

2017 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2017 - 5/31/2018

HERD: MD534 - GOSHEN RIM

HUNT AREAS: 15

PREPARED BY: MARTIN HICKS

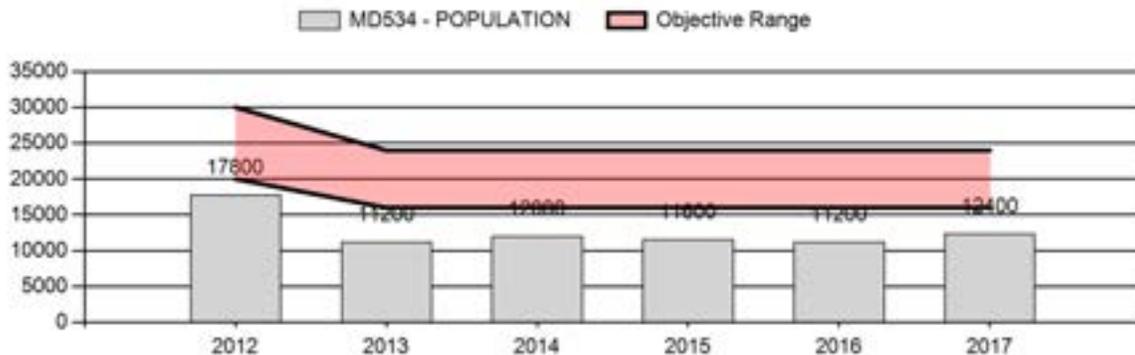
	<u>2012 - 2016 Average</u>	<u>2017</u>	<u>2018 Proposed</u>
Population:	12,760	12,400	11,600
Harvest:	858	1,064	980
Hunters:	1,668	1,892	1,800
Hunter Success:	51%	56%	54%
Active Licenses:	1,751	1,988	1,980
Active License Success:	49%	54%	49%
Recreation Days:	6,713	7,170	6,800
Days Per Animal:	7.8	6.7	6.9
Males per 100 Females	35	32	
Juveniles per 100 Females	61	46	

Population Objective ($\pm 20\%$) :	20000 (16000 - 24000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-38%
Number of years population has been + or - objective in recent trend:	20
Model Date:	02/27/2018

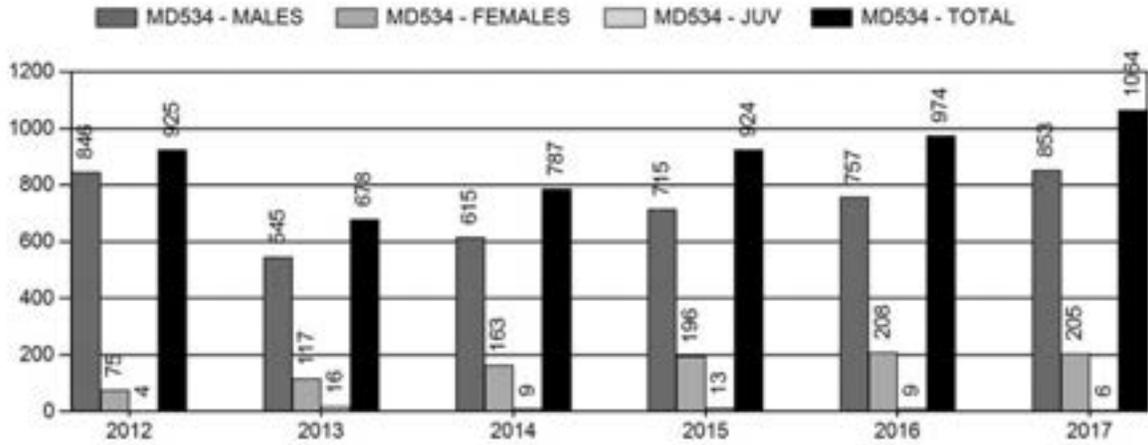
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	3.2%	3.4%
Males ≥ 1 year old:	26%	30%
Total:	7.8%	7.7%
Proposed change in post-season population:	-16%	-6%

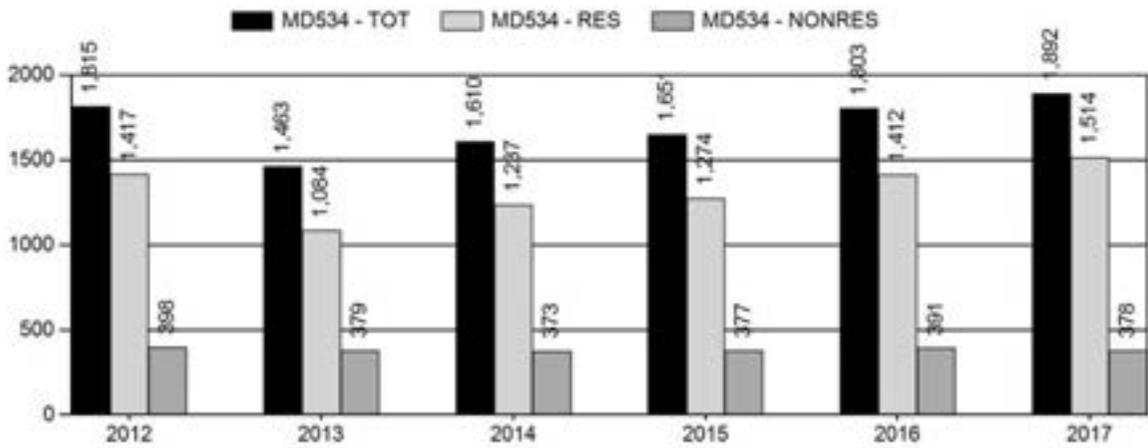
Population Size - Postseason



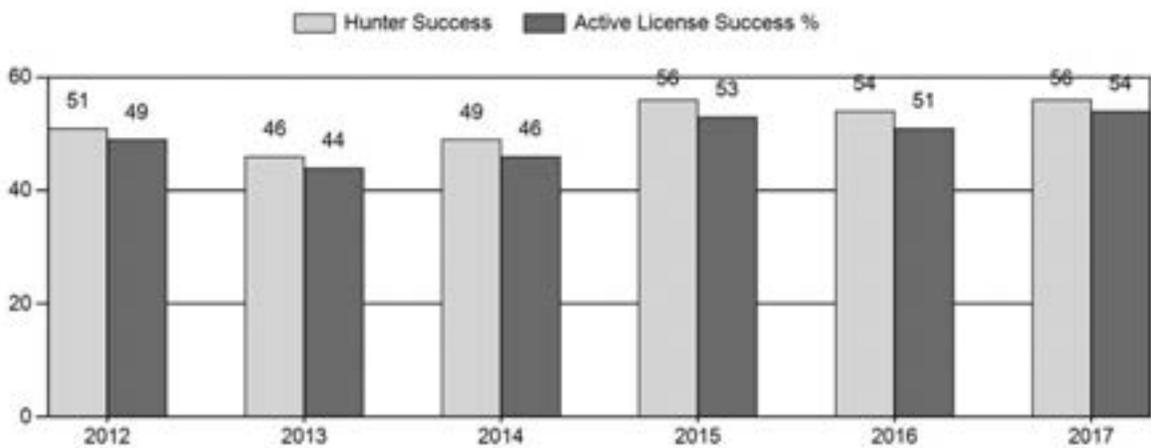
Harvest



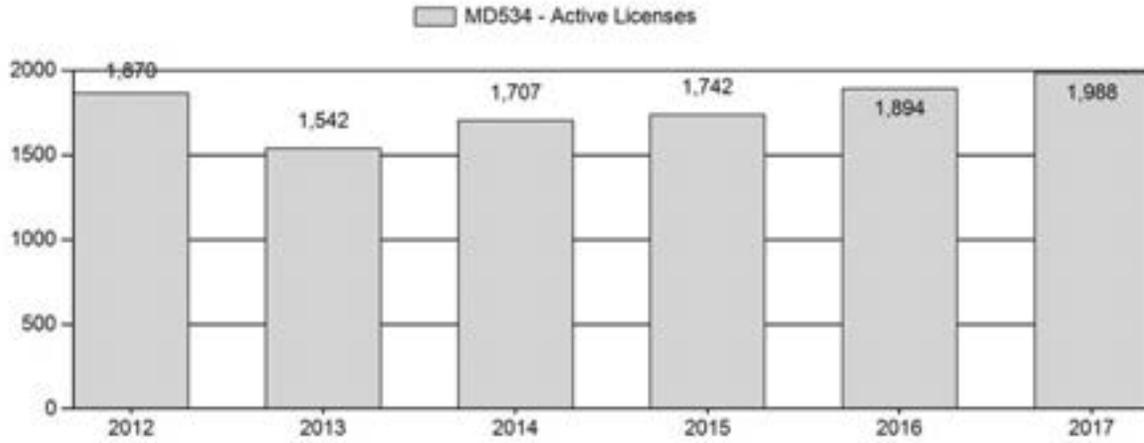
Number of Active Licenses



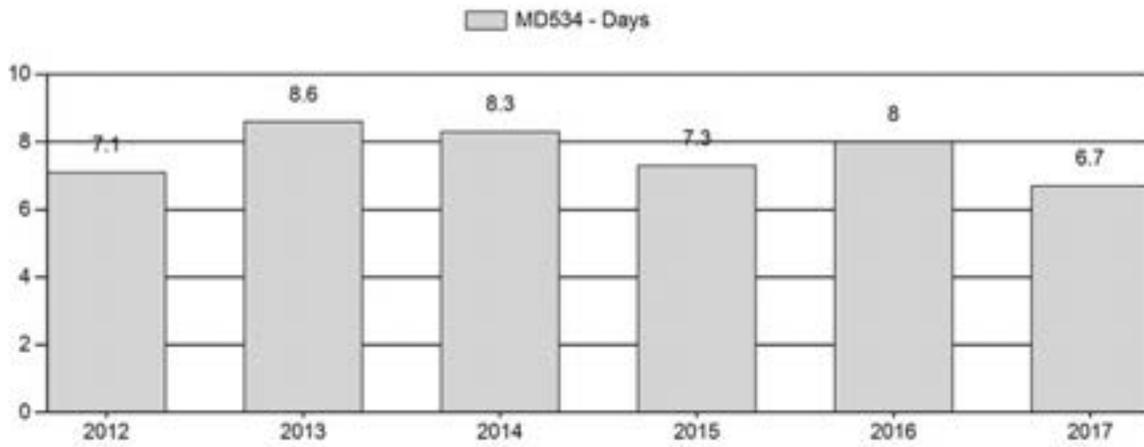
Harvest Success



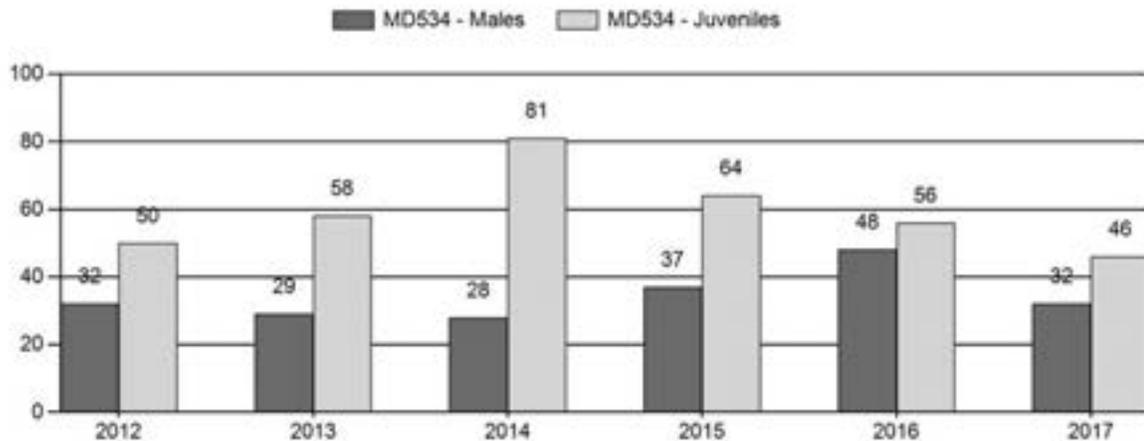
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2012 - 2017 Postseason Classification Summary

for Mule Deer Herd MD534 - GOSHEN RIM

Year	Post Pop	MALES							FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2012	17,800	121	0	0	0	192	313	18%	977	55%	487	27%	1,777	1,076	12	20	32	± 3	50	± 3	38
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 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	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 2017
15	6	0

Management Evaluation

Current Management Objective: 20,000 (16,000-24,000)

Management Strategy: Recreational

2017 Postseason Population Estimate: ~12,400

2018 Proposed Postseason Population Estimate: ~11,600

2017 Hunter Satisfaction: 67% Satisfied, 20% Neutral, 13% 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 2017 post-season population estimate was approximately 12,400 mule deer with a slightly declining population. 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 12,000 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.

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 that 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/>

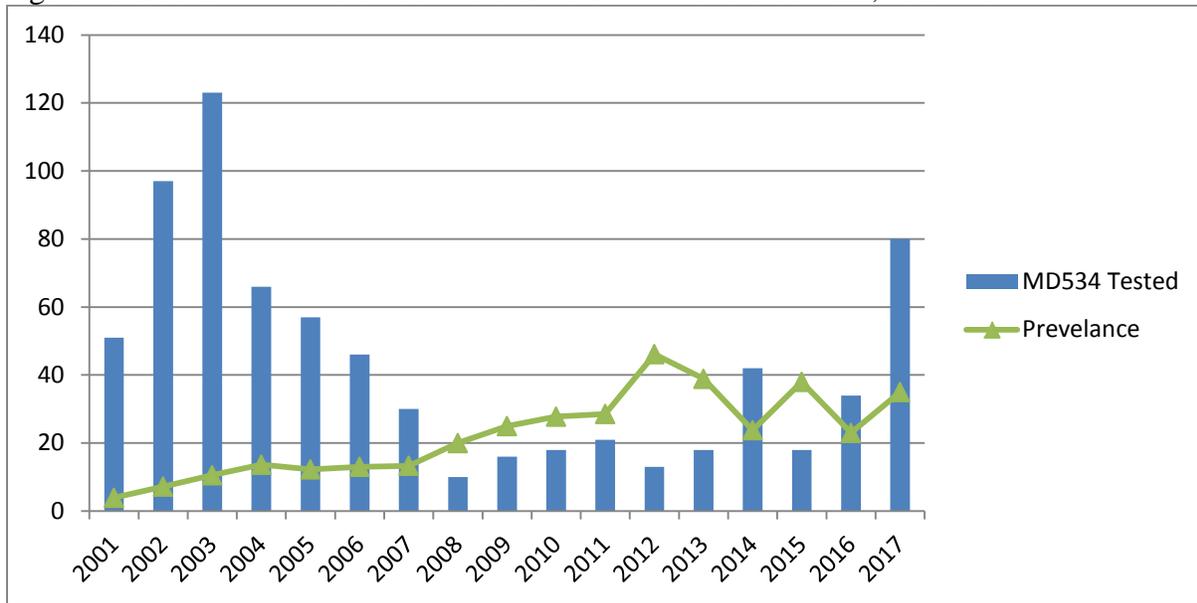
Habitat

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 species. 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 percent of the female population is harvested. Chronic wasting disease (CWD) is not as prevalent in this herd when compared to the Laramie Mountains Mule Deer and the South Converse Mule Deer Herd Units. However, efforts significantly increased in 2017 (n=80) to collect samples during the 2017 hunting season that were similar to efforts in 2002 and 2003 when prevalence was approximately 5%. It was interesting to see that compared to those years with low prevalence, the prevalence increased significantly. Perhaps this is what this herd typically runs but without an adequate sample size the true prevalence is unknown. Efforts to increase sample sizes are planned for future seasons to try and gain a better perspective on how the disease is affecting this mule deer herd's population performance, and to see if the harvest structure is changing CWD prevalence rates.

Figure 1. Goshen Rim Mule Deer Herd Unit CWD Prevalence Rate, 2001-2017



Fawn ratios in 2017 (46 fawns:100 does) continued to experience a decrease since 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) and 2016 (48 bucks:100 does), but observed buck ratios did drop in 2017 (32 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 (9 yearling bucks:100 does) were below the five-year average of 13 yearling bucks:100 does and reflect a below average fawn crop in 2016. Hunters in 2018 should still have a better than average chance of finding a 3+ year old buck on public land.

In 2017, 6% of the field harvest data was comprised of yearling bucks, which was 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 6% was somewhat surprising. However, the decrease in yearling buck harvest in 2017 correlated well with decrease of post-season fawn ratios from 2016 (56 fawns:100 does) compared to the all time high in 2014. 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 and based on the sample size of 49 mule deer bucks the average age was 4 years old. This was somewhat surprising given the above average fawn crop was three years prior, but given there were numerous older age bucks sampled from private land the average harvest age of 4 years old seems reasonable.

Since 2012 antler class data has been collected from harvested mule deer, then in 2013 data was collected from classified mule deer to gauge buck quality. Antler class data is broken down into

three classes: 1) Class I- ≤ 19 ", 2) Class II- 20-25", Class III- ≥ 26 ". Typically harvest class data is similar to classification class data (see tables from JCR). The field harvest data sample size increased by 43% in 2017 compared to 2016, lending credibility to the correlation. The sample size for post-season classifications was met in 2017 lending credibility to that data set as well. The percent of Class I, Class II and Class III bucks observed during post-season classifications in 2017 was identical to the 2016 post-season classification antler class data. Class II bucks were the majority (55%) of bucks recorded in the field during the 2017 hunting season and then during the post-season classification that shifted to Class I bucks (63%). Given the harvest was directed at Class II bucks it appears reasonable that more Class I bucks were observed post-season. Class III bucks were almost non-existent both in the field during the hunting season and post-season during ground classification surveys. Growing older deer in this herd unit continues to be difficult. According to Miller (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 (56%) in 2017 was higher than the five-year average of 51%, and hunter effort (6.7 days/harvest) in 2017 was lower 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 to the higher end of the recreational management strategy. However with buck ratios still well above the upper end of recreation management hunters should have had an easier time finding a mature buck during the 2017 season. The number of hunters that went to the field was slightly higher than last year and well above the five-year average. There were more bucks available for harvest, which most likely contributed to the increase in hunters going to the field. Weather conditions were similar to the 2016 season; warm to hot days with no snow cover, which might also explain the increase in hunter participation but without the surplus number of bucks most likely success would have decreased.

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 ranges varied from a high of 90% to a low of 40% with an average of 60%. 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 poor, the only data available is 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 2018 season structure will be the same as 2017; general season October 1-14 and 350 Type 6 licenses.

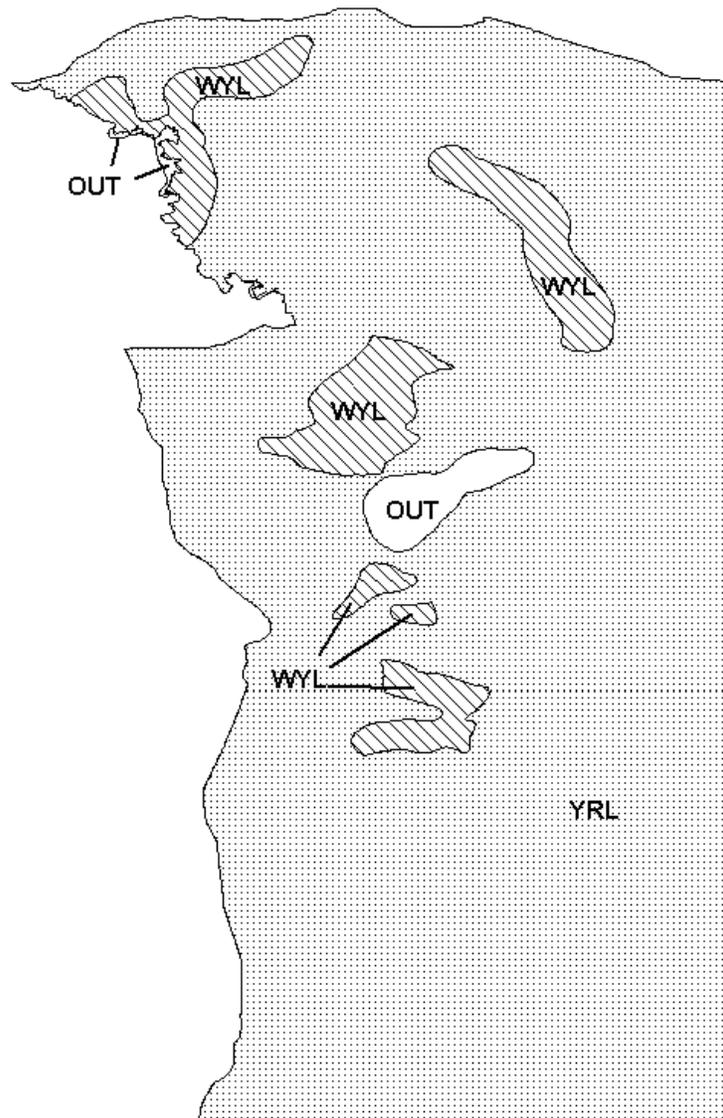
Department personnel will work with landowners and hunters to distribute harvest as damage issues arise. The Region T licenses will remain at 400. Based on license sales and available access opportunities the current number of Region T licenses seems adequate.

If we attain the projected harvest of 980 mule deer in 2018 and observe normal fawn production the predicated mule deer population of 11,600 will continue to remain well below the objective of 20,000.

Literature cited:

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

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



Mule Deer (MD534) - Goshen Rim
HA 15, 16, 55, 57
Revised - 97



2017 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2017 - 5/31/2018

HERD: MD537 - LARAMIE MOUNTAINS

HUNT AREAS: 59-60, 64

PREPARED BY: MARTIN HICKS

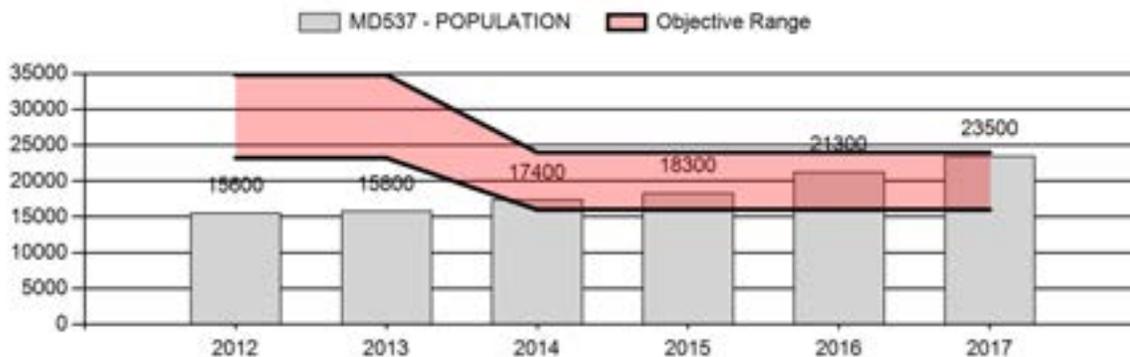
	<u>2012 - 2016 Average</u>	<u>2017</u>	<u>2018 Proposed</u>
Population:	17,680	23,500	24,500
Harvest:	1,050	1,244	1,300
Hunters:	1,915	2,185	2,200
Hunter Success:	55%	57%	59 %
Active Licenses:	1,977	2,215	2,250
Active License Success:	53%	56%	58 %
Recreation Days:	8,582	9,375	9,300
Days Per Animal:	8.2	7.5	7.2
Males per 100 Females	44	60	
Juveniles per 100 Females	71	50	

Population Objective (\pm 20%) :	20000 (16000 - 24000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	18%
Number of years population has been + or - objective in recent trend:	11
Model Date:	02/18/2018

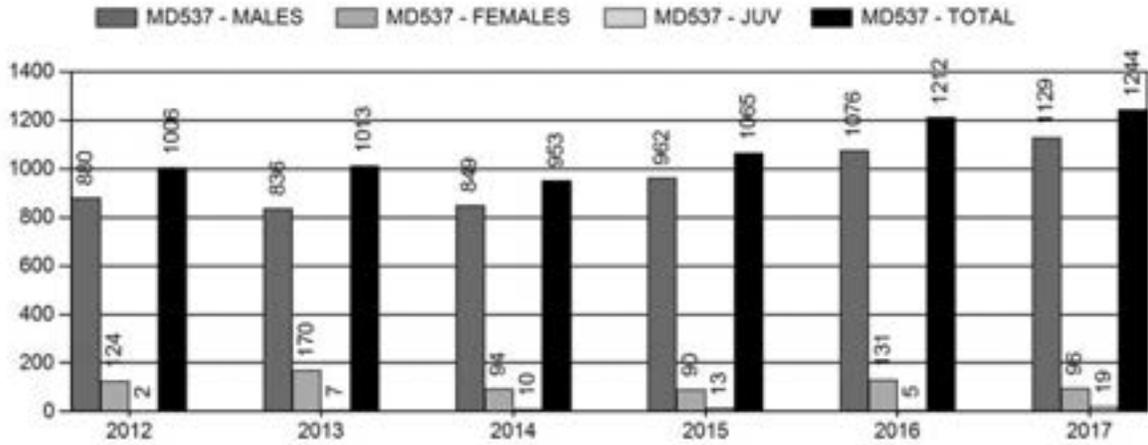
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females \geq 1 year old:	.9%	1.5%
Males \geq 1 year old:	16.3%	17.5%
Total:	5%	5%
Proposed change in post-season population:	+3%	+5%

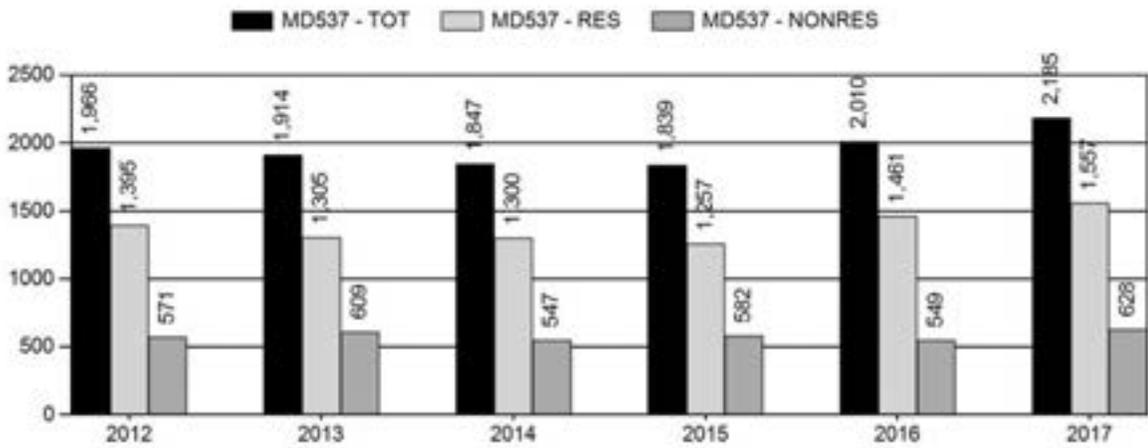
Population Size - Postseason



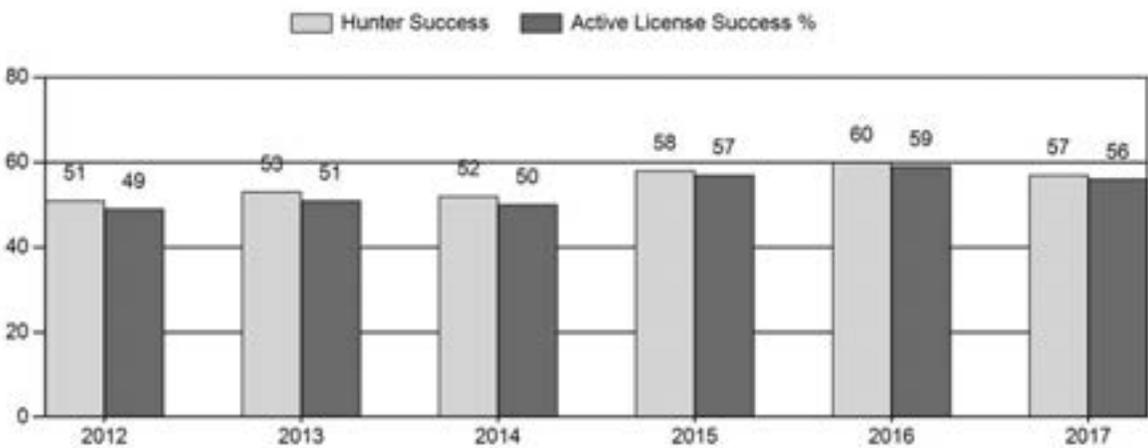
Harvest



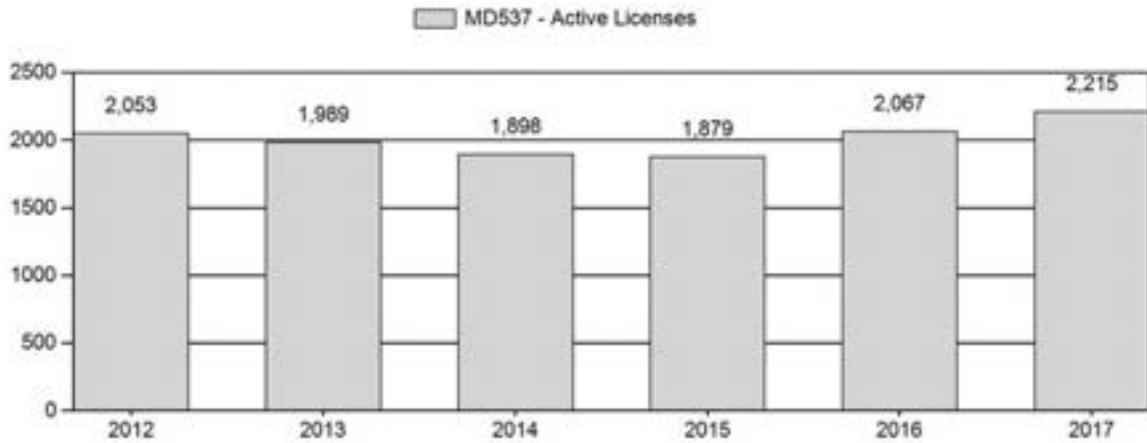
Number of Active Licenses



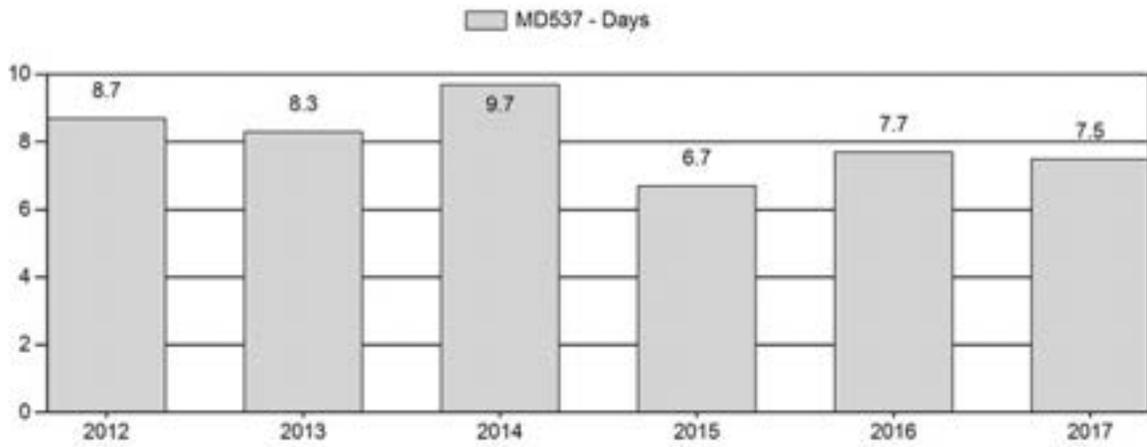
Harvest Success



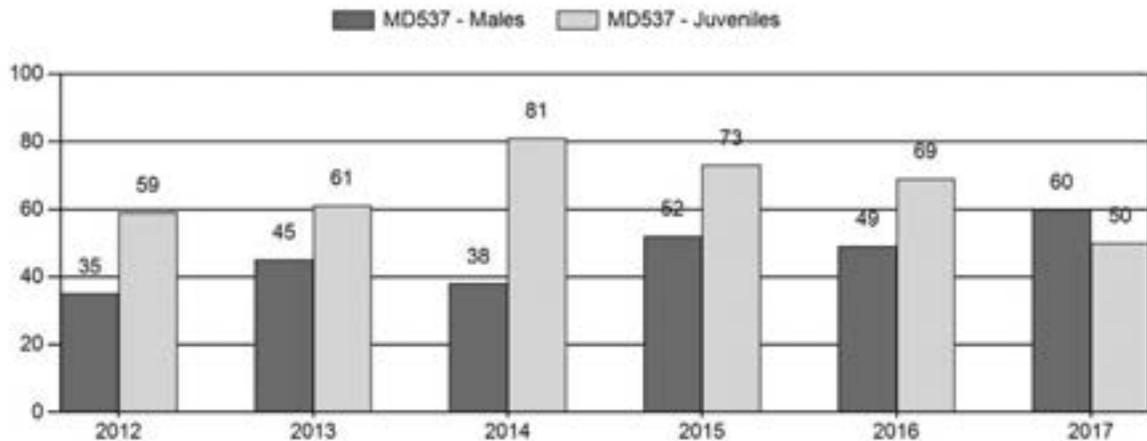
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2012 - 2017 Postseason Classification Summary

for Mule Deer Herd MD537 - LARAMIE MOUNTAINS

Year	Post Pop	MALES							FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	2+	2+	2+	2+	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf	100 Fem	Conf Int	100 Adult
			Cls 1	Cls 2	Cls 3	UnCls												Int			
2012	15,600	83	0	0	0	162	245	18%	699	51%	415	31%	1,359	1,218	12	23	35	± 3	59	± 5	44
2013	15,800	23	101	104	9	2	239	22%	528	48%	324	30%	1,091	1,161	4	41	45	± 4	61	± 5	42
2014	17,400	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	18,300	290	203	97	16	0	606	23%	1,164	44%	850	32%	2,620	1,304	25	27	52	± 3	73	± 4	48
2016	21,300	168	168	94	13	0	443	23%	900	46%	625	32%	1,968	1,308	19	31	49	± 3	69	± 4	47
2017	0	159	266	109	4	0	538	29%	893	48%	446	24%	1,877	1,535	18	42	60	± 0	50	± 0	31

**2018 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 2017
62,63,64	T6	+50
60	T1	0
60	T2	0
60	T6	0
64	T2	0
59,60,61,64,65	Region J	0
TOTAL		+50

Management Evaluation

Current Post-season Population Objective: 20,000 (16,000-24,000)

Management Strategy: Recreational

2017 Postseason Population Estimate: ~23,500

2017 Proposed Postseason Population Estimate: ~24,500

2017 Hunter Satisfaction: 67% Satisfied, 20% Neutral, 13% 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 2017 post-season population estimate was about 23,500 with a steady increase since 2012 when the population was around 15,600 mule deer. Chronic wasting disease (CWD) has been detected in this herd for well over two decades. The average prevalence since 1979 is 22%, 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 Arapahoe wild fire 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 since. Mule deer occupation in burned areas was also documented during the winter of 2013. In the long run this major fire will be a positive event for ungulate habitat. Landowners have started to treat areas post-fire outbreaks of cheatgrass so native perennial plant species have a chance to re-establish.

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 that unfortunately were not beneficial for fawn survival. Adult female mule deer lacked the nutritional values needed from plants to raise a fawn to six months of age, which became apparent based on post-season classifications surveys that resulted in fawn ratios well below the five-year average. Winter conditions have been mild compared to past winters so big game species 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 less than optimal in 2017 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'. Its presence ties the hands of habitat managers limiting habitat enhancement options, and may result in reduced carrying capacities of rangelands if 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 this 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 and there are plans to continue and treat additional acres in 2018.

Areas burned by the Arapaho Wildfire of 2012 continue to rebound. Aspen regeneration has been excellent, and appears that in areas assessed that browsing is within acceptable limits that will allow for full recovery of aspen habitats in many places. Canada thistle, leafy spurge, and knapweed spp. are present throughout the burn in varying degrees and 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 50 fawns:100 does in 2017 were well below the five-year average (68 fawn:100 does) until there is reverse in the population will likely decrease. According to Unsworth et al. (1999) populations increase when fawn ratios are above 66 fawn: 100 does. Buck ratios of 60 bucks:100 does are the highest observed in 35 years (2015 had the highest observed 52 bucks:100 does), well above the recreational management strategy. Based on tooth data (n= 120) the average age of a harvested buck was 4.5 year olds.

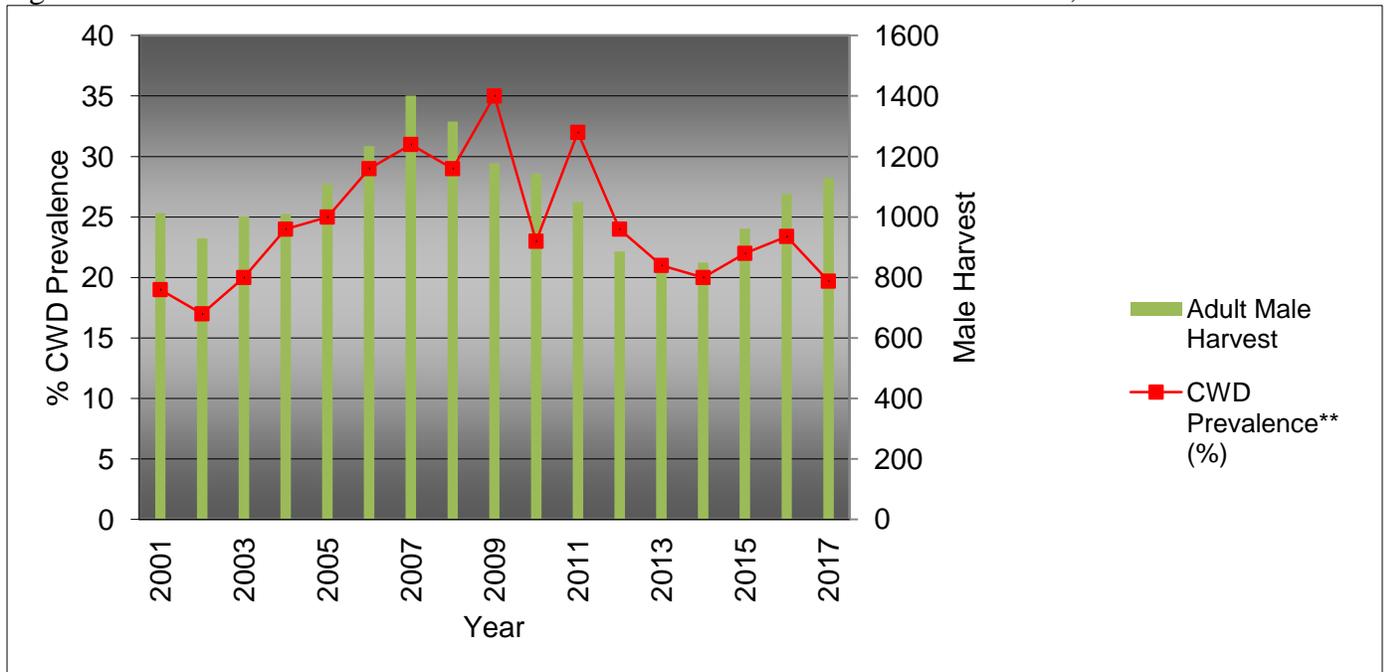
Since 2012 antler class data has been collected from harvested mule deer and then starting in 2013 from classified mule deer to gauge buck quality. Antler class data is broken down into three classes: 1) Class I- $\leq 19''$, 2) Class II- 20-25'', Class III- $\geq 26''$.

The proportions of Class I, Class II and Class III bucks from field harvest data in 2017 was similar to 2016 field harvest data. There continues to be a very small percentage of Class III bucks in the field. However, that is anticipated to change in the next couple of years given the surplus number of young buck currently on the landscape. The majority of bucks recorded during field checks were young to middle aged deer based on antler class data (92% \leq Class II, n=181) and tooth data, which included both yearling and adult bucks (average harvest age 4.5 years old, n=120). Post-season classification data was similar to 2016 with the majority of bucks within the Class I category (70%). This seems reasonable since the field harvest data indicated that 56% of the bucks field checked in 2017 were \geq Class II bucks. If you focus harvest pressure on the bucks \geq 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 a surplus number of bucks available for harvest opportunities in 2018.

According to the 2017 satisfaction survey, 67% of the hunters were satisfied with the quality of their hunt, similar to 2016. With a longer season and ample bucks on the landscape, satisfaction should improve in 2018.

CWD surveillance efforts increased in 2017 to improve samples sizes and accuracy of prevalence with the goal to gain a better understanding of how this disease affects population performance. Interestingly, prevalence in this herd unit has slowly decreased over time with decent sample sizes (Figure 1). According to Uehlinger, et al. (2016) the evidence that hunting pressure has a beneficial effect 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 the current harvest regime. DeVivo(2015) suggests that some mule deer live longer that had a less-susceptible genotype, which perhaps contribute 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 21% long-term prevalence for this herd, CWD will continue to have some impact on this herd. CWD collection efforts will continue to be a priority for this herd in the future. Larger sample sizes are needed to detect changes in prevalence based on harvest regimes.

Figure 1. CWD Prevalence and Buck Harvest in Laramie Mts Mule Deer Herd Unit, 2001-2017.



Harvest Data

Hunter success in 2017 (57%) was higher than the five-year average of 55% and hunter effort of 7.5 days per harvest was slightly lower than the five-year average of 8.2 days per harvest. Total buck harvest in 2017 was only slightly higher than 2016 and only 18% higher than the five-year average, which was somewhat surprising since the season was increased by six days and buck ratios were at a all time high. Employee observations indicated hunter participation did decrease as the season progressed and the majority of nonresident hunters typically hunt the first five days of the season, regardless of the length. Harvest data does support a stable to increasing trend in population, which also supports model simulations, personnel, landowner, and sportsmen observations, which is a shift in population trends that is welcomed by the hunting community.

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 the lowest AIC value and a better fit than the other two models. This model was chosen for the following reasons: 1) the model tracks juvenile variability in 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, indicative of the TSJ, CA model, 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 incorporated for those years since both herd units have high prevalence and the Laramie Mountains Herd Unit is adjacent to South Converse. This model is rated as fair to poor, there is not an abundance estimate but there is some survival data. There is not an annual population estimate with a standard error available to anchor the model to, but enough data to give the model a fair fit and results are biologically defensible. Adult survival was adjusted to .7-.8 instead of the recommended range of .7-.95 to account for chronic wasting

disease prevalence in years that did not have adult survival data. Hunters and landowners would like to see an increase in mule deer, given above average recruitment this has taken place. However, with current CWD prevalence, and poor habitat conditions, an increase in the population does not seem like a long term trend.

Management Summary

The hunting season's general license length was increased last year from a ten day season to a 16 day season to take advantage of the surplus number of bucks. With buck ratios well above the recommended range the same season structure will be the same for the 2018 season. 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. However, with the increase in population there is opportunity to harvest some additional does, so Type 6 licenses will increase from 100 to 150. 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 this 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 will remain the same at 900 to address low deer densities, especially on public lands. The 900 Region J quota will be consistent with recent license sales (2013=779, 2014=822, 2015=819, 2016=819, 2017=821) and should improve harvest statistics and reduce hunting pressure.

Language regarding the Thorne/Williams Wildlife Research Unit was stricken from limitations for Hunt Area 59 to simplify the regulations. No admittance signs will be posted on the unit to inform hunters they cannot hunt there.

If we attain the projected harvest of 1,300 mule deer, maintain average fawn recruitment, and account for CWD prevalence, the mule deer population will slightly increase to 24,500 mule deer and fall just outside the upper end of the post-season objective range of 16,000-24,000 mule deer.

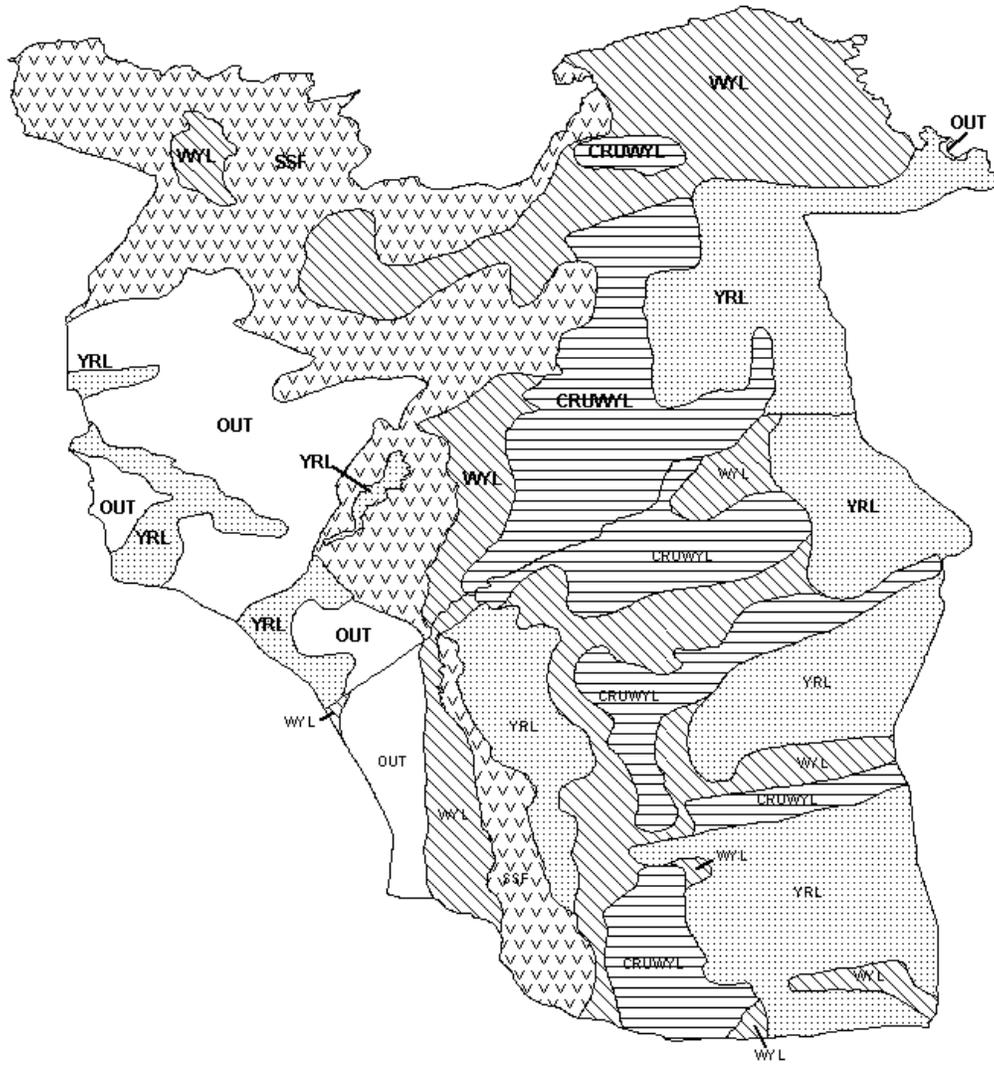
Literature Cited:

- Edmonds, D. R., M. J. Kauffman, B. A. Schumaker, F. G. Lindzey, W. E. Cook, T. J. Kreeger, and T. E. Cornish. 2016. Chronic Wasting Disease Drives Population Decline of White-Tailed Deer. *PLoS One*, 11(8), e061127
- DeVivo, Melia T. 2015, Chronic Wasting Disease Ecology and Epidemiology of Mule Deer in Mule Deer in Wyoming, Ph.D. Dissertation, University of Wyoming, Laramie, WY, USA.
- Mateus-Pinnilla N, Weng H-Y, Ruiz MO, Shelton P, Novakofski J. Evaluation of a wild white-tailed deer population management program for controlling chronic wasting disease in Illinois, 2003-2008. *Prev Vet Med.* 2013;110(3-4);541-8.

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

Uehlinger et al. *BMC Veterinary Research* (2016) 12:173 DOI 10.1186/s12917-016-0804-7

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



Mule Deer (MD537) - Laramie Mountains
 HA 59, 60, 62-64, 73
 Revised - 3/04



2017 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2017 - 5/31/2018

HERD: MD539 - SHEEP MOUNTAIN

HUNT AREAS: 61, 74-77

PREPARED BY: LEE KNOX

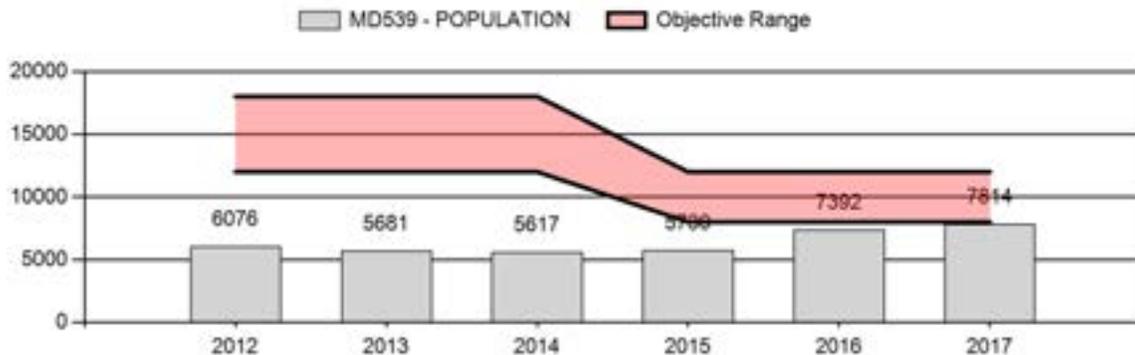
	<u>2012 - 2016 Average</u>	<u>2017</u>	<u>2018 Proposed</u>
Population:	6,099	7,814	8,142
Harvest:	320	428	450
Hunters:	1,313	1,563	1,600
Hunter Success:	24%	27%	28 %
Active Licenses:	1,313	1,563	1,600
Active License Success:	24%	27%	28 %
Recreation Days:	6,826	8,119	8,200
Days Per Animal:	21.3	19.0	18.2
Males per 100 Females	33	48	
Juveniles per 100 Females	61	57	

Population Objective (± 20%) :	10000 (8000 - 12000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-21.9%
Number of years population has been + or - objective in recent trend:	26
Model Date:	02/28/2018

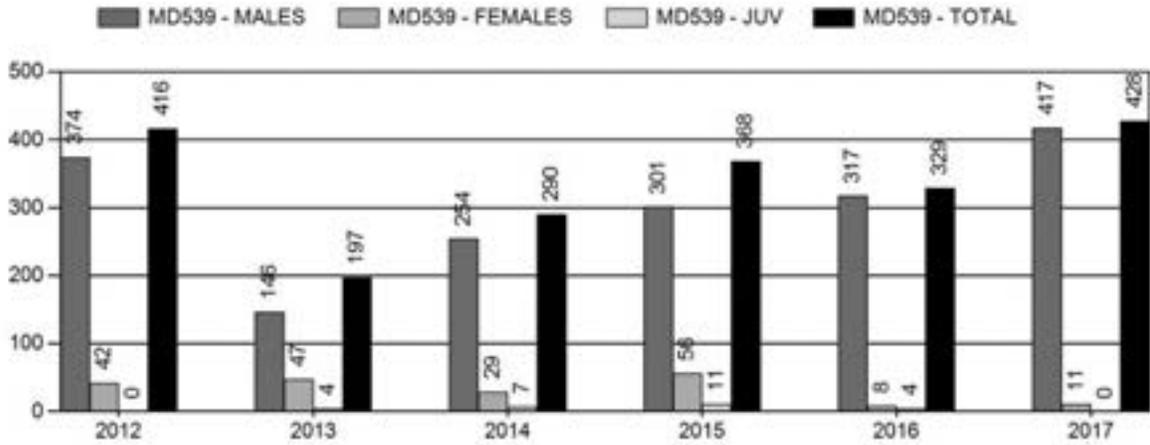
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	.3%	.3%
Males ≥ 1 year old:	20%	22%
Total:	9%	4%
Proposed change in post-season population:	6%	6%

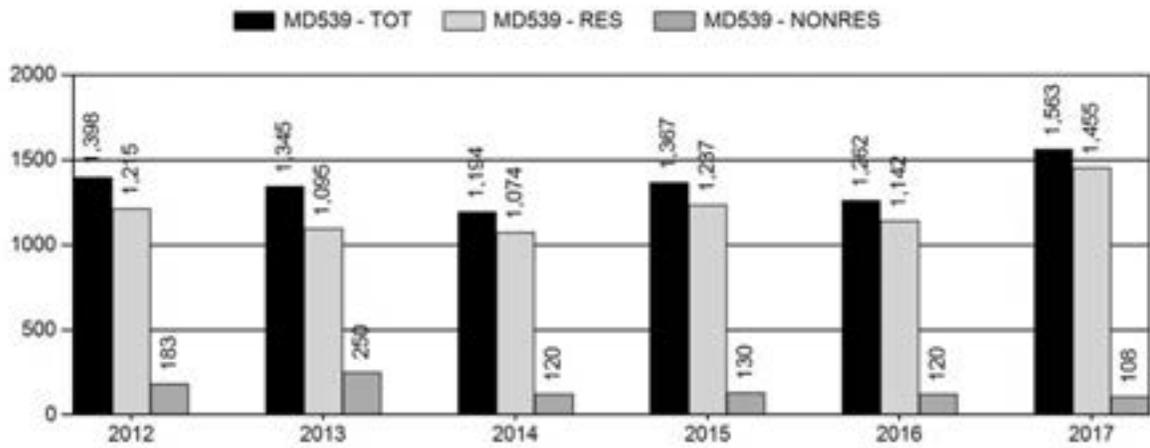
Population Size - Postseason



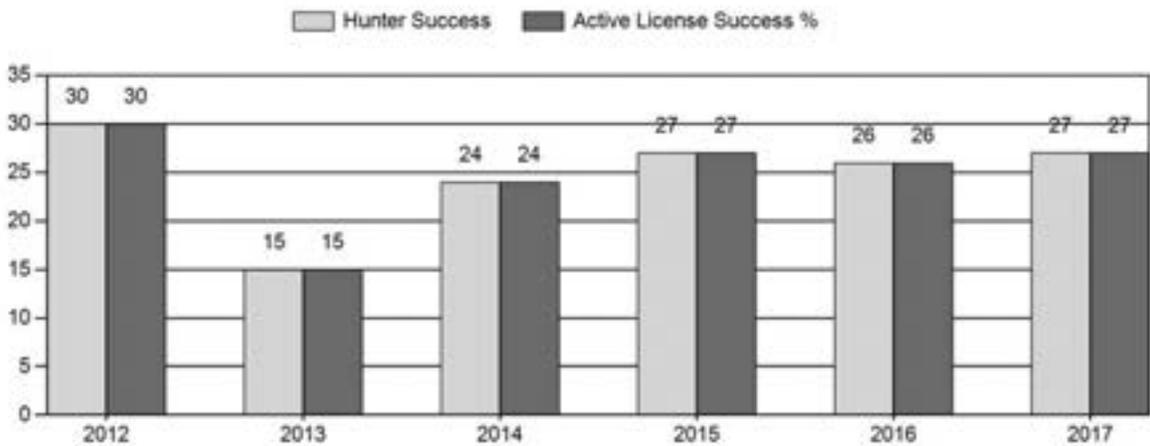
Harvest



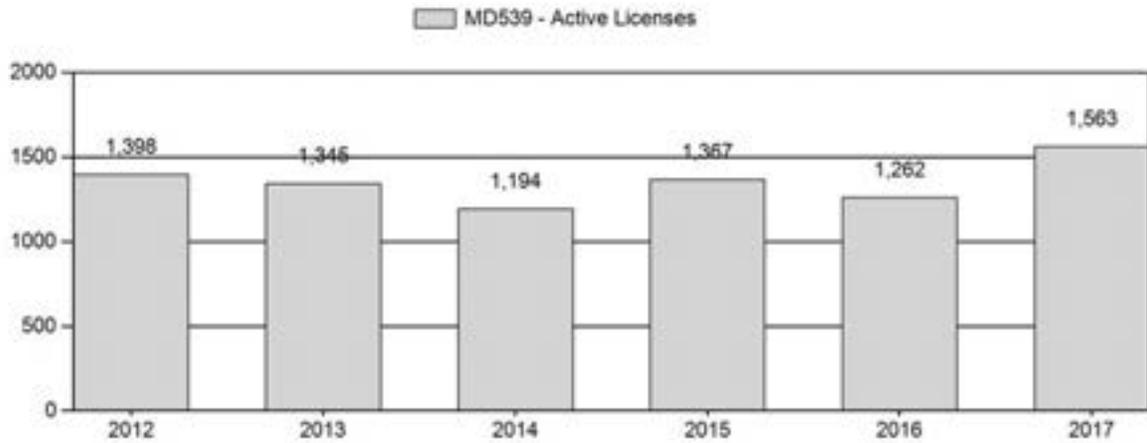
Number of Active Licenses



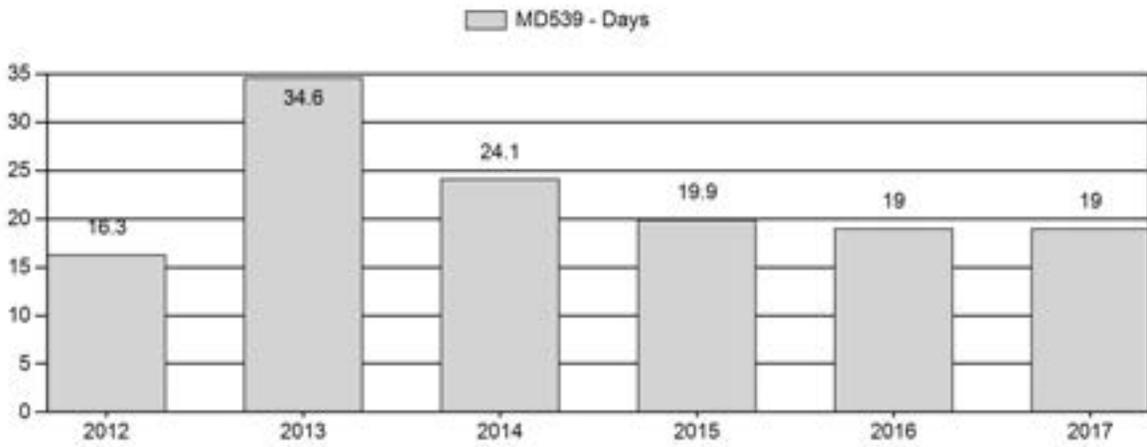
Harvest Success



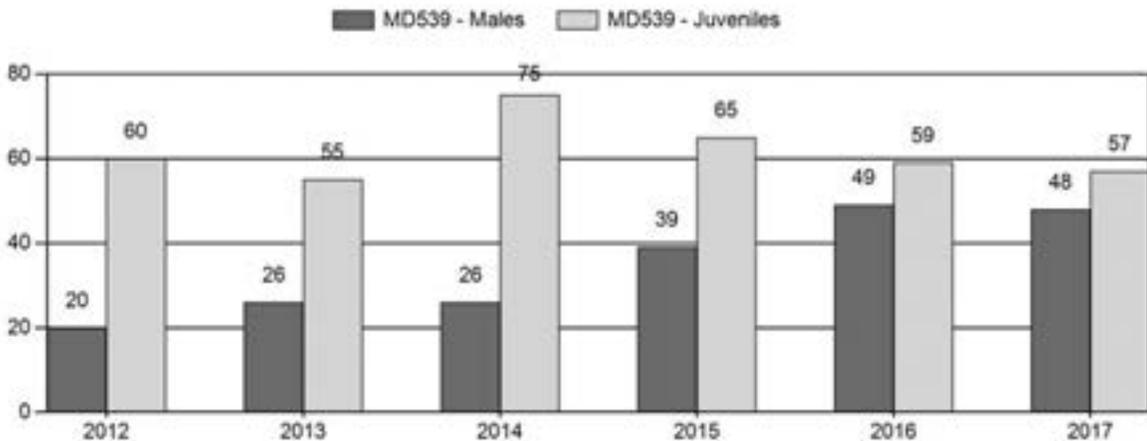
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2012 - 2017 Postseason Classification Summary

for Mule Deer Herd MD539 - SHEEP MOUNTAIN

Year	Post Pop	MALES							FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2012	6,076	33	0	0	0	52	85	11%	416	55%	249	33%	750	1,047	8	12	20	± 3	60	± 6	50
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 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 2017
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

2017 Postseason population Estimate: ~ 7,800

2018 Proposed Postseason Population Estimate: ~ 8,100

2017 Hunter Satisfaction: 54% Satisfied, 27% Neutral, 18% 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 2018 post-season population estimate is approximately 7,800 deer, indicating a population increase from 5,700 in 2009.

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 third 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 prevalence in harvested deer has increased from 3% in the early 2000s to 12% in 2017. Prevalence in collared doe mortalities is 40%.

Precipitation

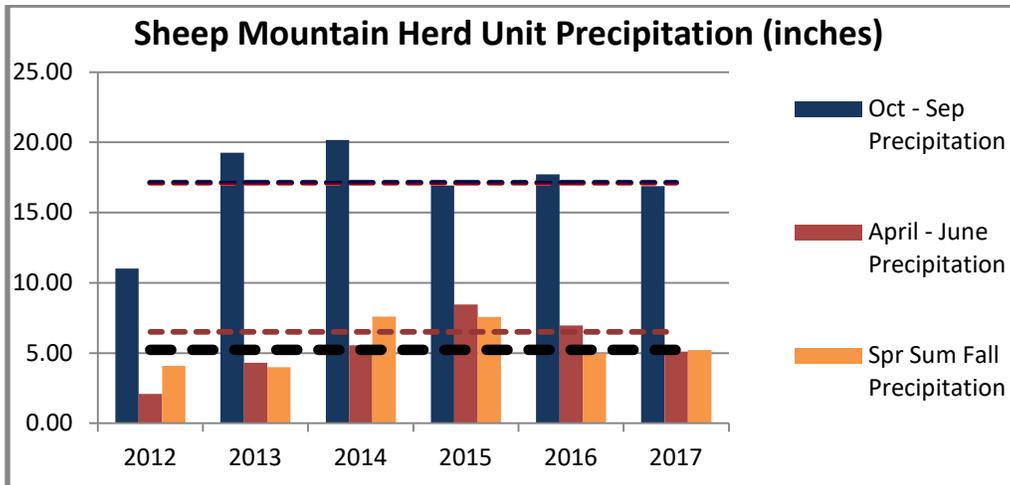


Figure 1. Parameter-Elevation Relationships on Independent Slopes Model (PRISM) utilized to estimate precipitation by calculating a climate-elevation regression for each Digital Elevation Model grid cell (4 km resolution).

Precipitation, from October 2016 through September 2017, was slightly less than the 30-year average (16.89”). During the growing season (April through June 2017), precipitation across all seasonal ranges was at the 30-year average (Figure 1). The majority of precipitation was received outside of the primary growing season, likely in the form of snow, particularly at higher elevations. While average annual precipitation appears to be normal (Figure 1), late summer and

fall precipitation was lacking across the herd unit. From late-June through October, conditions were very dry with unseasonably warm temperatures. Post-hunting season, the conditions remained very mild, with little snow cover, and most mule deer continued to live at higher elevations within the herd unit.

Winter Severity

The beginning of 2017 brought severe cold temperatures, deep snow, and high winds. These conditions are thought to have negatively impacted younger cohorts in the herd. The rest of the winter was fairly mild. One late snowstorm in mid-May produced heavy, wet snows on winter and transitional ranges. Warm temperatures allowed this moisture to enter the soil profile quickly, resulting in rapid uptake and use by perennial vegetation. As of mid-February 2018, upper elevations in the Snowy Range are at 88 - 116% of normal for snowpack, as reported at USDA - SNOTEL sites. To date, during the winter of 2017-2018, the lower elevations have remained relatively free of persistent snow. Winter conditions for ungulates have been excellent, with both a lack of deep snow and a lack of consecutive days of sub-zero temperatures.

Habitat

Growing season precipitation was normal across the herd unit in 2017, resulting in excellent growth of cool season grasses, forbs, and shrubs, particularly in lower elevation seasonal ranges. In spite of the precipitation received, many important shrub habitats on winter and transitional ranges continue to underperform due to maturity and decadence, caused by a general lack of disturbance.

Fecal pellets were collected from the collared does to determine winter dietary preferences. As expected, shrubs comprised an average of 84% of the deer diet, with grasses making up an average of 7%, and forbs, conifer, and unidentified plants making up the other 9% of the diet. There was a high percentage of *Artemisia* spp. found in the diet, despite the apparent lack of these shrubs across the landscape.

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 2019. In the summer of 2018, sampling will be extended to assess habitats from Centennial to Arlington along the east and northeastern flank of the Snowy Range in transitional and winter range habitats.

Field Data

Within the herd unit, 1,001 deer were classified, which approached the classification objective of 1,015 deer. Fawn ratios peaked in 2014, at 75 fawns: 100 does, and have declined annually since. Fawn ratios in 2017 were 57 fawns: 100 does, which is below the 10 year average of 60 fawns: 100 does.

In 2017, the antler point restriction (APR) was removed from the hunting season limitations. A decline in the buck ratio was expected due to increased harvest, especially in the younger age classes. The buck ratio did decline, but only from 49:100 does in 2016 to 48:100 does in 2017. The adult buck ratio increased to 37 bucks: 100 does. However, the yearling buck ratio declined, which could be contributed to the removal of the APR. Most of the deer herds in southeastern Wyoming saw similar declines in yearling bucks, which was most likely due to the severe weather conditions experienced during both winter and summer.

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 61%, (down from 67% in 2016), Class II was 31% (up from 25% in 2016), and Class III was 8% (up from 7% in 2016). This indicates younger bucks saw an increase in harvest with the removal of the APR, and, at the same time, the adult buck population was increasing.

Hunter numbers increased in the herd unit by 24%. 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 is increasing. Deer Hunt Area 76 made up 79% of the total increase in hunters in the herd unit, and saw a 46% increase in hunters in the hunt area. Hunter effort is the same as in 2016, and remains below the 10-year average of 22 days to harvest. Hunter success was also the same as in 2016, and below the 10-year average of 31%. Hunter success in the Sheep Mountain Herd Unit is far below the state-wide average of 70% and has one of the lowest herd unit success rates in the state.

Harvest Data

In 2017, we removed the APR from the hunting season limitations and increased the season length by three days. Harvest increased by 30% to 430 deer, exceeding the 10-year average of 400, although this is still less than the 15 and 20 year averages of 500 deer. Harvest in Hunt Area 76 increased by 95%, and accounts for 40% of the total harvest in the herd unit. The number of harvested deer checked increased from 31 in 2016 to 59 in 2017. The number of yearlings harvested that were checked in the field increased from 3% to 22%, likely due to the removal of the APR. Chronic wasting disease prevalence found in hunter harvested deer was 12% in 2017.

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 7,800 deer, with the population increasing from a low of 5,700 in 2009. 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 450 deer and have a fawn ratio of 66:100 does or higher, the herd should continue to grow. Using 66:100 does (Unsworth 1999) as our predicted fawn ratio,

we estimate a 2017 post-season population of approximately 8,100 deer. This is the third year that buck ratios were over the recreational maximum with the current estimate of 48 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, we will not make any changes to management to better analyze the adjustments made in 2016. 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.

Bibliography

Unsworth, J.W., D.F. Pac, G.C. White, and R.M. Bartmann. 1999. Mule deer survival in Colorado, Idaho, and Montana. *Journal of Wildlife Management* 63:315-326.

Legend

Sheep mountain seasonal range

RANGE

-  CRUWYL
-  OUT
-  SSF
-  WYL
-  YRL



Mule Deer (MD539) - SHEEP MOUNTAIN HERD UNIT
HA 61, 74-77
Revised 08/1988

APENDIX A

Sheep Mountain Mule Deer Study



Sheep Mountain Mule Deer Study



Project Description

The Sheep Mountain Mule Deer Herd Unit (SMMDHU) occupies an estimated 2,500 square miles in southeastern Wyoming, encompassing hunt areas 61, 74, 75, 76 and 77. This herd unit provides opportunity to sportsmen throughout Wyoming, as well as many non-resident hunters who travel from across the United States to hunt southeast Wyoming. The SMMDHU was chosen by the Wyoming Game and Fish Department for the Laramie Region Mule Deer Initiative (MDI) process because of its importance to sportsman in southeastern Wyoming.

Currently, biological data available for this herd unit has been limited to classification data collected on annual survey flights. The last known research study conducted on the SMMDHU was a small project in 1967-68 which provided limited insight into deer movements in the southern portion of the herd unit. The collaborative MDI process identified the following research objectives in order to improve management of this herd unit:

- Determine the seasonal habitat use and movements of deer classified on winter ranges within the SMMDHU Identify migration corridors, stopover areas and potential barriers to migration
- Develop more accurate seasonal range maps
- Prioritize areas for future predator management efforts
- Prioritize areas for future habitat improvement projects
- Collect survival data to improve the precision of the population model.

To achieve these objectives, 60 mule deer does were fitted with Global Positioning System (GPS) collars which collected the location of the deer every two hours. Collars will be deployed for two years. If a collar does not detect movement for nine hours, a mortality signal will be transmitted through an



email message. Mortalities will be investigated as soon as possible in order to collect relevant data, such as cause specific mortality and disease sampling. Fawn survival from known pregnant does will be checked in late spring and early summer to estimate the start and end of biological year survival. After two years, the Wyoming Game and Fish Department will contract with a third party to have the spatial data analyzed in order to delineate migration routes and stopover areas.

Pregnancy

Serum from 46 does was sent to a laboratory to determine pregnancy. Of the 46 does tested, 44 were pregnant (95%). Dr. Kevin Monteith was generous enough to assist during a day of capture and used an ultrasound to determine the number of fetuses per doe. Of the 14 does sampled, two were not pregnant (14%), three does had single pregnancies (21%), and nine were pregnant with twins (65%). The total pregnancy rate for the 60 does collared was 93%.

Mortalities

Any mortality that occurred within 14 days of capture was considered capture related. There were two mortalities during the first capture; One tested positive for CWD and the second tested negative, and was subsequently donated to a family in need. One doe, who was in poor body condition, tested positive for CWD, and died within four days of her capture. To date, 18 non-capture related mortalities have occurred; six were predated, two were hit by a vehicle, one was killed by a hunter, and one broke her neck on a fence. We were unable to determine cause specific mortality in eight of the deer due to lack of remains. Managers are concerned that of the 15 CWD samples taken from mortalities, six tested positive; however, the sample size is too small to make any inferences at this time. Over the course of the study, 74 deer have

been collared. Adult doe survival rate in the first year of the study is 84%. Adult doe survival rate to date is 78%.

Movement

Only one of the does collared on the Medicine River in hunt area 74 crossed into hunt area 75. It does not appear that she used an underpass, but instead crossed I-80. The deer captured near Cooper Creek all crossed under I-80 using county road underpasses. They then spread throughout hunt area 75, with the furthest traveling almost 17 miles. The deer collared in hunt area 76 and 77 have travel into hunt areas 75, 78, and 11 have migrated south into Colorado, with the furthest traveling over 40 miles.

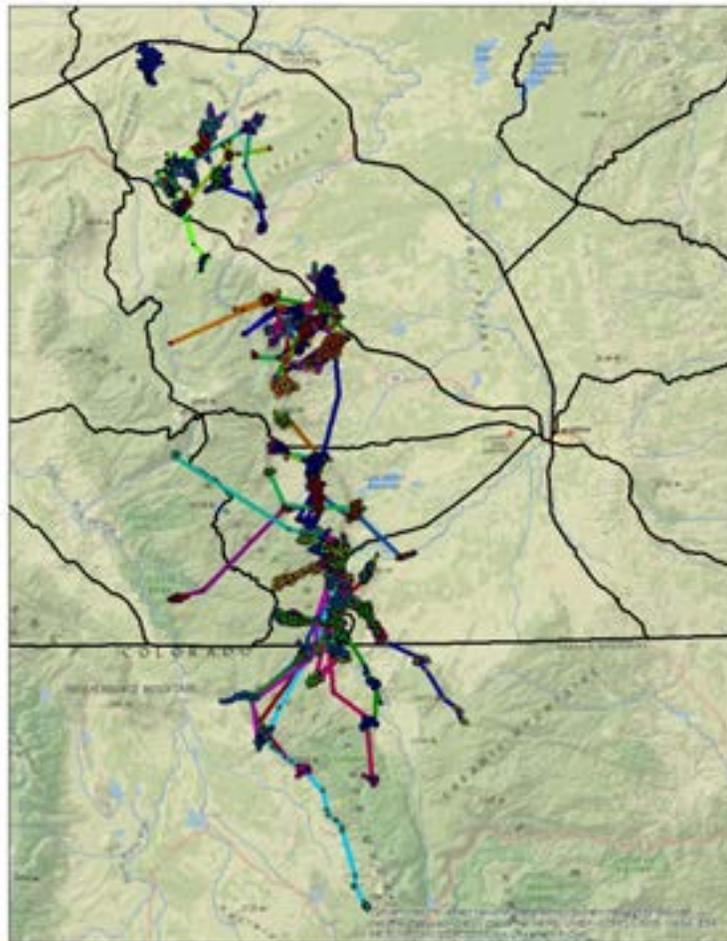


Figure 1. Location of collared deer as of 6/13/2017 in the Sheep Mountain Mule Deer Herd Unit

Acknowledgments

This project is possible due to funds from the Wyoming Game and Fish Commission, Wyoming Big Game License Coalition, South East Chapter of the Muley Fanatic Foundation, and Bow

Hunters of Wyoming. In addition several members from these organizations assisted in the capture along with students from the University of Wyoming Student Chapter of the Wildlife Society. A big thank you to all the landowners that allowed us access to their property and to those that assisted in the captures. Lastly thank you the Bureau of Land Management and the United States Forest Service for their assistance as well as use of the public lands they administer.



2017 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2017 - 5/31/2018

HERD: MD540 - SHIRLEY MOUNTAIN

HUNT AREAS: 70

PREPARED BY: WILL SCHULTZ

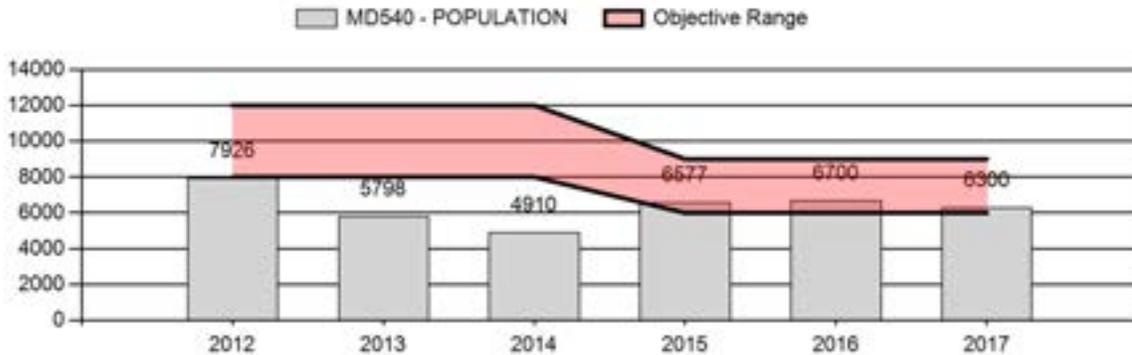
	<u>2012 - 2016 Average</u>	<u>2017</u>	<u>2018 Proposed</u>
Population:	6,382	6,300	6,400
Harvest:	225	313	300
Hunters:	581	653	700
Hunter Success:	39%	48%	43 %
Active Licenses:	587	666	707
Active License Success:	38%	47%	42 %
Recreation Days:	2,425	2,533	2,100
Days Per Animal:	10.8	8.1	7
Males per 100 Females	34	30	
Juveniles per 100 Females	52	50	

Population Objective (± 20%) :	7500 (6000 - 9000)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-16%
Number of years population has been + or - objective in recent trend:	2
Model Date:	02/26/2018

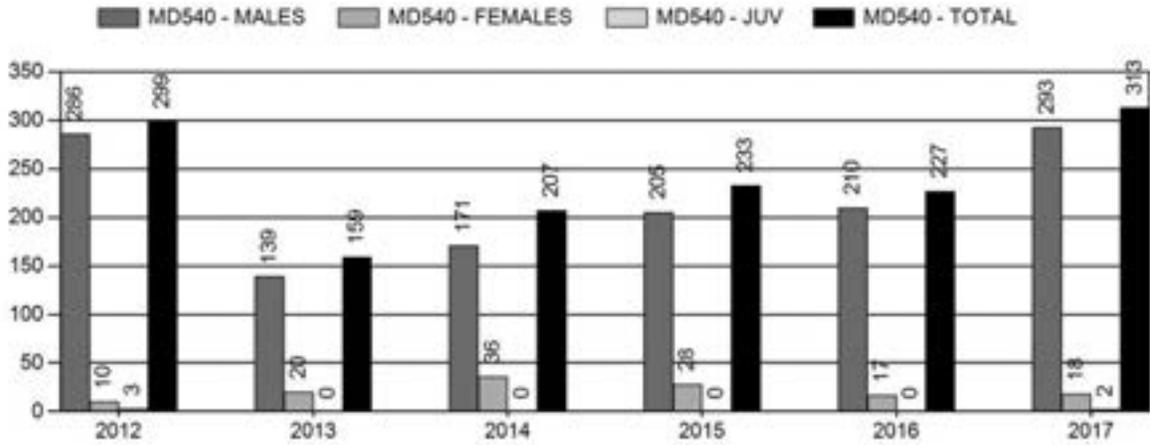
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0.3%	.6%
Males ≥ 1 year old:	14%	16%
Total:	4%	4%
Proposed change in post-season population:	3%	-5%

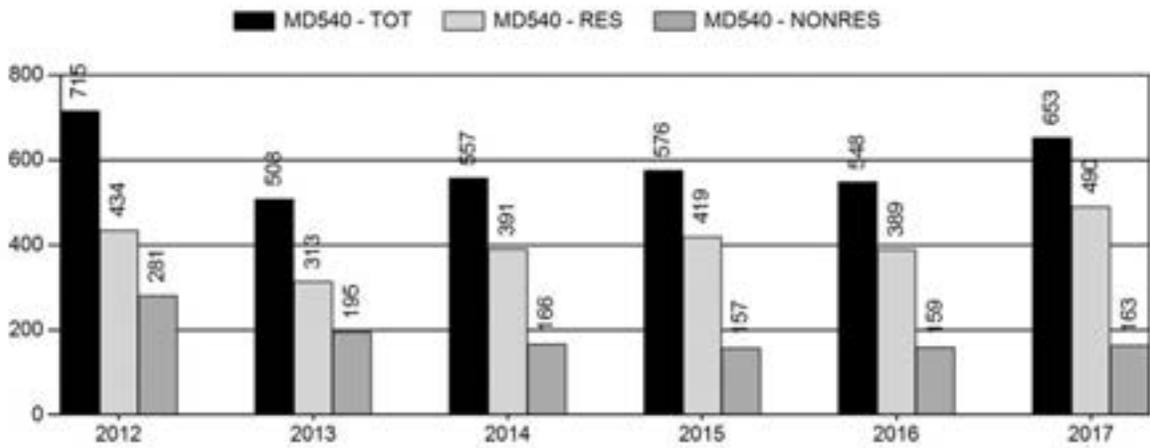
Population Size - Postseason



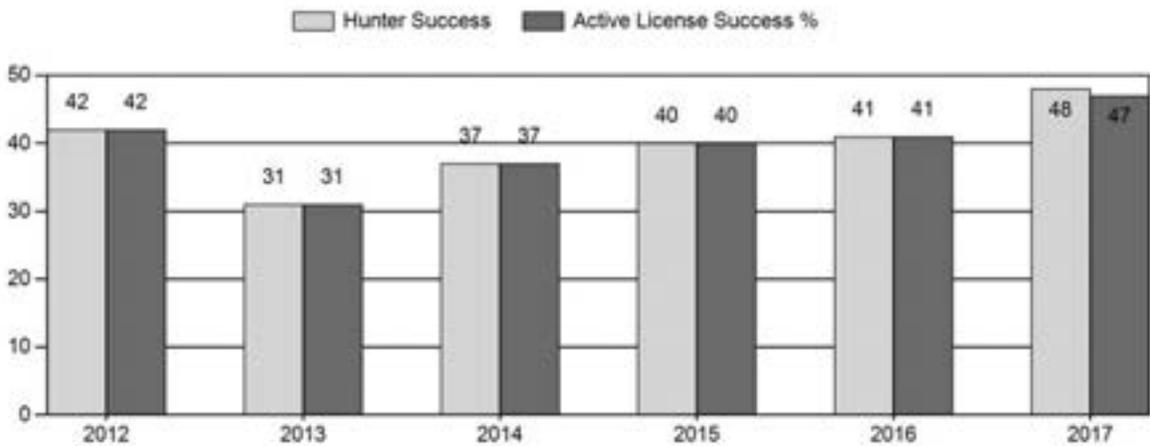
Harvest



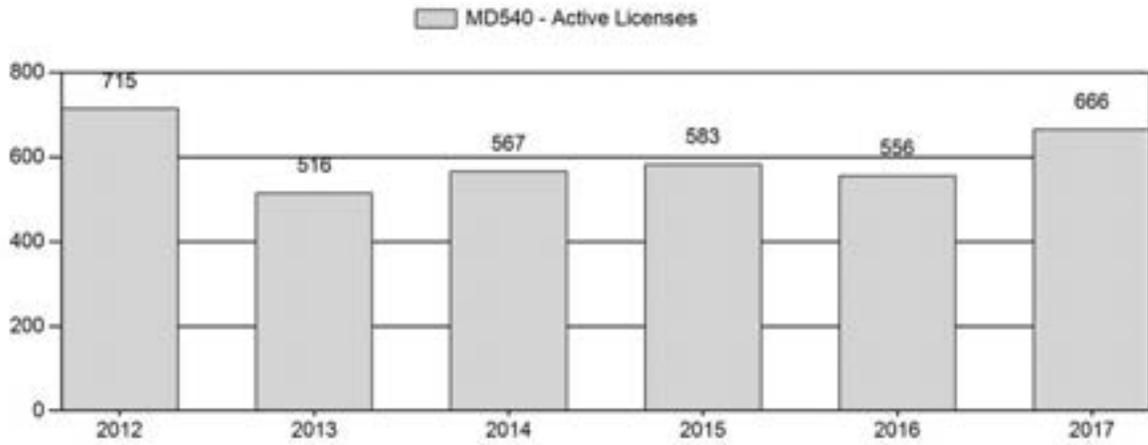
Number of Active Licenses



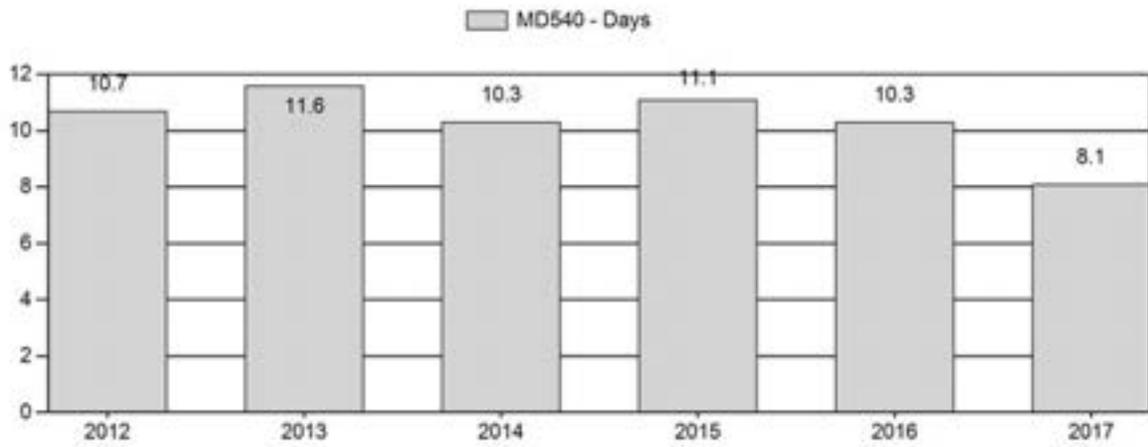
Harvest Success



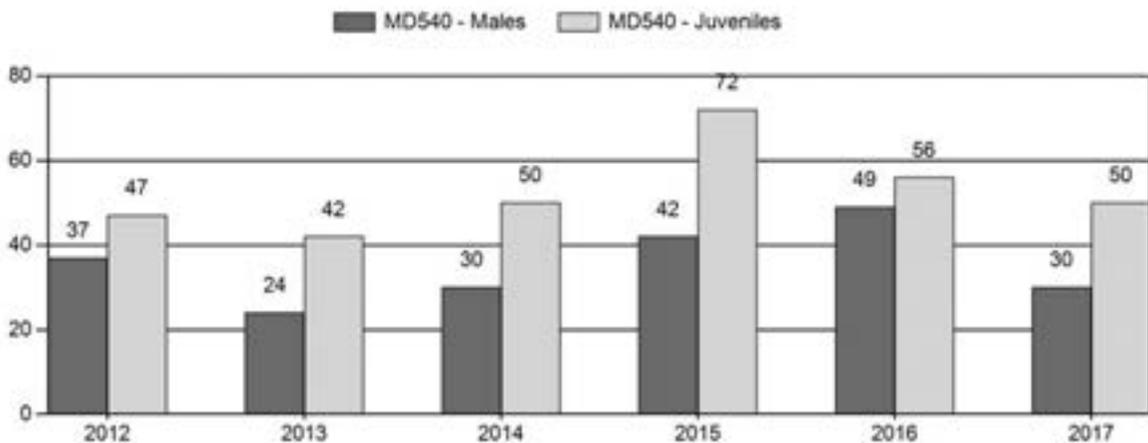
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2012 - 2017 Postseason Classification Summary

for Mule Deer Herd MD540 - SHIRLEY MOUNTAIN

Year	Post Pop	MALES								FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Ylng			Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult	
2012	7,926	16	0	0	0	39	55	20%	149	54%	70	26%	274	1,033	11	26	37	± 7	47	± 9	34	
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	6,200	13	23	18	3	0	57	17%	191	56%	96	28%	344	870	7	23	30	± 6	50	± 8	39	

**2018 HUNTING SEASONS
SHIRLEY MOUNTAIN MULE DEER (MD540)**

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

2018 Region D Nonresident Quota: 400

Hunt Area	License Type	Quota change from 2017
Herd Unit Total	None	None

Management Evaluation

Current Postseason Population Management Objective: 7,500 (6,000-9,000)

Management Strategy: Recreational

2017 Postseason Population Estimate: 6,300

2018 Proposed Postseason Population Estimate: 6,400

2017 Hunter Satisfaction: 63% Satisfied, 22% Neutral, 15% Dissatisfied

Mule deer in the Shirley Mountain herd unit are managed toward a population objective of 7,500. The population was estimated using a spreadsheet model developed in 2012 and updated in 2017. The herd unit is managed for recreational opportunity. The management objective was last reviewed in 2015 and reduced from 10,000 to 7,500 mule deer.

Herd Unit Issues

The Shirley Mountain herd unit is comprised of a mixture of habitat and landownership types. Hunter access to public lands containing mule deer habitat is considered good. Small groups of mule deer are considered nuisances and create damage in a localized area on the west side of Shirley Mountain, in the Lost Creek and Sage Creek drainages. Trends in mule deer numbers were in decline until this year; while interest from both resident and nonresident hunters in this herd unit has remained high. Expansion of wind farms in the eastern and southern portions of this herd unit is eminent.

Weather

Temperature and precipitation data was obtained for the National Oceanic and Atmospheric Administration's (NOAA) climatic Division 10 (Upper Platte), <https://www.ncdc.noaa.gov/cag/> to illustrate weather conditions thus far, during bio-year 2017 (Figures 1 and 2). These figures also include data from January - May of bio-year 2016 to describe the weather conditions immediately preceding bio-year 2017. Monthly mean temperatures in the winter months of bio-year 2016 and 2017 were slightly warmer than the 50-year monthly means but otherwise temperatures were similar to the 50-year monthly means. Precipitation in the latter part of bio-year 2016, primarily received in the form of snow, was stressful for mule deer in this herd unit. The summer of bio-year 2017 was drier than the 50-year average. Otherwise, relatively favorable weather conditions were experienced in Division 10 throughout the remainder of bio-year 2017.

Figure 1. January 2017 - January 2018 mean monthly temperatures and 50-year monthly means for NOAA climatic Division 10, Wyoming.

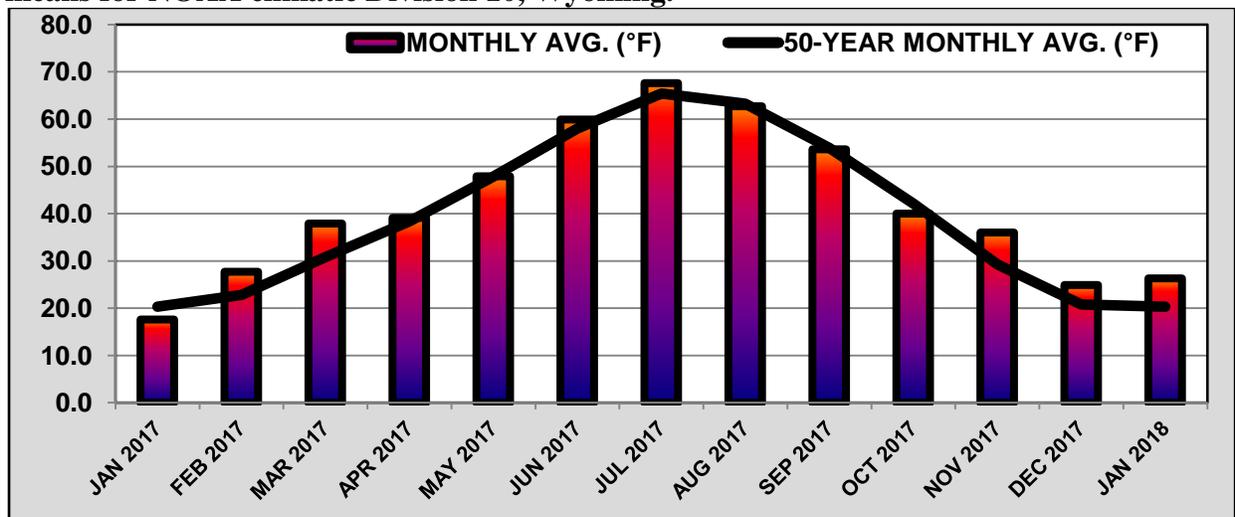
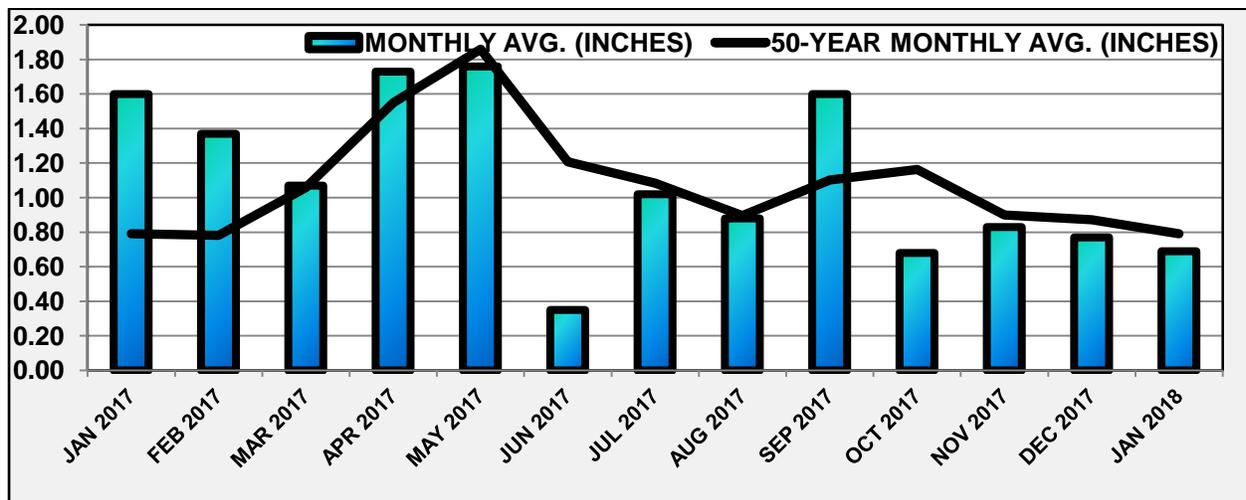


Figure 2. January 2017 - January 2018 mean monthly precipitation and 50-year monthly means for NOAA climatic Division 10, Wyoming.



Habitat

Positive trends in habitat conditions were observed in bio-year 2017 due to adequate amounts of early spring precipitation being received in this herd unit. 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

Postseason classifications were conducted from the ground in early January of 2018. A less than adequate sample size of 344 mule deer was greater than the 2016 sample size. Yearling buck ratios decreased in 2017 by 46% to 7/100 does. This decrease was contributed to the removal of the 3-points or more on either antler limitation. The adult buck ratio decreased in 2017 to 23/100 does, for a 33% decrease from 2016. There were three Class 3 bucks observed in the adult buck classification sample (n=44). The overall buck ratios decreased from 49/100 does in 2016 to 30/100 does in 2017. This overall decrease was also attributed to the removal of the antler point limitation. Fawn ratios decreased 11% from 56/100 does in 2016, to 50/100 does in 2017. This decrease from 2016 was contributed to relatively more severe winter conditions being experienced in this herd unit during the winter of 2016-2017. Similar decreases in fawn ratios were also observed in adjacent herd units.

Harvest Data

Overall, harvest increased and the satisfaction rate increased in 2017. This season was the first season without the 3-points or more on either antler point limitation since 2012. Yearlings bucks made up 16% of the total field checks for all bucks (n=56). Only one (1) Class 3 buck was observed in the field check sample. The final 2017 WGFD deer harvest survey report indicated 666 active general licensed hunters' harvested 313 mule deer for an overall success rate of 47%. General season buck harvest increased 28% and hunter numbers increased 17%, as compared with the 2016 hunting season statistics. The percentage of hunters with harvest survey satisfaction ratings of satisfied, or very satisfied, increased 5% to 63% in 2017.

Chronic wasting disease (CWD) was first observed in the Shirley Mountain herd unit in 2006. Since 1997, we have tested a total of 336 mule deer in this herd unit and have found 18 test positive for CWD. In 2017, we increased our surveillance efforts for CWD in this herd unit. Results of the 2017 samples (n=36) collected from hunter-harvested mule deer indicated an annual prevalence of 16% CWD positive.

Population

In 2017, we continued to use the CJ,CA model to develop a postseason population estimate of 6,400 mule deer for this herd unit. This model produced the greatest Fit score and the least AICc 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 7-day General season for antlered mule deer or any white-tailed deer will be offered in 2018. We reduced the season by one day in order to close the season at the end of the weekend. Type 6 private land doe or fawn licenses continued to be prescribed to reduce damage and nuisance deer issues in the Lost Creek and Sage Creek drainages.

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 limitation.

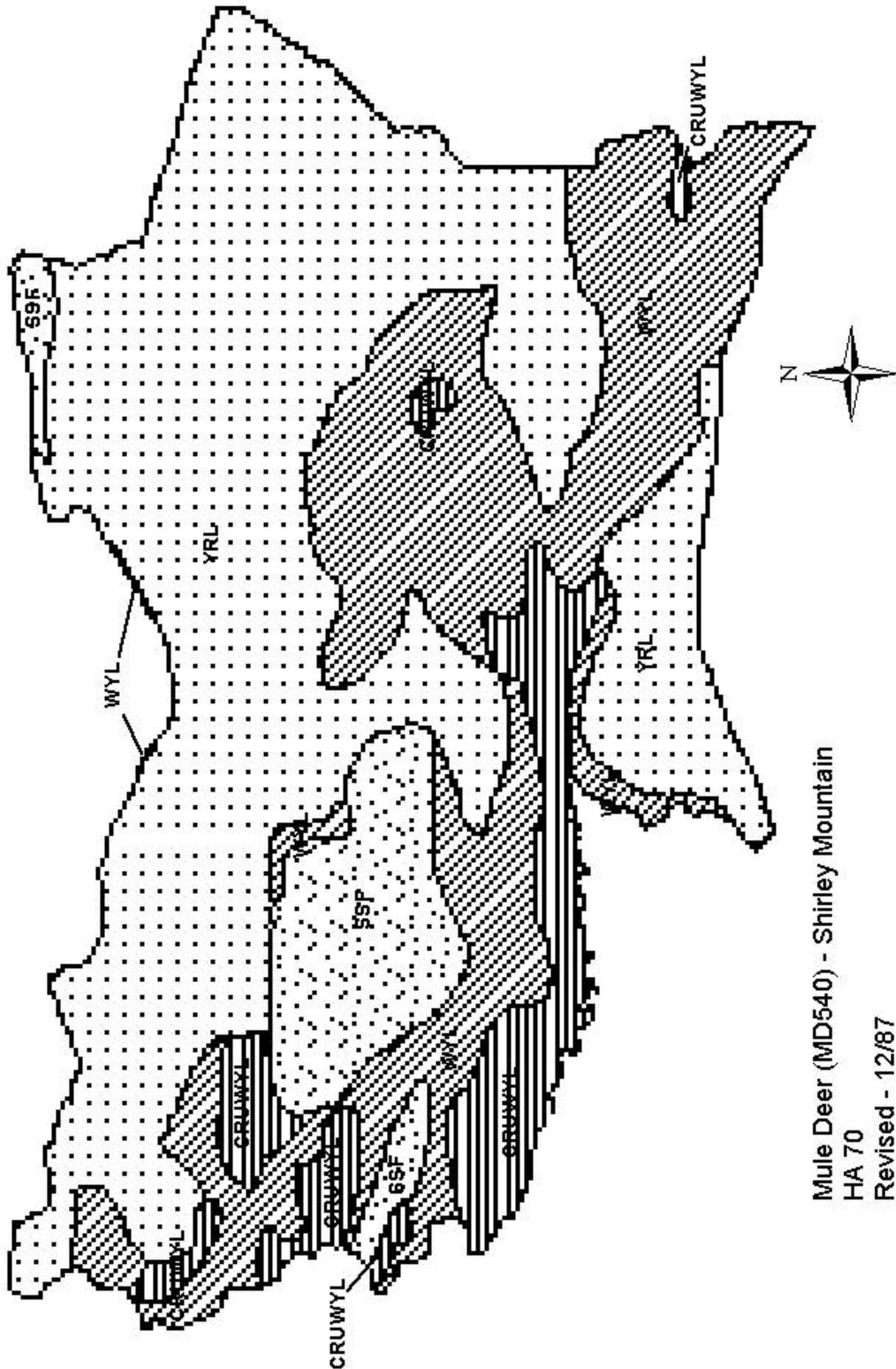
Literature Cited

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.



Mule Deer (MD540) - Shirley Mountain
 HA 70
 Revised - 12/87

2017 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2017 - 5/31/2018

HERD: MD541 - PLATTE VALLEY

HUNT AREAS: 78-81, 83, 161

PREPARED BY: WILL SCHULTZ

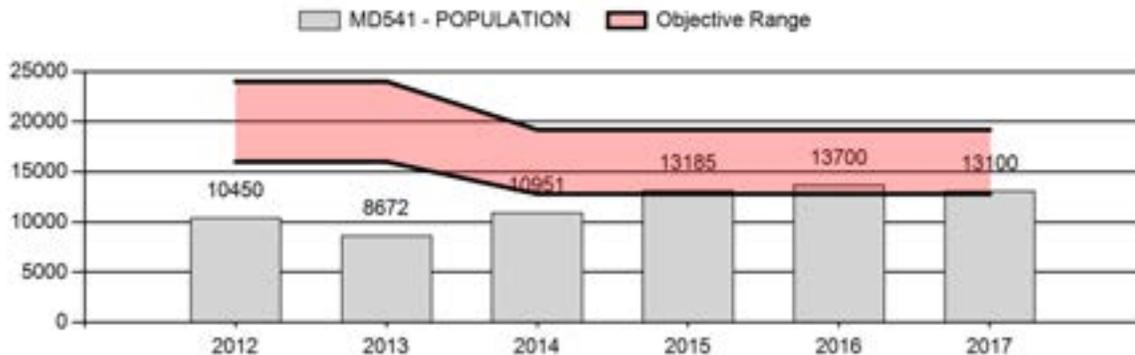
	<u>2012 - 2016 Average</u>	<u>2017</u>	<u>2018 Proposed</u>
Population:	11,392	13,100	13,000
Harvest:	480	691	705
Hunters:	1,056	1,079	1,275
Hunter Success:	45%	64%	55 %
Active Licenses:	1,056	1,079	1,275
Active License Success:	45%	64%	55 %
Recreation Days:	5,814	5,835	6,000
Days Per Animal:	12.1	8.4	8.5
Males per 100 Females	38	45	
Juveniles per 100 Females	60	57	

Population Objective (± 20%) :	16000 (12800 - 19200)
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-18.1%
Number of years population has been + or - objective in recent trend:	4
Model Date:	03/01/2018

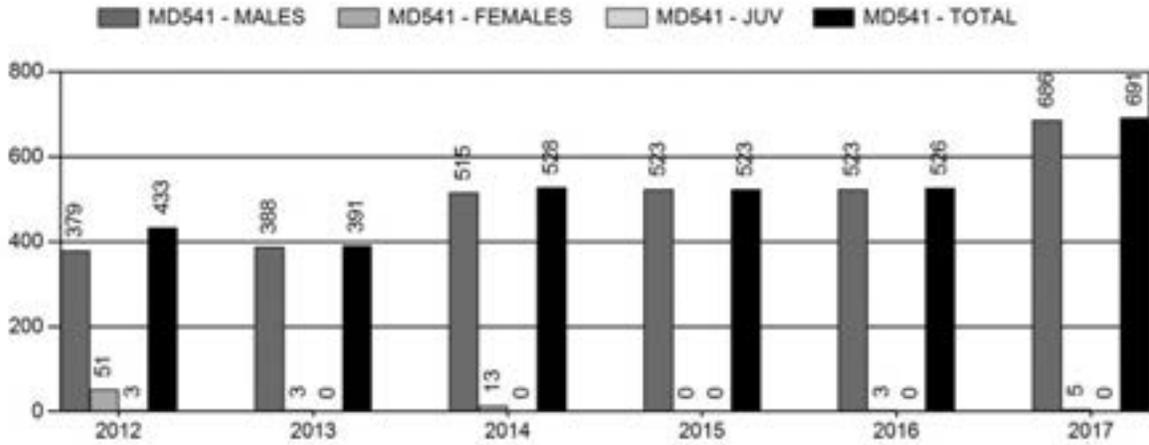
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0.2%	.1%
Males ≥ 1 year old:	24%	22%
Total:	6%	5%
Proposed change in post-season population:	-2.5%	-1.2%

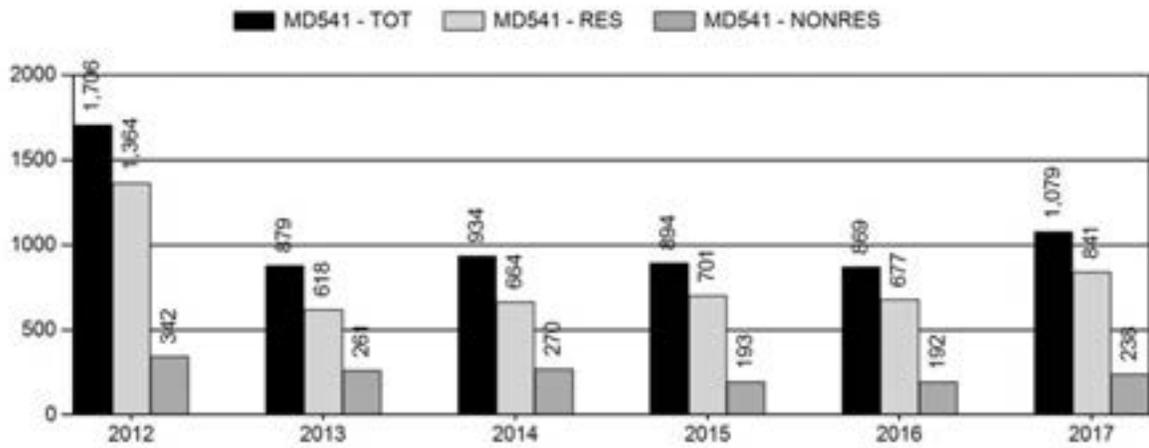
Population Size - Postseason



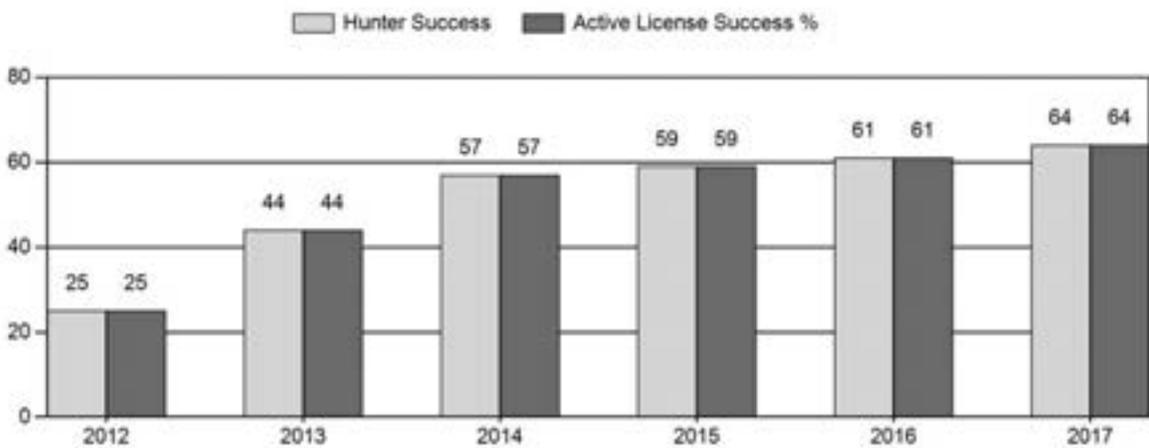
Harvest



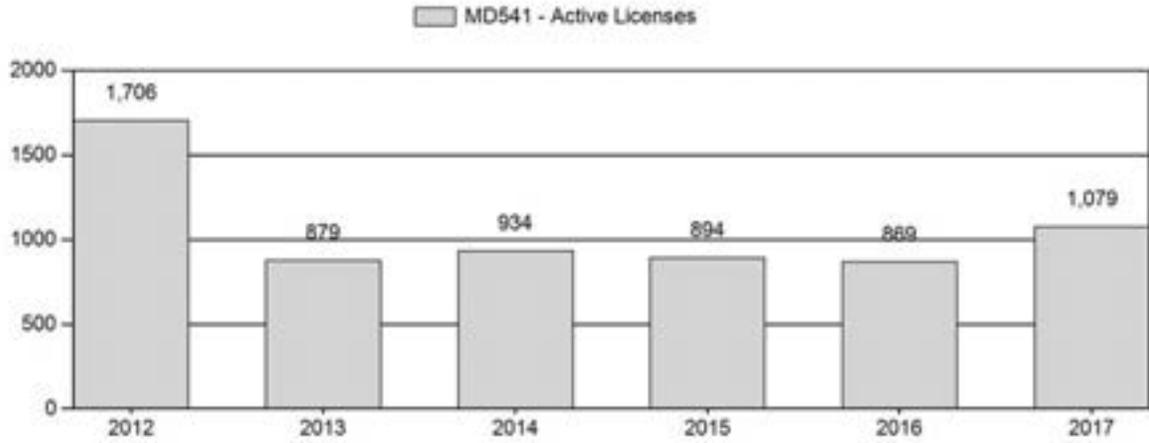
Number of Active Licenses



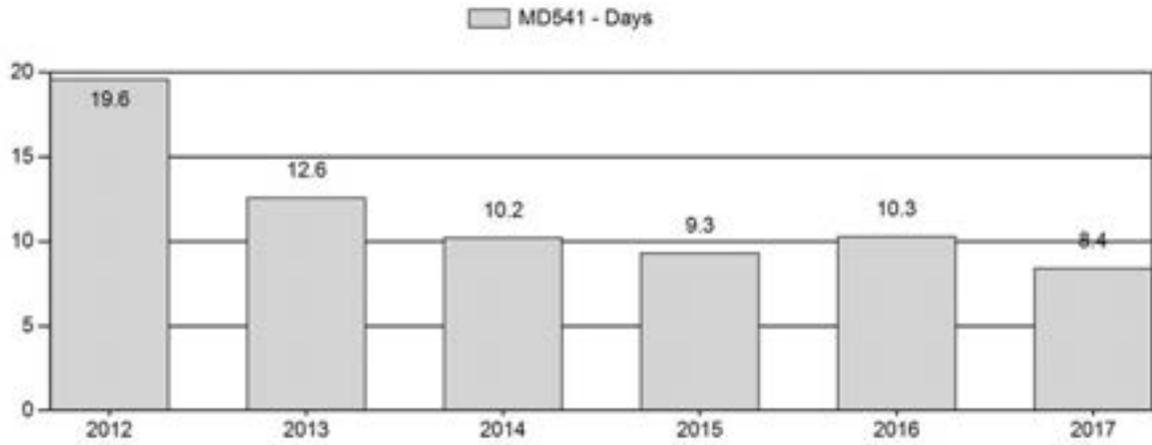
Harvest Success



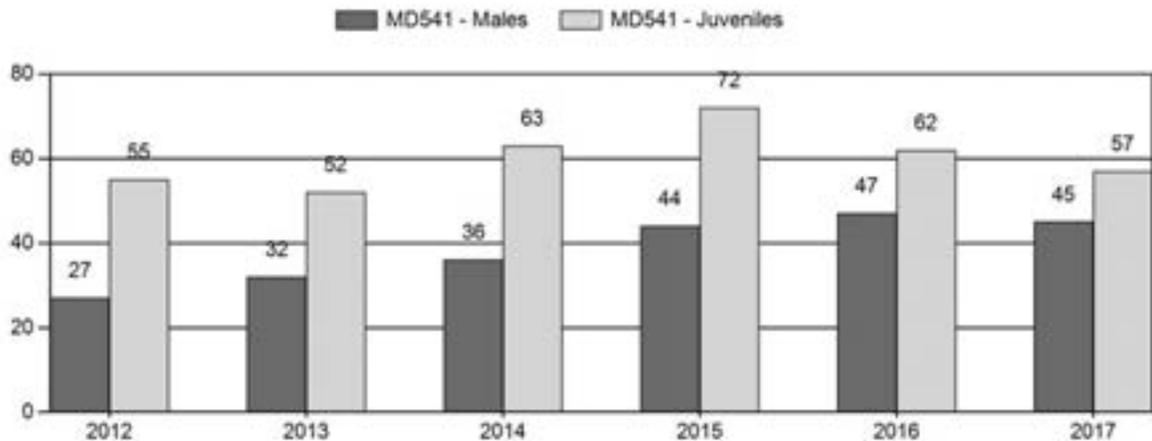
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2012 - 2017 Postseason Classification Summary

for Mule Deer Herd MD541 - PLATTE VALLEY

Year	Post Pop	MALES								FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	2+ Cls 1	2+ Cls 2	2+ Cls 3	2+ UnCls	Total	%	Total	%	Total	%	Ylng			Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult	
2012	10,450	70	0	0	0	143	213	15%	794	55%	438	30%	1,445	980	9	18	27	± 2	55	± 4	43	
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 HUNTING SEASON RECOMMENDATIONS
PLATTE VALLEY MULE DEER (MD541)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
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	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 2017
81	1	+100
Herd Unit Total	1	+100

Management Evaluation

Current Postseason Population Management Objective: 16,000 (12,800 – 19,200)

Management Strategy: Recreational

2017 Postseason Population Estimate: 13,100

2018 Proposed Postseason Population Estimate: 13,000

2017 Hunter Satisfaction: 77% Satisfied, 17% Neutral, 6% Dissatisfied

Mule deer in the Platte Valley herd unit are managed toward a numeric 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. The objective was reviewed in 2014 and reduced from a postseason population management objective of 20,000 mule deer to 16,000 mule deer.

Herd Unit Issues

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.

Weather

- Compiled by WGFD Terrestrial Habitat Biologist, Katie Cheesbrough

Annual bio-year precipitation from October 2016 through September 2017 is fairly close to the 30 year average. However, both the growing season precipitation across the herd unit (April-June 2017) and the later growing season precipitation for high elevation spring/summer/fall ranges (May-July 2016) were both notably lower than the 30 year averages. As illustrated in Figure 1, most of the precipitation occurred outside of the primary growing season, likely in the form of snow in the 2016-2017 winter. Significant early spring moisture events did not occur in 2017 like they have in the previous two years and moisture remained lower throughout the growing seasons (Figures 2 and 3). Relatively dry weather throughout the spring and early summer contributed to the rapid spread of the approximately 2,500 acre Keystone Fire in early July. Monsoonal moisture returned to the area in late summer resulting in a green-up period which may have provided deer with added nutrition as they headed into the fall.

Several big snowfall events occurring in early 2017 in the Platte Valley followed by sustained low temperatures may have challenged mule deer within the unit for a few weeks. However, wind events and a warming trend in February 2017 cleared the snow from much the winter range. As of late February 2018, Upper elevations on the west slope of the Snowy Range (8,440 – 10,130ft) are at 81-103% of normal for snowpack and the east slope of the Sierra Madres are 71-85% of normal as reported at USDA - SNOTEL sites. Lower elevations have remained relatively free of persistent snow in winter 2017-2018 with the Upper North Platte Basin at reporting 87% of normal snow water equivalent to date. Winter conditions for big game have been relatively mild, with a lack of deep snows and consecutive days of sub-zero temperatures.

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

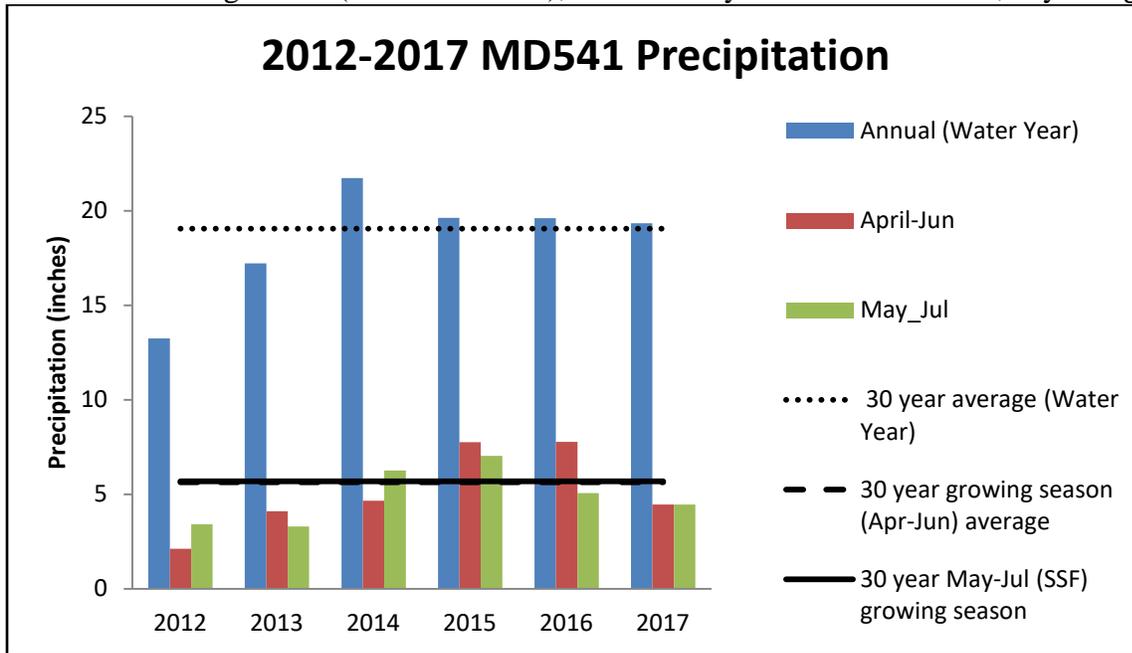


Figure 2. October-February bio-year 2017 South Brush Creek Snotel Site precipitation data, Wyoming.

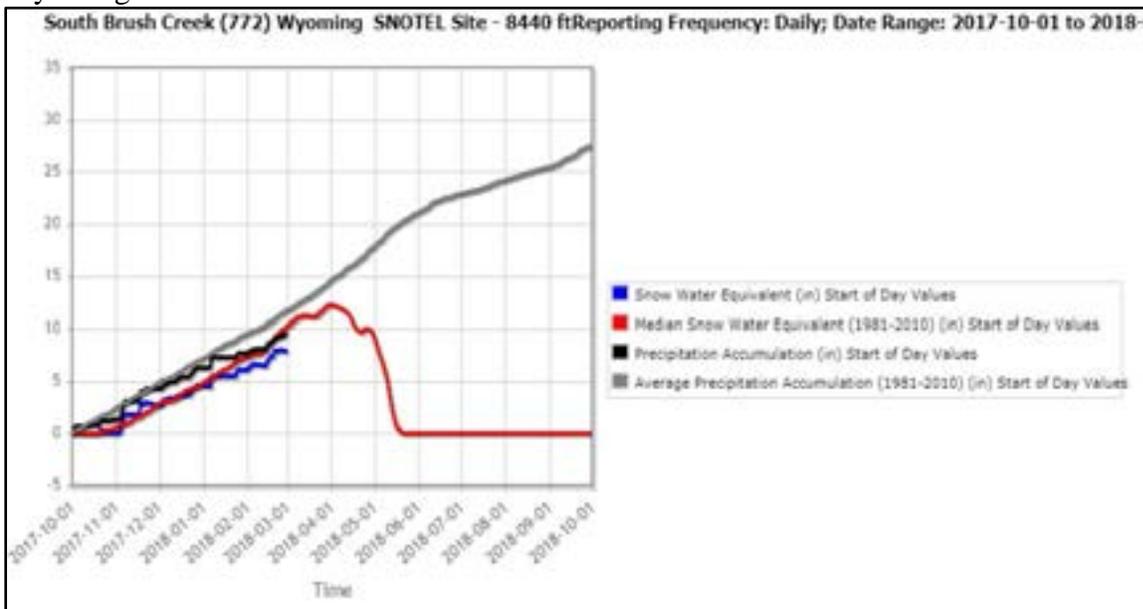
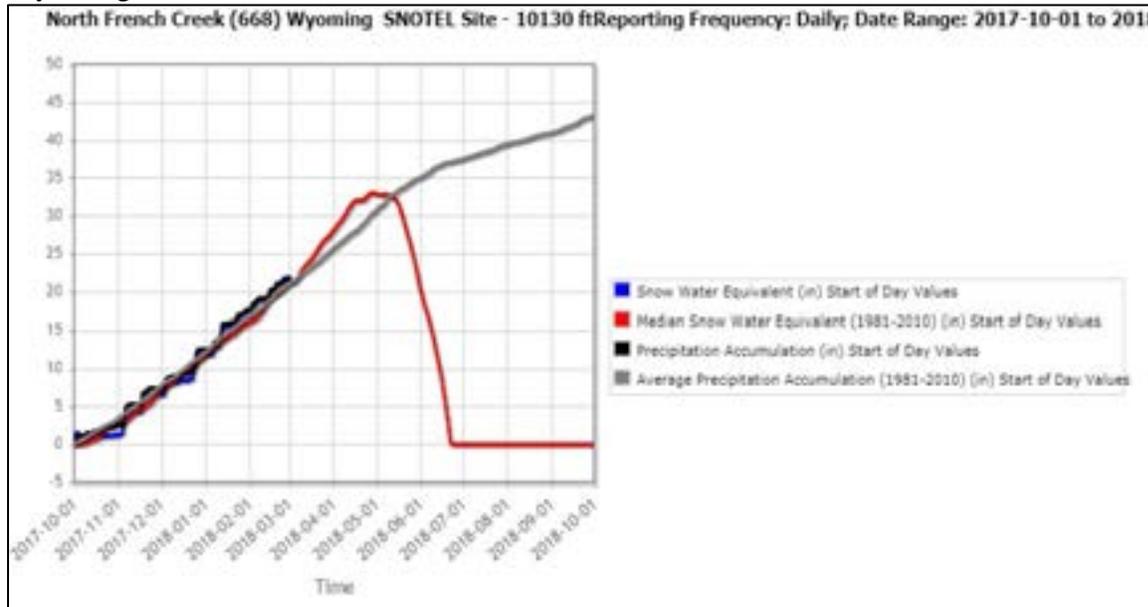


Figure 3. October-February bio-year 2017 North French Creek Snotel Site precipitation data, Wyoming.



Habitat

- Compiled by WGFD Terrestrial Habitat Biologist, Katie Cheesbrough

Growing season precipitation was below normal across the herd unit in 2017, 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 lower production (474.76 lbs/acre) during the 2017 growing season than seen in the past 3 years (562.16 lbs/ac average). However, these production values were still high enough to cover the previous year's wildlife utilization estimates (271.69 lbs/acre).

The lack of growing season moisture, a buildup of fine fuels from the two previous years of high grass production, and the abundance of dead beetle killed lodgepole pine created an environment conducive to wildfires in the Snow Range. The 2,527 acre Keystone 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.

Rapid Habitat Assessments conducted throughout the herd unit in from 2018-2017 suggest that many important shrub habitats continue to underperform due to maturity and decadence caused by a lack of disturbance.

Field Data

The 2017 Platte Valley Herd Unit postseason classification ratios were 45 bucks and 57 fawns per 100 does; based on an adequate sample of 1,489 mule deer. The buck ratio decreased 4% in 2017. This decrease was attributed to the 24% increase in harvest in 2017. The observed fawn ratio at 57 fawns/100 does was 8% less than the previous year and 7% less than the previous 5-year average. A mild winter and timely precipitation contributed to providing improved habitat

conditions and increased nutrition. Rodent and rabbit populations appeared to be decreasing from recent highs and may have contributed the lower fawn survival rate observed in 2017 as there were less alternative food sources available for mule deer predators.

Harvest Data

2017 marked the fifth year for limited quota hunting in the Platte Valley herd unit. Each hunt area was prescribed a license quota specific to the hunt area. The quotas were increased 25% in 2017. A total of 1,079 active licensed hunters harvested 686 bucks and 5 does. Overall harvest success increased from 61% in 2016 to 64% in 2017. The 2017 harvest rate was attributed to the increased fawn survival rates observed during the 2014-2016 bio-years, and 4 years of conservative limited quota seasons. Hunter satisfaction increased to 77% for hunters who indicated they were very satisfied or satisfied in 2017.

In 2016, Hunt Area 81 hunters were offered an opportunity to carry their licenses over to the 2017 season due to the Beaver Creek Fire. Harvest statistics reported in this section do not include data from the approximately 87 hunters who had carry over licenses for Hunt Area 81. We assume harvest rates for the carry over license holders were similar to those experienced by the Hunt Area 81 hunters who received their licenses through the 2017 license draw process. This would have added approximately 47 buck mule deer to the 2017 harvest for Hunt Area 81.

Harvest rates for yearling bucks decreased in 2017. Yearling bucks made up 11% ($n = 14$) of the field checked sample for buck harvest. This was a decrease of 31% from 2016. Field checked 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.

Chronic wasting disease (CWD) was first observed in the Platte Valley herd unit in 2002. Since 1997, we have tested a total of 2,002 mule deer in this herd unit and have found 30 to be positive for CWD. In 2017, we increased our surveillance efforts for CWD in this herd unit. Results of the 2017 samples ($n=106$) collected from hunter-harvested mule deer indicated an annual prevalence of 6% CWD positive.

Population

We continued the use of the TSJ,CA spreadsheet model in 2017. 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 2017 postseason population estimate of 13,100 mule deer for the Platte Valley herd unit. This was a 4% decrease in the population estimate from 2016. TSJ,CA model aligned very 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 AICc score of the suite of spreadsheet models. We rated this model 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).

We 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 eventually use this data to assess current and potential threats to maintaining connectivity for important mule deer habitat within this herd unit.

Management Summary

In 2018, hunting season timing, length, and license quotas will be similar to the 2017 season. We increased the license quota for Hunt area 81 as we no longer needed to compensate for the 2016 carryover licenses. This hunting season structure should offer optimal recreational hunting opportunities in the Platte Valley herd unit.

Literature Cited

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.

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

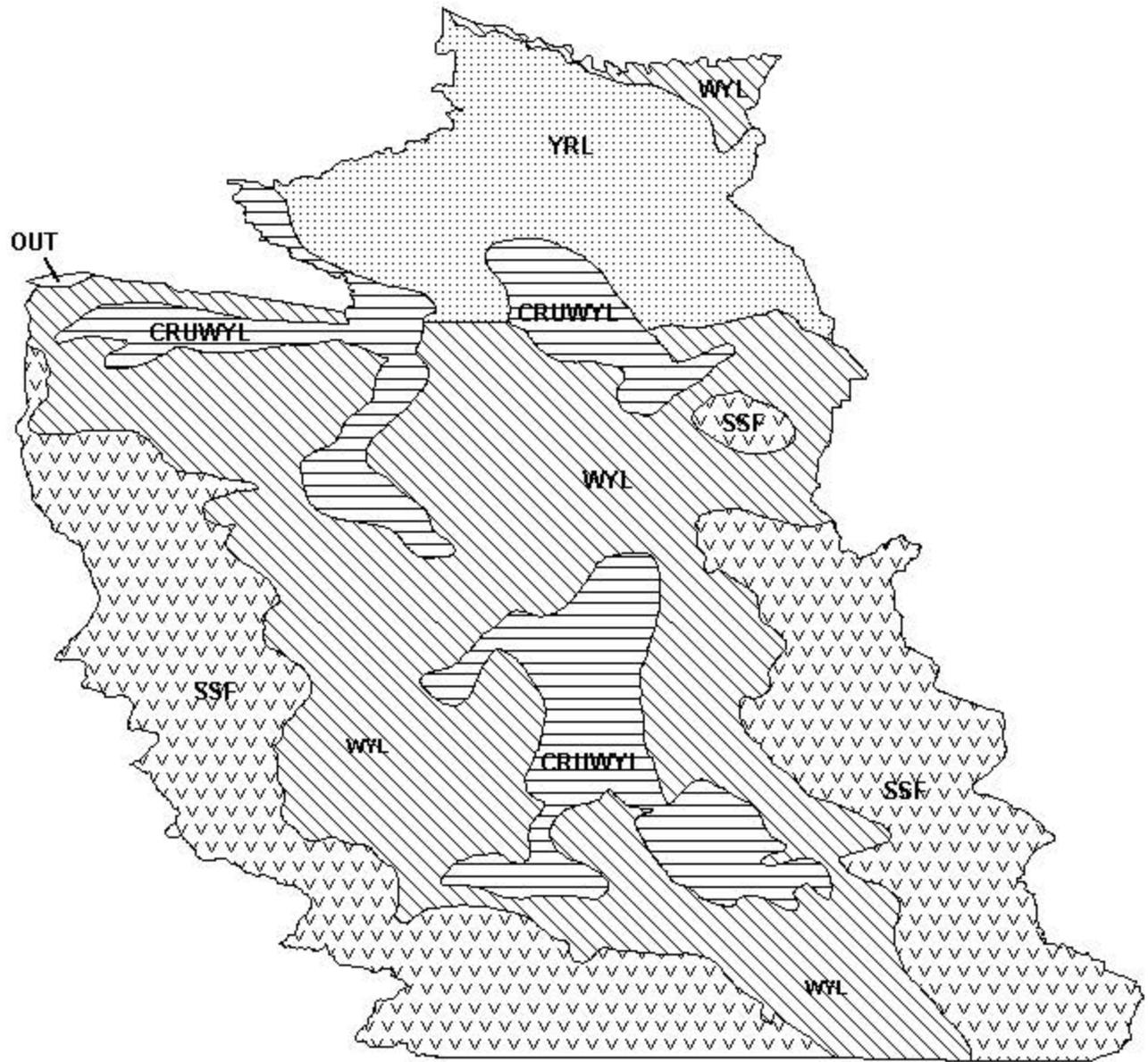
Kauffman, M., H. Sawyer, W. Schultz, and M. Hayes. 2015. Seasonal Ranges, Migration, and Habitat Use of the Platte Valley Mule Deer Herd. Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie. USA. 21 pp.

Newman, J. 1968. Deer Distribution and Movement Studies. Final Report. Wyoming Game and Fish Department, Cheyenne.

Strickland, M. D. 1975. An investigation of the factors affecting the management of a migratory mule deer herd in southeastern Wyoming – the Snowy Range. Ph.D. Dissertation, University of Wyoming, Laramie. 171 pp.

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

Wyoming Game and Fish Dept. 2012. 2012 v.110512 Platte Valley Mule Deer Plan. Wyoming Game and Fish Department, Cheyenne. 90 pp.



Mule Deer (MD541) - Platte Valley
 HA 78-81, 83, 161
 Revised - 12/87

