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ACKNOWLEDGEMENTS

The field data contained in these reports is the result of the combined efforts of Jackson Region Wildlife Division personnel including District Wildlife Biologists, District Game Wardens, the Disease Biologist, Feedground Manager, Wildlife Management Coordinator, and Region Supervisor, as well as other Department personnel working check stations and in the field. The authors wish to express their appreciation to all those who assisted in data collection.

2023 - JCR Evaluation Form

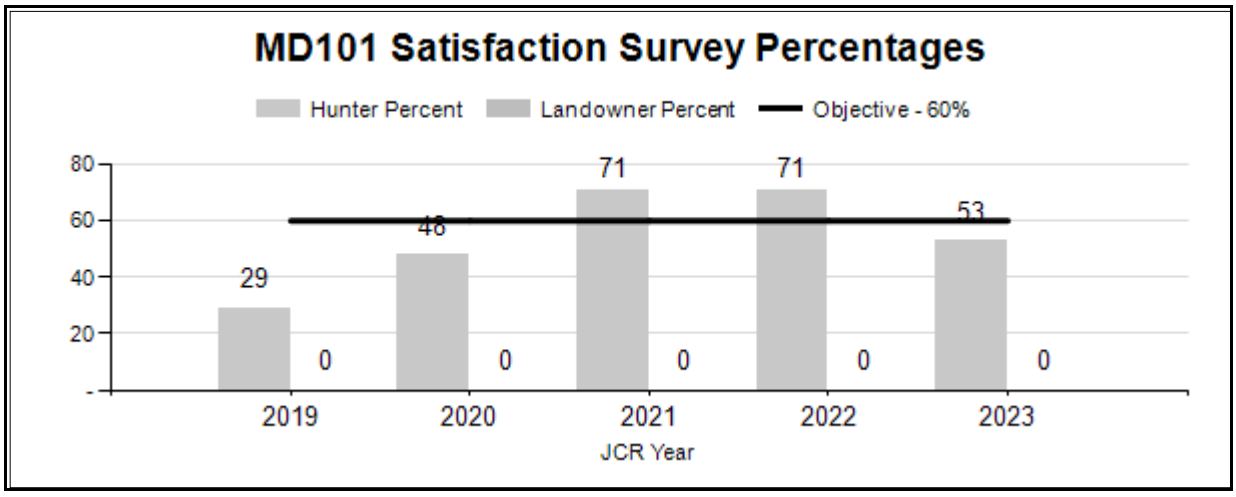
SPECIES: Mule Deer
PERIOD: 6/1/2023 - 5/31/2024

HERD: MD101 - TARGHEE

HUNT AREAS: 149
PREPARED BY: ALYSON COURTEMANCH

	2018 - 2022 Average	2023	2024 Proposed
Hunter Satisfaction Percent	58%	53%	60%
Landowner Satisfaction Percent	N/A	N/A	N/A
Harvest:	21	11	25
Hunters:	81	58	80
Hunter Success:	26%	19%	31%
Active Licenses:	81	58	80
Active License Success:	26%	19%	31%
Recreation Days:	390	212	350
Days Per Animal:	18.6	19.3	14
Males per 100 Females:			
Juveniles per 100 Females			

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



2024 HUNTING SEASONS
TARGHEE MULE DEER HERD (MD101)

Hunt Area	Type	Special Archery Dates		Regular Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
149	Gen	Sep. 1	Sep. 14	Sep. 15	Sep. 25		Antlered mule deer four (4) points or more on either antler or any white-tailed deer
149	3	Sep. 1	Sep. 14	Sep. 15	Nov. 30	25	Any white-tailed deer
149	8	Sep. 1	Sep. 14	Sep. 15	Nov. 30	25	Doe or fawn white-tailed deer

2024 Regional H Nonresident Quota: 350 licenses

2023 Hunter Satisfaction: 71.0% Satisfied, 19.4% Neutral, 9.7% Dissatisfied

2023 Management Summary

1.) Hunting Season Evaluation: This herd is managed with a hunter satisfaction objective (60%) because the majority of deer migrate to winter ranges in Idaho and are therefore not in Wyoming during post-hunt population survey time frame. Hunter satisfaction was 53% in 2023, which is lower than the previous two years. Deer from this herd experienced severe winter conditions in 2022/2023 and the population likely declined. Hunting opportunity in this herd unit is limited due to limited access points to public lands, steep terrain, and fall migration of mule deer to Idaho. A total of 58 active hunters harvested 11 mule deer in the herd unit in 2023, which is about half of the number of active hunters in previous years.

Seventeen white-tailed deer were harvested in 2023 (8 with a Type 3 license, 5 with a Type 8 license, and 4 with a general license). This is much higher than previous years (8 were harvested in 2022). Keeping white-tailed deer numbers low in this area is a priority for managers.

This mule deer herd is still recovering from the severe winter in western Wyoming and eastern Idaho in 2022/2023, therefore managers reduced the general license season length by 5 days in 2024 to close on September 25 and added an antler point restriction of four points or more on either antler. This is consistent with other hunt areas in Region H. The nonresident quota for Region H was also reduced from 250 to 350 licenses.

2.) Management Objective Review: This herd unit objective was reviewed in 2024. We are maintaining this herd at the current objective and management strategy. We evaluated and considered population status, mule deer seasonal distribution, and survey methods and decided a change is not warranted at this time. We will review this herd objective again in 2029; however, if the situation arises that a change is needed, we will review and submit a proposal as needed.

3.) Chronic Wasting Disease Management: This is a Tier 3 surveillance herd that is not a priority for CWD sampling at this time due to the very low deer harvest and difficulty in encountering hunters with harvested animals in the field. Collecting an adequate sample size in this herd is not feasible at this time. CWD management in this herd focuses on opportunistic hunter-harvest, roadkill sampling, suppressing white-tailed deer numbers and sampling any animals that are displaying signs of sickness. No hunter-harvested mule deer or white-tailed deer were sampled in 2023 (Table 1). A total of 3 hunter-harvested mule deer have been sampled in this herd during the last 3 years. CWD has not been detected in this herd, however confidence intervals are large due to very low sample size.

Table 1. CWD prevalence for hunter-harvested mule deer in the Targhee Mule Deer Herd, 2021-2023.

Year(s)	Percent CWD-Detected and sample size (*n*) *Hunter Harvest Only*		
	Adult Males (CI = 95%)	Yearling Males	Adult Females
2023	**0% (n=0)**	None sampled	None sampled
2021-2023	**0% (CI 0%-70.8%, n=3)**	None sampled	None sampled

2023 - JCR Evaluation Form

SPECIES: Mule Deer
PERIOD: 6/1/2023 - 5/31/2024

HERD: MD131 - WYOMING RANGE

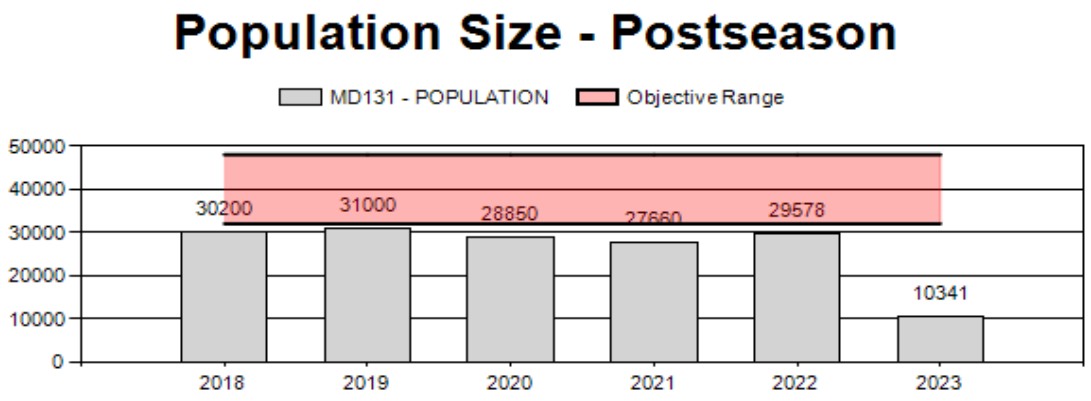
HUNT AREAS: 134-135, 143-145
PREPARED BY: GARY FRALICK

	2018 - 2022 Average	2023	2024 Proposed
Population:	29,458	10,341	10,349
Harvest:	1,661	416	400
Hunters:	4,970	2,588	2,400
Hunter Success:	33%	16%	17 %
Active Licenses:	4,970	2,588	2,400
Active License Success:	33%	16%	17 %
Recreation Days:	27,987	14,616	13,900
Days Per Animal:	16.8	35.1	34.8
Males per 100 Females	32	24	
Juveniles per 100 Females	63	34	

Population Objective (± 20%) :	40000 (32000 - 48000)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-74.1%
Number of years population has been + or - objective in recent trend:	7
Model Date:	02/26/2024

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

	JCR Year	Proposed
Females ≥ 1 year old:	<1%	0%
Males ≥ 1 year old:	18%	14%
Proposed change in post-season population:	<1%	<1%



2024 HUNTING SEASONS
WYOMING RANGE MULE DEER HERD (MD131)

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
134	Gen	Sep. 1	Sep. 30	Oct. 1	Oct. 6		Antlered mule deer three (3) or more points on either antler or any white-tailed deer
135	Gen	Sep. 1	Sep. 30	Oct. 1	Oct. 6		Antlered mule deer four (4) points or more on either antler or any white-tailed deer
143	Gen	Sep. 1	Sep. 14	Sep. 15	Sep. 25		Antlered mule deer four (4) points or more on either antler or any white-tailed deer
144	Gen	Sep. 1	Sep. 14	Sep. 15	Sep. 25		Antlered mule deer four (4) points or more on either antler or any white-tailed deer
145	Gen	Sep. 1	Sep. 14	Sep. 15	Sep. 25		Antlered mule deer four (4) points or more on either antler or any white-tailed deer
145	3	Sep. 1	Sep. 14	Sep. 15	Nov. 15	25	Any white-tailed deer
145	3			Nov. 16	Jan. 31		Antlerless white-tailed deer
145	8			Nov. 1	Jan. 31	25	Doe or fawn white-tailed deer

2024 Region G Nonresident Quota: 250 licenses

2023 Hunter Satisfaction: 21% Satisfied, 28% Neutral, 49% Dissatisfied

2024 Management Summary

1.) Hunting Season Evaluation:

The 2022-2023 winter is responsible for the downturn in the projected 2023 population estimate. Moreover, the effects of 2023 winter mortality, in association with the effects of elevated winter mortality during the 2017, 2019, and 2020 winters, have suppressed population growth. Consequently, the population estimate is projected to remain below the population objective of 40,000 deer. The 2023 post-hunt population estimate is approximately 10,300 deer, which is an historic low. The lingering effects of severe winter mortality during the preceding 5-year period and the loss of the 2022 and 2023 cohorts in 2023 will prevent a substantial population increase in 2024. Consequently, no change in population performance is anticipated in 2024.

As expected, harvest was lower in 2023 compared to the 5-year average of 1,661 deer harvested during the period from 2018 – 2022. Harvest decreased to an all-time low in 2023 with a total

estimate of 412 deer harvested. Hunter numbers also decreased by an estimated 59% from 2022 to 2023. In 2022, 4,901 hunters pursued deer in the herd unit compared to 2,879 hunter during the current year.

The behavior, habitat, winter weather patterns, classification data, vulnerability to harvest, and stakeholder interests differs between deer that use the northern portion of the herd unit (hunt areas 143-145) and the southern portion (hunt areas 134 and 135). Those dynamics are described below and justify the differing season dates within the herd unit.

Deer seasons in the northern areas have been adjusted in 2024 to reflect growing public concern over the extreme winter deer losses observed throughout the herd unit in 2023. That adjustment will entail the additional restriction of the 4-point or more antler point restriction (APR) for antlered mule deer in Areas 143 – 145, not to exceed 2 years of implementation (following a 3-point APR implemented in 2023). The season dates are unchanged from 2023. These hunting seasons - along with 14 other mule deer hunt areas in the Jackson and Pinedale Regions open and close concurrently. These seasons promote population growth and buck retention into the postseason population by focusing on antlered only hunting and closing deer seasons prior to the onset of the fall migration and the October 15 general elk hunting seasons. These seasons also reflect public sentiment to maintain the traditional September 15 opener. Season closure prior to the onset of the fall migration will ensure that overharvest of bucks does not occur.

In Hunt Areas 134 and 135 the management strategy has been to offer a season that includes two weekends with 14 days of general deer hunting opportunity. These seasons have been largely buck only hunting over the last 20+ years. This season structure is very conservative and the population is not limited by this level of hunting. Continuing to offer this type of hunting opportunity in light of having lower deer survival during tough winters is still biologically appropriate. Changes in hunting seasons will not resurrect deer that died in past winters. This type of season will also not limit future growth of the herd. However, due to low deer numbers from recent harsh winters there is a push from a segment of the public to have a season length shorter than 14 days. This a social issue rather than a biological one. Consequently, the season was reduced to 6 days after the 2022-23 winter and these limitations will continue in 2024. This season will offer one weekend of hunting opportunity. This is a very restrictive hunting season and will not inhibit or aid in improving the deer herd. Only time and more favorable weather patterns with help this herd recover. Analysis of past data in these areas shows no correlation between season length and harvest, hunter days or average days hunted per hunter. The change in the antler point restriction in hunt area 135 from three point to four point will match the restriction in hunt areas 143, 144 and 145.

2.) **Management Objective Review:** The Wyoming Range mule deer population objective was reviewed in 2021, with no changes proposed. In 2016 the population objective was reduced from 50,000 to 40,000 (± 20%) deer.

3.) **Herd Unit Evaluation**: Management strategies since 1993 emphasized hunting antlered deer in an effort to promote population growth. Antlered deer hunts occur in mid-September and early October throughout the herd unit. Hunt seasons close in the northern hunt areas prior to the onset of the annual fall migration in order to minimize vulnerability of bucks that migrate from

subalpine summer ranges to sagebrush winter ranges in the Upper Green River and Bear River Basins. Sustained population growth has been tempered by above normal overwinter mortality approximately every 3 years over the last 35 years. The most recent period of above normal winter mortality occurred in 2017, 2019, 2020, and 2023. Public concern about high winter mortality during the 2023 winter prompted managers to propose the 4-point or more antler point restriction (APR) for the 2024 season. Being the second year of APR implementation, the APR is proposed for no more than two more years, including the 2024 season (Appendix A).

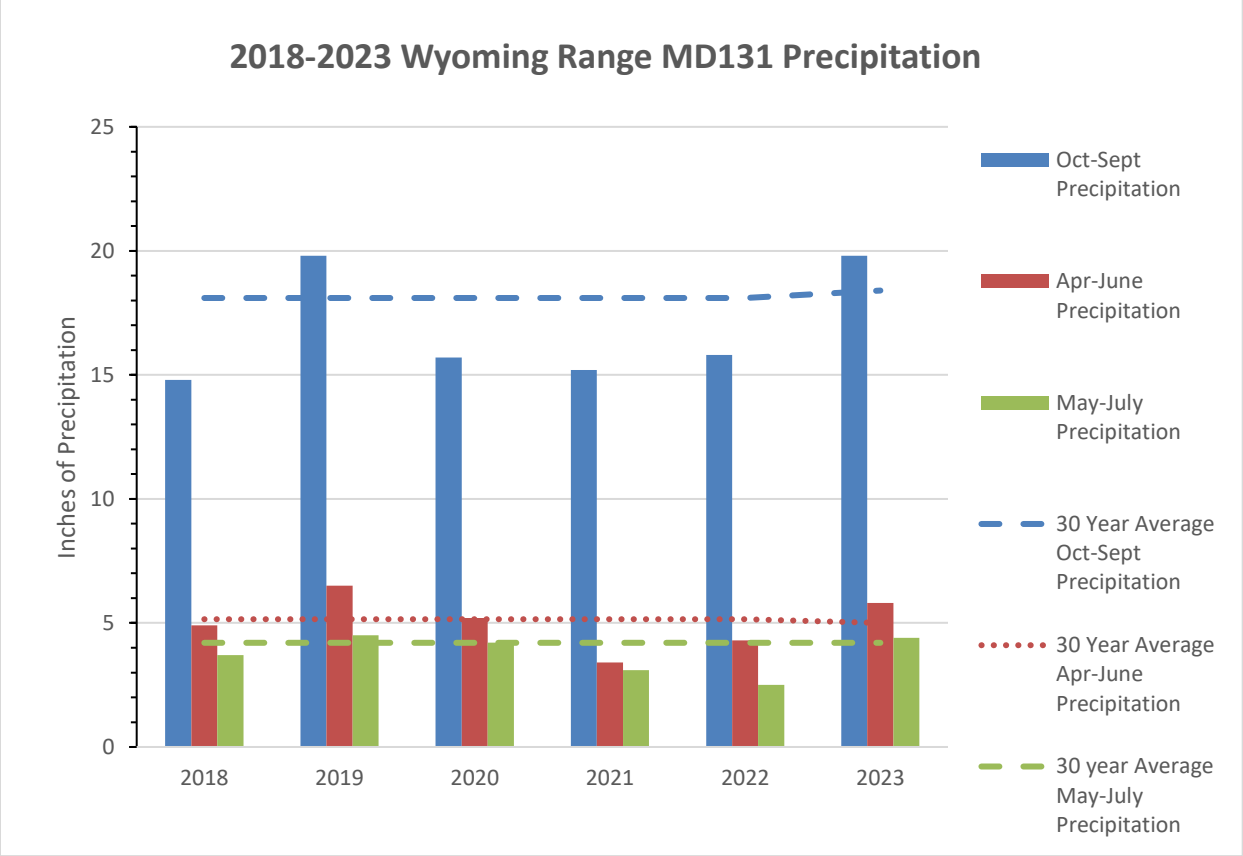
Nonresident Region G licenses decreased from 350 to 250 licenses in an effort to reduce buck harvest, especially in Areas 144 and 145. As a result of fewer nonresident Region G licenses issued, the postseason 2024 buck:doe ratio is anticipated to increase to levels near the management minimum of 30 bucks:100 does.

4.) Weather:

Precipitation: The 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 Wyoming Range Mule Deer Herd Unit during the period from October 2022 through September 2023 (water year). Annual precipitation was higher than the 30 year (Sept-Oct) average. Precipitation during the growing season (April-June) was above the 30 year average, and precipitation during the spring-summer period (May-July) was near the 30 year average. The 2022-2023 monthly winter precipitation was above average for all months between November and March. 2023 monthly spring precipitation was above average across the herd unit, except for April which was slightly below average. Summer 2023 precipitation was below average during June, above average in July, and near average during August. Herd unit precipitation during fall 2023 was below average between September and the end of November (Figure 1).

Winter Severity: Most low elevation winter ranges experienced below or near average monthly snow fall accumulation between November 2023 and February 25, 2024. Reporting locations in the Randolph Utah, Afton, and Fontenelle Dam, areas recorded between 62% and 98% of their long term average snow accumulation. However, the recoding station at Fossil Butte reported 123% of average snowfall during the same period. SNOWTEL sites at higher elevations showed the snow water equivalent ranging from 72-109% of the median as of February 25, 2024 (94% average across 7 stations), suggesting near average soil moisture conditions at most locations to begin the 2023 growing season. Average monthly temperatures recorded from locations near winter ranges were all consistently warmer than the long term monthly averages between November 2023 and February 2024.

Figure 1. 2018-2023 Wyoming Range mule deer (MD131) precipitation.



5.) Habitat:

Significant Events: Several habitat improvement efforts occurred within the herd unit during 2023. Approximately 262 acres of aspen conifer mixed stands between Big Piney and La Barge were treated with prescribed fire to promote aspen regeneration. Virtual fencing was applied using 550 cattle collars in portions of the North La Barge Grazing Allotment to provide rest to habitat treatments and deferment/rest for perennial stream riparian areas. Four miles of fence were converted to wildlife friendly specifications on the Calpet winter range complex. Five and a half miles of net-wire fencing was replaced with wildlife friendly fences along migration routes between the Tunp Range and Smith's Fork River. Mosaic sagebrush mowing treatments occurred on 1,801 acres of winter range on Rock Creek Ridge and South Slate Creek watershed. Approximately 24,535 acres were treated with aerial herbicide to control cheatgrass on Rock Creek Ridge, Slate Creek Ridge, and Christy Canyon areas. More details about these projects can be found in the Pinedale and Green River Region sections of the 2023 Statewide Habitat Plan (SHP) report.

Habitat Monitoring: Winter range shrub transects were monitored at five locations through the Calpet/Little Colorado winter range during 2023 to evaluate trends in annual leader growth of true mountain mahogany. The average annual mahogany leader growth of all five sites during 2023 was 5.89 inches, surpassing the long term average leader growth of 2.78 inches.

Department personnel also conducted monitoring associated with past and future treatments throughout the herd unit during 2023.

Rapid Habitat Assessments: Rapid Habitat Assessments (RHA) were first implemented by the Department in 2015 to generally characterize conditions of important habitat types on the landscape within Mule Deer Initiative (MDI) Herd Units. Department personnel completed 3,089 acres of rangeland RHAs, 141 acres of special feature RHAs, and 411 acres of aspen RHAs within the Wyoming Range Herd Unit during 2023. Surveys were conducted in transitional, summer, migration, and crucial winter range mule deer habitats. Approximately 31% of the acres surveyed in 2023 met objectives for good quality mule deer habitat, 2% of acres surveyed partially met habitat objectives with an upward trend, 11% of the acres were partially meeting habitat objectives, 55% of surveyed acres were partially meeting habitat objectives with a downward trend, and 1% of acres were not meeting habitat condition objectives.

6) Chronic Wasting Disease Management: The Wyoming Range mule deer herd is a Tier 1 surveillance herd. Reduced sampling in 2023 was a result of reduced harvest. The desired sample goal of 200 adult males was collected during the 3-year period from 2021-2023, with a total of 343 samples collected (Table 1). During the recent 3-year sampling period there were three (3) CWD-detected samples from hunter-harvested adult male deer. Samples in 2023 were collected without the assistance of CWD technicians, so a similar level of effort is expected into the foreseeable future.

Table 1. CWD prevalence for hunter-harvested mule deer in the Wyoming Range Herd.

Year	Percent CWD-Detected, number CWD-Detected, and sample size (n) *Hunter Harvest Only*		
	All Adult Male Deer (CI = 95%)	Yearling Males	Adult Females
2021	0.0% -0.6%, 1, (n=176)	0.0% (n=30)	0.0% (n=17)
2022	0.% - 1.4%, 2, (n=140)	0.0% (n=20)	0.0% (n=7)
2023	0.0%, 0, (n=27)	0.0% (n=1)	0.0% (0)
2021-2023	0.9%, 3, (n=343)	0.0%	0.0%

7.) Population Modeling: In 2021, WGFD managers began using PopR integrated population model (IPM) to estimate population indices for mule deer. The bio-year 2023 postseason population estimate for this herd unit was 10,341 (CL =8,772 – 12,027) mule deer. The IPM Analysis Report dated February 26, 2024 is appended to this report (Appendix B).

8.) Sightability Survey: A sightability survey was conducted in January 2024 to quantify the effects of the unprecedented winter mortality during the 2022-2023 winter. A sightability survey was flown the previous year (February 2023), but regional managers decided it was important to obtain another population estimate subsequent to the winter of 2022-23. The population estimate from the 2024 sightability survey was 11,000 animals. This estimate was used to inform the IPM population model, which is used as the post-season population estimate for this herd.

During the period from January 9 – 19, a Bell 47 helicopter was utilized to conduct the survey over five (5) major winter range complexes near LaBarge (HA143), Evanston (HA134), Kemmerer/Cokeville (HA135) and Star Valley (HA145) (Table 2, Appendix C). The sightability population estimate was 11,023 deer. At 90% confidence level, the range is 8,618 – 13,428. The number of hours flow and cost of the 2024 survey were notably less than in 2018 and 2023 because the low numbers of deer increased survey efficiency, with similar acreage and sub-units surveyed.

Table 2. A summary describing the metrics and total deer counted by hunt area during a mule deer sightablity survey, Wyoming Range mule deer herd, 2018, 2023, and 2024.

Hunt Area	**No. Deer Counted in 2024**	**No. Deer Counted in 2023**	**No. Deer Counted in 2018**
138	380	2323	1616
143	2034	5359	7053
145	449	463	1405
JN-PE Total	2,863	8,145	10,074
134	See GR Total	3493	8923
135	See GR Total	2467	4508
168	See GR Total	106	566
UT	See GR Total	1274	1246
Green River Total	1,635	7,340	15,243
Herd Unit Total	**4,498**	**15,485**	**25,317**
Sightability Corrected Estimate	11,023	30,213	29,074
85% & 90% CI	8618 – 13,428	24,956 - 35,470	28,606 - 29,542
Sightability Correction	+/-2,405	+/- 5,257	+/-3,757
Probablity of Detection/Observability	71%	74%	87%
PH Pop Estimate	10,341 (IPM)	29,578 (IPM)	30,500 (SSM)
No. Strata/Count Blocks	Strata: 294 High; 192 Low	Strata: 317 High; 173 Low	Count Blocks: 90 (68S;22N)
Subunits Available	High:421; Low:875	H:402; Low:701	High-34; Med:38;Low-18
Subunits Sampled	High: 70% Low:22%	High:79% Low:25%	100%
Total Area (Sq. Mi)	486	490	1,657
No. of Observers	~12	~12	~20
Number of Hours	99	121	133
Cost	$114,233	$130,062	$135,000

9.) Focal Herd Research: The Focal Herd captures commenced on December 19, 2022. In continuation with that initial effort, the Department conduced additional captures on December 2, 2023 on LaBarge, Star Valley and Cokeville, Evanston, and Kemmerer winter ranges to supplement the sample size initiated in 2022 (2022 Job Completion Report, Wyoming Range Mule Deer Herd, Wyoming Game and Fish Department).

Annual mule deer survival significantly increased during the 2023- 2024 winter above the extreme losses observed during the 2022- 2023 winter, which by all accounts was the most unprecedented winter mortality event in at least 40 years. As of May 23, 2024, 194 of the 231 deer that entered the winter in December 1, 2023 were alive. Survival among the adult male and female age classes was extremely high at 92% and 94% respectively. In addition, 33 fawns of the 59 radio-collared fawns, or 56%, were alive as of the May 23, 2024 reporting date (Appendix D).

APPENDIX A
Wyoming Range Mule Deer Herd
Post-hunt Herd Composition Data, 2016-2023

							Ratio:100 Females			
2016	Yrlng Males	Adult Males	Total Males	Does	Fawns	Total	Yrlng Males	Adult Males	Total Males	Fawns
HA134	95	190	285	774	489	1549	12	24	36	63
HA135	182	380	562	1605	1008	3175	11	24	35	63
HA143	256	260	516	1430	723	2669	18	18	36	50
144/145	Survey conducted in February 2017					517				
TOTAL	533	830	1363	3809	2220	7910	14	22	36	58
2017*	Herd Unit Wide Antlered Deer, APR Hunt Season									
HA134	14	153	167	672	389	1228	2	23	25	58
HA135	47	282	329	1105	701	2135	4	25	30	63
HA143	111	348	459	1547	701	2707	7	22	30	45
144/145	Sightability Survey Conducted in February 2018					1405				
TOTAL	172	783	955	3324	1791	7475	5	23	29	54
2018*	Herd Unit Wide Antlered Deer, APR Hunt Season									
HA134	134	135	269	1223	721	2213	11	11	22	59
HA135	197	375	572	1752	1070	3394	11	21	33	61
HA143	178	239	417	1277	742	2436	14	19	33	58
144/145	Survey conducted in February 2019					823				
TOTAL	509	749	1258	4252	2533	8,866	12	18	29	59
2019*	Herd Unit Wide Antlered Deer, APR Hunt Season									
HA134	14	86	100	520	287	907	3	16	19	55
HA135	111	318	429	1346	730	2505	8	24	32	54
HA143	338	365	703	1706	1088	3497	20	21	41	64
144/145	Survey conducted in February 2020					142				
TOTAL	463	769	1232	3572	2105	7051	13	21	34	59
2020	Herd Unit Wide Antlered Deer, 3 points APR Hunt Season									
HA134	14	82	96	635	395	1126	2	13	15	62
HA135	50	260	310	1302	835	2447	4	20	24	64
HA143	120	225	345	937	672	1954	13	24	37	72
144/145	Survey conducted in February 2021					632				
TOTAL	184	577	751	2874	1902	6159	6	20	26	66
2021										
HA134	39	29	68	210	99	377	18	14	32	47
HA135	101	131	232	909	520	1661	11	14	25	57
HA143	141	140	281	620	491	1392	23	22	45	79
144/145	Survey conducted in February 2022					493				
TOTAL	281	300	581	1739	1110	3923	16	17	33	64
2022										
HA134	55	70	125	386	225	736	14	18	32	58
HA135	159	260	419	1283	901	2603	12	20	33	70
HA143	380	411	791	1983	1324	4098	19	21	40	67
144/145	Sightability Survey Conducted in February 2023					463				
TOTAL	594	741	1335	3652	2450	7900	16	20	36	67
2023*	Herd Unit Wide Antlered Deer, APR Hunt Season									
HA134	7	36	43	121	37	201	6	30	36	30
HA135	4	43	47	141	60	248	3	30	33	42
HA143	26	74	100	533	174	807	5	14	19	33
144/145	Sightability Survey to be conducted in January 2024									
TOTAL	37	153	190	795	271	1256	5	19	24	34

APPENDIX B

Wyoming Game and Fish

IPM Analysis Report

February 26, 2024

Model Definition

- **Species:** Mule Deer
- **DAU:** Wyoming Range 131
- **Years:** 2004 - 2025
- **Effort Variable:** Days/Harv
- **Effort Prediction Method:** linear
- **Database:** observed_data

Structure

- **Reproduction:** Fixed Effect
- **Adult Survival:** Fixed Effect
- **Juvenile Survival:** Fixed Effect

Model Fitting

- **MCMC Burnin:** 50,000
- **MCMC Iterations:** 55,000
- **Thinning Rate:** 1

Diagnostics

The Brooks, Gelman and Rubin convergence diagnostic (Rhat) is a test used to determine whether the analysis has found a reliable solution. Values < 1.1 generally suggest that the model was run for a sufficient number of iterations while values > 1.1 suggest that the model should be run for more iterations. The maximum values of the point estimate and upper CI are reported below.

- **Rhat Max of Point Est:** 1.11
- **Rhat Max of Upper CI:** 1.35
- **Proportion $<$ 1.1:** 0.99
- **Convergence Likely:** Pretty likely, but not perfect

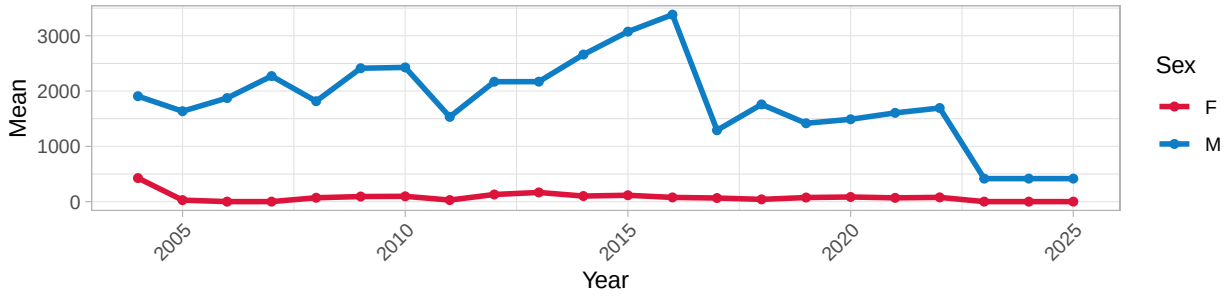
JCR Summary

	2023	2024	3 Year Average
Preseason Population Estimate	11,422 (9,735-13,274)	11,447 (8,699-14,704)	
Total Harvest	416	416	
Postseason Population Estimate	10,341 (8,772-12,027)	10,349 (7,834-13,363)	
Female $\geq$ 1 year old Harvest Rate	0	0	
Male $\geq$ 1 year old Harvest Rate	0.18	0.14	0.2
Projected Change in Postseason Population	0.41	1	

Using this report

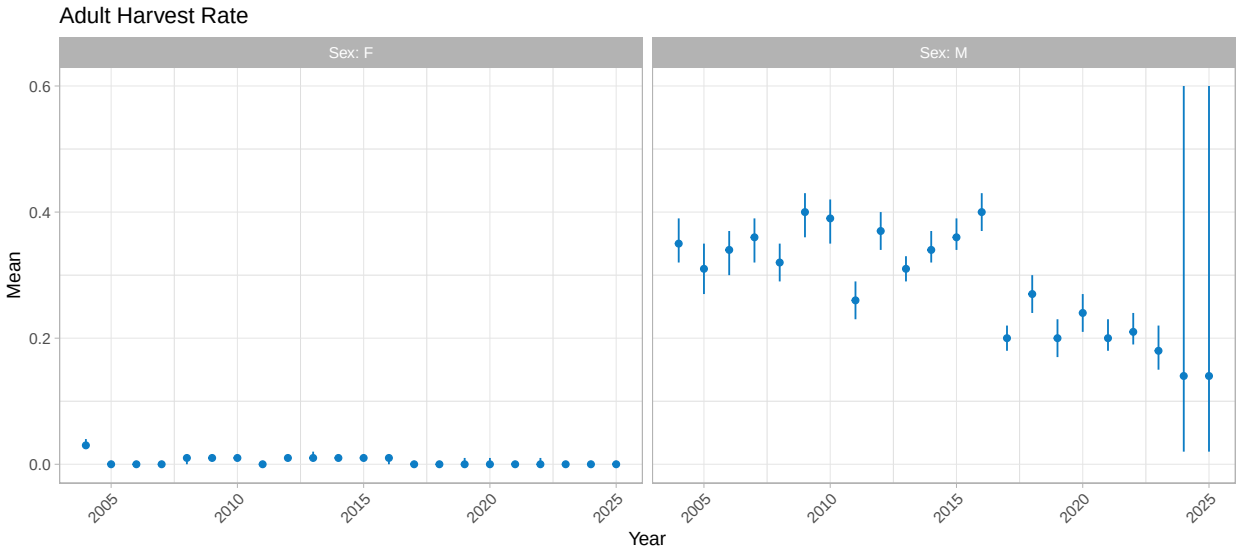
- Estimates v Observations
  - The term *estimate* is used to reference values estimated by the integrated population model (IPM) while *observation* is used to refer to field observations that serve as inputs to the IPM.

Harvest

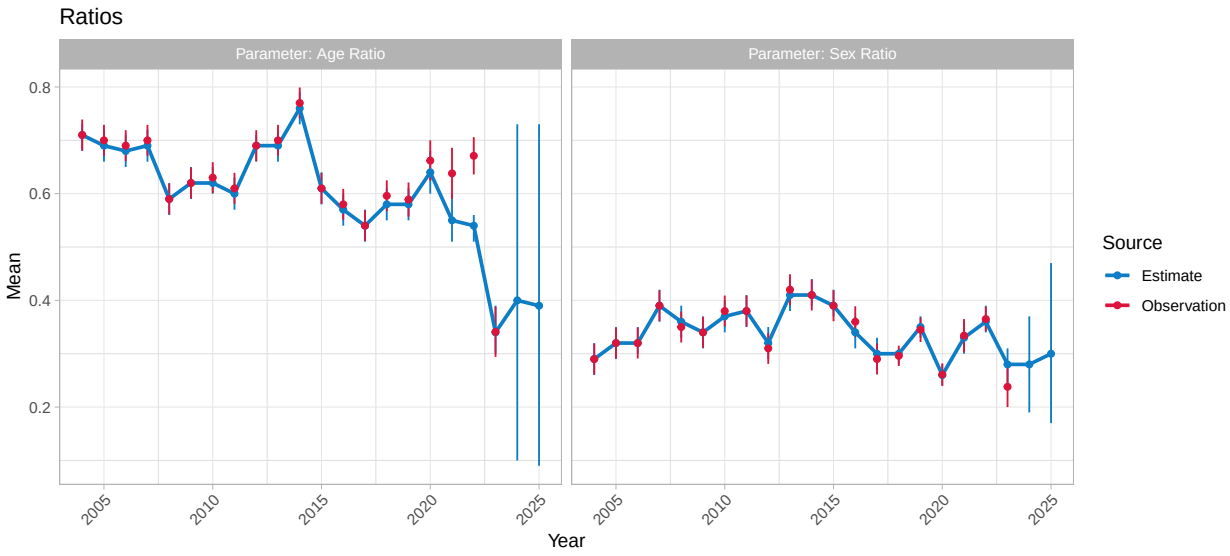


The plot above depicts male (M) and female (F) harvest through time.

Adult Harvest Rate

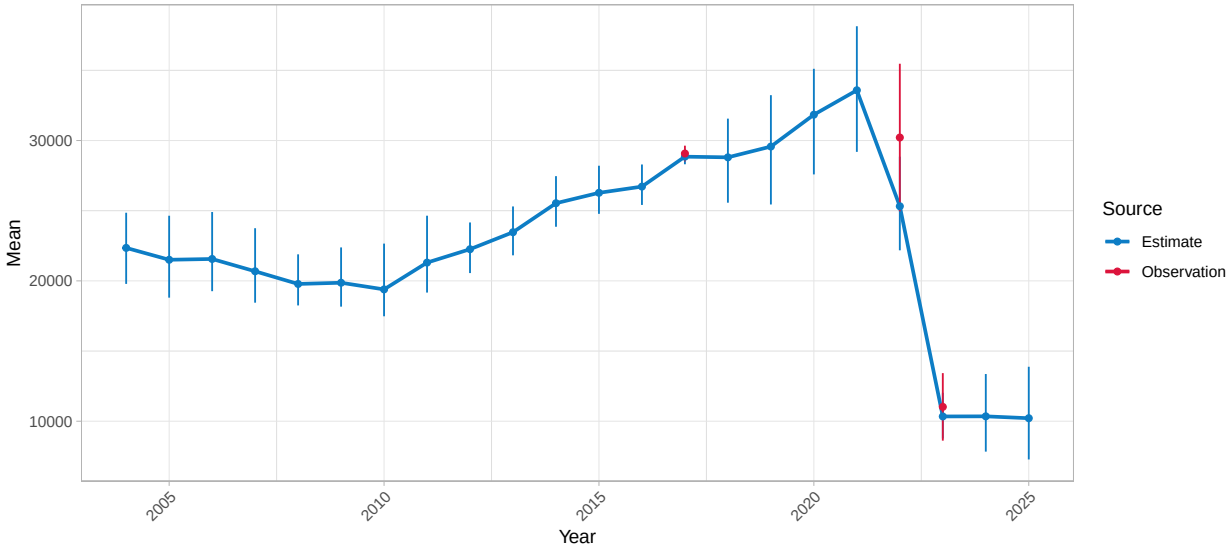


Ratios


Ratios
Parameter: Age Ratio
Parameter: Sex Ratio
Mean
0.8
0.6
0.4
0.2
2005
2010
2015
2020
2025
Year
Source
Estimate
Observation

Abundance

Total Post Season Abundance



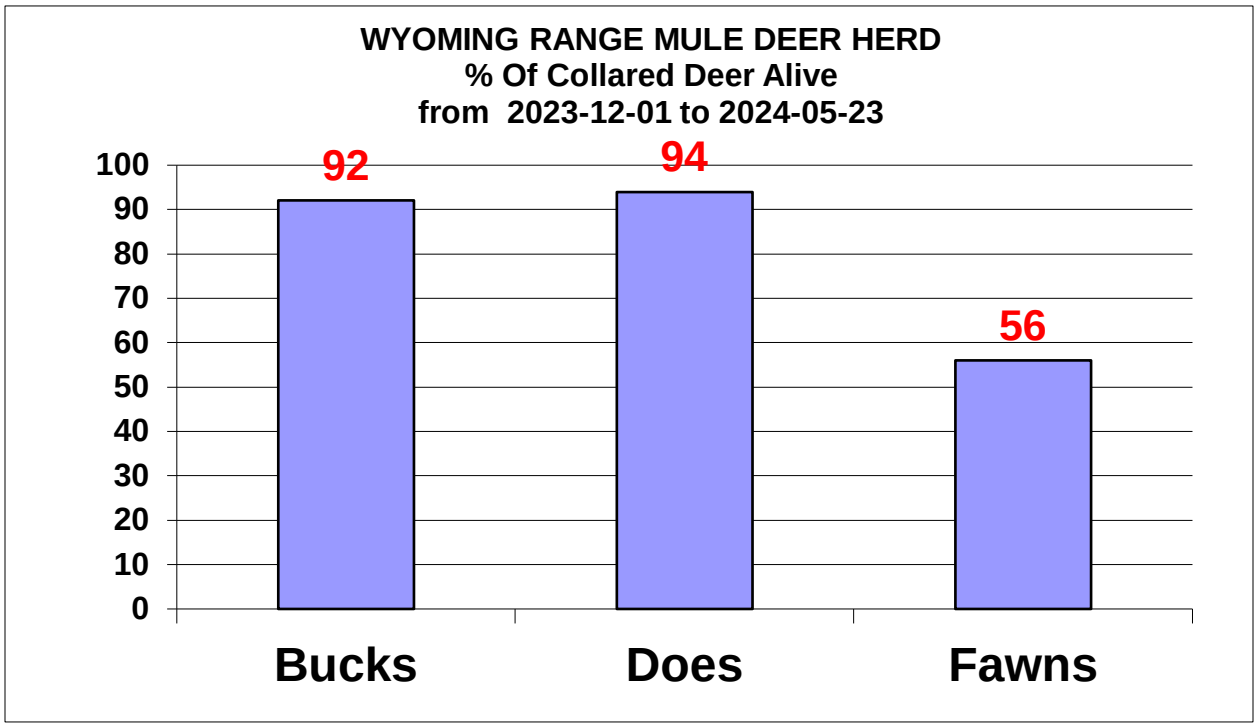
Report prepared using SpeedGoat® software

APPENDIX C

N
Bondurant
Hoback Basin
Clark Draw
Noble Basin
South Rim
Tripod Hill
Cow Gulch
Bronx
Forty Rod Flat
Merna
Beaver Ridge
Lookout Mountain
Cora
Daniel
Pinedale
Big Flattop Mountain
Fortification Mountain
Willow Lake
New Fork Lakes
Halfway
Sublette
Boulder
Soap Hole Basin
The Mesa
Lovatt Draw
Big Piney
Marbleton
Ross Ridge
Alkali Draw
Dry Basin
Basin Draw
Chapin Canyon
Figure Four Canyon
Bird Canyon
Calpet
La Barge
Mc Cray Basin
Lake Mountain WSA
Bridger National Forest
Commissary Ridge
Deadline Ridge
Absaroka Ridge
Snider Basin
North Mountain
Riley Ridge
Dempsey Basin
Lincoln
Cumberland Flats
Oyster Ridge
Opal Bench
Whiskey Basin
Seedskadee National Wildlife Refuge
Fossil
Fossil Ridge
Frontier
Kemmerer
Diamondville
Opal
Oakley
Elkol
Sublette Flat
Cokeville
Cokeville Meadows National Wildlife Refuge
Fairview
Auburn
Alpine Junction
Alpine
Thayne
Star Valley Ranch
Etna
Afton
Giveout
Raymond
Raymond Mountain WSA
Pegram
Sheep Creek Hills
Gannett Hills
Smoky Canyon
White Canyon
Webster Canyon
Black Mountain
Buck Mountain
Bald Mountain
Elk Mountain
Bradley Mountain
Prater Mountain
Grizzly Basin
Man Peak
Salt River Range
Corral Canyon
Grayback Ridge
Middle Ridge
Bear Lake Plateau
North Eden Canyon
Lake Ridge
Thomas Fork Valley
Sublette Range
Crawford Mountains
Randolph
Woodruff
Big Meadow
Stansbury Ridge
Murphy Ridge
Almy
Evanston-Uinta County Airport
Evanston
Uinta
Carter
Bridger
Fort Bridger
Lyman
Mountain View
Granger
Verne
Little America
Porter Hollow
Chicken Draw
Fourmile Gulch
Blackhorn Canyon
Lenelle Reservoir
Green River
Blacks Fork River
Paradise Rd
New Fork River
Lower Farson Cutoff rd
State Highway 372
State Highway 28
Whitney Canyon
Whitney Canyon Haul Rd
Bear River
Hams Fork
Twin Creek
Clear Creek
Ryckman Creek
Sharrard Creek
Slate Creek
North Fork Slate Creek
South Fork Slate Creek
Dempsey Ridge
Cottonwood Creek
North Cottonwood Creek
North Piney Creek
South Piney Creek
Hoback River
Little Greys River
Greys River
Salt River
Dell Creek
Fontenelle Creek
Dry Muddy Creek
Little Muddy Creek
Sheep Creek
Muddy Creek
Chicken Creek
Carter Creek
Hams Fork Creek
Commissary Ridge
Oldman Ridge
Deadline Ridge
Absaroka Ridge
Biglow Bench
Porter Hollow
Cumberland Flats
Lake Mountain WSA
Raymond Mountain WSA
Bridger National Forest
Fossil Butte National Monument
Cokeville Meadows National Wildlife Refuge
Seedskadee National Wildlife Refuge
Green River
Blacks Fork River
Fontenelle Reservoir
Lake Mountain WSA
Raymond Mountain WSA
Bridger National Forest
Fossil Butte National Monument
Cokeville Meadows National Wildlife Refuge
Seedskadee National Wildlife Refuge
0
7
14
28 Miles
Esri, NASA, NGA, USGS, FEMA, Lincoln County, WY, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS

APPENDIX D

WYOMING RANGE MULE DEER HERD
A SUMMARY OF FOCAL HERD MULE DEER SURVIVAL
DECEMBER 1, 2023 – MAY 23, 2024



Wyoming Range mule deer monitoring update 2024-05-23

There are currently **194** mule deer on air including **45 buck**s, **116 does**, and **33 juveniles**. There have been **37** total mortalities since 2023-12-01 including **4 bucks**, **7 does**, and **26 juveniles.**

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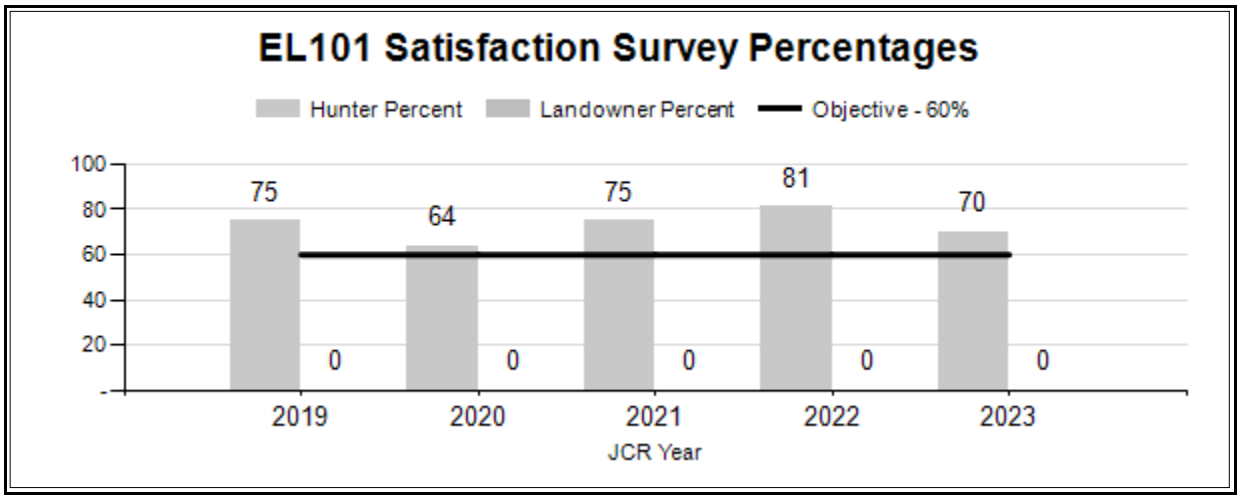
2023 - JCR Evaluation Form

SPECIES: Elk
PERIOD: 6/1/2023 - 5/31/2024
HERD: EL101 - TARGHEE
HUNT AREAS: 73
PREPARED BY: ALYSON COURTEMANCH

	2018 - 2022 Average	2023	2024 Proposed
Hunter Satisfaction Percent	74%	70%	75%
Landowner Satisfaction Percent	n/a	n/a	n/a
Harvest:	50	34	50
Hunters:	119	109	120
Hunter Success:	42%	31%	42%
Active Licenses:	128	122	120
Active License Success:	39%	28%	42%
Recreation Days:	844	902	700
Days Per Animal:	16.9	26.5	14
Males per 100 Females:			
Juveniles per 100 Females			

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:	6



2024 HUNTING SEASONS
TARGHEE ELK HERD (EL101)

Hunt Area	Type	Special Archery Dates		Regular Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
73	Gen	Sep. 1	Sep. 19	Sep. 20	Oct. 25		Any elk
73	6			Aug. 15	Jan. 31	35	Cow or calf valid on private land
73	6	Sep. 1	Sep. 19				Cow or calf valid in the entire area

2024 Nonresident Western Region Elk General License Quota: 2,775 licenses

2023 Hunter Satisfaction: 69.7% Satisfied, 16.6% Neutral, 11.0% Dissatisfied

2024 Management Summary

1.) Hunting Season Explanation: This herd is managed with a hunter satisfaction objective (60%) because the majority of elk migrate to winter ranges in Idaho, making them unavailable in Wyoming during the post-hunt population survey time frame. Hunter satisfaction in 2023 was 70%. Hunting opportunity in this herd unit is limited due to limited access points to public lands, steep terrain, and fall migration of elk to Idaho. Despite relatively low overall harvest numbers (34 elk were harvested in 2023 by 109 active hunters), hunter satisfaction in this herd unit is high and the herd is meeting its hunter satisfaction objective. This herd unit is part of the Western (W) Region for nonresident General licenses in 2024.

Many of these elk migrate into the Island Park Hunting Zone in Idaho, which is currently above Idaho's management objectives. Due to private lands damage issues, Idaho has relatively liberal late season elk hunting to reduce both cows and bulls in this herd. The numbers and composition of elk in Hunt Area 73 are largely driven by Idaho's elk management. Therefore, the Wyoming General license season for Hunt Area 73 was changed from a spikes excluded limitation to be valid for any elk in 2024. Restricting harvest in Hunt Area 73 to antlered elk, spikes excluded will not affect herd numbers or composition since the majority of these elk migrate into Idaho during their open hunting seasons. We will monitor how this change affects elk harvest and hunter satisfaction in Hunt Area 73 in future years and adjust if necessary.

2.) Management Objective Review: This herd unit objective was reviewed in 2024. We are maintaining this herd at the current objective and management strategy. We evaluated and considered population status, seasonal distribution, and survey methods and decided a change is not warranted at this time. The herd will be up for objective review again 2029; however, further work to find appropriate objectives as an alternative to the hunter satisfaction objective will likely result in proposed changes prior to 2029.

We evaluated the feasibility of shifting this herd to a population-based objective instead of a satisfaction-based objective this year. This is a relatively small, interstate elk herd that spends the

summer and early fall in Wyoming but the majority of the herd migrates to Idaho for the winter. They mix with other Idaho elk herds on winter ranges around Victor, Driggs, Tetonia, Ashton, and St. Anthony in Idaho. Herd numbers are largely driven by hunting seasons in Idaho. Some groups of elk can spend the winter in Alta, Wyoming and can cause damage on private lands, however, we added a Type 6 late season license valid on private lands, which has helped this problem. Annually, only about 30-60 elk are harvested in this herd unit. Approximately 20-30% of the harvest occurs on the Type 6 license. Hunter satisfaction has been above objective for the past 5 years.

It is unknown how many elk are in this herd unit. Some years, approximately 300 elk are in the Alta area around private lands. Surveys have not been conducted on public lands in the herd unit during the summer or early fall when elk are present because it would be very difficult and expensive to survey, given the high amount of forested cover and relatively low elk densities. The number of elk in this herd is largely driven by hunting seasons and/or agricultural damage situations in Idaho. Many of these elk winter on private lands in Idaho and cause damage, therefore Idaho has liberal seasons in some areas to control elk numbers. Elk from our Targhee Elk Herd migrate into two Idaho Elk Management Zones: Island Park Zone and Palisades Zone. From 2018-2022, we worked with Idaho Fish and Game to capture and GPS-collar 33 cow elk from Idaho winter ranges with suspected interchange with the Targhee Elk Herd.

The southern boundary of the Island Park Zone is Highway 33 generally between South Leigh Canyon, Tetonia, and Sugar City. This zone stretches north through Henry's Lake and Island Park. Elk from the northern portion of the Targhee Elk Herd migrate into this zone. This zone is currently over Idaho's objective and therefore they have relatively liberal hunting seasons. For example, in 2023 Idaho issued 800 antlerless elk licenses for various hunt areas and season lengths in the Island Park Zone, running from October 15 – November 30. There were also other controlled hunting seasons (limited quota seasons) totaling an additional 465 licenses as well as general hunts for archery and muzzleloader. The Palisades Zone includes the Teton Valley area south of Tetonia. Elk from the southern portion of the Targhee Elk Herd migrate into this zone. The Palisades Zone is within Idaho's objective for bulls and below objective for cows. Therefore, hunting seasons in this zone are less liberal.

It would be extremely difficult, expensive, and require a high degree of coordination with Idaho Fish and Game to obtain a population estimate for this herd unit. When elk are in Wyoming in the summer and fall, they are widely dispersed and mostly occur in forested areas. Therefore, aerial surveys would be difficult and may not yield reliable results. Camera surveys may be possible, but would be very time-consuming due to the remote and rugged areas throughout the herd unit. Currently, this elk herd is providing some hunter opportunity (with high satisfaction rates), damage on private lands in Alta is manageable, and managers feel that there are higher priority herds in the Jackson Region to devote limited time and resources for obtaining population estimates. Managers will continue to coordinate with Idaho Fish and Game and explore options for an alternative to the hunter satisfaction objective and may propose an objective change in the future. Based on field observations, we estimate there are approximately 400-600 elk in this herd.

3.) Chronic Wasting Disease Management: This is a Tier 3 surveillance herd that is not a priority for CWD sampling at this time due to its very low elk harvest. Collecting an adequate sample size in this herd is extremely difficult due to low elk harvest over a very large area. CWD management in this herd focuses on opportunistic hunter-harvest and roadkill sampling and sampling any animals that are displaying signs of sickness. One CWD sample was collected from a harvested elk in 2023 (Table 1). CWD has not been detected in this elk herd, although confidence intervals are large due to very low sample size.

Table 1. Chronic wasting disease prevalence for elk in the Targhee Elk Herd Unit in 2023 and for 3-year period of 2021-2023.

Year	Percent CWD-Positive and sample size (n) *Hunter Harvest Only*
	All Adult Elk (CI = 95%)
2023	0.0% (n=1)
2021 - 2023	0.0% (CI 0.0% - 45.9%, n=6)

2023 - JCR Evaluation Form

SPECIES: Elk

PERIOD: 6/1/2023 - 5/31/2024

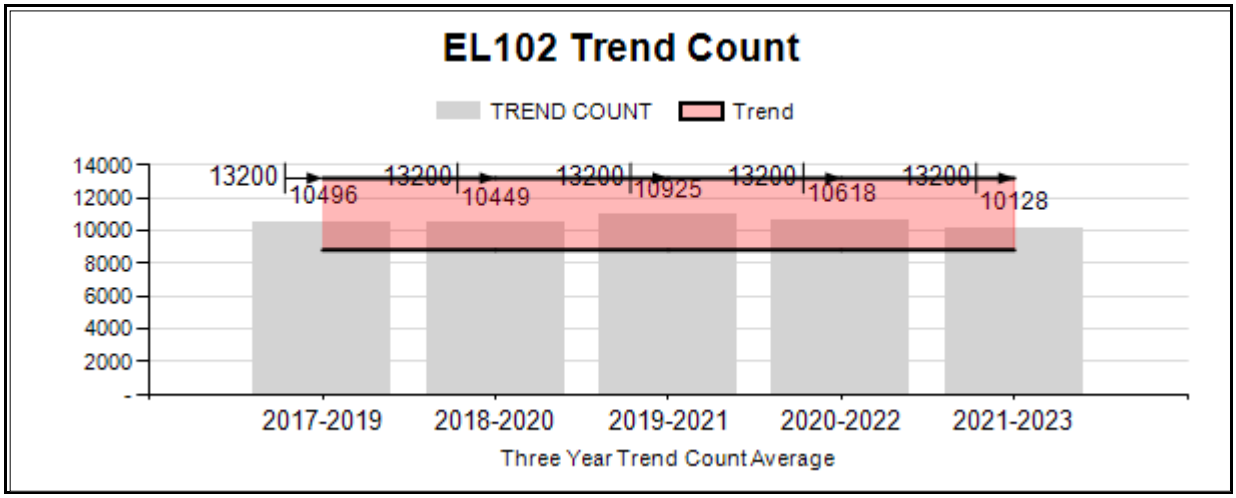
HERD: EL102 - JACKSON

HUNT AREAS: 70-72, 75, 77-83

PREPARED BY: ALYSON COURTEMANCH

	2018 - 2022 Average	2023	2024 Proposed
Trend Count:	10,493	9,264	11,000
Harvest:	1,101	862	1,100
Hunters:	2,612	2,006	2,600
Hunter Success:	42%	43%	42%
Active Licenses:	2,749	2,184	2,700
Active License Success	40%	39%	41 %
Recreation Days:	16,894	12,532	16,900
Days Per Animal:	15.3	14.5	15.4
Males per 100 Females:	33	86	
Juveniles per 100 Females	21	23	

Trend Based Objective (± 20%)	11,000 (8800 - 13200)
Management Strategy:	Recreational
Percent population is above (+) or (-) objective:	-15.8%
Number of years population has been + or - objective in recent trend:	2



2024 HUNTING SEASONS
JACKSON ELK HERD (EL102)

Hunt Area	Type	Special Archery Dates		Regular Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
70	Gen	Sep. 1	Sep. 19				Any elk
70	Gen			Sep. 20	Oct. 31		Antlered elk, spikes excluded
71	Gen	Sep. 1	Sep. 19				Any elk
71	Gen			Sep. 20	Oct. 31		Antlered elk, spikes excluded
72							Closed
75	4			Nov. 16	Dec. 8	20	Antlerless elk; the Snake River Bottom and Antelope Flats portions shall be closed
75	6			Nov. 16	Dec. 8	20	Cow or calf; the Snake River Bottom and Antelope Flats portions shall be closed
77				Oct. 9	Oct. 22		General license and unused limited quota licenses, excluding limited quota cow or calf licenses, valid for any elk
77				Oct. 23	Nov. 27		General license and unused limited quota licenses, antlerless elk
77	Youth only			Nov. 28	Dec. 1		National Elk Refuge permits shall be issued only for those in possession of a full price youth elk license, any elk; youth only
77				Dec. 2	Dec. 13		General license and unused limited quota licenses, antlerless elk
78	Gen	Sep. 1	Sep. 25				Any elk valid in the entire area
78	Gen			Aug. 15	Oct. 31		Antlerless elk valid on private land
78	1			Aug. 15	Sep. 25	75	Any elk valid off national forest

Hunt Area	Type	Special Archery Dates		Regular Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
78	1	Sep. 1	Sep. 25	Sep. 26	Jan. 31		Any elk valid in the entire area
78	2			Aug. 15	Oct. 31	50	Any elk valid on private land
78	2	Sep. 1	Sep. 25				Any elk valid in the entire area
78	6			Aug. 15	Sep. 25	175	Cow or calf valid off national forest
78	6	Sep. 1	Sep. 25	Sep. 26	Jan. 31		Cow or calf valid in the entire area
79							Closed
80	Gen	Sep. 1	Sep. 25	Sep. 26	Oct. 31		Any elk
80	6	Sep. 1	Sep. 25	Oct. 15	Nov. 20	300	Cow or calf
80	6			Nov. 21	Nov. 30		Cow or calf valid south of the Curtis Canyon and Sheep Creek Roads (U.S.F.S. roads 30440 and 30445) excluding the Flat Creek drainage
81	Gen	Sep. 1	Sep. 25				Any elk
81	Gen			Sep. 26	Oct. 25		Antlered elk, spikes excluded
82	Gen	Sep. 1	Sep. 25				Any elk
82	Gen			Sep. 26	Oct. 25		Antlered elk, spikes excluded
82	4	Sep. 1	Sep. 9	Sep. 10	Nov. 3	50	Antlerless elk
82	4			Nov. 4	Jan. 31		Antlerless elk on private land, also valid on private land in Areas 70 and 81
83	Gen	Sep. 1	Sep. 30				Any elk
83	Gen			Oct. 1	Oct. 25		Antlered elk, spikes excluded

2024 Nonresident Western Region Elk General License Quota: 2,775 licenses

2023 Hunter Satisfaction: 71.8% Satisfied, 16.4% Neutral, 11.8% Dissatisfied

2023 Management Summary

1.) Hunting Season Evaluation: The 2024 season structure was maintained similar to recent years and continues to focus antlerless harvest on short and medium-distance migratory herd segments with more conservative, mostly antlered harvest, on long-distance migratory and Gros Ventre herd segments.

The 2023 mid-winter trend count was 9,264 elk, a decline of 800 elk from 10,064 elk counted last year. This was due to very mild winter conditions during the survey and elk being widely dispersed across native winter ranges. In addition, some areas were not able to be comprehensively surveyed due to windy and low visibility flying conditions. The National Elk Refuge (NER) was not feeding at the time of the survey, therefore a ground classification count was not possible. Despite not feeding, there were several large groups of elk on the southern portion of the NER (hundreds and thousands). These groups were counted using videos taken from the helicopter, but were not classified. Overall, for the elk that were classified in the herd unit, the calves to 100 cows ratio was 23. The bulls to 100 cows ratio was 86, which is highly inflated due to many bulls being classified on native winter ranges and many cows not classified in the large groups on the NER. There were 2,144 elk in the Gros Ventre drainage (849 on feedgrounds and 1,295 on native winter range), 5,921 on the NER, and 1,199 on other native winter ranges. The 3-year trend count average is 10,128 and within the herd unit objective.

There are few changes to the 2024 hunting seasons. The Elk Reduction Program in Grand Teton National Park in Hunt Area 75 remained the same as last year because counts were low and the herd is not projected to increase much above the 11,000 objective in spring/summer 2024. Due to the mild winter and abnormal trend count conditions, there is a high degree of uncertainty around the actual size of the herd and therefore managers opted to not make any changes to Hunt Area 75. Archery seasons were added to several Hunt Area 78 license types as a result public requests for archery opportunity on these licenses. Clarification was added to the Hunt Area 80 late season limitations language. Hunt Area 82 Type 4 licenses were increased slightly from 45 to 50.

Overall harvest success in the Jackson Elk Herd in 2023 was 43%. A total of 862 elk were harvested. Due to mild fall and winter conditions, backcountry antlered elk hunting was average but late season cow/calf hunts had low success due to late migrations. There were three full price licenses that had over 60% success: Hunt Area 78 Type 1 license (69%), Hunt Area 78 Type 2 license (62%), and Hunt Area 82 Type 4 license (78%). Continued harvest pressure on specific segments of the herd are needed to prevent and manage damage. Quotas were increased for the Hunt Area 78 Type 1 and Hunt Area 82 Type 4 licenses in 2023. Most elk harvest on the Hunt Area 78 Type 1 license and all harvest on the Type 2 license occurs on private land and access is limited to a small number of landowners. Managers feel that there is currently not enough access to offer additional licenses. Managers proposed to increase the Hunt Area 82 Type 4 license last year to 75 but the public voiced concerns about this being too high.

During the 2023/2024 hunting season, there were two authorizations for auxiliary elk harvest in this herd unit under the Chapter 34 Regulation. These auxiliary hunts were for cow or calf elk in Hunt Areas 78, 70, 81, and 82 and ran from February 1-15, 2024. In total, a minimum of 14 cow

elk were harvested under these authorizations in addition to totals reported in the harvest survey. Details are as follows:

- **Auxiliary Hunt 2 – Elk Hunt Area 78** (valid in entire area)
  - Teton County – valid in the entire hunt area
  - Season Dates: February 1-15, 2024
  - Unused Hunt Area 78 Type 1 and Type 6 licenses; no new licenses issued
  - Minimum harvest = 1 adult cow elk

- **Auxiliary Hunt 3 – Elk Hunt Areas 70, 81, 82** (private land only)
  - Teton County – 2 participating landowners
  - Season Dates: February 1-15, 2024
  - 50 Auxiliary licenses authorized; unused Area 82 Type 4 licenses also valid
  - Minimum harvest = 13 adult cow elk (9 with auxiliary licenses, 4 with 82-4 licenses)

2.) Management Objective Review: The Jackson Elk Herd objective review was scheduled for 2021. However, herd unit managers decided to postpone the objective review until the current Elk Feedgrounds Public Collaborative Process is completed. The results of this process may have direct implications to the evaluation of the herd unit objective. The Wyoming Elk Feedgrounds Management Plan was adopted by the Wyoming Game and Fish Commission on March 12, 2024. This plan calls for Feedground Management Action Plans to be developed for each elk herd unit. The Jackson Herd Unit is expected to be completed in 2025 or 2026.

3.) Chronic Wasting Disease Management: This is a Tier 1 surveillance herd. The first CWD-detected elk in this herd unit was sampled in 2020 in Hunt Area 75. No additional CWD detections in elk have occurred since then. Prevalence estimates and sample sizes are presented below (Table 1). Sample size is high in this herd due to mandatory sampling in Hunt Areas 75 (Grand Teton National Park) and 77 (National Elk Refuge) and efforts by Department personnel in the Jackson Region to collect samples from meat processors, head barrels, and from hunter contacts in the field. However, sample distribution is skewed to the southern hunt areas that are primarily antlerless harvest where access is easier. Samples are limited from backcountry hunt areas, however Department personnel are working to improve this by prioritizing time spent contacting backcountry camps and trailheads as well as training hunters and outfitters to collect their own samples. Currently, CWD management activities are focused on proper carcass disposal and surveillance through hunter-harvested elk, road-kills, and any elk that is exhibiting signs of sickness.

Table 1. Chronic wasting disease prevalence for hunter-harvested elk in the Jackson Elk Herd Unit in 2023 and for 3-year period of 2021-2023.

Year	Percent CWD-Positive and sample size (n) *Hunter Harvest Only*
	All Adult Elk (CI = 95%)
2023	0.0% (n=137)
2021 - 2023	0.0% (CI 0.0% - 0.4%, n=883)

4.) Brucellosis Surveillance and Feedgrounds: Mild early winter conditions in the Jackson Region influenced later-than-average feeding start date across most feedgrounds, but a historic March 1 snow storm extended feeding seasons longer than anticipated based on overall winter severity. Feeding duration on the NER was one of the shortest and latest to start documented, starting on March 4 and ending on Mach 29 (26 total feeding days). Corral trapping did occur on the NER, in an effort to continue long term brucellosis surveillance and to deploy GPS collars. Brucellosis surveillance efforts in this herd were associated with satellite collar and ear tag deployments via darting and trapping on feedgrounds.

Table 2. 2024 Jackson Elk Herd Brucellosis Surveillance

Feedground	Capture Method	GPS collars deployed	# Captured	# Tested	# Seropositive	% Prevalence (2024)
National Elk Refuge	Trap	14	68	44*	11	25%
National Elk Refuge	Dart	5	5	5	2	40%
Patrol Cabin	Dart	6	6	6	3	50%
2024 Totals		25	79	56	16	29%

*statistically significant *n* for estimated prevalence to be within +/- 15% of true prevalence

Table 3. 2023-2024 Feedground start and end dates

Feedground	Start Date	End Date	Days fed
Gros Ventre (Patrol Cabin and Fish Creek)*	1/17/2024	4/10/2024	85
NER	3/4/2024	3/29/2024	26

*Very low feedground elk attendance at Fish Creek Feedground in 2023-2024

5.) National Elk Refuge Step-Down Plan: Biologists from the WGFD and NER jointly monitor forage and snow conditions prior to the initiation of feeding and in the past, have recommended that feeding start when available forage has declined to an average of 300 lbs/acre on the NER. In 2020, the U.S. Fish and Wildlife Service began implementation of its Bison and Elk Management Step-Down Plan: a Structured Framework for Reducing Reliance on Supplemental Winter Feeding (2019) on the NER. Under this plan, the NER is attempting to shorten the elk feeding season, as long as large groups of elk do not leave the NER and cause damage on private lands. The NER ceased feeding one week earlier than normal in 2020 and two weeks earlier in 2021. In 2022, the NER delayed the initiation of feeding by one week and ceased feeding 2 weeks early. In winter 2022/2023, the NER attempted to delay feeding initiation by 2 weeks, but severe winter conditions caused a large group of elk to stage to leave the NER after a delay of only 2 days, which triggered initiation of feeding to prevent elk going to private lands.

Early winter 2023/2024 conditions were very mild with very little snow in January and February. The 300 lbs/acre forage threshold was reached on February 28, 2024 mostly due to forage consumption by elk (bison did not come to the NER until March). The NER planned to delay feeding initiation by 2 weeks, however a record snowstorm occurred on March 1, 2024 and 1-2

feet of wet, dense snow fell on the NER. Therefore, WGFD and NER agreed to initiate feeding on March 4 to prevent elk from leaving the NER (a delay of 4 days). Other than the 10 winters in its history that the NER did not feed at all, March 4th is the latest feeding start date on record. Based on snowmelt trends, the predicted normal feeding end date would have been April 12, however the NER ended two weeks early on March 29th for a total feeding season length of 26 days. Except for the years when the NER did not feed at all, this was the shortest feeding season on record. The long-term average feeding season length is 65 days. Elk mortality on the NER was relatively low this winter with 1.5% mortality documented through early April.

6.) Research: Managers are continuing to focus collaring efforts in the Gros Ventre herd segment in order to better understand elk winter distribution, movements in and out of the drainage, and cow elk survival. These efforts began in fall 2018 and collaring efforts continued in 2019, 2021, and 2022 in order to maintain a sample size of approximately 20-30 cow elk. In total, 75 Gros Ventre cow elk have been collared since 2018. Cow elk survival in 2023 was 80%. Causes of death over the course of the study have been wolf and mountain lion predation (27%), harvest and wounding loss (31%), unknown cause (31%), birth complications (4%), disease (4%), and infection (4%) (Appendix A). The majority of harvest mortalities have occurred outside of the Jackson Herd Unit in adjacent hunt areas 68, 93, and 95. Please the attached project report for more details (Appendix A).

7.) Teton Wilderness and Yellowstone Summer Survey: Managers conducted a summer flight survey of the long-distance migratory segment of the Jackson Elk Herd in the Teton Wilderness in Bridger-Teton National Forest (Hunt Areas 70 and 71) and southern Yellowstone National Park (Appendix B). The primary goal of this survey is to obtain a calf:cow ratio for this herd segment since it has been declining over the long-term. Over two mornings, a total of 1,505 elk were observed including 318 calves and 985 cows for a calf:cow ratio of 32.3. This is the highest calf ratio observed in this herd segment since 1991. This survey is flown about every 3 years. The last survey was flown in summer 2020 and the calf:cow ratio was 21.3. Please see Appendix B for more details.

8.) Journal Publications:

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APPENDIX A.

2023 Progress Report - Gros Ventre Elk Project

Prepared by: Aly Courtemanch, North Jackson Wildlife Biologist
Wyoming Game and Fish Department

Summary

The purpose of this project is to gain information about the seasonal movements and survival of the Gros Ventre segment of the Jackson Elk Herd. The Jackson Elk Herd contains approximately 11,000 elk, and the Wyoming Game and Fish Department has a goal of wintering 3,500 of these elk in the Gros Ventre drainage. However, in recent years as few as 86 elk have spent the winter there. The objectives of this project are to monitor cow elk survival and causes of mortality, evaluate seasonal movements and winter distribution, and evaluate how wolf density and other factors such as changing weather patterns are affecting elk winter distribution. This project began in 2018 with the capture and collaring of 20 cow elk in the Gros Ventre drainage in the fall before they migrate to winter ranges. We captured additional elk in 2019, 2021, and 2022 to maintain a rotating sample size over time as collars dropped off. In total, we have collared 75 cow elk from 2018-2023. Collars have also periodically been redeployed on new elk on the two Gros Ventre feedgrounds during routine trapping or darting operations.

2023 Project Activities

There were 26 collared elk on-air in 2023. The only captures that occurred in 2023 were redeploying 4 collars on new elk at the Fish Creek feedground elk trap during routine trapping operations for brucellosis surveillance testing. The survival rate for collared elk was 81% in 2023. Five elk died; three from wolf predation, one from unknown causes, and one from hunter harvest in the Upper Green outside of the Jackson Herd Unit. Twenty-one elk remain on-air as of December 2023.

Preliminary Results

Cow elk survival

So far, cow elk annual survival has ranged from 71%-91% with a 5-year average of 82% (Figure 1). These survival rates are similar to what we would expect for cow elk, with the exception of 2022 when the survival rate was relatively low at 71%. Overall, during the 5 years of the study the primary causes of death were harvest (mostly outside of the Jackson Herd Unit) (31%; n=8), predation (27%, n=7 (6 wolf and 1 mountain lion)), and unknown causes (31%; n=8) (Figure 2). Other causes of death included disease (necrotic stomatitis; n=1), birth complication (n=1), and infection (n=1). Not all mortalities could be investigated right away because there were not dedicated technicians or graduate students on this project, so some were unknown. The relatively

high proportion of harvest mortalities was unexpected since hunting seasons in the Gros Ventre are structured to include very minimal cow harvest. All harvest mortalities with the exception of one occurred outside of the Jackson Herd Unit in hunt areas 93, 95, and 68. One wounding loss occurred on the National Elk Refuge in hunt area 77.

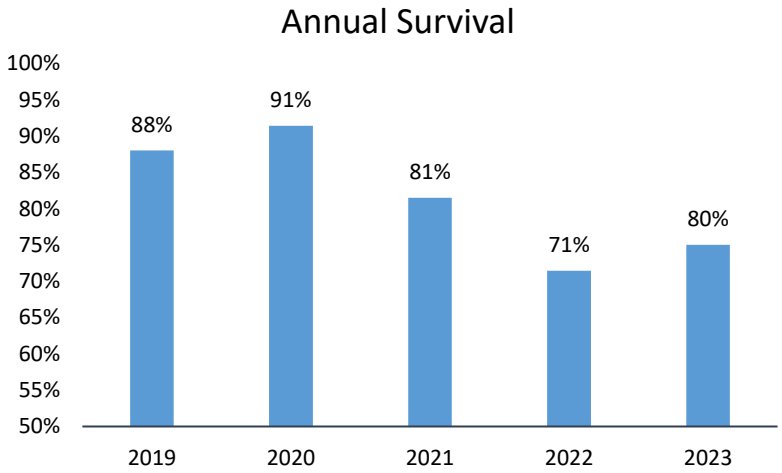


Figure 1. Annual survival of collared cow elk in the Gros Ventre herd segment, 2019-2023.

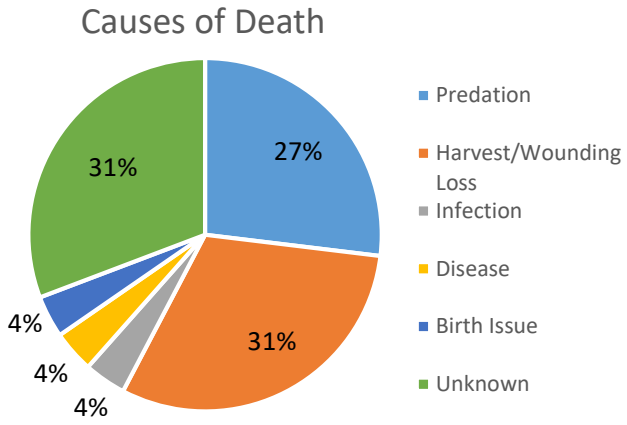


Figure 2. Causes of death of collared cow elk in the Gros Ventre herd segment, 2019-2023.

Seasonal movements

A major finding from this project was that approximately 30%-50% of collared Gros Ventre elk migrated out of the Gros Ventre drainage during the fall and early winter, mostly to the National Elk Refuge (NER), hunt area 80 to the east of the NER, and in Grand Teton National Park near the town of Kelly. Some of these elk returned to the Gros Ventre drainage prior to the core winter period (moved back in early-mid January, depending on snow conditions). The number of elk moving out of the Gros Ventre drainage is variable from year to year and is likely driven by a combination of weather conditions (snow) and wolf density in the drainage. We found that

individual elk can switch their movements from year to year (sometimes leaving the drainage and sometimes not). Overall, 25% of collared elk switched winter ranges at least once during the study, showing that elk are very flexible in their choices of where to winter. Some individuals also switched herd unit in the winter and went to Dubois. Overall, 50% of collared elk always wintered in the Gros Ventre, 25% always wintered on the NER, and 25% switched winter ranges (Figure 3). Nineteen percent of the collared elk wintered off of feedgrounds on native winter range and 81% wintered on feedgrounds (either in the Gros Ventre or on the NER). Interestingly, two elk utilized native winter range on the northern end of the NER and around Kelly Hill and never came to feed (one elk in winter 2018/2019 and one elk in winters 2019/2020 and 2020/2021).

Despite where elk chose to spend the winter, they showed very strong fidelity to their summer ranges with 95% returning to the same summer range every year. Only one elk switched its summer range during the study. Gros Ventre elk mostly summered in the Gros Ventre Range, Togwotee Pass area, Union Pass, South Fork Spread Creek/Kettle Creek area, and Fish Lake Mountain area (Figure 3). Interestingly, two elk summered in the Teton Wilderness. These findings have provided us with the best information to date on understanding elk movements in this herd segment and interpreting winter trend count fluctuations in the different herd segments.

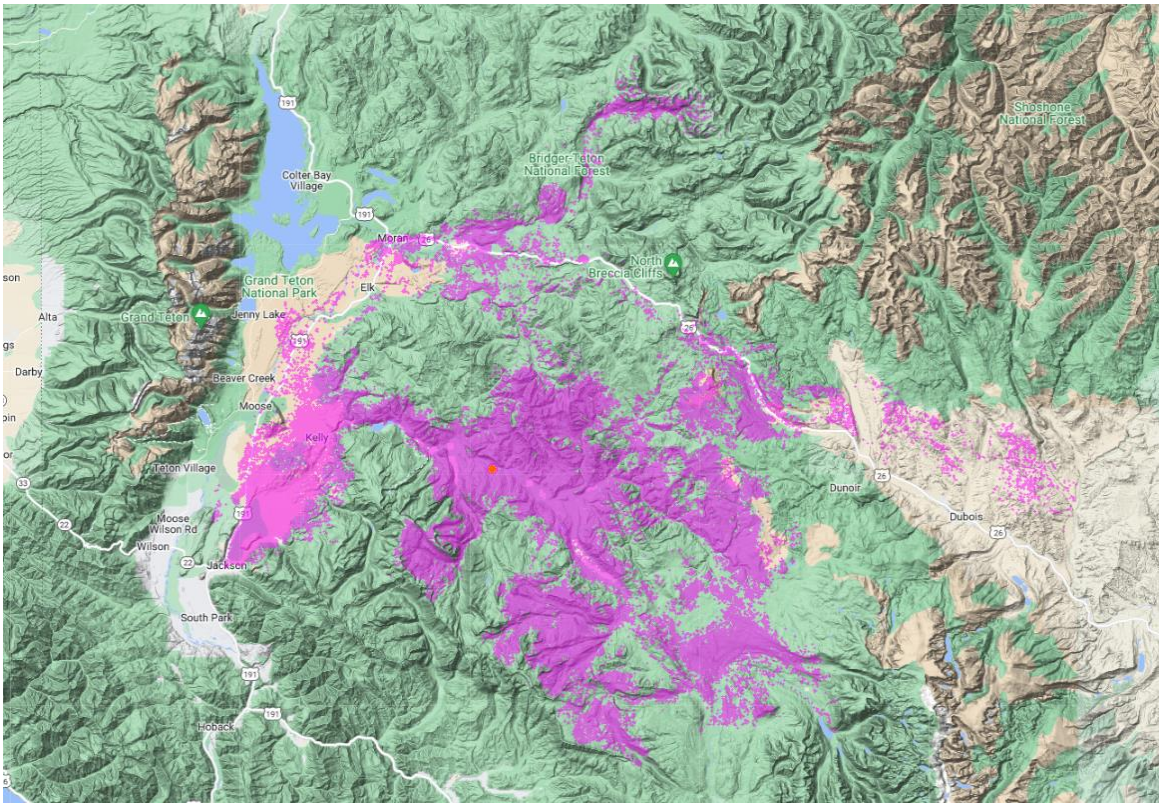


Figure 3. Map of GPS-collared Gros Ventre elk year-round locations (n=75 elk), 2018-2023.

Influence of wolf density and weather on elk distribution

These analyses are still pending and are planned to be completed in 2024.

APPENDIX B.

2023 Pre-Season Elk Classification Flight Report - Teton Wilderness and Southern Yellowstone

Report prepared by: Aly Courtemanch, North Jackson Wildlife Biologist, Wyoming Game and Fish Department

A pre-season elk classification flight was flown August 11-12, 2023 in the Teton Wilderness of Bridger-Teton National Forest (Hunt Areas 70 and 71) and southern Yellowstone National Park (Fig. 2, Fig. 3). The survey took place using a Bell helicopter with pilot Kyle Stenberg from Yarak Aviation (Big Timber, MT). Observers included Aly Courtemanch, North Jackson Wildlife Biologist and Jon Stephens, North Jackson Game Warden. We surveyed from approximately 0630 – 1100 hours over two mornings for a total of 9 hours.

The purpose of the survey was to obtain pre-season classification information on long-distance migratory elk from the Jackson Elk Herd. This segment of the Jackson Elk Herd has been in decline since the 1990s. Summer aerial classifications enable managers to survey this segment before they mix with elk from other herd segments on shared winter ranges.

A total of 1,505 elk were observed during the survey (Table 1). Elk sightability was high due to many large groups foraging in open, high elevation areas (Fig. 1). The overall calf:cow ratio was 32.3. The adult bull:cow ratio was 12.6, the yearling bull:cow ratio was 3.1, and the overall bull ratio was 15.7 (Table 1). Due to the low light conditions on both mornings, it is likely some spikes were misclassified as cows.

Figure 1. A group of elk in hunt area 70 near Marsten Pass.

Several elk were observed with white collars, which indicate they were captured on National Elk Refuge winter range. However, it should be noted that elk in the survey area comprise a mixture of the Jackson, Wiggins Fork, and Cody Herds, therefore not all 1,505 elk observed will migrate to Jackson Herd winter ranges.

When summer classification flights were first flown in this area in 1991, the calf:cow ratio was 37:100. During the past 20 years, the calf:cow ratio has been lower, fluctuating between 21 and 32 with an average of 26.6. There is variability between surveys, however, the overall trend has been flat in the calf:cow ratio from 2000-2023 (Fig. 4). The 2023 ratio was the highest it has been since 1991. The adult bull:cow ratio is highly variable, partly due to the prioritization of the survey in obtaining calf:cow classification and therefore focusing on calf/cow groups and the

difficulty in detecting small bull groups, often in forested areas. In 1991, the adult bull:cow ratio was 18. From 2000-2023, it has fluctuated between 8.2 and 30.2 with an average of 17.8 (Fig. 5).

Figure 2. Example of summer elk habitat in southern Yellowstone National Park.

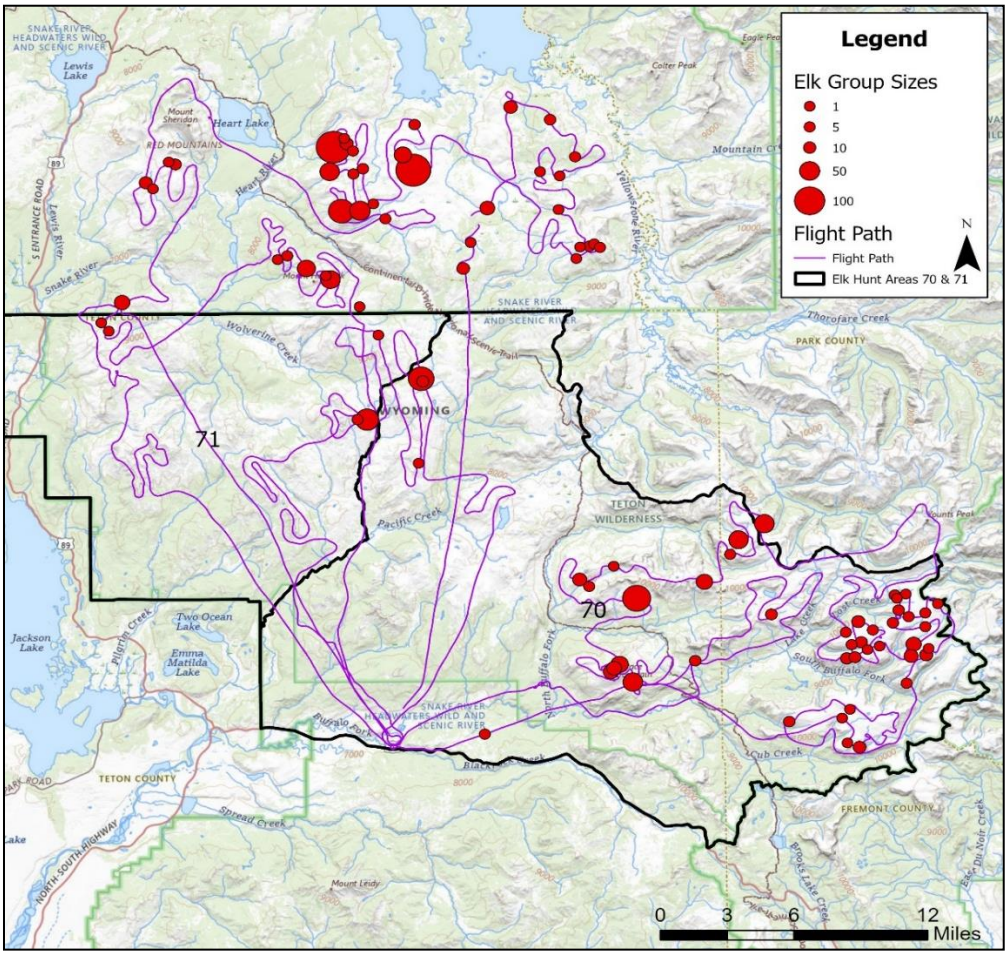


Fig. 3. Elk group locations (red points) and helicopter flight path (purple lines) during 2023 survey. The size of the red point corresponds to the size of the elk group observed.

Table 1. Elk classification by hunt area in the Teton Wilderness and southern Yellowstone National Park, August 11-12, 2023.

Location	Cows	Calves	Adult Bulls	Yearling Bulls	Unclassified	Total	Ratio per 100 Cows		
							Calves	Adult bulls	Yrl bulls
HA 70	433	119	65	17	47	681	27.5	15.0	3.9
HA 71	50	19	7	1	0	77	38.0	14.0	2.0
South YNP	502	180	52	13	0	747	35.9	10.4	2.6
Total	**985**	**318**	**124**	**31**	**47**	**1,505**	**32.3**	**15.7**	**3.2**

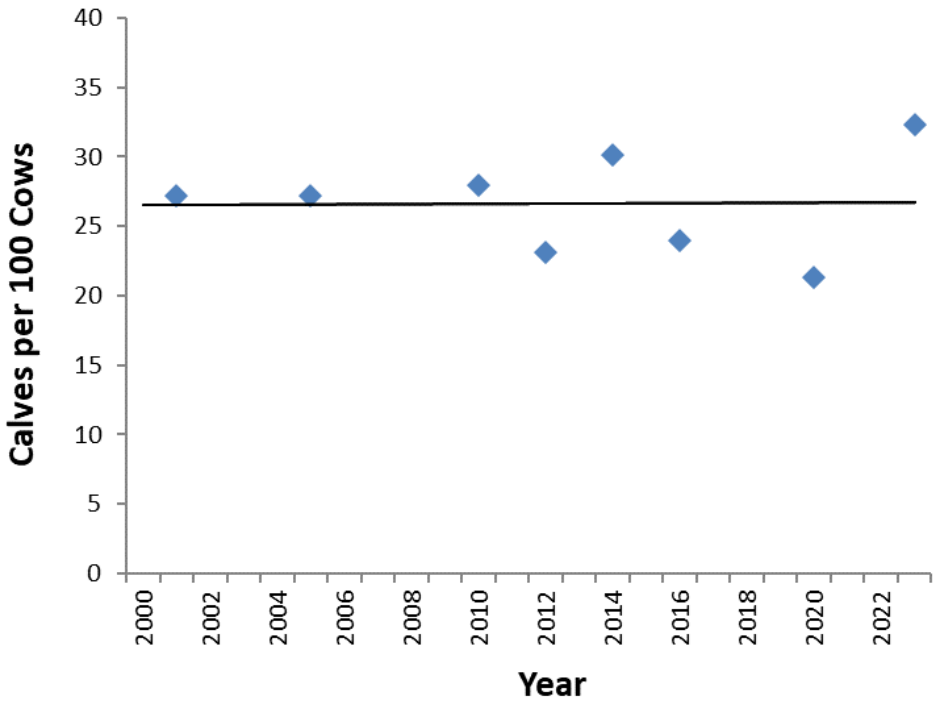


Fig. 4. Elk calf:cow ratios from Teton Wilderness/southern Yellowstone flights from 2000-2023. Ratios are variable, but generally showed a flat trend. The ratio in 2023 was the highest recorded since 1991.

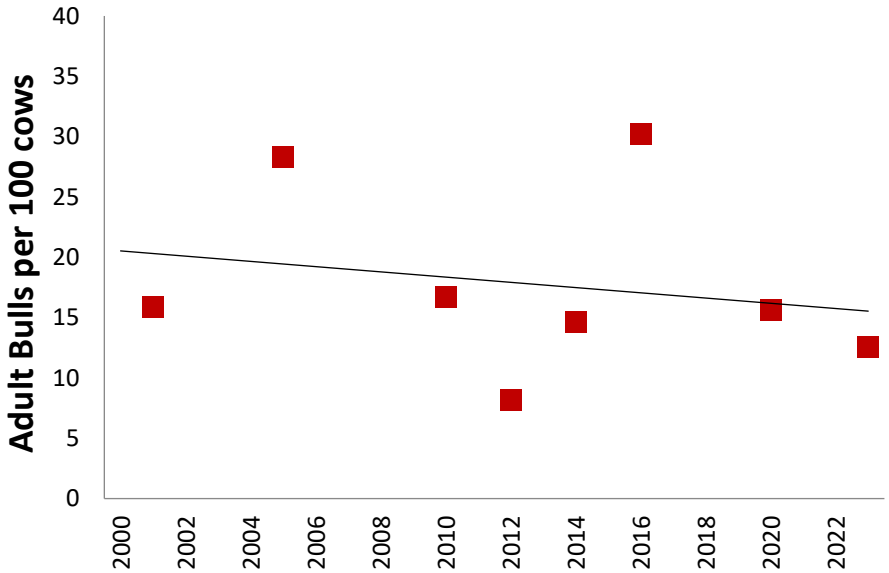


Fig. 5. Adult bull to cow ratios for Teton Wilderness/southern Yellowstone flights from 2000-2023. Ratios are variable, partially because bull groups are generally smaller and more difficult to detect than cow/calf groups.

Jon Stephens, North Jackson Game Warden, classifying a group of elk on Big Game Ridge in the Teton Wilderness.

2023 - JCR Evaluation Form

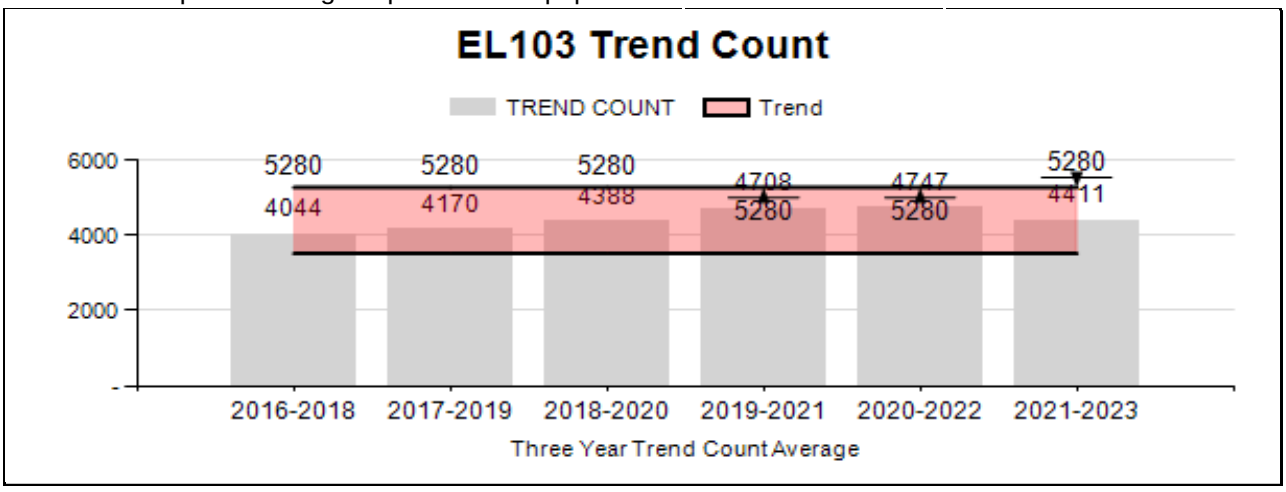
SPECIES: Elk
PERIOD: 6/1/2023 - 5/31/2024
HERD: EL103 - FALL CREEK
HUNT AREAS: 84-85
PREPARED BY: GARY FRALICK

	2018 - 2022 Average	2023	2024 Proposed
Trend Count:	4,599	4,396	4,200
Harvest:	546	783	820
Hunters:	1,534	1,625	1,725
Hunter Success:	36%	48%	48%
Active Licenses:	1,611	1,838	1,725
Active License Success	34%	43%	48%
Recreation Days:	9,991	12,139	13,022
Days Per Animal:	18.3	15.5	15.9
Males per 100 Females:	19	19	
Juveniles per 100 Females	29	27	

Trend Based Objective (± 20%)	4,400 (3520 - 5280)
Management Strategy:	Recreational
Percent population is above (+) or (-) objective:	-2.80%
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%
Total:	NA%	NA%
Proposed change in post-season population:	NA%	NA%



2024 HUNTING SEASONS
FALL CREEK ELK HERD (EL103)

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
84	Gen	Sep. 1	Sep. 25				Any elk
84	Gen			Sep. 26	Oct. 31		Any elk, spikes excluded
84	Gen			Nov. 1	Nov. 15		Antlerless elk
84	1			Nov. 1	Jan. 31	50	Any elk valid on private land west of U.S. Highway 191 and north and east of the Snake River starting at the South Park Bridge
84	6	Sep. 1	Sep. 25	Sep. 26	Nov.30	350	Cow or calf; that portion of Area 84 east and south of Shoal Creek to the Hoback River shall be closed after Nov. 20
84,85	7			Aug. 15	Jan. 31	250	Cow or calf valid on private land in Area 84; also valid in that portion of Area 85 on or within 200 yards of irrigated land north of Fall Creek
85	Gen	Sep. 1	Sep. 25				Any elk
85	Gen			Sep. 26	Oct. 31		Any elk, spikes excluded
85	6	Sep. 1	Sep. 25	Sep. 26	Nov. 15	100	Cow or calf

2024 Region W Nonresident Quota: 2,775 licenses

2023 Hunter Satisfaction: 77% Satisfied, 14% Neutral, 10% Dissatisfied

2024 Management Summary
1.) Hunting Season Evaluation: The hunting season structure will promote any elk, spikes excluded hunting opportunity from September 26 - October 31. Any elk hunting opportunities, in which hunters may select antlerless elk, can decrease hunting pressure on the antlered segment of the population and thereby potentially increase the number of antlered elk observed in the postseason population.

A November general license season in Area 84 that will provide additional opportunity because of the high number of elk counted on the Camp Creek and Horse Creek feedgrounds during the current postseason trend count. This portion of the general November cow/calf only hunt is

proposed to remain at 15 days, and close on November 15. In addition, the number of Type 6 licenses valid for cow or calf only in Area 84 will increase from 300 licenses to 350 licenses and the close on November 30. That portion of Area 84 east and south of Shoal Creek to the Hoback River will close on November 20 in order to not displace elk off the Dell Creek feedground in Area 87. The later closing date in November for Type 6 license holders offers 91 days of opportunity, and is an attempt to address elk numbers that are above desired levels on the Camp Creek and Horse Creek feedgrounds.

A modest increase in opportunity that was implemented in 2023 was successful at maintaining elk numbers at or below desired levels in Area 85. Consequently, no substantial changes are proposed other than eliminating the general license antlerless elk hunt November 1 – November 15. The number of Type 6 cow/calf licenses will remain at 100 and continue with the closing date of November 15. The removal of the general late season antlerless opportunity is to manage elk toward desired numbers on Dog Creek and South Park feedgrounds, which are 800 and 1000 elk, respectively.

The management strategy associated with the issuance of Type 7 licenses has proven to be popular with the hunting public and as a result, these limited quota licenses will be maintained at 250 licenses in 2024. These late season hunts provide an opportunity to harvest elk in areas where depredation to privately stored crops or co-mingling with livestock occurs.

A more liberal elk hunting season in 2023 resulted in the desired, higher elk harvest than the previous year. When comparing elk harvest between the 2022 and 2023 hunts, elk harvest increased in 2023 by 35%. In 2022, 1,547 hunters harvested 580 elk, while in 2023 a total of 783 elk were taken by 1,625 hunters. This increased harvest may account for the lower number of elk on some herd unit feedgrounds, however mild winter conditions could also have resulted in an increased proportion of elk wintering off feedgrounds.

In an effort to minimize damage to private property and co-mingling with domestic livestock, the Department initiated one auxiliary license hunt under the guidance of Chapter 34 permit and the other under a Department-administered Chapter 56 permit. Those results for the 2023 JCR reporting period are provided below.

- **Auxiliary Hunt 1, Chapter 34 Permit – Elk Hunt Area 84**
    - Teton County – 1 participating landowner
    - Season Dates: February 1-March 31, 2024
    - 10 Auxiliary licenses issued
    - Minimum harvest = 10 elk (10 cows)
    - Estimated harvest = 10 elk (10 cows)

- **Chapter 56 Permit – Elk Hunt Area 84**
    - Teton County – 1 participating landowner
    - Permit Dates: January 1 – February 28, 2024
    - Authorization for removal of up to 25 male and/or female elk
    - Total harvest = 1 elk (1 bull elk)

2.) Management Objective Review: The Fall Creek elk herd postseason trend objective is 4,400 elk. The postseason trend count objective was last reviewed in 2017. The Jackson Region's 5-year elk herd objective reviews were postponed due to the elk feedground management public collaborative process. As a result of that process, the Wyoming Elk Feedgrounds Management Plan was adopted by the Wyoming Game and Fish Commission on March 12, 2024. This plan calls for Feedground Management Action Plans to be developed for each elk herd unit. As a result, the Fall Creek Herd Unit review is expected to be completed in the next three years.

3.) Herd Unit Evaluation: The number of elk counted during postseason surveys decreased from 4,781 elk in 2023 to 4,396 elk in 2024 (Appendix A). The decrease in the number of elk counted was largely observed on the Camp Creek and Horse Creek feedgrounds. The number of elk decreased from 2,681 elk in 2023 to 2,508 elk in 2024 on these feedgrounds. The observed elk numbers not on feed, especially in Area 84, warrant a continuation of a more liberal approach to elk management in 2024. The trend count decrease is mostly attributed to mild winter conditions and more elk wintering on native winter ranges, especially in Area 85, as opposed to a significant biological reduction in the number of elk in the herd.

The spikes excluded restriction continues to be very popular with segments of the hunting public that are vocal about continuing with this management approach. The current herd unit management approach appears to be supported by the hunting public as evidenced by a rating of 76% hunter satisfaction in 2023.

4.) Chronic Wasting Disease Management: The Fall Creek elk herd is a Tier 2 surveillance herd that was prioritized in 2022, and specific efforts were directed at gathering CWD samples. Prevalence estimates and sample sizes are presented below (Table 1). During 2023, there were no CWD detections from hunter-harvested elk. Samples in 2023 were collected without the assistance of CWD technicians, so it is believed a similar level of effort and corresponding CWD samples should be expected into the foreseeable future. This level of effort is appropriate with the high profile and importance of this elk herd and because of increased surveillance in herds with feedgrounds. Since 2021, a total of 238 samples have been collected and tested with zero CWD detections.

Table 1. CWD prevalence for hunter-harvested elk in the Fall Creek Elk Herd, 2021 – 2023.

Years	Percent CWD-Detected and sample size (n) *Hunter Harvest Only*
	All Adult Elk (CI = 95%)
2021	0.0% (0.0%, n=63)
2022	0.0% (0.0%, n=101)
2023	0.0% (0.0%, n=74)
2021 - 2023	0.0% (0.0%, n=238)

5.) Disease Surveillance and Feedgrounds: Mild early winter conditions in the Jackson Region influenced later-than-average feeding start date across most feedgrounds, but a historic March 1 snow storm extended feeding seasons longer than anticipated based on overall winter severity. As part of a regional brucellosis surveillance plan, the Fall Creek Elk Herd was the priority surveillance herd for 2024 (Table 2). Planed surveillance for 2024 included corral trapping efforts at South Park and Horse Creek. Due to mild early season conditions and regional concern over elk displacement due to minimal snow pack and wolf activity, both trapping efforts were postponed for 2024. The sample schedule will be maintained, with Fall Creek scheduled for priority surveillance again in 2026.

Table 2. 2024 Fall Creek Elk Herd Brucellosis Surveillance.

Feedground	Capture Method	GPS collars deployed	# Captured	# Tested	# Seropositive	% Prevalence (2024)
Horse Creek	Dart	4	4	4	2	50%
Camp Creek	Dart	3	3	3	1	33%
South Park	Dart	4	4	4	3	75%
Dog Creek	Dart	4	4	4	3	75%
2024 Totals		15	15	15	9	60%

Table 3. 2023-2024 Feedground start and end dates.

Feedground	Start Date	End Date	Days Fed
South Park	1/12/2024	4/8/2024	88
Horse Creek	1/13/2024	4/6/2024	85
Camp Creek	1/13/2024	4/6/2024	85
Dog Creek	1/8/2024	4/9/2024	93

During the 2023-2024 feeding season, a mortality event was documented at the Horse Creek/Camp Creek Feedground complex south of Jackson (Table 3). Based on observations of sick calves and necropsy results, this prolonged morbidity/mortality event was determined to be from a buildup of *Fusobacterium necrophorum*, an anaerobic bacteria commonly found in the mammalian digestive tract. Between March 2nd and May 6, 2024 a total of 65 calf elk mortalities were documented. Twenty two occurred either on or directly adjacent to the feeding areas. An additional 43 calves were documented on national forests and private lands adjacent to Horse Creek and Camp Creek Feedgrounds during post-feeding ground-count mortality surveys. Based on disease presentation, scavenging patterns, locations, animal age and timing of mortality it is assumed that these individuals are highly likely to have been infected as well. This level of mortality accounts for a loss of more than 17% of the calves that were classified at Horse Creek and 12% of the calves that were classified at Camp Creek in 2024. This mortality event is substantially less than the 155 document calf mortalities last year (30% of the classified calves), but close to average for the last 5 years of 71 calves (14.6% of classified calves) per year.

In an effort to address the ongoing high calf mortality levels at Horse Creek Feedground, efforts were made to expand the available supplemental feeding area. When feeding at Horse Creek Feedground was initiated on January 13, 2024, feeding operations started on WGFD lands on Horse Creek Mesa (located northwest of the standard feeding area) (Appendix B). Hay harvested off of Horse Creek Mesa was stored on the mesa, allowing WGFD personnel to effectively feed elk in the area with minimal additional effort. Toward the end of the feeding season, elk were transitioned back up to Horse Creek Mesa in an effort to reduce the exposure of fed elk to conditions that lead to the necrobacellosis outbreak. Over the two feeding periods of feeding on Horse Creek Mesa, elk were fed for a total of 19 days with close to 50 tons of hay fed to ~800-1,000 elk.

APPENDIX A

							Ratio:100 Females			
2018	Adult Males	Yrlng Males	Total Males	Cows	Calves	Total	Adult Males	Yrlng Males	Total Males	Calves
84 HCFG	78	50	128	927	203	1258				
84 CCGF	11	28	39	512	157	708				
84 SPFG	74	42	116	513	167(50)	846				
84 NR	22	9	31	61	36(110)	238				
85 DCFG	48	29	77	595	201	873				
85 NR	8	8	16	111	25(15)	167				
TOTAL	241	166	407	2719	789(175)	4090	9	6	15	29
2019										
84 HCFG	181	89	270	1194	314	1778				
84 CCGF	10	27	37	563	201	801				
84 SPFG	88	45	133	553	185	871				
84 NR	18	13	31	46	29(56)	162				
85 DCFG	54	39	93	705	177	975				
85 NR	2	5	7	12	14(45)	78				
TOTAL	353	218	571	3073	920(101)	4665	11	7	18	30
2020										
84 HCFG	124	43	167	671	205	1043				
84 CCGF	19	39	58	990	201	1249				
84 SPFG	63	48	111	541	134	786				
84 NR	44	11	55	139	26(175)	395				
85 DCFG	28	14	42	398	78	518				
85 NR	15	2	17	30	1(369)	417				
TOTAL	293	157	450	2769	645(544)	4408	10	6	16	23
2021										
84 HCFG	175	125	300	1314	320	1934				
84 CCGF	14	50	64	688	203	955				
84 SPFG	72	60	132	539	193	864				
84 NR	1	0	1	0	0(174)	174				
85 DCFG	47	42	89	660	265	1014				
85 NR	6	1	7	0	0(111)	111				
TOTAL	315	278	593	3201	981(277)	5052	10	8	18	31
2022										
84 HCFG	175	91	266	1126	341	1733				
84 CCGF	39	31	70	710	168	948				
84 SPFG	94	67	161	555	233	949				
84 NR	48	18	66	34	7(29)	136				
85 DCFG	34	45	79	563	235	877				
85 NR	36	3	39	35	9(55)	138				
TOTAL	426	255	681	3023	993(84)	4781	14	8	22	33
2023										
84 HCFG	168	44	212	911	203	1326				
84 CCGF	36	38	74	855	253	1182				
84 SPFG	90	59	149	499	145	793				
84 NR	8	1	9	11	0 (78)	98				
85 DCFG	31	53	84	552	153	789				
85 NR	13	4	17	8	1 (182)	208				
TOTAL	346	199	545	2836	755(260)	4396	12	7	19	27

APPENDIX B

Horse Creek Mesa Elk Supplemental Feeding Trial

Prepared by Ben Wise
Regional Wildlife Disease Biologist, Jackson WY
Wyoming Game and Fish Department

A historic mortality event occurred at the Horse Creek feedground in the spring of 2023 when a total of 155 calf mortalities attributed to Necrobacellosis were documented (WGFD Jackson 2022 JCR). In response, wildlife managers in the Jackson Region undertook an effort to utilize adjacent Wyoming Game and Fish Commission owned lands to better distribute elk during critical disease transmission periods. The 2023-2024 feeding season served is a trial to determine the feasibility of expanding the Horse Creek feeding area long-term.

Necrobacellosis (a condition caused by the anaerobic bacteria *Fusobacterium necrophorum*) outbreaks tend to be directly correlated with high densities of ruminants confined to relatively small areas that are highly contaminated with fecal material, and are often associated with supplemental feeding operations (especially when high protein, course feed is being provided). Due to damage and co-mingling concerns, feeding often cannot be stopped when these outbreaks begin to occur (usually in the spring), so other disease management strategies must be implemented. Based on past experience successfully mitigating Necrobacellosis outbreaks in other feedgrounds, it was hypothesized that by moving elk from highly contaminated feeding areas on the traditional feedground and spreading them out in the spring, the infection cycle could be broken and calf mortality would be decreased.

Wyoming Game and Fish (WGFD) personnel developed a plan to utilize a portion of the Horse Creek Wildlife Habitat Management Area (WHMA) adjacent to the traditional elk feedground referred to as Horse Creek Mesa (HCM) (Figure 1 and 2). Horse Creek Mesa consists of a large (115 acres), relatively flat bench that is hayed annually by the WGFD for supplemental elk feed in the winter. Historically, this property was not used for winter elk feeding due to logistics and equipment limitations. Utilizing this property for elk feeding allows elk to be evenly distributed at a substantially lower density than can be achieved on the traditional Horse Creek elk feedground (75 acres). Due to limited winter elk use of HCM, fecal contamination was non-existent at the time of feeding initiation on HCM. This allowed elk to be fed throughout the entirety of the feeding area while still adhering to Low Density (LD) feeding parameters, even during the tail end of the elk feeding season (e.g. did not need to avoid high contamination areas when feeding). Pasture grass hay that was harvested from HCM was stacked, tarped and fenced on HCM to reduce the amount of time and effort required to haul hay to feed elk on the mesa. Approximately 35 tons of hay were harvested from HCM and stored on HCM. An additional 14 tons of hay was brought up from stackyards on the traditional feedground (usually 2-3 bales/day) during HCM feeding operations. This allowed for the feeding of 800-1000 elk for a total of 19 days (split between the beginning and end of the feeding season), which equated to 22% of the feeding season.

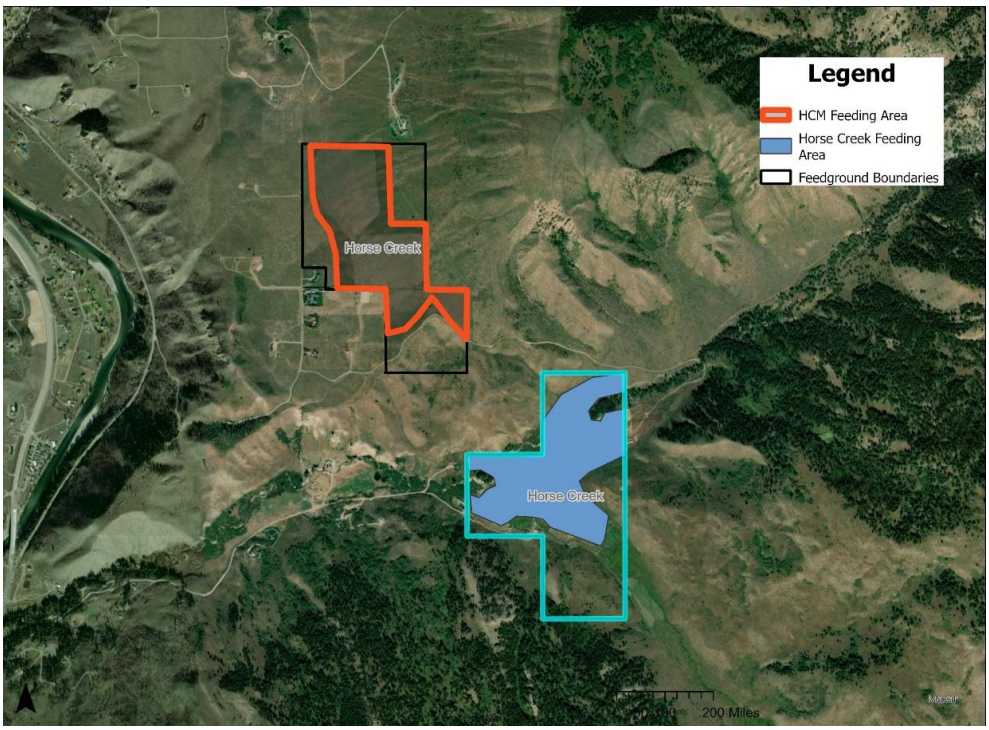


Figure 1. Horse Creek WHMA

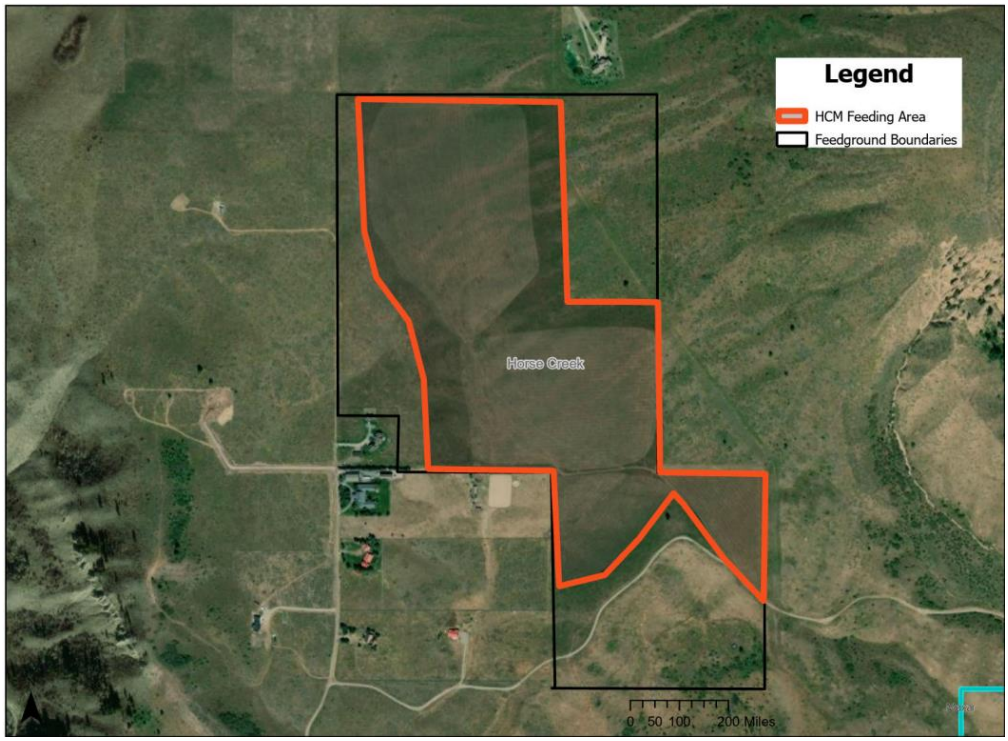


Figure 2. Horse Creek Mesa Feeding Area

Elk feeding at Horse Creek WHMA began on January 13, 2024 and feeding operations were initiated on HCM on a trial basis with specific goals; 1) Ensure that feeding would be able to draw elk up to HCM and 2) Demonstrate safety and feasibility of feeding on HCM. Elk were fed on HCM for the first 7 days of the feeding season, and then feeding operations transitioned down to the traditional feedground. Regional wildlife personnel as well as the Habitat Access Coordinator discussed feeding transition timing to reinitiate on HCM, with the goal of ending feeding for the Horse Creek feedground on HCM as opposed to need to transition back to the traditional feedground again.

Due to a sustained warming trend in early March and 10 year average feeding end dates, it was decided to begin feeding again on HCM on March 19th. Elk easily and willingly transitioned to HCM and by March 21st, the majority of the elk were no longer visiting the traditional feedground at all. For several days after beginning feeding on HCM, elk would travel from the traditional feedground to HCM, feed on provisioned hay, and then move back down to the traditional feedground after feeding. By day 3 of feeding on HCM, elk were no longer moving back to the traditional feedground after feeding, instead, they freely utilized south facing slopes adjacent to HCM. Conditions of the traditional feedground at this time had degraded significantly, with large areas of pooled water, high densities of fecal contamination (Figure 3 and 4) and the onset of necrobacellosis infections in calves beginning to occur. Feeding continued on HCM until March 30, when all the stored hay was exhausted and feedground attendance diminished to under 800 elk. Feeding was reinitiated on the traditional feedground for an additional week to ensure elk did not relocate to Camp Creek Feedground or move into damage/co-mingling situations.

Once elk became acclimated to feeding on HCM, WGFD personnel were able to adequately distribute elk over 79 of the available 115 acres (due to slope), allowing LD feeding to be achieved (Figure 5, 6 and 7). Elk were not fed on the same feedlines more than once during the entirety of the feeding efforts, further reducing feedline contamination. The average daily feeding area on HCM was 17 acres (approximately 20% of the available feeding area/day), which allowed for testing the feeding equipment's ability to break new feedlines daily and feeding on clean snow throughout the entirety of the feeding trial. Common practice toward the end of the feeding season is reducing feed rations (hay fed per elk per day) incrementally over several weeks, as it allow elk to gradually transition to native forage as snowpack subsides. Over the second feeding period, elk hay rations were incrementally reduced from ~7.5 lbs/elk to 5.5 lbs/elk. Elk fed on HCM did not redistribute to private lands during the feeding operation, and based upon conversations with adjacent landowners as well as regional personnel, no additional elk distribution/damage issues occurred.

Feeding was conducted primarily by the Wildlife Disease Biologist for the duration of the trial due to concerns about logistics, safety and additional time required to feed on HCM. Feeding on HCM requires additional snow removal to ensure that the access road is clear of snow and ice, as well as clearing snow from the gates at the upper hay stack. On average feeding took an additional 20-30 minutes (10 additional minutes each way for drive time and 5-10 min managing gates/tarps at haystack), but leaving the tractor in the equipment shed located near the traditional

feedground allowed it to be plugged in to ensure it would start. Keeping the tractor parked in the equipment shed also allowed hay to be transported from the lower hay sheds to HCM, reducing the overall amount of hay that had to be stored in the HCM stackyard. Feeding was done with a John Deer 6155 tractor coupled with a Square Spinner bale feeder. This combination was able to easily navigate the 24-30" of heavily crusted snow accumulated on HCM at the beginning of the feeding trial and allowed even distribution of hay throughout the feeding area. Initial discussions on HCM feeding feasibility included options to plow the E Horse Creek rd. Concerns regarding safety of that road, however, meant that the option of plowing and accessing HCM from the Horse Creek Mesa road were also discussed. During the trial, the Wildlife Disease Biologist and Habitat and Access Coordinator were able to plow the E Horse Creek road within a day of needing access and that was the only access route used to feed on HCM for the duration.

Morbidity of calves appeared to improve during feeding on HCM. Prior to feeding on HCM, 8 elk calf mortalities were documented on the traditional feedground. Once feeding on HCM was initiated no additional documented elk mortalities occurred among elk attending the feedlines on HCM. Several calves (n=2), already showing signs of necrobacellosis infection, succumbed to the disease between March 19-March 30, but these mortalities occurred on the traditional feedground and appeared to be calves that were too weak to transition to HCM. Overall calf mortality should not be used as a measure of the success of this feeding trial, as necrobacellosis infections can take 2-4 weeks to result in mortality after initial infection.

Overall, the goals of the trial were to determine feasibility of feeding on HCM in terms of human safety, equipment needs, and elk behavior. The trial was deemed a success because the current equipment was sufficient to safely conduct the feeding operations on HCM and the elk demonstrated the ability to easily transition between HCM and the traditional feedground, in both directions. Feeding on HCM is a viable option for reducing transmission of necrobacillosis and brucellosis at the Horse Creek feedground with current equipment and capacity. In order for HCM to be pursued as an expansion of the Horse Creek feedgrounds, a workplan would be needed to outline feeding and road plowing responsibilities moving forward. Additionally, any updated LD feeding plans for Horse Creek Feedground should include HCM delineated feeding area. It is important to note that the intention of expanding into HCM is to reduce disease transmission and calf mortality, and is not intended to increase the number of elk in the herd unit or in attendance at the feedground.

Figure 3. Horse Creek Feedground, March 18, 2024

Figure 4. Horse Creek Feedground, March 21, 2024

Figure 5. Horse Creek Mesa, March 19, 2024

Figure 6. Horse Creek Mesa, March 24, 2024

Figure 7: Horse Creek Mesa, March 25, 2024 (same feeding area as Figure 5, feed was distributed between previous feedlines to reduce feedline contamination).

2023 - JCR Evaluation Form

SPECIES: Elk
HERD: EL105 - AFTON
HUNT AREAS: 88-91

PERIOD: 6/1/2023 - 5/31/2024

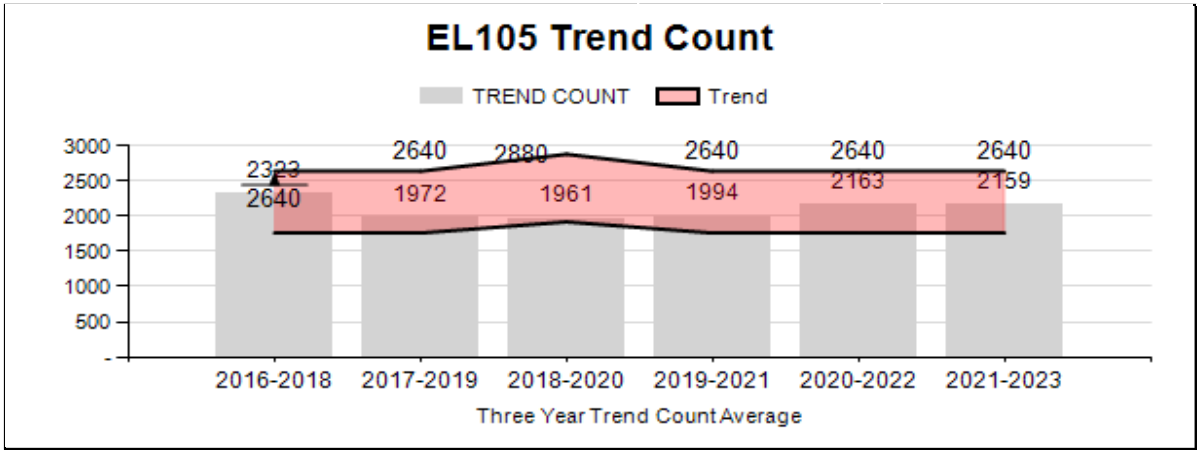
PREPARED BY: GARY FRALICK

	2018 - 2022 Average	2023	2024 Proposed
Trend Count:	1,998	2,366	2,100
Harvest:	849	834	900
Hunters:	2,398	2,183	2,250
Hunter Success:	35%	38%	40 %
Active Licenses:	2,502	2,384	2,250
Active License Success	34%	35%	40 %
Recreation Days:	15,306	15,927	16,125
Days Per Animal:	18.0	19.1	17.9
Males per 100 Females:	20	20	
Juveniles per 100 Females	37	27	

Trend Based Objective (± 20%)	2,200 (1760 - 2640)
Management Strategy:	Recreational
Percent population is above (+) or (-) objective:	8%
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%
Total:	NA%	NA%
Proposed change in post-season population:	NA%	NA%



2024 HUNTING SEASONS
AFTON ELK HERD (EL105)

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
88	1	Sep. 1	Sep. 30	Oct. 1	Oct. 31	40	Any elk
88				Nov. 1	Nov. 30		Antlerless elk valid south of Peterson Lane and south and west of the Greys River Wildlife Habitat Management Area Elk Fence
89	Gen	Sep. 1	Sep. 30	Oct. 15	Oct. 25		Any elk
90	Gen	Sep. 1	Sep. 30	Oct. 15	Oct. 25		Any elk
90	6	Sep. 1	Sep. 30	Oct. 15	Oct. 25	50	Cow or calf
91	Gen	Sep. 1	Sep. 30	Oct. 15	Oct. 31		Any elk
91	1	Sep. 1	Sep. 30	Oct. 1	Oct. 31	100	Any elk
91	1			Nov. 1	Dec. 31		Antlerless elk
91	1			Jan. 1	Jan. 31		Antlerless elk valid off national forest
91	6	Sept. 1	Sept. 30	Oct. 1	Dec.31	300	Cow or calf
91	6			Jan. 1	Jan. 31		Cow or calf valid off national forest
91	7	Sept.1	Sept. 30	Oct. 1	Jan. 31	150	Cow or calf valid off national forest west of U.S. Highway 89 and south of Wyoming Highway 239

2024 Region W Nonresident Quota: 2,775 licenses

2023 Hunter Satisfaction: 66% Satisfied, 21% Neutral, 13% Dissatisfied

2024 Management Summary

1.) Hunting Season Evaluation: The 2024 hunting season is designed to promote population stability, while minimizing harvest of antlered elk, especially in the Greys River segment of the population - Hunt Areas 89 and 90.

In Area 89, a shortened season will end prior to October 31 for the fourth consecutive year. This shorter season is designed to promote an increase in total bull numbers and ratios observed on native winter ranges and the Greys River feedground. However, an additional effort to minimize the harvest of antlered elk will allow the harvest of any elk from October 15 – October 25. The continuation of an any elk season for the entire hunt is a substantial departure from the general,

any elk season which after 5 days, October 15-October 19, was then followed by antlered elk only until October 25 during the 2020 and 2021 seasons.

In the upper Greys River, Hunt Area 90, an effort was initiated in 2021 to the increase total elk and bulls numbers on the Forest Park feedground after one of the lowest number (N=399) of elk documented on this feedground since its inception in 1979. The more restrictive hunting seasons in 2021 and 2022, which generally reduced antlerless elk harvest resulted in substantial increases in the number of elk counted on this feedground. In 2022 and 2023 surveys, a total of 650 and 703 elk have been counted, respectively (Appendix A). During the current survey 709 elk were counted on Forest Park feedground. As a result of a positive response in elk numbers on this feedground, hunting seasons in 2024 will reflect additional hunter opportunity. Consequently, the 2024 hunting season will allow the harvest of any elk October 15-October 25. The longer any elk season will allow antlerless elk harvest in order to maintain elk numbers on the Forest Park feedground near the Commission-established quota of 750 elk.

In Area 91, the current management strategy initiated in 2022 emphasizes elk harvest along the Idaho-Wyoming Stateline. In an attempt to address long-term, chronic damage issues and potential elk-livestock co-mingling concerns, the Type 7 license will continue to focus on antlerless elk along the Idaho-Wyoming Stateline from October 1 – January 31. Managers believe this continued management response to increasing elk numbers, largely from elk moving into Wyoming from Idaho, will alleviate damage and co-mingling concerns along a portion of Area 91 that historically has proven difficult to manage. In order to accommodate access to private property the number of licenses that will be commensurate with access opportunity, the number of Type 7 licenses will increase from 100 licenses to 150 licenses. Because of wide-spread elk moment onto private lands and associated damage to stored crops and co-mingling with livestock during the 2023 winter, the unused Type 1 and Type 6 license holders will be permitted to take antlerless elk on all lands off the National Forest system in this hunt area.

There are no changes proposed for Hunt Area 88. The closing date for the antlerless only hunt will remain November 30 in order to minimize elk displacement away from the Greys River feedground to potential damage situations on private property in Areas 88 and 91.

In an effort to minimize damage to private property and co-mingling with domestic livestock, the Department initiated one auxiliary license hunt under the guidance of Chapter 34 permit and the other under a Chapter 56 permit. Those results for the 2023 JCR reporting period are provided below.

- **Auxiliary Hunt 1, Chapter 34 Permit – Elk Hunt Area 91**
    - Lincoln County – 1 participating landowner
    - Season Dates: February 1-March 31, 2024
    - 3 Auxiliary licenses issue
    - Minimum harvest = 3 elk (3 cows)
    - Estimated harvest – 3 elk (3 cows)

- **Chapter 56 Permit – Elk Hunt Area 91**
    - Lincoln County – 3 participating landowners
    - Permit Dates: January 1 – February 28, 2024
    - Authorization for removal of up to 25 male and/or female elk
    - Total harvest = 4 elk (2 cows, 1 spike, 1 bull)

2.) Management Objective Review: The Afton elk herd postseasons trend objective is 2,200 elk. The postseason trend count objective of 2,200 elk was last reviewed in 2017. The Jackson Region's 5-year elk herd objective reviews were postponed due to the elk feedground management public collaborative process. As a result of that process, the Wyoming Elk Feedgrounds Management Plan was adopted by the Wyoming Game and Fish Commission on March 12, 2024. This plan calls for Feedground Management Action Plans to be developed for each elk herd unit. As a result, the Afton Creek Herd Unit review is expected to be completed in the next three years.

3.) Herd Unit Evaluation: Management strategies have focused on maintaining elk numbers and more recently attempting to promote population growth and increase the number of bulls in the Greys River – Hunt Areas 89 and 90. The 2024 season for these areas continues with a management approach to increase bull numbers by allowing the harvest of any elk, thereby potentially reducing the harvest of antlered elk, during the entire hunting season. This approach has proven to be have widespread public support, based on hunter satisfaction surveys, for increasing bull numbers in the Afton elk herd, and specifically in Greys River.

In Area 91, the management effort will continue to promote late season antlerless harvest in order to reduce damage to stored crops and the potential for elk to co-mingle with livestock on private lands.

4) Chronic Wasting Disease Management: The Afton elk herd is a Tier 2 surveillance herd that prioritized in 2023, and specific efforts were directed at gathering CWD samples. Prevalence estimates and sample sizes are presented below (Table 1). During the 2023 sampling period there no CWD-detected samples from hunter-harvested elk. Samples in 2022 were collected without the assistance of CWD technicians, so it is believed a similar level of effort and corresponding CWD samples should be expected into the foreseeable future. This level of effort is appropriate with the high profile and importance of this elk herd and because of increased surveillance in herds with feedgrounds. Since 2021, a total of 201 samples have been collected and tested with zero samples where CWD was detected.

Table 1. CWD prevalence for hunter-harvested elk in the Afton Elk Herd, 2021 – 2023.

Years	Percent CWD-Positive and sample size (n) *Hunter Harvest Only*
	All Adult Elk (CI = 95%)
2021	0.0% (0.0%, n=86)
2022	0.0% (0.0%, n=57)
2023	0.0%(0.0%, n=58)
2021 - 2023	0.0% (0.0%, n=201)

5.) Disease Surveillance and Feedgrounds: Mild early winter conditions in the Jackson Region influenced later-than-average feeding start date across most feedgrounds, but a historic March 1 snow storm extended feeding seasons longer than anticipated based on overall winter severity. Elk at Greys River Feedground were darted to deploy satellite collars in order to continue long term movement and disease monitoring of elk attending this feedground (Table 2).

Table 2. 2024 Afton Elk Herd Brucellosis Surveillance.

Feedground	Capture Method	GPS collars deployed	# Captured	# Tested	# Seropositive	% Prevalence (2024)
Greys River	Dart	3	3	3	0	0%
2024 Totals		3	3	3	0	0%

During the 2023-2024 feeding season, with start and stop dates, was noted at the Greys River and Forest Park feedgrounds, (Table 3).

Table 3. 2023-2024 Feedground start and end dates.

Feedground	Start Date	End Date	Days Fed
Greys River	1/12/2024	4/11/2024	91
Forest Park	1/17/2024	4/10/2024	85

APPENDIX A

Appendix A. Afton Elk Herd, posthunt herd composition data, 2019-2023.

							Ratio:100 Females			
Year	Adult Males	Yrlng Males	Total Males	Cows	Calves	Total	Adult Males	Yrlng Males	Total Males	Calves
2019										
88 GRFG	22	13	35	343	110	488				
88 NR	0	1	1	3	1	5				
89 NR	15	10	25	187	82 (63)	357				
90 FPFG	36	25	61	318	108 (2)	489				
90 NR	3	0	3	6	4	13				
91 NR	20	7	27	18	9 (230)	284				
TOTAL	96	56	152	875	314(295)	1636	11	6	17	36
2020										
88 GRFG	33	16	49	400	95	544				
88 NR	0	0	0	2	3	5				
89 NR	19	7	26	59	21(156)	262				
90 FPFG	31	6	37	312	50	399				
90 NR	0	0	0	7	5	12				
91 NR	70	34	104	175	102(776)	1157				
TOTAL	153	63	216	955	276(932)	2379	16	7	23	29
2021										
88 GRFG	30	36	66	385	132	583				
88 NR	0	0	0	0	0	0				
89 NR	2	9	11	54	22(270)	357				
90 FPFG	50	24	74	407	169	650				
90 NR	0	0	0	1	2	3				
91 NR	19	9	28	95	51(201)	375				
TOTAL	101	78	179	942	376(471)	1968	11	8	19	40
2022										
88 GRFG	35	15	50	313	108	471				
88 NR	0	0	0	0	0	0				
89 NR	5	13	18	144	33	195				
90 FPFG	64	46	110	446	147	703				
90 NR	0	0	0	0	0	0				
91 NR	5	0	5	0	0(768)	783				
TOTAL	109	74	183	903	288 (768)	2142	12	8	20	32
2023										
88 GRFG	20	17	37	312	55	404				
88 NR	0	0	0	0	0	0				
89 NR	8	2	10	0	0 (541)	551				
90 FPFG	63	46	109	453	147	709				
90 NR	NS	NS	NS	NS	NS	NS				
91 NR	12	6	18	102	31 (551)	702				
TOTAL	103	71	174	867	233(1092)	2366	12	8	20	27

2023 - JCR Evaluation Form

SPECIES: Moose

PERIOD: 6/1/2023 - 5/31/2024

HERD: MO101 - TARGHEE

HUNT AREAS: 16, 37

PREPARED BY: ALYSON COURTEMANCH

	2018 - 2022 Average	2023	2024 Proposed
Population:		N/A	N/A
Harvest:	4	5	5
Hunters:	5	5	5
Hunter Success:	80%	100%	100%
Active Licenses:	5	5	5
Active License Success:	80%	100%	100%
Recreation Days:	58	80	60
Days Per Animal:	14.5	16	12

Limited Opportunity Objective:

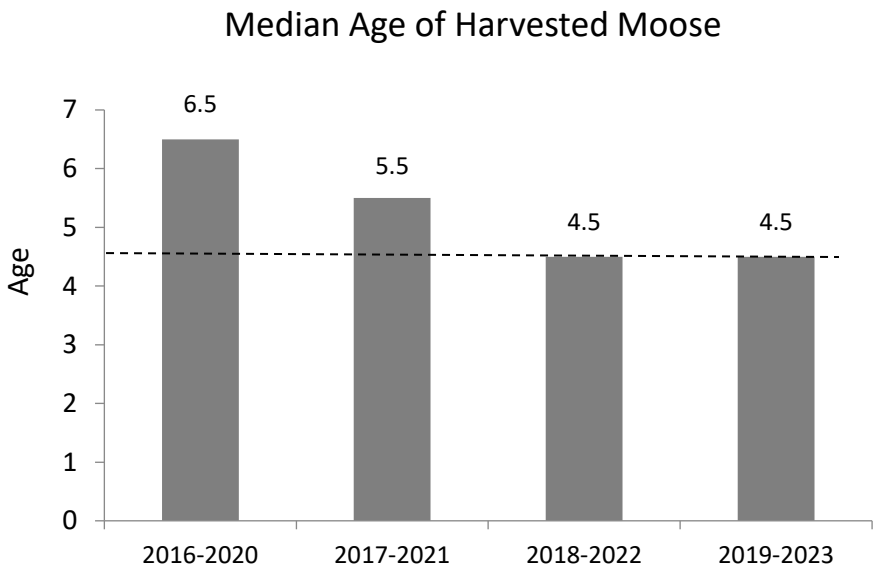
5-year median age of > 4.5 years for harvested moose

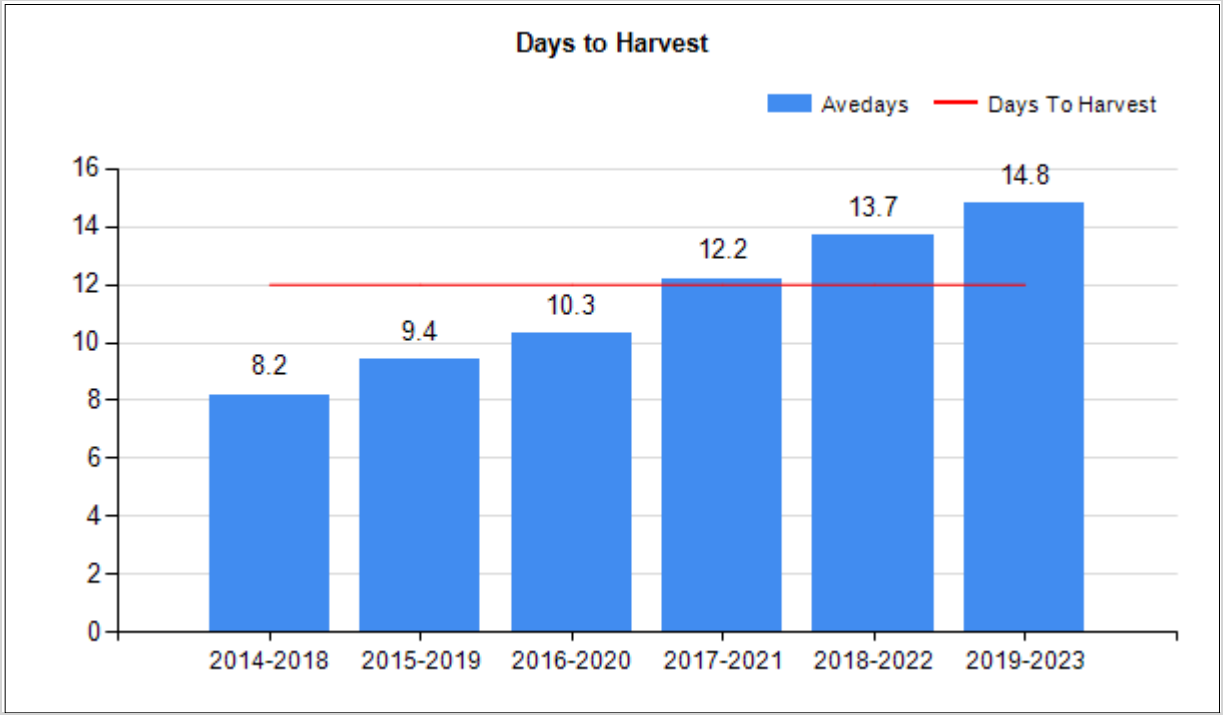
5-year average of <= 12 days/animal to harvest

Secondary Objective:

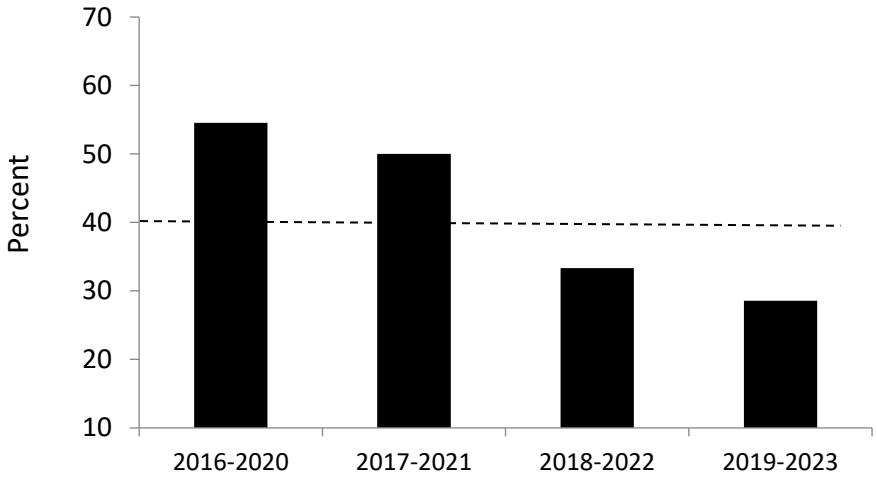
5-year average of 40% of harvested moose are > 5 years of age

Management Strategy: Special





Percent of Harvested Moose >5 Years Old



2024 HUNTING SEASONS
TARGHEE MOOSE HERD (MO101)

Hunt Area	Type	Special Archery Dates		Regular Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
16, 37	1	Sep. 1	Sep. 14	Sep. 15	Nov. 15	5	Antlered moose (4 residents, 1 nonresident)

2023 Management Summary

1.) Hunting Season Evaluation: Management of this herd is not based on a mid-winter trend count because the majority of moose migrate to winter ranges in Idaho and the small areas of winter ranges in Wyoming are difficult to survey due to forest cover. Herd objectives are based on 1) median age of harvested moose ≥4.5 years, 2) at least 40% of harvested moose over 5 years old, and 3) average days to harvest less than 12. This herd met objective #1 this year but not objectives #2 or #3. Five of 5 license-holders hunted in 2023 and harvest success was 100%. Three of the five hunters submitted teeth for aging. The median harvest age for the past 5 years is 4.5 years old, however, the trends in age have been steadily decreasing since 2015. Days per animal was 16 (5-year average is 14.8) and has been steadily increasing. Only 29% of harvested moose over the past 5 years have been over 5 years old, and this has been trending down over time.

The hunting seasons remained the same in 2024. Managers will need to improve tooth submissions from hunter-harvested moose to effectively monitor herd objectives in the future. Managers will monitor the declining trend in age of harvested moose and increasing days to harvest, which may indicate a changing population.

2.) Management Objective Review: This herd unit objective was reviewed in 2024. We are maintaining this herd at the current objective and management strategy. We evaluated and considered population status, moose seasonal distribution, and survey methods and decided a change is not warranted at this time. We will review this herd objective again in 2029; however, if the situation arises that a change is needed, we will review and submit a proposal as needed.

2023 - JCR Evaluation Form

SPECIES: Moose

PERIOD: 6/1/2023 - 5/31/2024

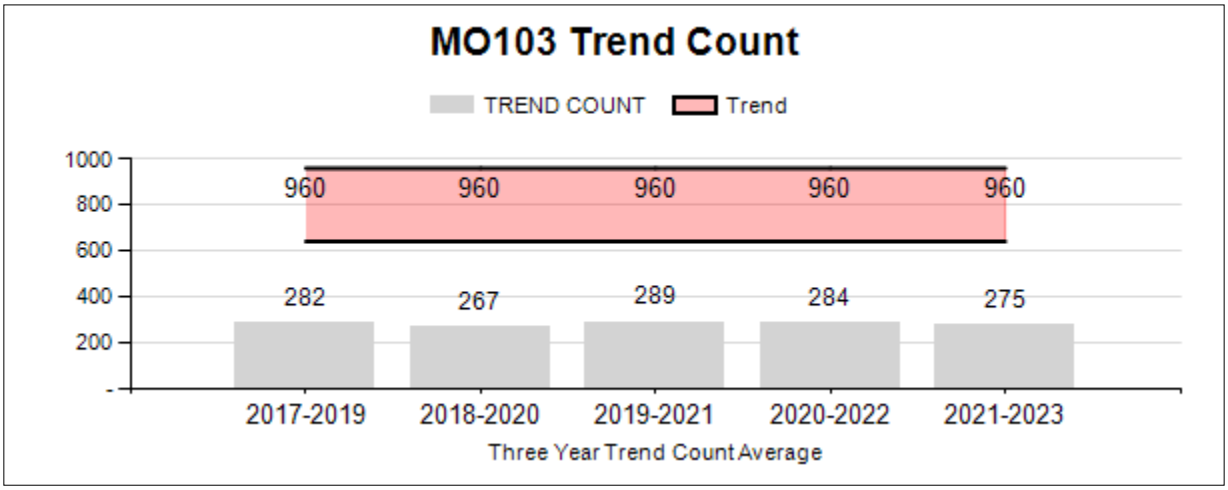
HERD: MO103 - JACKSON

HUNT AREAS: 7, 14-15, 17-19, 28, 32

PREPARED BY: ALYSON COURTEMANCH

	2018 - 2022 Average	2023	2024 Proposed
Trend Count:	285	203	300
Harvest:	9	10	10
Hunters:	10	10	10
Hunter Success:	90%	100%	100 %
Active Licenses:	10	10	10
Active License Success	90%	100%	100 %
Recreation Days:	100	145	100
Days Per Animal:	11.1	14.5	10
Males per 100 Females:	87	99	
Juveniles per 100 Females	51	35	

Trend Based Objective (± 20%)	800 (640 - 960)
Management Strategy:	Special
Percent population is above (+) or (-) objective:	-74.6%
Number of years population has been + or - objective in recent trend:	20



2024 HUNTING SEASONS
JACKSON MOOSE HERD (MO103)

Hunt Area	Type	Special Archery Dates		Regular Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
7, 14, 15, 19, 32							Closed
17, 28	1	Sep. 1	Sep. 14	Sep. 15	Nov. 15	5	Antlered moose (5 residents)
18	1	Sep. 1	Sep. 30	Oct. 1	Nov. 15	5	Antlered moose (4 residents, 1 nonresident)

2023 Management Summary

1.) Hunting Season Evaluation: A total of 204 moose were counted during the 2023 mid-winter trend count. The 3-year average is 276 moose. This year's trend count was low due to mild winter conditions that caused moose to be widely dispersed into side drainages and forested areas, making them difficult to find and count. We had a short window of good weather for aerial surveys, which limited the areas we could search for moose. Even though the herd continues to be well below the objective of 800 moose, managers feel that limited antlered moose hunting in some areas is still sustainable due to high bull ratios. The bull ratio during the mid-winter trend count was 99 bulls per 100 cows, which is the highest on record for this herd. Harvest success was 100% in 2023 with days per animal at 14.5. Even though the bull ratio during winter surveys is very high, feedback from hunters is that bulls are very difficult to find during the hunting season. Fall hunting seasons have been very warm and dry in recent years. For this reason, managers extended the season to November 15 beginning in 2023 to allow hunters more time to harvest. The season length will remain the same in 2024. Managers will continue to monitor the bull ratio and consider increasing licenses in the future.

Even though overall moose numbers remain low, calf to cow ratios have been steadily increasing in recent years. In 2009, the calf to cow ratio was 15 calves per 100 cows. Since then, it has increased and the most recent 5-year average was 51. However, the ratio dipped slightly during the last two winters to 38 and 35. Hunt areas 7, 14, 15, 19, and 32 remained closed in 2024. We have received clear feedback from the public that they do not support opening these areas at this time. With only 10 licenses in this herd unit, we plan to rotate the one nonresident license between Hunt Area 18 and the combined Hunt Area 17/28 each year. This license was in Hunt Area 17/18 last year, so it will be in Hunt Area 18 in 2024.

2.) Management Objective Review: The next scheduled objective review is in 2025.

3.) Research: There are three research projects currently occurring in the Jackson Herd Unit. Managers initiated a moose GPS-collaring project in collaboration with Wyoming Department of Transportation (WYDOT) in the southern end of the herd unit and northern end of the Sublette Moose Herd Unit in winter 2019 to evaluate moose movements around roadways in relation to

moose-vehicle collisions. The areas surrounding the Snake River Bridge on Highway 22 have the highest rate of moose-vehicle collisions in Teton County. For that reason, wildlife underpasses have been incorporated into the planning design for a bridge replacement project planned for 2023-2025. Since 2019, a total of 29 cow moose have been GPS-collared to provide movement data for the wildlife crossings project. Funding support has been provided by WYDOT, Teton Conservation District, Greater Yellowstone Coalition, U.S. Geological Survey at Montana State University, Veterinary Initiative for Endangered Wildlife, and Teton County Government. Please see the attached project report for more information (Appendix A).

We are partnering with U.S. Geological Survey and Montana State University where a PhD student is investigating winter ticks (*Dermacentor albipictus*) and their effects on moose in the Jackson area. Most research on winter ticks has occurred in the eastern United States with very little known about winter tick life cycles, survival, etc. in the West. This project is studying 1) winter tick abundance in different habitat types during the fall when they are attaching to moose and how long they are active, 2) quantifying winter tick numbers on captured moose and linking tick load to spring hair loss severity, health indictors through urine and feces, and calf survival, 3) evaluating winter tick survival and fecundity in the spring after falling off moose using experimental plots in different habitat types, and 4) investigating genetic similarity of winter ticks from elk and moose to determine how each host species is contributing to tick population dynamics. Results from this study are expected in 2024-2025.

We are partnering with the Wyoming Cooperative Fish and Wildlife Research Unit at the University of Wyoming to study how moose learn to migrate and survival/cause-specific mortality during early years of life. This project will also provide data on moose seasonal ranges and movements in portions of the Jackson Herd Unit where collaring has never occurred. This project began in March 2023 with a small pilot project capturing and collared 5 cow and calf pairs to test the fit of expandable calf collars. The main project began in January 2024 with the capture and GPS-collaring of moose cow and calf pairs in the Buffalo Valley and Gros Ventre River drainages. A total of 5 pairs were captured in the Buffalo Valley (including a set of twin calves), 7 pairs in the Gros Ventre drainage, and 3 single cows in the Gros Ventre drainage. There were no mortalities during captures. Please see Appendix B for a capture report.

4.) Journal Publications:

Allen, S.E., P. Van Wick, A.B. Courtemanch, and T. Cufaude. 2023. Butorphanol, azaperone, and medetomidine for chemical immobilization in free-ranging Shiras (Alces alces shirasi) moose: ground and helicopter darting in Wyoming, USA. *Journal of Wildlife Diseases* **59**(2):359-362.

Decesare, N.J., R.B. Harris, M.P. Atwood, E.J. Bergman, A.B. Courtemanch, P.C. Cross, G.L. Fralick, K.R. Hersey, M.A. Hurley, T.M. Koser, R.L. Levine, K.L. Monteith, J.R. Newby, C.J. Peterson, S. Robertson, and B.L. Wise. 2024. Warm places, warm years, and warm seasons increase parasitizing of moose by winter ticks. *Ecosphere* **15**(3):e4799.

Tucker, M.A.,…A. Courtemanch,…(+164 authors). 2023. Behavioral responses of terrestrial mammals to COVID-19 lockdowns. *Science* **380**(6649):1059-1064.

APPENDIX A

ANNUAL REPORT – 2023

Jackson Moose Movements, Roadways, and Health Project

Prepared by: Aly Courtemanch, North Jackson Wildlife Biologist,
Wyoming Game and Fish Department

Photo credit: Zach Andres

Introduction

This project began in 2019 with initial funding from the Wyoming Department of Transportation for the Wyoming Game and Fish Department (WGFD) to collar adult moose in the vicinity of the Highway 22/390 intersection, located west of Jackson, Wyoming. The aim of the project was to gather information about moose movements and road crossing patterns in the Snake River Bridge Replacement Project area, which would inform the quantity and locations of wildlife crossings and associated wildlife exclusionary fencing for the road project. Ten cow moose were ground-darted by WGFD biologists and collared in March 2019 within 3 miles of the intersection. This was the first time that moose had been collared in this area, which is the southern end of the Jackson Moose Herd Unit and northern end of the Sublette Moose Herd Unit.

Due to a high degree of interest and support from the public, local non-profit organizations, County government, and university researchers, we obtained additional funding for this project from Teton Conservation District, Greater Yellowstone Coalition, Veterinary Initiative for Endangered Wildlife, U.S Geological Survey – Montana State University, Wyoming Governor's Big Game License Coalition, and Teton County beginning in 2020. As a result, additional collaring occurred in 2020 and 2022. We also developed research partnerships with graduate students, professors, and researchers at Montana State University and Veterinary Initiative for Endangered Wildlife that leveraged this collaring study to address additional research questions related to winter ticks and general moose health and causes of mortality.

In total, 29 cow moose have been captured and collared for this project from 2019-2022. No moose died during capture operations or within 2 weeks post-capture.

Aly Courtemanch and Gary Fralick, WGFD wildlife biologists, attach a GPS collar to an anaesthetized cow moose near Highway 390 in March 2020.
Photo credit: Mark Gocke, WGFD

A darted cow moose forages with her calf before she is anaesthetized for collaring.
Photo credit: Mark Gocke, WGFD

Preliminary Results

Seasonal movements

Preliminary results from the study show that approximately 50% of the collared moose that spend the winter in residential areas are migratory and 50% are resident. Migratory individuals spend the summer in Grand Teton National Park near Death Canyon, Open Canyon, and Granite Canyon and on Bridger-Teton National Forest near Ski Lake, Phillips Canyon, Teton Pass, and

on Jackson Hole Mountain Resort (Figure 1). Interesting movements include one moose that traveled to the Mt. Leidy area and another moose that traveled over the Teton Range into Moose Creek (Figure 1). Resident moose do not have distinct summer and winter ranges, and reside year-round in residential neighborhoods near the Snake River, Wilson, Fall Creek Road, Highway 390, and West Gros Ventre Butte.

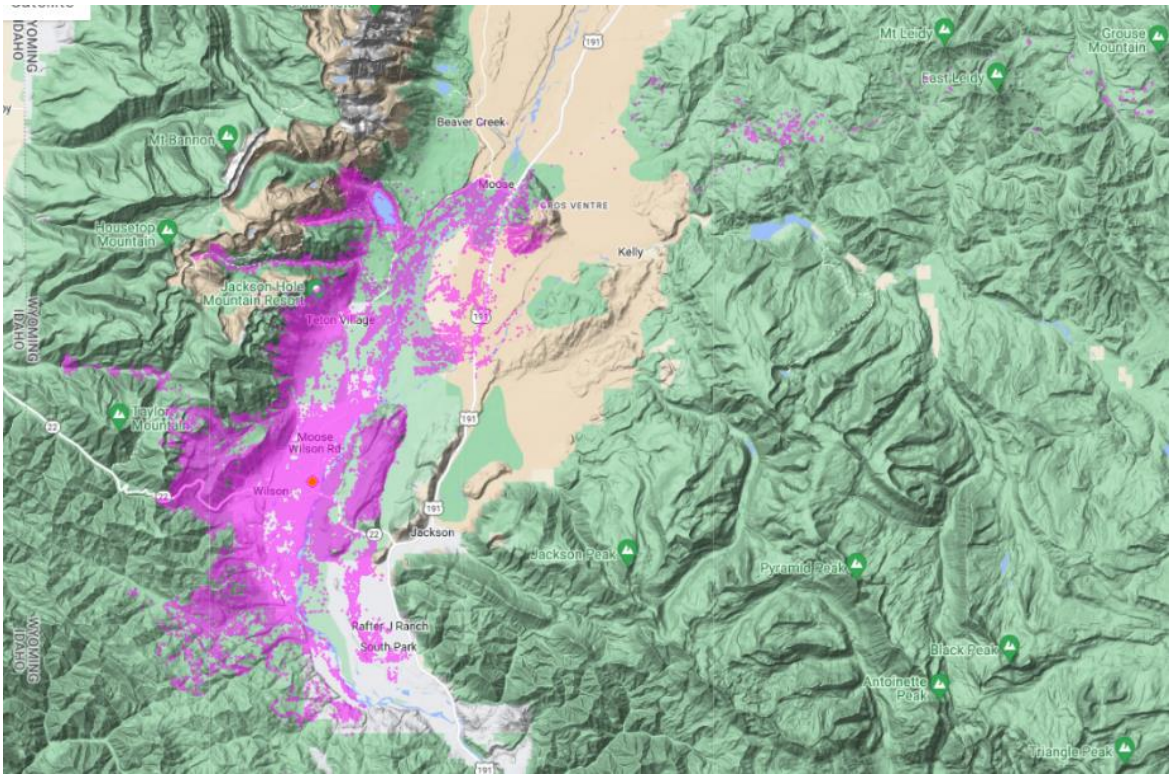


Figure 1. Map of year-round GPS collar locations for moose captured in residential areas in the Wilson and Jackson area (n=30).

Road crossings

One of the primary objectives of this study was to learn where, when, and how frequently moose were crossing Highway 22 and Highway 390 within the Snake River Bridge Replacement project area to inform wildlife underpass locations and exclusionary fencing. From 2019-2022, collared moose crossed Highway 22 or Highway 390 within the project area (within the spatial extent of the planned wildlife exclusionary fencing) a total of 670 times. About 50% of these crossings occurred during the daytime and 50% during nighttime. Four wildlife underpasses are currently being constructed around the Snake River Bridge and Highway 22/390 intersection, which were directly informed by this study.

For the larger moose study area, individual collared moose exhibited varying frequencies of road crossings. Some individuals cross major roads a few times a year, whereas other moose have crossed over 300 times since they have been collared. On average, individual collared moose crossed major roads 125 times while they were collared (over 2.5 years). This is an average of 50 times each year for each individual. In general, migratory moose have less

exposure to roads than resident moose. From 2019-2022, collared moose crossed major roads a total of 2,055 times. Interestingly, thus far none of the collared moose in this study have been killed in vehicle collisions.

A collared moose and her calf cross Highway 22 west of the 22/390 intersection at dawn. Photo credit: Mark Gocke, WGFD

Mortalities of Collared Moose

None of the 29 moose that were ground-darted and collared for this study died during capture or within two weeks after capture. A total of 10 collared moose died at various times during the project; their deaths were investigated as quickly as possible. Causes of death have been highly variable and included accidents (n=2; 1 drowning and 1 fall from a cliff), injury followed by systemic infection (n=1), suspected exposure to a toxic substance (n=1; suspected ingestion of antifreeze); chronic, severe physiological issues (n=2), and unknown causes (n=4). Three of the moose that died of unknown causes had collars that failed to send mortality alerts and one moose had a grizzly bear on her carcass, therefore we could not conduct a timely investigation due to human safety. It is unknown whether this moose was predated by a bear or died of other causes and was scavenged. The two moose with suspected physiological issues died in residential backyards and were necropsied immediately. One of these moose had chronic kidney issues, chronic hepatitis of the liver, and vascular thrombosis in the rumen, suggesting chronic digestive inflammation and damage. This moose was known to be feed regularly in a backyard, which likely contributed to her death. The moose that died from suspected ingestion of antifreeze also died in a backyard very suddenly along with her calf. These causes of death illustrate how living in residential areas may shield moose from some causes of death such as predation, but expose them to other hazards.

Aly Courtemanch, WGFD Wildlife Biologist, necropsies a dead moose near Wilson.

Mortalities of Un-Collared Moose

During some winters, the Wyoming Game and Fish Department receives a high volume of calls from the public reporting moose that are found dead in residential areas around Jackson and Wilson. In the past, we have conducted moose necropsies opportunistically when WGFD biologists have the time. A comprehensive moose necropsy usually takes at least 4 hours with at least 2 staff to complete plus additional time to prepare samples and send them to the WGFD Wildlife Health Lab in Laramie. In winters 2020 and 2021, we collaborated with Dr. Virginia Stout, a wildlife veterinarian with Veterinary Initiative for Endangered Wildlife to conduct necropsies in a more consistent way. In addition to the collared moose necropsies described above, we completed 15 necropsies on un-collared moose that died from unknown causes (i.e. not vehicle collisions). These moose were fresh (less than 24 hours post-mortem). Causes of death were highly variable and in many cases, they were multi-factorial with no one specific cause identified (Table 1).

Table 1. Causes of death for collared (n=10) and un-collared (n=15) moose in the Jackson/Wilson area, March 2019 – December 2023.

Cause of Death	**Number of moose**
Winter tick/emaciation	4 (all calves)
Adenovirus	1
Possible toxins (likely ingestion of antifreeze; ingestion of an anticoagulant such as a rodenticide)	3
Trauma/injury followed by infection	4
Natural accidents (drowning, fall)	2
Multi-factorial combinations of chronic kidney damage/chronic liver hepatitis/pneumonia/chronic inflammation and vascular damage in rumen/high internal parasite loads	7
Unknown cause (4 collared moose)	4
Total	**25**

This is the first time that we have documented moose dying from winter tick in the Jackson area. In winter 2020/2021, many moose were infected with high numbers of winter ticks (see photo below). Winter ticks are becoming more prevalent in this herd and could be a larger source of mortality in the future, especially for calves. We are collaborating with a PhD student from Montana State University, Troy Koser, to investigate winter ticks. We expect results from his project as well as several journal publications in the next few years.

We also learned through the necropsy work that a large proportion of moose are dying from a combination of chronic organ damage, inflammation, infection, and vascular issues (Table 1). These moose also have high parasite loads. When moose have combinations of multiple chronic issues like this, it is indicative of long-term stress on their bodies and immune systems. In the case of these moose that live predominantly in and around suburban development in Jackson and Wilson, this is likely caused by a combination of poor diet (backyard feeding and feeding on nonnative landscaping plants) and chronic stress from dogs, lights, traffic, and general human activity. Through this project, we discovered that backyard feeding is more widespread than previously thought. Moose are fed a variety of food items that can cause inflammation, digestive issues, organ stress, and ultimately death, such as alfalfa hay, various types of processed pellets, grain, corn, fruit, carrots, and bread. We also saw many landowners putting out salt blocks to attract wildlife to their property, which can spread diseases through saliva between moose and other species as well as congregate animals.

A collared moose in the Jackson area with high winter tick infestation and hair loss.
Photo credit: Troy Koser

Future Project Activities

This project is wrapping up in 2024 when the last moose collars will automatically drop off. We are currently planning for another phase of the moose movements and roadways portion of this project to start in winter 2024/2025. WYDOT will be finishing the construction of the wildlife underpasses and fencing for the Highway 22/390 project in late 2024 or 2025. The past collaring provided data on moose movements in this area that informed the locations and design of these underpasses and fencing. We would like to follow up the construction with post-construction

monitoring of moose movements to see how moose use or don't use the underpasses. WYDOT will place cameras in the underpasses to document successful wildlife use, however the moose collar data will provide valuable information on moose behavior around the underpasses and fence ends. Are moose avoiding the underpasses? Do moose have a preference for certain underpass designs over others? Are moose going around the ends of the fences instead of using the underpasses? These data will provide valuable information about wildlife response to this type of wildlife crossing project, which is very complex in this suburban landscape with high levels of human activity, pathways, etc. compared to other wildlife crossings projects in Wyoming in more rural landscapes.

APPENDIX B

Jackson Moose Calf Survival and Development of Migration Patterns

Capture Report, January 2024

Prepared by: Cody Wallace, PhD Student, University of Wyoming

A collared male calf moose recovering from immobilization drugs

PROJECT BACKGROUND

Wyoming is close to the southern extent of the Shiras moose subspecies range and many of these southern populations have been declining. Moose are large-bodied ungulates that are adapted for cold temperatures and most of the research on population declines has focused on habitat changes, the effects of heat stress on moose due to a warming climate, and disease/parasites. The Jackson moose herd declined by approximately 70% in the 1990s and early 2000s. Previous research and monitoring indicated that this decline was likely caused by over browsing on winter ranges, large-scale habitat alteration due to wildfires, and predation. The population has stabilized in recent years but at low numbers (~250-350 moose on winter trend counts). Additional impacts such as warming temperatures, disease/parasites, residential development, and road mortality may be contributing factors in preventing this population from increasing. Calf to cow ratios declined in the 1990s and early 2000s along with the population numbers and reached a low of 15 calves to 100 cows in 2009. Since then, however, ratios have been steadily improving with 58 calves to 100 cows observed in the winter of 2022. Wyoming Game and Fish Department (WGFD) managers have been anticipating that these improved ratios will translate into growing population numbers, but this has not happened. Managers are hypothesizing that calves may be dying at a high rate in later winter after trend count surveys are completed, and/or

during the second year of life after separation from their mother. Juvenile survival has a strong influence on the demographic performance of ungulate populations. Thus, the first goal of this project is to evaluate cause-specific mortality of juvenile moose in late winter and during their second and third years of life.

Across the globe, long-distance migrations have been declining due to anthropogenic disturbances such as roads, fences, energy development, and habitat loss. To protect migratory populations, it is important to understand how migration is maintained within populations. Recent evidence suggests that for migratory ungulates, animals are relying on memory of previous migrations to be able to repeat these movements year after year. This poses the question of how these migrations are learned in the first place. Understanding how animals learn to migrate is vital to help us understand the capacity migratory taxa have to respond to environmental change. Much of the research in this area has occurred in mule deer, however there is indication that other species may differ in how they learn to migrate and how loyal they are to those learned migrations over their early life. Moose are an ideal species to test this question because they are primarily solitary making it easy to capture mother-offspring pairs. The Jackson moose population is particularly well suited for this work because it is a partially migratory population where some animals migrate and others don't, allowing us to evaluate the second objective of this study: if moose adopt the same migratory strategy and seasonal ranges as their mother and whether they adhere to those patterns during the first three years of life.

There has been very little work done to evaluate the amount and causes of late winter juvenile mortality in Shiras moose and none in the Jackson area. There is also little known about how migration is learned and possibly passed from one generation to the next. The results of this work will provide information that will have direct management implications to the Jackson moose population while simultaneously helping to answer questions that could improve conservation of long-distance migratory populations across the world.

DATA COLLECTION

In January we captured 12 cow-calf moose pairs, one of which had twins, and 3 adult cows without calves. All moose were captured via helicopter darting and animals were field processed by Native Range Capture Services. Captures took place on January 29th, 30th, and 31st, 2024. Captures took place on Bridger-Teton National Forest in the Buffalo Valley and Gros Ventre drainage areas. During captures we had no capture mortalities, but one adult female died within the two-week period following captures that we consider could have been a capture-related mortality. When this mortality was investigated the cause of death appeared to be predation by wolves, but we cannot rule out that it was not related to being captured. During captures, all moose were fitted with Telonics RECON-4660-4 Globalstar Satellite GPS collars. The female calves were fit with 2 6-inch expandable sections and the male calves were fit with 2 8-inch expandable sections to allow for growth. Collars were set to drop off in March 2027 except for male calves that were set to drop off in March 2026. The Telonics collars are programmed to collect a GPS location every 2 hours and transmit 4 locations via satellite every day. The battery capacity of these collars is approximately 3 years. The collars emit a very high frequency (VHF) signal, which will allow ground technicians to locate collars to retrieve the stored data in the case of a mortality.

The capture crew collected biological samples during processing. They collected blood samples (~20 ml) and hair (20+ hairs) for DNA testing and to provide the Wyoming Game and

Fish Veterinary Lab with samples to screen for disease. They collected fecal samples (~15 to 20 pellets) for nutrition analysis. They also conducted 2 (10cm) tick transects on both the withers and on the rump.

CAPTURE LOCATIONS

Of the 28 moose captured and successfully collared in January 2024, 3 of the collars were deployed on male calves and 10 on female calves. Of the 12 pairs, 5 were captured in the Buffalo Valley and 7 were captured in Gros Ventre area. The 3 cows that were captured without calves were all captured in the Gros Ventre area.

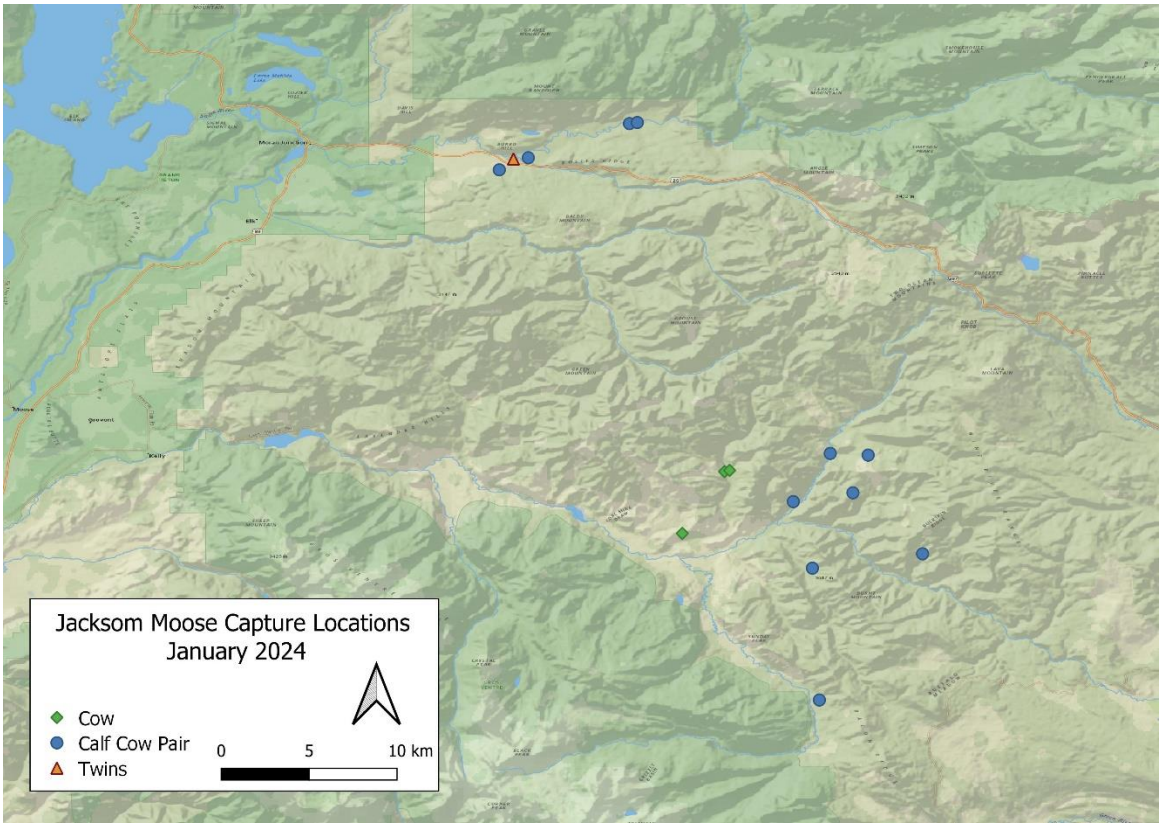


Figure 1. Locations of all (n = 28) moose captured in the larger Jackson study area, January 2024.

COLLABORATORS

Wyoming Cooperative Fish and Wildlife Research Unit and the Wyoming Game and Fish Department. We want to sincerely thank all collaborators for their help and funding to make this project possible: Wyoming Game and Fish Department, Teton Conservation District, and Wyoming Governor's Big Game License Coalition. In addition, we would like to thank the numerous landowners that allowed us access to capture on their property; this project would not be possible without their collaboration.

FOR MORE INFORMATION, CONTACT:

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Wyoming Game and Fish Department
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An adult cow and calf moose walk away after being captured and collared.

2023 - JCR Evaluation Form

SPECIES: Bighorn Sheep

PERIOD: 6/1/2023 - 5/31/2024

HERD: BS106 - TARGHEE

HUNT AREAS: 6

PREPARED BY: ALYSON COURTEMANCH

	2018 - 2022 Average	2023	2024 Proposed
Population:		N/A	N/A
Harvest:	1	1	2
Hunters:	1	2	2
Hunter Success:	20%	50%	100%
Active Licenses:	1	2	2
Active License Success:	20%	50%	100%
Recreation Days:	21	13	28
Days Per Animal:		13	14

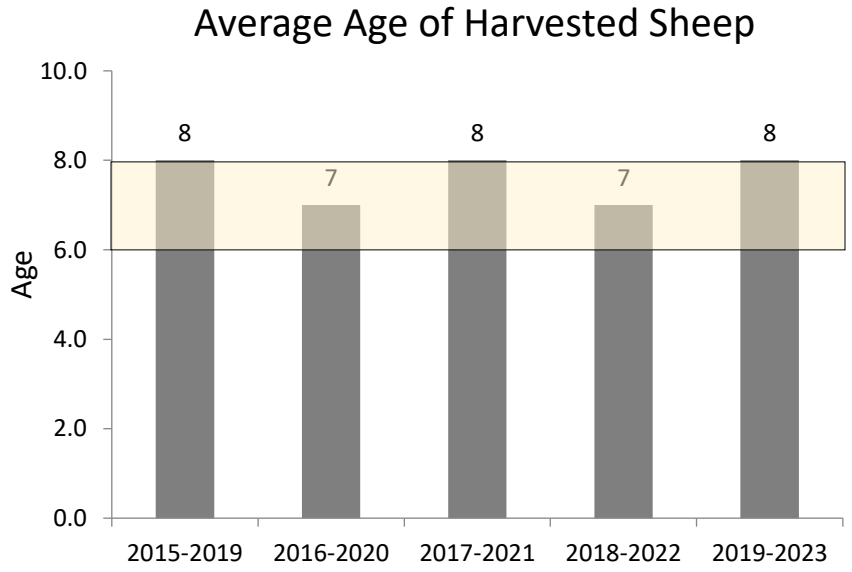
Limited Opportunity Objective:

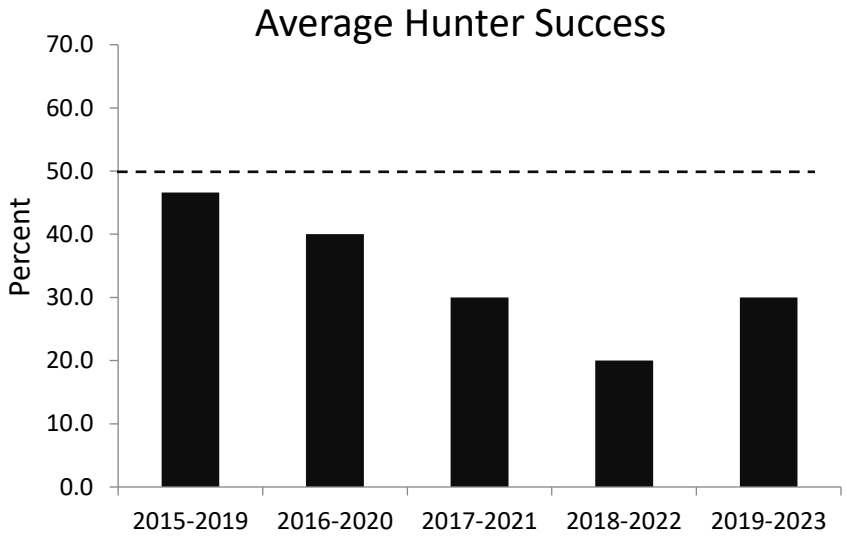
5-year average harvest age of 6-8 years

5-year average hunter success of >= 50%

Secondary Objective:

Management Strategy: Special





2024 HUNTING SEASONS
TARGHEE SHEEP HERD (BS106)

Hunt Area	Type	Special Archery Dates		Regular Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
6	1			Aug. 1	Aug. 31	2	Any ram valid north of South Badger Creek (2 residents)
6	1			Sep. 1	Oct. 31		Any ram valid in the entire area

2023 Management Summary

1.) Hunting Season Evaluation: This is a limited opportunity management herd with three objectives: 1) 5-year average harvest age of 6-8 years, 2) 5-year average hunter success of at least 50%, and 3) documented occurrence of mature rams available in the hunt area. There were two licenses in this herd in 2023 and one hunter was successful and harvested an 8 year-old ram. There have only been two sheep harvested in this herd unit during the last 5 years. The average age of harvested sheep during the past 5 years is 8 years old. The average hunter success during the past 5 years is 30%. Therefore, this herd is meeting its first objective but not the second.

Managers have been conducting a mid-winter trend count on this herd annually for the past 9 years. Unfortunately, due to limited helicopter availability and bad weather, we were not able to conduct a count in winter 2023/2024. The count was 71 sheep last winter, which was a drop from

100, 90, and 104 the previous three winters (2020-2022). The lower count could have been a result of the severe, and prolonged winter of 2022/2023.

Wyoming Game and Fish Department personnel conducted a summer ground survey in a portion of Hunt Area 6 around the Middle Fork of Darby Creek, The Wedge, Death Canyon Shelf, Mt. Bannon, and Fossil Mountain. Over the course of three days, one group of ewes and lambs (7 ewes, 3 lambs) was observed on the upper Death Canyon Shelf to the east of Fossil Mountain Grand Teton National Park. Personnel from Caribou-Targhee National Forest surveyed in the Alaska Basin area and did not observe any sheep.

2.) Management Objective Review: This herd unit objective was reviewed in 2024. We are exploring changing to a population-based objective with secondary harvest objectives. However, due to the interagency management of this herd and public and stakeholder interest, any herd unit objective change will involve a high degree of coordination and outreach. Therefore we are maintaining this herd at the current objective and management strategy while we explore options this year.

3.) Research: Grand Teton National Park (GTNP) began a new research project in 2023 partnering with the University of Idaho and a PhD student. This study aims to quantify spatiotemporal variation in forage resources and to estimate the nutritional carrying capacity of bighorn sheep in the Teton Range. To accomplish this broad objective, researchers will intensively sample vegetation communities throughout the range and use those data to validate and improve upon an existing model for predicting forage characteristics across space and time in the Tetons. In addition to this, GTNP captured and deployed GPS collars on 14 female sheep in November 2023, measured their body fat using ultrasonography and palpation scoring, and tested for respiratory disease. Overall, the 14 ewes had exceptional levels of body fat with most animals having over 20%. Disease testing at the Wyoming Game and Fish Department Wildlife Health Laboratory found that all sheep tested positive for leukotoxin-positive *Mannheimia* species from tonsil swabs and some sheep were positive for non-hemolytic *Bibersteinia trehalosi*. All sheep were negative for *Mycoplasma ovipneumoniae,* leukotoxin-positive *Bibersteinia trehalosi*, *Pasteurella multocida*, and leukotoxin-positive *Mannheimia haemolytica/glucosida*. These results are similar to previous disease testing in this herd. This is the first year of a multi-year project.

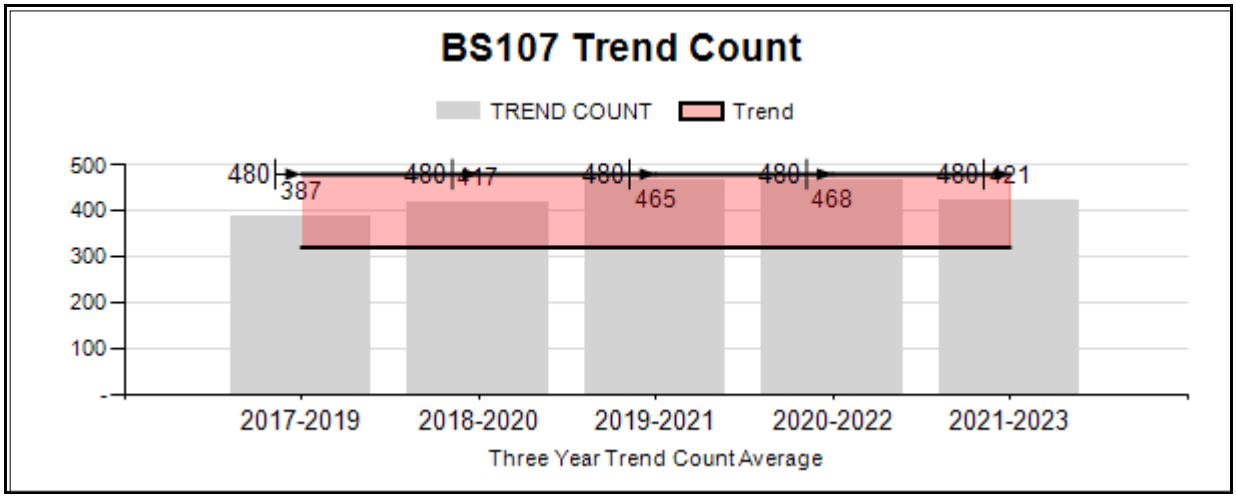
2023 - JCR Evaluation Form

SPECIES: Bighorn Sheep
HERD: BS107 - JACKSON
HUNT AREAS: 7

PERIOD: 6/1/2023 - 5/31/2024
PREPARED BY: ALYSON COURTEMANCH

	2018 - 2022 Average	2023	2024 Proposed
Trend Count:	433	350	400
Harvest:	10	21	22
Hunters:	15	35	22
Hunter Success:	67%	60%	100%
Active Licenses:	15	35	22
Active License Success	67%	60%	100%
Recreation Days:	154	295	300
Days Per Animal:	15.4	14.0	13.6
Males per 100 Females:	41	47	
Juveniles per 100 Females	39	40	

Trend Based Objective (± 20%)	400 (320 - 480)
Management Strategy:	Special
Percent population is above (+) or (-) objective:	-12.5%
Number of years population has been + or - objective in recent trend:	3



2024 HUNTING SEASONS
JACKSON SHEEP HERD (BS107)

Hunt Area	Type	Special Archery Dates		Regular Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
7	1	Aug. 1	Aug.14	Aug. 15	Oct. 31	12	Any bighorn sheep (11 residents, 1 nonresident)
7	6	Aug. 1	Aug. 31	Sep. 10	Oct. 15	10	Ewe or lamb valid within the Gros Ventre River drainage (9 residents, 1 nonresident)
7	6			Nov. 1	Nov. 15		Ewe or lamb valid within the Gros Ventre River drainage

2024 Management Summary

1.) Hunting Season Evaluation: This herd is managed using a 3-year average mid-winter trend count objective of 400 sheep (+/-20%). The herd increased from 2012-2022 after its last pneumonia die-off. In winters 2020/2021 and 2021/2022, the herd surpassed its objective of 400 sheep and its upper +20% buffer. In those years, 491 and 505 sheep were counted, respectively. Last year, 407 sheep were counted during the mid-winter trend count, and this year 350 sheep were counted. However, due to windy conditions during helicopter count this year, we were unable to survey all bighorn sheep winter range that are normally flown. These winter ranges that were missed typically hold at least 50 sheep, but perhaps more this year due to the mild winter conditions. We estimate that there are a minimum of 400 sheep in the herd.

Even though numbers have decreased, managers do not suspect a significant pneumonia die-off has occurred. Approximately 30 sheep are currently collared in this herd for research purposes and there have been no pneumonia-related mortalities in collared adults during the past two years. We also have not detected an increase in the number of skulls found and reported by the public for recovery in spring 2023 or 2024. It is unknown why trend counts have dropped during the last two years, however, it could be related to the severe winter of 2022/2023. There was an increase in collared sheep mortality that winter, mostly due to mountain lion predation. Mountain lion predation may have been compensatory mortality that winter since sheep entered the winter in poorer than average body condition, winter conditions were severe, and most of the collared sheep that died were also carrying *Mycoplasma ovipneumoniae*. Regardless of the cause for the drop in herd numbers, the population decline back to the population objective is a positive development because it may have prevented a density-driven pneumonia outbreak.

The lamb:ewe ratio during this year's mid-winter trend count was 40:100 and the adult ram:ewe ratio was 44:100. Forty-one rams with ¾ curl or larger horns were observed during the survey. This number is lower than previous years but many of the mature rams that are often observed on

the high elevation winter ranges that were not surveyed this year. In 2023, 11 of 12 Type 1 hunters harvested a ram (92% success). Average age of harvested rams was 6.5 years with a range of 3 years to 10 years. Type 1 licenses will be maintained at 12 again in 2024.

Managers added a Type 6 ewe/lamb license beginning in 2022 because the herd was increasing above objective, which has historically coincided with pneumonia die-offs. Ongoing research with the University of Wyoming has shown that the body fat of collared ewes and pregnancy rates declined when herd numbers increased and the number of sheep infected with pneumonia-causing pathogens increased. These are signals that the population is likely headed toward another pneumonia outbreak if the herd remains above objective. Harvest success on the Type 6 licenses during the past two years was lower than expected at 30% and 38%. Now that the herd appears to be back down at the population objective, managers are using Type 6 licenses to stabilize numbers at the 400 objective. Given an estimated minimum of 400 sheep, lamb recruitment this spring will again push the population above objective, which is why ewe harvest is important in order to maintain objective numbers. Ten Type 6 licenses will be issued in 2024 to maintain this herd at objective. Managers added season dates from November 1-15 this year to increase hunter success when sheep are more accessible at lower elevations. Benefits of this later season are that lambs will be older and more likely to survive on their own after ewes are harvested and ewes will be harvested more randomly, reducing the likelihood that certain social groups that are easier to access on summer range will be overharvested. License reductions from 30 to 10 are to account for the anticipated increase in harvest success. Concurrent research will continue with the University of Wyoming to monitor how the Type 6 ewe/lamb season affects body condition, population demographic rates, and disease in the herd.

2.) Management Objective Review: The next scheduled objective review is 2025.

3.) Research: We continued the research project with the University of Wyoming on bighorn sheep nutrition, disease, and population dynamics. This research began in 2015 and has provided valuable information that has guided bighorn sheep management in this herd. After last year's severe winter (2022/2023) where sheep had the lowest body condition we had ever recorded in March (~5.5% fat), a very low pregnancy rate (46%), and relatively high disease prevalence in December (48% had *Mycoplasma ovipneumoniae*), sheep in this herd fared much better this winter. Body fat rebounded over the summer and in December 2023 was one of the highest recorded at 16.4% fat and none of the captured sheep had *Mycoplasma ovipneumoniae*. Pregnancy was 100% in March 2024. This research continues to improve our understanding of how to best manage this herd in the context of respiratory disease that is established and circulating in the herd (Appendix A).

4.) Journal Publications:

Wagler, B.L., R.A. Smiley, A.B. Courtemanch, D. Lutz, D. McWhirter, D. Brimeyer, P. Hnilicka, T.J. Robinson, and K.L. Monteith. 2023. Implications of forage quality for population recovery of bighorn sheep following a pneumonia epizootic. *Journal of Wildlife Management* **87**(6):e22452

Wagler, B.L., R.A. Smiley, A.B. Courtemanch, D. Lutz, D. McWhirter, D. Brimeyer, P. Hnilicka, and K.L. Monteith. 2024. Disparate home range dynamics reflect nutritional inadequacies on summer range for a large herbivore. *Ecosphere* **15**(5):e4864.

Update

Smiley

Bighorn Sheep Nutrition Disease Project

Exploring how nutrition and disease affect bighorn sheep.

Pneumonia—a respiratory disease originally introduced by domestic sheep and goats—remains one of the greatest issues for conservation of bighorn sheep populations across North America. Herds infected with pneumonia can experience different fates. Some slowly decline, some undergo crash-recovery cycles, and some tolerate it without substantial mortality. Ecological factors such as population size, food availability, nutritional condition, immune function, and disease all could influence population trends and the ability for herds to recover after pneumonia die-offs. Because untangling these complex interactions is critical to developing management plans to maintain healthy populations of bighorn sheep, we are investigating how nutrition and disease interact to influence population dynamics.

Project goals

Understand how ecological factors, including habitat quality, pathogens, and social dynamics influence the effect of pneumonia on bighorn sheep populations.

Evaluate management strategies aimed at mitigating the effects of pneumonia on populations.

Approach

With GPS collars, disease assessment, and intensive field studies, we study the same animals through time to track pathogen presence, nutritional condition, adult and lamb survival, causes of mortality, and forage availability.

Recent finding 1: Pneumonia negatively affects both mothers and their lambs.

When bighorn sheep are infected with pathogens, they gain less fat over the summer and lose more fat over the winter. Bighorn sheep require fat to survive and raise lambs, so less fat may mean that they can't meet their energetic needs. Not only do pathogens mean mothers have less fat to help them raise lambs, the pathogens can cause disease and mortality for the lambs. In other words, pathogens are problems for bighorn sheep both directly by causing disease and indirectly through the energy it takes to deal with them.

Gocke

Above: Weighing a bighorn sheep at captures near Green River Lakes, WY. The snot around her nose may be caused by pneumonia.

Recent finding 2: Pregnancy rates and nutritional condition down, but lamb survival steady.

Remarkably, only 50% of the sheep we caught in Jackson this March were pregnant; pregnancy rates are typically above 95%. The sheep were also the skinniest we have seen since we began the project in 2015. This summer, we caught 5 lambs in the Jackson herd and 7 lambs in the West Side herd; 8 made it to November 2023. We are eager to continue monitoring the herd to understand the mechanisms behind these dramatic changes.

Gavin

Above: We captured this lamb in summer 2023, and we've been studying her mother and grandmother for the past few years. We have 3 generations of data in this one family group!

Published paper!

Recent finding 3: Summer range forage influences disease, which then influences population dynamics.

Bighorn sheep have to spend their limited energy on fighting pneumonia infections, surviving, raising offspring, and other critical life functions. The bighorn sheep in the Jackson and Whiskey Mountain herds in western Wyoming have similar demands on their energy—both populations have experienced pneumonia die-offs since the 1900s, and pneumonia continues to circulate in both herds; however, the herds have had dramatically different population trajectories, with Jackson sheep having higher adult survival and lamb recruitment. To better understand whether nutrition is a limiting factor for these bighorn sheep herds, we investigated the differences in forage between their summer ranges.

Jackson summer range was better than Whiskey Mountain's. Jackson sheep had access to twice as much forage than sheep in Whiskey Mountain. Because they have more and higher-quality food, Jackson sheep likely have more resources to fight off disease, survive, and raise offspring.

Above: Jackson sheep can eat more high quality food, which gives them the energy necessary to fight infection, survive, and raise healthy lambs.

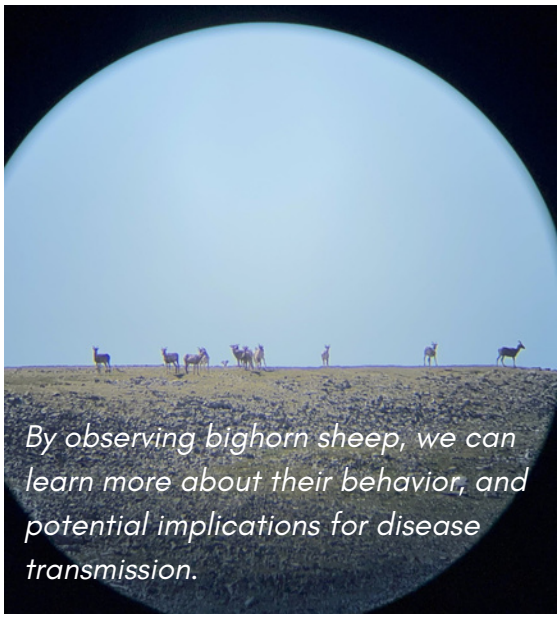
Skelly

Above: We conducted over 700 vegetation transects and collected over 2,000 forage samples from the summer ranges of the Jackson and Whiskey Mountain populations.

Read the whole paper by searching for "Implications of forage quality for population recovery of bighorn sheep following a pneumonia epizootic," by Brittany L. Wagler and colleagues, published in Journal of Wildlife Management in 2023.

Upcoming work: How do social dynamics affect pneumonia transmission?

Bighorn sheep are social animals, which could potentially affect the potential of pneumonia to spread. We are beginning to study how the environment shapes social dynamics in sheep, and in turn, how those dynamics influence the spread of disease. To tackle these questions we are using GPS collar data and intensive field observations of bighorn sheep on their summer range.



Gavin

By observing bighorn sheep, we can learn more about their behavior, and potential implications for disease transmission.

Project leads

This project is led by master's student Jack Gavin (left), PhD student Rachel Smiley (middle), and research scientist Brittany Wagler (right).

Partners and collaborators

The Bighorn Sheep Nutrition Disease Project benefits from being highly collaborative in development, operations, and funding. We are fortunate to partner with the Wyoming Game and Fish Department and the Wyoming State Veterinary Laboratory, a collaboration through which we can pull expertise from managers, disease specialists, and ecologists. Funds have been provided by the Wyoming Game and Fish Department, Wyoming Game and Fish Commission, Wyoming Wildlife and Natural Resource Trust, National Wild Sheep Foundation, Wyoming Wild Sheep Foundation, Wyoming Governor's Big Game License Coalition, Bureau of Land Management, Wyoming Animal Damage Management Board, Wyoming Wildlife Livestock Disease Research Partnership, Teton Conservation District, and Bowhunters of Wyoming Inc. Special thanks to the Wyoming Game and Fish Department, United States Forest Service, Wyoming State Veterinary Lab, Bureau of Land Management, National Elk Refuge, Pinto Ranch, Steve Kilpatrick, Sara Bridge, Steve and Kara Losik, and Des Brunette for assistance with logistics, lab analyses, field housing, and fieldwork.

2023 - JCR Evaluation Form

SPECIES: Mountain Goat
HERD: MG101 - PALISADES
HUNT AREAS: 2, 4

PERIOD: 6/1/2023 - 5/31/2024

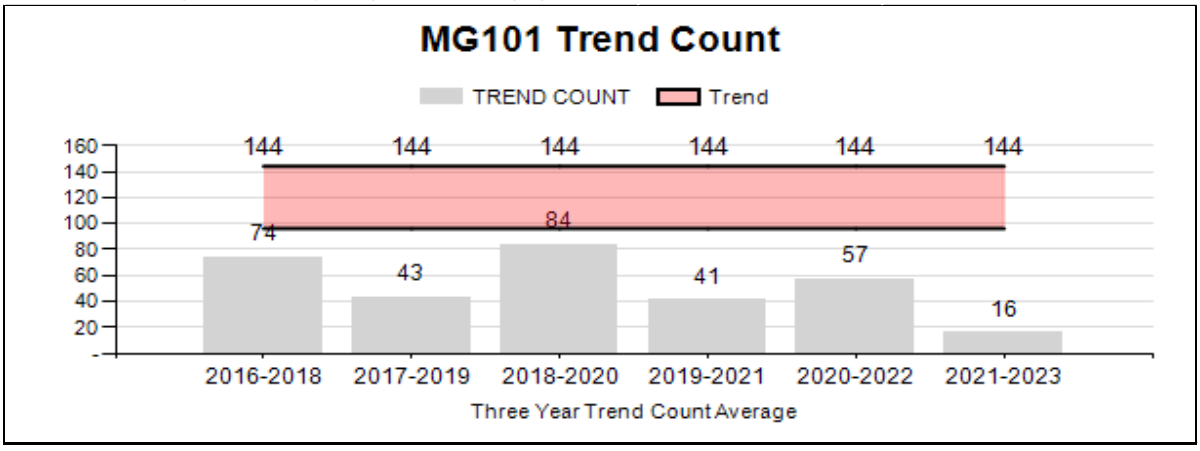
PREPARED BY: GARY FRALICK

	2018 - 2022 Average	2023	2024 Proposed
Trend Count:	100	0	75
Harvest:	14	6	5
Hunters:	32	9	9
Hunter Success:	44%	67%	56 %
Active Licenses:	32	9	9
Active License Success	44%	67%	56 %
Recreation Days:	222	95	98
Days Per Animal:	15.9	15.8	19.6
Males per 100 Females:	0	0	
Juveniles per 100 Females	35	0	

Trend Based Objective (± 20%)	120 (96 - 144)
Management Strategy:	Special
Percent population is above (+) or (-) objective:	N/A%
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%
Total:	NA%	NA%
Proposed change in post-season population:	NA%	NA%



2024 HUNTING SEASONS
PALISADES MOUNTAIN GOAT HERD (MG101)

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
2	1	Aug. 15	Aug. 31	Sep. 1	Oct.31	5	Any mountain goat (5 residents)
4							Closed

2023 Hunter Satisfaction: NA

2024 Management Summary

1.) Hunting Season Evaluation: In Area 2, for the second consecutive year a total of five (5) licenses, valid for any goat, are proposed to be issued in 2024. This season reflects a decrease from a total of eight (8) licenses that have been issued since 2017. The decrease in hunting opportunity reflects a decline in the number of goats counted during the 2022 mid-summer trend count.

The season will run September 1 – October 31. The number of licenses issued in 2024 will remain lower than the historical number issued since the herd was developed in 1996. The season and number of licenses issued reflects a population dynamic that depicts the management trend count threshold below the 120 (+/- 20%) mountain goats for the first time since 1996.

The 2023 hunting season was the 25th year that goats were hunted in Area 2. A total of five (5) licenses were issued, in addition to the one (1) Super Tag license hunter. A total of four goats were harvested, which comprised two billies and two nannies in 2023. Since 1999, a total of 168 mountain goats (139 billies, 29 nannies) have been harvested in Hunt Area 2. During this period, billes and nannies have comprised 83% and 17% of the total harvest, respectively.

In Area 4, a total of 4 hunters did not harvest any mountain goats on the 2023 Type A licenses. Given the low numbers of observed mountain goats this year, Area 4 will be closed in 2024. Future opportunity in Area 4 will be assessed based on population numbers and availability for harvest outside of Grand Teton National Park.

2.) **Management Objective Review:** The Palisades mountain goat mid-summer trend count objective is 120 goats. The trend count objective was established in 2015 and reviewed in 2020 with no changes proposed.

3.) **Herd Unit Evaluation**: A most recent mid summery trend count was conducted in August 2022. During the 2022 survey a total of 48 mountain goats were observed, which reflects the lowest mid-summer trend count since 1996. A total of 34 adults and 14 kids were observed. The kid:100 adult ratio was 41.

There was no trend count conducted in 2023. The next herd unit-wide trend count will be conducted in August 2024. The proposed 2024 survey will be conducted from a helicopter and

is a collaborative and concurrent effort with Idaho Department of Fish and Game to survey the Snake River Range mountain goat population.

The Palisades herd offers hunters the opportunity to harvest trophy class billies that typically are at least 5 years old. Management goals of the Wyoming subpopulation have focused on maintaining a flexible management approach through the annual issuance of 4 – 12 licenses valid for any goat since 1999. This approach has resulted in a high degree of hunter satisfaction, exceptionally high hunter success, low days/animal harvest, and trophy class males being taken in most years since the hunt was initiated in 1999.

2023 - JCR Evaluation Form

SPECIES: Bison

PERIOD: 6/1/2023 - 5/31/2024

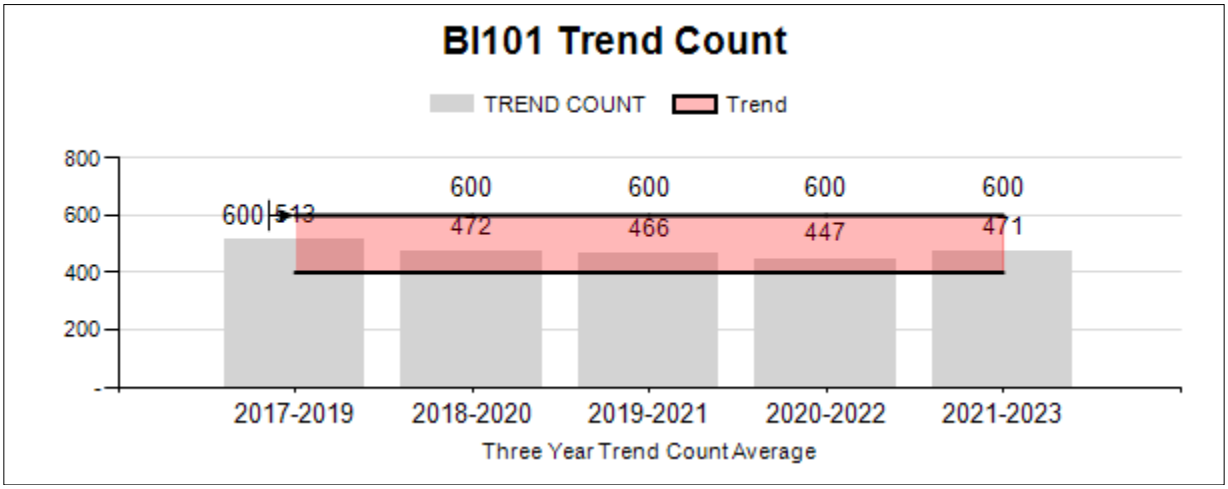
HERD: BI101 - JACKSON

HUNT AREAS: 2

PREPARED BY: ALYSON COURTEMANCH

	2018 - 2022 Average	2023	2024 Proposed
Trend Count:	463	514	500
Harvest:	103	19	60
Hunters:	154	49	70
Hunter Success:	67%	39%	86%
Active Licenses:	154	49	70
Active License Success	67%	39%	86%
Recreation Days:	1,403	709	750
Days Per Animal:	13.6	37.3	12.5
Males per 100 Females:	77	61	
Juveniles per 100 Females	40	45	

Trend Based Objective (± 20%)	500 (400 - 600)
Management Strategy:	Recreational
Percent population is above (+) or (-) objective:	3%
Number of years population has been + or - objective in recent trend:	1



2024 HUNTING SEASONS
JACKSON BISON HERD (BI101)

Hunt Area	Type	Special Archery Dates		Regular Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
2	1			Aug. 15	Jan. 31	70	Any wild bison; from Jan. 2 – Jan. 31 limited alternate permits for the National Elk Refuge may be available through the Department's Jackson Regional Office on a first-come first-served basis until the season closes or forage/weather conditions dictate that supplemental feeding is necessary. Also valid in Area 1 within the Clark's Fork River and Soda Butte Creek drainages from Aug. 15 – Dec. 31. Valid in other parts of Area 1 upon notification and authorization by the Department. (63 residents, 6 nonresidents)

2024 Management Summary

1.) Hunting Season Evaluation: A total of 514 bison were counted during the 2023 mid-winter trend count. As a result of the mild winter conditions, all bison were in Grand Teton National Park (GTNP) during the survey; none were on the National Elk Refuge (NER). The calf:cow ratio was 45 and the bull:cow ratio was 61. The herd had been trending below the population objective of 500 bison for the past 5 years, however this year it increased to just over 500 due to a reduction in licenses and lower hunter success during the 2023 season. Nineteen bison were harvested during the 2023 season (17 bulls and 2 cows).

The 2023 hunting season was the first time that bison did not come to the NER before the end of January. Winter conditions were extremely mild with very little snowfall, which allowed bison to remain within GTNP for most of the season. Hunter success was lower than it has been in recent years at 39%. The 5-year average hunter success is 68%, although it is highly variable year to year depending on weather and the timing of bison migration to the NER. The lower hunter success this year was due to bison not migrating to the NER during the hunting season. All bison harvest occurred east of Elk Ranch in the Wallace Draw/Coal Mine Draw areas and one bison was harvested on Shadow Mountain. Managers increased bison licenses from 50 to 70 in 2024 in response to the higher population numbers.

In recent years, hunters have been encouraged to harvest any bison rather than being selective for bulls with a goal of increasing harvest success. Harvesting more cows on the Type 1 license is also a management tool; cow harvest is needed to maintain the herd at objective and curb growth above the objective as well as allow bull ratios to increase.

2.) Management Objective Review: This herd unit objective was reviewed in 2024. We are maintaining this herd at the current objective and management strategy. We evaluated and considered population status and interagency management and decided a change is not warranted at this time. This is a long-standing population objective that is working well under current management. The population has been within the objective for the past 7 years. We will review this herd objective again in 2029; however, if the situation arises that a change is needed, we will review and submit a proposal as needed.

3.) Winter Conditions: Very mild winter conditions in January and February allowed bison to remain in GTNP. A severe snowstorm occurred on March 1, 2024 and 1-2 feet of wet, dense snow fell in the Jackson area. Elk feeding was initiated on the NER on March 4th. In the weeks following this snowstorm, several large groups of bison attempted to move south and ended up on Highway 26/89/191 in GTNP. Due to high snowbanks and dense snow, these groups refused to get off the highway. The National Park Service plowed Antelope Flats Road, closed portions of the highway, and pushed these groups of bison down the highway and onto Antelope Flats Road. Most of these groups eventually followed the Gros Ventre Road past the town of Kelly and turned south at the Kelly Pit to the west of the town or turned at the Gros Ventre Campground. One group turned at Kelly Warm Springs, traveled up the Gros Ventre Road, went into the Gros Ventre River bottom at the jumping rocks, and circled back through Teton Valley Ranch and eventually found their way around the town of Kelly and into the Gros Ventre River bottom to the west of the town. One group of bison also traveled down the highway at night and ended up on Circle EW Road north of the Jackson Hole Airport before the National Park Service was notified. These bison were later pushed north to Antelope Flats Road. Bison groups ranged from 5 bison to over 100 bison and created lengthy traffic jams that lasted several hours in some cases. Approximately 160 bison showed up on NER supplemental feedlines by mid to late March and other groups remained in the Gros Ventre River bottom west of Kelly. None of these bison that traveled south caused significant conflict on private lands.

2023-2024 Jackson Region Feedground Disease Management Report

Ben Wise

Regional Wildlife Disease Biologist, Jackson WY

Wildlife disease management and mitigation is an integral part of supplemental elk and bison feedground management in the Jackson Region of the Wyoming Game and Fish Department (WGFD). Supplemental feeding of wildlife exacerbates disease transmission and wildlife managers attempt to limit disease transmission and resulting morbidity and mortality.

Brucellosis Mitigation and Management

Brucella abortus, a gram negative bacterial infection is the causative agent for the disease Brucellosis. Brucellosis is a mammalian bacterial disease that has been endemic in the Greater Yellowstone Ecosystem (GYE) since the early 1900's. The main route of transmission of this disease is via physical contact with infected reproductive materials (aborted fetuses, placenta, amniotic fluids, live born fetuses, etc.) during the transmission period (February 15-June 1). Both the primary transmission route and transmission period were determined and validated through work that was partially undertaken by the WGFD's Brucellosis-Feedground-Habitat (BFH) section from the mid 1980's through 2018. Along with the information that was collected on what transmission in the environment looks like, several Best Management Practices (BMP) were developed in an effort to slow the rate of transmission of brucellosis in feedground settings. Due to the increased risk of disease proliferation in the feedground systems of western Wyoming, several of these practices have been adopted (referred to as the "Target Feedground Plan") at various levels of success in an effort to reduce and control communicable diseases both within wildlife and among livestock populations in the region. For the 2023-2024 feeding season, the following brucellosis (and overall wildlife disease) management efforts were implemented.

Brucellosis Surveillance

During the winter of 2023-2024, the Jackson Regional Disease Biologist captured elk using chemical immobilization and corral traps on feedgrounds to deploy GPS collars on elk for brucellosis investigations, movement analysis and continue long term brucellosis seroprevalence trend data. Mild early winter conditions in the Jackson Region influenced later-than-average feeding start date across most feedgrounds, but a historic March 1 snow storm extended feeding seasons longer than anticipated based on overall winter severity. Research has indicated that Brucella-induced abortions in elk peak in March, April, and May, which means that feeding later into spring can increase brucellosis prevalence on a feedground.

As part of a regional brucellosis surveillance plan, the Fall Creek Elk Herd was the priority surveillance herd for 2024. Planed surveillance for 2024 included corral trapping efforts at South Park and Horse Creek Feedgrounds. Due to mild early season conditions and regional concern over elk displacement due to minimal snow pack and wolf activity, both trapping efforts were postponed for 2024. Corral trapping did occur on the NER, in an effort to continue long term brucellosis surveillance and to deploy

GPS collars. A total of 97 elk were handled this winter at seven locations. Twenty nine (29) elk were chemically immobilized on feed lines at WGFD operated feedgrounds as well as the National Elk Refuge. A total of 43 collars were deployed, and 73 yearling and adult cows were sampled in the Jackson Region, feedground serology data available below (Figure 1).

Figure 1. 2024 Jackson Feedground Elk Capture Summary

Feedground	Capture Method	GPS collars deployed	# Captured	# Tested	% Prevalence	Long Term Sero % (total tested)
National Elk Refuge	Trap	14	68	44*	25%	34% (1890)
National Elk Refuge	Dart	5	5	5	40%	34% (1890)
Camp Creek	Dart	3	3	3	33%	43% (93)
South Park	Dart	4	4	4	75%	30% (317)
Dog Creek	Dart	4	4	4	75%	54% (79)
Horse Creek	Dart	4	4	4	50%	47% (180)
Patrol Cabin	Dart	6	6	6	50%	40% (103)
Greys River	Dart	3	3	3	0%	33% (1470)
Totals =		43	97	73	31%	

*statistically significant *n* for estimated prevalence to be within +/- 15% of true prevalence

Target Feedground Plan

- Low Density Feeding: Low Density (LD) Feeding is a technique that was developed and validated by the WGFD BFH unit in the late 2000's in an effort to reduce contact (and subsequent transmission risk) between elk on supplemental feed. LD feeding has been shown to reduce contacts with aborted fetuses by 66-75% and is a cost effective method to directly reduce brucellosis prevalence among elk attending feedgrounds, and indirectly reduce risk of brucellosis spillover into livestock. The basic idea behind this technique is to distribute the hay in a uniform pattern across the feeding area, which reduces the linear travel of elk on feedlines. When done correctly the feedground looks similar to a checkerboard, allowing an individual animal up to eight potential paths of travel to move between hay piles as opposed to a linear feeding (traditional) system where there are only two directions of travel on the feed lines. Where applicable, the Jackson Region has implemented LD feeding to varying degrees throughout the region and where this techniques is utilized effectively, brucellosis seroprevelance appears to be decreasing. In an effort to better implement LD feeding on feedground utilizing mechanized feeding, two (2) Square Spinner square bale feeders were used at South Park and Horse Creek Feedgrounds in 2021-2022. This new feeding equipment allows for LD feeding and a better overall ability to spread elk out and utilize more feeding area compared to other equipment used in the past

- Early End Dates: In conjunction with LD feeding, early supplemental feeding end dates have been shown to also reduce brucellosis transmission on feedgrounds (and subsequently reduce brucellosis infection rates among attending elk). Research by the WGFD has found that the rate of elk abortion due to brucellosis on feedgrounds peaks in March, April and May, so the earlier in spring that managers can encourage elk to free range, the less the chance for elk to become exposed to the disease on a crowded feedground. However, to end feeding as early as possible there must be sufficient native forage available for the elk so they remain in good health, and the risk of elk causing damage to stored crops or co-mingling with cattle must be very low. Based on more than 35 years of WGFD feedground data, over 50% of the variation in brucellosis seroprevalence among elk attending feedgrounds can be explained by the end date of the feeding season (the later into spring a feedground operates, the higher brucellosis prevalence is), and truncating feeding seasons, where possible and if successful, should lead to long term decreases in brucellosis prevalence over time.

***Fusobacterium necrophorum* Outbreak**

During the 2023-2024 feeding season, a mortality event was documented at the Horse Creek/Camp Creek Feedground complex south of Jackson. Based on visual and necropsy observations this prolonged morbidity/mortality event was determined to be from a buildup of *Fusobacterium necrophorum,* an anaerobic bacteria commonly found in the mammalian digestive tract. Based on past experience and documentation, these outbreaks typically occur on feedgrounds when animal densities are high and they cannot be adequately spread out to utilize clean feeding areas throughout the spring. Typically these mortality events occur later in the feeding season as daily temperatures increase and freeze-thaw cycles allow the proliferation of the bacteria in the feeding areas. Bacteria proliferation, high densities of elk, limited ability to spread animals out on clean feeding areas and the accumulation of feces throughout the feeding season results in an increased risk of *F. necrophorum* outbreaks.

Feed type may also play a role in this disease and subsequent mortality. Rough, course feed has been documented to increase the risk of oral injury and allows a pathway for *Fusobacterium necrophorum* to invade compromised tissues. It has also been documented that due to the nutritional content of alfalfa hay, *Fusobacterium necrophorum* production in the rumen is increased, further increasing the risk of disease outbreak in susceptible populations. Based on feedground movement research, feeding alfalfa hay on elk feedgrounds also results in increased time spent on feed lines daily and more difficulty in early termination of feeding in the spring. In areas predisposed to these disease outbreaks (high elk numbers relative to the area available to feed), it is advisable to only feed grass hay (or only feed grass hay during the tail-end of the feeding season) in an effort to reduce the time that elk spend in high density congregations, reduced risk of oral injury and easier implementation of early end date management.

Typically, this disease presents itself as either infectious necrotic pododermatitis (“hoof-rot”) or Necrotic Stomatitis (“mouth-rot”) due to either inter-digital or inter-oral injury and subsequent infection of *F. necrophorum* from the environment. The majority of the mortality attributed to this disease occurs in

calves attending feedgrounds. Biologists, pathologists, researchers and veterinary staff speculate this is due, in part, to their small size, limited resources (nutritional stress) and their increased vulnerability to systemic infection that can result from severe *F. necrophorum* infections. If infected individuals are able to survive a *F. necrophorum* infection, often there will be lifelong morbidity (deformed hooves, necrosis of the jaw, etc.) in the afflicted areas due to the infection.

Between March 2nd and May 6, 2024 a total of 65 calf elk mortalities were documented on and adjacent to the Horse Creek and Camp Creek feedgrounds. Twenty two occurred either on or directly adjacent to the feeding areas. An additional 43 calves were documented on national forests and private lands adjacent to Horse Creek and Camp Creek Feedgrounds during post-feeding ground-count mortality surveys. Based on disease presentation, scavenging patterns, locations, animal age and timing of mortality it is assumed that these individuals are highly likely to have been infected as well. This level of mortality accounts for a loss of more than 17% of the calves that were classified at Horse Creek and 12% of the calves that were classified at Camp Creek in 2024. This mortality event is substantially less than the 155 document calf mortalities last year (30% of the classified calves), but close to average for the last 5 years of 71 calves (14.6% of classified calves) per year.

In an effort to address the ongoing high calf mortality levels at Horse Creek Feedground, efforts were made to expand the available supplemental feeding area. When feeding at Horse Creek Feedground was initiated on January 13, 2024, feeding operations started on WGFD lands on Horse Creek Mesa (located northwest of the standard feeding area). Hay harvested off of Horse Creek Mesa was stored on the mesa, allowing WGFD personnel to effectively feed elk in the area with minimal additional effort. Toward the end of the feeding season, elk were transitioned back up to Horse Creek Mesa in an effort to reduce the exposure of fed elk to conditions that lead to necrobacellosis outbreaks. Over the two feeding periods of feeding on Horse Creek Mesa, elk were fed for a total of 19 days with close to 50 tons of hay fed to ~800-1000 elk (see 2023 JCR Fall Creek Appendix B).