summary

for Pronghorn Herd PR529 - BIG CREEK

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Pre Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	800	8	43	51	18%	141	51%	84	30%	276	503	6	30	36	± 8	60	± 11	44
2014	802	42	87	129	24%	271	50%	137	26%	537	501	15	32	48	± 5	51	± 5	34
2015	882	58	91	149	28%	248	46%	141	26%	538	561	23	37	60	± 6	57	± 6	36
2016	950	61	123	184	27%	311	46%	175	26%	670	657	20	40	59	± 5	56	± 5	35
2017	750	48	114	162	29%	285	50%	120	21%	567	435	17	40	57	± 5	42	± 4	27
2018	687	45	186	231	31%	344	45%	182	24%	757	546	13	54	67	± 3	53	± 3	32

2019 HUNTING SEASON RECOMMENDATIONS
BIG CREEK PRONGHORN (PR529)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
51	1	Sep. 16	Nov. 14	75	Limited quota	Any antelope
	6	Aug. 15	Sep. 15	150	Limited quota	Doe or fawn valid on private land
	6	Sep. 16	Nov. 14		Limited quota	Doe or fawn valid in the entire area
	Archery	Aug. 15	Sep. 15			Refer to license type and limitations in Section 3 of Chapter 5

Hunt Area	License Type	Quota change from 2018
51		**None**

Management Evaluation
Current Postseason Population Management Objective: 800 (640 – 960)
Management Strategy: Recreational
2018 Postseason Population Estimate: 525
2019 Proposed Postseason Population Estimate: 400
2018 Hunter Satisfaction: 90% Satisfied, 3% Neutral, 7% Dissatisfied

Pronghorn in the Big Creek herd unit are managed toward a numeric objective of 800. The Big Creek herd unit is classified as a recreational management herd unit. This strategy directs Wyoming Game and Fish Department (WGFD) to manage harvest opportunity to maintain a preseason ratio of 30-59 bucks:100 does in the herd unit. The population was estimated using a spreadsheet model developed in 2012 and updated in 2018.

Herd Unit Issues
The Big Creek herd unit occurs entirely within Hunt Area 51, and contains 533.8 km^2 of occupied habitat. The occupied habitat consists primarily of sagebrush grassland and mountain shrub habitat types. Agricultural lands consist of irrigated alfalfa and former wheat fields which are being reverted to rangeland. Cattle ranches occupy most of the rangeland in this herd unit. Rural residential development is occurring to the east of the town of Riverside, and in the Baggot Rocks and Skyline areas. In the past these areas provided pronghorn with seasonal habitats and

the observed changes in land use appear to be displacing pronghorn into other areas. Pronghorn damage to alfalfa crops continues to be an issue in this herd unit. Access is difficult except for on those private lands receiving damage.

Pronghorn in this herd unit tend to migrate north to the North Platte River and west to the Encampment River in fall, and return to the south and east in the spring. This herd is considered to be an interstate herd connected to the North Park pronghorn herd of Colorado. During severe winters, many of the North Park pronghorn migrate north into the Big Creek herd unit. During milder winters the North Park pronghorn tend to winter in Colorado. Pronghorn from this herd unit may cross the rivers and enter the Iron Springs and Elk Mountain Pronghorn herd units, particularly during severe winters.

We are maintaining this herd at the current objective and management strategy based on internal discussions and conversations with our constituents. We evaluated and considered population status and habitat data included in this document and a change is not warranted at this time. We will review this herd objective again in 2024; however, if the situation arises that a change is needed, we will review and submit an updated proposal.

Weather

The 2017-18 winter had numerous periods of bitter cold, continuing through February, but much of the winter range was open and available. Winter losses were expected to be near average leading into bio-year 2018. The spring of 2018 was dry, resulting in slow plant growth and green-up of rangelands. The majority of the summer and fall were extremely dry, causing much of the available forage to cure. However, fawn production was similar to past years, most likely due to the availability of agriculture fields that provided female pronghorn the necessary diet needed for lactation. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided pronghorn with a valuable boost in nutrition prior to the winter of 2018-19. While there have been several notable snow storms and cold snaps during the winter of 2018-19, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Fairly average pronghorn survival is expected for the winter of 2018-19.

Temperature and precipitation data was obtained for the National Oceanic and Atmospheric Administration (NOAA), https://w2.weather.gov/climate/xmacis.php?wfo=cys to illustrate weather conditions thus far, during bio-year 2018 (Figures 1 and 2). These figures also include data from January-May of bio-year 2017 to describe the weather conditions immediately preceding bio-year 2018.

Figure 1. January 2018 - January 2019 mean monthly temperatures and 20-year monthly means for Rawlins, Wyoming.

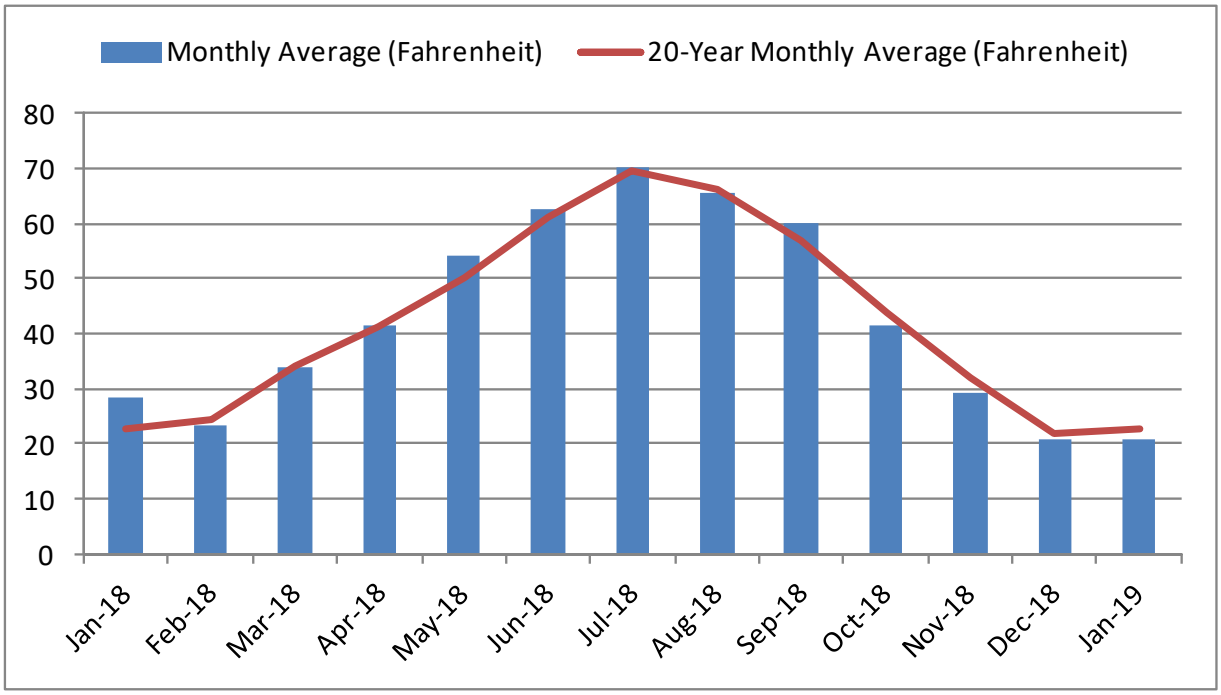
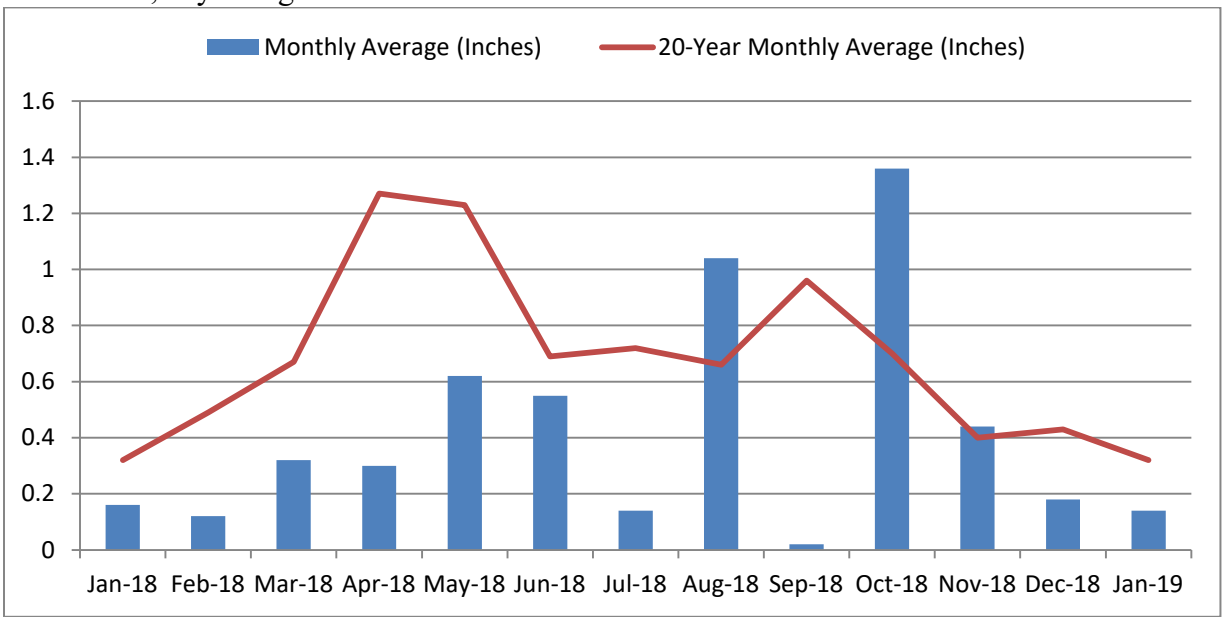


Figure 2. January 2018 - January 2019 mean monthly precipitation and 20-year monthly means for Rawlins, Wyoming.



Habitat
This herd unit has a limited number of established habitat transects to measure production and/or utilization on shrub species that are preferred browse for pronghorn. However, these transects have not provided sufficient data to make reliable inferences about habitat quality. Anecdotal observations indicate growth and moisture during the spring of 2018 was poor, and summer and early fall of 2018 were quite dry and hot. Pronghorn became more concentrated in areas where moisture and green forage persisted during this time period, and may have over browsed preferred plant species in some cases. October precipitation resulted in a late fall green-up of forage that likely benefited pronghorn nutritionally prior to the winter of 2018-19. Most shrub-steppe habitat in this herd unit is decadent and in need of treatments designed to improve the nutritional value of sagebrush and other plants.

Field Data
Preseason classification sample size increased in 2018 and was the largest sample (n=757) recorded in this herd unit. Total sample size exceeded the statistically desired sample size. The preseason buck:doe ratio increased in 2018 to 67:100, exceeding the upper limit for recreational management (30-59:100). This increase was predominately in adult bucks, with the 2018 yearling buck:doe ratio actually being less than the five-year average. The preseason fawn:doe ratio increased from 42:100 in 2017, to 53:100 in 2018.

Seven pronghorn line transect (LT) surveys have been conducted in this herd unit. The most recent LT was conducted in 2012. Density estimates from these LTs were incorporated into the spreadsheet model to improve the population estimate's accuracy.

Harvest Data
The 2018 harvest survey indicated a total of 147 pronghorn were harvested; 59 bucks, 84 does, and 4 fawns. Overall hunter success declined to 91% in 2018, and was below the five-year average for this herd unit. Typically hunters in this herd unit have enjoyed 100% overall harvest success. This historically high success rate was attributed to many of the successful hunters possessing both Type 1 and Type 6 licenses. In 2018, Type 1 licensed hunters had a success rate of 87%, and 75% for Type 6 licensed hunters. The average number of days hunted for each pronghorn harvested increased to 3.6, and was slightly above the five-year average (3.4 days). This average may suggest that pronghorn were less available in publically accessible portions of the herd unit in 2018. Hunter satisfaction decreased slightly with 94% of hunters reporting they were satisfied with their hunt in 2017 to 90% in 2018.

Population
In 2018, the "Constant Juvenile-Constant Adult Mortality Rate" (CJCA) spreadsheet model was selected again for the Big Creek herd unit because it produced the lowest AICc score. The population estimate from this model is likely underestimating the true number of pronghorn in this herd unit. The end of year density estimates developed from previous LT surveys appeared to overestimate actual pronghorn abundance in this herd unit. This model was rated as poor, and not biologically defensible in our evaluation. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model (Morrison 2012). The poor rating was primarily due to inadequate sample sizes for past preseason classification surveys and the likely violation of an assumption that this is a closed population. Interstate movement of pronghorn complicates

monitoring and subsequent management activities in this herd unit. Small sample sizes and interstate movements of pronghorn for this herd unit may produce bias in LT survey estimates. However, completing a LT survey for this herd unit should become a priority in the near future.

Management Summary

The increase in Type 6 license quota in 2017 was prescribed to reduce pronghorn numbers towards a more appropriate level in consideration of damage to alfalfa fields in the western part of the herd unit. It was anticipated that these damage concerns would continue in 2019, and as such the Type 6 licenses quota remained the same. Although the population model affords us little opportunity to get an accurate post hunt population estimate, this level of harvest should stabilize the population at, or slightly below, the population objective.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet Model for Ungulate Population data Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 41 pp.

Bibliography of Herd Specific Studies

None

2018 - JCR Evaluation Form

SPECIES: Bighorn Sheep
PERIOD: 6/1/2018 - 5/31/2019

HERD: BS516 - DOUGLAS CREEK

HUNT AREAS: 18
PREPARED BY: LEE KNOX

	2013 - 2017 Average	2018	2018 Proposed
Population:		N/A	N/A
Harvest:	1	0	
Hunters:	1	0	
Hunter Success:	100%	0%	CLOSED
Active Licenses:	1	0	
Active License Success:	100%	0%	
Recreation Days:	2	0	
Days Per Animal:	2	0	

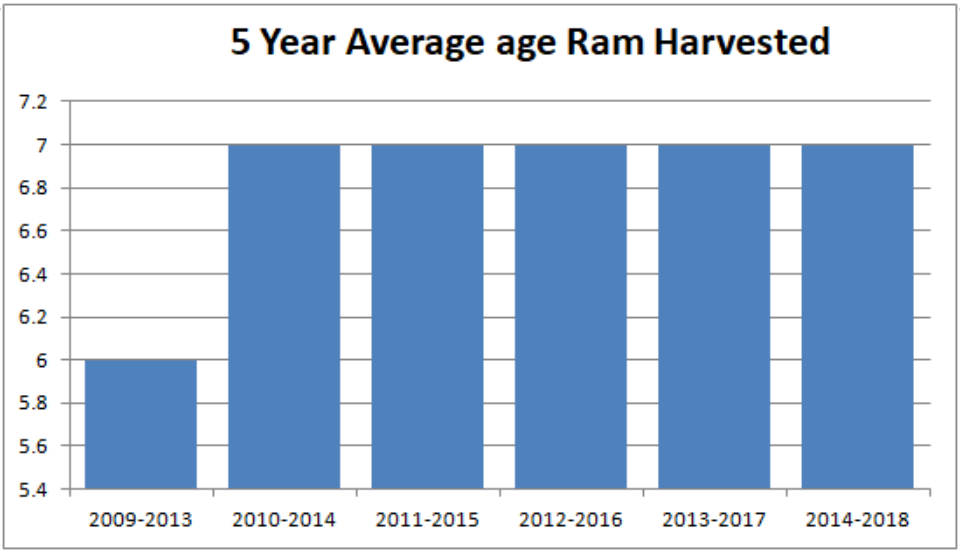
Limited Opportunity Objective:

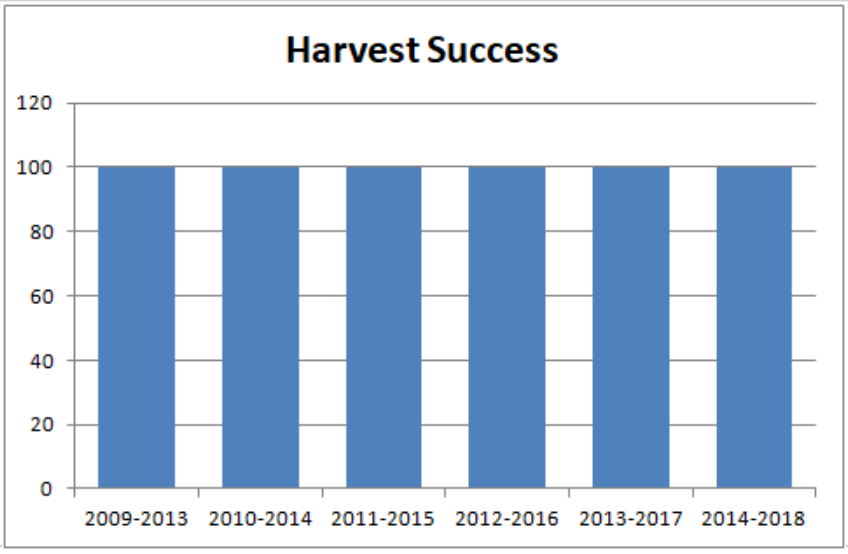
5-year average of > 75% hunter success

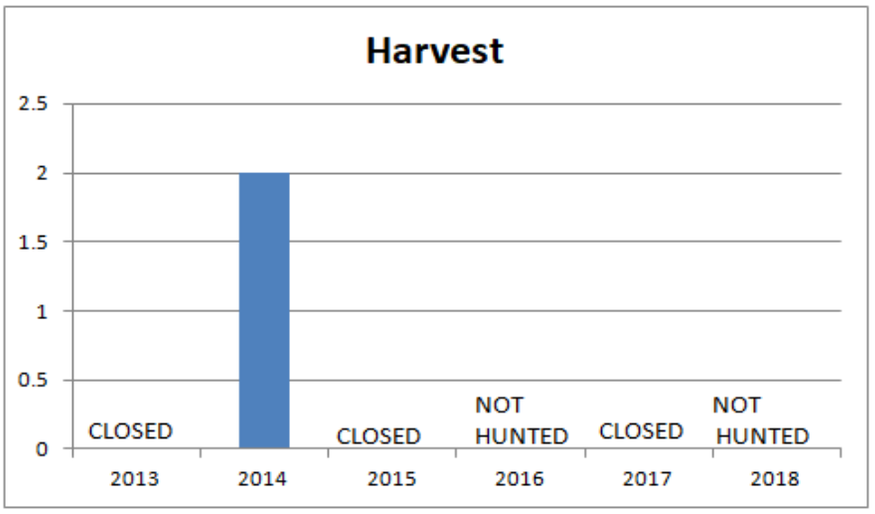
5-year average harvest age of 6-8 years

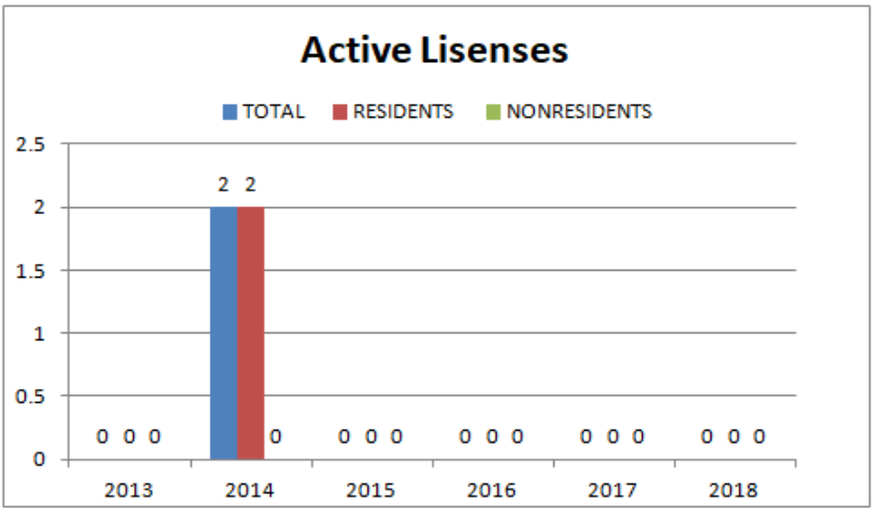
Secondary Objective:

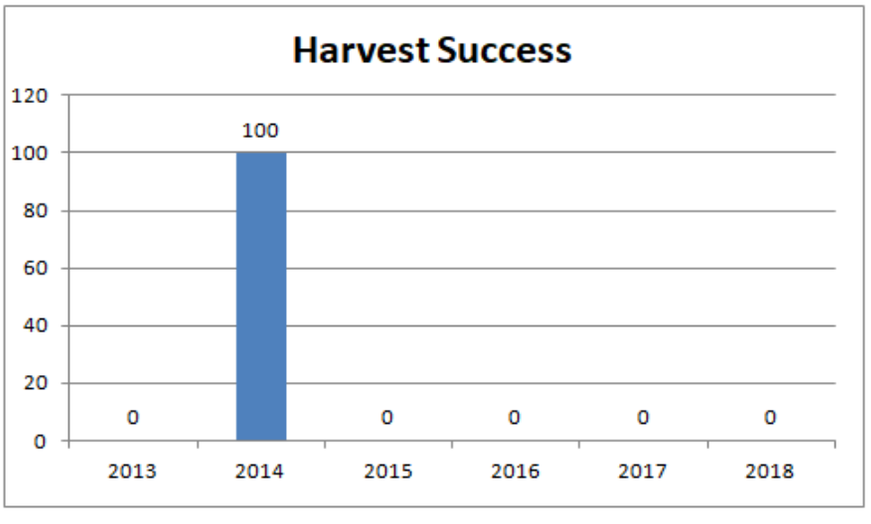
Management Strategy: Special

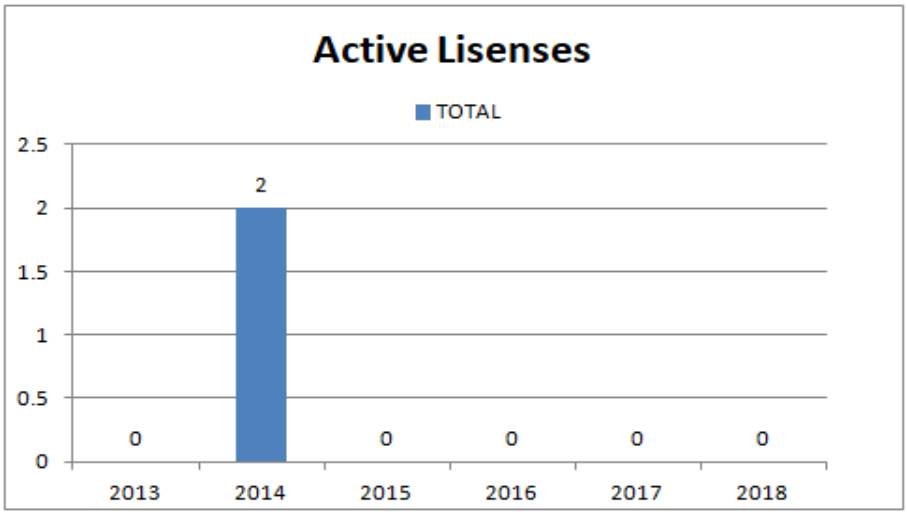


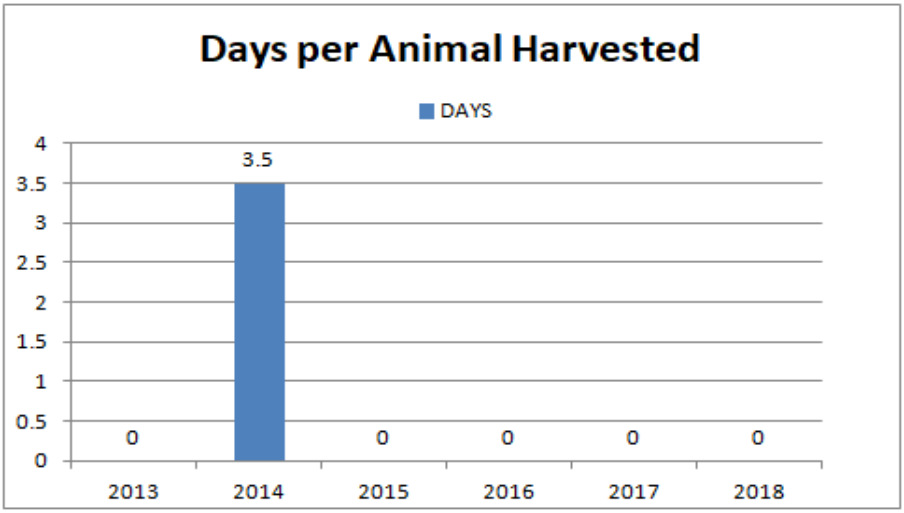

Harvest Success
120
100
80
60
40
20
0
2009-2013
2010-2014
2011-2015
2012-2016
2013-2017
2014-2018

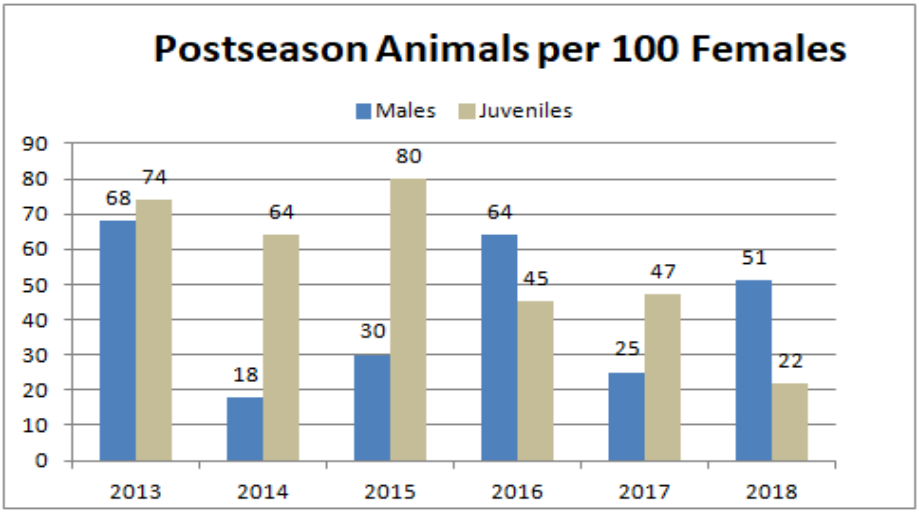

Harvest
2.5
2
1.5
1
0.5
0
CLOSED
CLOSED
NOT HUNTED
CLOSED
NOT HUNTED
2013
2014
2015
2016
2017
2018


Active Lisenses
TOTAL
RESIDENTS
NONRESIDENTS
2.5
2
1.5
1
0.5
0
2 2
0 0 0
0
0 0 0
0 0 0
0 0 0
0 0 0
2013
2014
2015
2016
2017
2018


Harvest Success
120
100
80
60
40
20
0
100
0
0
0
0
0
2013
2014
2015
2016
2017
2018


Active Lisenses
TOTAL
2.5
2
1.5
1
0.5
0
2
0
0
0
0
0
2013
2014
2015
2016
2017
2018


Days per Animal Harvested
DAYS
4
3.5
3
2.5
2
1.5
1
0.5
0
3.5
0
0
0
0
0
2013
2014
2015
2016
2017
2018


Postseason Animals per 100 Females
Males
Juveniles
90
80
70
60
50
40
30
20
10
0
68
74
18
64
30
80
64
45
25
47
51
22
2013
2014
2015
2016
2017
2018

2013 - 2018 Postseason Classification Summary

for Bighorn Sheep Herd BS516 - DOUGLAS CREEK

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	6	7	13	28%	19	41%	14	30%	46	0	32	37	68	± 0	74	± 0	44
2014	75	3	1	4	10%	22	55%	14	35%	40	0	14	5	18	± 9	64	± 19	54
2015	75	0	3	3	14%	10	48%	8	38%	21	0	0	30	30	± 21	80	± 41	62
2016	0	4	3	7	30%	11	48%	5	22%	23	0	36	27	64	± 33	45	± 26	28
2017	0	1	7	8	15%	32	58%	15	27%	55	68	3	22	25	± 0	47	± 0	38
2018	75	1	18	19	30%	37	58%	8	12%	64	0	3	49	51	± 0	22	± 0	14

2019 HUNTING SEASONS
DOUGLAS CREEK BIGHORN SHEEP (BS516)

Hunt Area	Type	Date of Seasons		Quota	License	Limitations
		Opens	Closes			
18,21	1	Sept. 1	Oct. 31	CLOSED	Limited quota	CLOSED

Area	Type	Changes from 2018
18,21	1	-2
Herd Unit Total	**1**	**-2**

Management Evaluation

2017 population estimate: 75

Current Management Objective:

1) **5-year running average of ≥ 75% hunter success**- 100%
2) **5-year running average age of harvested rams between 6 and 8 years of age**- 2012-2017 Average Age: 7 years old
3) **Documented occurrence of adult rams in the population**~ > 25 rams observed

Management Strategy: Special

The management objective for the Douglas Creek bighorn sheep herd unit was changed in 2016 from a post season population objective to limited opportunity that manages for the following objectives:

1) 5-year running average of ≥ 75% hunter success
2) 5-year running average age of harvested rams between 6 and 8 years of age
3) Documented occurrence of adult rams in the population

Herd unit Issues

The Douglas Creek herd unit is located primarily in the Savage Run and Platte River wilderness areas in the Snowy Range Mountains on the Medicine Bow National Forest. The herd is under special management guidelines to provide trophy opportunity to the public. Pine beetles have dramatically changed the landscape in the Medicine Bow National Forest where a large percentage of mature pines have died and are starting to fall over. At this time, the impacts to this herd from the pine beetle epidemic are unclear. Area 18 was closed from 2004 through 2007 and then again in 2009, 2011, 2013, 2015, and 2017 because this population has remained below desired levels. Licenses were offered in 2018 for one resident and one nonresident, however both hunters choose to hunt area 21, and did not hunt in 18. Hunt Area 18 will be closed in 2019.

Weather

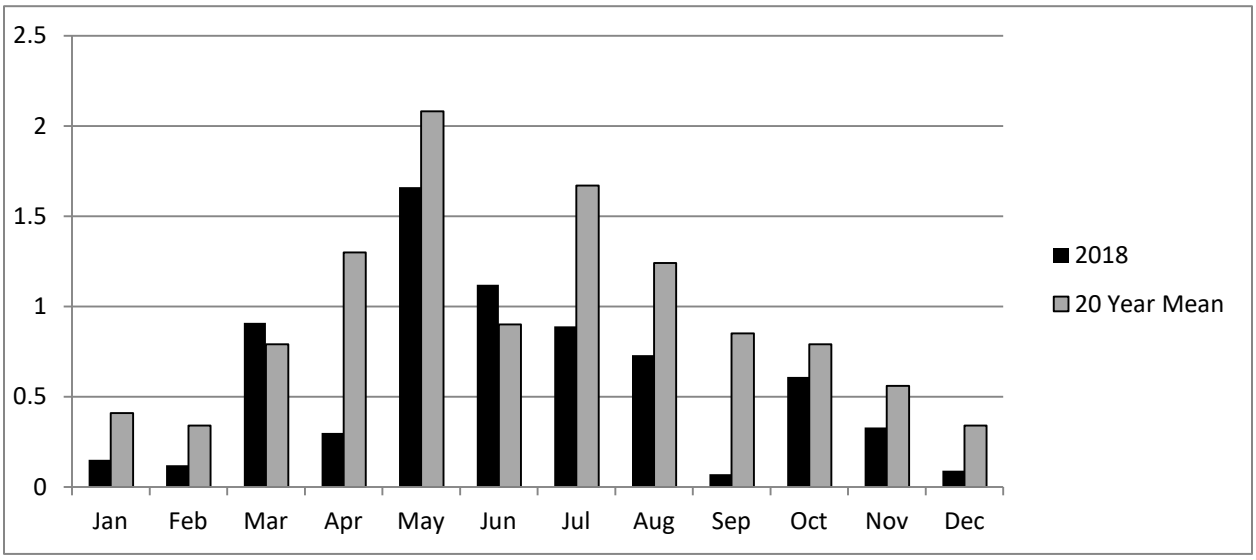


Figure 1. Monthly precipitation totals in inches for 2018 and the 20 year mean (1999-2019). Report was created at https://w2.weather.gov/climate/xmacis.php?wfo=cys using data collected at the Laramie Regional Airport.

Precipitation amounts were below average at all elevations throughout southeast Wyoming. No significant prolonged periods of extreme heat or cold temperatures were observed, or extreme or prolonged periods of snow loading in lower elevation winter ranges. Timing of precipitation and amounts received during key growth periods for cool season grasses and preferred transitional range and winter range shrub species was excellent. While early season growing conditions were optimal, late summer and fall precipitation were lacking.

Habitat

Precipitation received in April, May, and early June resulted in excellent growth of cool season grasses and forbs, and above average leader growth on preferred key shrubs in low elevations. At upper elevations, May, June, and July precipitation was also above average, and created favorable forage conditions. While early season growing conditions were optimal, late summer and fall precipitation were lacking. Conifer encroachment and windthrow of beetle-killed pine trees is suspected to, or likely will, have negative impacts on bighorn sheep movements and migrations. Cheatgrass prevalence at lower elevations is also concerning to habitat managers, particularly on south facing aspects in the Platte Valley.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality. Data should not heavily influence population management in the Douglas Creek herd unit.

Field Data

We have very little data on this population. The general public provides few reports during the summer and hunting seasons. Field personnel make an effort to document the status of segments of the herd during other big game surveys and an annual winter ground survey. Past observation data consistently documents low post-weaning lamb survival. Poor habitat quality, lack of habitat, and the lack of well-defined seasonal migrations, and perhaps lingering effects of Pasteurellosis or some other disease may be stagnating this population. In December, 64 sheep

were classified with a lamb to ewe ratio of 22:100, low even in this herd unit. Nineteen rams were also documented on that flight, for a ratio of 51 rams: 100 does. This winter 10 ewes were caught, sampled and collared (9 were collared) for disease as part of a state wide disease surveillance in bighorn sheep. While capturing sheep, the crew documented 25 rams by the A Bar A ranch, with an additional 4 at the state line.

Harvest Data
In 2016, two licenses were issued for one nonresident and one resident, valid in Hunt Areas 18 and 21; however the two hunters choose not to hunt in 18. Two rams were harvested in Hunt Area 21. The herd unit was closed in 2017. In 2018 the herd unit was open for two residents. Both rams were harvested in Hunt Area 21. The Last Ram harvested in Hunt Area 18 was in 2014.

Population
Data is not adequate for developing a reasonable population model. We are unable to collect the data needed to reliably estimate the population size of this sheep herd. This herd remains stagnate. The population and distribution of sheep has shrunken considerably over the last 20+ years for unclear reasons. With field data and public reports, it's reasonable to estimate this population between 70-100 sheep.

Management Strategy
The season is open for 2 rams every other year to maintain the opportunity to harvest a 6 year or older age class ram, which is specified by the special management guidelines. The season will be Closed in 2019.

2018 - JCR Evaluation Form

SPECIES: Bighorn Sheep

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

HERD: BS517 - LARAMIE PEAK

HUNT AREAS: 19

PREPARED BY: MARTIN HICKS

	2013 - 2017 Average	2018	2019 Proposed
Population:		N/A	N/A
Harvest:	6	9	8
Hunters:	7	9	8
Hunter Success:	86%	100%	100 %
Active Licenses:	7	9	8
Active License Success:	86%	100%	100 %
Recreation Days:	79	83	80
Days Per Animal:	13.2	9.2	10

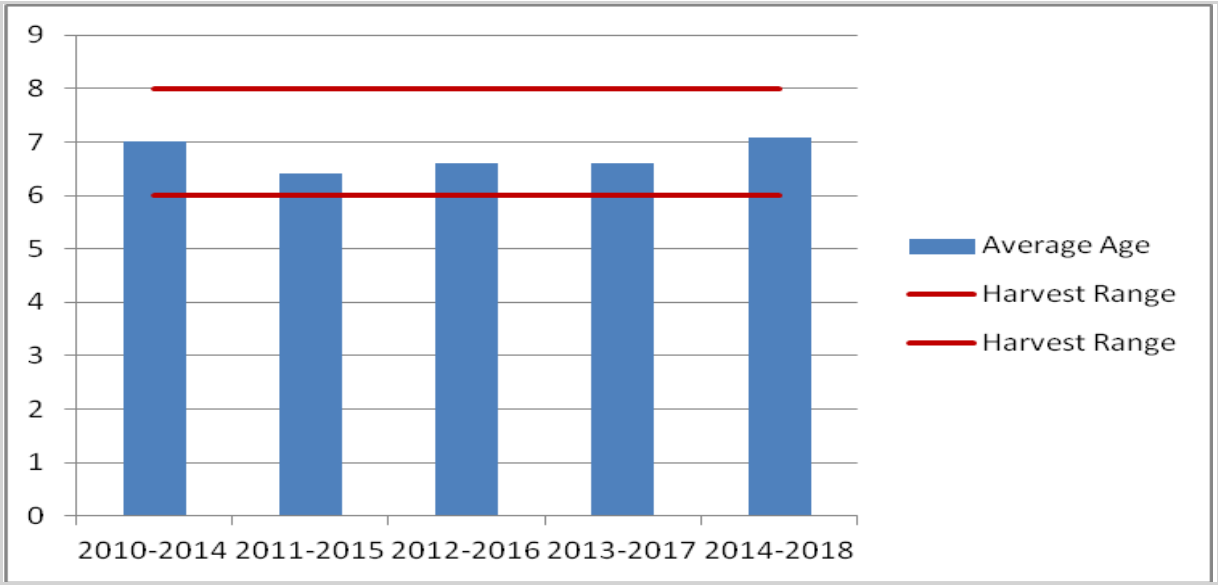
Limited Opportunity Objective:

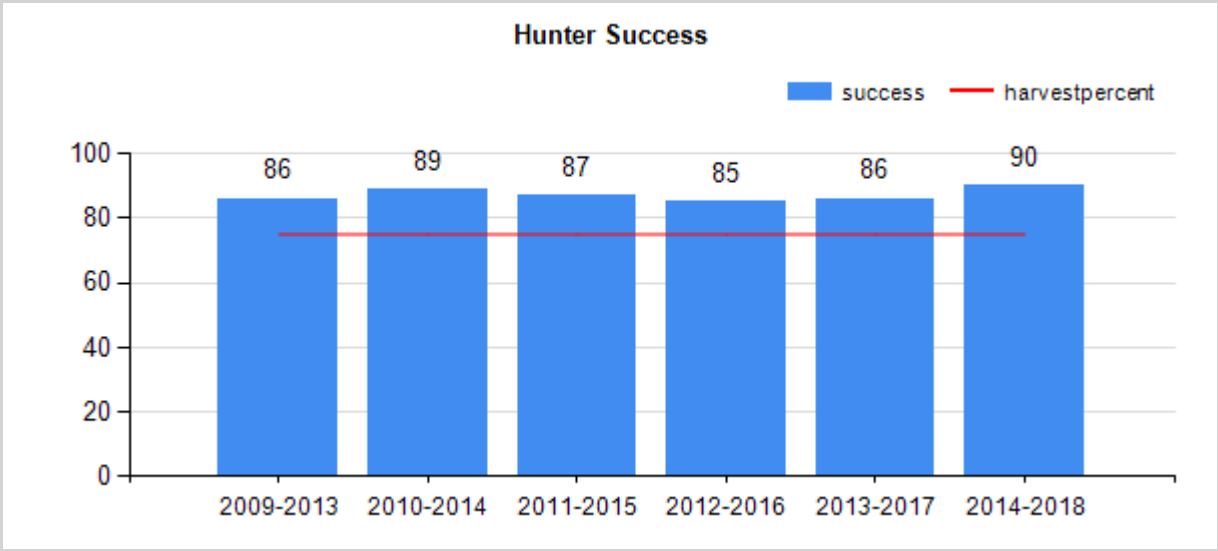
5-year average of > 75% hunter success

5-year average harvest age of 6-8 years

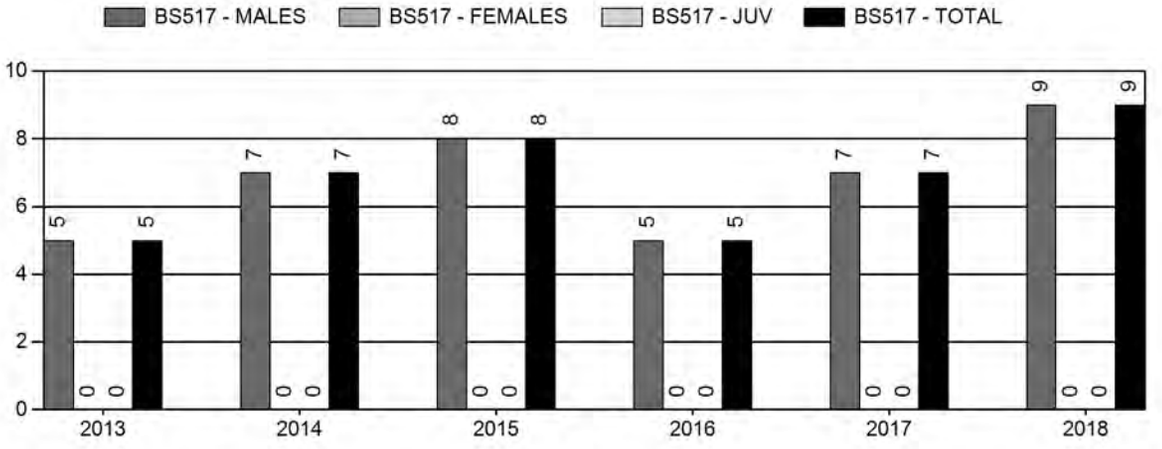
Secondary Objective:

Management Strategy: Special

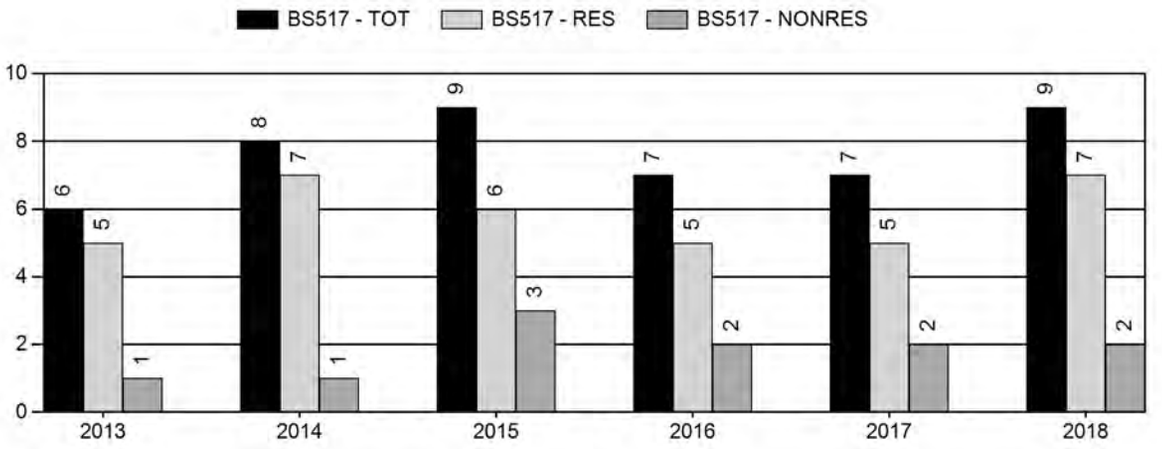



Hunter Success
success
harvestpercent
100
80
60
40
20
0
86
89
87
85
86
90
2009-2013
2010-2014
2011-2015
2012-2016
2013-2017
2014-2018

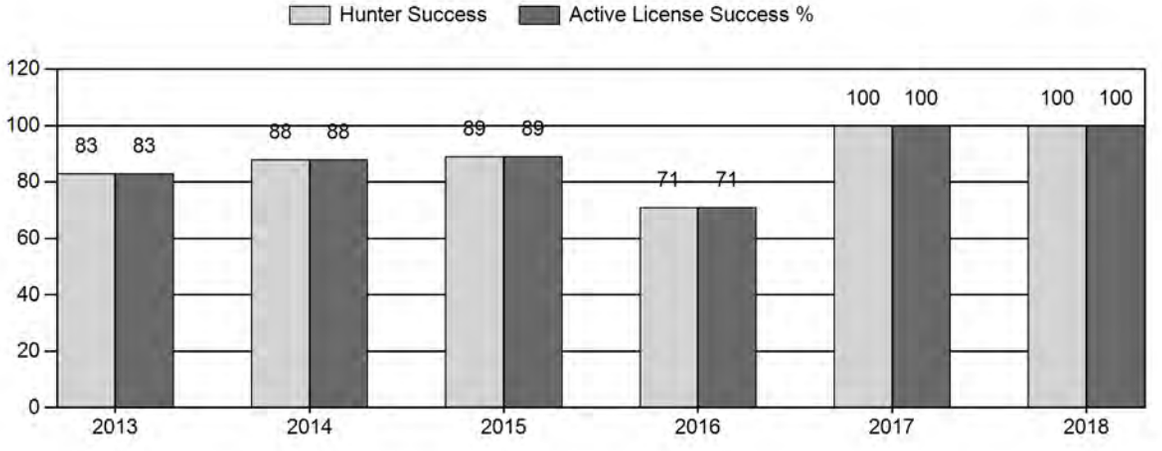
Harvest



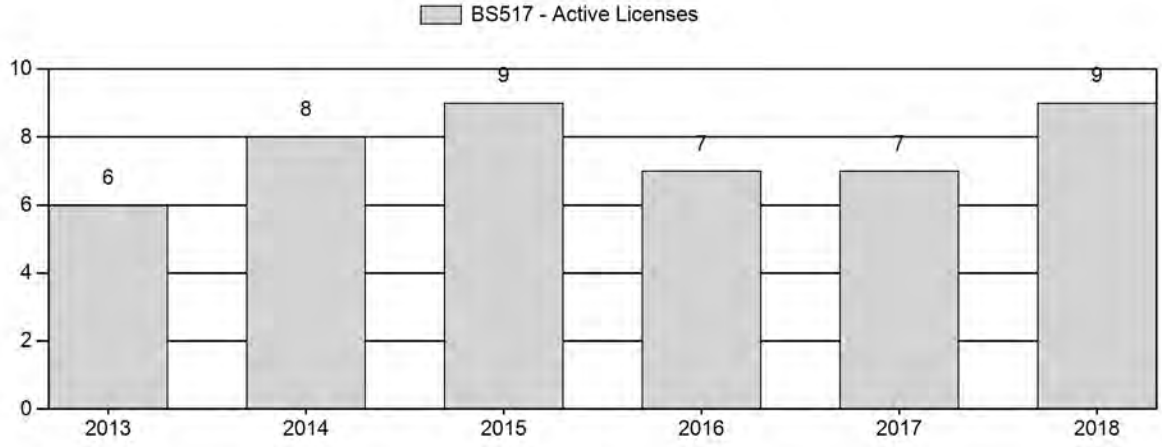
Number of Active Licenses



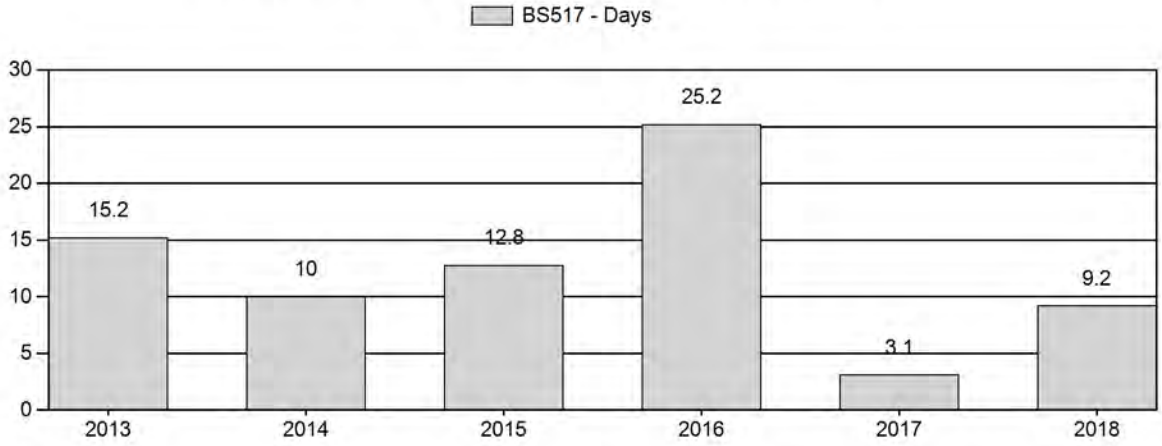
Harvest Success



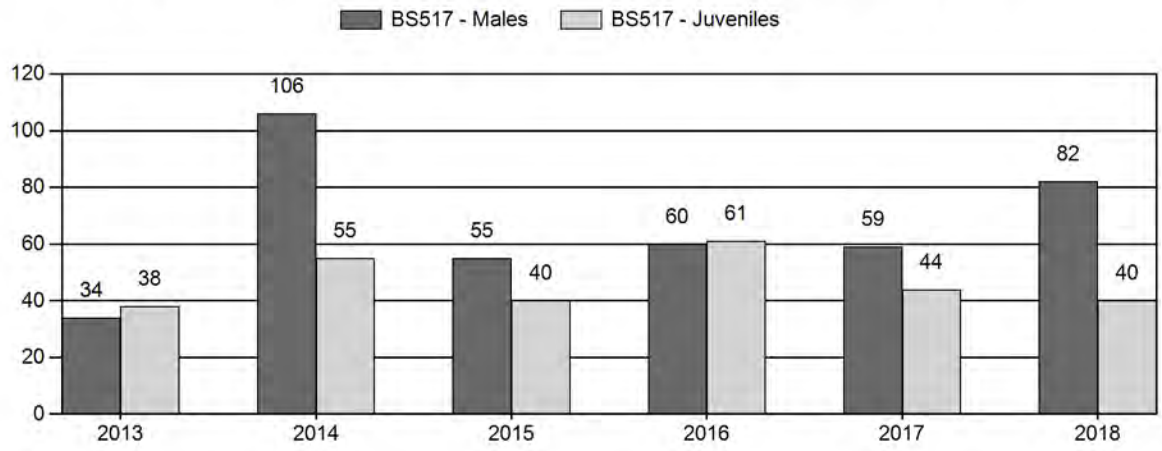
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Bighorn Sheep Herd BS517 - LARAMIE PEAK

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	7	16	23	20%	68	58%	26	22%	117	0	10	24	34	± 0	38	± 0	29
2014	0	8	25	33	41%	31	38%	17	21%	81	0	26	81	106	± 0	55	± 0	27
2015	0	2	21	23	28%	42	51%	17	21%	82	0	5	50	55	± 0	40	± 0	26
2016	0	10	30	40	27%	67	45%	41	28%	148	0	15	45	60	± 0	61	± 0	38
2017	0	5	30	35	29%	59	49%	26	22%	120	0	8	51	59	± 0	44	± 0	28
2018	0	9	28	37	37%	45	45%	18	18%	100	0	20	62	82	± 0	40	± 0	22

2019 HUNTING SEASONS
LARAMIE PEAK BIGHORN SHEEP HERD (BHS517)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
19	1	Sept. 1	Oct. 31	8	Limited quota	Any ram

Special Archery Season Hunt Areas	Opening Date	Closing Date	Limitations
19	Aug. 15	Aug. 31	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
19	1	0

Management Evaluation

Current Management Objective:

1) **5-year running average of ≥ 75% hunter success**- 90%
2) **5-year running average age of harvested rams between 6 and 8 years of age**- 2014-2018 Average Age: 7 years old
3) **Documented occurrence of adult rams in the population**- 37

Management Strategy: Recreational

Herd Unit Issues

The management objective for the Laramie Peak Bighorn Sheep herd was a post-season population objective of 500 wild sheep. The management strategy is recreational management. The objective and strategy were last revised in 1978. The population objective was reviewed during the winter/spring of 2014 and will be reviewed again in 2019. Based on department staff, landowner, and public comments the following population management alternative objectives were approved by the WGFD Commission:

1) 5-year running average of ≥ 75% hunter success
2) 5-year running average age of harvested rams between 6 and 8 years of age
3) Documented occurrence of adult rams in the population

The Laramie Peak Herd Unit is comprised of 70% private land. The southern portion (south of WY Hwy 34) is over 90% private land. Hunters can expect to pay a trespass/trophy or outfitter fee to hunt on private land. There are two state sections that hunters can access that hold sheep throughout the season and have produced adult rams in past hunting seasons. A portion of occupied sheep habitat was within the 2012 Arapahoe fire that burned over 98,000 acres. This affected sheep distribution post-fire, but above average summer/fall precipitation in 2013 and spring precipitation in 2014 resulted in increased vegetation production for pre-winter diets and early spring green up that will benefit parturition areas for pregnant ewes. The fire will have long-term benefits for wild sheep, but initially there has been a flush of noxious weeds (e.g. cheatgrass, Canada thistle) that land managers will need to address.

A majority of wild sheep are harvested within the northern portion of the herd unit. The Laramie Peak Wildlife Habitat Management Unit is essential for sheep habitat and harvest where 200 plus sheep inhabit. In 2007 forty-two sheep were released in this area from the Perma-Paradise Herd in Montana. These sheep have thrived and improved the overall genetics and health of the existing herd.

During the winter of 2018/19 the WGFD did aerial capture 16 female wild sheep to finish up the state-wide disease surveillance research. Of those 16 sheep captured 15 were fitted with GPS satellite radio collars. Biological samples were collected on all sheep, 6 from Sybille Canyon and 10 from Duck Creek. The herd objective was reviewed in 2019 and there were no changes.

Weather

Weather in this herd unit was relatively normal during the past bio-year. Precipitation amounts were average throughout most elevations throughout southeast Wyoming during spring months then became dry and hot from July through October. Higher elevations (>8,000 ft) did start to receive snow in November and December. High wind events coupled with periods of extreme cold temperatures did occur throughout winter months which most likely had a negative effect on wild ungulates. Timing of precipitation and amounts received during key growth periods for cool season grasses and preferred transitional range and winter range shrub species was slightly above average. While early season growing conditions were adequate, late summer and fall precipitation were lacking. Generally speaking weather patterns most likely had a positive influence on all big game species. For specific meteorological information for the Laramie Peak herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat

Forage availability in 2018 was similar to 2017 based on NOAA weather data. Precipitation was similar to the long-term average which produced adequate forage for lactating ungulates. Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500'. Its presence ties the hands of habitat managers limiting habitat enhancement options, and may result in reduced carrying capacities of rangelands if it is the predominant species.

Cheatgrass prevalence at lower elevations such as Sybille Canyon and areas burned by the Arapaho Fire of 2012 is concerning to habitat managers. While wildfires have reduced conifer canopies in the Laramie Range, deemed to be largely conducive to bighorn sheep movements and migrations, the prevalence of cheatgrass is cause for concern. In Summer 2015, Colorado State University natural resource program scientists worked cooperatively with WGFD and USFS personnel to map cheatgrass infestations via satellite imagery and on-the-ground vegetation sampling efforts. Future herbicide applications to control cheatgrass will likely be largely based off of this data. With recent completion of an Environmental Assessment by the USFS, options have expanded greatly to control cheatgrass, including aerial application of herbicides.

There were two wild fires that occurred within bighorn sheep habitat in 2018. The Britania fire burned approximately 30,000 acres and the School Creek fire burned 320 acres. Both fires are

concerning because of the potential for cheatgrass invasion. Funding has been submitted to six different entities in the amount of $100,000 that would be used for aerial application of the herbicide Plateau to control 4,000 acres of cheatgrass. If funded application period would be August 15-September 15, 2019.

Field Data

In 2018 there were 9 out of the 9 bighorn sheep harvested (one license carry over from 2018) with an average age of 8.4 years old for a 100% success rate. The five-year average is slightly lower at 7 years old and the five-year running success average is 90%, which met the two alternative objective criteria.

Since 1964 there have been a total of 228 wild sheep released from two herd sources: Whiskey Mountain in Wyoming and Perma-Paradise in Montana (Table 1). These transplants have helped to supplement the herd and improve overall herd health.

Table 1. Transplant release data for the Laramie Peak Bighorn Sheep Herd.

Year	Number	Release Location	Source Herd
1964	40	North Laramie River Canyon	Whiskey Mountain Herd
1965	36	Labonte Canyon	Whiskey Mountain Herd
1966	21	Labonte Canyon	Whiskey Mountain Herd
1973	42	Duck Creek Canyon	Whiskey Mountain Herd
1982	27	Marshall	Whiskey Mountain Herd
1989	20	Marshall	Whiskey Mountain Herd
2007	42	Hay Canyon	Perma-Paradise- MT
Total	228		

Lamb recruitment continues to improve compared to ratios prior to the 2007 release. There were a total of 100 wild sheep classified in 2018 with lamb ratios of 40 lambs:100 ewes which was slightly lower than the 5-year average (47 lambs:100 ewes) but still way higher prior to the 2007 release. In 2018 the post-season male ratios were 82 rams:100 ewes, which was significantly higher than the 5-year average of 62 rams:100 ewes. The yearling ram ratio (20 yearling rams:100 ewes) was higher than the 5-year average (13 yearling rams:100 ewes). Based on surveys there is a well represented number for each age class. Several 8+ old rams were observed in the Duck Creek sub-herd.

In February 2017 six ewes were collared and disease samples collected from the Iron Mountain sub-herd. Year-round collar data overlaps the areas that were treated with prescribed fire in 2010 and 2014 demonstrating the importance fire plays in habitat enhancement (Figure 1). From October to December 2018 there were three mortalities. Cause of death is unknown but they died within 1 mile of each other.

In January 2019, 16 female bighorn sheep were captured within the Laramie Peak Herd unit, which was part of the state-wide disease surveillance program. Results of the biological samples taken are unknown at this time, but will be available by the 2019 JCR reporting period to determine overall herd health. There were 6 ewes captured within the Sybille Canyon sub-herd and 10 ewes captured within the Duck Creek sub-herd with one mortality on Feb 4 (cause

unknown) and one collar malfunctioning so only 8 collars remain active at this time. Movement data has shown they have not traveled far from the capture site (Figures 2 and 3). These sheep will be continued to be monitored throughout the year particularly during lambing periods and winter to obtain post-season classifications.

Figure 1. Data points from six different female bighorn sheep (Jan 2018 - Feb 2019) that overlap two prescribed burns (dark blue polygon) within the Iron Mt sub-herd.

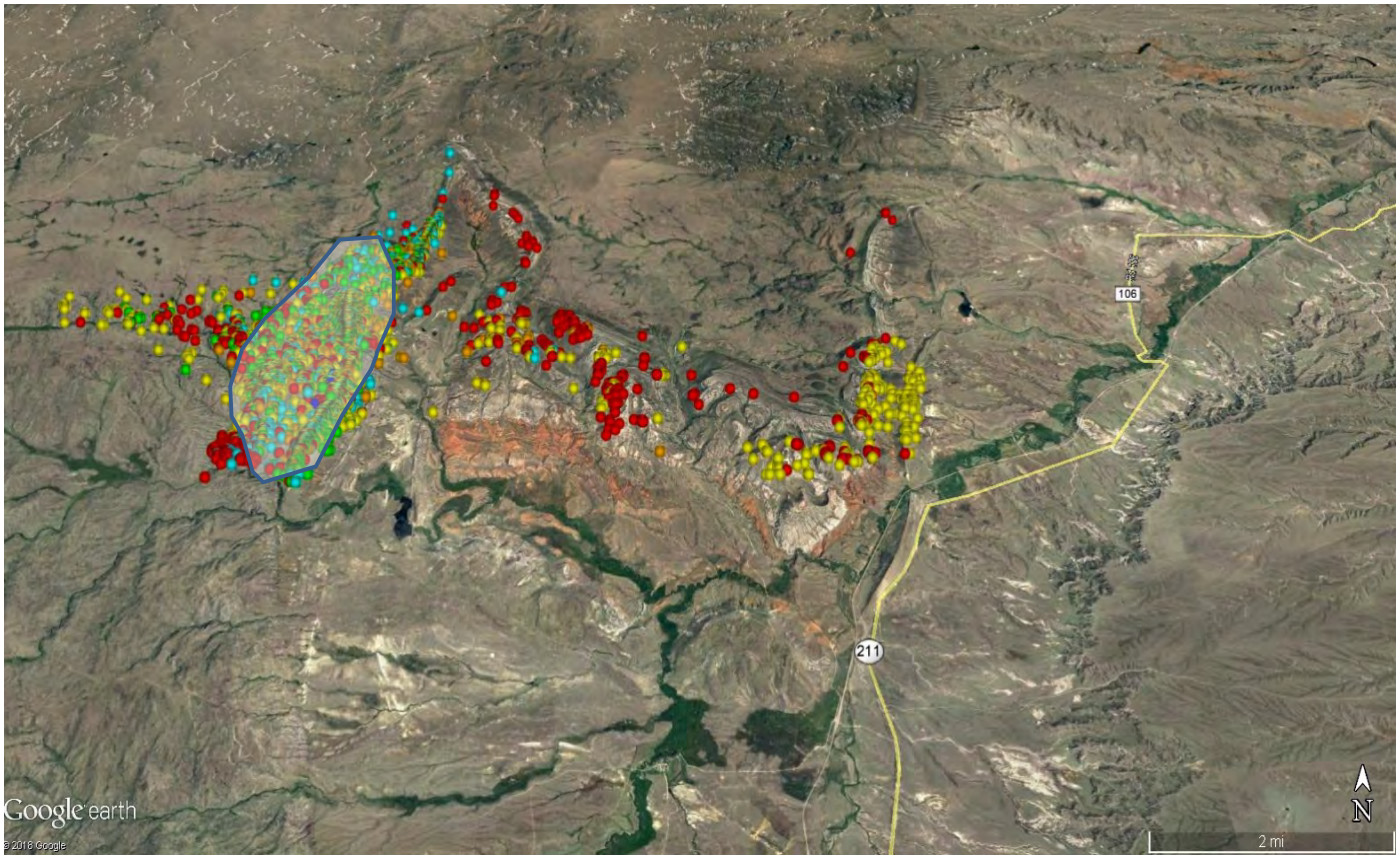


Figure 2. Data points from five bighorn sheep ewes within Sybille Canyon from Jan 20-Feb 12, 2019.

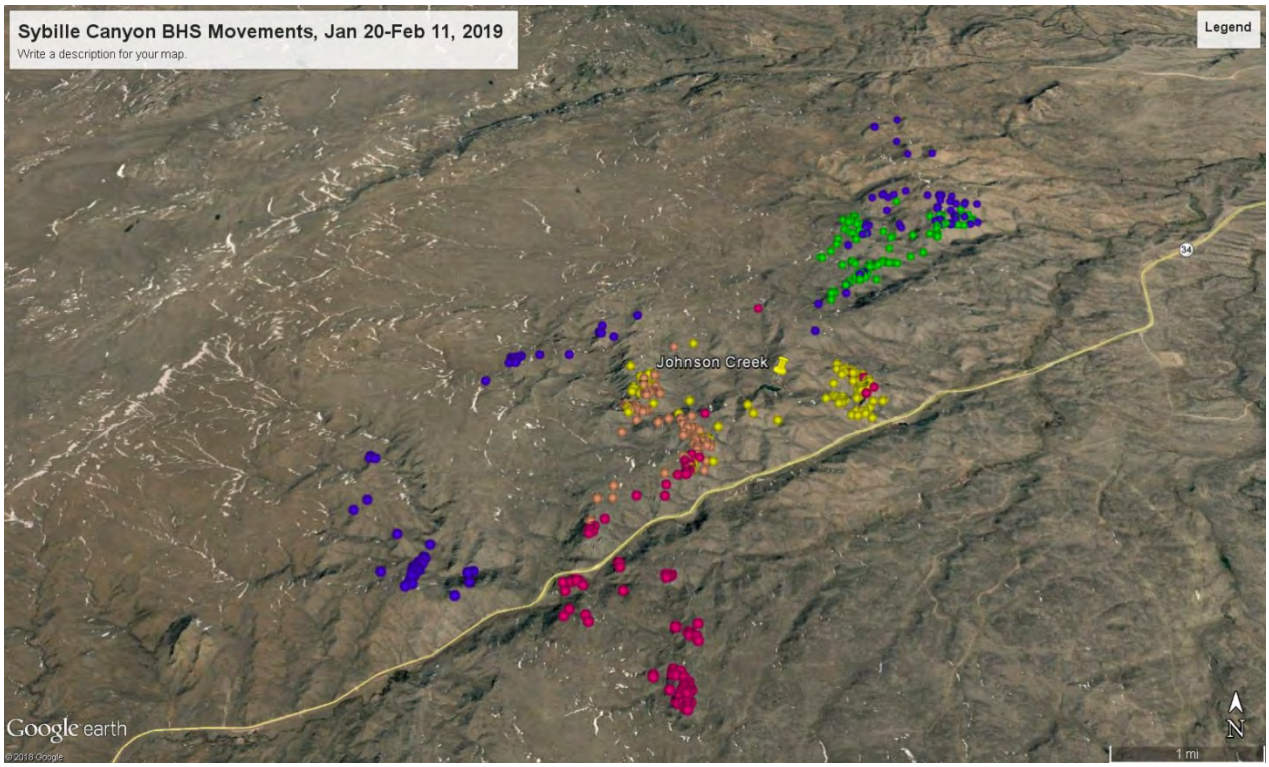
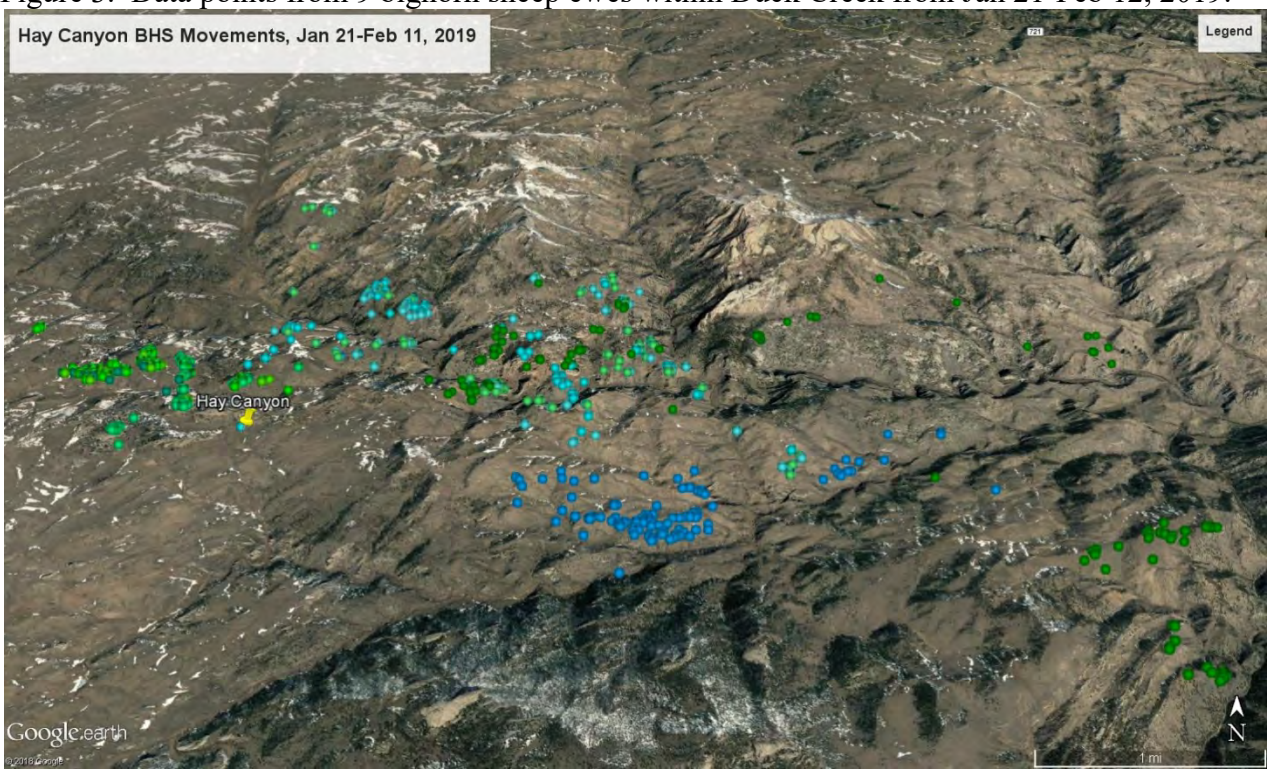


Figure 3. Data points from 9 bighorn sheep ewes within Duck Creek from Jan 21-Feb 12, 2019.



Harvest Data

This was the second year harvest success reached 100% since 2010. There was one carry over license due to a medical hardship for a total of nine rams harvested. There were two 11 year old rams harvested, one that scored 191" under the Boone and Crocket Scoring system (Figure 4), which is the third largest ram harvested in Wyoming all time. The other 11 year old ram was one that was brought in from Montana as a lamb in 2007. In 2018 hunters were willing to put in the time to scout and effort it takes to harvest a ram in Hunt Area 19. The majority of harvest came from Duck Creek (7/9 rams) with two within Sybille Canyon. It was also apparent that hunters took time to scout given the average number of days to harvest a ram was 9.2 days, slightly below the five-year average of 13.2 days per harvest. Three of the hunters went with an outfitter and three were local that knew the country and took the time to scout during the summer.

The Laramie Peak bighorn sheep season has run from September 1-October 31 for the past 27 years. Prior to that, the season ran from September 1- October 14. The increased season length appears to provide adequate opportunity to harvest a ram, given this is typically a once in a lifetime license.

In 2012 there were several fires that burned within bighorn sheep occupied habitat. The Arapahoe, Cow Camp, and Russell's Camp fires burned over 112,000 acres, with the Arapahoe fire being the largest (98,000 acres). Throughout the area there is observed recovery in vegetation. Photo points have been established throughout the fire to document plant succession. Perennial forbs and grasses along with aspen have re-established post-fire. The Britania fire (30,000 acres) and School Creek fire (320 acres) should also benefit bighorn sheep in the future. The major obstacle will be cheatgrass control within the burned areas. If funding is available, treatments will start in the fall of 2019 to control this noxious weed.

There is not a reliable working model for this herd unit due to limited population data collected on an annual basis.

We are maintaining this herd at the current objective and management strategy based on internal discussions and conversations with our constituents. We evaluated and considered population status and habitat data included in this document and a change is not warranted at this time. We will review this herd objective again in 2024; however, if the situation arises that a change is needed, we will review and submit an updated proposal.

Management Summary

For the 2019 season, 8 licenses will be offered for any ram. Given previous harvest statistics, fire activity and current ram ratios hunters should have a high probability of harvesting a mature ram.

2018 - JCR Evaluation Form

SPECIES: Bighorn Sheep

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

HERD: BS519 - ENCAMPMENT RIVER

HUNT AREAS: 21

PREPARED BY: TEAL CUFAUDE

	2013 - 2017 Average	2018	2019 Proposed
Population:		N/A	N/A
Harvest:	0	2	0
Hunters:	0	2	0
Hunter Success:	0%	100%	0 %
Active Licenses:	0	2	0
Active License Success:	0%	100%	0 %
Recreation Days:	4	16	0
Days Per Animal:	0	8	0

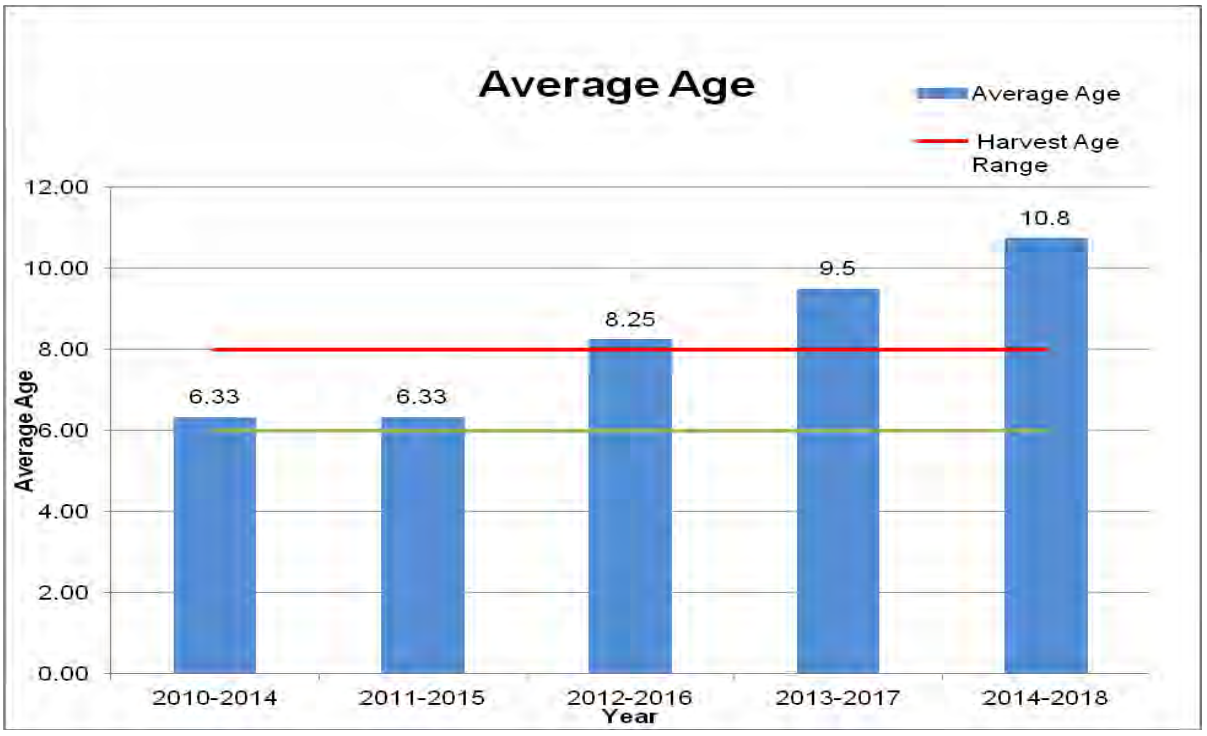
Limited Opportunity Objective:

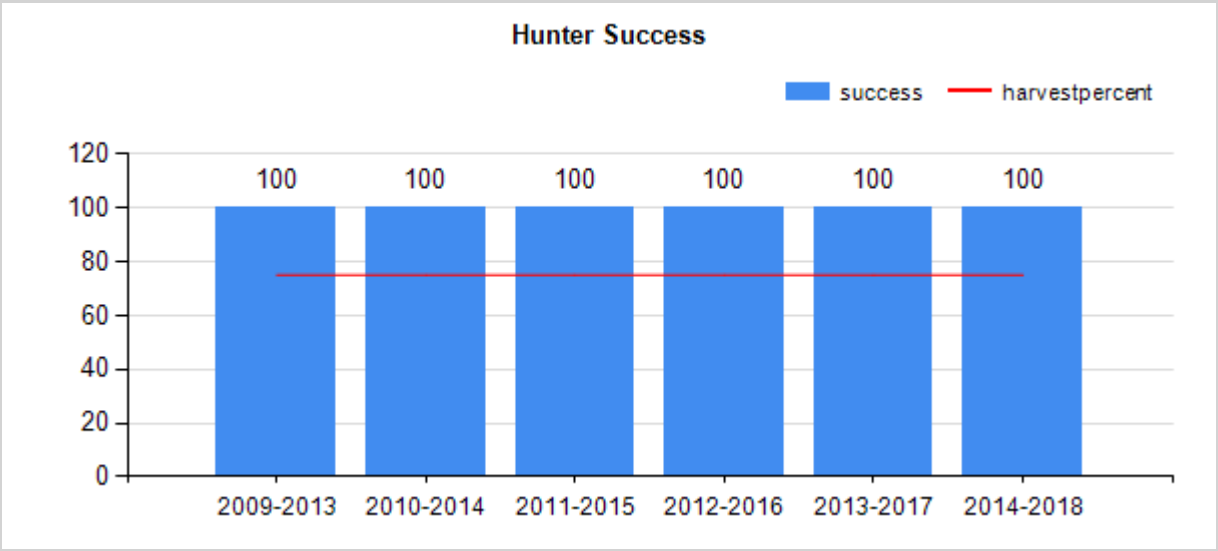
5-year average of > 75% hunter success

5-year average harvest age of 6-8 years

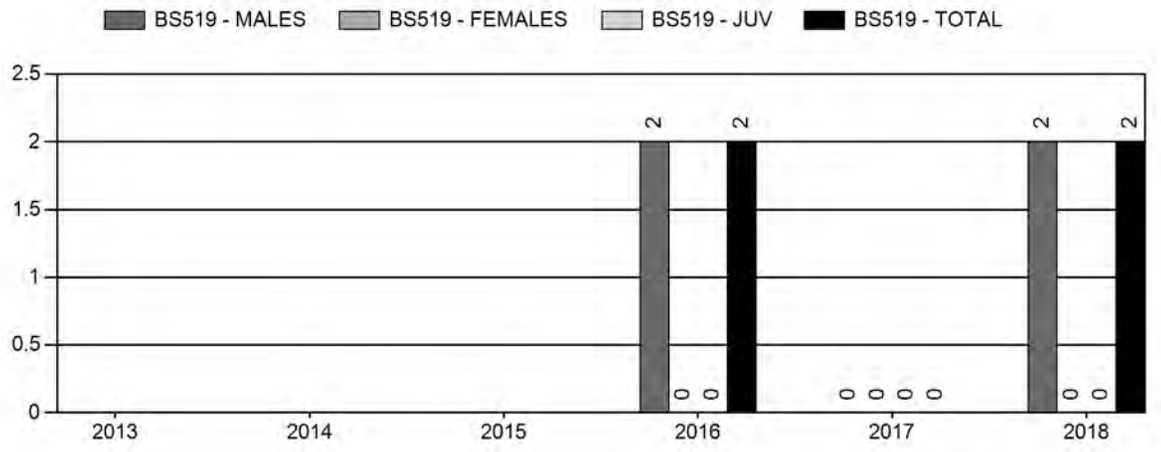
Secondary Objective:

Management Strategy: Special

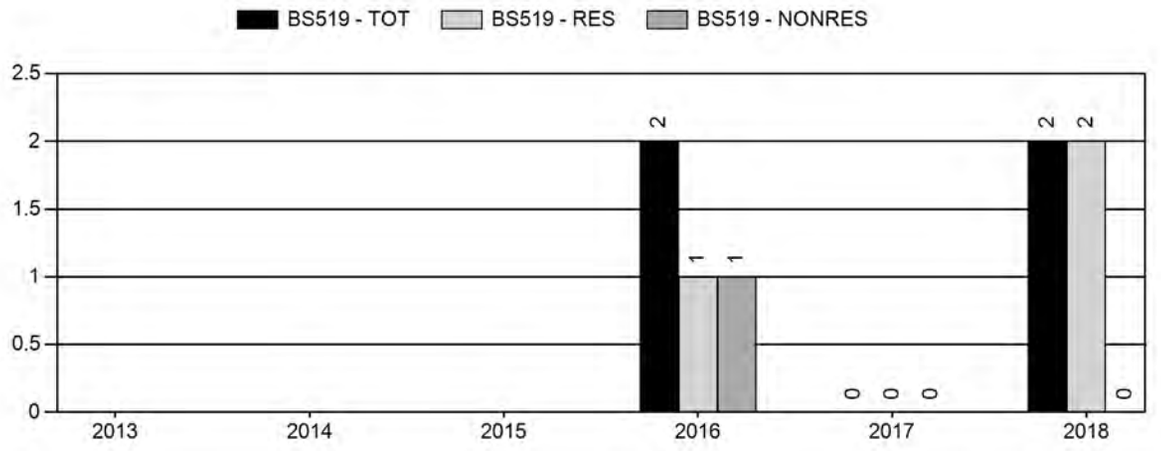



Hunter Success
success
harvestpercent
120
100
80
60
40
20
0
100
100
100
100
100
100
2009-2013
2010-2014
2011-2015
2012-2016
2013-2017
2014-2018

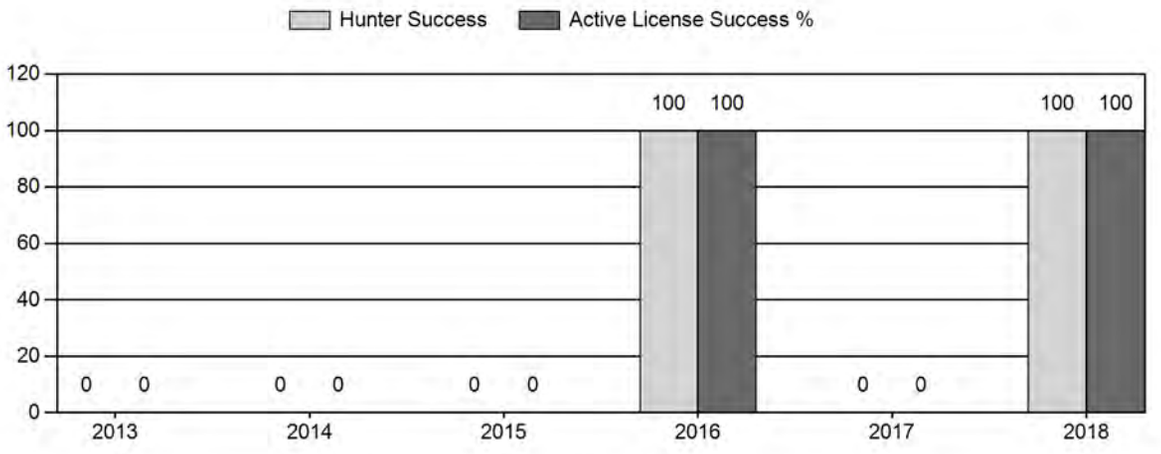
Harvest



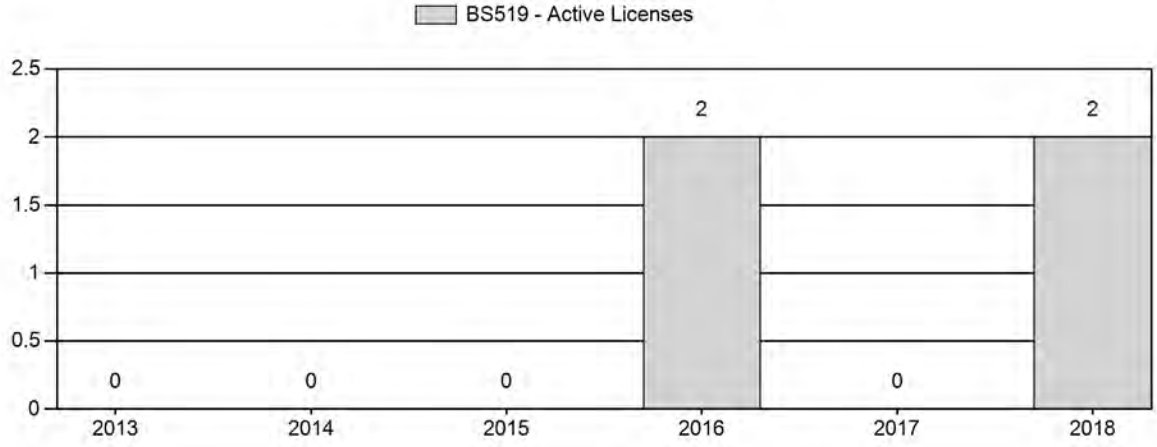
Number of Active Licenses



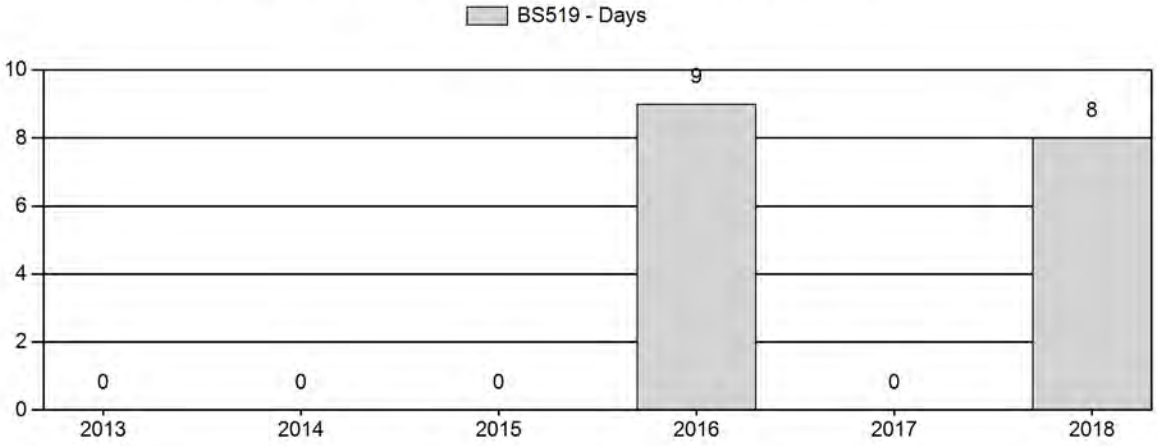
Harvest Success



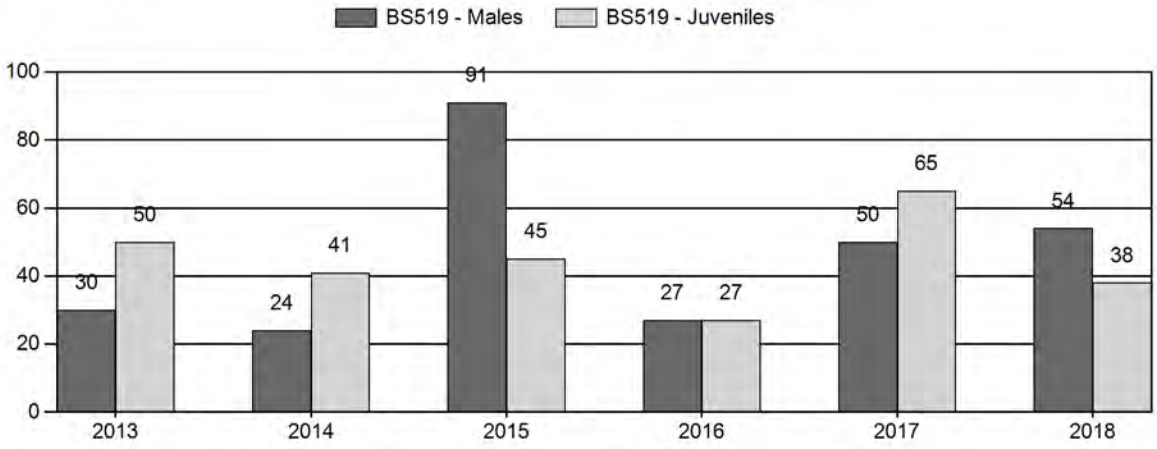
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Bighorn Sheep Herd BS519 - ENCAMPMENT RIVER

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	0	3	3	17%	10	56%	5	28%	18	0	0	30	30	± 0	50	± 0	38
2014	0	1	3	4	14%	17	61%	7	25%	28	0	6	18	24	± 0	41	± 0	33
2015	0	2	8	10	38%	11	42%	5	19%	26	47	18	73	91	± 0	45	± 0	24
2016	0	1	3	4	17%	15	65%	4	17%	23	0	7	20	27	± 0	27	± 0	21
2017	0	2	8	10	23%	20	47%	13	30%	43	0	10	40	50	± 0	65	± 0	43
2018	0	0	7	7	28%	13	52%	5	20%	25	0	0	54	54	± 0	38	± 0	25

2019 HUNTING SEASON RECOMMENDATIONS
Encampment River Bighorn Sheep (BS519)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
18,21	1					~~Any ram (2 residents)~~ CLOSED

Hunt Area	License Type	Quota change from 2018
18,21	1	-2
Herd Unit Total	**1**	**-2**

Management Evaluation

Current Management Objective: Bighorn Sheep Limited Opportunity

1) 5-year running average of >75% hunter success
   - Currently Met: 2014-2018 Hunter Success- 100%
2) 5-year running average age of harvested rams between 6 and 8 years of age, and
   - Currently Met: 2014-2018 Harvest Mean Age- 10.8 years of age
3) Documented occurrence of adult rams in the population.
   - Currently Met: >7 adult rams observed in 2018

Management Strategy: Special

Based on Wyoming Game and Fish Department (WGFD), landowner, and public comments the objective for the Encampment River Bighorn Sheep herd was changed from a postseason population objective to the Bighorn Sheep Limited Opportunity Objective in 2016. The management strategy for this herd is classified as special (mean age of harvested rams between 6-8 years of age). The Encampment River Bighorn Sheep herd provides limited hunting opportunities. Challenging terrain, weather, and budgetary constraints have resulted in minimal population monitoring data collection in this herd unit. Annual classification data has been collected opportunistically in conjunction with deer and elk surveys. A population model has not been constructed for the herd unit.

Herd Unit Issues

Bighorn sheep were reintroduced in the Encampment River area, south of Encampment, in 1977. Bighorn sheep numbers in this herd unit appeared to peak at approximately 130 bighorn sheep, in the early-1980s. Bighorn sheep numbers in this herd unit have been in decline since the early 1980s. The lack of a rebound in numbers has been primarily attributed to decadent habitat. Domestic sheep grazing on United States Forest Service (U.S.F.S) lands within the western half

of the herd unit and the potential for comingling and disease transmission have ultimately limited attempts to actively increase bighorn sheep numbers either through additional habitat improvement or supplemental transplants. The population is now at such a low number it is assumed natural recovery is limited. Harvest opportunities have been offered every other year for the past decade in combination with the Douglas Creek Bighorn Sheep herd unit (BS516).

In 2013, the State of Wyoming, and thus WGFD, intervened on behalf of the U.S.F.S, in the United States District Court petition for judicial review, BIODIVERSITY CONSERVATION ALLIANCE vs. BUTCH BLAZER, et al. In 2017, Judge Alan B. Johnson ordered the petition for judicial review be denied. The Deputy Under Secretary's decision to uphold the Medicine Bow National Forest Revised Land and Resource Management Plan concerning the issue of bighorn sheep viability was affirmed.

Weather

The 2017-18 winter was mild with below average snowpack and was relatively favorable to wildlife. The spring of 2018 was dry, resulting in slow plant growth and green-up of rangelands. The majority of the summer and fall were extremely dry, causing much of the available forage to cure. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided bighorn sheep with a valuable boost in nutrition prior to the winter of 2018-19. While there have been several notable snow storms and cold snaps during the winter of 2018-19, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Fairly average bighorn sheep survival is expected for the winter of 2018-19.

Temperature and precipitation data was obtained for the National Oceanic and Atmospheric Administration (NOAA), https://w2.weather.gov/climate/xmacis.php?wfo=cys to illustrate weather conditions thus far, during bio-year 2018 (Figures 1 and 2). These figures also include data from January-May of bio-year 2017 to describe the weather conditions immediately preceding bio-year 2018.

Figure 1. January 2018 - January 2019 mean monthly temperatures and 20-year monthly means for Rawlins, Wyoming.

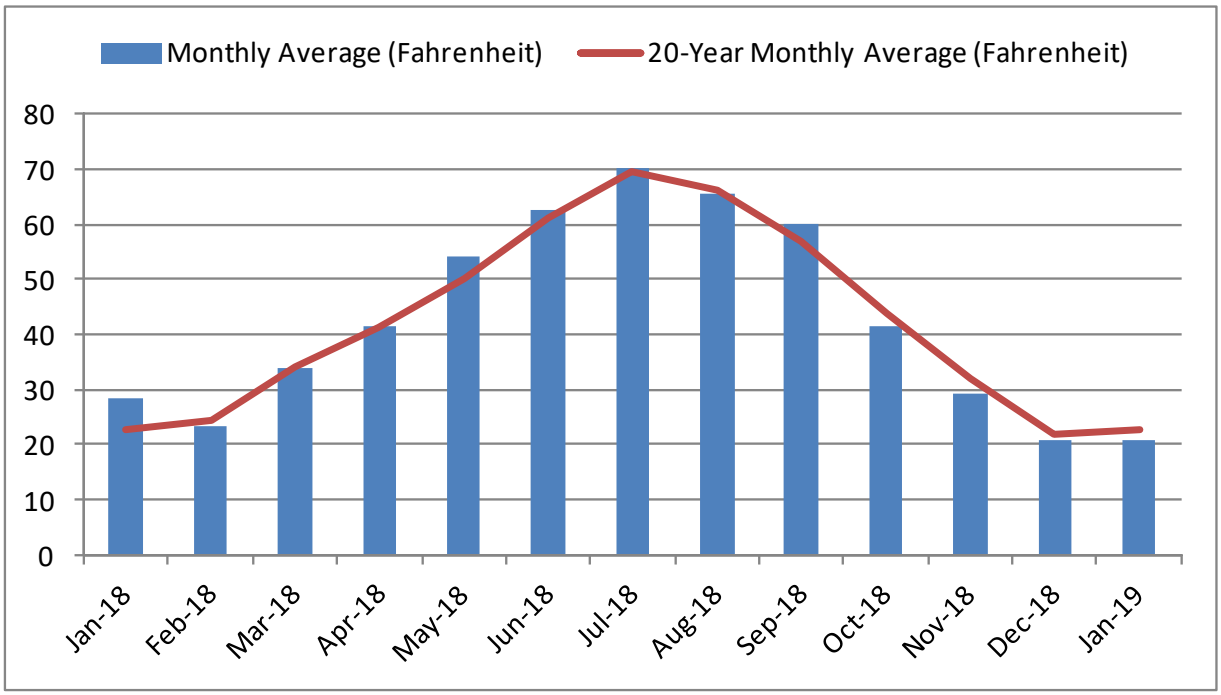
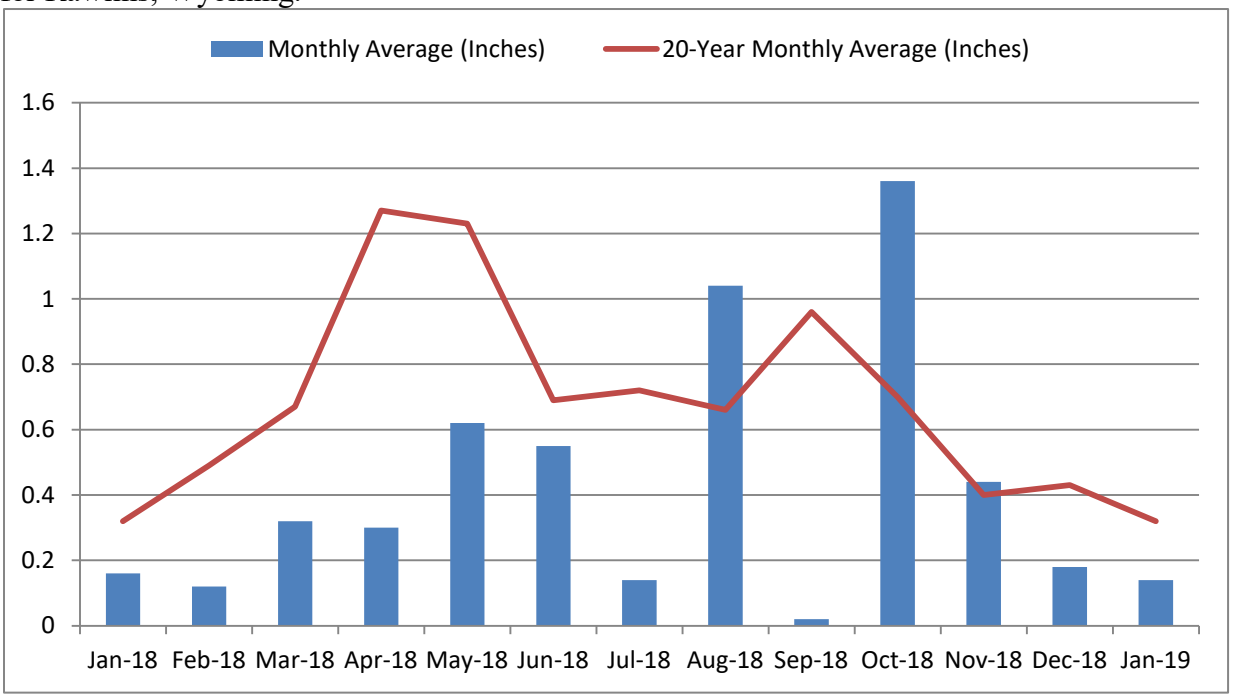


Figure 2. January 2018 - January 2019 mean monthly precipitation and 20-year monthly means for Rawlins, Wyoming.



Habitat

Current transects have not always been located in the best locations due to terrain or ownership status. We plan to revaluate each transect this spring to improve the quality of data being gathered. The spring and summer of 2018 were severe and little to no new growth was documented by field staff. Most available forge appeared to be growth from 2017.

Field Data

Adequate classification data for this herd has been difficult to collect. The 2018 postseason classification sample(n=25) was obtained from a single observation during aerial deer classifications in December 2018. The postseason classification results were 7 adult rams, 0 yearling rams, 13 ewes, and 5 lambs. This sample produced ratios of 53 rams/100 ewes and 38 lambs/100 ewes. Due to the variable nature of data collection in this herd unit, it can be difficult to interpret the data annually.

Harvest Data

In 2018, the hunting season was open in conjunction with the Douglas Creek Bighorn Sheep herd unit. Two Type 1 license (two residents) were offered. Both hunters harvested trophy quality rams in the Encampment River Bighorn Sheep herd unit. The ages for the harvested rams were 9 and 15 years of age. The five-year (2014-2018) mean age of 10.8 years of age is older than the preceding five-year mean. The five-year average hunter success remained at 100%.

Population

A population model has not been constructed for this herd unit due to limited classification data and no annual survival information. Based on the trend of classification data and casual observations, a reasonable estimate of 40-60 bighorn sheep should be considered for this herd unit.

In February 2018, five bighorn sheep ewes from this herd unit were helicopter/net-gun captured and collared. The purpose of this effort was to provide a credible, standardized estimate of the number of bighorn sheep that utilize winter range. Additionally bighorn sheep location information will help inform where habitat monitoring should occur in this herd unit. A full array of disease samples were also collected from captured bighorn sheep as part of a statewide disease surveillance effort. The GPS capabilities of these collars did not function properly so recapture was scheduled for 2019. In January 2019, a total of eight bighorn sheep were helicopter/net-gun captured. Three of the five previously collared bighorn sheep ewes were recaptured and the collars that were not working were removed. A total of six GPS collars were deployed.

Management Summary

The hunting season is closed in 2019 for this herd unit. Issuance of Type 1 licenses will be considered again in 2020. The 2020 bighorn sheep licenses for this herd unit will likely be valid in Hunt Area 18 (Douglas Creek Bighorn Sheep herd unit) as well.

Bibliography of Herd Specific Studies

Arnett, E.B. 1990. Bighorn sheep habitat selection patterns and response to fire and timber harvest in Southcentral Wyoming. M.S. Thesis, University of Wyoming, Laramie. USA. 156 pp.

Cook, J.G. 1990. Habitat, nutrition, and population ecology of two transplanted bighorn sheep populations in southcentral Wyoming. Ph.D. Thesis, University of Wyoming, Laramie. Wyoming. USA. 310 pp.

_____ E.B. Arnett, L.L. Irwin, F. Lindzey. 1989. Ecology and Population Dynamics of Two Transplanted Bighorn Sheep Herds in Southcentral Wyoming. University of Wyoming, Laramie. Wyoming. USA. 234 pp.

Haas, W.L. 1979. Ecology of an introduced herd of Rocky Mountain bighorn sheep in southcentral Wyoming. M.S. Thesis, Colorado State University, Fort Collins. Colorado. USA. 343 pp.

_____ and E. Decker. 1980. A study of a recently introduced bighorn sheep herd in Proc. Bien Symp. North Wild Sheep and Goat Coun. 2:143-166.

2018 - JCR Evaluation Form

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

HERD: EL531 - IRON MOUNTAIN

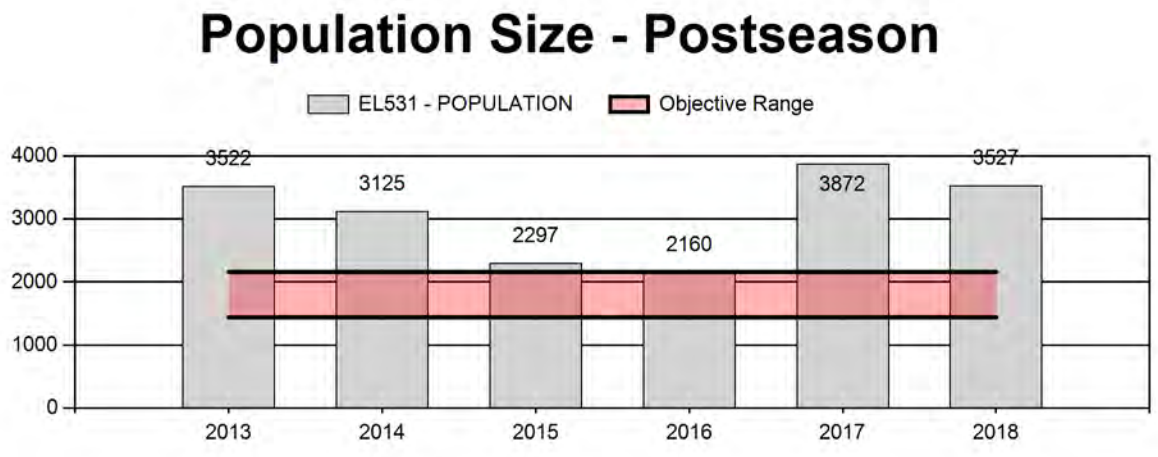
HUNT AREAS: 6
PREPARED BY: LEE KNOX

	2013 - 2017 Average	2018	2019 Proposed
Population:	2,995	3,527	3,400
Harvest:	653	650	650
Hunters:	1,571	1,331	1,300
Hunter Success:	42%	49%	50%
Active Licenses:	1,627	1,391	1,400
Active License Success:	40%	47%	46%
Recreation Days:	10,725	7,953	8,000
Days Per Animal:	16.4	12.2	12.3
Males per 100 Females	29	24	
Juveniles per 100 Females	51	45	

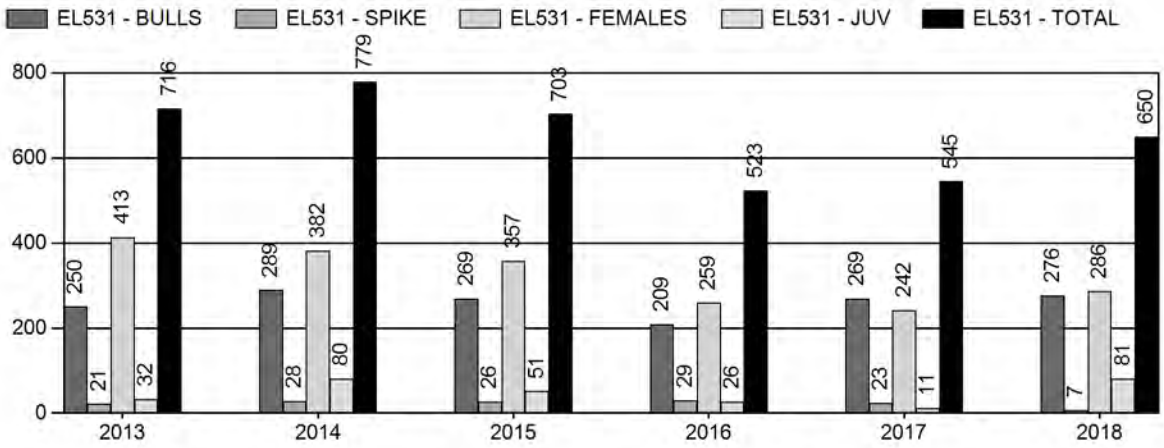
Population Objective (± 20%) :	1800 (1440 - 2160)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	96%
Number of years population has been + or - objective in recent trend:	0
Model Date:	2/28/2019

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

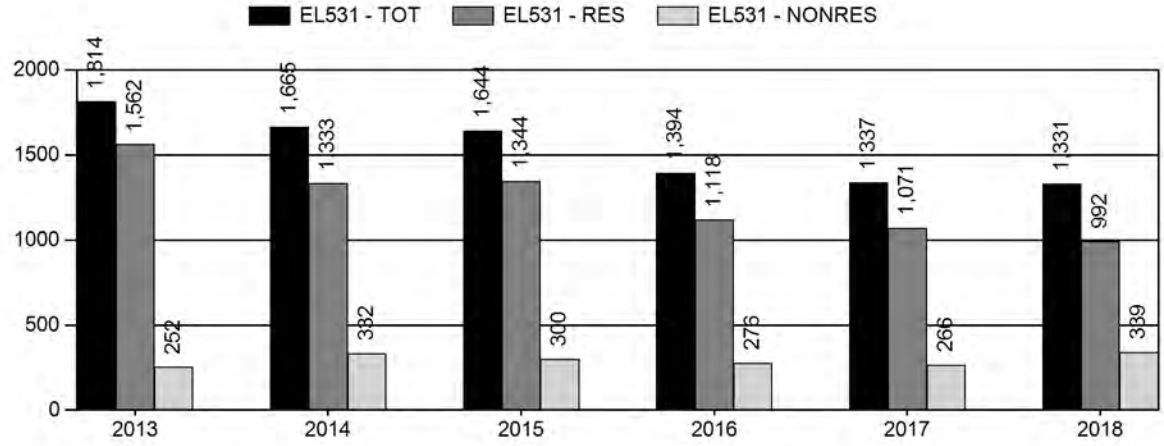
	JCR Year	Proposed
Females ≥ 1 year old:	15%	15%
Males ≥ 1 year old:	30%	30%
Total:	17%	17%
Proposed change in post-season population:	5%	5%



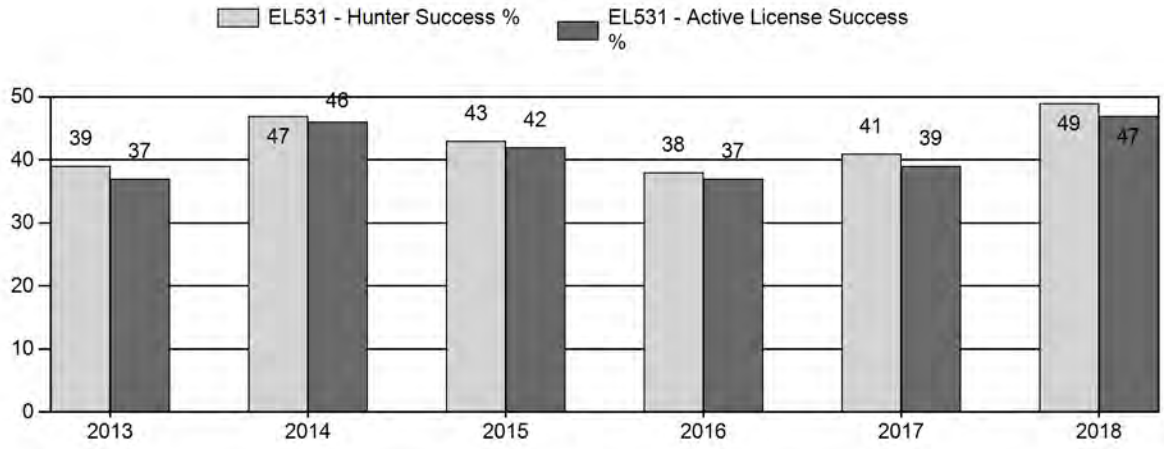
Harvest



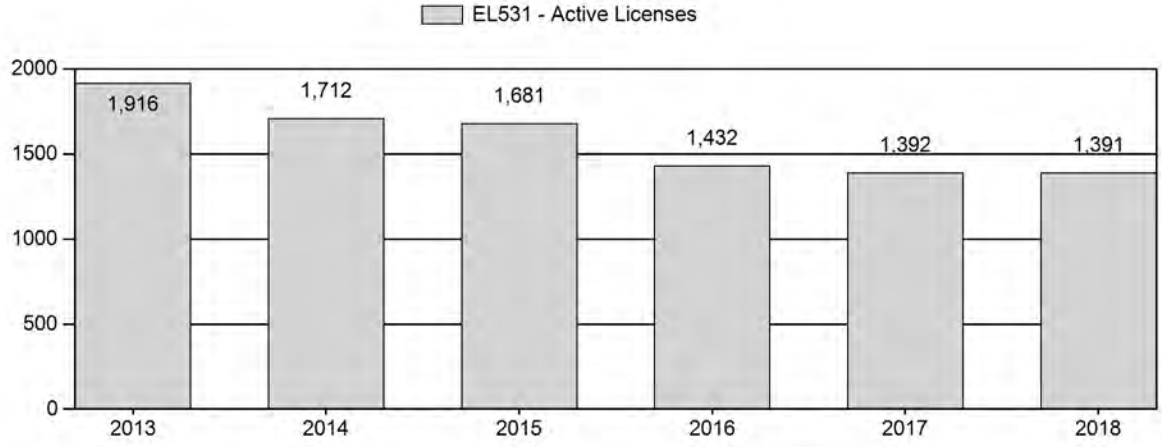
Number of Hunters



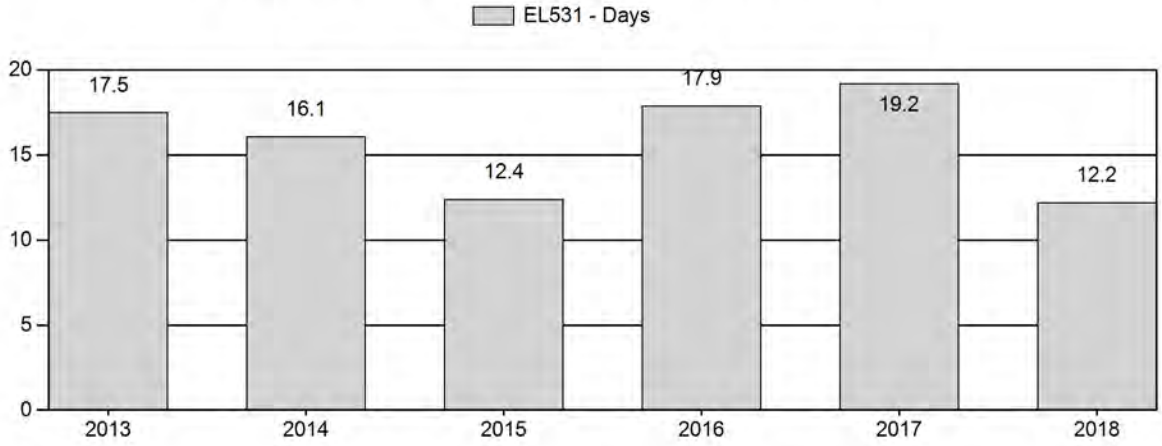
Harvest Success



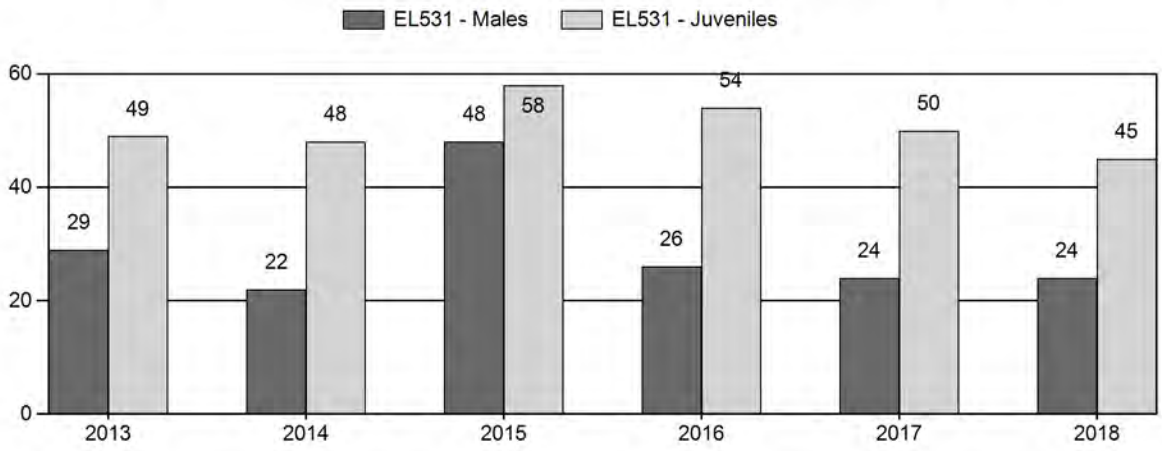
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL531 - IRON MOUNTAIN

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	3,522	75	86	161	16%	557	56%	273	28%	991	707	13	15	29	± 3	49	± 4	38
2014	3,125	44	67	111	13%	499	59%	238	28%	848	671	9	13	22	± 3	48	± 4	39
2015	2,297	152	142	294	23%	616	49%	355	28%	1,265	743	25	23	48	± 3	58	± 3	39
2016	2,160	123	50	173	15%	657	55%	357	30%	1,187	631	19	8	26	± 2	54	± 3	43
2017	3,872	155	150	305	14%	1,269	58%	629	29%	2,203	614	12	12	24	± 1	50	± 2	40
2018	3,527	116	106	222	14%	919	59%	409	26%	1,550	636	13	12	24	± 2	45	± 3	36

2019 HUNTING SEASONS
IRON MOUNTAIN ELK (EL531)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
6		Oct. 1	Oct. 31		General	Any elk valid off national forest
6		Nov. 1	Nov. 30		General	Antlerless elk valid off national forest
6	1	Oct. 15	Oct. 31	75	Limited Quota	Any elk
6	1	Nov. 1	Jan. 31			Antlerless elk
6	4	Nov. 1	Jan. 31	50	Limited Quota	Antlerless elk
6	6	Aug. 15	Jan. 31	1100	Limited Quota	Cow or calf valid off national forest
6	Archery					Refer to Section 3 in Elk Regulations

Hunt Area	License Type	Changes from 2018
6	1	0
	4	0
	6	0
Herd Unit Totals		0

MANAGEMENT EVALUATION

Current Postseason Population Management Objective: 1,800 (1,440-2,160)
Management Strategy: Recreational
2018 Postseason Population Estimate: ~3,500
2019 Proposed Postseason Population Estimate: 3,400
2018 Hunter Satisfaction:, 68% Satisfied, 18% Neutral, 14% Dissatisfied

The management objective for the Iron Mountain Elk herd unit is a post-season population objective of 1,800 elk. The management strategy is recreational, which requires maintaining a post-hunt bull ratio of 15 to 29:100 cows. The population management objective and management strategy were reviewed in 2016.

Herd Unit Issues

The Iron Mountain Elk herd unit includes Hunt Area 6, which is comprised of mostly private lands, except for the Pole Mountain Unit of the Medicine Bow National Forest and several sections of Bureau of Land Management and State of Wyoming lands. Urban sprawl and non-traditional land owners are increasing in the herd unit, adding to the already limited hunter access within the hunt area. The Iron Mountain elk herd continues to be a concern to many landowners due to large wintering herds, sometimes exceeding 1,000 elk (during the 2017 classification flight, a herd of 1,600 elk were observed together). Many of the landowners in the herd unit offer bull elk hunts to clients, therefore bull quality and quantity are a concern. Some, but not all, landowners have expressed concerns about the length of the overall elk season in Hunt Area 6 and have expressed interest in eliminating the January portion of the season. The lengthy season (August 15th-January 31st) is a result of damage issues and an effort to reduce the overall population to the population management objective (1,800). The 2018 post-season population estimate was 3,500 elk, with the population slowly trending downward from a high of 5,500 in 2011.

Weather

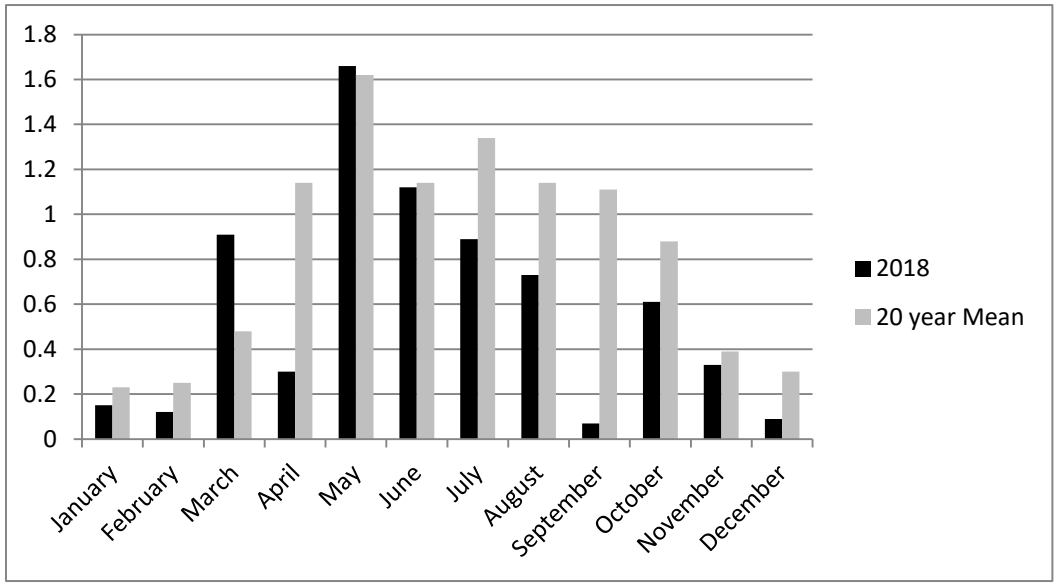


Figure 1**.** Monthly precipitation totals in inches for 2018 and the 20 year mean (1999-2019). Report was created at https://w2.weather.gov/climate/xmacis.php?wfo=cys using data collected at the Laramie Regional Airport.

Precipitation was similar to the 20 year mean during key growth periods for cool season grasses and preferred transitional range and winter range shrub species. While early season growing conditions were optimal, late summer and fall precipitation was lacking. The extreme cold and high winds experienced in early winter, as well as hot dry conditions in midsummer, likely increased the mortality in the younger cohort.

Habitat
Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500'. Its presence ties the hands of habitat managers limiting habitat enhancement options, and may result in reduced carrying capacities of rangelands if it is the predominant species.

The limited number of habitat transects that have been established throughout the Laramie Region have not provided sufficient data to make reliable assumptions of habitat quantity or quality and consequently should not heavily influence population management for any particular big game species.

Field Data
A total of 1,550 elk were classified in 2018, exceeding the estimated classification objective of 636 elk. Bull ratios in 2018 remain near the 3 year average at 25 Bulls: 100 cows but significantly lower than 2015 (48:100). This reduction is more than likely an effect of survey effort and weather, rather than an actual decline in the overall number of bulls in the herd. This herd has historically been very productive and continues to be with 45 calves per 100 cows. After changing the license issuance from limited quota to general in 2012, the number of active licenses has been on a steady decline from a high of 2,480 in 2012 to 1,391 in 2018.

Harvest Data
Harvest increased from 550 elk in 2017 to 650 elk in 2018. Bull harvest remained similar to 2017 (290 elk) while cow/calf harvest made up the increase of 100 harvest elk. At best we are keeping up with calf production each year, but it is more likely that we are not harvesting enough elk to maintain or decrease the total population. Both the Type 1and Type 4 licenses remain very popular with the public. Type 1 license drawing odds are less than 15% for residents, and non-residents require 6 or more preference points to be successful in drawing this license. Hunter success decreased on the Type 1 license to 25% in 2018, compared to 35% in 2017, and well below the 5 year average of 52%. The Type 4 license hunt has always been more difficult, but this is the first year that no elk were harvested. Counter to what we would expect with low hunter success, hunter satisfaction remained relatively high, with 68% of hunters being either very satisfied or satisfied. The decline in harvest and low success with some license types in 2018 suggests a continued issue with hunters not being able to find adequate access to the large herds of elk that are able to find refuge within the Iron Mountain elk herd unit. Without increased landowner willingness and cooperation in providing access to hunters, managers will continue to struggle to reach the desired population management objective (1,800).

Population
This is the fifth year that we have collected adequate classification data to allow the population model to perform. The "Constant Juvenile and Adult Survival" (CJ, AS) model was selected as the most biologically reasonable model for the Iron Mountain herd, and produced an AIC score

of 449 and a Fit score of 476. This model did not have the lowest AIC score, but the lower scoring models (TSJ, CA and TSJ, CA, MSC) do not appropriately describe this herd (i.e. there are not factors (predation or weather events) that would lead to large variations with juvenile survival) and the post-season population estimates for these models were below the total number of elk classified, which is not realistic. Although AIC and Fit scores are provided herein, using AIC ranking is not recommended as the best model selection method because we have no sample-based population estimates or survival estimates incorporated into the models. The CJ, CA model predicts the Iron Mountain population declining from a high of 5,500 in 2011 to the current population estimate of 3,500 in 2018. While this model is ranked "Poor" due to a lack of inclusion of juvenile and adult survival rates and inadequate samples of historical classification data, the population estimate provided seems biologically reasonable.

Management Summary

The Iron Mountain Elk Herd continues to be a very productive herd, but also a difficult herd to reach an adequate harvest as a result of access issues. The 2018 hunting saw an increase in harvest, but still below an estimated minimum of around 700 annually needed to reduce the overall population closer to the population management objective (1,800). Currently the season structure is as liberal as the public or the landowners will tolerate. We issued 1,100 type 6 licenses in 2018, 837 were purchased, 591 were active, leaving plenty of opportunity if needed. Currently with the lack of public land, Hunter Management Areas, and consistent landowner cooperation, the Iron Mountain Elk Herd will continue to present challenges to managers into the future.

2018 - JCR Evaluation Form

SPECIES: Elk | PERIOD: 6/1/2018 - 5/31/2019

HERD: EL533 - SNOWY RANGE

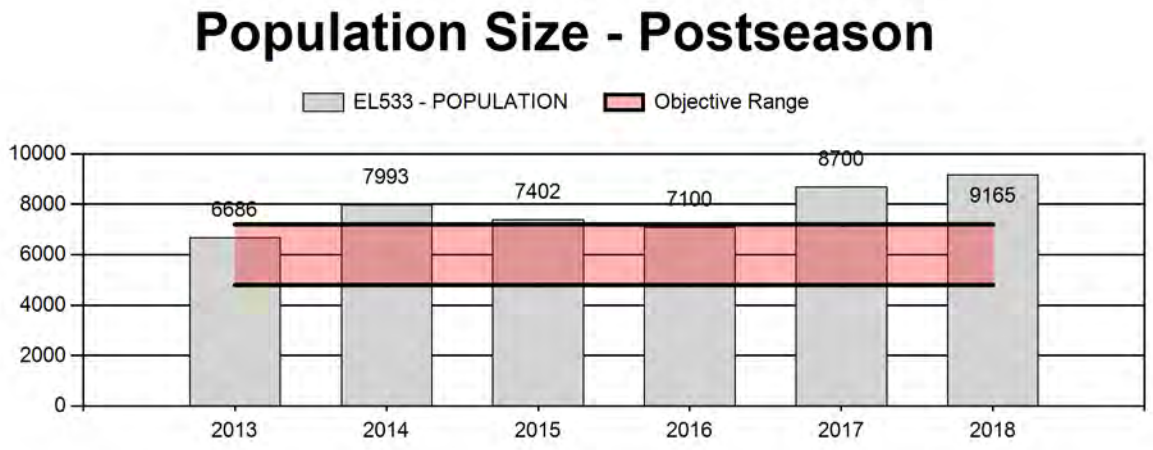
HUNT AREAS: 8-12, 110, 114, 125 | PREPARED BY: TEAL CUFAUDE

	2013 - 2017 Average	2018	2019 Proposed
Population:	7,576	9,165	8,300
Harvest:	2,018	2,072	2,150
Hunters:	5,975	5,603	5,600
Hunter Success:	34%	37%	38%
Active Licenses:	6,269	5,941	6,000
Active License Success:	32%	35%	36%
Recreation Days:	48,423	43,839	47,500
Days Per Animal:	24.0	21.2	22.1
Males per 100 Females	27	30	
Juveniles per 100 Females	45	39	

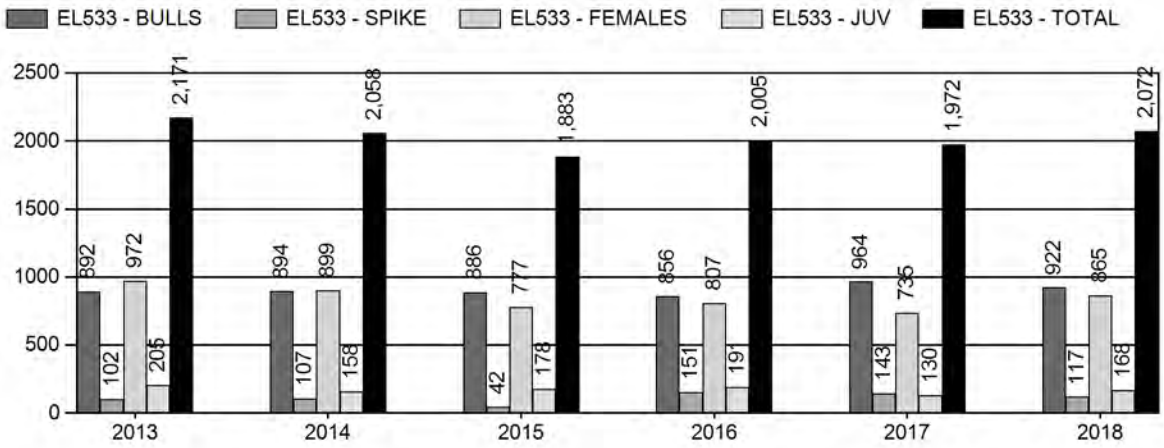
Population Objective (± 20%) :	6000 (4800 - 7200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	53%
Number of years population has been + or - objective in recent trend:	5
Model Date:	03/08/2019

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

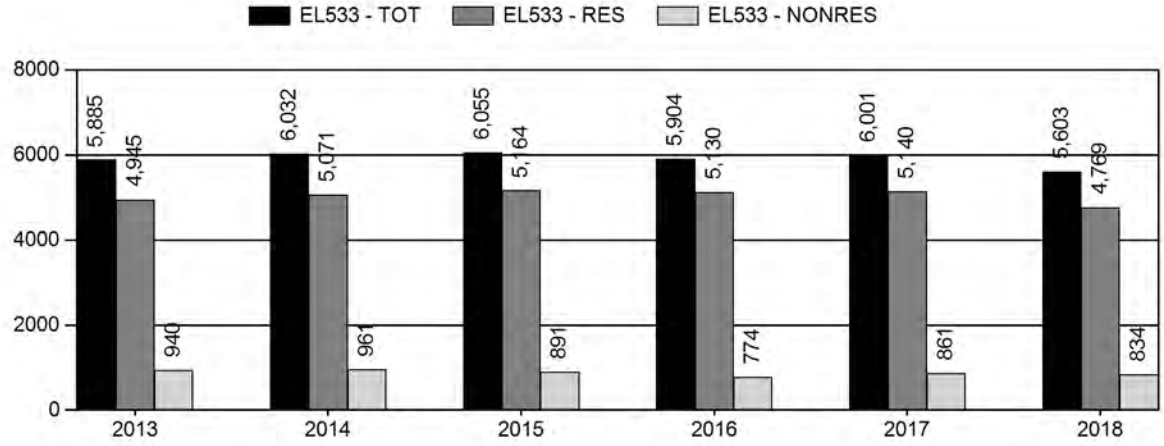
	JCR Year	Proposed
Females ≥ 1 year old:	15%	17%
Males ≥ 1 year old:	45%	54%
Total:	25%	22%
Proposed change in post-season population:	-8%	-9%



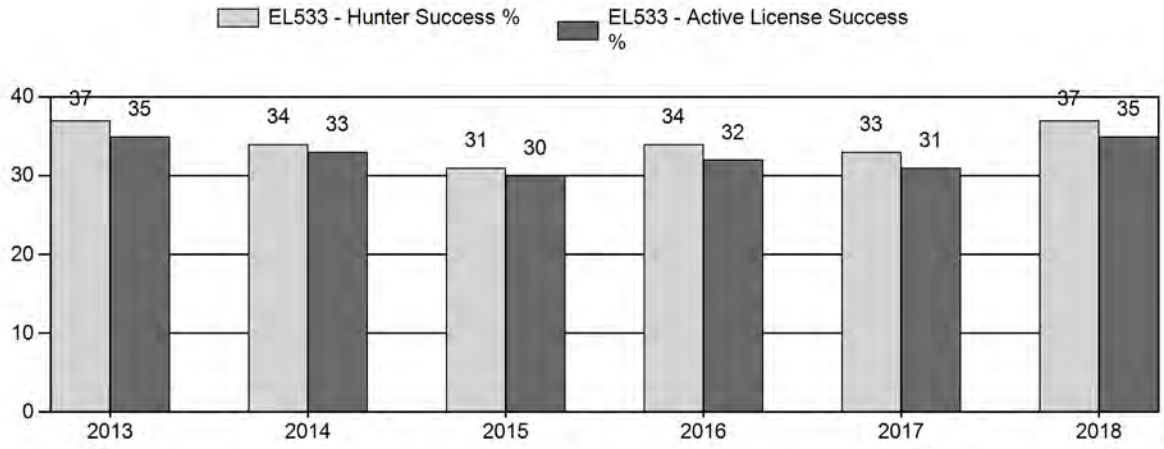
Harvest



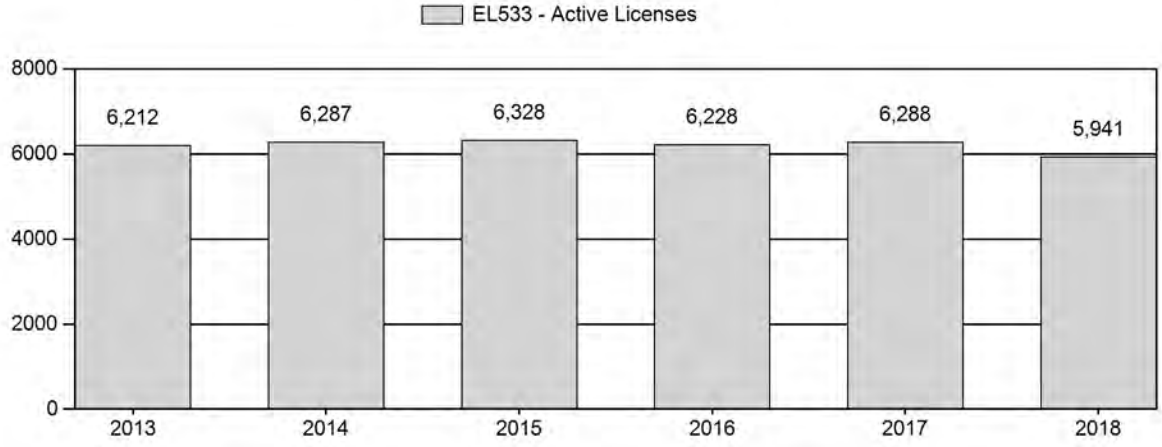
Number of Hunters



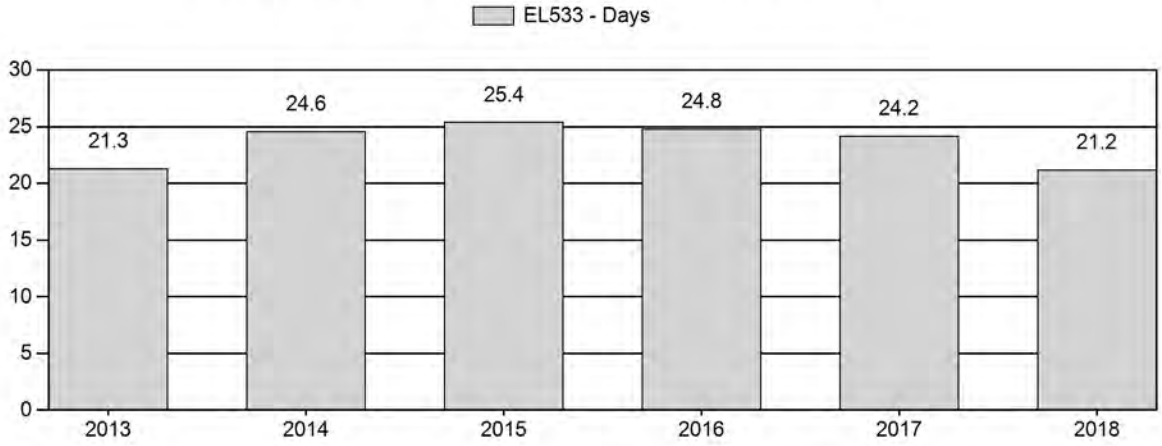
Harvest Success



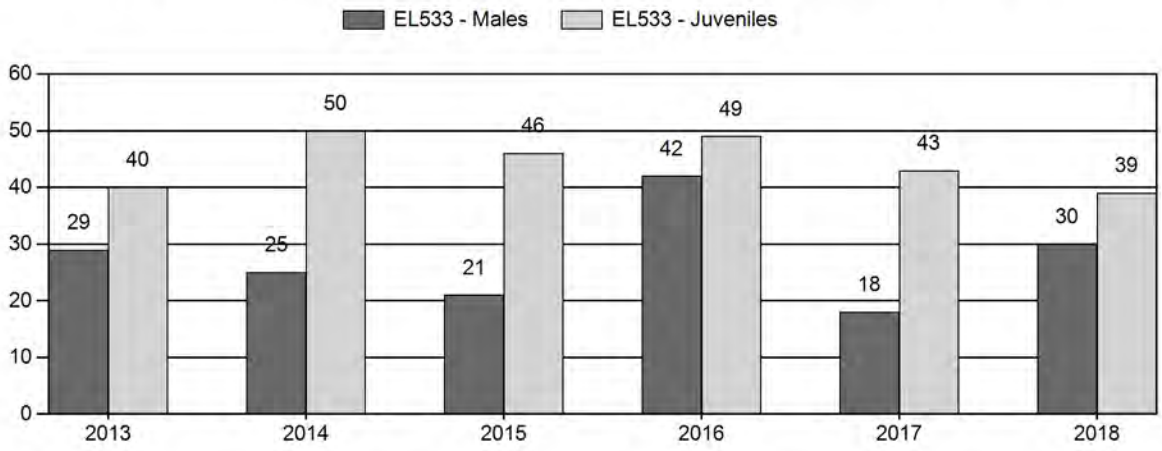
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL533 - SNOWY RANGE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	6,686	292	456	748	17%	2,539	59%	1,023	24%	4,310	646	12	18	29	± 1	40	± 1	31
2014	7,993	259	148	407	14%	1,609	57%	800	28%	2,816	640	16	9	25	± 1	50	± 2	40
2015	7,402	206	190	396	13%	1,885	60%	876	28%	3,157	693	11	10	21	± 1	46	± 2	38
2016	7,100	242	470	712	22%	1,697	52%	837	26%	3,246	657	14	28	42	± 2	49	± 2	35
2017	8,700	182	146	328	11%	1,778	62%	768	27%	2,874	707	10	8	18	± 1	43	± 2	36
2018	9,165	187	278	465	18%	1,574	59%	608	23%	2,647	585	12	18	30	± 2	39	± 2	30

2019 HUNTING SEASON RECOMMENDATIONS
SNOWY RANGE ELK (EL533)

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
8	1	Oct. 1	Jan. 31	~~100~~ 150	Limited quota	Any elk
	6	Aug. 15	Jan. 31	~~100~~ 200	Limited quota	Cow or calf
9		Oct. 15	Oct. 31		General	Any elk
	6	~~Aug. 15~~	~~Sep. 30~~	150	~~Limited quota~~ CLOSED	~~Cow or calf valid on private land~~
		Oct. 1	Dec. 31		Limited quota	Cow or calf
		~~Jan. 1~~	~~Jan. 31~~		~~Limited Quota~~ CLOSED	~~Cow or calf valid off national forest~~
9, 10	7	Aug. 15	Jan. 31	~~50~~ 150	Limited quota	Cow or calf valid off national forest
10		Oct. 15	Oct. 31		General	Any elk
	6	~~Aug. 15~~	~~Sep. 30~~	~~200~~ 100	~~Limited quota~~ CLOSED	~~Cow or calf valid on private land~~
		Oct. 1	~~Nov. 30~~ Dec.31		Limited Quota	Cow or calf
		~~Dec. 1~~	~~Jan. 31~~		~~Limited quota~~ CLOSED	~~Cow or calf valid off national forest~~
11	1	Oct. 1	Nov. 14	150	Limited quota	Any elk
	4	Oct. 1	Nov. 14	300	Limited quota	Antlerless elk
	6	Aug. 15	Jan. 31	50	Limited quota	Cow or calf valid off national forest and off the Wyoming Game and Fish Commission's Wick Wildlife Habitat Management Area
	9	Sep. 1	Sep. 30	50	Limited quota	Any elk, archery only
12		Oct. 15	Oct. 31		General	Any elk
	6	Oct. 1	Nov. 14	~~150~~ 200	Limited quota	Cow or calf
		Nov. 15	Jan. 31			Cow or calf valid west of Wyoming Highway 130
12, 13, 15, 110	7	Aug. 15	Jan. 31	~~100~~ 125	Limited quota	Cow or calf valid on private land
110		Oct. 15	Oct. 31		General	Any elk
	6	Oct. 1	Nov. 14	~~50~~ 100	Limited quota	Cow or calf
114	1	Oct. 1	Nov. 30	50	Limited quota	Any elk
	6	Aug. 15	Jan. 31	200	Limited quota	Cow or calf
125	1	Oct. 1	Dec. 31	~~200~~ 250	Limited quota	Any elk
		Jan. 1	Jan. 31			Valid for antlerless elk
	6	Oct. 1	Jan. 31	~~200~~ 300	Limited quota	Cow or calf

Hunt Area	License Type	Quota change from 2018
8	1	+50
8	6	+100
9,10	7	+100
10	6	-100
12	6	+50
12,13,15,110	7	+25
110	6	+50
125	1	+50
125	6	+100
Herd Unit Total	**1**	**+100**
	6	**+200**
	7	**+125**

Management Evaluation

Current Management Objective: 6,000 (4,800 – 7,200)
Management Strategy: Recreational
2018 Postseason Population Estimate: ~ 9,100
2019 Proposed Postseason Population Estimate: ~ 8,300
2018 Hunter Satisfaction: 66% Satisfied, 20% Neutral, 14% Dissatisfied

Elk in the Snowy Range Herd Unit are managed toward a postseason population objective of 6,000. The objective was last reviewed in 2018. A recreational management strategy has been prescribed for the Snowy Range Elk Herd Unit. The recreational strategy directs Wyoming Game and Fish Department (WGFD) to manage for an annual post-season bull to cow ratio within the parameters of 15-29:100 at the herd unit level. The population was estimated using a spreadsheet model developed in 2012 and updated in 2018.

Herd Unit Issues

The Snowy Range Elk Herd Unit includes elk Hunt Areas 8, 9, 10, 11, 12, 110, 114, and 125 in south central Wyoming. The herd unit contains 1,922 mi^2 of delineated elk range which includes the Snowy Range of the Medicine Bow Mountains and the peripheral sagebrush grasslands located in the North Platte, Medicine Bow, and Laramie River watersheds. Landownership of the delineated elk range consists of 42% US Forest Service (USFS), 27% private, 18% Wyoming Game and Fish Department, 8% Bureau of Land Management, and 5% other ownership. Issues in this herd unit include agricultural and residential development, invasive and noxious plants, and travel management in important elk habitat.

Weather

- *Compiled by WGFD Terrestrial Habitat Biologist, Katie Cheesbrough*

Annual bio-year precipitation from October 2017 through September 2018 is notably below the 30 year average and approaching precipitation levels seen in the 2012 drought year. Similarly, the growing season precipitation across the herd unit (April-June 2018) and the later growing season precipitation for high elevation spring/summer/fall ranges (May-July 2018) were also

well below the 30 year averages. As illustrated by the PRISM data (Fig. 1) and the 2017-2018 water year SNOTEL data (Fig. 2), the majority of precipitation in the Platte Valley occurs outside of the primary growing season, generally in the form of snow. However, winter 2017-2018 was relatively mild with, what seemed like, very little snow in the lower elevations. USDA-Snotel site data from February 2018 showed that snow water equivalent (SWE) was within 81-103% of normal on the west slope of the Snowy Range (8,440-10,130 ft). However, high sustained winds in early 2018 may have contributed to significant evaporative losses of moisture from that snowpack, further decreasing precipitation for the year. Due to a lack of snow in the lower elevations, relatively mild temperatures, and early snowmelt, the 2017-2018 winter conditions may have been favorable for big game.

Figure 1. Parameter-Elevation Relationships on Independent Slopes Model (PRISM) was utilized to estimate precipitation by calculating a climate-elevation regressions for each Digital Elevation Model grid cell (4km resolution) for the Platte Valley in Carbon County, Wyoming.

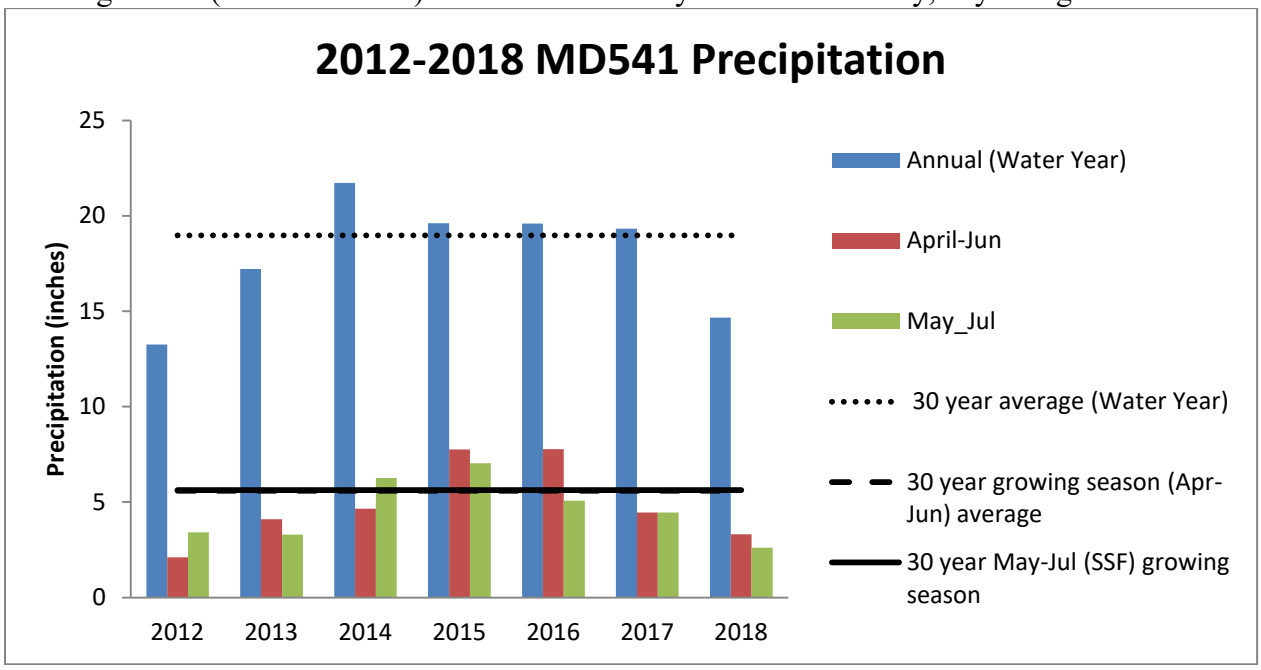
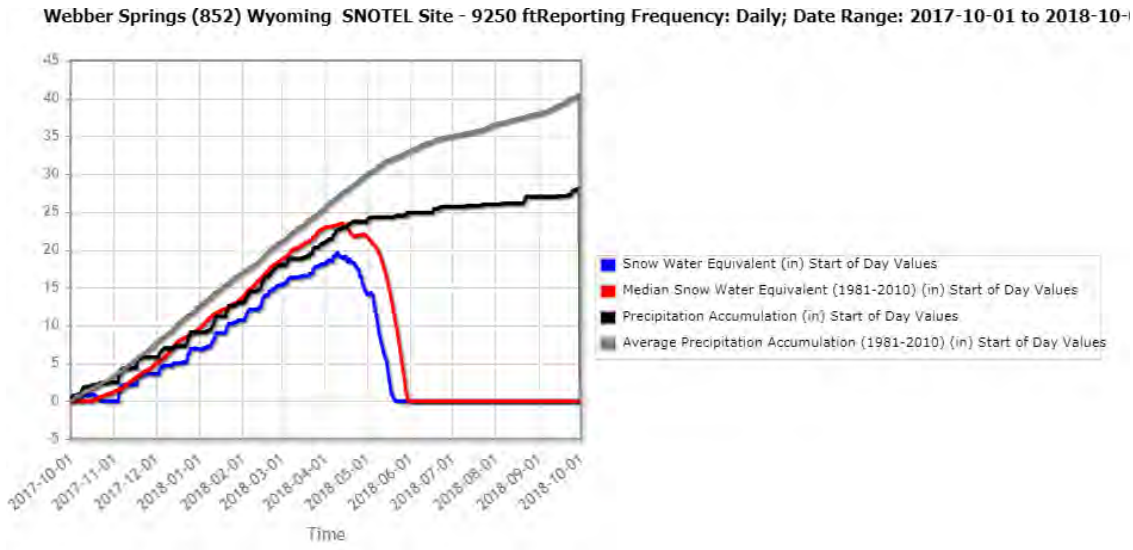


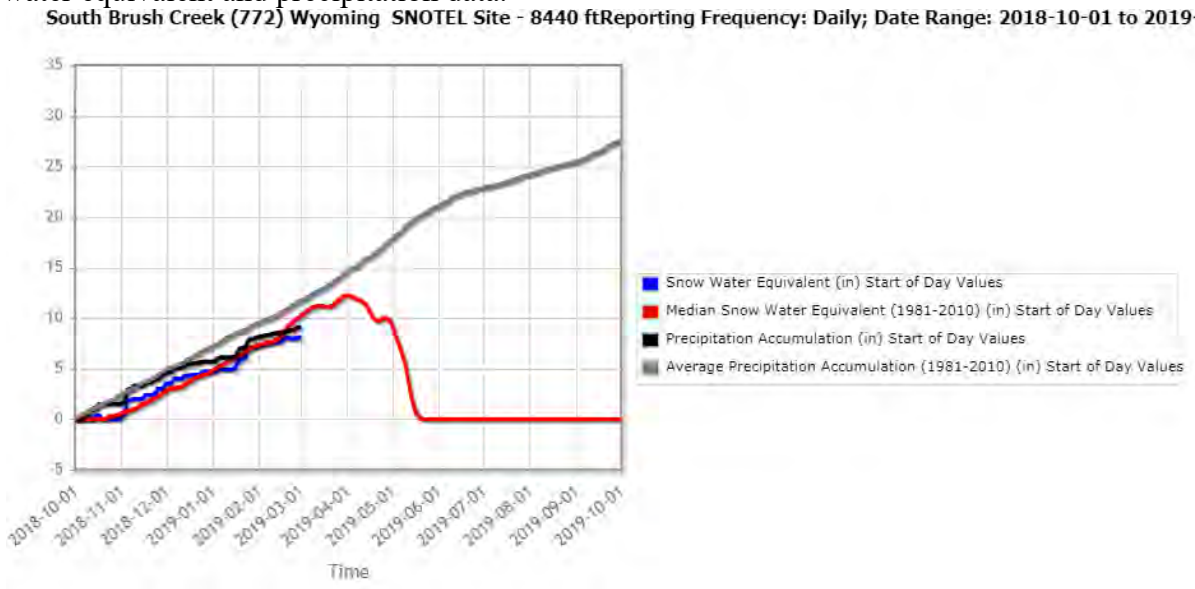
Figure 2. October – September bio-year 2017 Webber Springs USDA-SNOTEL Site snow water equivalent and precipitation data.



The early snowmelt at high elevations can be attributed to relatively high temperatures in early spring. The only significant spring moisture came in the last week of May with little to no precipitation until mid June. Extremely dry, hot, and windy weather throughout the spring, summer, and into the fall contributed.

Winter 2018-2017 SNOTEL data indicate just below normal snowpack on the west slope of the Snowy Range (Fig. 3). Colder weather and snow in early to mid-October may have caused elk to move more quickly into lower elevations, which may have resulted in harvest impacts.

Figure 3. October – February bio-year 2018 South Brush Creek USDA- SNOTEL Site snow water equivalent and precipitation data.



Habitat

- Compiled by WGFD Terrestrial Habitat Biologist, Katie Cheesbrough

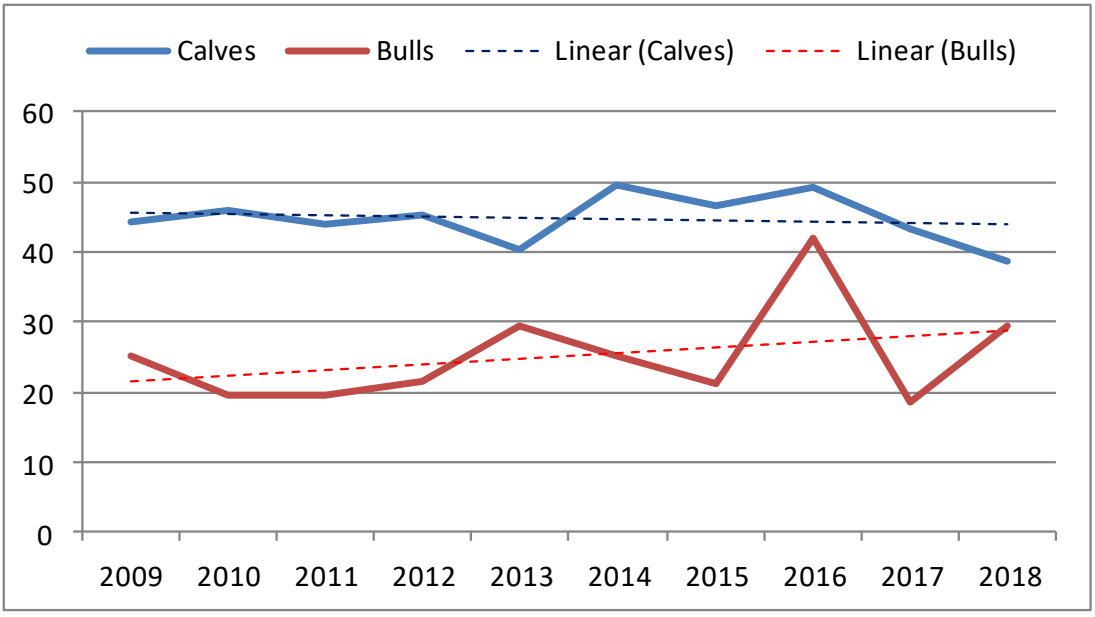
Growing season precipitation was below normal across the herd unit in 2018, resulting in slower and less growth of cool season grasses, forbs, and shrubs, particularly in lower elevation seasonal ranges. Vegetation production sampling conducted on the Pennock Wildlife Habitat Management Area showed a continued trend of lower production during the 2018 growing season (373.68 lbs/acre) than seen in the past 4 years (539.53 lbs/ac average). However, these production values were still high enough to cover the previous year's wildlife utilization estimates (340 lbs/acre). Sustained hot and dry conditions throughout the summer decreased shrub leader production throughout the herd unit and likely had impacts on browse availability in transition and winter ranges in 2018. Rapid Habitat Assessments conducted throughout the herd unit in from 2015-2018 suggest that many important shrub habitats continue to underperform due to maturity and decadence caused by a lack of disturbance.

Field Data

In 2018, elk in this herd unit were classified in conjunction with mule deer classification aerial surveys. A total of 2,647 elk were counted and classified. This classification effort produced ratios of 30 bulls and 38 calves per 100 cows in this herd unit.

Calf production decreased slightly from 43 calves: 100 cows in 2017, to 38 calves: 100 cows in 2018. This bull ratio was 38% greater than the 2017 ratio and 7% greater than the average for the last five years. The past 10 years of bull and calf ratio data indicates the calf ratio is stable to declining (Figure 3). Calf ratios continued to provide for an excellent recruitment rate in this herd unit. Bull ratios are experiencing an increasing trend over the past 10 years.

Figure 3. Bull and calf ratios per 100 cows in the Snowy Range elk herd unit, 2009 - 2018, Wyoming.



Harvest Data
The 2018 harvest survey data indicated 5,603 active licensed hunters harvested 2,072 elk, which was a 5% increase in harvest from 2017. The total harvest success rate of 37% was a 4% increase from 2017. Branch antlered bulls accounted for 89% of the male harvest in 2018 and 44% of the overall harvest. The proportion of spikes in the male harvest for the entire herd unit decreased to 11% in 2018 from 13% in 2017. Antlerless elk accounted for 50% of the total 2018 elk harvest. Harvest rates, days per harvest (21.2), and harvest success rates under the current liberal hunting season structure continued to be considered acceptable. In 2018, 23% of the branch antlered bull harvest was attributed to archery; while 27% of the branch antlered bull harvest was attributed to archery in 2017.

Chronic wasting disease (CWD) was first observed in the Snowy Range herd unit in 2004. Since 1997, a total of 1,351 elk in this herd unit have been tested and 14 have tested positive for CWD. In 2018, surveillance efforts for CWD in this herd unit continued. Results of the 2018 samples (n=117) collected from hunter harvested elk indicated an annual prevalence of 4.3% CWD positive. Annual CWD prevalence can be under or over represented due to small sample sizes. The five-year estimated hunter harvested elk CWD prevalence in this herd unit was >0-5%.

Population
In 2018, the "Constant Juvenile and Constant Adult" (CJ, CA) spreadsheet model was used to simulate Snowy Range Herd Unit population dynamics. The other models in the spreadsheet model suite had either higher AIC scores or were not biologically realistic. Without other important information such as an independent abundance estimate or historical survival data to incorporate into the model, accuracy of estimates will continue to be unknown. This model was rated as poor, and not biologically defensible in our evaluation. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model (Morrison 2012).

The 2018 postseason population estimate for the Snowy Range herd unit was 9,100 elk. A decreasing trend in the annual estimate continued with CJ, CA model and was considered to be consistent with the observations by field managers. We considered the 2018 postseason population estimate produced by the CJ, CA spreadsheet model to be somewhat plausible.

Management Summary
The hunting seasons in the Snowy Range Herd Unit continue to provide recreational elk hunting opportunities while reducing the overall elk population towards the objective. Hunt Areas 8, 114, and 125 will continue to have limited quota hunting seasons in 2019. WGFD will provide additional opportunities (more licenses) for both bull and antlerless elk harvest in Hunt Areas 8 and 125. Landownership in Hunt Area 125 is predominately private. Many of the landowners in this hunt area are either directly engaged in outfitting elk hunts or lease their property to outfitters, however there are several landowners who do allow public hunting access in this hunt area because they are experiencing significant damage to growing or stored hay crops.

Hunt Area 11 will also remain a limited quota hunting season area in 2019. Hunt Area 11 contains a substantial amount of accessible public land, including the Wyoming Game and Fish Commission's Wick Wildlife Habitat Management Area and USFS lands. This hunt area

continues to provide a limited opportunity for hunters to experience a quality elk hunt on public land.

Hunt Areas 9, 10, 12, and 110 will continue to be general license hunting areas in 2019. Limited quota, reduced-price cow or calf licenses will continue to be available in each of these hunt areas as an additional effort to increase antlerless harvest. The majority of the Snowy Range Herd Unit's annual elk harvest occurs in these four hunt areas. Most of the occupied elk range in these hunt areas is public land and hunter access is very good. In Hunt Areas 9 and 10, the August-September Type 6 season was eliminated in 2019, but August-January Type 7 seasons continued to be offered to mitigate damage on private land. Additionally, many of the landowners do allow elk hunting, typically antlerless elk, in an effort to reduce the impacts from elk on their agricultural-based livelihoods.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet Model for Ungulate Population data Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 41 pp.

Bibliography of Herd Specific Studies

Reeve, A.F., F.G. Lindzey, and S.H. Anderson. 2003. Elk population in Wyoming: 1978-2001. Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie, Wyoming. USA. 138pp.

2018 - JCR Evaluation Form

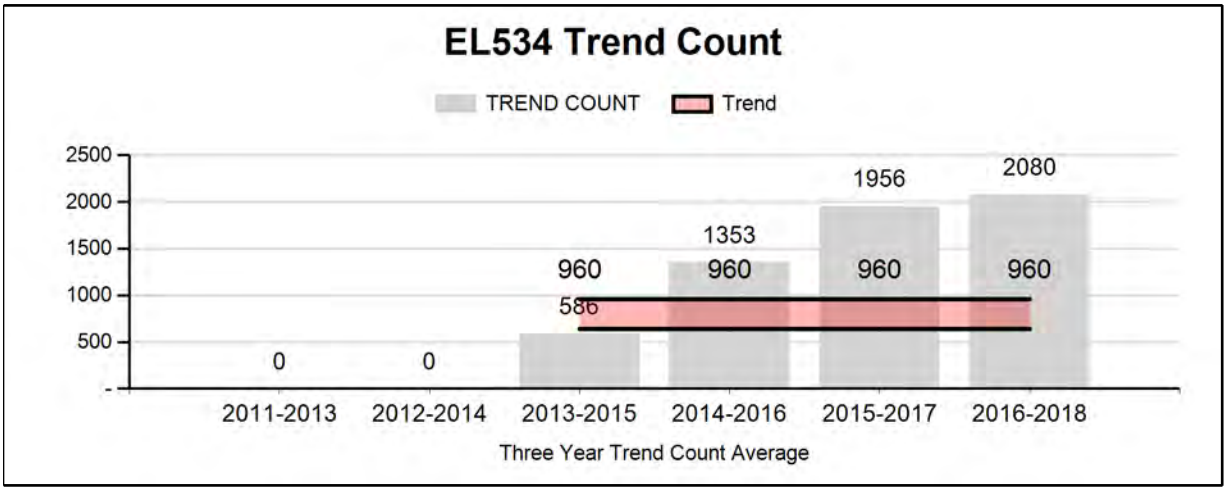
SPECIES: Elk
PERIOD: 6/1/2018 - 5/31/2019
HERD: EL534 - SHIRLEY MOUNTAIN
HUNT AREAS: 16
PREPARED BY: TEAL CUFAUDE

	2013 - 2017 Average	2018	2019 Proposed
Trend Count:	1,174	2,131	2,000
Harvest:	349	408	450
Hunters:	628	703	750
Hunter Success:	56%	58%	60%
Active Licenses:	656	722	775
Active License Success	53%	57%	58%
Recreation Days:	4,850	5,717	5,500
Days Per Animal:	13.9	14.0	12.2
Males per 100 Females:	42	30	
Juveniles per 100 Females	42	53	

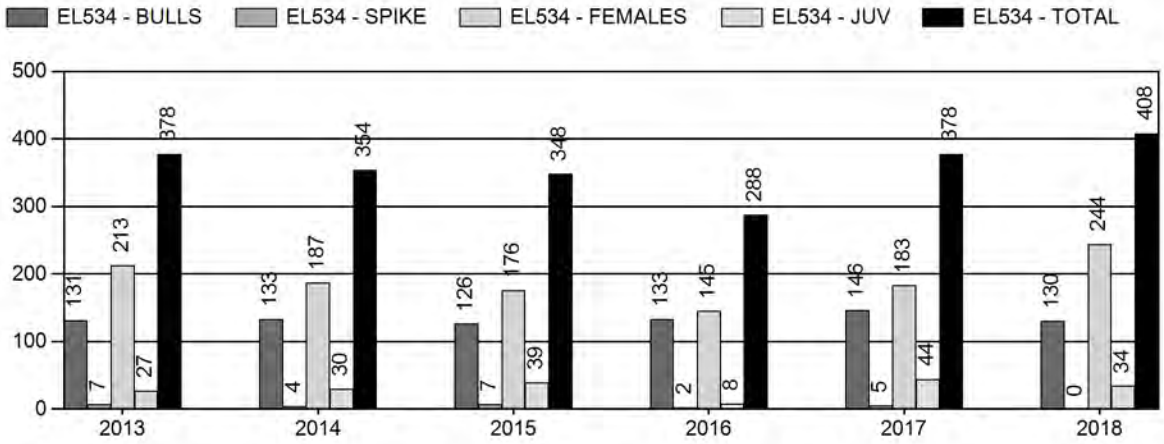
Trend Based Objective (± 20%)	800 (640 - 960)
Management Strategy:	Special
Percent population is above (+) or (-) objective:	166%
Number of years population has been + or - objective in recent trend:	4

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

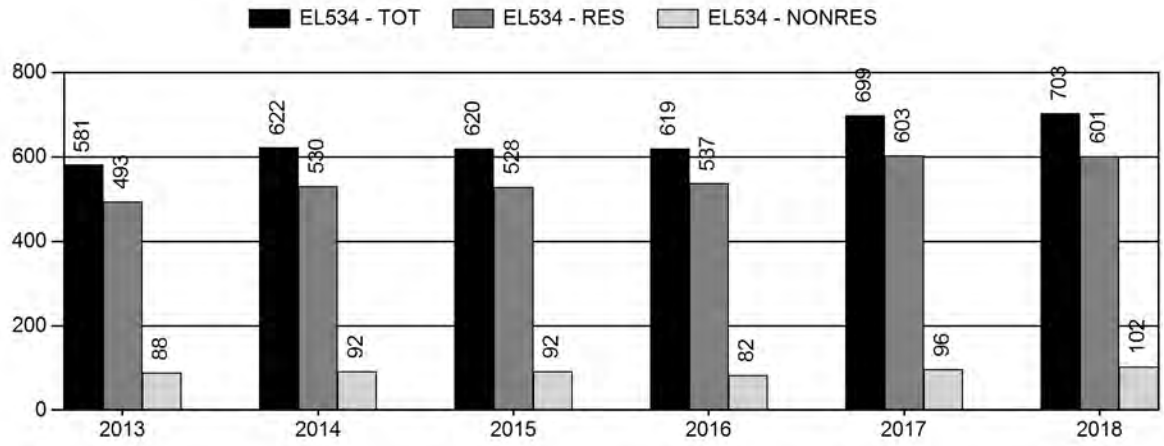
	JCR Year	Proposed
Females ≥ 1 year old:	NA%	N/A%
Males ≥ 1 year old:	NA%	N/A%
Juveniles (< 1 year old):	NA%	N/A%



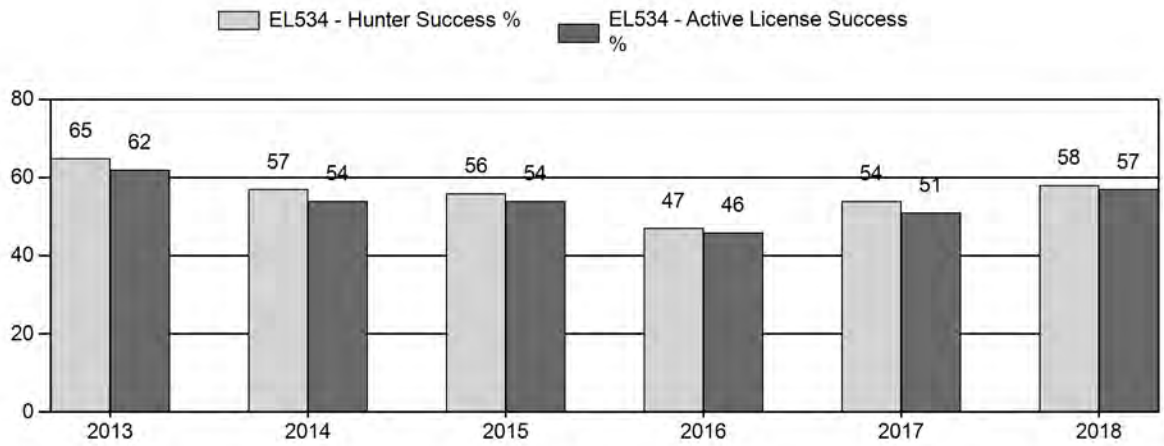
Harvest



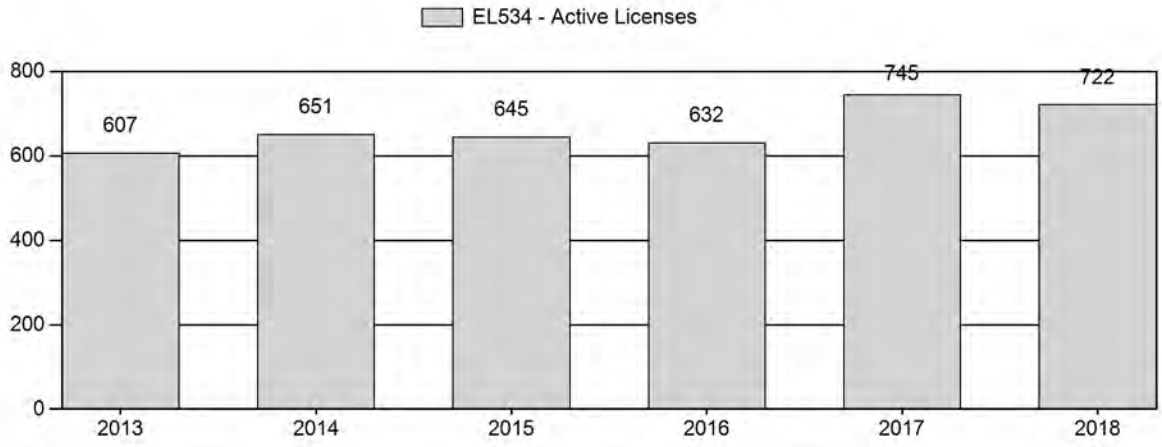
Number of Hunters



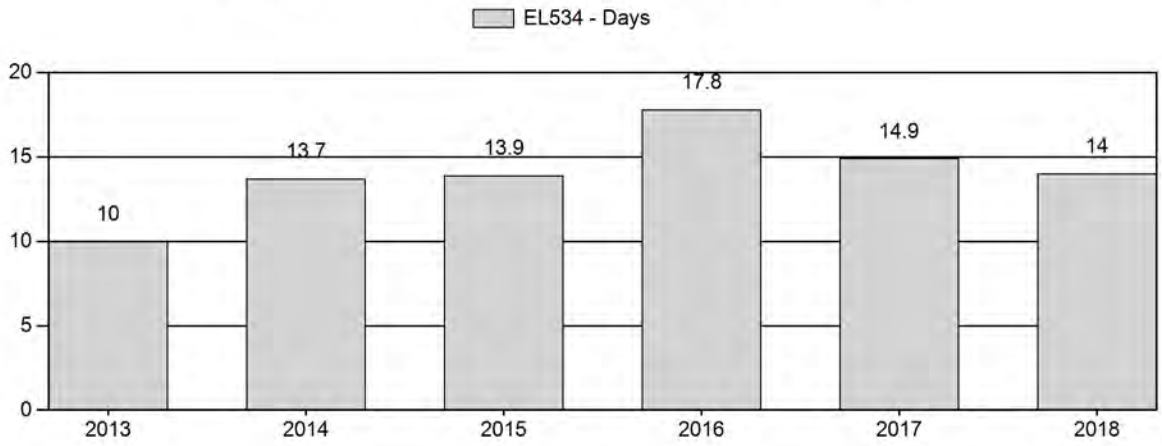
Harvest Success



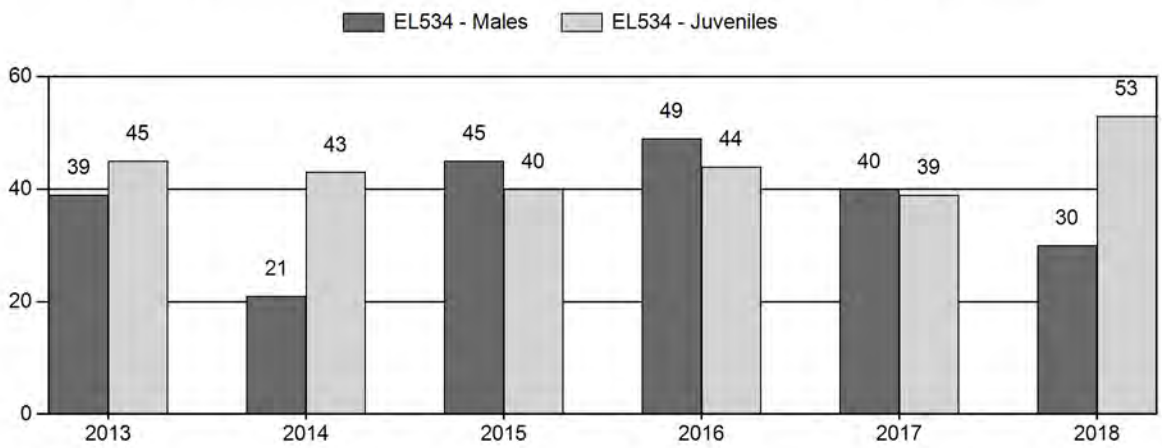
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Elk Herd EL534 - SHIRLEY MOUNTAIN

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	1,462	52	90	142	21%	365	54%	165	25%	672	568	14	25	39	± 4	45	± 4	33
2014	767	14	47	61	13%	294	61%	127	26%	482	395	5	16	21	± 2	43	± 4	36
2015	0	86	342	428	24%	948	54%	383	22%	1,759	596	9	36	45	± 0	40	± 0	28
2016	0	160	422	582	25%	1,196	52%	523	23%	2,301	634	13	35	49	± 0	44	± 0	29
2017	0	99	301	400	22%	1,012	56%	396	22%	1,808	581	10	30	40	± 0	39	± 0	28
2018	0	127	228	355	17%	1,164	55%	612	29%	2,131	463	11	20	30	± 0	53	± 0	40

2019 HUNTING SEASON RECOMMENDATIONS
SHIRLEY MOUNTAIN ELK (EL534)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
16	1	Oct. 1	Oct. 31	150	Limited quota	Any elk
	1	Dec. 1	Jan. 31			Antlerless elk
	2	Nov. 1	Nov. 30	50	Limited quota	Any elk
	2	Dec. 1	Jan. 31			Antlerless elk
	4	Sep. 1	Sep. 30	300	Limited quota	Antlerless elk valid on the Hanna Draw Hunter Management Area (HMA permission slip required)
	4	Oct. 1	Jan. 31			Antlerless elk valid in the entire area
	6	Aug. 15	Sep. 30	300	Limited quota	~~Cow or calf valid on private land or the Hanna Draw Hunter Management Area (HMA permission slip required)~~ Cow or calf valid on private land or the Hanna Draw Hunter Management Area (HMA permission slip required) or within ½ mile of irrigated land
	6	Oct. 1	Jan. 31			Cow or calf valid in the entire area
	Archery	Sep. 1	Sep. 30			Refer to license type and limitations in Section 3 of Chapter 7

Hunt Area	License Type	Quota change from 2018
Herd Unit Total		**None**

Management Evaluation
Current Mid-Winter Trend Count Management Objective: 800 (640-960)
Management Strategy: Special
2018 Trend Count: 2,131
Most Recent 3-year Running Average Trend Count: 2,080
2018 Hunter Satisfaction: 80% Satisfied, 12% Neutral, 8% Dissatisfied

Elk in the Shirley Mountain herd unit are managed toward a mid-winter trend count of 800. The management objective was reviewed in 2015 and changed from a postseason population objective of 800 elk to a mid-winter trend count of 800 elk. The management strategy was changed in 2015 from recreational management to special management. Under special management, bull ratios are allowed to exceed 30 bulls: 100 cows and the proportion of branch-antlered bulls are expected to exceed 66% of the antlered elk harvest.

Herd Unit Issues
The Shirley Mountain herd unit encompasses 4,548 km^2 of occupied elk habitat. Land ownership consists of 55% mixed federal lands, primarily Bureau of Land Management, 35% private ownership, and 10% Wyoming Office of State Land and Investments land. The southern half of the herd unit is mostly a checkerboard of private, state, and BLM lands as a result of land grants to railroads in the 19th century. The northern half contains more single owner blocks of land with large areas of accessible public land. Wind energy developments are a relatively new land use in this herd unit. There are currently two wind farms in this herd unit and there is interest in developing more wind farms. Wyoming Game and Fish Department's (WGFD) ability to manage elk numbers through harvest is difficult because a large portion of the elk habitat in this herd unit is owned by one landowner who provides a very limited amount of access. Interchange of elk with adjacent herd units may compromise the closed population assumption for this herd unit. Annual population monitoring efforts and results have been highly variable.

Weather
The 2017-18 winter had numerous periods of bitter cold, continuing through February, but much of the winter range was open and available. Winter losses were expected to be near average leading into bio-year 2018. The spring of 2018 was dry, resulting in slow plant growth and green-up of rangelands. The majority of the summer and fall were extremely dry, causing much of the available forage to cure. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided elk with a valuable boost in nutrition prior to the winter of 2018-19. While there have been several notable snow storms and cold snaps during the winter of 2018-19, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Average elk survival is expected for the winter of 2018-19.

Temperature and precipitation data was obtained for the National Oceanic and Atmospheric Administration (NOAA), https://w2.weather.gov/climate/xmacis.php?wfo=cys to illustrate

weather conditions thus far, during bio-year 2018 (Figures 1 and 2). These figures also include data from January-May of bio-year 2017 to describe the weather conditions immediately preceding bio-year 2018.

Figure 1. January 2018 - January 2019 mean monthly temperatures and 20-year monthly means for Rawlins, Wyoming.

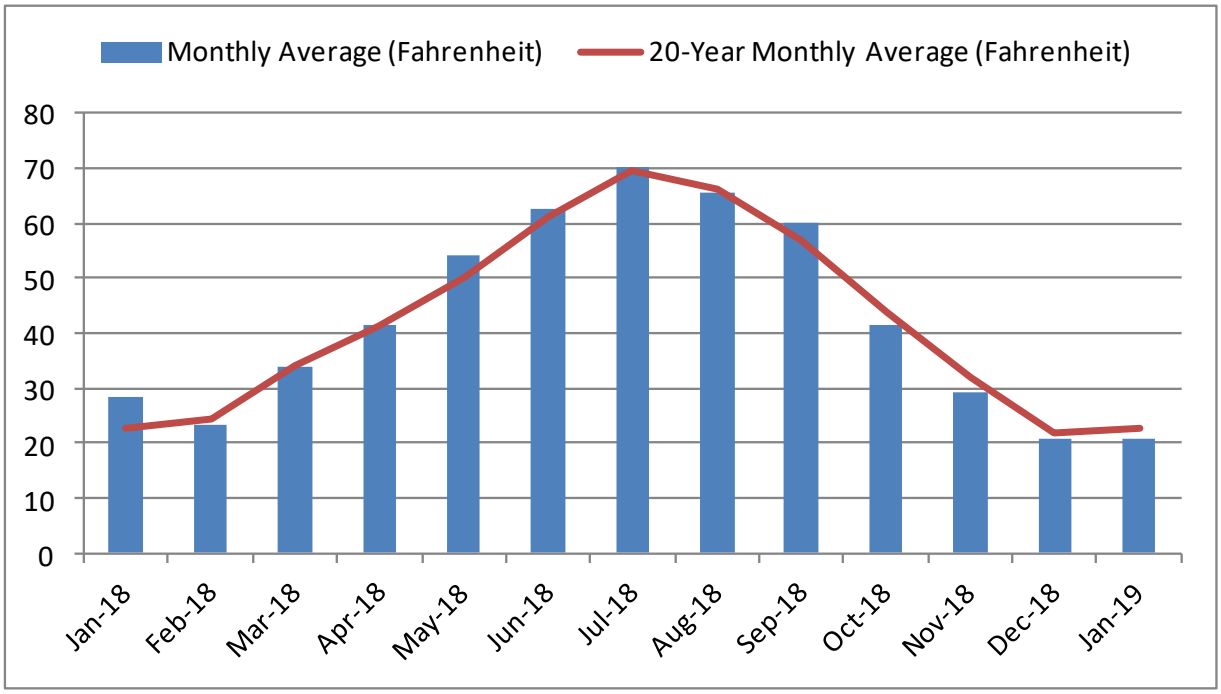
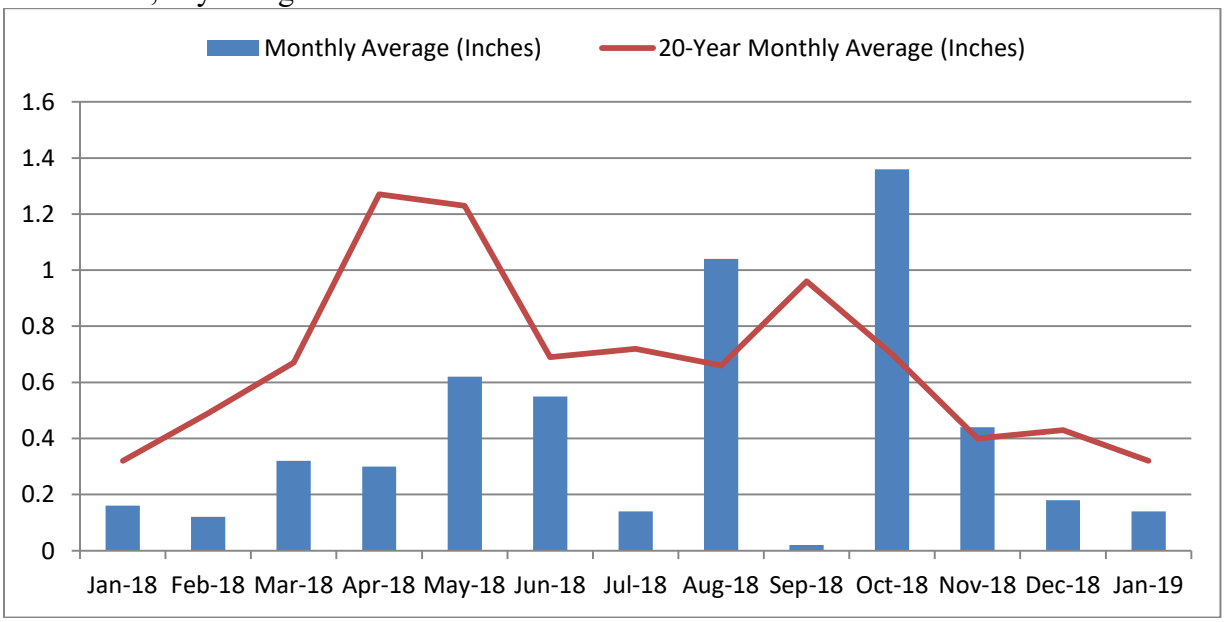


Figure 2. January 2018 - January 2019 mean monthly precipitation and 20-year monthly means for Rawlins, Wyoming.



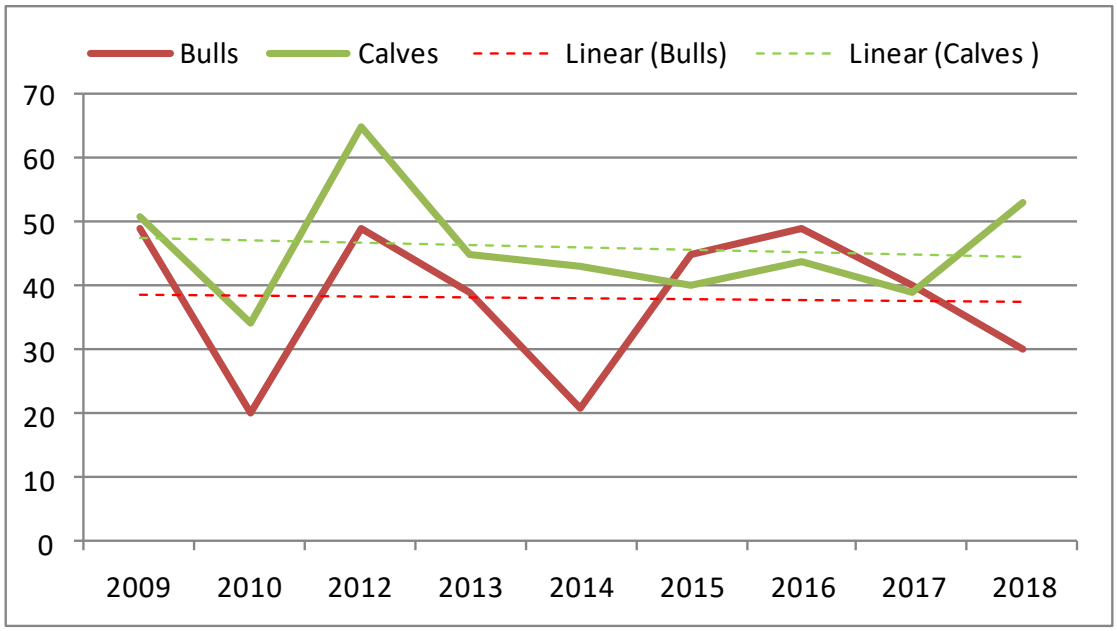
Habitat

The limited number of habitat transects that have been established within this herd unit do not provide sufficient data to make reliable inferences about habitat quantity or quality. Most shrub-steppe habitat in this herd unit is decadent and in need of treatments designed to improve the nutritional value of sagebrush and other plants.

Field Data

The mid-winter trend count to estimate the wintering population of elk in the herd unit was conducted in January 2019. Postseason sex and age classifications were conducted in conjunction with a mid-winter trend survey. The results were a total of 30 bulls and 53 calves per 100 cows, from a sample of 2,131 elk. Figure 3 illustrates how the 2018 postseason ratios compared to previous classification results during the past 10 years.

Figure 3. Shirley Mountain Elk Herd Unit bull and calf ratios per 100 cows, 2009 - 2018, Wyoming.



Previously the collection of classification data varied annually in methodology, primarily due to no dedicated survey flight budget for this herd. With the change in management objective type from a postseason population objective, to a mid-winter trend count objective, a dedicated budget for annual helicopter surveys has been established. This has resulted in more consistent sampling for trend, sex, and age data collection.

Harvest Data

2018 elk harvest survey data indicated 703 hunters harvested 408 elk in 2018, with an overall success rate of 58%. The 2018 harvest success increased 5% from 2017. The 2018 branch antlered bull harvest (n=130) decreased 11% from 2017. Antlerless harvest (n=278) increased 16% in 2018. Overall, harvest in 2018 was relatively more successful with more elk being harvested and less days being expended for each elk harvested.

Chronic wasting disease (CWD) was first observed in the Shirley Mountain herd unit in 2006. In 2018, surveillance efforts for CWD continued in this herd unit. Since 1997, a total of 160 elk have been tested in this herd unit. A total of four tested elk have been positive for CWD. Results of the 2018 samples (n=19) collected from hunter harvested elk indicated an annual prevalence of 10.5% CWD positive. Annual CWD prevalence can be under or over represented due to small sample sizes. The five-year estimated hunter harvested elk CWD prevalence in this herd unit was 0%.

Population

In 2015, the management objective was reviewed and converted from a population management objective of 800 elk postseason, to a mid-winter trend count objective of 800 elk. The spreadsheet model which was previously used to develop the annual population estimate for elk in this herd unit did not function adequately enough to provide managers with a reliable estimate and was the primary reason for changing from a population based management objective to a mid-winter trend count objective. Maintaining sustainable numbers of elk in the Shirley Mountain herd unit, while also maintaining bull ratios within the special management parameters, is the ultimate management objective. Improving population monitoring techniques is keystone to insuring these management objectives are met. Replacing the spreadsheet model derived population estimate with the mid-winter trend count as the management benchmark will provide for a more accurate assessment of annual elk numbers in the is herd unit.

A mid-winter trend count survey was completed in January of 2019 (Figure 4). A total of 2,131 elk were observed in the herd unit. This sample size was relatively similar to the sample (n=1,800) observed last year. The most recent surveys' sample sizes are substantially greater when compared to previous helicopter surveys, covering relatively the same area in the herd unit. In 2010, 691 elk were observed and in 2013, 672 elk were observed during helicopter classification surveys. It would appear the number of elk wintering in this herd unit has been significantly under estimated.

Management Summary

The 2019 hunting season recommendations were prescribed with the objectives of maintaining bull ratios within the special management parameters and reducing elk numbers. Access in the Beer Mug Hunter Management Area (HMA) was anticipated to change in 2019. A significant number of elk harvested during the Type 2 season have historically been harvested on the HMA. With less private property enrolled in the HMA it is probable that Type 2 licensed hunter success may decrease in 2019. Access in the Hanna Draw HMA continued in 2019 with August, September, and November periods for Type 4 and Type 6 licensed hunters. The 50 Hanna Draw HMA permission slips that have been allocated in October during past hunting seasons were instead allocated in August for 2019. There are several elk damage situations that were addressed by liberalizing the Type 6 August 15-September 30 season limitation to include "within ½ mile of irrigated land."

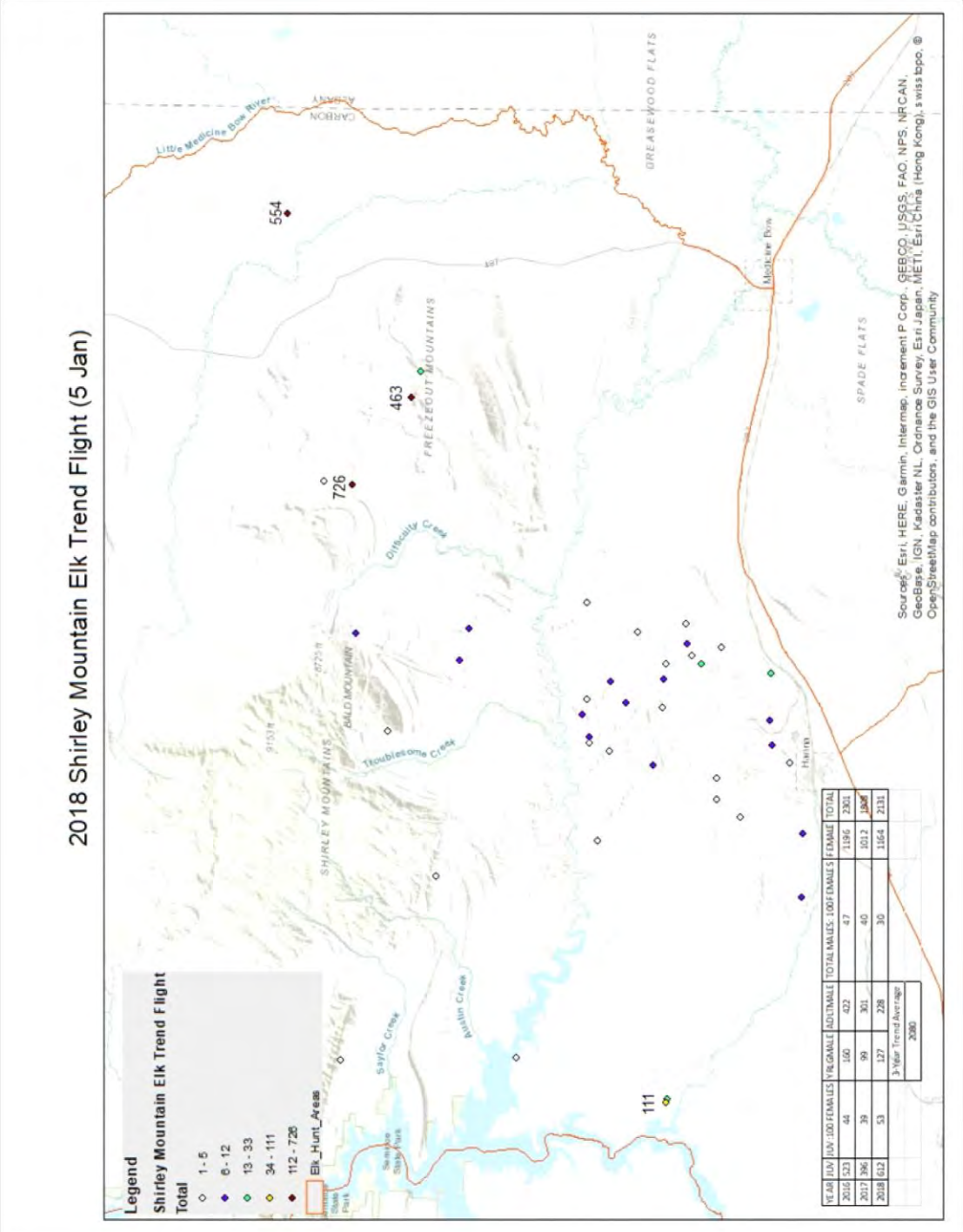
Literature Cited

None

Bibliography of Herd Specific Studies

None

Figure 4. 2018 Mid-winter trend count observations in the Shirley Mountain Elk Herd Unit, Wyoming.



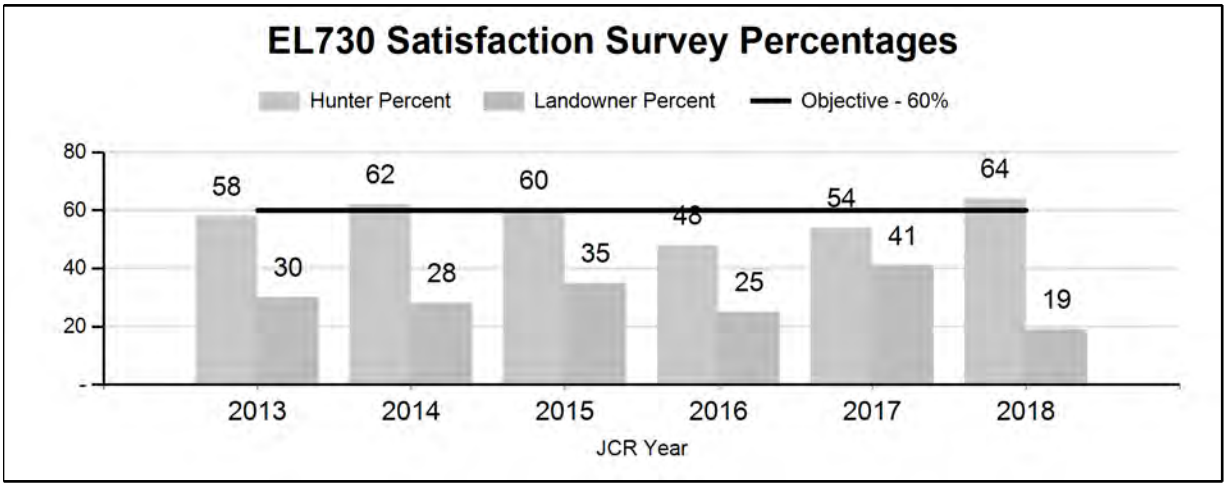
2018 - JCR Evaluation Form

SPECIES: Elk
HERD: EL730 - RAWHIDE
HUNT AREAS: 3

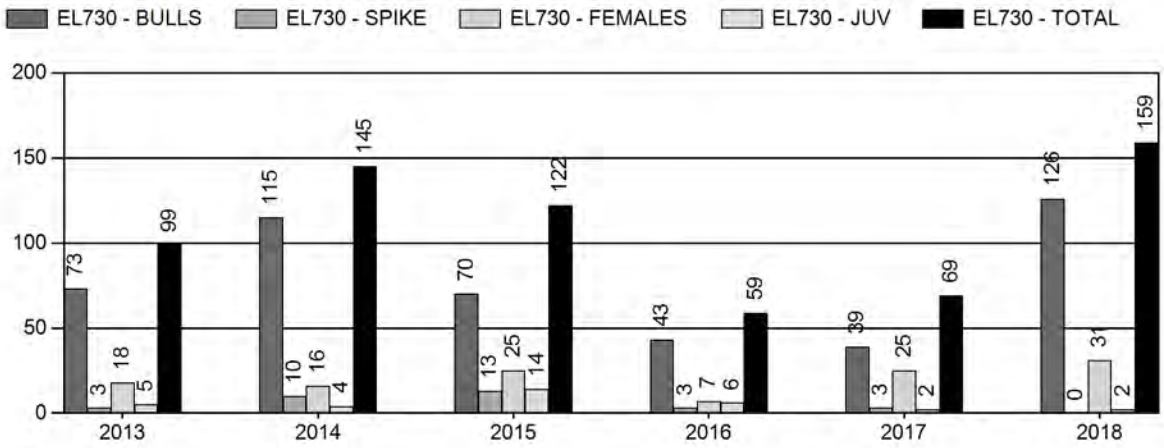
PERIOD: 6/1/2018 - 5/31/2019
PREPARED BY: MARTIN HICKS

	2013 - 2017 Average	2018	2019 Proposed
Hunter Satisfaction Percent	57%	64%	60%
Landowner Satisfaction Percent	32%	19%	40%
Harvest:	99	159	150
Hunters:	317	344	300
Hunter Success:	31%	46%	50%
Active Licenses:	335	356	310
Active License Success:	30%	45%	48%
Recreation Days:	2,309	2,313	1,480
Days Per Animal:	23.3	14.5	9.9
Males per 100 Females:	0	0	
Juveniles per 100 Females	0	0	

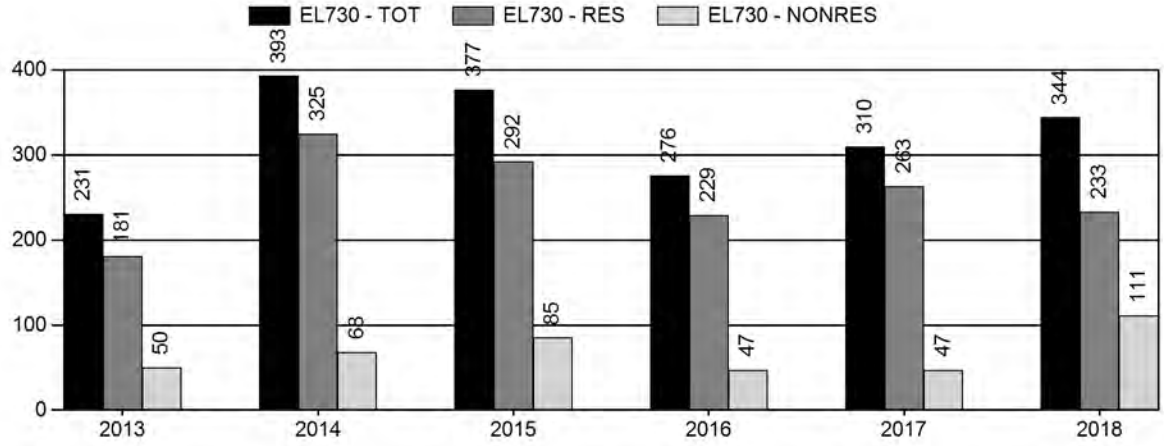
Satisfaction Based Objective	60%
Management Strategy:	Special
Percent population is above (+) or (-) objective:	-18%
Number of years population has been + or - objective in recent trend:	6



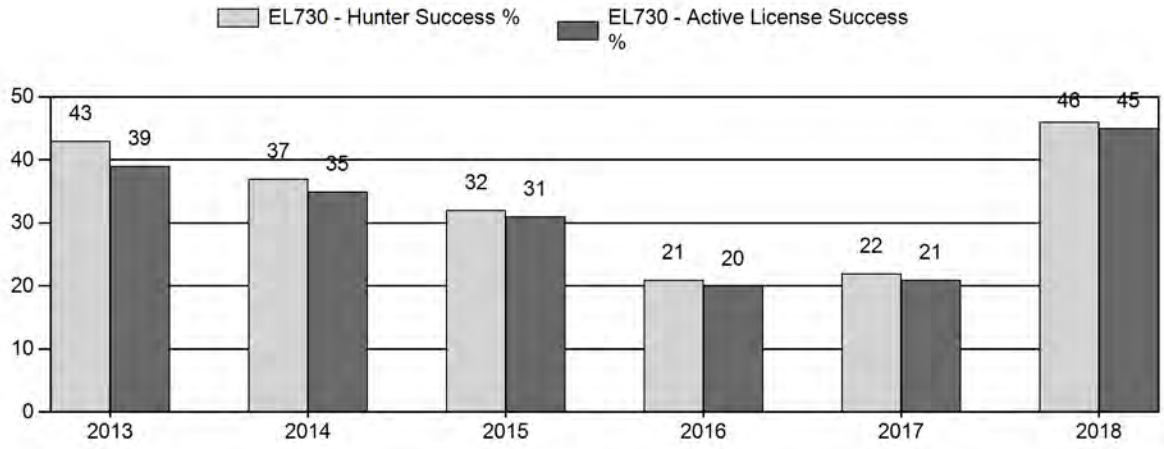
Harvest



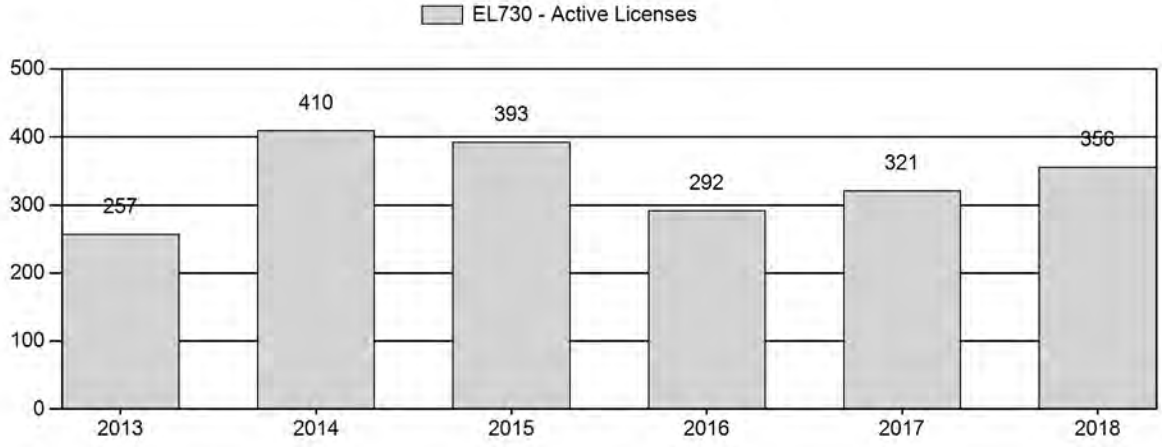
Number of Hunters



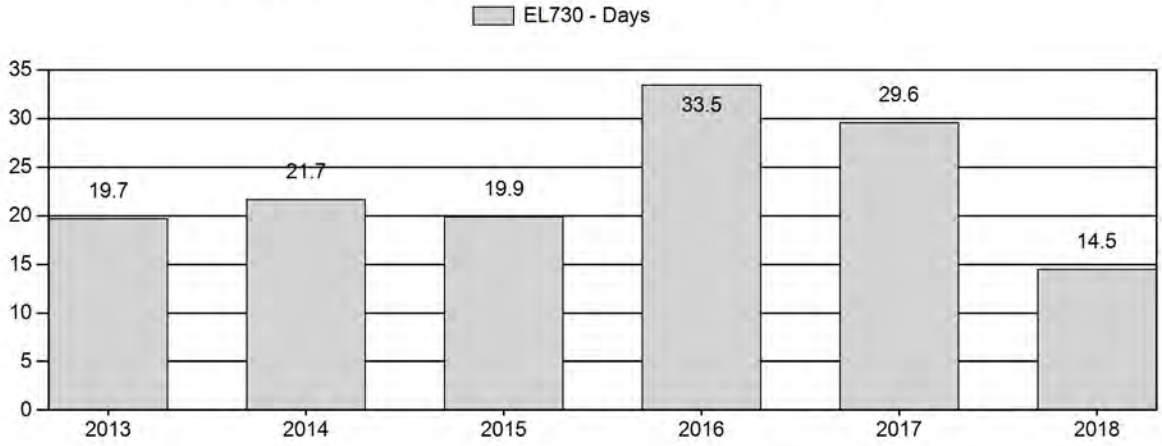
Harvest Success



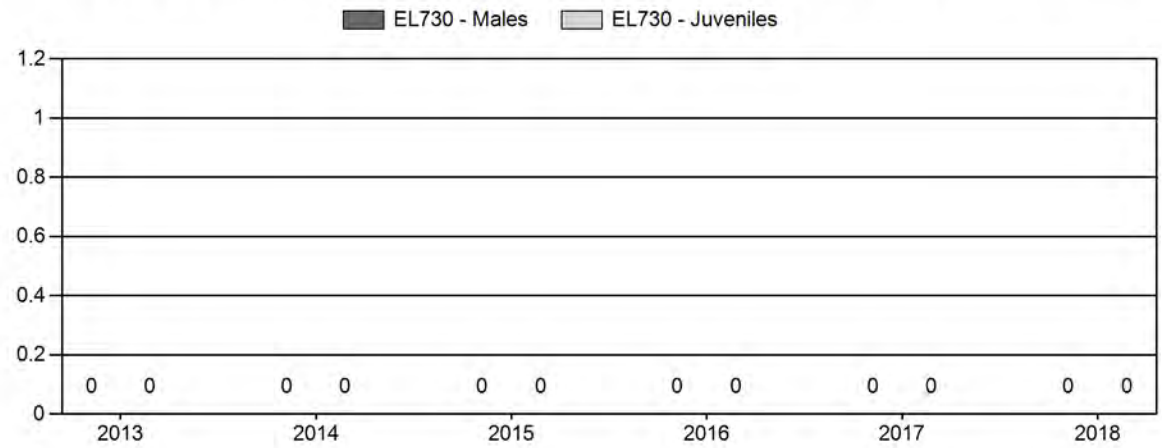
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



RAWHIDE ELK HERD (730)
2019 HUNTING SEASONS

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
3	Gen	Sept. 15	Oct. 14		General	Any elk
		Oct. 15	Jan. 31			Any elk south of U.S. Highway 26
3	6	Aug. 15	Nov. 30	200	Limited quota	Cow or calf
3	6	Dec. 1	Jan. 31			Cow or calf elk south of U.S. Highway 26

Special Archery Season Hunt Areas	Opening Date	Closing Date	Limitations
3	Sept. 1	Sept. 14	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
3	6	0

Management Evaluation

Current Hunter/Landowner Satisfaction Management Objective: 60% landowner/hunter satisfaction
Management Strategy: Private Land Management
2018 Hunter Satisfaction Estimate: 64%
2018 Landowner Satisfaction Estimate: 13%
Most Recent 3-year Running Average Hunter Satisfaction Estimate: 55%
Most Recent 3-year Running Average Landowner Satisfaction Estimate: 26%

The management objective for this herd was changed in 2012 from a post-season population objective of 40 elk to a nonnumeric population objective based on landowner and hunter satisfaction and the percentage of branch antlered bulls in the harvest. In 2017 the percentage of branch antlered bulls in the harvest was removed and the management strategy changed to Private Land Management during the herd objective process. We will follow trends over time to make management decisions based on constituent satisfaction. There is not a working model for this herd unit due to our inability to collect adequate population data. The herd will be taken to the public in 2022 for the 5-year review.

Herd Unit Issues

This herd unit has been difficult to manage based on our inability to collect adequate herd composition data along with field harvest data. Based on field personnel and landowner

observations we estimate there are over 400 elk in the Rawhide Elk Herd, with the population expanding south of the North Platte River into Goshen, Platte and Laramie Counties. There have been several public meetings to address the increasing population, and as a result the herd boundary was expanded south to the Colorado border for the 2012 season. Additionally the portion of Area 3 north of U.S. Highway 26 was changed to a general season for the 2014 season (the southern portion was changed to a general in 2011).

Weather

Weather in this herd unit was relatively normal during the past bio-year. Weather patterns in this portion of Wyoming are typically never severe enough to affect elk survival. When heavy snow events do happen, then herds will move down to agricultural fields to seek out stored hay. For specific meteorological information for the Rawhide herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat

Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500'. Its presence ties the hands of habitat managers limiting habitat enhancement options, and may result in reduced carrying capacities of rangelands if it is the predominant specie. This herd unit is comprised of a mix of native rangelands, CRP, dryland and irrigated croplands and riparian areas.

Areas burned by wildfires (~20,000 acres) within the last 10 years have responded favorably due to reduction in conifers and enhancement of herbaceous plant communities. There are some portions of the burned areas are predominantly cheatgrass, and will likely remain in that state unless treated with herbicides but overall the burned areas appear to be progressing through their successional plant stages. At certain times of the year elk are observed in the burned areas, however based on elk collar data and landowner observations they are using more or the western portion of the Guard Camp that burned in 2010 (Tracer Fire) and spend less time in the Chicago Fire which burned in 2012.

Field/Harvest Data

Harvest success and effort has fluctuated around 31% and 24 days per harvest for the past five years. However, during the 2018 season elk hunters experienced an increase in harvest success (49%) and spent fewer days in the field (10 days/harvest). Harvest did increase on private land adjacent to the North Platte River and just southeast of Glendo, which based on collared elk locations (Figure 1) and harvest of collared elk (n=4) was an accurate assessment. This increase in harvest helped to re-distributed elk to more accessible places, particularly the Broom Creek Hunter Management Area. Harvest in this hunt area is driven by access; if the majority of hunters are limited to public land then success decreases and effort increases. Finding elk in this herd unit can be difficult due to landownership patterns and when it does open up, which was the case in 2018 there is an increase in harvest (63% increase in bull harvest in 2018 compared to 2017). The majority of access is restricted to the Broom Creek HMA north of US Hwy 26 and is also dependent on crop damage south of US Hwy 26. Based on the comments from the annual landowner survey, the majority of landowners the own property south of Hwy 26 want to see a decrease in the herd size so they are willing to allow access. In 2012 the severe drought displaced elk and they were not found in traditional places (i.e. alfalfa fields). In 2014, 2015 and

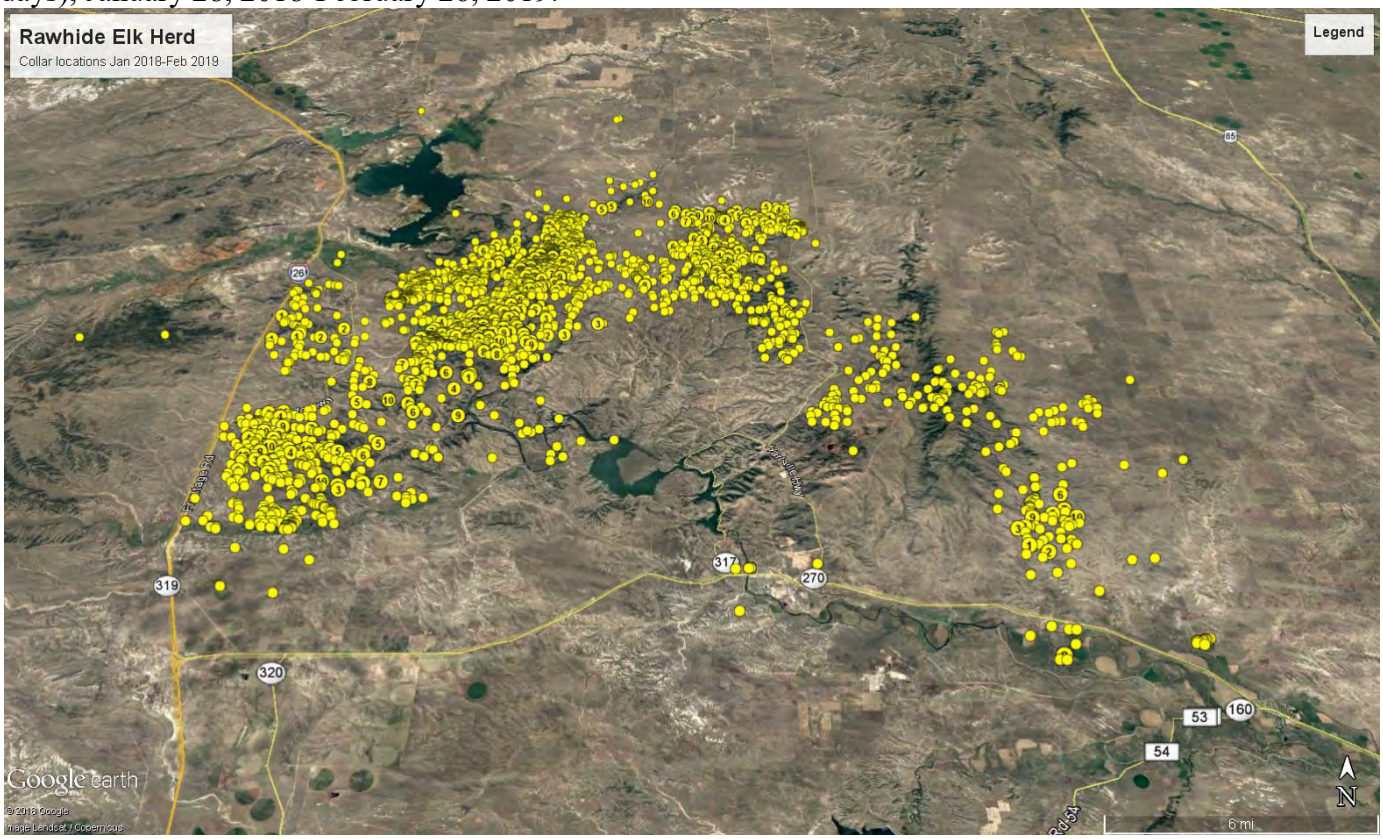
2016 above average spring and summer precipitation re-distributed elk which increased forage production and as a result elk were not dependent upon irrigated crops. In 2017 and 2018 spring precipitation decreased and elk were causing damage on irrigated croplands south of Hwy 26. Elk that were traditional found within Whalen Canyon appear to have re-distributed to other areas of the herd unit.

Active license numbers have fluctuated around 330 for the past five years. Starting in 2011 that portion of Hunt Area 3 south of U.S. Highway 26 became a general season. After several public meetings over the past three years coupled with a landowner survey it was decided to convert that portion of Area 3 north of US Hwy 26 from a limited quota area to a general hunt area. However, in 2015 and 2016 landowners north of U.S. Hwy 26 voiced their concern that elk were no longer in their traditional areas and therefore damage issues have decreased. There are now fewer active licenses as a general season then when this herd was managed under a limited quota regime.

Since this herd unit changed to a satisfaction management evaluation in 2012 and a private land management strategy in 2017 classification data is no longer collected.

During the 2017/18 winter 29 elk were captured and fitted with GPS radio collars that will be deployed for three years to look at habitat selection, identify seasonal ranges, document calving areas and map movement patterns. This is a cooperative study with the Wyoming Military Department. During the first year of collar deployment there were seven mortalities, four from hunting, one as a result of calving complications, one from a mountain lion predation and one unknown. It was expected to observe elk cross Interstate Hwy 25 (I-25) and head west based on the number of vehicle collisions just south of Glendo along I-25. However, only one elk did cross I-25, then decided to come back and has remained east of I-25. For the most part the 29 collared elk remained within or adjacent to the National Guard Camp, and were highly selective for the area within the North Platte River corridor between Glendo and Guernsey during their first year of deployment (Figure 1). On January 22, 2019 six of the collars were re-deployed; all on female elk. Elk routinely cross the North Platte River, which is the current boundary between Hunt Area 3 and Hunt Area 7. A closer examination on that boundary will be explored in the coming year.

Figure 1. Rawhide Elk Herd Unit elk locations from 29 different cow elk (1 location ever two days), January 28, 2018-February 26, 2019.



Landowner/Hunter Satisfaction Survey Results

The landowner satisfaction survey results (Appendix A) showed that only 13% of the landowners were satisfied the elk population is at or about at desired levels, which was significantly lower than the 2017 satisfaction level of 41%. Landowners appear to be split on what they want to see for elk numbers, 45% indicated the elk population is above desired levels and 42% indicated the elk population was below desired levels. There were 24 surveys returned for a 40% return rate, lower than 2017, which had a return rate of 45%, but still exceeded the 25% threshold required for the satisfaction survey. Based on the past six years of surveys landowners are still not pleased with the number of elk, which was more evident this year given the split in preferred elk densities. Landowners south of US Hwy 26 still prefer to have lower densities, particularly ones that are in irrigated crop production and landowners north of the highway wants to see more elk and manage for trophy bulls. Bringing their satisfaction up to 60% continues to be a challenge. The hunter satisfaction survey indicated that 64% were satisfied with their hunt, which was an increase from 2017. The increase in satisfaction appears plausible given there were more elk accessible to hunters and the significant increase in bull harvest.

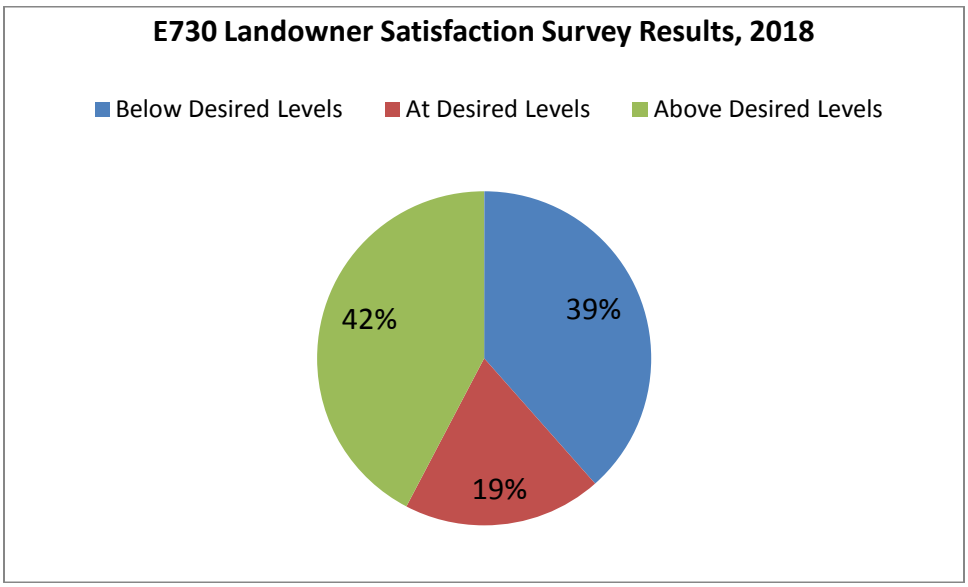
Management Summary

In summary, the 2019 season is designed to reduce elk numbers particularly in the southern portion of the herd unit. We hope to attain a harvest of 150 elk.

Appendix A

2018 Landowner survey results and comments for the Rawhide Elk Herd Unit

Sample size: 26



Comments:

1) Very destructive to fences and pastures. Would prefer they were not here at all
2) Making Area 3 a general area has made it difficult for us. We are dealing with a lot of local trespassers-sneaking in to shoot elk. If you must make this a general-tag-open it up to out of state hunters also so we can at least make some money off hunts. There is a HUGE antelope population here please give out more tags in this area! We are overrun!! Glen Southwick 307-334-0911
3) We use to see elk on the 4J pasture between Hwy 270 and Waylen Canyon. Not since you opened up licenses north of Hwy 26 over the counter. Should be a draw with a higher percentage of success than before.
4) The elk don't bother me, I have none on my place. The antelope is what bothering me. Several hundred running on my place. Yes I let people hunt.
5) Way below. You wanted to get rid of elk in hunt area #3. You have nearly succeeded. David A. Stenson
6) The elk in our area don't stay around. They just pass through. Friends to our north 15 miles where the elk do stay say they have to many.
7) I have little or no knowledge regarding this area. Gene Lenz PO Box 1200 Lusk 82225
8) Martin, I had my game camera on my pasture from October until New Years Day. I got many interesting pics including mountain lion, badger, coyotes, many mule deer but one pic of an elk. It was a 5 point and he was alone. Also, I hunt that pasture 15-20 times each elk season and have not harvested an elk since 2012. Thanks for what you do, Jaron Fredrick

9) Over here on the east side of the Rawhide Buttes section 12 Range 64 on the Brozovich Ranch, we have not had very many elk. We don't have irrigation or lots of free flowing water. West of us, in rougher and more rocky terrain and tree covered ground.
10) Seeing a few, but would like more. Thanks
11) We don't have very many come on our property
12) Current population does not allow hunting after deer season at the head of Deer Creek on Little Deer Creek
13) We really don't care to have all the elk here. Between the damage to crops, pivots and fences along with the risk of Brucellosis being transferred to cattle it's not worth the risk.
14) Sorry this is late, time got away from me. Saw more this year, but would still take more. May even get a tag this year. Thanks, Harold Stroh

1602 North Broken Arrow Trail
Lakeland, Florida 33813

Wyoming Game and Fish Department
5400 Bishop Blvd.
Cheyenne, WY 82006

ATTN: WGFD
Mr. Martin Hicks
1212 South Adams
Laramie, WY 82070

Thank you for your inquiry.

It is my understanding that the Northern portions of Unit 3 are 95% ± privately owned, and that other "uses" (other than dedicated Elk hunting) are equally pursued, and accomplished.

For instance: If cattle is pursued, the private landowner has done a good job of balancing the grazing/hay/water/hunting resources to be acceptable to him/her.

Let us just say "This is a given".

If it was not, the private landowner would alter the balance of the mix over the years, because he is footing the "whole bill", unlike other lands.

Therefore, Answer/Question No. 2 is the current, most accurate answer.

The next question, to me, is: Does Wyoming want to enhance (or allow) the landowner to have a better elk experience?

If so, we can suggest some program changes.

Thank you for your initial interest.

John Curls, Sr.

John Curls, Sr.
Hidden Valley Ranch
3147 State Road 270
Manville, WY 82227
Phone: 863-698-1342

P.S. it is a pleasure to be an outdoors man in Wyoming.

2018 - JCR Evaluation Form

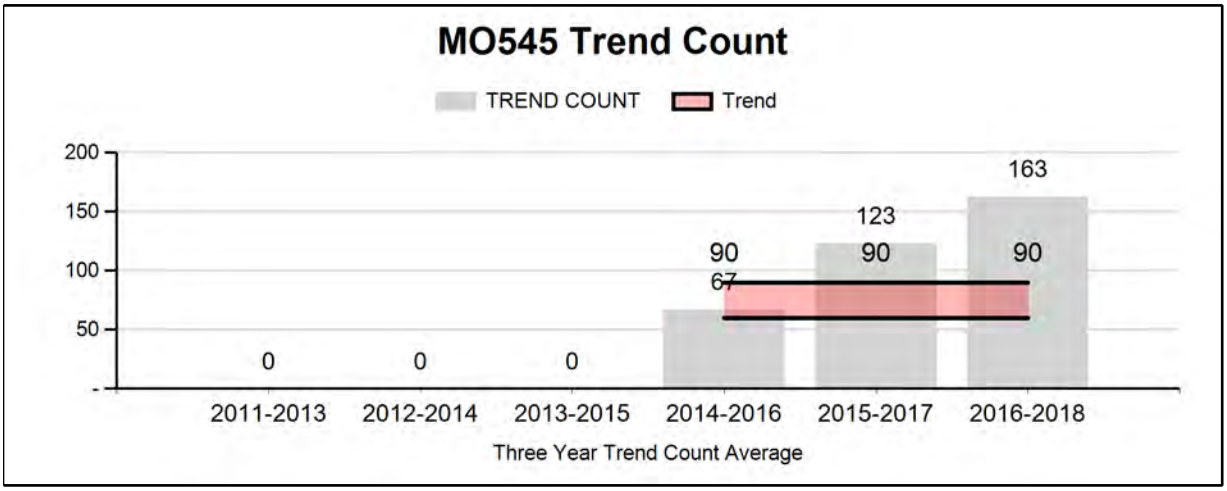
SPECIES: Moose
PERIOD: 6/1/2018 - 5/31/2019
HERD: MO545 - SNOWY RANGE
HUNT AREAS: 38, 41
PREPARED BY: TEAL CUFAUDE

	2013 - 2017 Average	2018	2019 Proposed
Trend Count:	74	120	150
Harvest:	44	40	41
Hunters:	48	42	42
Hunter Success:	92%	95%	98 %
Active Licenses:	48	42	42
Active License Success	92%	95%	98 %
Recreation Days:	411	275	375
Days Per Animal:	9.3	6.9	9.1
Males per 100 Females:	109	94	
Juveniles per 100 Females	47	51	

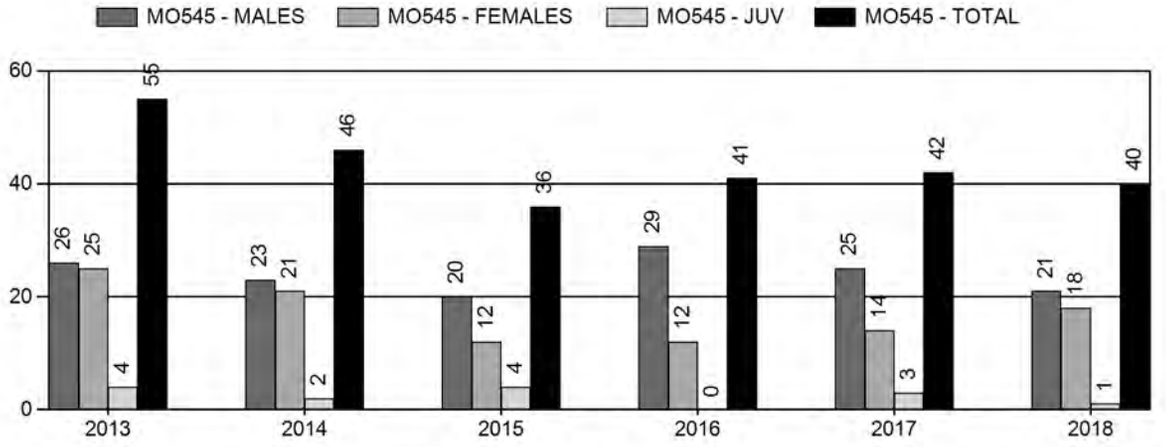
Trend Based Objective (± 20%)	75 (60 - 90)
Management Strategy:	Special
Percent population is above (+) or (-) objective:	60%
Number of years population has been + or - objective in recent trend:	3

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

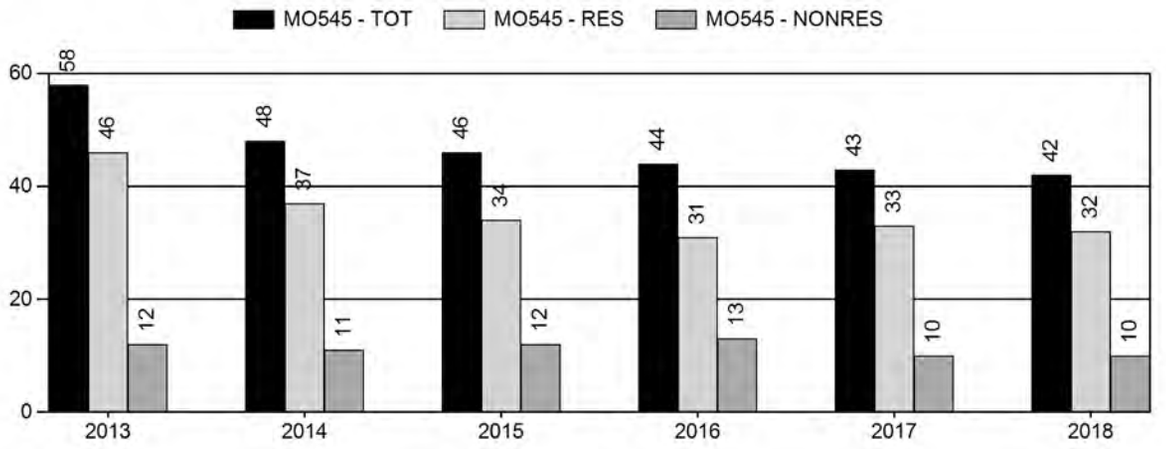
	JCR Year	Proposed
Females ≥ 1 year old:	NA%	NA%
Males ≥ 1 year old:	NA%	NA%
Juveniles (< 1 year old):	NA%	NA%



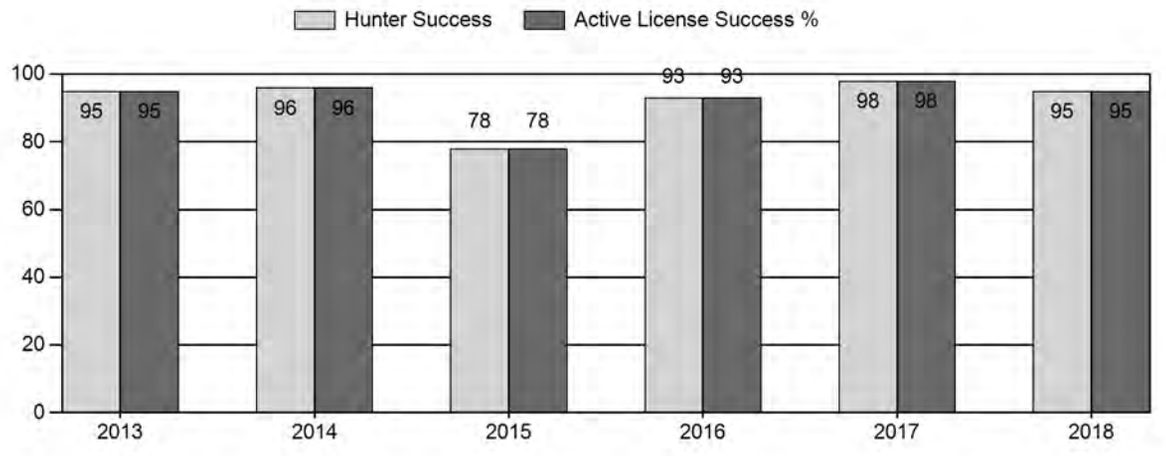
Harvest



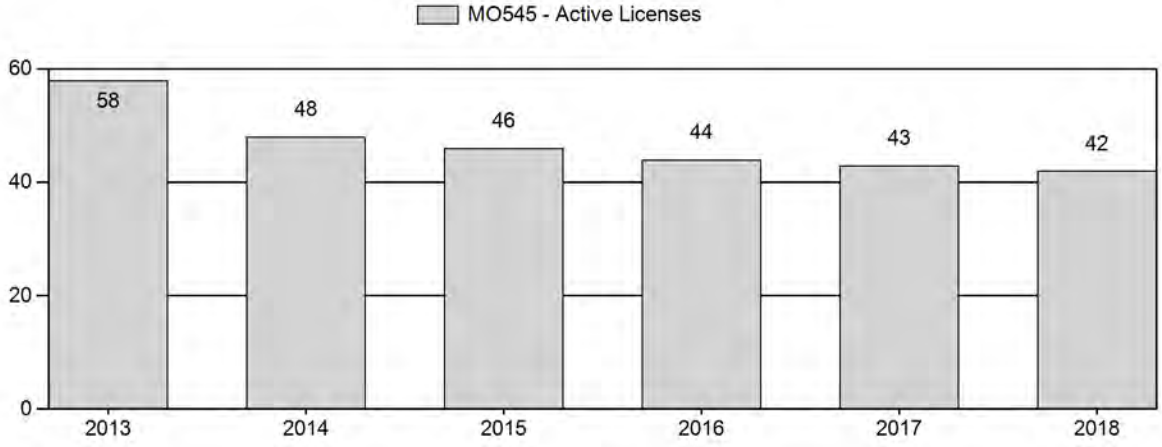
Number of Active Licenses



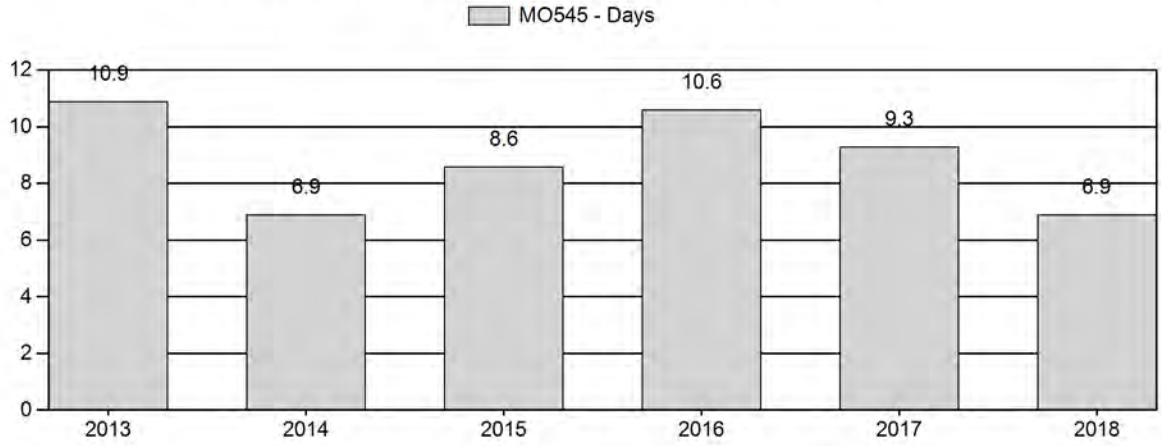
Harvest Success



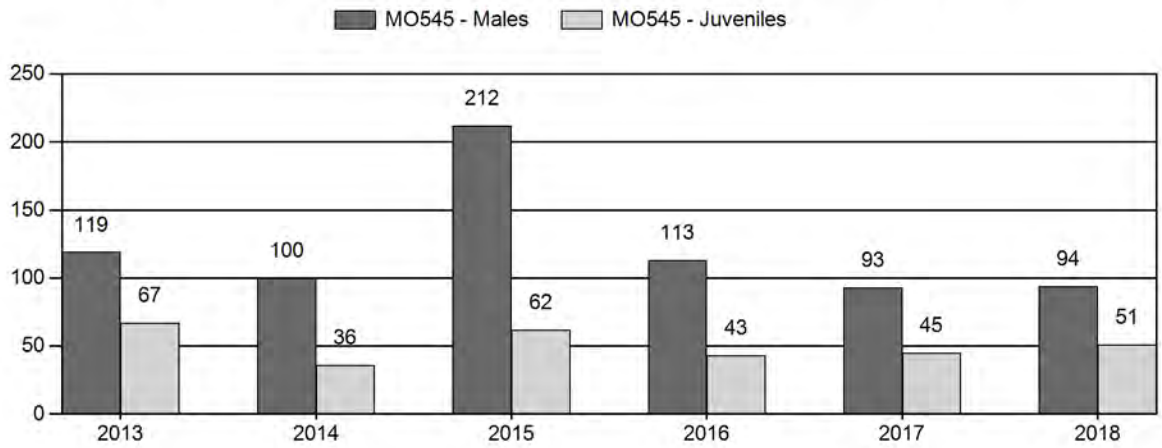
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Moose Herd MO545 - SNOWY RANGE

		MALES				FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	Adult	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	0	5	27	32	42%	27	35%	18	23%	77	0	19	100	119	± 0	67	± 0	31
2014	266	2	20	22	42%	22	42%	8	15%	52	254	9	91	100	± 35	36	± 17	18
2015	0	0	17	17	57%	8	27%	5	17%	30	246	0	212	212	± 0	62	± 0	20
2016	0	9	77	86	44%	76	39%	33	17%	195	0	12	101	113	± 0	43	± 0	20
2017	0	17	49	66	39%	71	42%	32	19%	169	0	24	69	93	± 0	45	± 0	23
2018	0	13	33	46	38%	49	41%	25	21%	120	0	27	67	94	± 0	51	± 0	26

2019 HUNTING SEASON RECOMMENDATIONS
SNOWY RANGE MOOSE (MO545)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
38, 41	1	Oct. 1	Nov. 14	20	Limited quota	Any moose, except cow moose with calf at side
	4	Oct. 1	Nov. 14	20	Limited quota	Antlerless moose, except cow moose with calf at side
	Archery	Sep. 1	Sep. 30			Refer to license type and limitations in Section 3 of Chapter 8

Hunt Area	License Type	Quota change from 2018
Herd Unit Total		**None**

Management Evaluation

Current Management Objective: Mid-Winter Trend Count of 75 Moose

Secondary Management Objectives:

1) 3-yr. average of ≥ 4 years of age median for harvested bulls.
   - Currently Met: 2016-2018 Median Age for Harvested Bulls- 5.2 years of age
2) 3-yr. average of ≥ 40% of bulls in harvest = ≥ 5 years of age.
   - Currently Met: 2016-2018 Percentage of Bulls ≥ 5 years of age- 65%
3) Maintain sustainable communities of willow species preferred by moose

Management Strategy: Special

2018 Mid-Winter Trend Count: 120 Moose

Moose in the Snowy Range herd unit are managed toward a mid-winter trend count of 75 moose. The herd is managed under a special management strategy. Attempts to develop a spreadsheet model for this herd were not successful. In the absence of an accurate or usable population estimate for the Snowy Range Moose herd unit, a change to an alternative objective was necessary. The management objective was last reviewed in 2016 and changed from a postseason population objective of 100 moose to the mid-winter trend count of 75 moose.

Herd Unit Issues

The Snowy Range herd unit stretches across southern Wyoming, along the Colorado border, from Baggs to Cheyenne. Moose are found year-round in areas on Pole Mountain, Sierra Madre Mountains, and most notably, the Snowy Range Mountains. These moose descended from moose transplanted in Colorado and historically were not native to this area. Challenges for managing moose in this herd unit include a rapidly changing forest ecosystem, high parasite infestation rates, and human conflict/safety. Moose, especially throughout the southern extent of

their range, are susceptible to a variety of diseases and parasites. Presence of carotid artery worms (Elaeophora schneideri) has been increasingly documented in most herd units in Wyoming. No moose harvested in the Snowy Range herd unit were reported to have indications of carotid artery worms in 2018. Limited population monitoring data collection has been an issue in this herd unit in the past. The 2018 trend count declined to 120 moose. Inclement weather conditions prevented complete coverage of a few drainages in Area 41.

Weather

The 2017-18 winter had numerous periods of bitter cold, continuing through February, but much of the winter range was open and available. The spring of 2018 was dry, resulting in slow plant growth and green-up of rangelands. The majority of the summer and fall were extremely dry, causing much of the available forage to cure. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided moose with a valuable boost in nutrition prior to the winter of 2018-19. While there have been several notable snow storms and cold snaps during the winter of 2018-19, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Early February snowpack (snow water equivalent) at mid-elevation, as reported by the South Brush Creek Snotel Site (Figure 1), is 99% of normal. Higher elevations are seeing higher winter snowpack with the Brooklyn Lake Snotel Site (Figure 2) reporting a snowpack that is 119% of normal.

Figure 1. October-February bio-year 2018 South Brush Creek Snotel Site precipitation data, Wyoming.

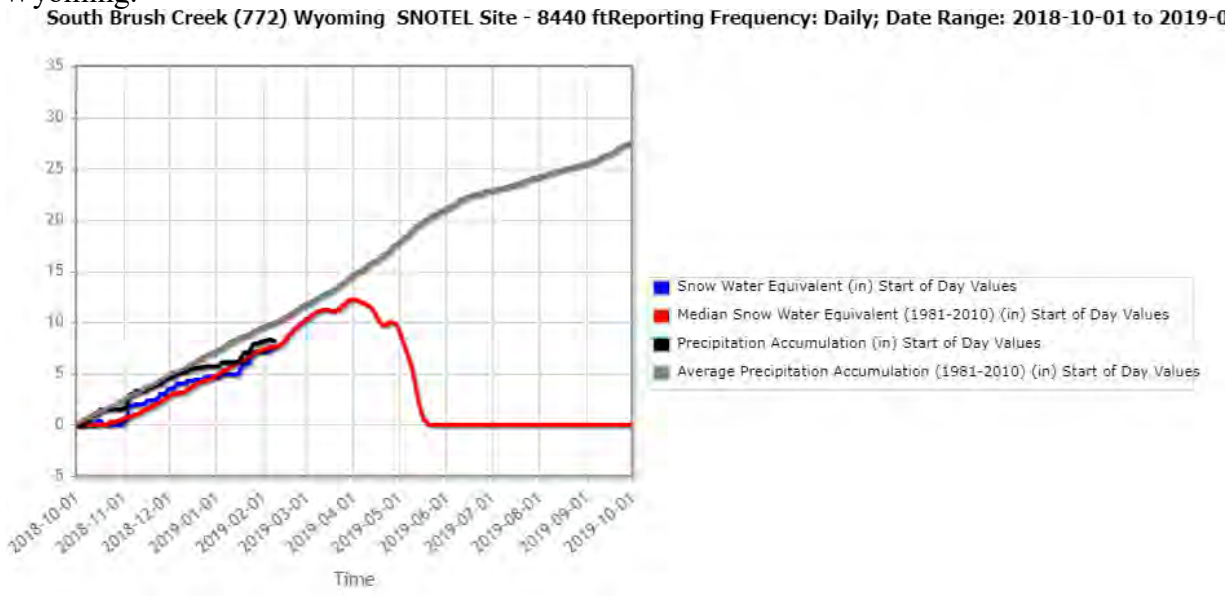
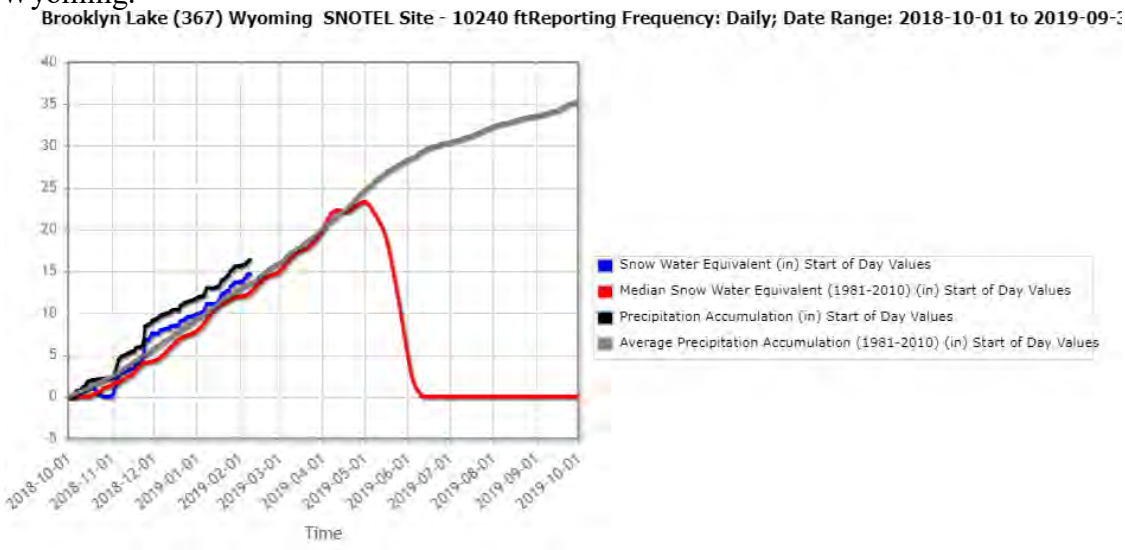


Figure 2. October-February bio-year 2018 Brooklyn Lake Snotel Site precipitation data, Wyoming.



Habitat

Previous research in this herd unit indicated moose habitat, primarily willow communities, were generally decadent and over browsed (Baigas 2008, Jesmer 2014). Determining which ungulate species were responsible for the over browsing of willows was and still is difficult to determine. In association with the Snowy Range Moose Study being conducted by UW graduate student Alex May, three years worth of habitat data have been collected in the Snowy Range. Between 2015 and 2016, willow browse monitoring using the Kiegley Live Dead Index (LDI) was conducted on 57 transects. Data collected indicated a positive trend in browse pressure when compared to data collected in earlier studies. These results suggest planeleaf willow growth is less inhibited by browsing than previous years. However, managers need to remain cognizant of the negative impacts moose may contribute to willow community degradation and need be prepared to implement corrective population management if warranted. WGFD is currently developing a rapid habitat assessment technique for moose habitat which should provide managers with a tool to assess willow community health and sustainability. No willow browse monitoring was conducted by WGFD in bio-year 2018.

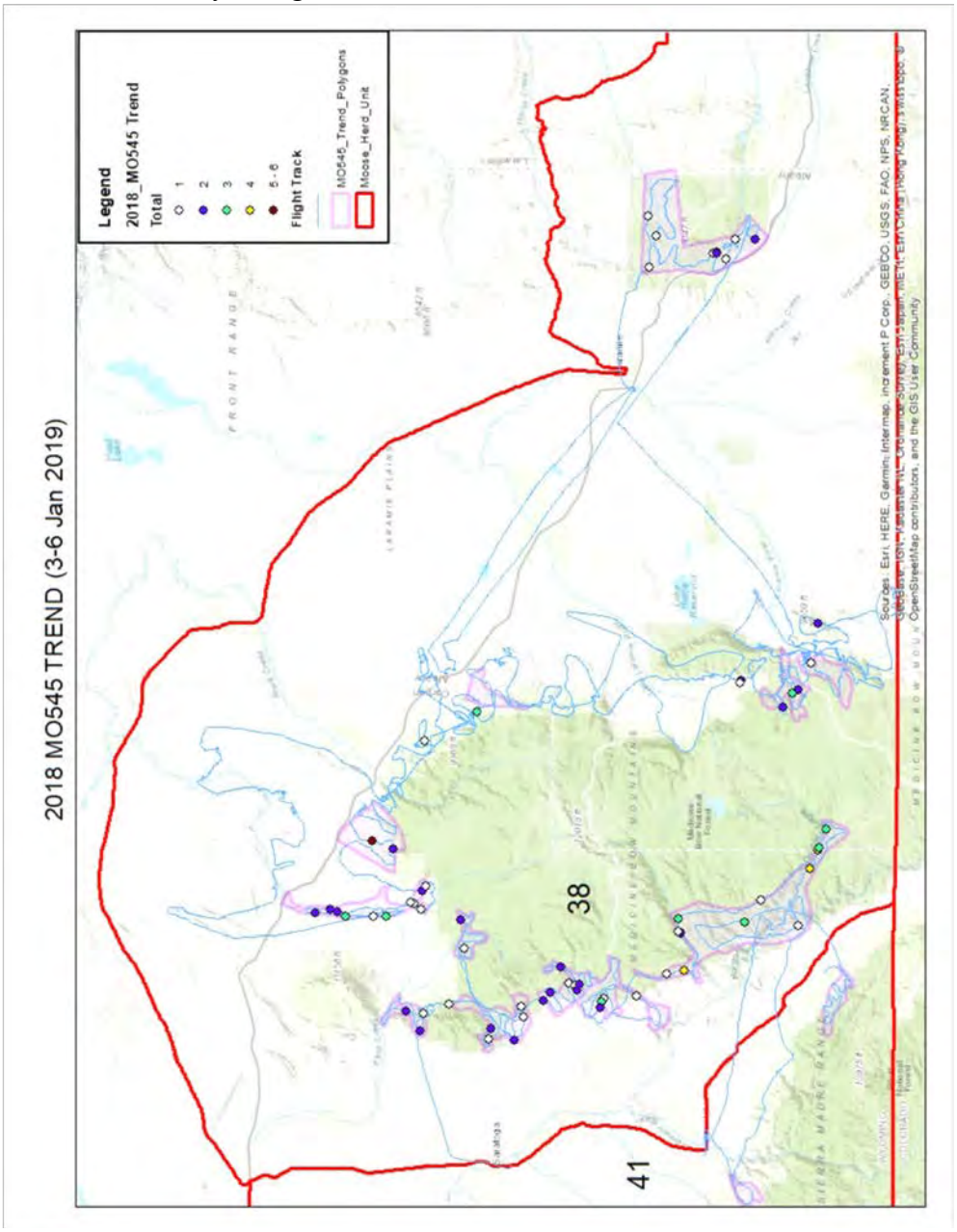
Low amounts of precipitation and high temperatures lead to a drying trend in the spring. This pattern made for lower vegetative production which may have affected forage during early parturition. Precipitation slowed even more in June and vegetation began to cure out early. The early drying of vegetation, accompanied by strong winds, the increase of fine fuels from previous years of high grass production, and the abundance of dead beetle killed lodgepole created an environment conducive to large wildfires in the Sierra Madres. These wildfires could potentially serve to improve moose habitat by increasing aspen production, diversifying willow species age class, and increasing herbaceous production throughout moose ranges in the areas impacted by fire.

Field Data

The third moose mid-winter trend count was conducted in January 2019. Several areas were preselected to systematically search for moose and approximately 13 hours of helicopter flight

time was spent conducting the survey (Figure 3). All polygons were flown using a Bell Jet Ranger Helicopter. Most moose were observed in willow riparian areas and adjacent sagebrush/bitterbrush slopes, or aspen stands. We were unable to fly thoroughly in the two polygons in Hunt Area 41, due to inclement weather conditions, thereby reducing the number of moose detected. A total of 120 moose were observed and all were classified by sex and age. Several of the moose were observed between preselected search areas but they were included in the trend count sample as past surveys produced similar observations and it is likely that future surveys will produce similar observations. The results from the classifications were 94 bulls:100 cows and 51 calves:100 cows.

Figure 3. Moose observations and flight track from the mid-winter trend count in the Snowy Range Moose Herd Unit, Wyoming.



Harvest Data

A total of 21 bulls and one cow were harvested by 19 Type 1 licensed hunters, two Wyoming Governor's Licenses (one resident and one nonresident), one hunter with a Medical Carry Over (resident), and one hunter with a Super Tag (nonresident) for a harvest success rate of 96%. Type 4 license holders harvested 17 cows, and one reported calf for harvest success rate of 95%. The days per animal harvested decreased from 9.3 days in 2017, to 6.9 in 2018, which was below the five-year average.

The Snowy Range herd unit has a reputation for producing trophy quality bulls, and this continued again in 2018. Median age for tooth samples (n=14) from harvested bulls was 5.5 years old (Figure 4). The three-year running average for median age of harvested bulls increased slightly to 5.2 years of age (Figure 5). The proportion of bulls in the harvest which were five-years or older increased to 71% (Figure 6). Overall, the bull harvest continued to be within WGFD's parameters for "prime-age bulls" (Thomas 2008).

The tooth age samples (n=12) for harvested antlerless moose in 2018 ranged from one to 16 years of age. The proportion (17%) of antlerless harvest ≤ 2 years in age was significantly lower than the 2017 proportion (40%).

Figure 4. Median age of bulls harvested for the Snowy Range Moose Herd Unit, from lab aged teeth (n=14) in 2018, Wyoming.

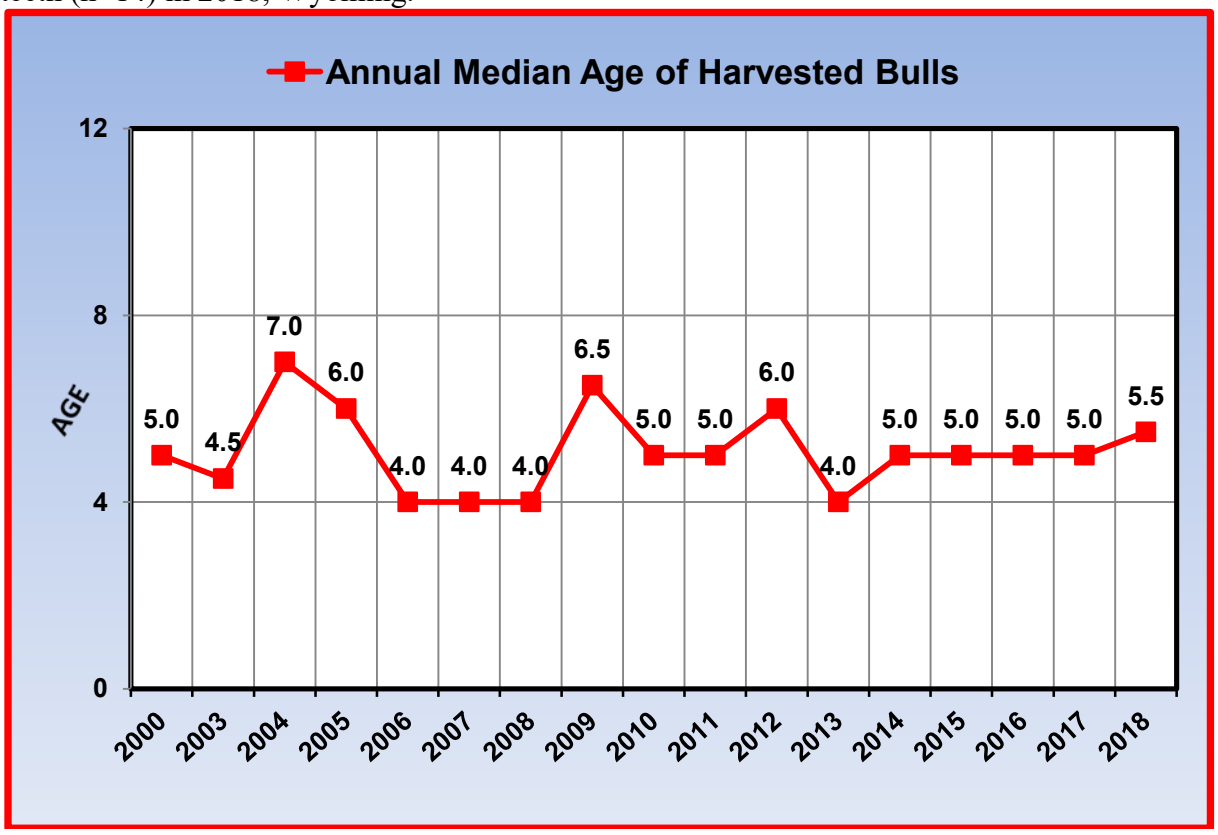


Figure 5. Average (3-year running) median age of bulls harvested for the Snowy Range Moose herd unit, from lab aged teeth (n=14) in 2018, Wyoming.

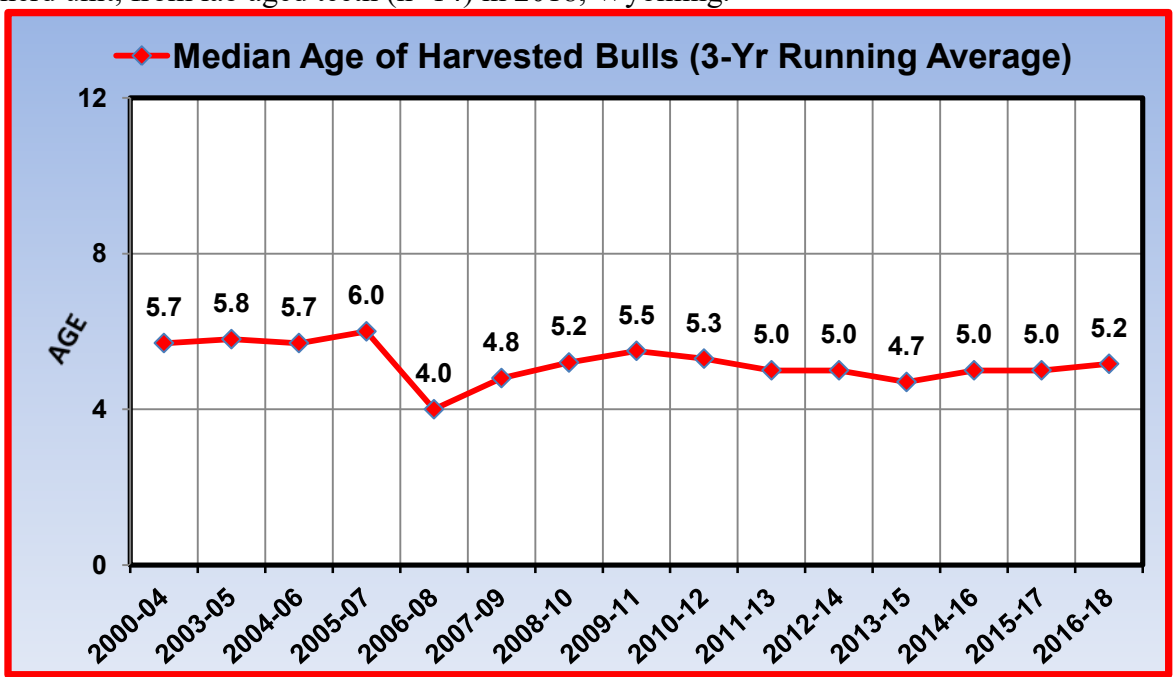


Figure 6. Annual Percentages of the bull harvest ≥ 5-years in age from Snowy Range Moose herd unit, from lab aged teeth (n=14) in 2018, Wyoming.

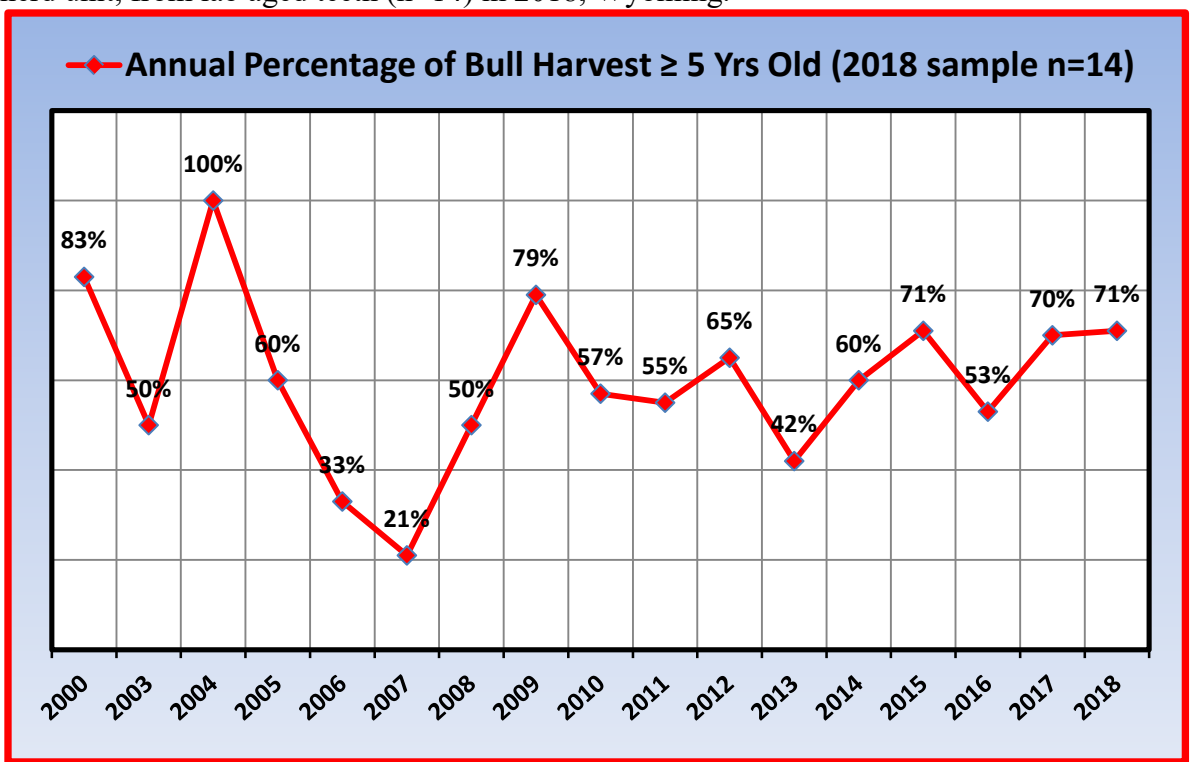
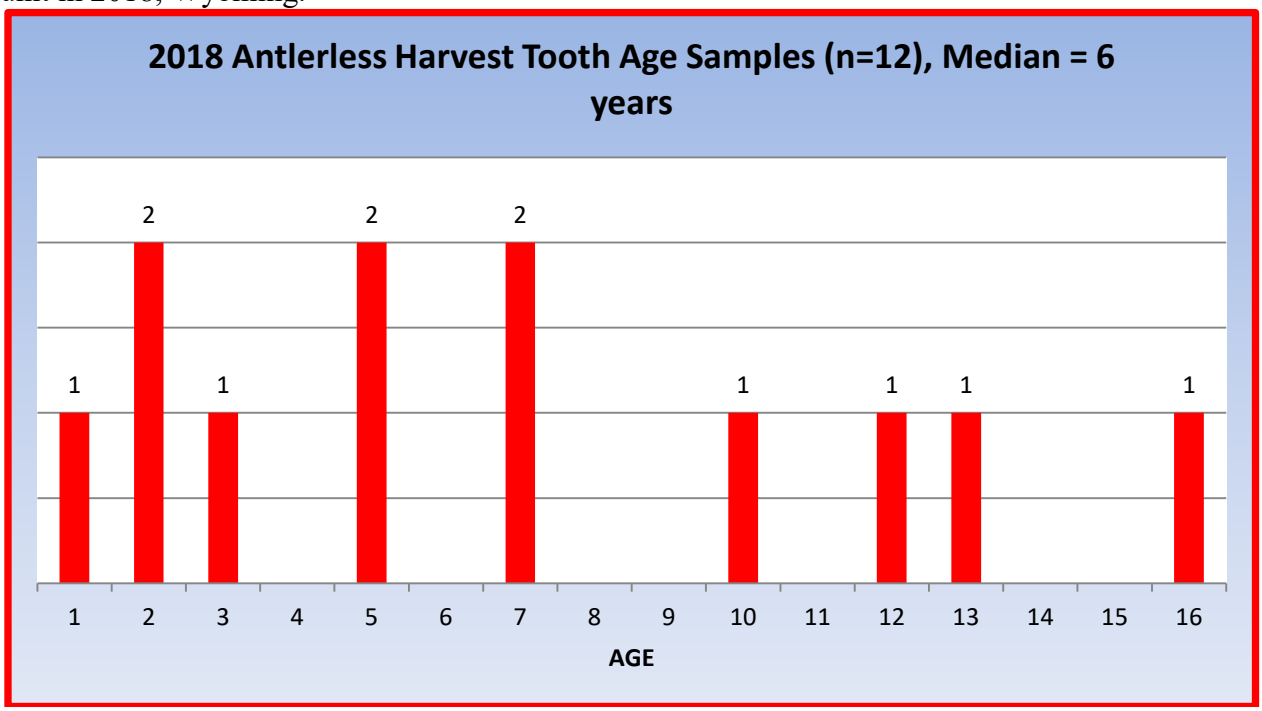


Figure 7. Age class distribution for antlerless moose harvested from Snowy Range Moose herd unit in 2018, Wyoming.



Population

A population model has not been developed for this herd unit. A moose abundance survey was completed in the Snowy Range herd unit in March 2015, resulting in an abundance estimate of 266 ± 56 (90% CI) moose. These results provided managers with the first plausible abundance estimate for moose wintering in the Snowy Range herd unit. Since bio-year 2016, mid-winter trend counts have been conducted to monitor moose in this herd unit. The trend count objective was set at 75 moose in 2016. Based on the results from the first three annual surveys, 201 moose, 169 moose, and 120 moose respectively, this initial objective was likely too low to meaningfully correlate with current moose numbers observed during the trend flight. The three-year trend count average from 2016-2018 was 163 moose. This management objective will be re-evaluated in 2021.

Management Summary

In 2019, Type 1 and Type 4 license numbers remain at 20 licenses each as they have for the last three years. Hunting season lengths also remain the same.

Current Herd Specific Studies

The Snowy Range Moose Study being conducted by UW graduate student Alex May presents an excellent opportunity to examine the relationship between moose habitat use and seral changes brought about by bark beetles. By making use of an existing GPS dataset collected prior to extensive beetle damage and comparing it to a new GPS dataset, and examining current individual movement strategies in beetle-killed forests. Interesting findings from this research are as follows:

- Adult survival of Snowy Range moose in 2016 was 79% and in 2017 was 95%.

- Pregnancy rates in Snowy Range Moose averaged 80% from 2015-17.
- Moose are avoiding forests in the Snowy Range herd unit. If moose do choose forest they are selecting for "more dead forest (i.e. beetle-killed forest)." Moose are selecting aspen and willow riparian areas throughout the bio-year.
- A slightly positive LDI result conducted in 2015-16 could indicate a relatively stable moose population in this herd unit. The results of this monitoring indicate the moose population is not booming or crashing.

Another moose research project was initiated by the Wyoming Cooperative Fish and Wildlife Research Unit and the WGFD in the Snowy Range herd unit during the spring of 2017. The objectives for this latest research project are as follows:

- Assess survival and cause-specific mortality of adult female moose.
- Evaluate patterns of habitat use of female moose as a function of habitat conditions, with specific reference towards understanding balance between thermal refuge and forage acquisition.
- Conduct annual surveys for recruitment; evaluate seasonal patterns of adult survival; continued monitoring of willow production/browsing; and measuring indices of nutritional condition of harvested animals via kidney collection.

Literature Cited

Thomas, T. P. 2008. Moose Population Management Recommendations. Wyoming Game and Fish Department, Cheyenne. 17 pp.

Bibliography of Herd Specific Studies

Baigas, P. E. 2008. Winter Habitat selection, winter diet, and seasonal distribution mapping of Shiras moose (*Alces alces shirasi*) in southeastern Wyoming. M.S. Thesis, Univ. Wyoming, Laramie, Wyoming. USA. 220 pp.

Jesmer, B., Jacob Goheen, Matthew Kauffman, Kevin Monteith, Aly Courtemanch. 2014. Statewide Moose Habitat Project: Linking Habitat and Nutrition with Population Performance in Wyoming Moose. Annual Report 2014. Department of Zoology and Physiology, University of Wyoming, Laramie. 11 pp.

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2018 - JCR Evaluation Form

SPECIES: Mule Deer
PERIOD: 6/1/2018 - 5/31/2019

HERD: MD534 - GOSHEN RIM

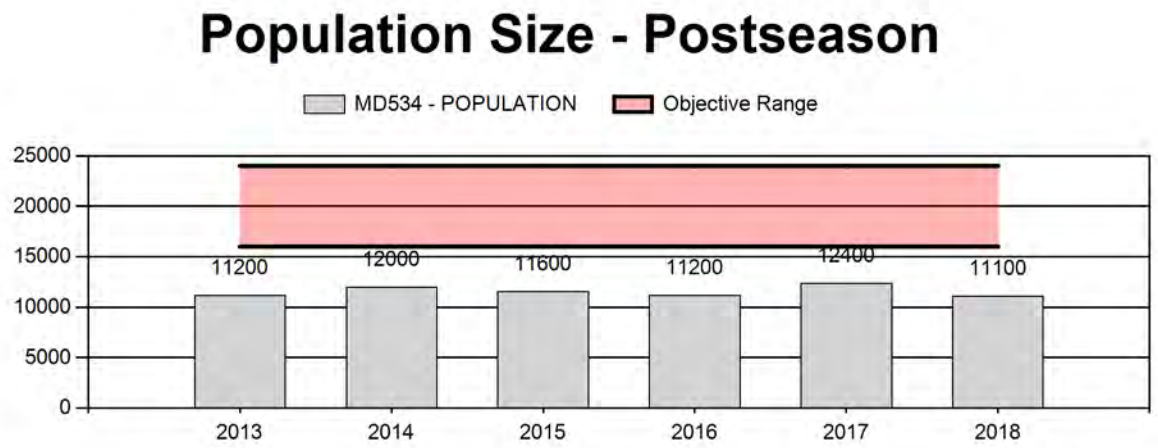
HUNT AREAS: 15
PREPARED BY: MARTIN HICKS

	2013 - 2017 Average	2018	2019 Proposed
Population:	11,680	11,100	9,900
Harvest:	885	965	1,000
Hunters:	1,684	1,818	1,800
Hunter Success:	53%	53%	56 %
Active Licenses:	1,775	1,901	1,900
Active License Success:	50%	51%	53 %
Recreation Days:	6,836	7,808	7,800
Days Per Animal:	7.7	8.1	7.8
Males per 100 Females	35	35	
Juveniles per 100 Females	61	48	

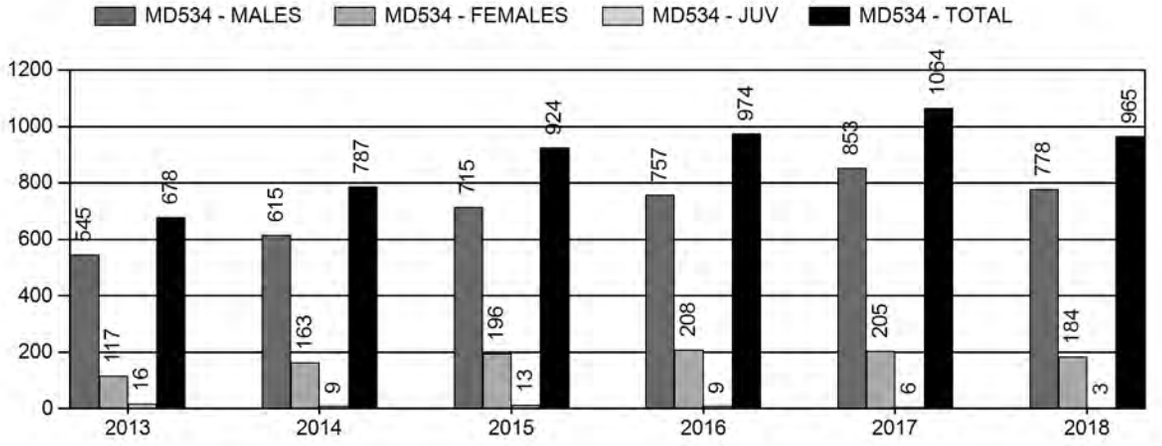
Population Objective (± 20%) :	20000 (16000 - 24000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-44.5%
Number of years population has been + or - objective in recent trend:	10
Model Date:	02/27/2019

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

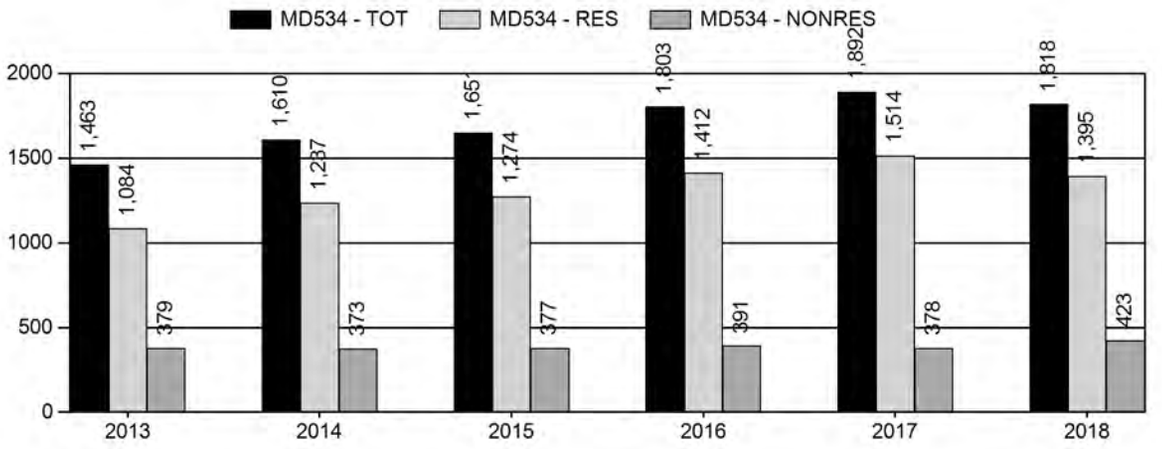
	JCR Year	Proposed
Females ≥ 1 year old:	3.2%	3.7%
Males ≥ 1 year old:	30%	38%
Total:	7.9%	9%
Proposed change in post-season population:	-12%	-11%



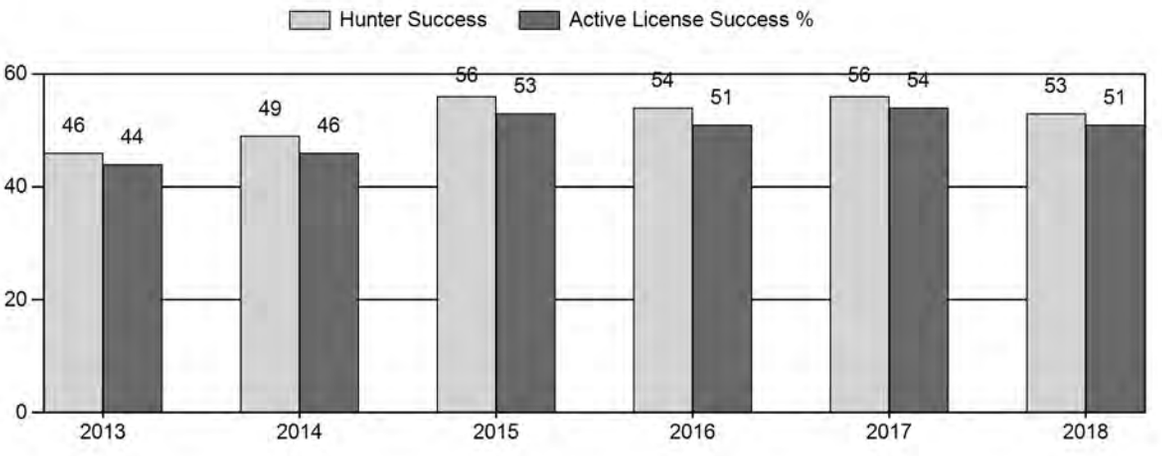
Harvest



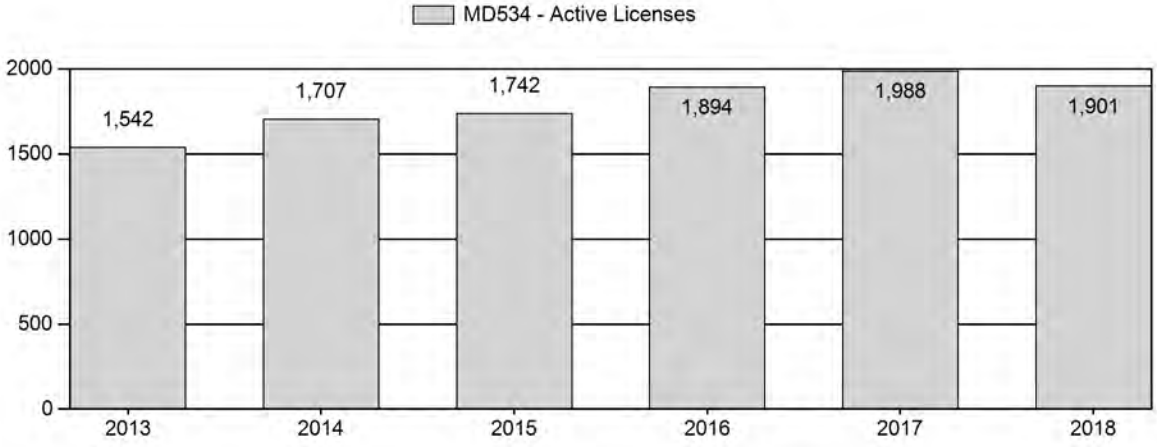
Number of Active Licenses



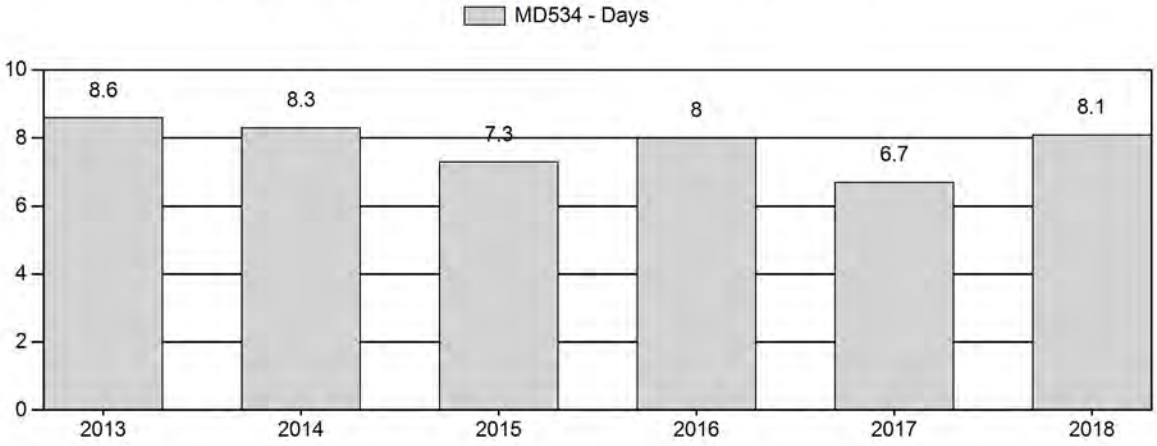
Harvest Success



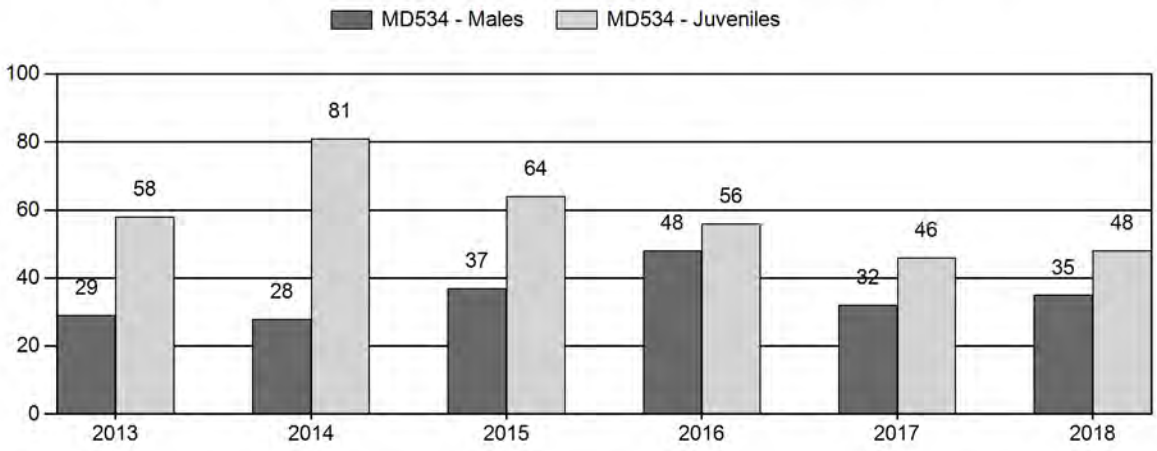
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Mule Deer Herd MD534 - GOSHEN RIM

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	11,200	39	128	172	21	88	224	15%	776	53%	451	31%	1,451	1,235	5	24	29	± 3	58	± 4	45
2014	12,000	93	53	67	23	7	243	13%	876	48%	706	39%	1,825	1,130	11	17	28	± 2	81	± 5	63
2015	11,600	181	144	64	19	13	421	18%	1,137	50%	726	32%	2,284	1,234	16	21	37	± 2	64	± 3	47
2016	11,200	222	183	91	17	0	513	24%	1,067	49%	594	27%	2,174	1,266	21	27	48	± 3	56	± 3	38
2017	12,400	77	124	63	8	0	272	18%	863	56%	399	26%	1,534	980	9	23	32	± 3	46	± 3	35
2018	11,100	97	142	65	11	0	315	19%	908	55%	432	26%	1,655	824	11	24	35	± 3	48	± 3	35

2019 HUNTING SEASONS
GOSHEN RIM MULE DEER HERD UNIT (MD534)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
15	Gen	Oct. 1	Oct. 14		General	Antlered mule deer or any white-tailed deer
15	6	Oct. 1	Dec. 31	~~350~~400	Limited quota	Doe or fawn
Region T				400		

Special Archery Season Hunt Areas	Opening Date	Closing Date	Limitations
15	Sept. 1	Sept. 30	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
15	6	0

Management Evaluation
Current Management Objective: 20,000 (16,000-24,000)
Management Strategy: Recreational
2018 Postseason Population Estimate: ~11,100
2019 Proposed Postseason Population Estimate: ~9,900
2018 Hunter Satisfaction: 67% Satisfied, 117% Neutral, 16% Dissatisfied

The management objective for the Goshen Rim Mule Deer Herd Unit was changed from 25,000 to 20,000 and Hunt Areas 15,16,55,57 were combined into Hunt Area 15 as a result of internal recommendations and public input during the 2013 herd objective review process. The management strategy is recreational management with a post-season buck ratio range of 20-29 bucks:100 does.

Herd Unit Issues
The 2018 post-season population estimate was approximately 11,100 mule deer with a population that has been fluctuating around 11,000-12,000 mule deer for the past five years. Restricted access makes it difficult to manage this herd. Access is driven by isolated private land experiencing damage and small parcels of state, BLM lands, and private lands enrolled into the Department's PLPW program.

Without paying a trespass/trophy fee or hiring an outfitter, hunters have a difficult time harvesting a mature mule deer buck. Landowners and hunters would like to see an increase in mule deer, but without major habitat revitalization (for part of the year mule deer are dependent on irrigated and dryland agriculture fields) this herd unit will most likely remain around 11,000 mule deer. Buck ratios are anticipated to remain on the higher end of the recreational

management strategy due to private land (92% of the occupied habitat). Public land hunters will continue to have a difficult time finding a mature buck due to the majority of land being held in private ownership.

Chronic Wasting Disease (CWD) prevalence continues to increase in harvested male mule deer and undoubtedly is having a negative impact on the herd.

Major landscape changes have been occurring in the southern portion of the herd unit. Urban sprawl continues to increase north and east of Cheyenne as well as industrial (methane production) development in Laramie County. The USDA's Conservation Reserve Program (CRP) has experienced a decline in productivity and quality of perennial forage throughout the herd unit. The conversion of dryland (wheat fields) cropland to CRP in the past provided favorable fawning and winter cover for mule deer. These stands are now monotypic stands of unfavorable perennial grasses (i.e. smooth brome and crested wheatgrass) with no legume component, providing little if any habitat benefits.

Weather

Weather in this herd unit was relatively normal during the past bio-year. Precipitation amounts were average at all elevations throughout southeast Wyoming during spring months then became dry and hot from July through November, which is the typical pattern. However, there was one major hail storm the hit along the Interstate Highway 25 corridor in early June that most likely resulted in higher than average fawn mortality for all wild ungulate species. This became evident when post-season classifications were conducted in November and results indicated fawn production was 25% below the five-year average. For specific meteorological information for the Goshen Rim Mule Deer herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat

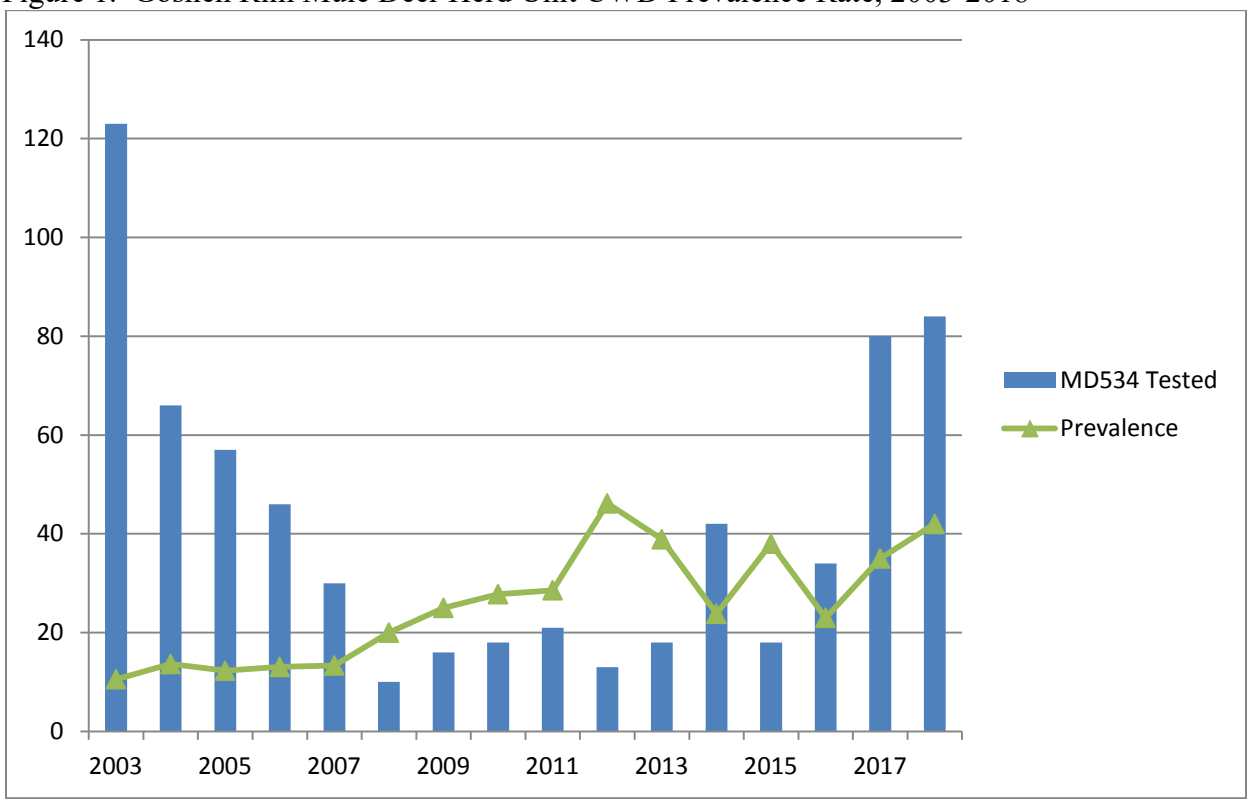
Based on spring precipitation levels, forage availability was similar to past years that experienced average weather conditions. Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500'. Its presence ties the hands of habitat managers limiting habitat enhancement options, and may result in reduced carrying capacities of rangelands if it is the predominant specie. This herd unit is comprised of a mix of native rangelands, CRP, dryland and irrigated croplands.

Field Data

This herd experienced a sharp decline in 2012 following the worst drought recorded since the 1930's and since then has been fluctuating around 12,000 mule deer. General licenses have focused harvest on the male segment of the population with little effort to remove females. There were 350 Type 6 licenses available for the 2017 season for doe harvest opportunity and address damage situations. On average less than 2% of the female population is harvested. Chronic wasting disease (CWD) has become more prevalent in this herd when compared to the Laramie Mountains Mule Deer and the South Converse Mule Deer Herd Units. Prevalence in 2018 was 42%, which is significantly higher than the five-year average of 32%, however, only one year out of the past five had an adequate sample size. In 2003 there was a substantial effort to increase the samples size of hunter harvested mule deer to obtain a base line in CWD prevalence, which resulted in a prevalence of around 11%. This effort was duplicated in 2017

and 2018 and prevalence significantly increased to 35% and 42% respectively (Figure 1). Prevalence > 30% is likely to lead to a decline in population (DeVivo 2015).

Figure 1. Goshen Rim Mule Deer Herd Unit CWD Prevalence Rate, 2003-2018



Fawn ratios in 2018 (44 fawns:100 does) continued to decline starting in 2014 (81 fawns:100 bucks), which was one of the highest ratios observed in the past 16 years. This ratio is well below 66 fawns:100 does which is the level needed to increase a population (Unsworth et al. 1999). Above average fawn ratios in 2014 and 2015 helped to bolster buck ratios in 2015 (37 bucks:100 does), 2016 (48 bucks:100 does), but observed buck ratios did drop in 2017 (32 bucks:100 does) but did slightly increase in 2018 (35 bucks:100 does) and are more in line with the five years prior to the spike in buck ratios (30 bucks:100 does). Yearling buck ratios (11 yearling bucks:100 does) were similar to the five-year average of 12 yearling bucks:100 does and reflect a slightly below average fawn crop in 2017. Hunters in 2019 are going to have an average chance of finding a 3+ year old buck on public land.

In 2018, 3% of the field harvest data was comprised of yearling bucks, which was a slight decrease compared to 2017 but a significant decrease compared to 2016 (26%), and well below the five-year average of 20%. The majority of yearling mule deer that are aged in the field typically come from public land where hunters are usually less selective, so the 3% was somewhat surprising. However, the decrease in yearling buck harvest in 2018 correlated well with decrease of post-season fawn ratios from 2017 (46 fawns:100 does) compared to the all time high in 2014 (81 fanws:100 does). On public land the majority of mature male deer are typically 2-3 years old. However on private land where access is controlled, the average age is usually 4-6 years old. Based on field observations and field harvest data, public land hunters

typically harvest younger deer, lending credibility to a lower buck:doe ratio on the limited amount of public lands. For the first time in many years tooth samples were collected from mule deer. Based on a sample size of 49 mule deer bucks, the average age was 4 years old, which was expected given the above average fawn ratios observed four year ago.
Since 2012 antler class data have been collected from harvested mule deer. In 2013 the Department began collecting data from classified mule deer to gauge buck quality. Antler class data are broken down into three classes: 1) Class I- ≤19", 2) Class II- 20-25", Class III- ≥26". Typically harvest class data are similar to classification class data (see tables from JCR). The field harvest data sample size increased in 2017 and 2018 by 42% and 47% respectively relative to the five-year average, lending credibility to the correlation between the two datasets. The sample size for post-season classifications was met in 2018. The percent of Class I, Class II and Class III bucks observed during post-season classifications in 2018 was almost identical to the 2017 post-season classification antler class data. Class II bucks were the majority (53%) of bucks recorded in the field during the 2018 hunting season. During the post-season classification, however, the majority of bucks observed were Class I bucks (65%). Given the harvest was directed at Class II bucks it appears reasonable that more Class I bucks were observed post-season. The percent of Class III harvested bucks recorded in 2018 increased compared to 2017 but were almost non-existed during ground classification surveys. Growing older deer in this herd unit continues to be difficult. According to Miller and Conner (2005) chronic wasting disease (CWD) has a higher prevalence in male mule deer than females and it is also more prevalent in prime age male deer.

Harvest Data
Hunter success (53%) in 2018 was similar to the five-year average of 52%. Hunter effort (8.1 days/harvest) in 2018 was slightly higher than the five-year average of 7.8 days per harvest. Access continues to be an issue in this herd unit with 92% of the occupied habitat consisting of private land. Public hunting access is available through the Access Yes Hunter Management Access Program on the Guernsey Guard Camp, walk-in areas, and the various Wildlife Habitat Management Areas. Access for the most part is driven by damage, which is the reason for the Type 6 licenses. Access for buck harvest is extremely difficult unless a hunter is willing to pay a trespass fee or hire an outfitter. Private land ratios inflate overall buck ratios. However, with buck ratios still above the recreation management objective hunters should have had an easier time finding a mature buck during the 2018 season. The number of hunters that went to the field was slightly lower than in 2017 but still well above the five-year average. There were more bucks available for harvest, which most likely contributed to the increase in hunter participation. Weather conditions were similar to the 2017 season; warm to hot days with no snow cover, which might also explain the increase in hunter participation.

Population
The "Time-Specific Juvenile and Constant Adult Survival" (TSJ,CA) spreadsheet model was chosen to use for the post-season population estimate of this herd and will most likely be used in the future. The model has a slightly higher AIC value but did have the best fit compared to the other two models. Given the better fit of data and perceived population trend by personnel, landowners and hunters, this seemed like the most plausible model. Juvenile survival varied from 90% - 40% with an average of 59%. Hunters and landowners would like to see a continued increase in the population. However, given poor fawn production, CWD, and poor shrub conditions an increase is not likely. This models ranks as poor, since the only data available are classification and harvest data.

Management Summary
Hunting seasons in this herd unit have traditionally started on October 1 and run for 14 days for the general season with limited doe/fawn harvest opportunity running later. The 2019 general license season length will be the same as 2018; general season October 1-14 but there is opportunity to increase doe harvest to prevent crop and stored hay damage so the Type 6 licenses will increase by 50 for a total of 400 Type 6 licenses. Department personnel will work with landowners and hunters to distribute harvest as damage issues arise. The Region T licenses will remain at 400. Based on license sales and available access opportunities the current number of Region T licenses seems adequate.

If we attain the projected harvest of 1,000 mule deer in 2019 and observe average fawn production the predicted mule deer population of 9,900 will continue to remain well below the objective of 20,000.

Literature cited:
DeVivo, Melia T. 2015. Chronic Wasting Disease Ecology and Epidemiology of Mule Deer in Wyoming, Ph.D. dissertation, University of Wyoming, Laramie, WY, USA

Miller, MW and Conner MM: Epidemiology of chronic wasting disease in free-ranging mule deer; spatial,temporal and demographic influences on observed prevalence patterns. Journal of Wildlife Diseases 41.2 (2005): 275-290

Unsworth, JW, Pac DF, White GC, and Bartmann BC: Mule deer survival in Colorado, Montana, and Idaho. J. Wildl. Manage. 63(1):315-326, 1999

2018 - JCR Evaluation Form

SPECIES: Mule Deer
PERIOD: 6/1/2018 - 5/31/2019

HERD: MD537 - LARAMIE MOUNTAINS

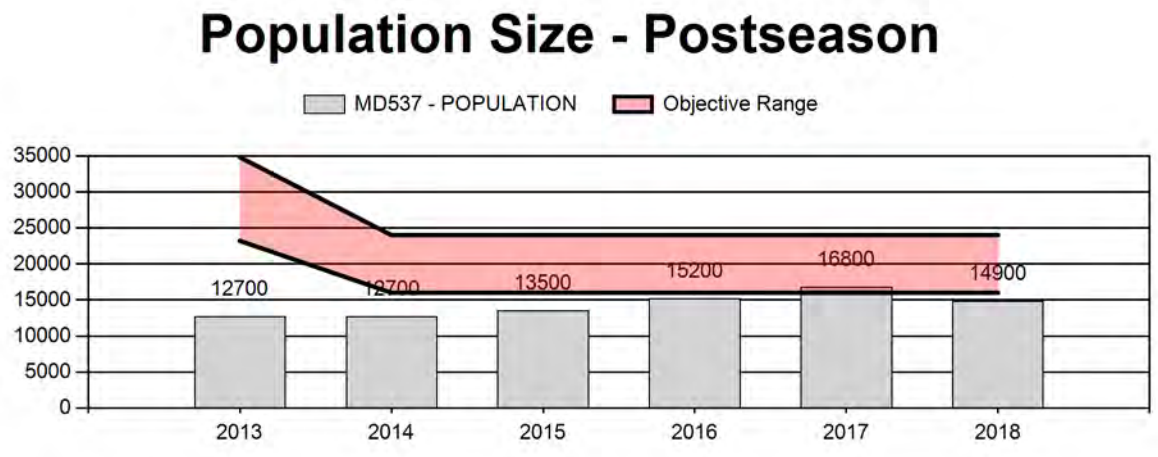
HUNT AREAS: 59-60, 64
PREPARED BY: MARTIN HICKS

	2013 - 2017 Average	2018	2019 Proposed
Population:	14,180	14,900	13,000
Harvest:	1,097	1,073	1,050
Hunters:	1,959	2,041	2,040
Hunter Success:	56%	53%	51%
Active Licenses:	2,010	2,081	2,080
Active License Success:	55%	52%	50%
Recreation Days:	8,706	9,665	9,600
Days Per Animal:	7.9	9.0	9.1
Males per 100 Females	48	36	
Juveniles per 100 Females	69	58	

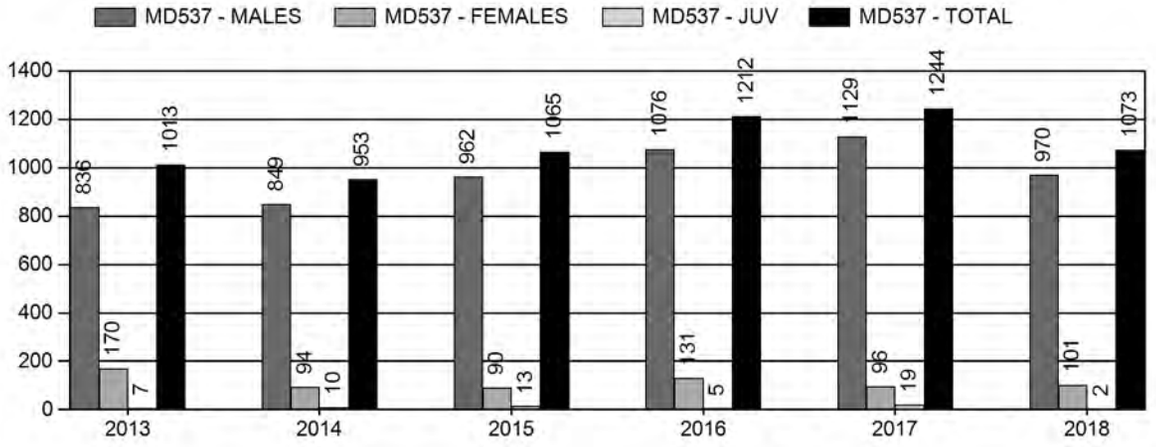
Population Objective (± 20%) :	20000 (16000 - 24000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-25.5%
Number of years population has been + or - objective in recent trend:	1
Model Date:	03/04/2019

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

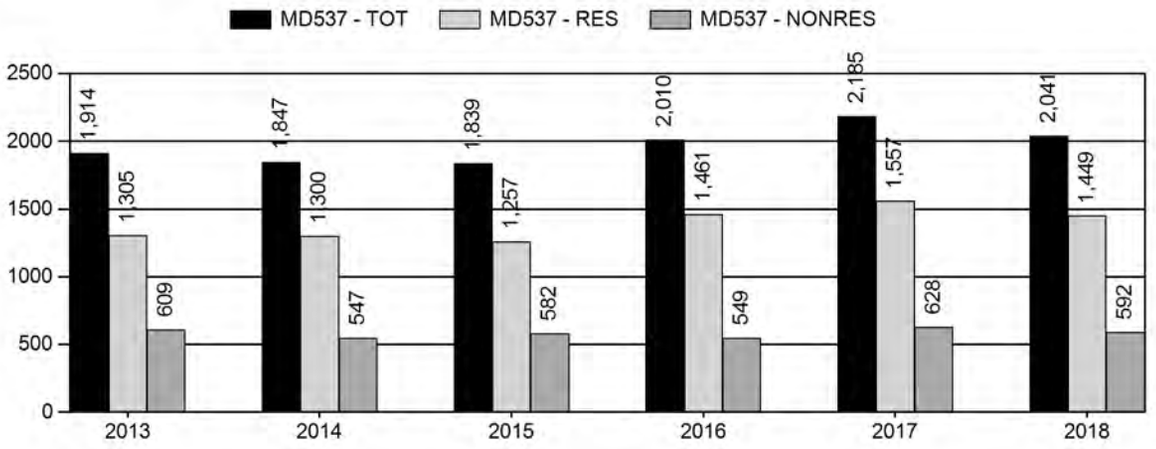
	JCR Year	Proposed
Females ≥ 1 year old:	1.5%	1.6%
Males ≥ 1 year old:	25%	30%
Total:	6.7%	7.4%
Proposed change in post-season population:	-12%	-13%



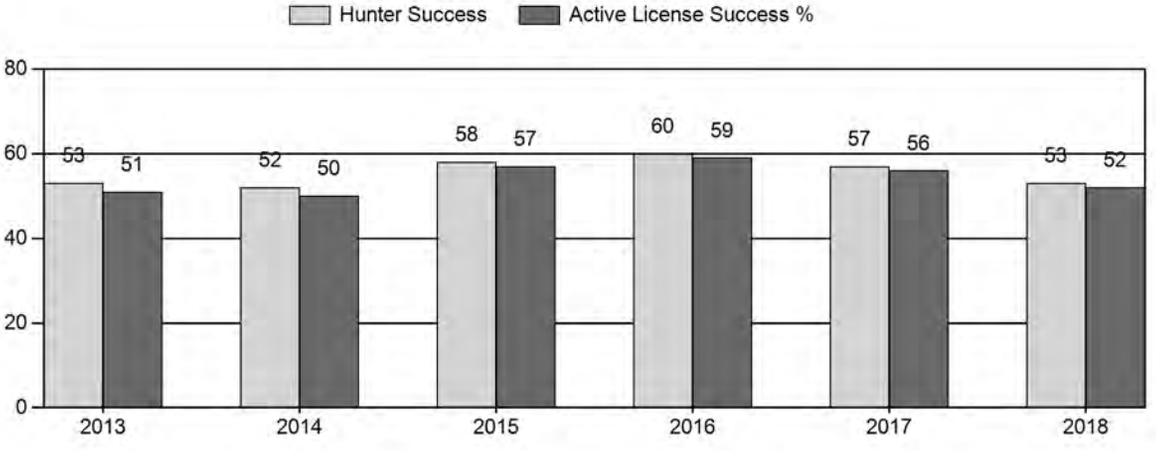
Harvest



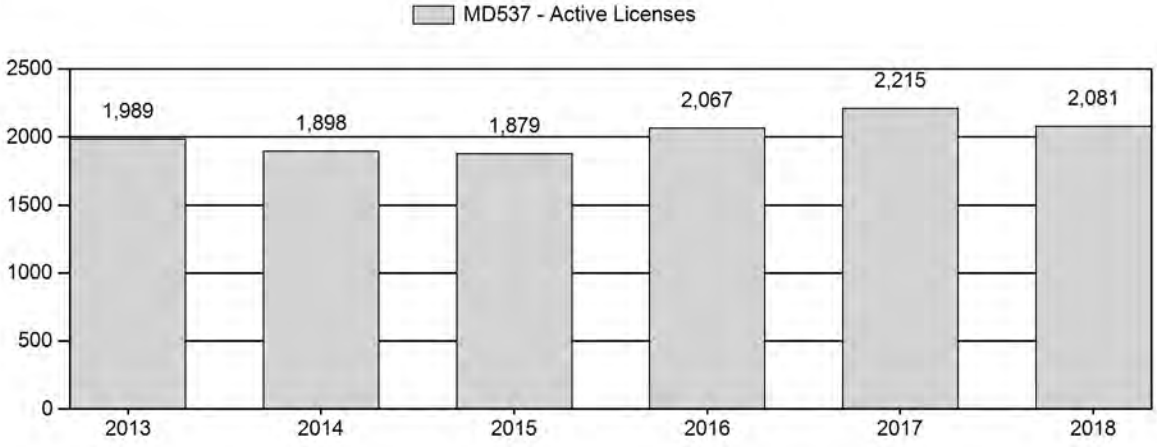
Number of Active Licenses



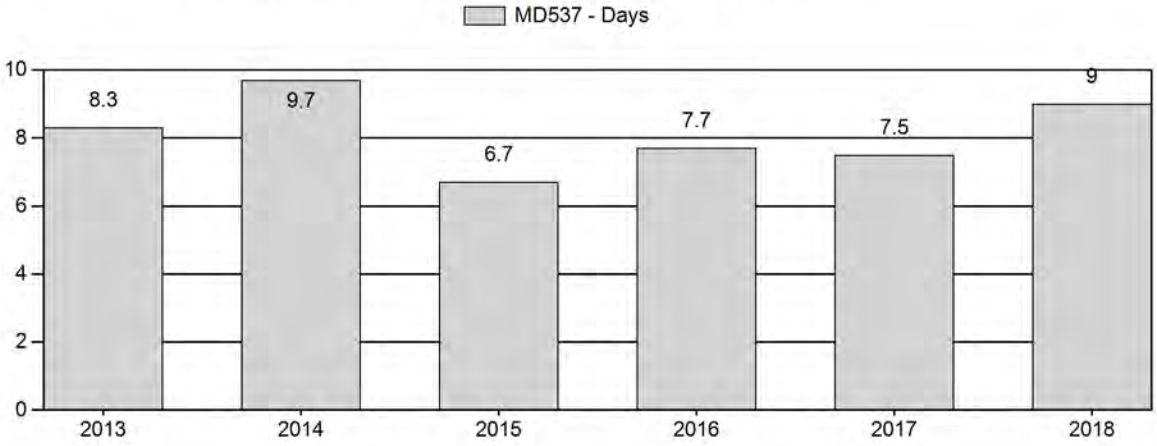
Harvest Success



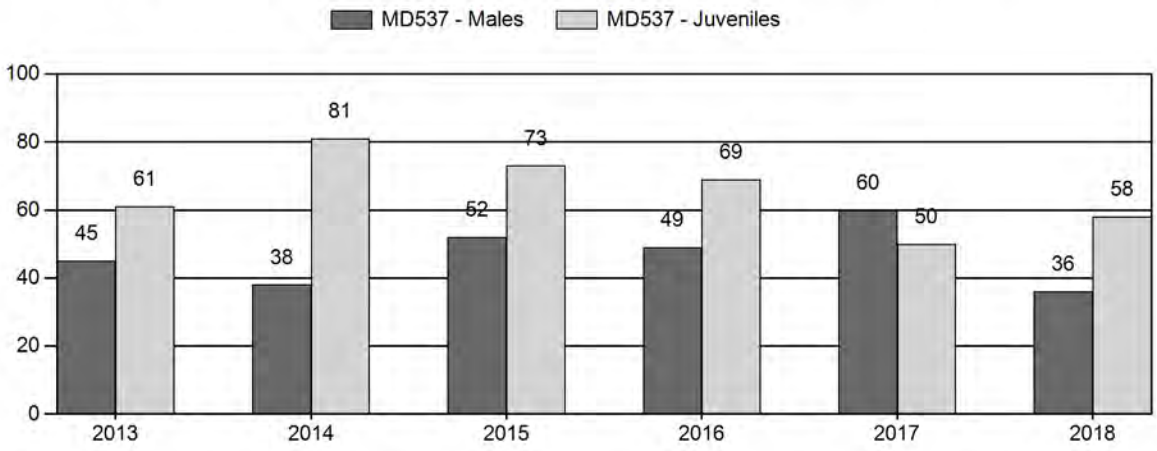
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Mule Deer Herd MD537 - LARAMIE MOUNTAINS

		MALES							FEMALES		JUVENILES			Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls Obj	Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	15,700	23	101	104	9	2	239	22%	528	48%	324	30%	1,091 1,161	4	41	45	± 4	61	± 5	42
2014	17,900	147	177	161	36	0	521	17%	1,384	46%	1,115	37%	3,020 1,135	11	27	38	± 2	81	± 4	59
2015	20,700	290	203	97	16	0	606	23%	1,164	44%	850	32%	2,620 1,304	25	27	52	± 3	73	± 4	48
2016	21,200	168	168	94	13	0	443	23%	900	46%	625	32%	1,968 1,308	19	31	49	± 3	69	± 4	47
2017	19,000	159	266	109	4	0	538	29%	893	48%	446	24%	1,877 1,535	18	42	60	± 4	50	± 4	31
2018	17,000	76	123	50	3	0	252	18%	706	52%	409	30%	1,367 1,258	11	25	36	± 3	58	± 4	43

2019 HUNTING SEASONS
LARAMIE MOUNTAINS MULE DEER HERD (MD537)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
59	Gen	Oct. 15	Oct. 31		General	Antlered mule deer or any white-tailed deer
59,64	6	Oct. 15	Oct. 31	150	Limited quota	Doe or fawn, valid on private land
59,64	6	Nov. 1	Dec. 31			Doe or fawn white-tailed deer
60	1	Oct. 20	Nov. 5	100	Limited quota	Antlered deer on national forest, any deer valid off national forest; All lands within Curt Gowdy State Park, archery only
60	1	Nov. 6	Nov. 30			Doe or fawn white-tailed deer valid off national forest; all lands within Curt Gowdy State Park, archery only
60	2	Oct. 20	Nov. 5	200	Limited quota	Any deer valid off national forest; all lands within Curt Gowdy State Park, archery only
60		Nov. 6	Nov. 30			Doe or fawn white-tailed deer valid off national forest; all lands within Curt Gowdy State Park, archery only
60	6	Oct. 20	Nov. 30	50	Limited quota	Doe or fawn; all lands within Curt Gowdy State Park, archery only
64	Gen	Oct. 15	Oct. 31		General	Antlered mule deer or any white-tailed deer, except the Wyoming Game and Fish Commission's Tom Thorne/Beth Williams Wildlife Habitat Management Area and the Laramie Peak Wildlife Habitat Management Area north of the Tunnel Road (Albany County Rd 727), shall be closed
64	2	Oct. 15	Oct. 31	100	Limited quota	Antlered mule deer or any white-tailed deer
59,60,61,64, 65	J			900		

Special Archery Season Hunt Areas	Opening Date	Closing Date	Limitations
59,60,64	Sept. 1	Sept. 30	Refer to Section 2 of this Chapter

Summary of Change

Hunt Area	License Type	Quota Change from 2018
62,63,64	T6	0
60	T1	0
60	T2	0
60	T6	0
64	T2	0
59,60,61,64,65	Region J	0
TOTAL		0

Management Evaluation

Current Post-season Population Objective: 20,000 (16,000-24,000)
Management Strategy: Recreational
2018 Postseason Population Estimate: ~14,900
2019 Proposed Postseason Population Estimate: ~13,000
2018 Hunter Satisfaction: 68% Satisfied, 17% Neutral, 15% Dissatisfied

The management objective for the Laramie Mountains Mule Deer Herd Unit was reviewed in 2014 and as a result of internal and public involvement the objective was decreased to 20,000 mule deer and Hunt Areas 59,62,63 were combined into Hunt Area 59 and Hunt Areas 64,73 were combined into Hunt Area 64. The recreational management strategy will remain in place with a post-season buck ratio range of 20-29 bucks:100 does.

Herd Unit Issues

The 2018 post-season population estimate was about 17,000. The population experienced a steady increase until 2016 then has since shifted to downward decline. Chronic wasting disease (CWD) has been detected in this herd for well over two decades. The average prevalence since 1997 is 23%, contributing towards the suppression of this herd. Management strategy has been very conservative with little doe harvest to try and increase the herd. Approximately 50% of the herd unit is private lands which affects our ability to provide opportunity. The herd objective was reviewed in 2019 and there were no changes.

The Britania wildfire in 2018, which burned 30,000 acres, burned within portions of crucial winter, spring, summer, fall, yearlong and winter/yearlong seasonal ranges. Cheatgrass is expected to be an issue in lower elevations of the burn, particularly on south-facing slopes. The Arapahoe wild fire (100,000 acres) that burned in 2012 will have habitat effects for years to come. In some areas perennial vegetation is responding. In other places the ground appears sterile with little to no vegetation growth. Mule deer have been harvested in the burned areas.

Mule deer occupation in burned areas was also documented during the winter of 2013. In the long run these two major fires will be a positive event for ungulate habitat. Landowners have started to treat post-fire outbreaks of cheatgrass within the Arapahoe Fire and funds have been requested to treat 4,000 acres within the Britania Fire for fall of 2019.

Weather

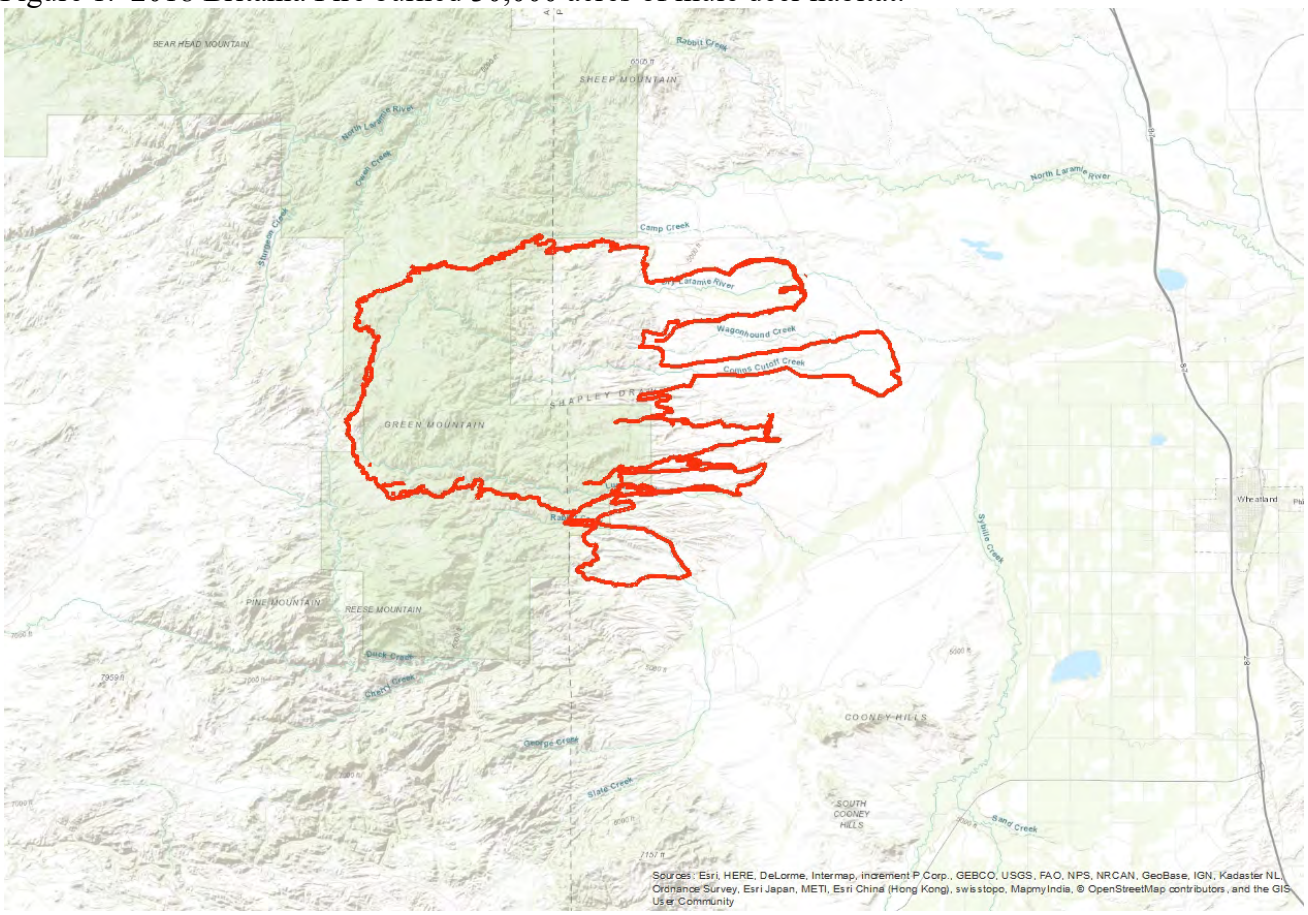
Weather in this herd unit was relatively normal during the past bio-year. Precipitation amounts were below levels recorded during spring months of 2014 and 2015 which experienced all time high fawn production. Summer months were similar to past years with hot, dry conditions that lasted into fall and were not beneficial for fawn survival. Adult female mule deer lacked the nutritional value needed from plants to raise a fawn to six months of age. Post-season classifications surveys indicated fawn ratios well below the five-year average. Winter conditions have been mild compared to past winters so big game species likely will head into spring in relatively decent condition. For specific meteorological information for the Laramie Mountains herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat

Forage availability was adequate in 2018 compared to past years. Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500 ft. Its presence ties the hands of habitat managers by limiting habitat enhancement options, and may result in reduced rangeland carrying capacities where it is the predominant species. In summer 2015, Colorado State University natural resource program scientists worked cooperatively with WGFD and USFS personnel to map cheatgrass infestations via satellite imagery and on-the-ground vegetation sampling efforts. In 2017 there were 62 landowners that utilized these data throughout Platte County to treat over 19,000 acres of areas severely infested with cheatgrass with a soil amendment bacteria (MB906) and the herbicide Plateau (imazapic). The combination of herbicide and soil amendment has shown promising results as an effective way to control cheatgrass. In 2018 there were 2,500 acres treated and there are plans to continue and treat additional acres in 2019.

The Britania Fire (Figure 1) burned approximately 30,000 acres in late August of 2018. The fire moved throughout the Laramie Range at a high rate of speed but cheatgrass outbreaks are expected particularly in the eastern portion of the fire where there are sandier soils at lower elevations. Funds were requested from six different funding sources in the amount of $100,000 to treat 4,000 acres of areas of higher concern for cheatgrass infestation. Pending funds, the WGFD will work with Platte County Weed and Pest, Platte County Resource District and the Natural Resources Conservation District to maximize dollars and sign-up affected landowner's property.

Figure 1. 2018 Britania Fire burned 30,000 acres of mule deer habitat.



Areas burned by the 2012 Arapaho Wildfire continue to rebound. Aspen regeneration has been excellent, and browsing appears to be within acceptable limits to allow full recovery of aspen habitats in many places. Canada thistle, leafy spurge, and knapweed spp. are present throughout the burn in varying degrees. Efforts have been made to treat these areas. This herd unit is comprised of a mix of native rangelands, CRP, dryland and irrigated croplands.

Field Data

Fawn ratios of 58 fawns:100 does in 2018 were well below the five-year average (67 fawn:100 does). Until there is an improvement in the ratio, the population will continue to decrease. According to Unsworth et al. (1999) populations increase when fawn ratios are above 66 fawn: 100 does. Buck ratios (36 bucks:100 does) were well below both the five-year average of 48 bucks:100 does, and the all-time high of 60 bucks:100 does (2017). This was expected given that fawn production decreased annually following the 30 year high of 81 fawns:100 does in 2014. The 2018 buck ratio still falls slightly above the upper level of the recreational management strategy of 30 bucks:100 does. Based on tooth data (n= 162) the average age of a harvested buck was 4.2 years old.

Since 2012 antler class data have been collected from harvested mule deer. Starting in 2013, the Department began collecting data from classified mule deer to gauge buck quality. Antler class data are broken down into three classes: 1) Class I- ≤19", 2) Class II- 20-25", Class III- ≥26".

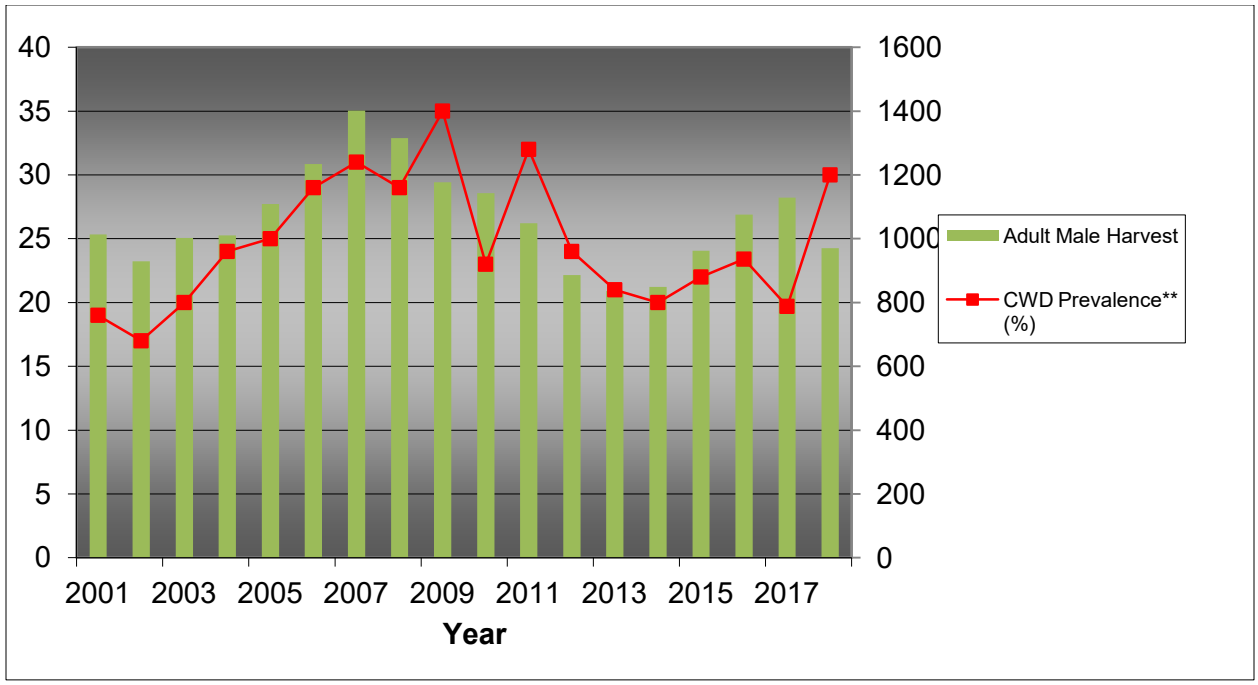
The proportions of Class I, Class II and Class III bucks from field harvest data in 2018 were similar to 2017 field harvest data. There continues to be a very small percentage of Class III bucks in the field. We expected to see an increase in Class III bucks given the surplus number of bucks resulting from high fawn production in 2014. Unfortunately, that has not come to fruition. Adult bucks do not appear to be living past 5-6 years most likely as a result of high CWD prevalence. Recent studies suggest that male mule deer appear to have a higher likelihood of CWD infection than females (Miller et al. 2000, Grear et al. 2006, DeVivo et al. 2015). The majority of bucks recorded during field checks were young to middle aged deer based on both antler class data (93% were either Class I or Class II, n=156) and tooth data, which included both yearling and adult bucks (average harvest age 4.1 years old, n=162). Post-season classification data were similar to 2017, with the majority of bucks in the Class I category (70%). This seems reasonable since harvest data indicated that 56% of the bucks field checked in 2018 were ≥ Class II bucks. If you focus harvest pressure on the bucks ≥ 3 years of age then you should expect to see a larger proportion of younger bucks post-season on the landscape. Only 1% of the post-season bucks classified were Class III. Poor fawn production from 2011-2013, combined with CWD prevalence and lower survival rates, most likely contributed to fewer older age class bucks in the field. Based on harvest and classification data there will be fewer adult bucks available for harvest in 2019, though there should be a sufficient number to provide adequate opportunities for hunters.

According to the 2018 satisfaction survey, 68% of hunters were satisfied with the quality of their hunt, similar to 2017. Fewer bucks on the landscape in 2019 likely will not improve hunter satisfaction levels, but there will be enough bucks available for harvest that satisfaction should not decrease.

CWD surveillance efforts were similar in 2018 compared to 2017. Prevalence did increase from 20% in 2017 to 30% in 2018, which is significantly higher than the five-year average of 23%. We focused on improving samples sizes and accuracy of prevalence estimates, with the goal to gain a better understanding of how the disease affects population performance. Interestingly, prior to 2018 prevalence in this herd unit has slowly decreased over time with decent sample sizes (Figure 2). According to Uehlinger, et al. (2016) the influence of hunting pressure on the spread or prevalence of CWD is unclear. Mateus-Pinilla et al. (2013) suggest that intensive, non-selective culling was effective in reducing CWD prevalence in two out of three studies. This type of culling has not been applied to this particular herd but if there is some promise to intensive culling to reduce prevalence then perhaps this could be implemented in areas with cluster outbreaks. The slow decline could be a result of current and past harvest regimes, which were designed to increase harvest when the above average buck ratios were observed (2007-2011, 2017, 2018) by having longer general seasons. DeVivo (2015) suggests that some mule deer live longer that have a less-susceptible genotype, which perhaps contributes to a more sustainable remnant population. Regardless, CWD studies have demonstrated negative impacts on Wyoming mule deer herds (Edmonds 2016, DeVivo 2015), and with a 23% long-term prevalence for this herd, CWD will continue to have some effect. CWD sample collection

efforts will continue to be a priority for this herd in the future. The mechanisms driving the spike in prevalence from 2017 (20%) to 30% in 2018 are unclear, WAFWA (2017) does suggests that higher buck ratios could perhaps increase prevalence, which were at an all time high in 2017 (60 bucks:100 does). Regardless of the reason in increased prevalence, CWD will continue to present complications in population performance. Alternative harvest strategies should be considered if the goal is to reduce prevalence to levels that are acceptable to maintain or perhaps even increase the population. State-wide efforts are underway to inform the public on CWD and to gauge the level of support for potential future management alternatives utilizing WAFWA's plan: Recommendations for Adaptive Management of Chronic Wasting Disease in the West (2017) that provide clear strategies to reduce CWD prevalence.

Figure 2. CWD Prevalence and Buck Harvest in Laramie Mountains Mule Deer Herd Unit, 2001-2018.



Harvest Data

Hunter success in 2018 (53%) was lower than the five-year average of 56%. Hunter effort of 9.0 days per harvest was higher than the five-year average of 7.9 days per harvest. Total buck harvest in 2018 was 18% lower in 2017 and similar to the five-year average, which was somewhat surprising given that the season was increased by six days and buck ratios were at an all-time high. The fall was mild with no major snow events so weather should not have hampered hunter's ability to go to the field and find a buck. There were several days of high wind events that typically hinder hunting success, which could be one factor for the decrease in harvest. Employee observations indicated hunter participation decreased as the season progressed. The majority of harvest came in the first five days of the season. Harvest data indicate a decreasing trend in population, which is corroborated by model simulations and field

observations. Landowners and sportsmen noticed an increase in young bucks but were disappointed to not find more Class III bucks on the landscape.

Population

The "Time-Specific Juvenile and Constant Adult Survival" (TSJ,CA) spreadsheet model was chosen to use for the post-season population estimate of this herd. This model had similar AIC values compared to the other two models, and better fit. This model was chosen for the following reasons: 1) the model tracks variation in juvenile survival, which is more consistent with this herd unit based on the fluctuations in juvenile composition data, 2) there is a large number of years with classification and harvest data, which is a requirement for the TSJ, CA model (Morrison, 2012), 3) simulated population trends mimic perceived trends observed by local personnel, landowners and hunters. Adult survival was changed in years 2010-2013. Adult survival data from the South Converse Mule Deer Herd Unit CWD study was used for these years since both herd units have high prevalence and the Laramie Mountains Herd Unit is adjacent to South Converse. The TSJ, CA model is rated as fair to poor. There is not an annual population estimate with a standard error available to anchor the model, but there are enough data to give the model a fair fit and results are biologically defensible. Adult survival was adjusted to .7-.8 (averaged .8) instead of the recommended range of .7-.95 to account for CWD prevalence in years that did not have adult survival data, which was slightly higher than the four year average survival of .7 from the South Converse Herd unit (2010-2013). Hunters and landowners would like to see an increase in mule deer, and they did for a couple of years, but given recent poor recruitment buck numbers have and will most likely continue to decrease. Couple that with high CWD prevalence and poor habitat conditions the population will continue to decline.

Management Summary

The hunting season's general license length was increased in 2016 from a ten day season to a 16 day season to take advantage of the surplus number of bucks. With buck ratios still above the recommended range the same season structure will be the same for the 2018 season. There is concern because of the sudden drop in buck ratios, but "stock piling" bucks in an area with high CWD prevalence is a concern and research suggests that one way to reduce prevalence is to reduce buck densities (WAFWA, 2017). Late doe/fawn seasons have been used to address damage situations in lower elevations on private land, but the public has overwhelmingly indicated they would like to see more mule deer. Consequently, Type 6 licenses will remain the same as in 2017. According to Miller (2010) male mule deer have a higher prevalence rate of CWD than female mule deer and CWD prevalence is higher in prime age males than younger males. Based on these data, running a longer season that would provide opportunity for a hunter to harvest a male mule deer prior to having it succumb to CWD could reduce transmission. Hunt Area 60 remains a sought after license for hunters since it gives hunters a chance to hunt into November when bucks are more susceptible to harvest. Region J licenses sold out for the first time since the quota was reduced to 900 in 2013. However to maintain adequate hunter densities, particularly on public land the quota will remain at 900.

We are maintaining this herd at the current objective and management strategy based on internal discussions and conversations with our constituents. We evaluated and considered population status and habitat data included in this document and a change is not warranted at this time. We will review this herd objective again in 2024; however, if the situation arises that a change is needed; we will review and submit an updated proposal.

If we attain the projected harvest of 1,055 mule deer, continue to have poor fawn recruitment, and account for CWD prevalence, the mule deer population will continue to decrease to a 2019 post-season population estimate of 13,000 mule deer, which would be fall below the lower end of the post-season objective range of 16,000-24,000 mule deer.

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2018 - JCR Evaluation Form

SPECIES: Mule Deer
PERIOD: 6/1/2018 - 5/31/2019

HERD: MD539 - SHEEP MOUNTAIN

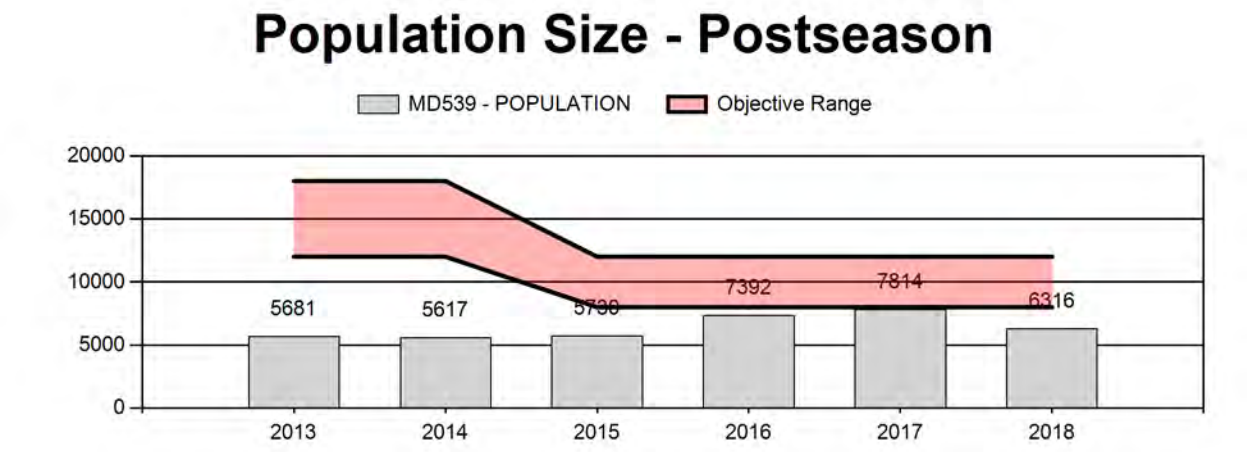
HUNT AREAS: 61, 74-77
PREPARED BY: LEE KNOX

	2013 - 2017 Average	2018	2019 Proposed
Population:	6,447	6,316	6,626
Harvest:	322	478	500
Hunters:	1,346	1,480	1,500
Hunter Success:	24%	32%	33 %
Active Licenses:	1,346	1,480	1,500
Active License Success:	24%	32%	33 %
Recreation Days:	7,093	7,284	7,000
Days Per Animal:	22.0	15.2	14
Males per 100 Females	38	31	
Juveniles per 100 Females	60	61	

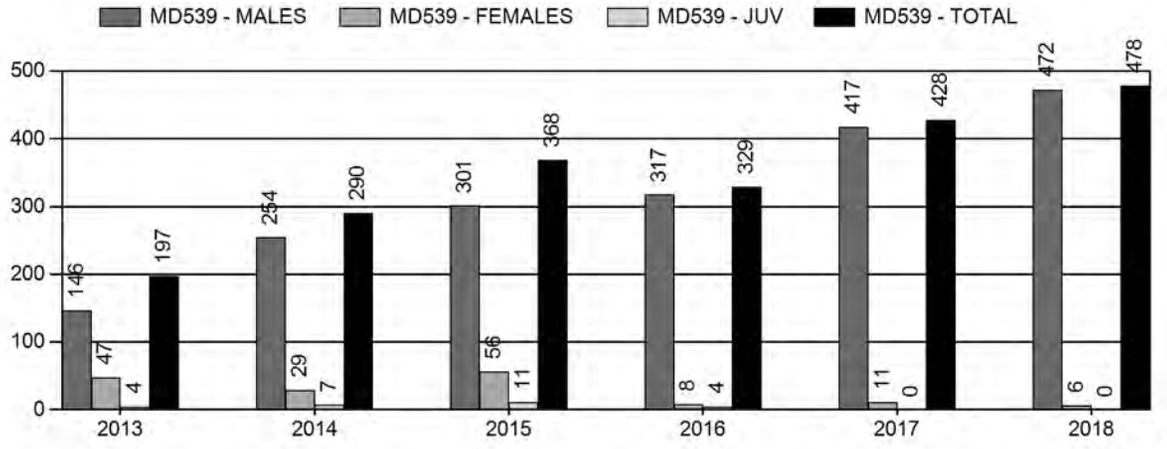
Population Objective (± 20%) :	10000 (8000 - 12000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-36.8%
Number of years population has been + or - objective in recent trend:	20
Model Date:	2/20/2019

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

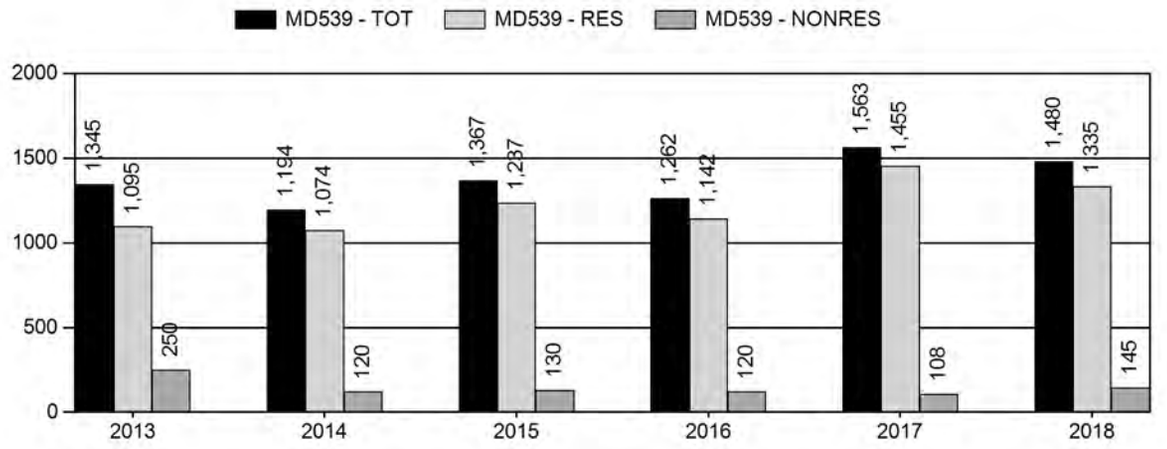
	JCR Year	Proposed
Females ≥ 1 year old:	.3%	.3%
Males ≥ 1 year old:	22%	22%
Total:	4%	4%
Proposed change in post-season population:	6%	6%



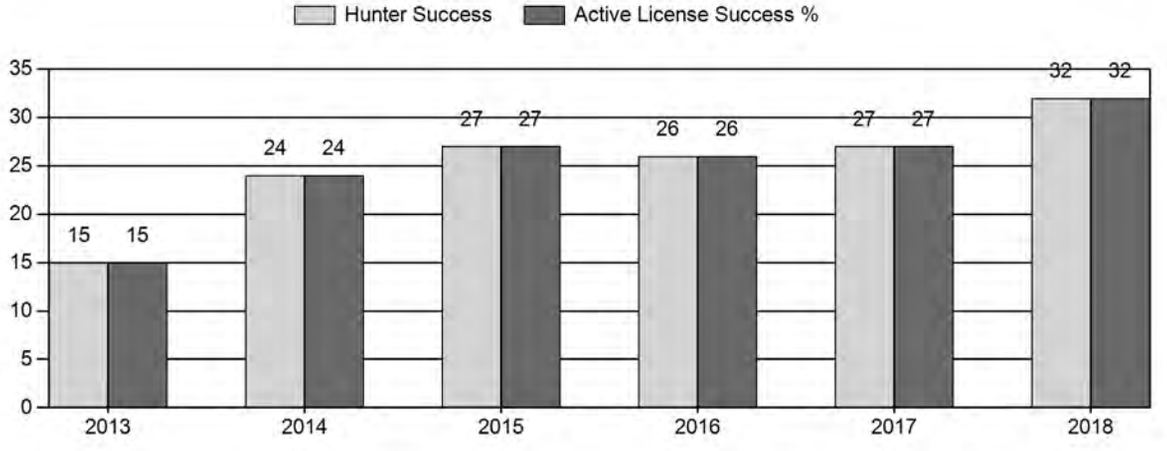
Harvest



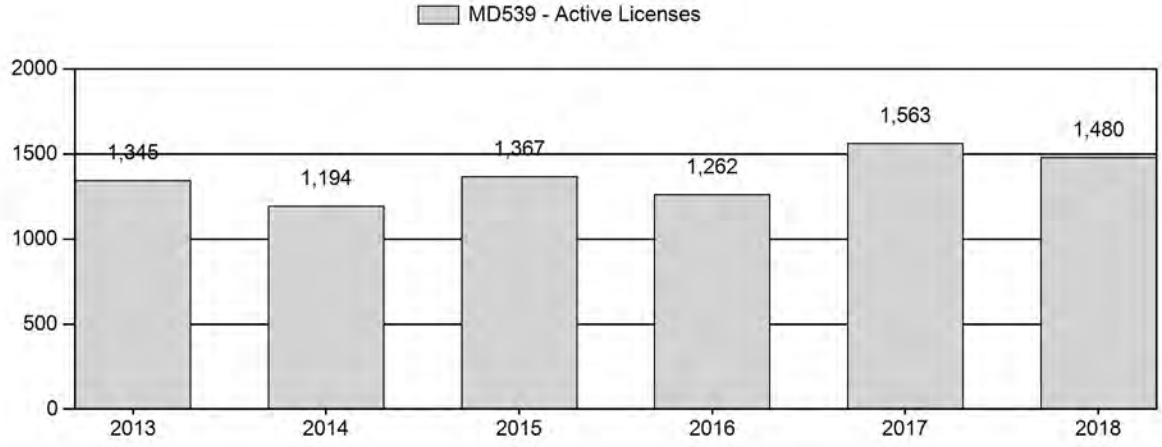
Number of Active Licenses



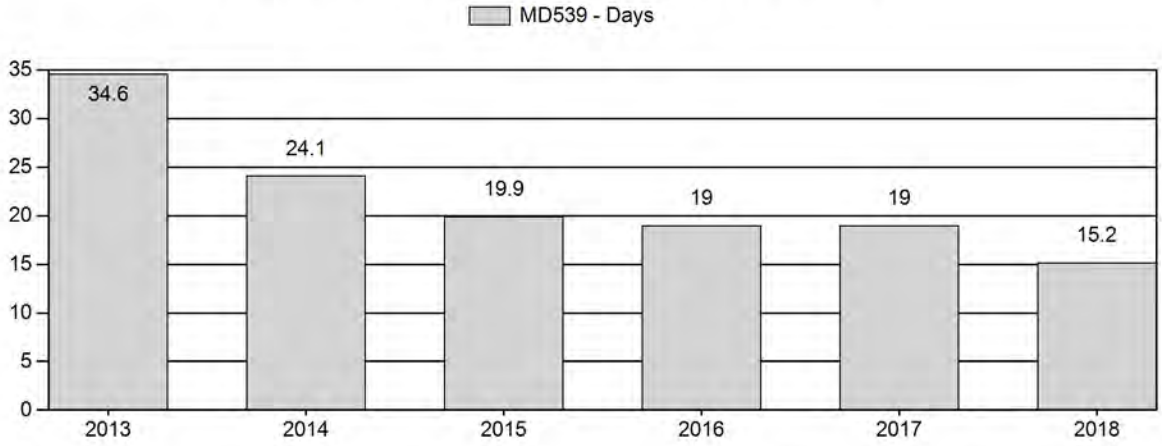
Harvest Success



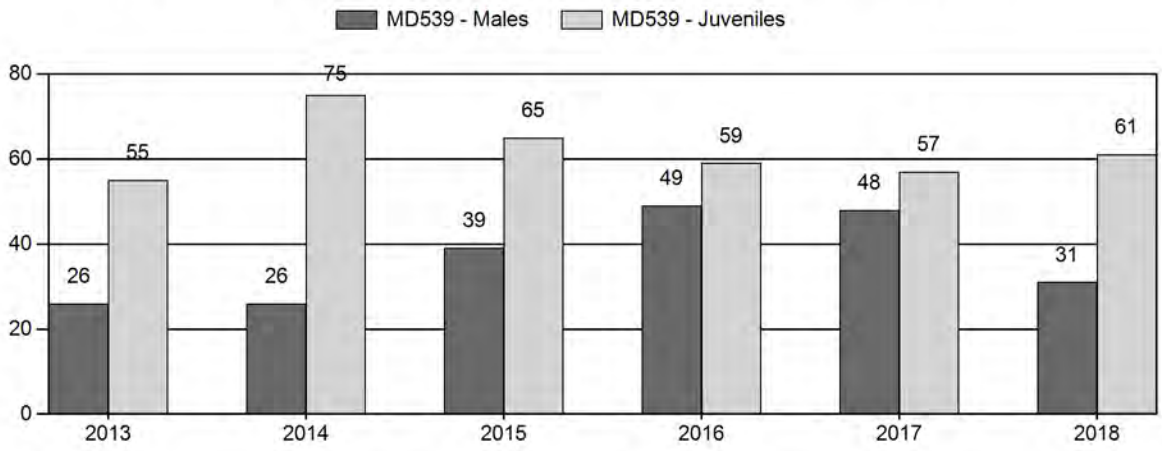
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Mule Deer Herd MD539 - SHEEP MOUNTAIN

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	5,681	82	47	42	16	1	188	14%	721	55%	395	30%	1,304	984	11	15	26	± 2	55	± 4	43
2014	5,617	31	23	14	8	0	76	13%	290	50%	218	37%	584	1,109	11	16	26	± 4	75	± 8	60
2015	5,730	83	56	47	21	0	207	19%	531	49%	347	32%	1,085	1,099	16	23	39	± 4	65	± 5	47
2016	7,392	99	104	83	23	0	309	23%	633	48%	373	28%	1,315	1,124	16	33	49	± 4	59	± 4	40
2017	7,814	54	88	73	19	0	234	23%	490	49%	277	28%	1,001	1,015	11	37	48	± 5	57	± 5	38
2018	6,316	39	39	38	15	0	131	16%	423	52%	260	32%	814	1,001	9	22	31	± 4	61	± 6	47

2019 HUNTING SEASONS
SHEEP MOUNTAIN MULE DEER (MD539)

Hunt Area	Type	Date of Seasons		Quota	License	Limitations
		Opens	Closes			
61		Oct. 1	Oct. 10		General	Antlered mule deer or any white-tailed deer
74		Oct. 1	Oct. 10		General	Antlered mule deer or any white-tailed deer
75		Oct. 1	Oct. 10		General	Antlered mule deer or any white-tailed deer
76		Oct. 1	Oct. 10		General	Antlered mule deer or any white-tailed deer
77		Oct. 1	Oct. 10		General	Antlered mule deer or any white-tailed deer
Archery		Sept. 1	Sept. 30			Refer to license type and limitations in Section 2

Region D Nonresident Quota: 400

Area	Type	Change from 2018
REGION D	LIMITED QUOTA	None
Herd Totals	**GENERAL**	**None**

Management Evaluation

Current Postseason Population Management Objective: 10,000 (8,000-12,000)
Management Strategy: Recreational
2018 Postseason population Estimate: ~ 6300
2019 Proposed Postseason Population Estimate: ~ 6600
2018 Hunter Satisfaction: 60% Satisfied, 25% Neutral, 15% Dissatisfied

The management objective for the Sheep Mountain Mule Deer herd unit is a postseason population objective of 10,000 mule deer. The management strategy is recreational management with guidelines to maintain a post-hunt buck ratio of 20-29:100 does. The objective and management strategy were last reviewed in 2015.

Herd Unit Issues

The Sheep Mountain herd unit encompasses deer Hunt Areas 61, 74, 75, 76 and 77. Land ownership varies from mostly private land, with limited public access, to large portions of public land. The 2019 post-season population estimate is approximately 6,300 deer, a decline from 7,000 in 2018.

Historically, the Sheep Mountain herd unit has one of the lowest hunter success rates in the state. Most of the herd's summer range is in dense lodgepole or spruce forests that were heavily logged in the 1960s and 1970s. There has been a large-scale forest die off from pine and spruce beetles and the full impacts on the herd unit are currently unknown. Winter and transition range is currently limited.

Black bear and lion mortality limits were increased along with season lengths for these species in 2013. A three-year predator removal project was finalized in 2015 with the Albany County Predator Board. This project focuses on key mule deer parturition areas in the Sheep Mountain herd unit to evaluate the effect of coyotes on fawn recruitment.

We are in the fourth year of the Sheep Mountain Mule Deer Initiative (SMMDI). This program helped initiate discussions between the WGFD, federal agencies and non-government organizations that should translate into future on-the-ground improvements. In the spring of 2017, 60 mule deer does were fitted with Global Positioning System (GPS) collars that collect the location of the deer every two hours. Collars will be deployed for two years and will provide information about habitat use and migration routes.

Disease continues to be a threat to this herd. Chronic wasting disease (CWD) prevalence in harvested deer has increased from 3% in the early 2000s to 12% in 2017. No CWD positive deer were tested in 2018. Prevalence in collared doe mortalities over the course of the project is 40%.

Weather

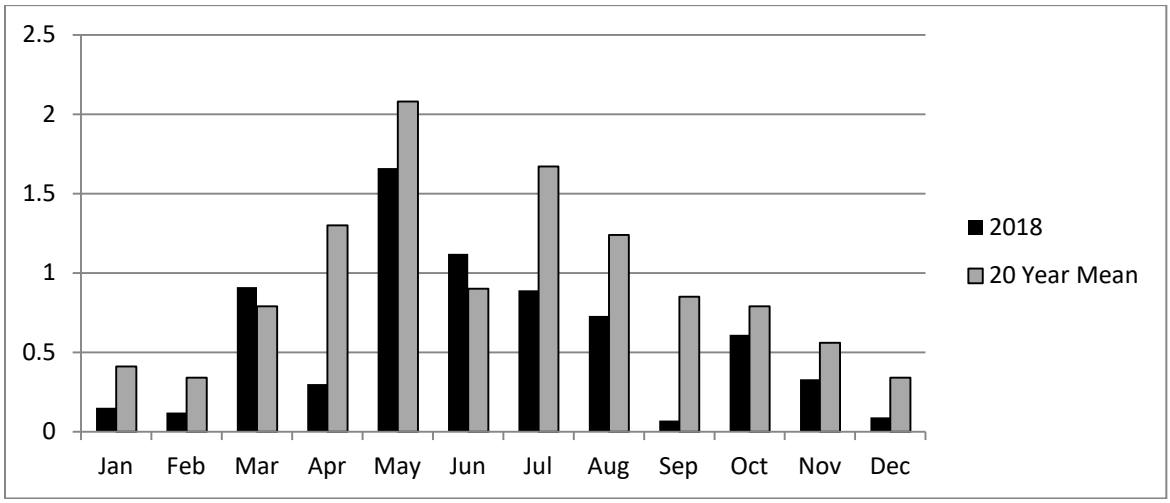


Figure 1. Monthly precipitation totals in inches for 2018 and the 20 year mean (1999-2019). Report was created at https://w2.weather.gov/climate/xmacis.php?wfo=cys using data collected at the Laramie Regional Airport.

Precipitation in 2018 was similar to the 20 year mean during key growth periods for cool season grasses and preferred transitional range and winter range shrub species. While early season growing conditions were optimal, late summer and fall precipitation was lacking. Winter snow pack in the Snowy Range has been average, to above average. Snow depths at lower elevations have been minimal and winter range forage has been accessible through most of the winter.

Habitat

No permanent vegetation transects were read this year within this herd unit, but considerable effort was spent assessing habitats with the new "Rapid Habitat Assessment" methodologies developed by the Department. Habitat types assessed included mixed-mountain shrubs in transitional and winter ranges and riparian habitats/willow complexes in lower elevations, mostly between I-80 and the town of Medicine Bow. Mixed-mountain shrub habitats assessed were characterized as mature/decadent, with signs of current and historic high herbivory/browse on winter ranges. Habitat assessment data will continue to be collected for a period of five years and reported in the objective review for this herd in 2020.

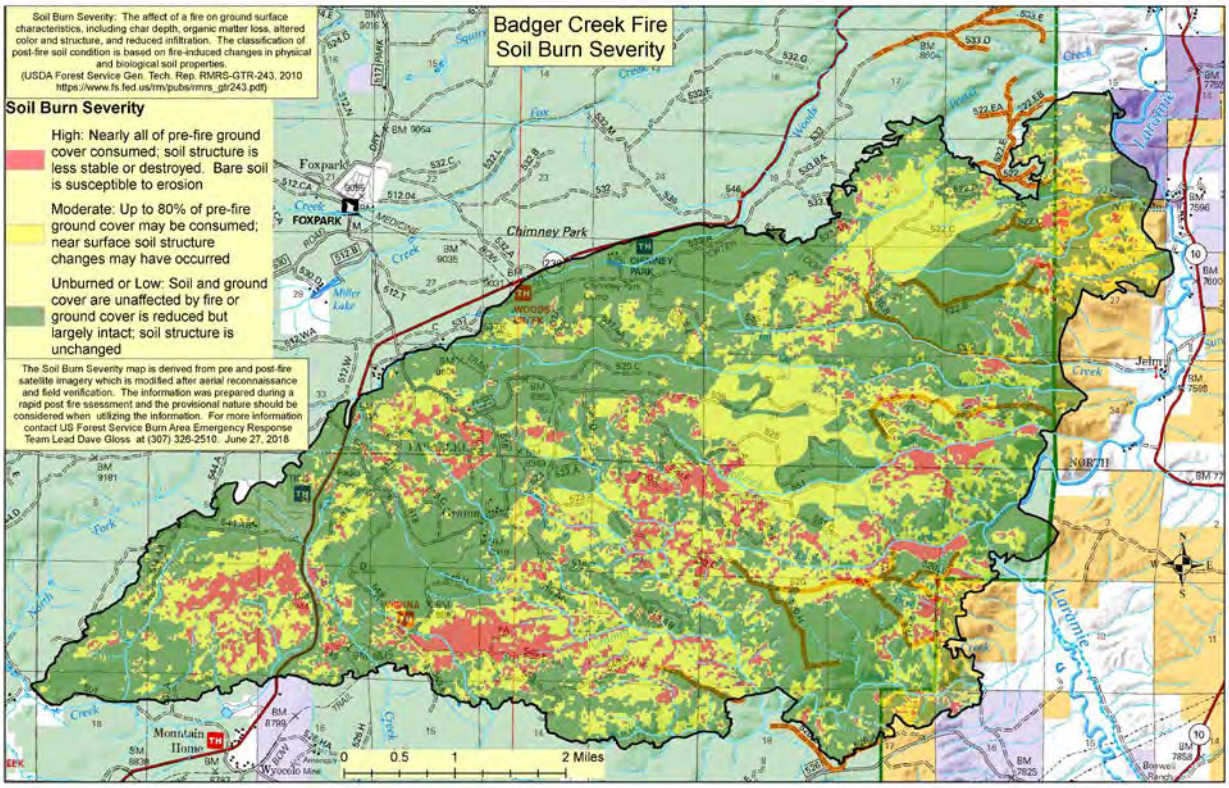


Figure 2. The Soil Burn Severity index map of the Badger Creek Fire in 2018.

The Badger creek fire started in mid June, burning over 20,000 acres in the Sheep Mountain herd unit. The fire burned mule deer summer, transition, and winter habitats. From on the ground observations, as well as aerial observations during classification flights, we believe this fire will greatly benefit wildlife. Much of what burned was thick lodgepole pine forests, and decadent aspen and shrub communities. In the fall of 2018 we worked with the BLM and USFS to aerially spray cheetgrass in the lower elevations of the burn. We will continue monitoring the burn for invasive weeds in 2019.

Field Data

Within the herd unit, 814 deer were classified, falling short of the classification objective of 1,001 deer. Fawn ratios peaked in 2014, at 75 fawns: 100 does, and have declined annually since.

Fawn ratios in 2018 were 61 fawns: 100 does, exceeding the 10 year average of 60 fawns: 100 does. Peak fawn ratios in 2014, and a conservative season structure, lead to the highest buck ratios recorded in the herd unit. With an annually declining fawn ratio, buck ratios were expected to decline in 2018. However the 2018 estimate of 31 bucks: 100 does is above the 20 year average, exceeds recreational management guidelines, and indicates we are still conservative on harvest.

A new ranking system in our classification was implemented in 2013 that places bucks into three classes based on antler spread: Class I is 19 inches or less, Class II is 20-25 inches, and Class III is 26 inches or greater. Of the total number of bucks classified, Class I made up 60%, (down from 61% in 2017), Class II was 29% (down from 31% in 2017), and Class III was 11% (up from 8% in 2017). Overall we are seeing a healthy distribution of age classes of bucks in the population.

Hunter numbers decreased slightly in the herd unit by 5%. The number of hunters in the herd unit peaked at 2,300 in 2003 and then declined to a low of 1,200 in 2014. With an increasing deer population and a slightly longer season, the number of hunters overall has increased. Hunter effort declined by four days, the lowest since 2008, and remains below the 10-year average of 22 days to harvest. Hunter success increased by 5%, exceeding the 10-year average of 31%, and the highest success rate since 2008.

Harvest Data

Harvest increased by 12% to 480 deer, exceeding the 10-year average of 400, still less than the 15 and 20 year averages of 500 deer. The number of harvested deer checked in the field was similar to 2017 (n=63) at 60 in 2018, however the number of deer tested for CWD was down with 75% of the deer checked being tested in 2018, compared to 90% in 2017. Chronic wasting disease prevalence found in hunter harvested deer was 0% in 2018 with the 3 year average at 10%. Teeth were pulled from deer that were tested for CWD when possible, as well as an outside antler width measurement. The average age deer harvested was 4.5 years old and the average antler width was 20” (n=40).

Population

The Time-Specific Juvenile & Constant Adult Survival (TSJ, CA) Spreadsheet Model was chosen for this herd unit. This model had the lowest AIC score of 166 and a fit of 72, and estimates the population to be 6,300 deer, with the population increasing from a low of 5,600 in 2013. This model is ranked as good. Classification and harvest data is of good quality going back to 1993. Survival rates are available for this herd unit as well as from adjacent herds, both in Wyoming and Colorado. However, to achieve a more accurate population estimate, an abundance survey is needed. Field staff, landowners, and hunters agree the population is growing and the herd should be managed to continue this growth.

Management summary

If we attain the projected harvest of 500 deer and have a fawn ratio of 66:100 does or higher (Unsworth 1999) as our predicted fawn ratio, we estimate a 2019 post-season population of approximately 6,600 deer. Although buck ratios declined, this is still the fourth year over the recreational maximum with the current estimate of 31 bucks: 100 does. However, we have not

seen the benefits associated with special management buck ratios. In 2016, we removed the APR to take harvest pressure off the older age classes and lengthened the season by three days to a 10-day season. We saw an increase in hunters and harvest in 2017, and in 2018. In 2019, we will not make any changes to management to better analyze a three year trend. The nonresident quota for Region D will remain at 400 licenses to address low deer populations in the Region D herd units. This will maintain hunter opportunity that is congruent with the current mule deer resource.

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2018 - JCR Evaluation Form

SPECIES: Mule Deer
PERIOD: 6/1/2018 - 5/31/2019

HERD: MD540 - SHIRLEY MOUNTAIN

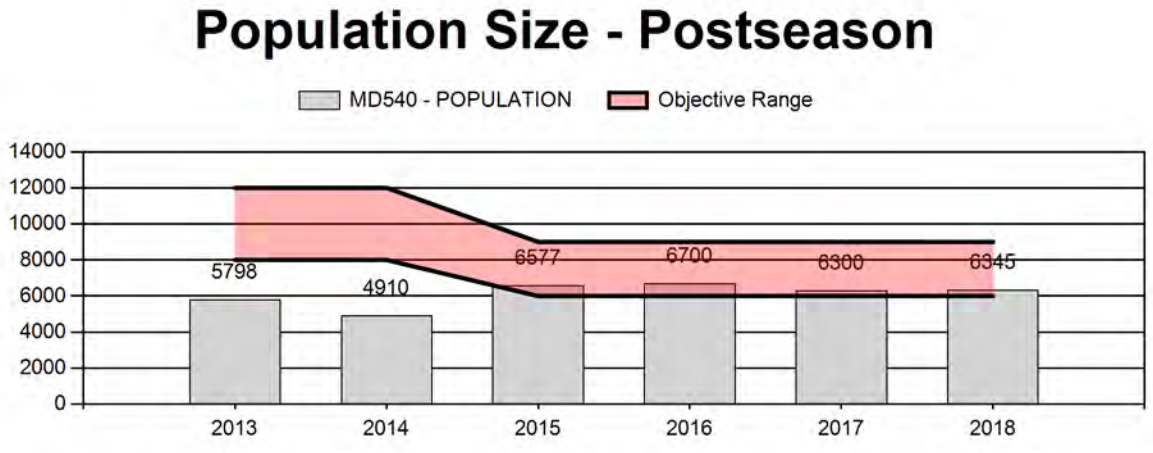
HUNT AREAS: 70
PREPARED BY: TEAL CUFAUDE

	2013 - 2017 Average	2018	2019 Proposed
Population:	6,057	6,345	6,378
Harvest:	228	327	315
Hunters:	568	593	580
Hunter Success:	40%	55%	54 %
Active Licenses:	578	595	590
Active License Success:	39%	55%	53 %
Recreation Days:	2,290	2,462	2,350
Days Per Animal:	10.0	7.5	7.5
Males per 100 Females	33	32	
Juveniles per 100 Females	52	63	

Population Objective (± 20%) :	7500 (6000 - 9000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-15.4%
Number of years population has been + or - objective in recent trend:	3
Model Date:	2/23/2019

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

	JCR Year	Proposed
Females ≥ 1 year old:	.8%	.1%
Males ≥ 1 year old:	21%	18%
Total:	5%	5%
Proposed change in post-season population:	-5%	-.5%



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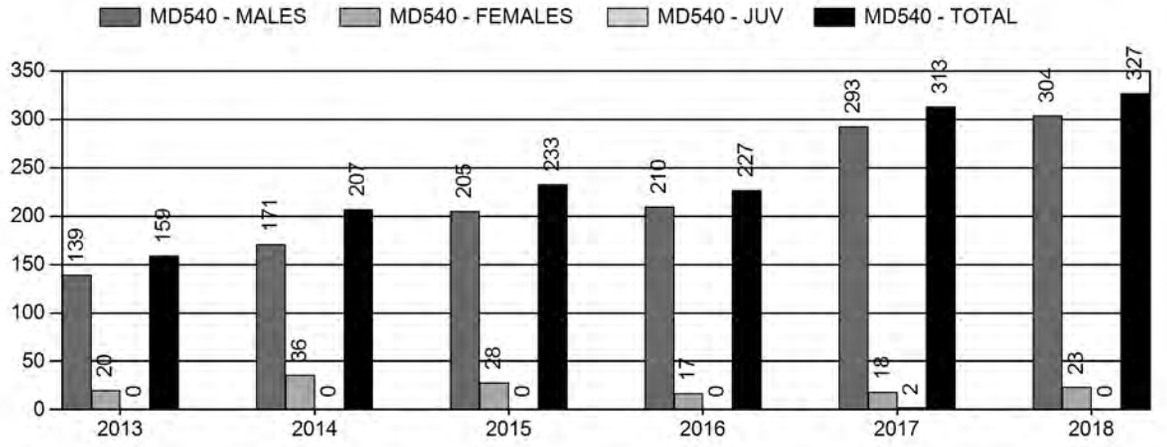
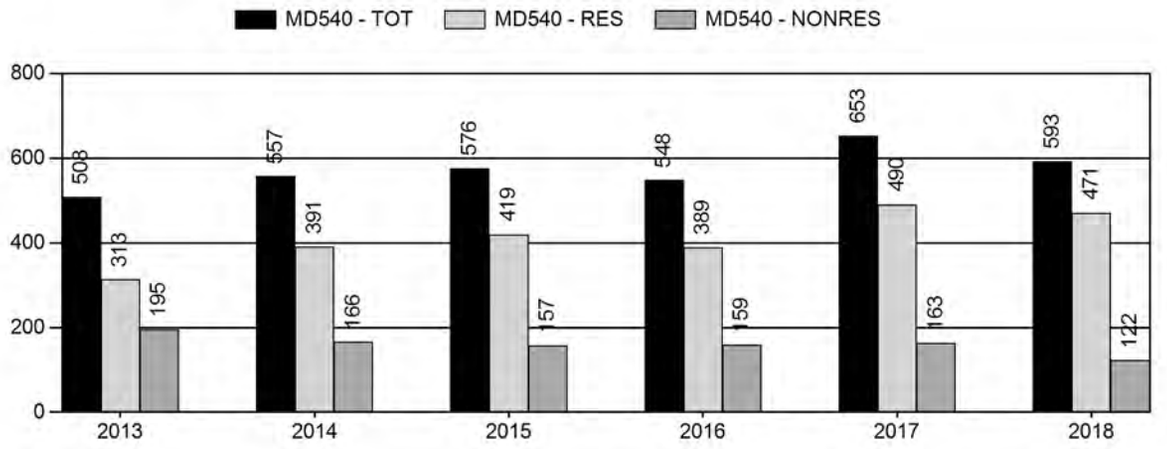
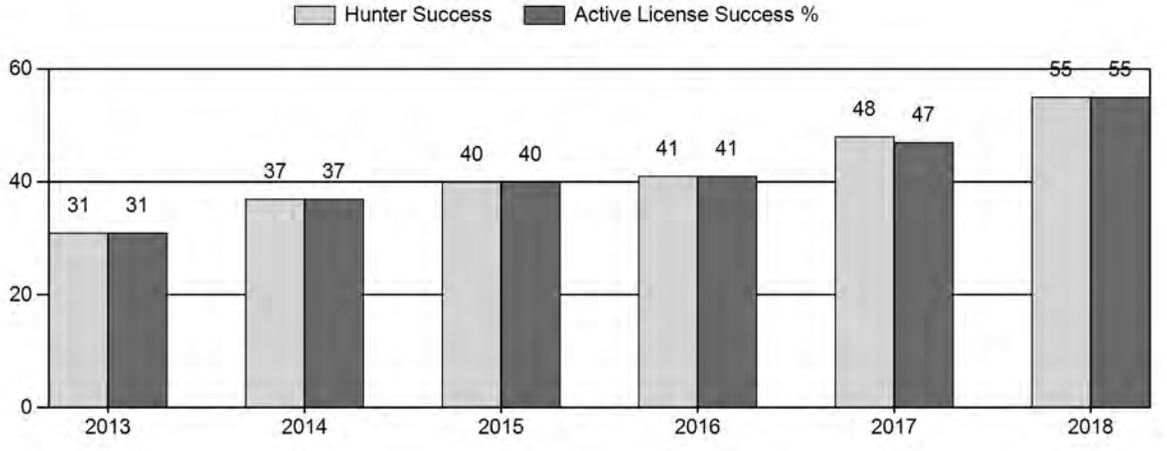


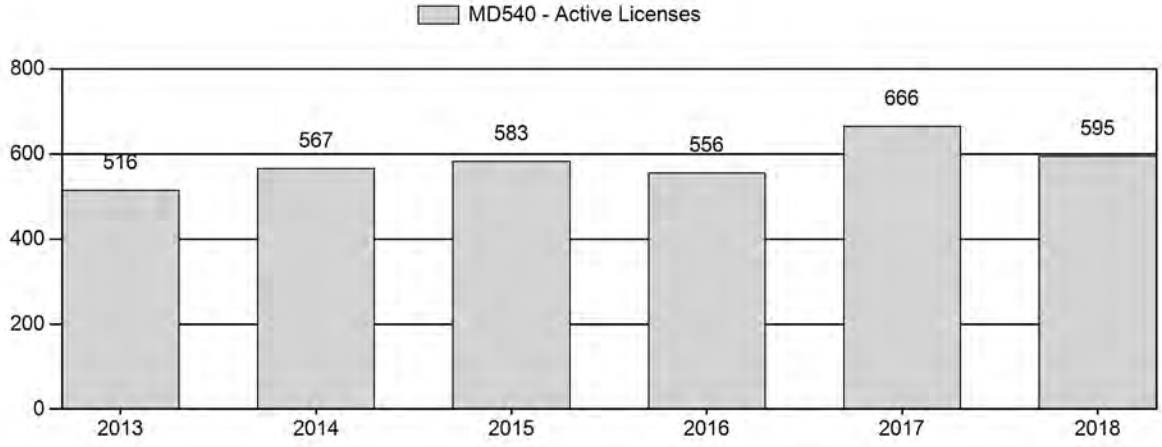
Number of Active Licenses



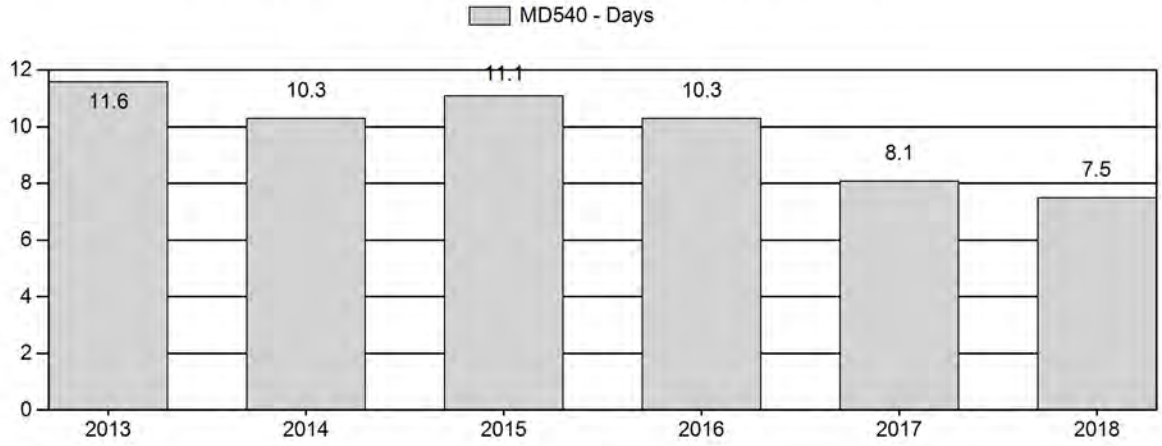
Harvest Success



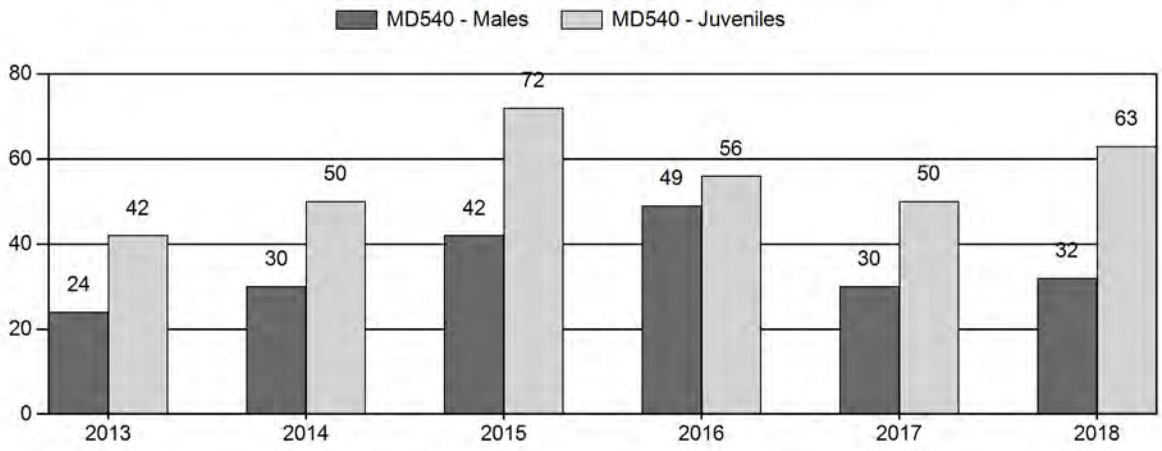
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Mule Deer Herd MD540 - SHIRLEY MOUNTAIN

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	5,798	26	0	0	0	32	58	14%	246	60%	103	25%	407	997	11	13	24	± 4	42	± 6	34
2014	4,910	20	21	9	1	0	51	17%	170	56%	85	28%	306	915	12	18	30	± 6	50	± 8	38
2015	6,577	27	18	12	1	0	58	20%	137	47%	99	34%	294	831	20	23	42	± 8	72	± 12	51
2016	6,700	19	26	22	2	0	69	24%	142	49%	80	27%	291	863	13	35	49	± 9	56	± 10	38
2017	6,300	13	23	18	3	0	57	17%	191	56%	96	28%	344	870	7	23	30	± 6	50	± 8	39
2018	6,345	27	20	15	1	0	63	16%	198	51%	125	32%	386	1,011	14	18	32	± 6	63	± 9	48

2019 HUNTING SEASONS
SHIRLEY MOUNTAIN MULE DEER (MD540)

Hunt Area	Type	Season Dates Opens	Closes	Quota	License	Limitations
70		Oct. 15	Oct. 21		General	Antlered mule deer or any white-tailed deer
	6	Oct. 15	Nov. 30	~~25~~	~~Limited quota~~ CLOSED	~~Doe or fawn valid on private land~~
	Archery	Sep. 1	Sep. 30			Refer to license type and limitations in Section 3 of Chapter 6

2019 Region D Nonresident Quota: 400

Hunt Area	License Type	Quota change from 2018
70	**6**	**-25**
Herd Unit Total	**6**	**-25**

Management Evaluation

Current Postseason Population Management Objective: 7,500 (6,000-9,000)
Management Strategy: Recreational
2018 Postseason Population Estimate: ~6,300
2019 Proposed Postseason Population Estimate: ~6,400
2018 Hunter Satisfaction: 63% Satisfied, 21% Neutral, 16% Dissatisfied

Mule deer in the Shirley Mountain Herd Unit are managed toward a post-season population objective of 7,500 with a recreational management strategy. This strategy directs Wyoming Game and Fish Department (WGFD) to manage harvest opportunity to maintain 20-29 bucks: 100 does in the herd unit postseason. The management objective was last reviewed in 2015 and reduced from 10,000 to 7,500 mule deer. The population was estimated using a spreadsheet model developed in 2012 and updated in 2018.

Herd Unit Issues

The Shirley Mountain Mule Deer herd unit consists of Deer Hunt Area 70. The Herd Unit contains the Shirley, Bennett (Seminoe), Freezeout, and Pedro Mountains. Habitats include montane forests (primarily lodgepole pine), aspen, mountain shrub, sagebrush-grasslands, grasslands, riparian, agricultural lands, and reclaimed coal mines. Hunter access to public lands containing mule deer habitat is considered good. Wind energy developments are a relatively new land use in this herd unit and there is interest in developing more wind farms in the future.

Weather

The 2017-18 winter had numerous periods of bitter cold, continuing through February, but much of the winter range was open and available. Winter losses were expected to be near average leading into bio-year 2018. The spring of 2018 was dry, resulting in slow plant growth and green-up of rangelands. The majority of the summer and fall were extremely dry, causing much of the available forage to cure. Fortunately, precipitation in October resulted in a late surge of plant growth, which may have provided mule deer with a valuable boost in nutrition prior to the winter of 2018-19. While there have been several notable snow storms and cold snaps during the winter of 2018-19, there were also periods of warm weather and high winds that melted and drifted snow to expose forage. Average mule deer survival is expected for the winter of 2018-19.

Temperature and precipitation data was obtained for the National Oceanic and Atmospheric Administration (NOAA), https://w2.weather.gov/climate/xmacis.php?wfo=cys to illustrate weather conditions thus far, during bio-year 2018 (Figures 1 and 2). These figures also include data from January-May of bio-year 2017 to describe the weather conditions immediately preceding bio-year 2018.

Figure 1. January 2018 - January 2019 mean monthly temperatures and 20-year monthly means for Rawlins, Wyoming.

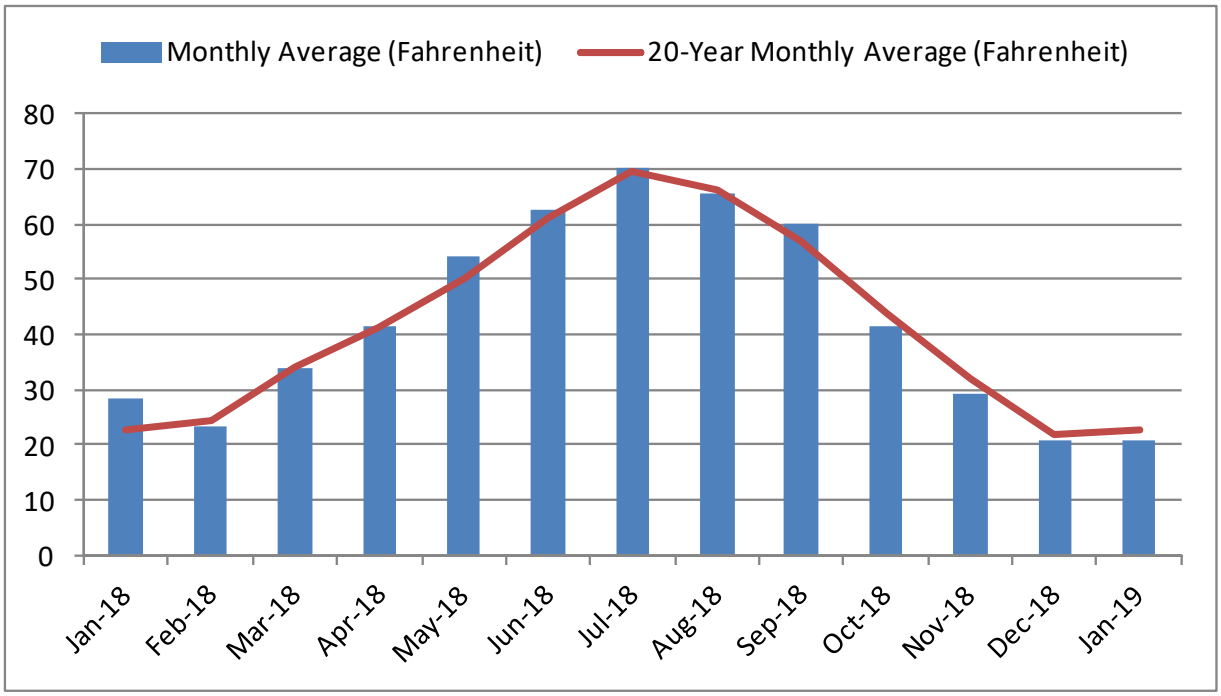
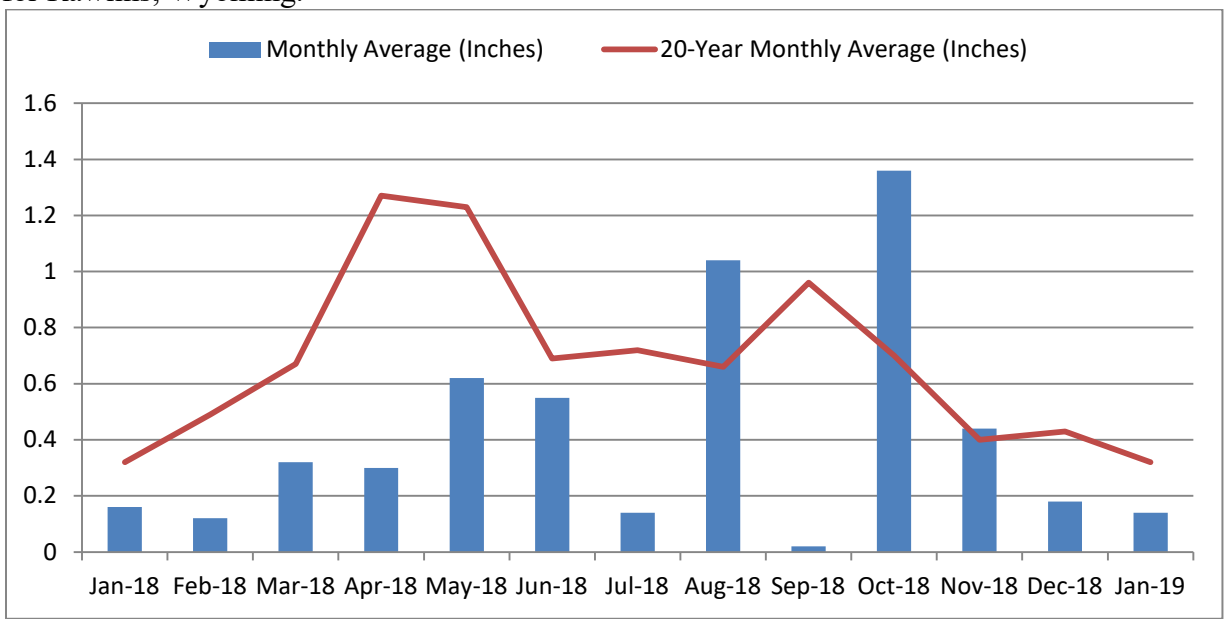


Figure 2. January 2018 - January 2019 mean monthly precipitation and 20-year monthly means for Rawlins, Wyoming.



Habitat

The limited number of habitat transects that have been established within this herd unit do not provide sufficient data to make reliable inferences about habitat quantity or quality. Most shrub-steppe habitat in this herd unit is decadent and in need of treatments designed to improve the nutritional value of sagebrush and other plants.

Field Data

In January 2019, mule deer in this herd unit were classified using aerial survey techniques. A total of 386 mule deer were classified, which was below the desired sample size. Obtaining an adequate classification sample has been a challenge in this herd unit.

The observed fawn ratio was 63 fawns:100 does which was a 26% increase from the 50 fawns:100 does observed in 2017. This increase in fawn production was attributed to mild 2017-18 winter conditions in this herd unit. The observed total bucks per 100 does increased from 30:100 in 2017 to 32:100 in 2018. The slight increase in observed total buck ratios were a consequence of a 50% increase in the observed yearling buck ratio (14:100) in 2018. The previous five-year average buck ratio was 34 bucks: 100 does. The below average total buck ratio in the last two years is attributed to the removal of the antler point restriction. The observed adult buck ratio decreased by 27% in 2018 to 18:100 does. Adult (>1.5 years of age) bucks were assigned to antler classes during classification surveys. The total adult classification sample (n=36) resulted in the following: 56% Class I (<20”wide) bucks, 42% Class II (20-25”wide) bucks, and 3% Class III (>25” wide) bucks.

Harvest Data

Overall, harvest increased and hunter satisfaction remained high in 2018. This season was the second season without the antler point restriction since 2012. Yearling bucks made up 16% of the total field checks for all bucks (n=67). Four (4) Class III bucks were sampled during 2018 field checks. The 2018 harvest survey report indicated 593 active licensed hunters' harvested 327 mule deer for an overall success rate of 55%. General season buck harvest increased 4% and general season hunter numbers decreased 12%, as compared with the 2017 hunting season statistics.

Chronic wasting disease (CWD) was first observed in the Shirley Mountain Herd Unit in 2006. Since 1997, a total of 383 mule deer have been tested for CWD in this herd unit and 24 have tested positive for CWD. In 2018, surveillance efforts for CWD continued in this herd unit. Results of the 2018 samples (n=47) collected from hunter harvested mule deer indicated an annual prevalence of 11%. Annual CWD prevalence can be under or over represented due to small sample sizes. The five-year estimated hunter harvested deer CWD prevalence in this herd unit was >10-20%.

Population

The "Constant Juvenile and Constant Adult" (CJ, CA) spreadsheet model was chosen to use for the post-season population estimate of this herd. This model produced the poorest fit score, but the lowest AIC score. We rated this model as poor, and not biologically defensible. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model, and primarily due to less than adequate sample sizes for postseason classification counts (Morrison 2012). Without other information such as a recent abundance estimate or long-term survival data to incorporate into the model, the accuracy of model estimates will continue to be unknown.

Management Summary

A seven-day general season for antlered mule deer or any white-tailed deer will be offered in 2019. Type 6 private land doe or fawn licenses were in eliminated in 2019 because damage and nuisance mule deer issues in the Lost Creek and Sage Creek drainages have been resolved. The Region D nonresident quota was retained at 400 licenses because we are providing more harvest opportunity in this herd unit without an antler point restriction.

Literature Cited

Morrison, T. 2012. User Guide: Spreadsheet Model for Ungulate Population data. Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 41 pp.

Bibliography of Herd Specific Studies

McDaniel G. W., F. G. Lindzey. 1991. Seasonal Movements, Population Characteristics and Habitat Use of Mule Deer in the Shirley Mountain Area, Central Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming, Laramie. 64 pp.

Strickland, D., L.L. McDonald, G. Johnson, W. Erickson, D. Young Jr., and J. Kern. 1994. An Evaluation of Mule Deer Classifications From Helicopter and Ground Surveys. Western Ecosystems Technology, Inc. Cheyenne. 61pp.

2018 - JCR Evaluation Form

SPECIES: Mule Deer
PERIOD: 6/1/2018 - 5/31/2019

HERD: MD541 - PLATTE VALLEY

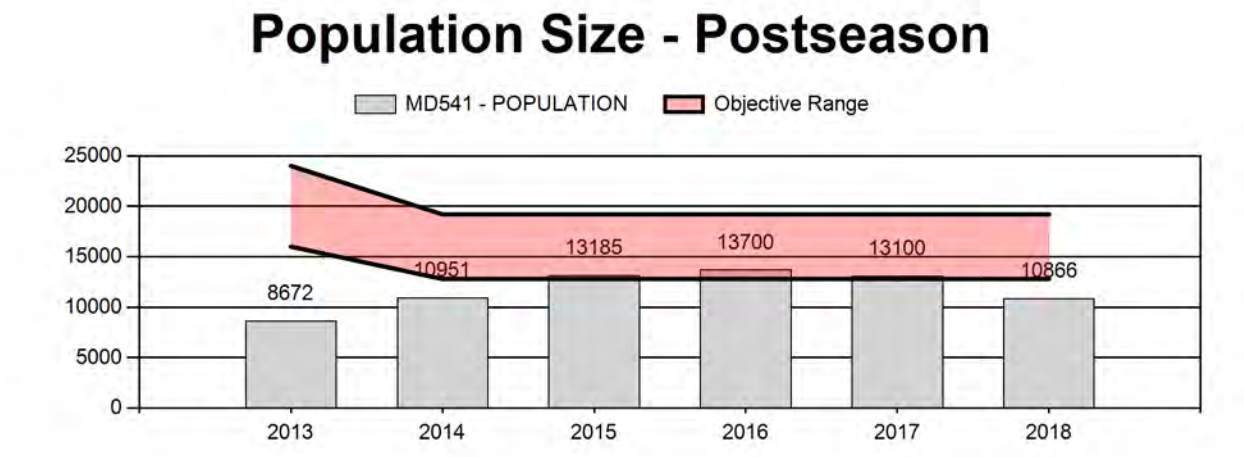
HUNT AREAS: 78-81, 83, 161
PREPARED BY: TEAL CUFAUDE

	2013 - 2017 Average	2018	2019 Proposed
Population:	11,922	10,866	11,263
Harvest:	532	639	680
Hunters:	931	1,033	1,040
Hunter Success:	57%	62%	65 %
Active Licenses:	931	1,033	1,050
Active License Success:	57%	62%	65 %
Recreation Days:	5,282	6,242	6,500
Days Per Animal:	9.9	9.8	9.6
Males per 100 Females	41	35	
Juveniles per 100 Females	61	59	

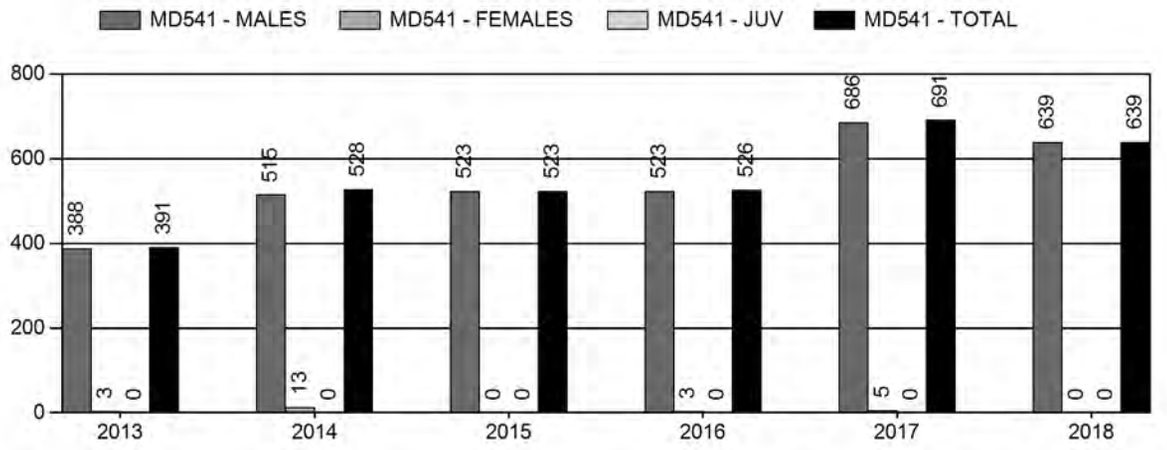
Population Objective (± 20%) :	16000 (12800 - 19200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-32.1%
Number of years population has been + or - objective in recent trend:	5
Model Date:	2/23/2019

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

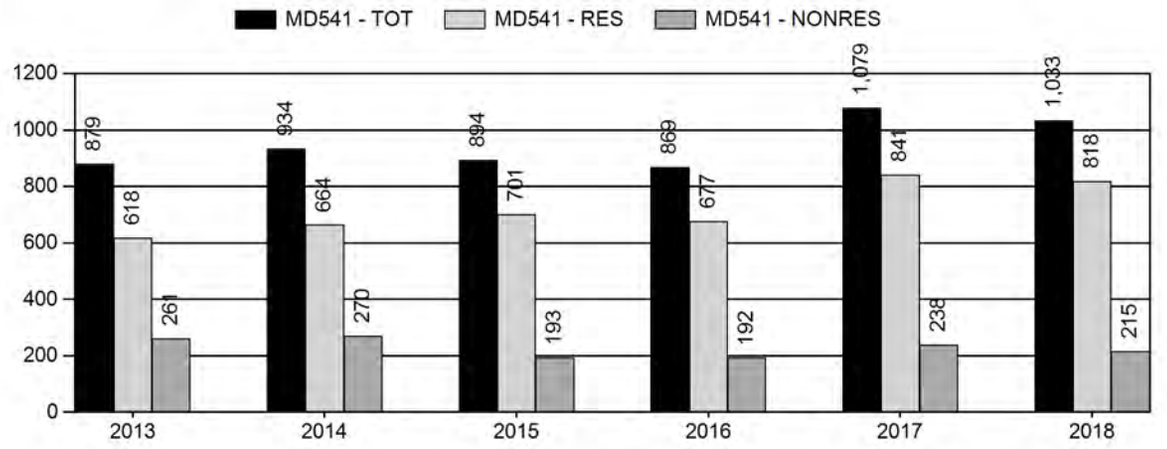
	JCR Year	Proposed
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	26%	26%
Total:	6%	6%
Proposed change in post-season population:	-10%	4%



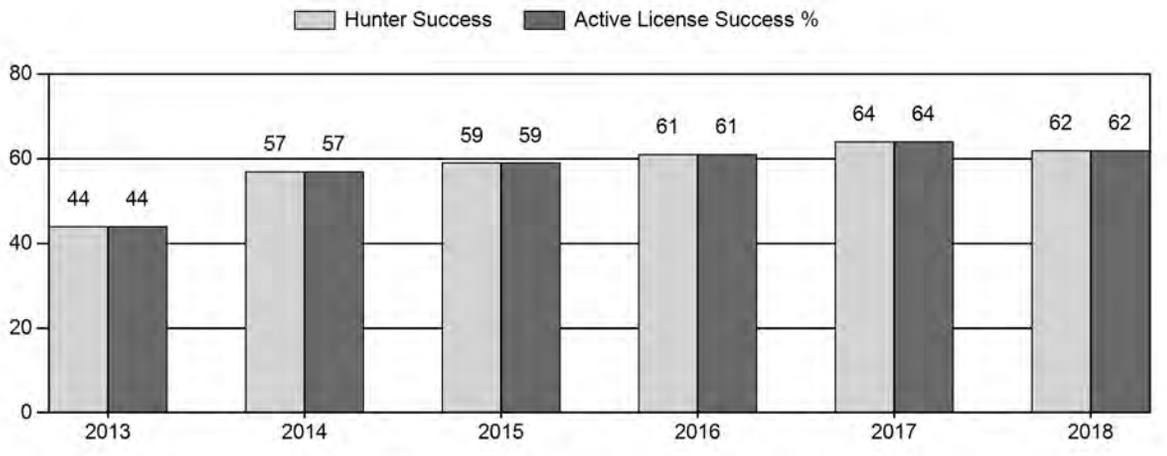
Harvest



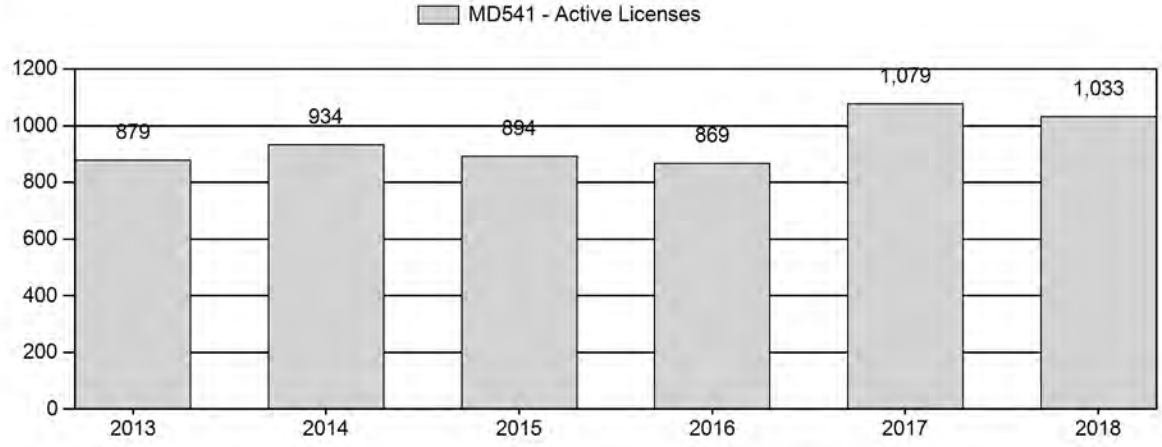
Number of Active Licenses



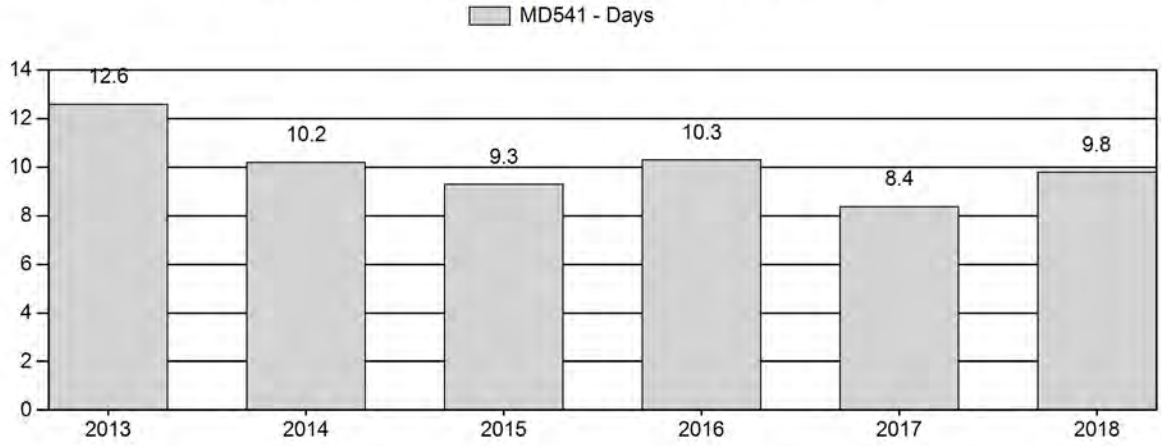
Harvest Success



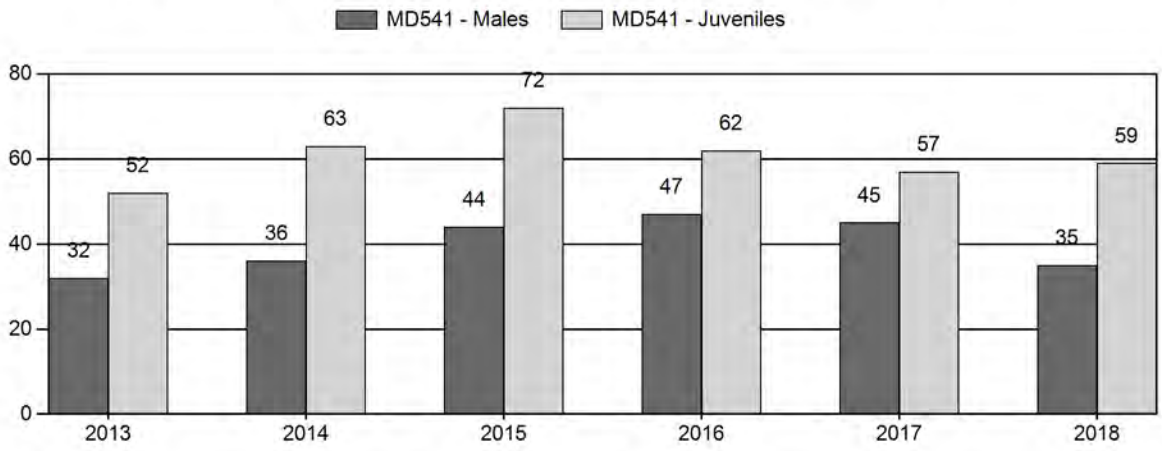
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2013 - 2018 Postseason Classification Summary

for Mule Deer Herd MD541 - PLATTE VALLEY

		MALES							FEMALES		JUVENILES				Males to 100 Females				Young to		
Year	Post Pop	Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Tot Cls	Cls Obj	Yling	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2013	8,672	136	0	0	0	209	345	17%	1,092	55%	565	28%	2,002	937	12	19	32	± 2	52	± 3	39
2014	10,951	85	118	86	30	0	319	18%	888	50%	560	32%	1,767	964	10	26	36	± 3	63	± 4	46
2015	13,185	143	82	130	19	0	374	21%	842	46%	604	33%	1,820	962	17	27	44	± 3	72	± 5	50
2016	13,700	96	206	250	7	0	559	23%	1,188	48%	731	29%	2,478	1,159	8	39	47	± 3	62	± 3	42
2017	13,100	64	125	114	29	0	332	22%	738	50%	419	28%	1,489	1,165	9	36	45	± 4	57	± 4	39
2018	10,866	147	200	188	33	0	568	18%	1,638	52%	971	31%	3,177	1,123	9	26	35	± 2	59	± 3	44

2019 HUNTING SEASON RECOMMENDATIONS
PLATTE VALLEY MULE DEER (MD541)

Hunt Area	Type	Season Dates Opens	Season Dates Closes	Quota	License	Limitations
78	1	Oct. 1	Oct. 14	375	Limited quota	Antlered mule deer or any white-tailed deer
79, 161	1	Oct. 1	Oct. 14	400	Limited quota	Antlered mule deer or any white-tailed deer
80, 83	1	Oct. 1	Oct. 14	250	Limited quota	Antlered mule deer or any white-tailed deer
81	1	Oct. 1	Oct. 14	~~250~~ 200	Limited quota	Antlered mule deer or any white-tailed deer
	Archery	Sep. 1	Sep. 30			Refer to license type and limitations in Section 3 of Chapter 6

Hunt Area	License Type	Quota change from 2018
81	**1**	**-50**
Herd Unit Total	**1**	**-50**

Management Evaluation
Current Postseason Population Management Objective: 16,000 (12,800 – 19,200)
Management Strategy: Recreational
2018 Postseason Population Estimate: ~10,800
2019 Proposed Postseason Population Estimate: ~11,200
2018 Hunter Satisfaction: 75% Satisfied, 15% Neutral, 10% Dissatisfied

Mule deer in the Platte Valley herd unit are managed toward a numeric post-season population objective of 16,000. The population was estimated using a spreadsheet model developed in 2012 and is updated annually. The herd is managed for recreation opportunity. This strategy directs Wyoming Game and Fish Department (WGFD) to manage harvest opportunity to maintain 20-29 bucks: 100 does in the herd unit postseason.

Herd Unit Issues
The Platte Valley herd unit consists of Deer Hunt Areas 78, 79, 80, 81, 83, and 161. Hunt Areas 78 and 79 are located on the west slope of the Snowy Range, and Hunt Areas 80 and 81 are

located on the east slope of the Sierra Madre Range, in the Medicine Bow Mountains. Hunt Areas 83 and 161 are located immediately adjacent in the northern portion of the herd unit and contain drier and less productive habitats. Hunt Areas 83 and 161 are included in the herd unit because mule deer that summer in high elevation mountain habitat in the southern portion of the herd unit migrate to winter ranges in these hunt areas during winter (Ward et al. 1976).

In 2012, WGFD collaboratively developed the Platte Valley Mule Deer Plan and began to implement additional strategies identified to improve the quality of the hunting experience in this herd unit. These strategies included: 1.) changing hunting season structure from traditional general seasons to limited quota seasons; 2.) achieve a buck harvest success rate of 40%; 3.) set a goal of at least 20% of field-checked harvested bucks meeting an antler spread of 24" or more; and 4.) 60% of the harvest survey respondents replying they were "satisfied" or "very satisfied" with their hunting experience.

Fieldwork continues on several Platte Valley Habitat Partnership projects but progress on large scale projects has been delayed by the NEPA process associated with working on federally managed lands. A large proportion of the mule deer that reside in this herd unit during winter spend the summer and early fall in Colorado which complicates management. The Platte Valley Mule Deer Initiative and Platte Valley Habitat Partnership continue to work on improving mule deer management and habitat.

We are maintaining this herd at the current objective and management strategy based on internal discussions and conversations with our constituents. We evaluated and considered population status and habitat data included in this document and a change is not warranted at this time. We will review this herd objective again in 2024; however, if the situation arises that a change is needed, we will review and submit an updated proposal.

Weather

- Compiled by WGFD Terrestrial Habitat Biologist, Katie Cheesbrough

Annual bio-year precipitation from October 2017 through September 2018 is notably below the 30 year average and approaching precipitation levels seen in the 2012 drought year. Similarly, the growing season precipitation across the herd unit (April-June 2018) and the later growing season precipitation for high elevation spring/summer/fall ranges (May-July 2018) were also well below the 30 year averages. As illustrated by the PRISM data (Fig. 1) and the 2017-2018 water year SNOTEL data (Fig. 2), the majority of precipitation in the Platte Valley occurs outside of the primary growing season, generally in the form of snow. However, winter 2017-2018 was relatively mild with, what seemed like, very little snow in the lower elevations. USDA-Snotel site data from February 2018 showed that snow water equivalent (SWE) was within 81-103% of normal on the west slope of the Snowy Range (8,440-10,130 ft) and within 71-85% of normal on the east slope of the Sierra Madres. However, high sustained winds in early 2018 may have contributed to significant evaporative losses of moisture from that snowpack, further decreasing precipitation for the year. Due to a lack of snow in the lower elevations, relatively mild temperatures, and early snowmelt, the 2017-2018 winter conditions may have been favorable for big game.

Figure 1. Parameter-Elevation Relationships on Independent Slopes Model (PRISM) was utilized to estimate precipitation by calculating a climate-elevation regressions for each Digital Elevation Model grid cell (4km resolution) for the Platte Valley mule deer herd unit in Carbon County, Wyoming.

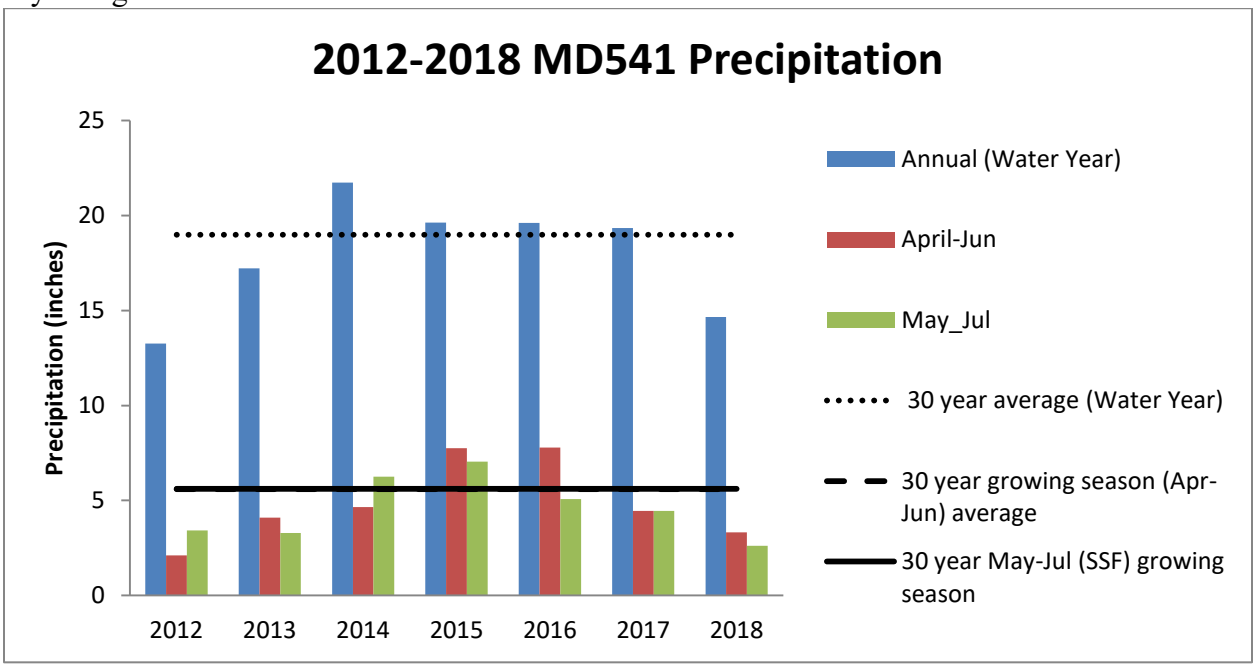
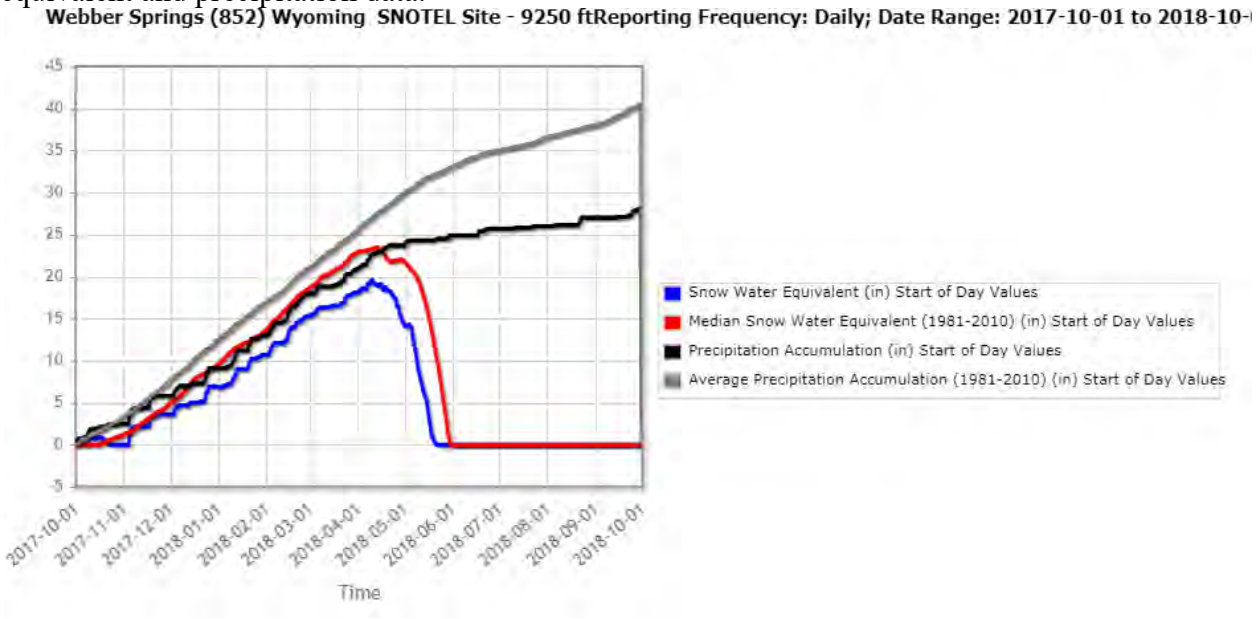


Figure 2. October – September bio-year 2017 Webber Springs USDA-SNOTEL Site snow water equivalent and precipitation data.



The early snowmelt at high elevations can be attributed to relatively high temperatures in early spring. The only significant spring moisture came in the last week of May with little to no precipitation until mid June. Extremely dry, hot, and windy weather throughout the spring,

summer, and into the fall contributed to the start (September 15th, 2018) and rapid spread of the Ryan fire to over 28,500 acres in Colorado and Wyoming. The Ryan fire burned until lower temperatures and moisture returned to the area in early October 2018.

Winter 2018-2017 SNOTEL data indicate average to slightly above average snowpack on the east slope of the Sierra Madres (Fig. 3) and just below normal snowpack on the west slope of the Snowy Range (Fig. 4). Colder weather and snow in early to mid-October may have caused deer to move more quickly into lower elevations, which may have resulted in harvest impacts.

Figure 3. October – February bio-year 208 Webber Springs USDA-SNOTEL Site snow water equivalent and precipitation data.

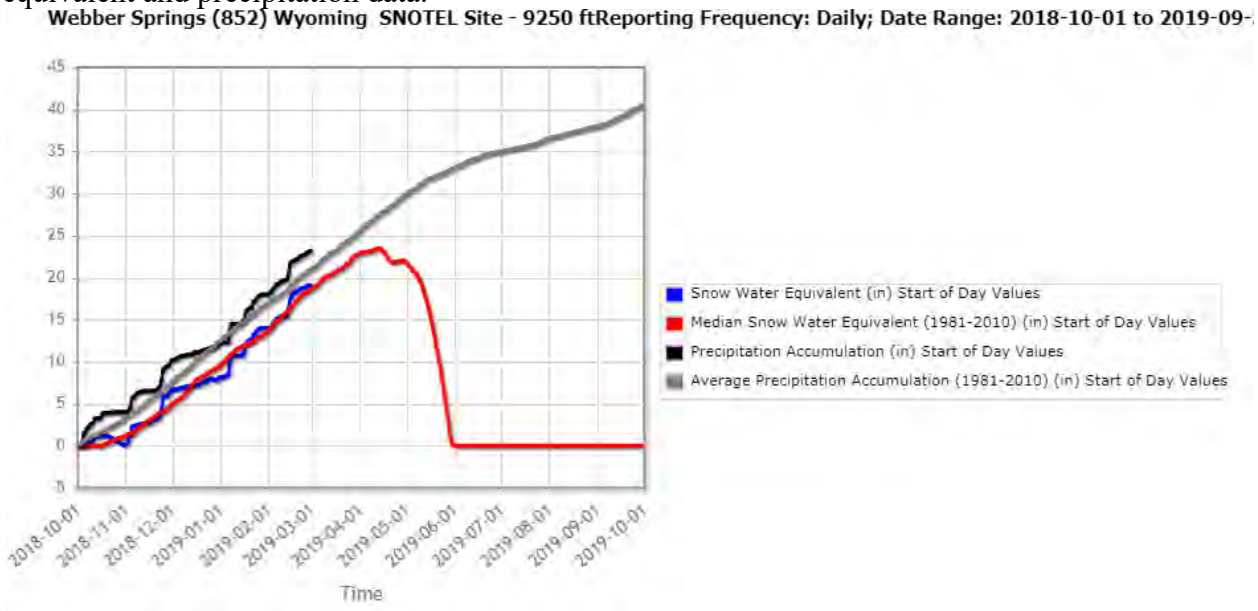
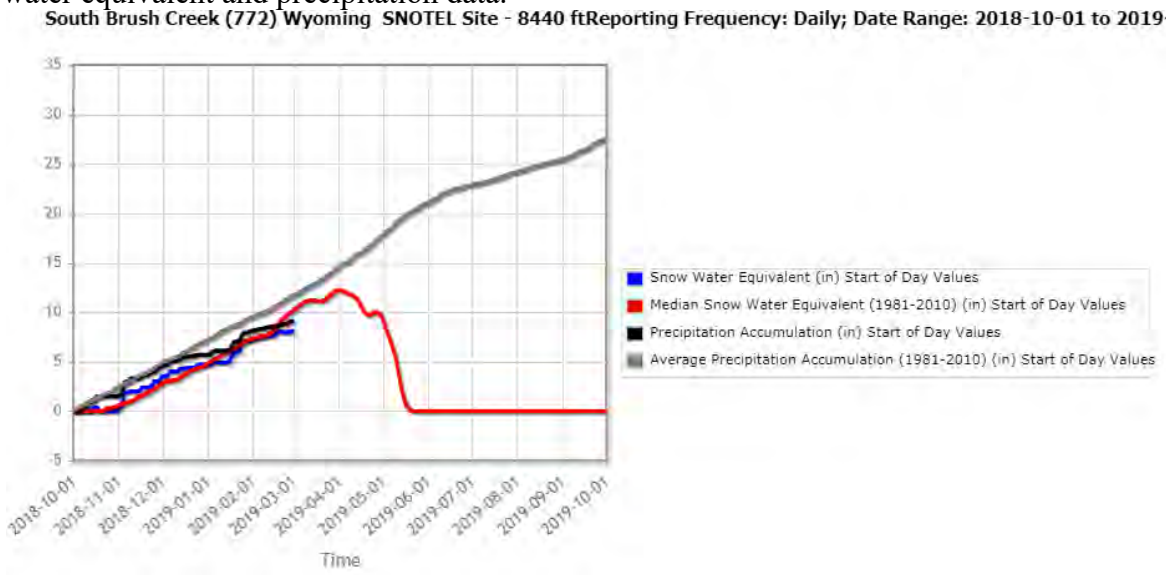


Figure 4. October – February bio-year 2018 South Brush Creek USDA- SNOTEL Site snow water equivalent and precipitation data.



Habitat

- Compiled by WGFD Terrestrial Habitat Biologist, Katie Cheesbrough

Growing season precipitation was below normal across the herd unit in 2018, resulting in slower and less growth of cool season grasses, forbs, and shrubs, particularly in lower elevation seasonal ranges. Vegetation production sampling conducted on the Pennock Wildlife Habitat Management Area showed a continued trend of lower production during the 2018 growing season (373.68 lbs/acre) than seen in the past 4 years (539.53 lbs/ac average). However, these production values were still high enough to cover the previous year's wildlife utilization estimates (340 lbs/acre).

The lack of growing season moisture and the abundance of dead beetle killed lodgepole created an environment conducive to wildfires in the Sierra Madres. The 28,500+ acre Ryan Fire could potentially serve to increase aspen production and diversify forest species age class and herbaceous production within mule deer summer range in the areas affected in the future. However, the fire may have some short-term impacts on forage availability going into fall/winter 2018. Additionally, sustained hot and dry conditions throughout the summer decreased shrub leader production throughout the herd unit and likely had impacts on browse availability in transition and winter ranges in 2018.

Rapid Habitat Assessments conducted throughout the herd unit in from 2015-2018 suggest that many important shrub habitats continue to underperform due to maturity and decadence caused by a lack of disturbance.

Field Data

The 2018 Platte Valley herd unit post-season classification ratios were 35 bucks and 59 fawns per 100 does; based on an adequate sample of 3,177 mule deer. This was the largest post-season classification sample since 2011. The buck ratio decreased 20% in 2018, most notably in Hunt Areas 78 and 81. Adult (>1.5 years of age) bucks were assigned to antler classes during classification surveys. The total adult classification sample (n=421) resulted in the following: 47% Class I (<20"wide) bucks, 45% Class II (20-25"wide) bucks, and 8% Class III (>25" wide) bucks. The observed fawn ratio at 59 fawns: 100 does was 3% less than the previous five-year average. This decline in fawn production is primarily attributed to changes in the ability of habitat to provide the specific forage, cover, and security required by mule deer. Changes in the seral stage of vegetative communities to less productive stages and drought have reduced annual forage production and may be playing a critical role in depressed fawn ratios. Rodent and rabbit populations appeared to be decreasing from recent highs and may have contributed the lower fawn survival rate observed in 2018 as there were less alternative food sources available for mule deer predators. Mule deer numbers remain below objective levels in this herd unit.

Harvest Data

2018 marked the sixth year for limited quota hunting in the Platte Valley herd unit. Each hunt area was prescribed a license quota specific to the hunt area. In 2018, hunting season timing, length, and license quotas were similar to the 2017 season. The license quota for Hunt Area 81 was increased as there was no longer a need to compensate for the 2016 carryover licenses.

A total of 1,033 active licensed hunters harvested 639 bucks in 2018. Overall harvest success decreased from 64% in 2017 to 62% in 2018. Hunter satisfaction decreased slightly in 2018 to 75% hunters reporting they were very satisfied or satisfied.

In 2018, Hunt Area 81 hunters were offered an opportunity to carry their licenses over to the 2019 season due to the Ryan Fire. Approximately 55 Hunt Area 81 licensed hunters opted to carryover their license.

A total of 166 hunter harvested bucks were checked in the field in 2018. Yearling bucks made up 12% (n = 20) of the field checked buck harvest sample. This was a slight increase from 11% in 2017. Field check harvest data from years prior to the implementation of limited quota hunting seasons indicated, on average, greater than 25% of the buck harvest consisted of yearling bucks. 35% of all field checked bucks in the herd unit were Class I (<20" wide) bucks, 35% were Class II (20-25" wide) bucks, and 18% were Class III (>25" wide) bucks.

Chronic wasting disease (CWD) was first observed in the Platte Valley herd unit in 2002. Since 1997, a total of 2,114 mule deer in this herd unit have been tested for CWD and 40 mule deer have tested positive. In 2018, CWD surveillance efforts continued in this herd unit. Results of the 2018 samples (n=112) collected from hunter harvested adult mule deer indicated an annual prevalence of 8.9% CWD positive. Annual CWD prevalence can be under or over represented due to small sample sizes. The five-year estimated hunter harvested deer CWD prevalence in this herd unit was >5-10%.

Population

The "Time-Specific Juvenile and Constant Adult Survival" (TSJ, CA) spreadsheet model was chosen to estimate the post-season population of this herd. This model provided the balance of allowing juvenile survival rates to be optimized for alignment with observed population dynamics, while maintaining a constant survival rate for adult mule deer in model simulations. The TSJ, CA model produced a 2018 postseason population estimate of 10,866 mule deer for the Platte Valley Herd Unit. This was a 20% decrease in the population estimate from 2017. This herd unit has experienced three years of low fawn ratios (59:100). Lower buck ratios in 2018 and low fawn ratios are likely what is driving this model's post-season population estimate. The model does predict an increasing trend in post-season population in 2019. The TSJ, CA model aligned well with abundance estimates for this herd unit and corroborated with the observations from field managers and the public. The TSJ,CA model also offered the best AIC score of the suite of spreadsheet models. This model was rated as fair, and biologically defensible in our evaluation. This rating was based on criteria identified in the user's guide for the WGFD spreadsheet model (Morrison 2012).

In 2018, The Platte Valley Mule Deer Migration Corridor was designated. The Platte Valley Mule Deer Migration Corridor network represents high use seasonal migration corridors and stopover habitat documented through the use of GPS collar technology and delineated using a Brownian bridge movement model (Sawyer et al. 2009). These corridors document important habitats used by approximately 5,000 mule deer migrating from summer range in Colorado to winter range in Wyoming. The corridors also illustrate the barrier to migration caused by the development of Interstate 80 where at present only approximately 400 mule deer utilize one

machinery underpass for safe passage to winter range. Important stopover areas include areas designated as crucial winter range in the Encampment River Wilderness Study Area (WSA), Beaver Hills, Bennett Peak, Baggot Rocks, Cedar Breaks, Savage Meadows and St. Mary's Ridge. WGFD continued to evaluate migration data from the Platte Valley mule deer radio-collar movement project (Kauffman et al. 2015) to identify migration corridors, migration bottlenecks and stopover habitats. WGFD will use these data to assess current and potential threats to maintaining connectivity for important mule deer habitat within this herd unit.

Management Summary

The 2019 hunting season structure will be similar to 2018. The only change will be a reduction of 50 licenses in Hunt Area 81, for a total of 200 Hunt Area 81 Type 1 licenses. There is the potential that 55 carryover licenses are used in Hunt Area 81 in 2019, in addition to the prescribed 200 Hunt Area 81 Type 1 licenses. If we attain the projected harvest of 680 mule deer bucks in 2019 and observe normal fawn production the predicted mule deer population of 11,200 will continue to remain below the objective of 16,000.

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Kauffman, M., H. Sawyer, W. Schultz, and M. Hayes. 2015. Seasonal Ranges, Migration, and Habitat Use of the Platte Valley Mule Deer Herd. Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 21 pp.

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Yost, J. 2009. North Park Deer Movement and Distribution Study Update - March, 2009. Colorado Division of Wildlife, Steamboat Springs. 4 pp.

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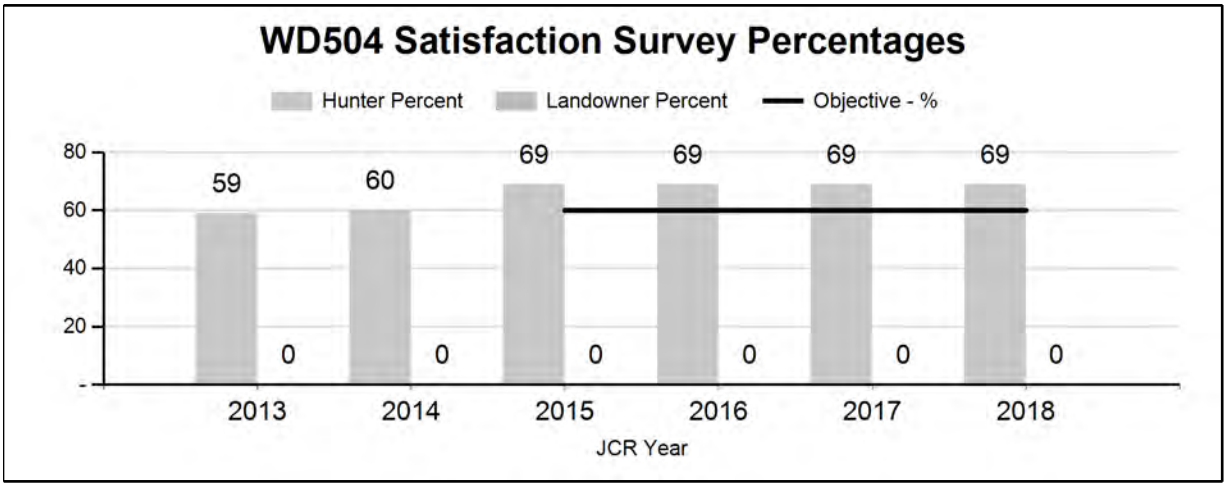
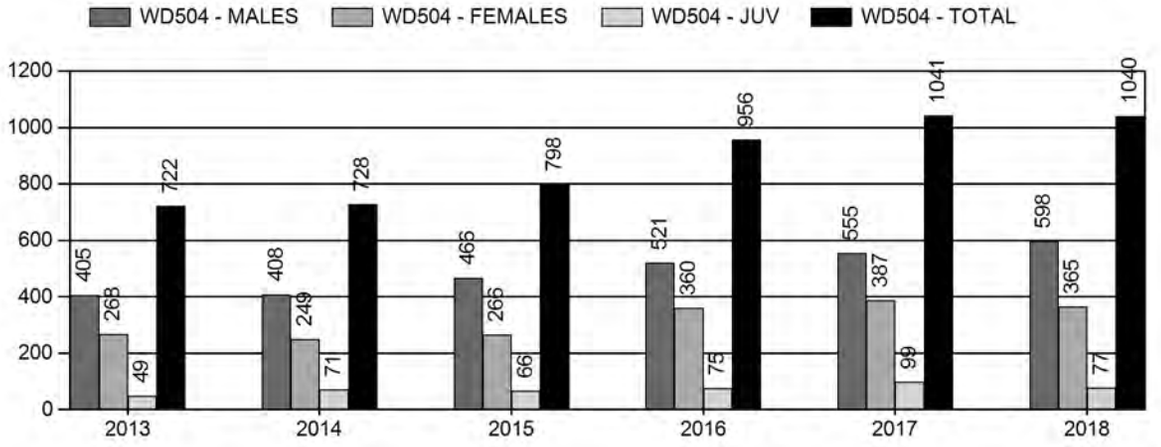
2018 - JCR Evaluation Form

SPECIES: White tailed Deer
PERIOD: 6/1/2018 - 5/31/2019
HERD: WD504 - SOUTHEAST WYOMING
HUNT AREAS: 15, 59-64, 70, 73-81, 83, 161
PREPARED BY: MARTIN HICKS

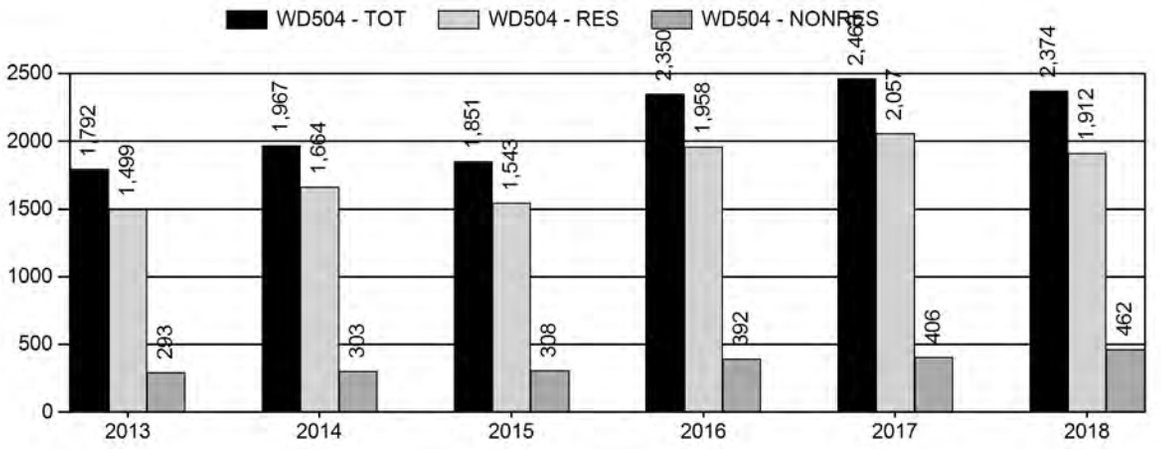
	2013 - 2017 Average	2018	2019 Proposed
Hunter Satisfaction Percent	65%	69%	65%
Landowner Satisfaction Percent	0%	0%	0%
Harvest:	849	1,040	1,150
Hunters:	2,085	2,374	2,475
Hunter Success:	41%	44%	46%
Active Licenses:	2,350	2,738	2,840
Active License Success:	36%	38%	40%
Recreation Days:	9,409	12,051	12,800
Days Per Animal:	11.1	11.6	11.1
Males per 100 Females:	35	0	
Juveniles per 100 Females	71	0	
Satisfaction Based Objective			60%
Management Strategy:			Recreational
Percent population is above (+) or (-) objective:			N/A%
Number of years population has been + or - objective in recent trend:			5



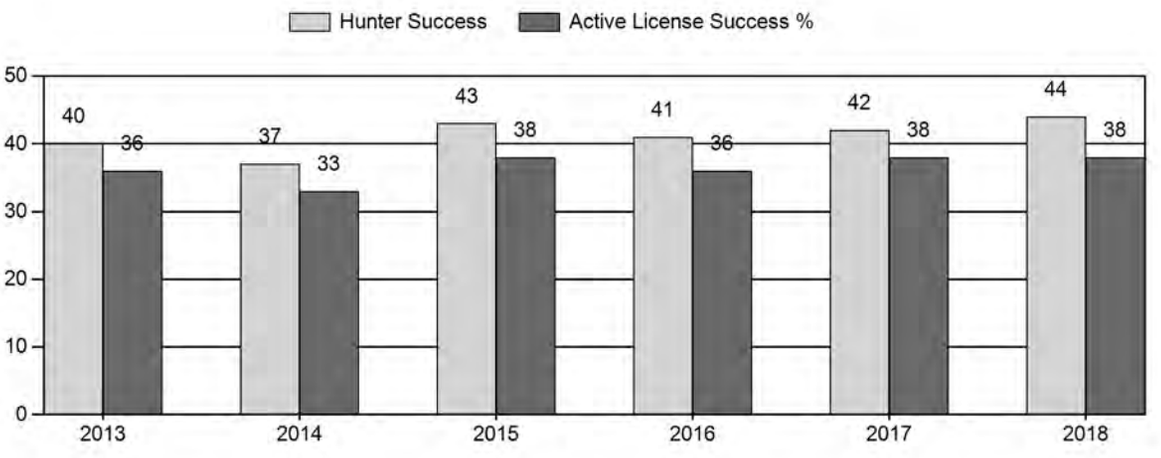
Harvest



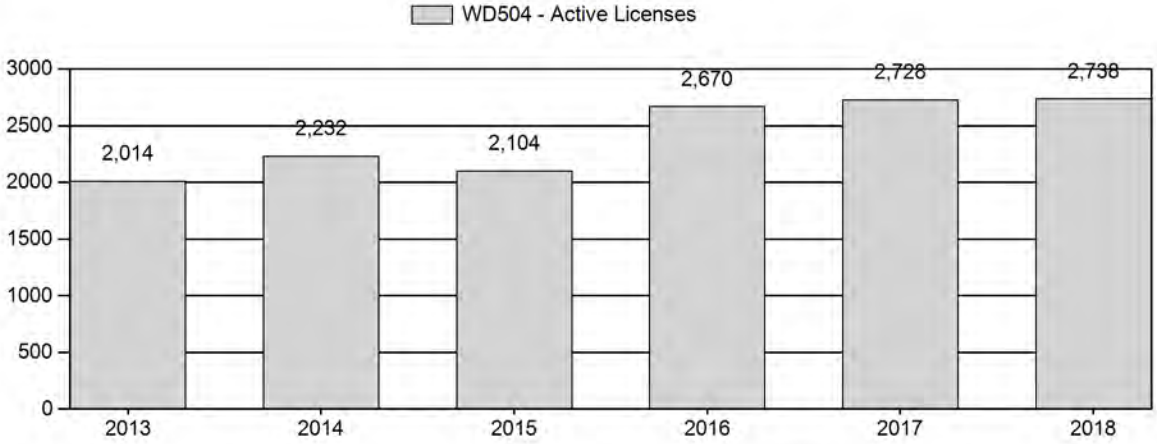
Number of Active Licenses



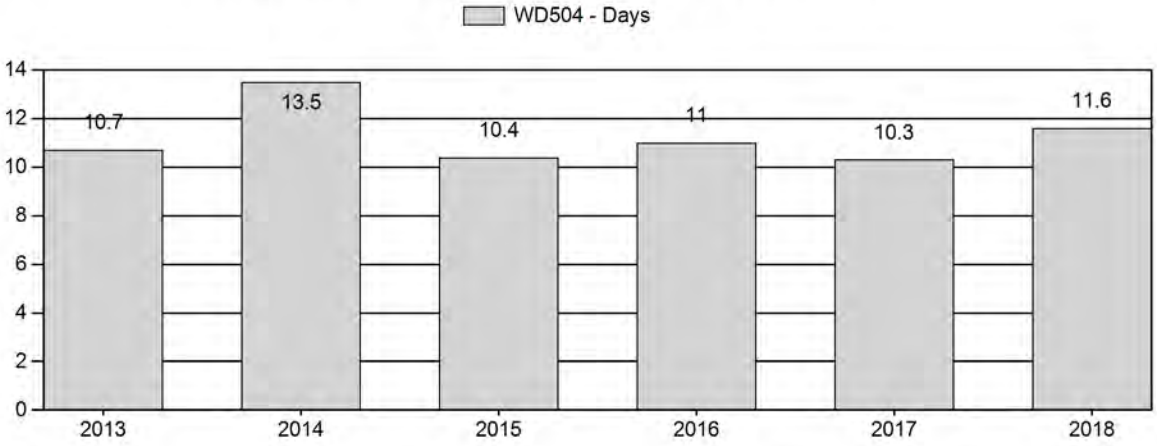
Harvest Success



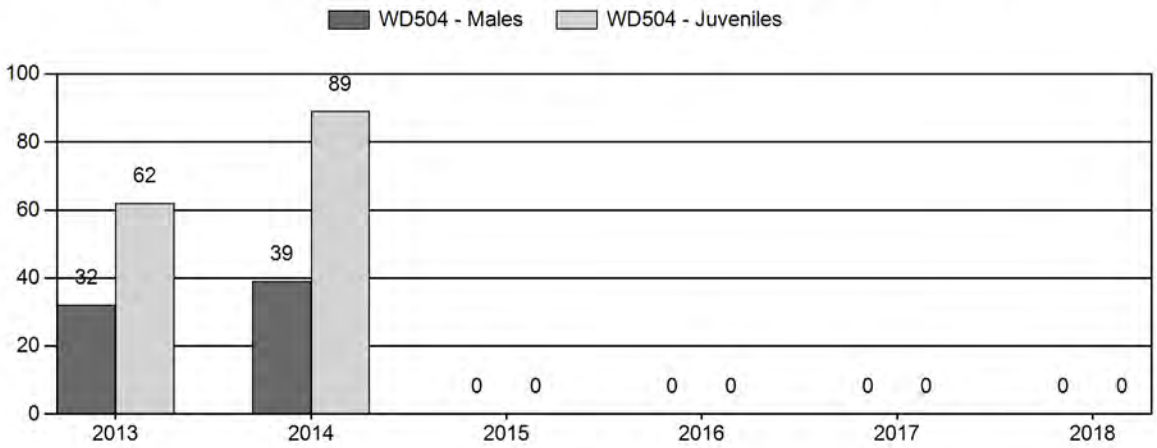
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2019 HUNTING SEASONS
SOUTHEAST WYOMING WHITE-TAILED DEER HERD (WTD504)

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
15	3	Oct. 1	Nov. 30	~~450~~ 500	Limited quota	Any white-tailed deer
	3	Dec. 1	Dec. 31			Doe or fawn white-tailed deer
15	8	Oct. 1	Dec. 31	~~400~~ 450	Limited quota	Doe or fawn white-tailed deer
59,60,64	3	Oct. 1	Nov. 30	~~200~~ 250	Limited quota	Any white-tailed deer, all lands within Curt Gowdy State Park, archery only
59,60,64	3	Dec. 1	Dec. 31			Doe or fawn white-tailed deer valid in Area 59 and Area 64
59,60,64	8	Oct. 1	Dec. 31	~~300~~ 350	Limited quota	Doe or fawn white-tailed deer; all lands within Curt Gowdy State Park, archery only
70,74	3	Oct. 1	Dec. 31	50	Limited quota	Any white-tailed deer
70,74	8	Oct. 1	Dec. 31	50	Limited quota	Doe or fawn white-tailed deer
75,76,77	3	Oct. 1	Dec. 31	75	Limited quota	Any white-tailed deer
75,76,77	8	Oct. 1	Dec. 31	100	Limited quota	Doe or fawn white-tailed deer
78,79,80,81, 161	3	Oct. 1	Dec. 31	25	Limited quota	Any white-tailed deer
78,79,80,81, 161	8	Sept. 1	Dec. 31	50	Limited quota	Doe or fawn white-tailed deer

Special Archery Season Hunt Areas	Opening Date	Closing Date	Limitations
15,59,60,64,70,74,75,76,77,78,79,80, 81,161	Sept. 1	Sept. 30	Refer to Section 2 of this Chapter

Hunt Area	Type	Quota change from 2018
15	3	+50
15	8	+50
59,60,64	3	+50
59,60,64	8	+50
Total	**3**	**+100**
	8	**+100**
Total		**+200**

Management Evaluation

Current Hunter Satisfaction Management Objective: Hunter satisfaction; Target goal: ≥ 60%
Management Strategy: Private Land
2018 Hunter Satisfaction Estimate: 63%
Most Recent 3-year Running Average Hunter Satisfaction Estimate: %

The management objective for the Southeast Wyoming Herd Unit was reviewed in 2015 through the public objective review process. It was determined to abandon the numeric objective of 4,000 white-tailed deer and go with a sportsperson satisfaction survey with a satisfaction goal of ≥ 60% and a private land management strategy. A landowner satisfaction survey will not be used in conjunction with the sportsmen survey. The sample size would be very low and the majority of occupied white-tailed deer habitat is on private land, which complicates management since there is limited access.

Herd Unit Issues

There is not a reliable post-season population estimate. This is an open herd with Colorado and Nebraska so trying to model this herd would violate the assumption that it is closed. Seasons are designed to provide opportunity during the mating period when male deer are more vulnerable to harvest. Management is driven primarily by local Department personnel perception of population trend and landowner tolerance for this species.

Weather

Weather in this herd unit was relatively normal during the past bio-year. Precipitation amounts were average at all elevations throughout southeast Wyoming during spring months then became dry and hot from July through November. Generally speaking weather patterns most likely did not have a negative effect on white-tailed deer. For specific meteorological information for the Southeast Wyoming herd unit the reviewer is referred to the following link: http://www.ncdc.noaa.gov/cag/

Habitat

Forage availability for white-tailed deer was typical compared to past years. Cheatgrass continues to be a major threat to native rangelands and big game ranges, particularly at all elevations below 6,500 ft. Its presence ties the hands of habitat managers by limiting habitat enhancement options, and may result in reduced rangeland carrying capacities where it is the predominant species. This herd unit is comprised of a mix of riparian areas, native rangelands, CRP, dryland and irrigated croplands.

There were no major flooding events in 2018 and past flooding events most likely improved riparian habitat. With favorable land management post-flooding, the potential exists for cottonwood and willow regeneration in many stream systems. Establishment of these species may aid in reversing negative trends in woody species composition and age classes of important understory browse species and woody species that provide thermal and hiding cover values.
White-tailed deer inhabit areas that are supported by agriculture, including dryland and irrigated croplands.

Field/Harvest Data

This herd will grow rapidly. Seasons adjustments may bring the population down. Disease outbreaks common at high densities, such as EHD, may also reduce numbers. Hunter success is typically around 36% with hunter effort running about 11 days per harvest. Hunting opportunity is limited to private

land. Low success and high effort contributed to hunters trying to find a white-tailed deer on public land or trying to harvest a deer during the general season when they are less vulnerable to harvest. Chronic wasting disease is found throughout the herd unit but the impact it has on this herd unit is unknown. The long-term prevalence average is around 20%, though this estimate is derived from a relatively small sample size. There are a limited number of tooth samples so a reliable inference into population performance is not available.

The hunter satisfaction level was 63% for the 2018 season, which is similar to past years. White-tailed deer have rebounded well from the 2012 EHD outbreak so there is plenty of opportunity for hunters. However, access is difficult to obtain in this herd unit, particularly for bucks so that could explain why the satisfaction rate is not higher.

Population

There is not a reliable post-season population estimate. This is an open herd with Colorado and Nebraska so trying to model this herd would violate the assumption that it is closed. Seasons are designed to provide opportunity during the mating period when male deer are more vulnerable to harvest. Management is driven primarily by local Department personnel perception of population trend and landowner tolerance for this species. There are not enough tooth samples collected in the field to infer any population dynamics.

Management Summary

Population trends vary with weather conditions and disease outbreaks. As densities become high, the population is likely to crash from an EHD outbreak. Severe winter conditions will also reduce white-tailed deer numbers if they go into the winter in poor condition. There have been no reports of winter mortalities. There was an EHD outbreak in 2012 that prompted a decrease in Type 8 licenses for hunt areas in southeast Wyoming. White-tailed deer have recovered to levels prior to the 2012 outbreak so Type 3 and Type 8 licenses will increase where appropriate based on access and local deer densities. Landowners in southeast Wyoming have observed an increase in white-tailed deer and have expressed concerns on densities so access should improve throughout the area. Hunt Area 15 Type 3 licenses will increase from 450 to 500 and Type 8 licenses from 400 to 450. Hunt Areas 59, 60, 64 Type 3 licenses will increase from 200 to 250 and Type 8 licenses from 300 to 350.

For the 2019 season we will try to attain a harvest of around 1,150 white-tailed deer. Our objective is to provide opportunity and minimize damage and maintain a hunter satisfaction level greater than 60%.