

2022 - JCR Evaluation Form

SPECIES: Bighorn Sheep
 HERD: BS200 - ABSAROKA
 HUNT AREAS: 1-5, 22, 999

PERIOD: 6/1/2022 - 5/31/2023
 PREPARED BY: TONY MONG

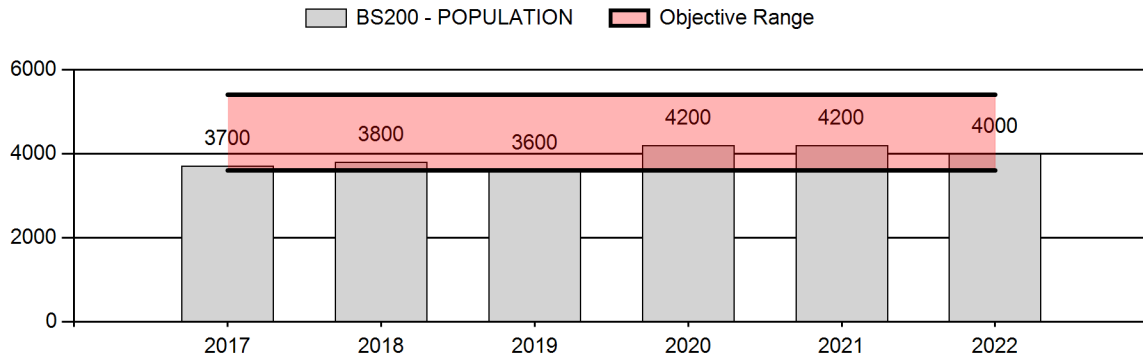
	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Population:	3,900	4,000	4,100
Harvest:	109	103	105
Hunters:	137	125	126
Hunter Success:	80%	82%	83%
Active Licenses:	137	125	126
Active License Success:	80%	82%	83 %
Recreation Days:	1,192	1,052	1,100
Days Per Animal:	10.9	10.2	10.5
Males per 100 Females	36	50	
Juveniles per 100 Females	35	44	

Population Objective (± 20%) : 4500 (3600 - 5400)
 Management Strategy: Special
 Percent population is above (+) or below (-) objective: -11.1%
 Number of years population has been + or - objective in recent trend: 0
 Model Date: 02/15/2023

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

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	n/a%	n/a%
Males ≥ 1 year old:	n/a%	n/a%
Proposed change in post-season population:	n/a%	0%

Population Size - Postseason



**2023 Hunting Seasons
Absaroka Bighorn Sheep (BS200)**

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
1	1	Aug. 15	Aug. 31	Sep. 1	Oct. 31	15	Any ram (14 res., 1 nonres.)
2	1	Aug. 15	Aug. 31	Sep. 1	Oct. 31	25	Any ram (22 res., 3 nonres.)
3	1	Aug. 15	Aug. 31	Sep. 1	Oct. 31	25	Any ram (23 res., 2 nonres.)
4	1	Aug. 15	Aug. 31	Sep. 1	Oct. 31	25	Any ram (23 res., 2 nonres.)
5	1			Aug. 1	Aug. 31	31	Any sheep valid within the Owl Creek drainage (27 res., 4 nonres)
5	1	Aug. 15	Aug. 31	Sep. 1	Oct. 31		Any ram
22	1	Aug. 15	Aug. 31	Sep. 1	Oct. 31	5	Any ram, also valid in Area 5 (5 res.)

2022 Management Summary

1.) Hunting Season Evaluation: We are increasing licenses in three hunt areas and decreasing in two hunt areas for a total increase of 5 licenses in the herd unit. Overall, we are making adjustments for the new 90/10 resident/non-resident split and therefore we increased or decreased licenses to hit a multiple of 5 or 10 except for Hunt Area 5, which had an additional license added for the non-resident random draw. We are decreasing licenses in Hunt Areas 3 and 5. Harvest statistics and hunter comments from Hunt Area 3 continue to show low numbers of available rams and most likely overall population numbers for the area. Despite good harvest statistics in Hunt Area 5 in 2022, early flight numbers indicate a possible loss of overall numbers of rams in the area, thus the decrease in licenses. Hunt Areas 1 and 2 have shown great harvest success and ram quality over the last 2 years, which should allow for more license opportunity in both areas.

2.) Management Objective Review: In 2022, managers reviewed the current herd level estimated population objective of 4,500 and determined that no change in that objective type or level was needed. Because this is a large population spread over a very large area, the herd level objective is only used a very course level to determine the herd performance. We also reviewed the individual hunt area objective metrics (harvest success, days to harvest and average age of ram harvested) used to determine population performance at a more fine scale and have determined that no change is necessary at this time. Currently, harvest parameters for each of the hunt areas seem to be the best gauge on how rams are doing in each of the hunt areas that allows us to make inferences on how many licenses should be in the hunt area the next hunting season.

2022 - JCR Evaluation Form

SPECIES: Bighorn Sheep
 HERD: BS212 - DEVIL'S CANYON
 HUNT AREAS: 12

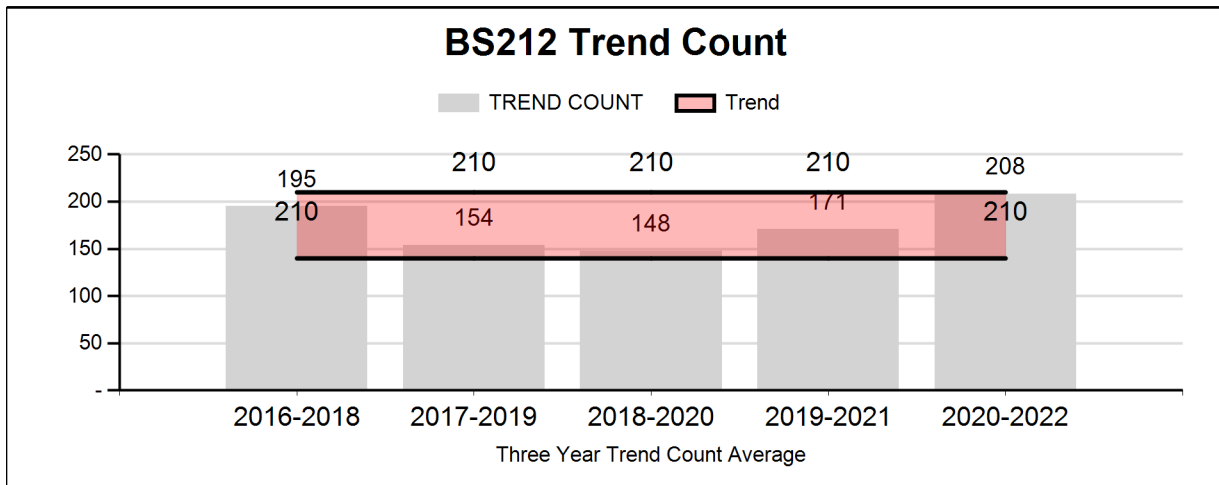
PERIOD: 6/1/2022 - 5/31/2023
 PREPARED BY: SAM STEPHENS

	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Trend Count:	167	253	100
Harvest:	6	11	2
Hunters:	6	12	2
Hunter Success:	100%	92%	100 %
Active Licenses:	6	12	2
Active License Success	100%	92%	100 %
Recreation Days:	40	42	10
Days Per Animal:	6.7	3.8	5
Males per 100 Females:	59	53	
Juveniles per 100 Females	47	12	

Trend Based Objective (± 20%) 175 (140 - 210)
 Management Strategy: Special
 Percent population is above (+) or (-) objective: 45%
 Number of years population has been + or - objective in recent trend: 1

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

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	4%	0%
Males ≥ 1 year old:	9%	5%
Juveniles (< 1 year old):	0%	0%



2022 - JCR Evaluation Form

SPECIES: Bighorn Sheep

PERIOD: 6/1/2022 - 5/31/2023

HERD: BS106 - TARGHEE

HUNT AREAS: 6

PREPARED BY: ALYSON
COURTEMANCH

	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Population:		N/A	N/A
Harvest:	1	0	2
Hunters:	1	1	2
Hunter Success:	20%	0%	100%
Active Licenses:	1	1	2
Active License Success:	40%	0%	100%
Recreation Days:	19	24	19
Days Per Animal:	19	0	19

Limited Opportunity Objective:

5-year average harvest age of 6-8 years

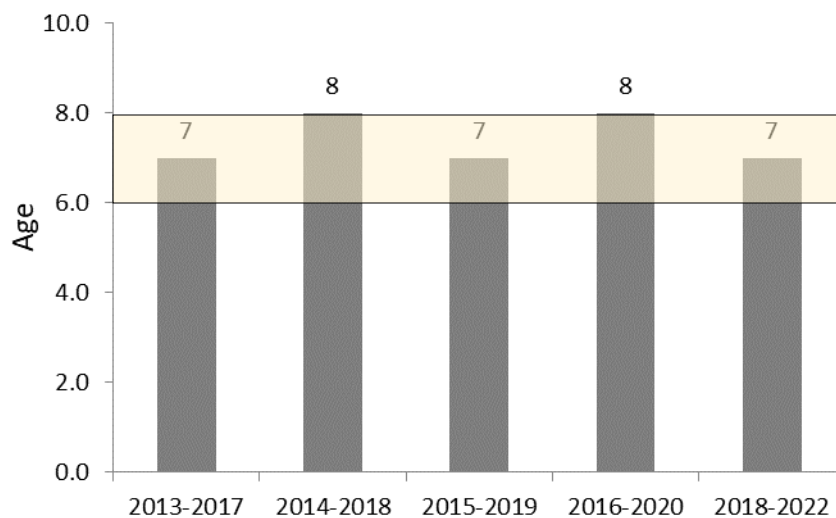
5-year average hunter success of $\geq 50\%$

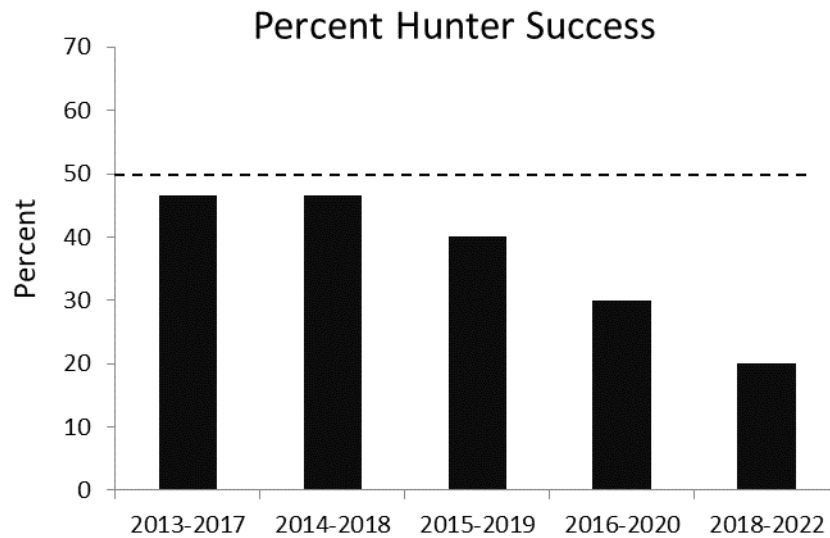
Secondary Objective:

Management Strategy:

Special

Average Age of Harvested Sheep





**2023 HUNTING SEASONS
TARGHEE SHEEP HERD (BS106)**

Hunt Area	Hunt Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
6	1			Aug. 1	Aug. 31	2	Any ram valid north of South Badger Creek (1 resident, 1 nonresident)
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 two objectives: 1) 5-year average harvest age of 6-8 years, and 2) 5-year average hunter success of at least 50%. The one hunter in 2022 was not successful, however, the hunter reported seeing mature rams and had opportunity. There has only been one sheep harvested in this herd unit during the last 5 years. This trend is reflected in the declining average hunter success metric. The average age of harvested sheep is 7 (because 1 hunter harvested a 7.5 year old sheep during the past 5 years). The average hunter success is 20%. Therefore, the herd is meeting the first objective but not the second.

Managers reduced the license quota from 2 to 1 beginning in 2018 because mature ram numbers were low, particularly in the southern herd segment where all harvest has occurred in the past 20 years. At that time, a total of 76 sheep were being counted in the herd with 22 rams of which

only 13 had at least $\frac{3}{4}$ curl. The February 2022 survey found a total of 104 sheep and an increase in rams with a total of 37, of which 26 were at least $\frac{3}{4}$ curl (11 in the southern portion of the herd unit and 15 in the northern portion). This winter's survey was delayed due to consistently bad weather in the Tetons, but was accomplished in early April 2023. A total of 71 sheep were observed including 29 rams, of which 18 had at least $\frac{3}{4}$ curl (10 in the southern portion of the herd unit and 8 in the northern portion).

One of the challenges with managing this herd is that surveys are flown in the winter when most sheep are on winter ranges in Grand Teton National Park; therefore, it is difficult to know how many of the rams seen during the winter surveys are outside of the park and available to hunters in the open hunt area during the fall. The WGFD biologist conducted a 3-day ground survey in August 2022 in the North Darby Creek/Wedge/Mt. Bannan area and did not see any rams (one group of ewes and lambs was observed). Likewise, biologists from Caribou-Targhee National Forest conducted a 4-day ground survey for bighorn sheep in the Alaska Basin/Mt. Meek area and did not see any rams. The WGFD game warden observed a group of bighorn sheep of unknown age/sex in the Fox Creek drainage in fall 2022. However, managers received more reports from the public of seeing groups of rams in Hunt Area 6 in 2022. Managers received a report of two groups of rams of various ages totaling 16 in the southern portion of the hunt area in fall 2022 and a report of 12 rams in the northern portion of the hunt area in spring 2022. For these reasons, licenses were increased from 1 to 2 in 2023. The season was extended from August 1 – August 31 for the northern portion of the hunt area only in order to encourage harvest in the northern herd segment.

2.) Management Objective Review: The next scheduled objective review is 2024.

3.) Mid-Winter Trend Count: This herd has been increasing for the past five years from low trend counts of 40-60 sheep from 2015-2017 to trend counts of 90-100 from 2020-2022. However, the trend count dropped slightly this year to 71 sheep. Winter 2022/2023 was very prolonged and severe with low and mid elevation ranges covered in deep snow until mid May, which likely impacted sheep survival and may cause reduced lamb numbers for next year. Due to consistently poor weather conditions in February and March, this year's survey was not completed until early April, however, most sheep were still concentrated at high elevations with deep snow in lower elevation side canyons. This year's survey only found 5 lambs and a lamb ratio of 15 lambs per 100 ewes, which is concerning for future population trends. As in past years, the survey found almost an equal split of sheep between the northern portion of the herd unit (34 sheep) and southern portion (37 sheep).

4.) Teton Range Bighorn Sheep Working Group: The Teton Range Bighorn Sheep Working Group was very active during the past year. The working group includes representatives from WGFD, Grand Teton National Park (GTNP), Bridger-Teton National Forest (BTNF), Caribou-Targhee National Forest (CTNF), Wyoming Wild Sheep Foundation, and Northern Rockies Conservation Collaborative (retired biologist who studied the herd in the 1970s). The working group initiated the Teton Sheep and Winter Recreation Community Collaborative Process in winter 2019/2020 to address the impacts of backcountry skiing on this herd. Final results of this collaborative process were delayed due to COVID-19, however a final plan was released in October 2021. The various agencies are now working on moving forward with a combination of

an education and stewardship campaign, voluntary winter range closures, and possibly mandatory winter range closures in GTNP through a NEPA Environmental Analysis (decision expected in 2023). WGFD and BTNF have been actively engaged with Jackson Hole Mountain Resort and their backcountry guiding operation to avoid bighorn sheep wintering areas and document bighorn sheep sightings. The working group has been actively involved in commenting during the NEPA process for Grand Targhee Ski Resort's proposed expansion into Teton Canyon. Also, GTNP and WGFD have been working collaboratively on a fecal DNA project over the last four years to gain better information on the population size and genetic health of this herd. Final results from this project are expected in summer 2023.

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SPECIES: Bighorn Sheep

PERIOD: 6/1/2022 - 5/31/2023

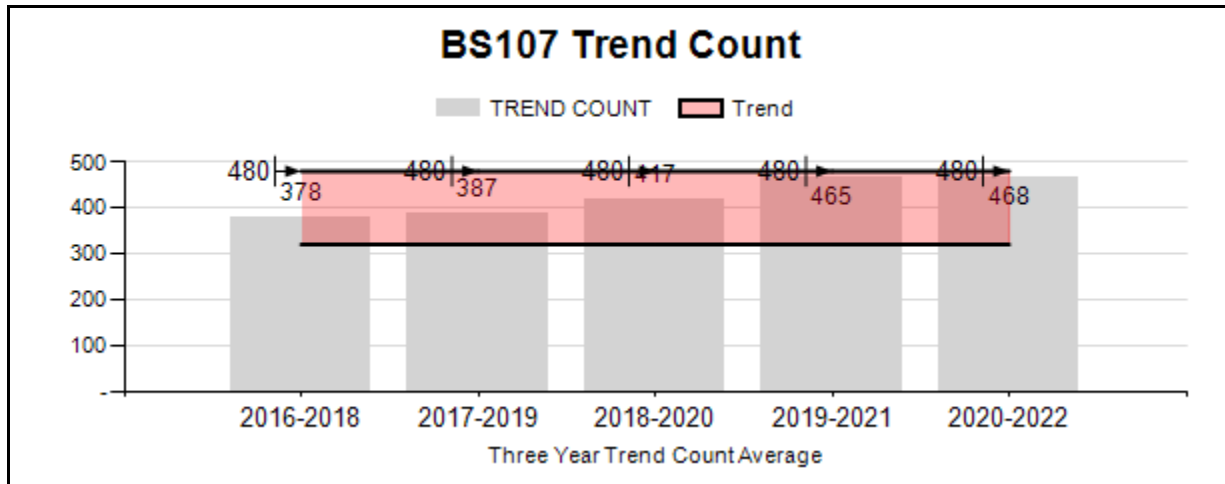
HERD: BS107 - JACKSON

HUNT AREAS: 7

PREPARED BY: ALYSON COURTEMANCH

	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Trend Count:	431	407	400
Harvest:	8	19	27
Hunters:	12	29	42
Hunter Success:	67%	66%	64 %
Active Licenses:	12	29	42
Active License Success	67%	66%	64 %
Recreation Days:	122	247	280
Days Per Animal:	15.2	13	10.4
Males per 100 Females:	39	49	
Juveniles per 100 Females	38	30	

Trend Based Objective (± 20%)	400 (320 - 480)
Management Strategy:	Special
Percent population is above (+) or (-) objective:	2%
Number of years population has been + or - objective in recent trend:	3



2022 - JCR Evaluation Form

SPECIES: Bighorn Sheep

PERIOD: 6/1/2022 - 5/31/2023

HERD: BS107 - JACKSON

HUNT AREAS: 7

PREPARED BY: ALYSON COURTEMANCH

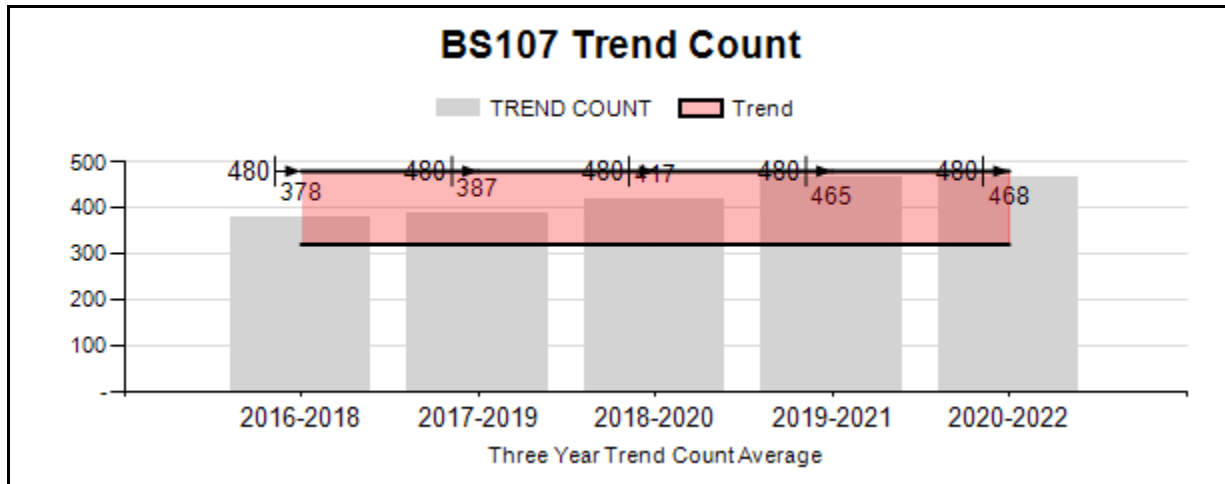
	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Trend Count:	431	407	400
Harvest:	8	19	27
Hunters:	12	29	42
Hunter Success:	67%	66%	64 %
Active Licenses:	12	29	42
Active License Success	67%	66%	64 %
Recreation Days:	122	247	280
Days Per Animal:	15.2	13	10.4
Males per 100 Females:	39	49	
Juveniles per 100 Females	38	30	

Trend Based Objective ($\pm 20\%$) 400 (320 - 480)

Management Strategy: Special

Percent population is above (+) or (-) objective: 2%

Number of years population has been + or - objective in recent trend: 3



**2023 HUNTING SEASONS
JACKSON SHEEP HERD (BS107)**

Hunt Area	Hunt Type	Archery Dates		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	30	Ewe or lamb valid within the Gros Ventre River drainage (27 residents, 3 nonresidents)

2023 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 has been increasing since 2012 after its last pneumonia die-off. In recent years, the herd surpassed its objective of 400 sheep and it has been above its upper +20% buffer (480 sheep) for the past two of three years. This year, 407 sheep were counted during the mid-winter trend count with a 3-year average of 468 sheep. The trend count was lower this year due to unknown reasons, but managers do not suspect a pneumonia die-off has occurred or other substantial reduction in the herd. Approximately 20 sheep are currently collared in this herd for research and there have been no pneumonia-related mortalities in collared adults this year. Due to above average winter conditions, sheep were distributed in different areas during the survey, therefore, managers suspect that several groups of sheep were missed during the survey.

The lamb:ewe ratio during the mid-winter trend count was 30:100 and the adult ram:ewe ratio was 49:100. Fifty-three rams with $\frac{3}{4}$ curl or larger horns were observed during the survey. Due to the increasing overall numbers in the population and number of mature rams, managers increased Type 1 licenses from 12 to 16 in 2022. After feedback from hunters and outfitters who spent significant time in the field last year, managers decided to reduce Type 1 licenses back to 12 in 2023 but open the season two weeks earlier for archery (August 1) and two weeks earlier for rifle (August 15) to give hunters a longer period of time. Managers have been concerned in recent years that hunter success and age of harvest sheep have been declining while average days to harvest has increased, which corroborates feedback from outfitters and hunters that quality rams have been difficult to find. Harvest success was 63% in 2022 however much of that success was driven by hunters harvesting younger sheep during the last few days of the season. Average age of harvested sheep was 6.5 years.

Since the herd has been above objective and trending upward, managers added a Type 6 ewe/lamb license beginning in 2022. In the past, this sheep herd has undergone pneumonia die-offs when the population reaches approximately 500 sheep. Ongoing research with the University of Wyoming has shown that the body fat of collared ewes on the Gros Ventre winter

ranges has declined in recent years, while ewes on the Curtis Canyon/Flat Creek winter ranges have remained relatively stable. Managers believe this decline in body fat may be a signal that bighorn sheep are competing for resources due to the growing population and may be a precursor to another pneumonia outbreak. Managers issued 16 ewe/lamb licenses valid for the Gros Ventre drainage in 2022 to reduce the population density in that herd segment. Harvest success was lower than expected at 38%. There were 182 ewes classified in the Gros Ventre drainage in February 2022, so this licenses only removed ~4% of the ewes. Interest in this license was high with a 4% draw rate for residents and 7% for non-residents in 2022. Due to the low harvest success, managers increased these licenses to 30 in 2023 to work toward population reduction goals of at least 10% reduction in ewes. Managers feel that this number of licenses will increase harvest but also prevent hunter overcrowding in the area. This season was also lengthened slightly to correspond with other species openers in the same area on September 10. Concurrent research will continue with the University of Wyoming to monitor how the ewe/lamb season affects body condition, population demographic rates, and disease in the Gros Ventre drainage, compared to the segment of the population that winters in Curtis Canyon and Flat Creek.

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

2022 - JCR Evaluation Form

SPECIES: Bighorn Sheep

PERIOD: 6/1/2022 - 5/31/2023

HERD: BS609 - WHISKEY MOUNTAIN

HUNT AREAS: 8-10

PREPARED BY: ZACH GREGORY

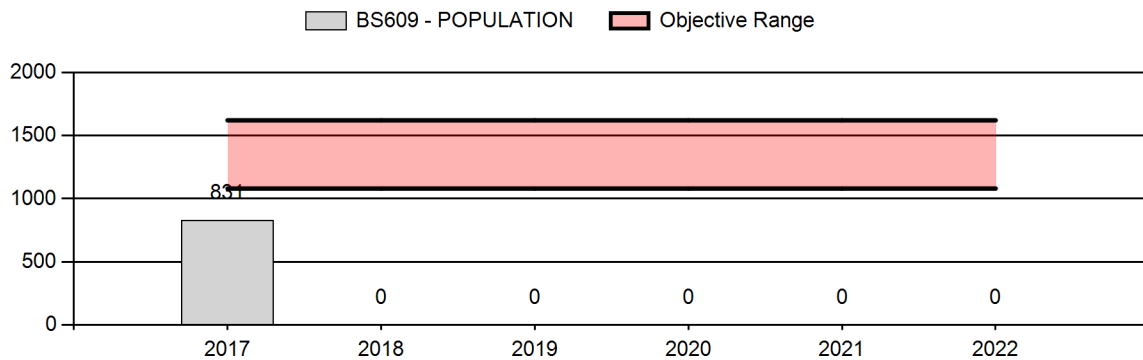
	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Population:	166	N/A	N/A
Harvest:	10	7	12
Hunters:	18	12	14
Hunter Success:	56%	58%	86%
Active Licenses:	18	12	14
Active License Success:	56%	58%	86%
Recreation Days:	167	105	175
Days Per Animal:	16.7	15	14.6
Males per 100 Females	49	57	
Juveniles per 100 Females	21	36	

Population Objective ($\pm 20\%$) :	1350 (1080 - 1620)
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	N/A%
Number of years population has been + or - objective in recent trend:	12
Model Date:	None

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

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0%	0%
Males ≥ 1 year old:	0%	0%
Proposed change in post-season population:	0%	0%

Population Size - Postseason



**2023 Hunting Seasons
Whiskey Mountain Bighorn Sheep (BS609)**

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
8	1	Aug. 15	Aug. 31	Sep. 1	Oct. 31	4	Any ram (4 Resident)
9	1	Aug. 1	Aug. 14	Aug. 15	Oct. 15	5	Any ram (4 Resident; 1 Nonresident)
10	1	Aug. 1	Aug. 14	Aug. 15	Oct. 15	5	Any ram (5 Resident)

2023 Management Summary

1.) Hunting Season Evaluation: Since 2018 there has been insufficient demographic data collected in this herd to produce an accurate population estimate. Regardless, it appears the population continued to decline in 2022. Personnel classified a historically low number of sheep within the herd unit in 2022 with a sample of 224 due, in part, to weather conditions and the inability to fly area 8. Due to the low classification sample, age:sex ratios should be viewed with caution. That said, the lamb:ewe ratio was similar to 2021 being the highest it has been in the last 6 years at 36:100. Area 8 had a lamb:ewe ratio of 18:100, the lowest its been since 2017. Area 9 had a lamb:ewe ratio of 40:100 and area 10 had a ratio of 39:100, a significant increase from previous years. Hunter success in 2022 in areas 9 and 10 was 67% and 100%, respectively and well within the historic range for these areas. In 2022 the average age of rams harvested in 9 and 10 (11 and 8, respectively) indicate the availability of older rams in these hunt areas. Although the population has not improved, there still is ample hunting opportunity in areas 9 and 10. To best accommodate the new 90/10 split, an increase of one license to 5 in both areas 9 and 10 will allow one nonresident hunter every year in each hunt area in alternating years. The low harvest success of 20% in area 8 during 2022 was the lowest recorded in 20+ years, following 43% success during the previous 2 years (2020 and 2021). Prior to 2020 the 5-year average success was 55%. These recent poor success rates suggest and support field observations that overall ram numbers and hunter opportunity have declined. Four licenses (all going to resident hunters) will be issued in area 8 in 2023 in an effort to maintain harvest opportunity while allowing for increased growth and recruitment of younger rams.

In 2019, a lamb survival study was initiated in the eastern portion of this herd to determine cause specific mortality of lambs and track body condition of sheep in the population. In the spring of 2019, 24 adult ewes were outfitted with GPS collars and had VITs implanted to aid researchers in capturing neonate lambs. Graduate students from the University of Wyoming were able to capture 14 neonate lambs during spring, 2019. Between June, 2019 and January, 2020 all lambs subsequently died. The study continued in 2020/21 with 11 lambs captured and collared between May and June, 2020. Similar to 2019, all 11 collared lambs died by the end of February, 2021. Each year, roughly half of the collared lamb mortalities were attributed to pneumonia. In 2022, the study continued in the Red Creek sub herd, but unfortunately only 3 lambs were collared, all of which died. Given sheep availability during captures, ruggedness of the terrain, and access to

lambing areas, it was decided to stop collaring lambs in areas 9 and 10. During March of 2021, 14 ewes were captured, collared, and VITs implanted in 11 pregnant ewes in Area 8. This capture effort was the first time sheep had ever been captured and handled in the area. This study has continued since 2021 with approximately 20 collared sheep as of date with a scheduled completion of field work and captures in March, 2024. The same study objectives to collect body condition, pathogen levels, and lamb survival remained the same as conducted previously in other portions of this herd unit (Areas 9 and 10) and some surrounding herds. Of particular interest so far from these Area 8 sheep is that body condition (fat levels) are much better than sheep sampled from the east side of this herd unit, moderate lamb survival, and seasonal range use showing relatively small and consistent distribution among years.

In collaboration with the Eastern Shoshone & Northern Arapaho Tribal Fish and Game, the WGFD and University of Wyoming, implemented “test and remove” of bighorn sheep infected with *Mycoplasma ovipneumoniae* (MOVI) in the Red Creek portion of the herd unit. Bighorn sheep that test positive for MOVI twice within a 14 month period with at least 2 months in between testing are considered “chronic carriers” and are removed. To date, 11 ewes have met the definition as a chronic carrier and all 11 of those have been removed. Lambing season in 2022 was the first glimpse at reproduction/survival after removing 7 of the chronic carriers. During 2022-2023 winter classifications, personnel counted 15 ewes, 7 lambs, 7 mature rams, and 1 yearling ram. This number of lambs (ratio of 47:100) has not been observed in this sub-herd in the past 6 years. In fact, this is more observed lambs than has been seen in the last 6 years combined. We are still in the beginning stages of the project, and are not making inferences about this increased number of lambs, but this is an encouraging step forward.

2. Management Objective Review: The Whiskey Mountain BHS herd population objective is 1,350 sheep. While the population has been in decline for quite some time, managers agree the current objective is appropriate and an acceptable management goal, especially given the presumption bighorn sheep numbers will rebound with expanded “test and remove” in the herd. Through recent research, disease has been identified as the main factor in extremely low recruitment rates. In response, managers have elected to initiate a test and remove program to increase recruitment in this herd and reverse the downward trend in the population. Also, forage utilization on Whiskey Mountain BHS winter range indicates ample available habitat to support the current population objective. Finally, while we have not been able to generate a reliable population estimate, a new abundance estimate technique using trail cameras will be utilized in 2023-2024 to perhaps improve our ability to estimate this population’s size.

**2023 HUNTING SEASONS
DEVILS CANYON BIGHORN SHEEP HERD (BS212)**

Hunt Area	Hunt Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
12	1	Aug. 1	Aug. 14	Aug. 15	Oct. 15	2	Any ram

2022 Management Summary

1.) Hunting Season Evaluation:

In 2022, increased sheep harvest was applied to address an overabundance of bighorns in Devil’s Canyon. This included a modest increase to Type 1 licenses as well as the issuance of a new Type 6 ewe license. Female harvest was intentionally low in 2022 as this was the first time ewe tags were employed as a management tool. Therefore only 4 licenses were issued. Immediately following the end of the 2022 hunting season a significant mortality event impacted the Devils Canyon Herd. The death of a GPS collared ewe in late October revealed another 36 sheep carcasses over the course of three days. Fresh carcasses were necropsied and samples sent to the Wyoming Game and Fish Department’s Wildlife Health Laboratory. Four living sheep were removed by department personnel after exhibiting clinical signs of pneumonia such as nasal discharge and extreme lethargy (unwillingness to move). Wildlife Health Laboratory staff concluded that this outbreak was triggered by a novel strain of the pathogen *Mannheimia haemolytica*. Disease related mortality continued through the fall and into the winter. By December 31, 2022: approximately 44% of the collared sheep (n=6 ewes: 6 rams) were lost to the pneumonia outbreak. Although the impact to the entire herd is not yet known, surveillance flights were conducted in November, December, January, and February where 30-83 sheep were counted. The steep decline in survival for the 2022-23 winter prompted the reduction in Type 1 licenses and the removal of any ewe harvest. The summer 2023 aerial classification and trend flight results will dictate future management decisions and be published in the 2023 JCR.

2.) Devils Canyon Bighorn Sheep Movement Analysis:

With disease sampling funding secured through the Wyoming chapter of the Wild Sheep Foundation, additional funding was opportunistically granted by the organization (\$12,450) and the Wyoming Governors Big Game License Coalition (\$15,000) in 2019 to purchase GPS collars (n=30) to monitor habitat use, seasonal movement, and annual recruitment rates of Devils Canyon bighorn sheep. Amongst four capture efforts (November 2019, March 2020, December 2020, and January 2022) we have maintained a sample size of 10 adult males (1-7 y.o) and 20 adult females fitted with GPS collars. GPS collars proved to be a critical tool in detecting and monitoring disease related mortalities following the initial *Mannheimia haemolytica* die-off throughout the 2022-23 winter. A total of 15 mortalities were detected from a starting total of 30 GPS collared sheep in 2022. Each event was investigated and cause was attributed to every mortality (Figure 1).

Figure 1. Cause-Specific Mortality of GPS Collared Bighorn Sheep

SEX	Time of Mortality	Cause of Death
Ewe	February 2022	Capture Myopathy

Ram	August 2022	Poached
Ram	September 2022	Mountain Lion Predation
Ewe	October 2022	Disease
Ewe	October 2022	Disease
Ewe	October 2022	Disease
Ewe	October 2022	Disease
Ewe	November 2022	Disease
Ram	November 2022	Disease
Ram	November 2022	Disease
Ram	November 2022	Disease
Ram	December 2022	Disease
Ram	December 2022	Disease
Ewe	December 2022	Disease
Ram	December 2022	Disease
Ram	April 2023	Disease
Ram	April 2023	Mountain Lion Predation

The remaining collars are expected to collect data until June 2023, and will allow us to detect additional disease-related mortalities for the remainder of the 2022 Biological Year.

2022 - JCR Evaluation Form

SPECIES: Bighorn Sheep
 HERD: BS615 - FERRIS-SEMINOE
 HUNT AREAS: 17, 26

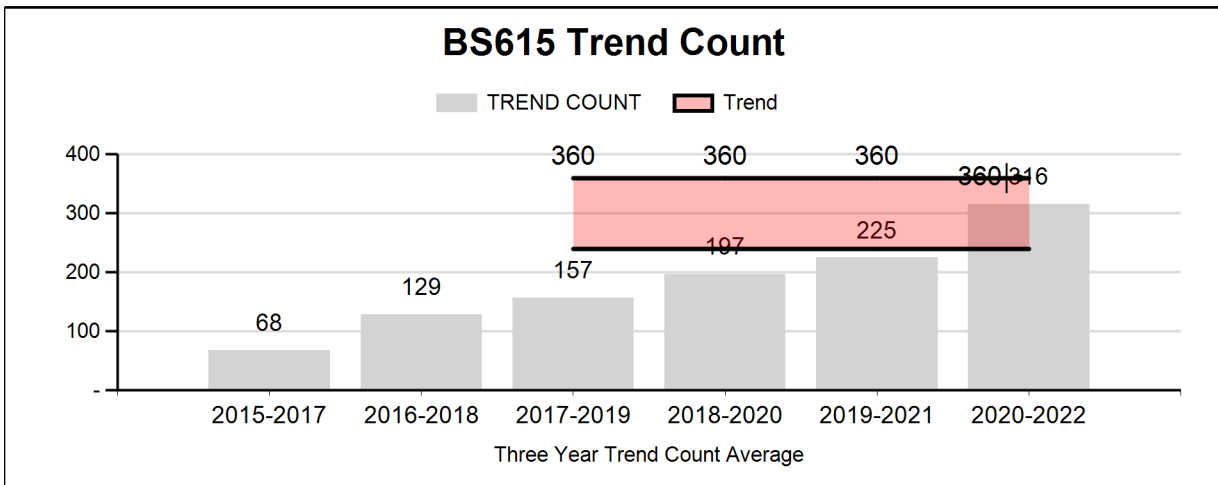
PERIOD: 6/1/2022 - 5/31/2023
 PREPARED BY: GREG HIATT

	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Trend Count:	202	409	300
Harvest:	5	11	32
Hunters:	5	11	32
Hunter Success:	100%	100%	100%
Active Licenses:	5	11	32
Active License Success	100%	100%	100%
Recreation Days:	34	74	32
Days Per Animal:	6.8	6.7	1
Males per 100 Females:	61	0	
Juveniles per 100 Females	48	0	

Trend Based Objective (± 20%) 300 (240 - 360)
 Management Strategy: Special
 Percent population is above (+) or (-) objective: 36%
 Number of years population has been + or - objective in recent trend: 14

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

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0%	10%
Males ≥ 1 year old:	12%	10%
Juveniles (< 1 year old):	0%	0%



**2023 Hunting Seasons
Ferris-Seminole Bighorn Sheep (BS615)**

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
17	1	Aug. 15	Aug. 31	Sep. 1	Oct. 31	10	Any ram (9 residents, 1 nonresident)
17	6	Aug. 15	Aug. 31	Sep. 15	Oct. 31	12	Ewe or lamb (11 residents, 1 nonresident)
17	7	Aug. 15	Aug. 31	Sep. 15	Oct. 31	5	Ewe or lamb (4 residents, 1 nonresident) valid within the Sand Creek drainage
26	1	Aug. 15	Aug. 31	Sep. 1	Oct. 31	2	Any ram (2 residents)
26	6	Aug. 15	Aug. 31	Sep. 15	Oct. 31	3	Ewe or lamb (3 residents)

2023 Management Summary

1.) Hunting Season Evaluation: A winter trend count flown in January 2023 had ideal conditions of fair winds, good light and near-continuous deep snow cover. Observers found 409 bighorn sheep, providing a 3-year average of 316 sheep and reaching the objective of 300 (see Figure 1. and Appendix A.). As is typical, the majority (62%) of these animals were in the Seminole Mountains in Area 17, with another 31% in the Ferris Mountains. Less than 8% were found in the Bennett Mountains. Lamb production improved from 47:100 in 2021 to 54:100, and was within the normal range for this herd. Lamb production was again higher in Area 26 (86:100) than in Area 17 (49:100).

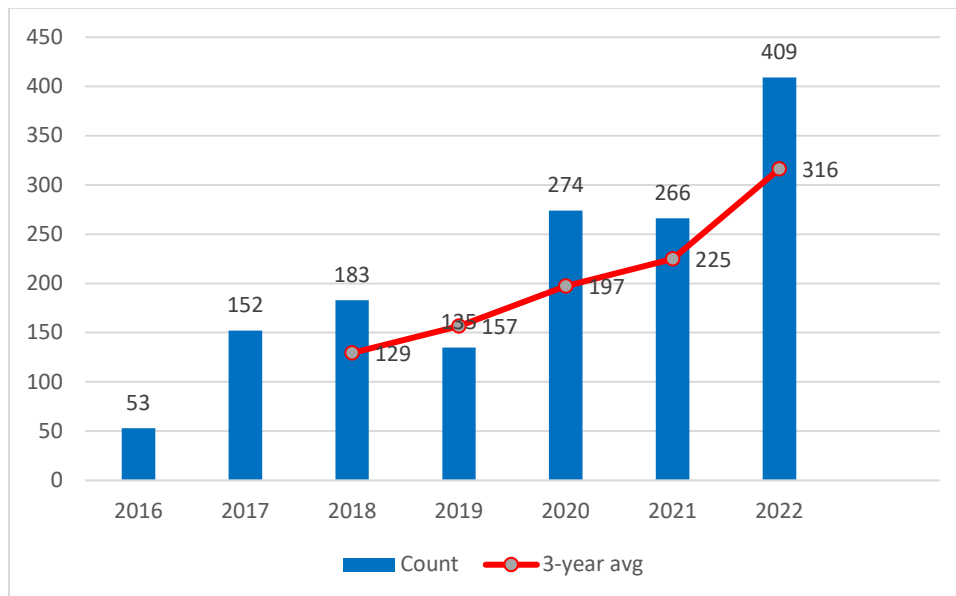


Figure 1. Winter trend counts and 3-year averages for the Ferris-Seminole Bighorn Sheep Herd.

Ram:ewe ratios ranged from a low 40:100 in the Ferris Mountains to 257:100 in the Bennett Mountains, with the combined herd ratio at 72:100, less than the 87:100 observed in 2021. A total of 130 rams were found during the trend count, compared to 96 rams in 2021. As in 2021, two-thirds of the rams were found in the Seminoe portion of Area 17. Average age of harvested rams declined from 7.4 years in 2019 to 7.0 years in 2020 and 6.7 years in 2021, but remained essentially stable in 2022 at 6.6 years (Figure 2.). While there is a good supply of rams, the majority appear to be younger, products of the exceptional lamb production seen within this herd in most years.

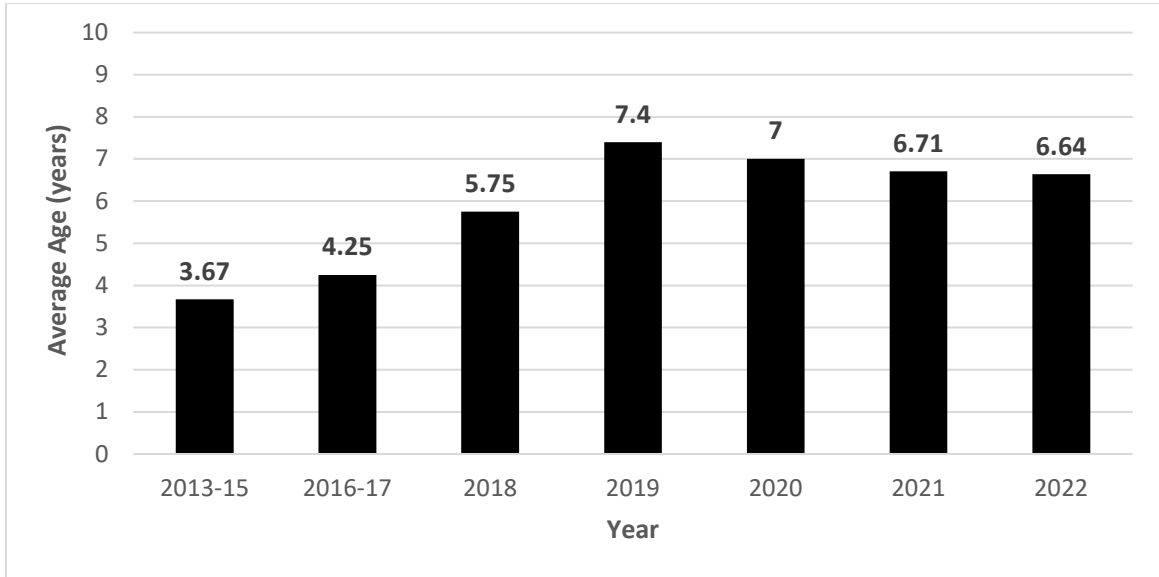


Figure 2. Average age of rams harvested from the Ferris-Seminoe Bighorn Sheep Herd.

License quotas were separated between the two hunt areas for the first time in 2021. Trend count data show there are enough mature rams for another increase in the quota for Area 17. The combined total for the herd would be 12 licenses for rams, an increase of two over the 2022 quota. With the herd reaching objective size and lamb production and survival remaining high, harvest of ewes has become necessary. First, the healthy lamb production and survival seen in this herd is largely due to major habitat treatments in the past decade. To maintain the high productivity of this herd, bighorn sheep numbers need to be managed to maintain the range health of those habitats. And secondly, the greatest threat to this herd is the possibility of disease transfer from domestic animals outside the herd unit. To address this threat, it is necessary to keep bighorn sheep numbers at a healthy density to minimize the likelihood of bighorn sheep trying to disperse or wander to new ranges which may harbor dangerous pathogens.

A spreadsheet model of this herd suggests an annual harvest of about 20 ewes would be adequate to stabilize herd growth. To prevent overharvest of the small proportion of the population in Area 26, only 3 Type 6 ewe/lamb licenses are issued in that area. Twelve licenses are available as Type 6 licenses valid for all of Area 17. Because of the easy access to the Seminoe Mountains, it is expected most of these will be filled near the Seminoe Road

at the eastern edge of the area. To ensure that some ewe harvest comes off sheep ranges on the eastern end of the Ferris Mountains, 5 Type 7 ewe/lamb licenses are also issued for Area 17, valid only in the Sand Creek drainage.

Winter severity in 2022-23 was extreme, with below normal temperatures, high winds, and record snowfall producing deep crusted snow cover over much of the herd unit. High winter mortality was documented in pronghorn and mule deer herds west and south of this herd unit, but none of the bighorn sheep with active collars for the Bennett Mountain monitoring study died from winter stress. Conditions along the Miracle Mile were more moderate than on the south or west sides of the Seminoe Mountains, or the Ferris Mountains. Pick-up skull recoveries following other hard winters suggest bighorn sheep on the south slopes of the Seminoe Mountains have had poorer survival than on other winter ranges in this herd, and it appears that pattern may have been repeated again this winter. At least one ewe, with a non-functioning radio collar, was found dead by shed hunters south of the Red Hills. Spring classifications found noticeably fewer lambs remaining in the southern portion of the Seminoe Mountains (24:100) than on the north (60:100) or in the Bennett Mountains (44:100). Overall, mid-April classifications found 43 lambs:100 ewes where 54:100 were seen in January, indicating lamb mortality was not excessive. This April survey did not sample any bighorn sheep from the Ferris Mountains, so it is not known how lamb survival fared in that segment of the herd. Even if winter losses were above normal this year, there should be enough bighorn sheep to support the expected ewe harvest. While a combination of ewe harvest and above normal winter mortality could potentially reduce this herd below objective size, the high lamb production and survival seen in this herd should produce a prompt recovery.

Appendix A Winter Trend Count Report

Bio Year: 2022	Herd Code: BS615
Species: Bighorn sheep	Herd Unit: Ferris-Seminole
Aircraft: R66 helicopter	Hunt Areas: 17, 26
Pilot: Dave Stinson, 307 Aviation	Dates: 18-19 Jan 2023
Observers: Linnea Sailor	Flight Time: ?? hrs
Conditions: excellent snow cover, good light, light winds	

Survey Design:

An aerial trend count of this herd was flown on 18-19 January 2023. As in 2021, the bighorn sheep trend count/classification survey was flown simultaneous with the Ferris elk trend count. Again, coverage of this year's bighorn sheep trend count was expanded to include habitats likely to be occupied by elk and was more extensive than in most previous years. Because of the combining of surveys, exact hours of flight for this bighorn sheep survey are not quantifiable.

As in previous trend counts, all known or suspected bighorn sheep wintering areas on the Ferris, Seminole and Bennett Mountains were flown, guided by past flights and telemetry locations. Efforts were made to classify all bighorn sheep found. Digital photography was used to classify larger groups.

Count Results:

Hunt Area	Count Block	Classification				Total	Herd Ratios (/100 ewes)	
		Ewes	Lambs	Rams	Uncl		Lamb	Ram
17	Ferris	63	37	25	0	125	58.7	39.7
17	Seminole	111	55	87	0	253	49.5	78.4
26	All	7	6	18	0	31	85.7	257.1
Total		181	98	130	0	409	54.1	71.8

Conditions for this year's trend count were exceptional, with fresh, deep snow cover, good light and light winds for all days of flying. A total of 409 bighorn sheep were counted, significantly more than the 266 counted in BY2021 and the 274 found in BY2020. As is typical, the majority (92%) of the animals were in Area 17, with two-thirds of these in the Seminole Mountains and the remainder in the Ferris Mountains. All of the increase in the trend count this year was in the Seminole Mountains, which more than doubled in number, with counts for the Ferris and Bennett portions of the herd essentially unchanged from 2021. Locations and relative group size of bighorn sheep found during this survey are shown in Figure 1.

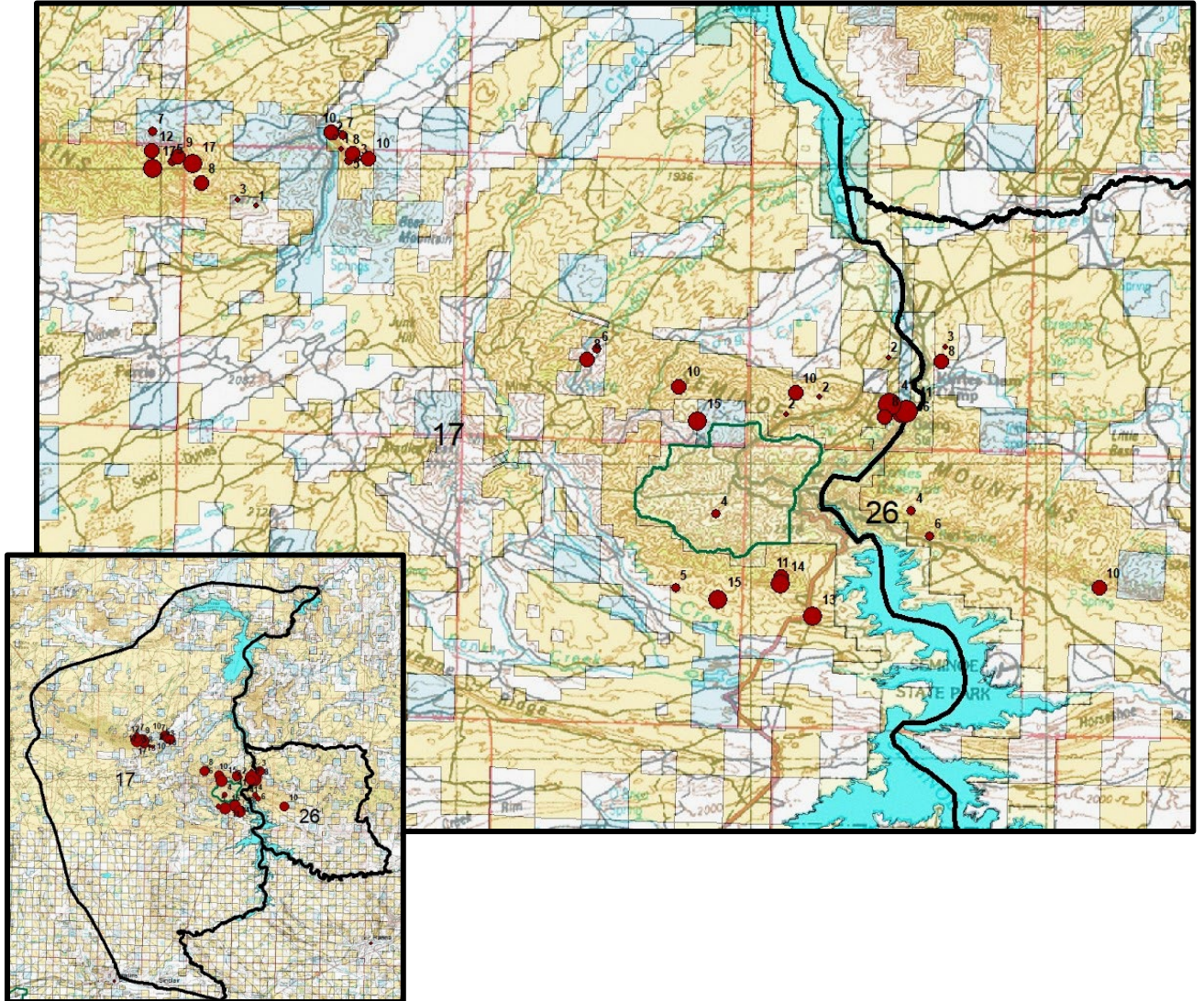


Figure 1. Locations and groups sizes of bighorn sheep found in the Ferris-Seminole Herd during the 2022 winter trend count on 18-19 January 2023.

**2023 Hunting Seasons
Douglas Creek Bighorn Sheep Herd Unit (BS 516)**

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
18	1	Aug. 15	Aug. 31	Sep. 1	Nov.30	3	Any ram (3 residents)

Current Management Objective: Bighorn Sheep Limited Opportunity

- 1) 5-year running average of >75% hunter success
 - Currently Met: 2018-2022 Hunter Success- 100%
- 2) 5-year running average age of harvested rams between 6 and 8 years of age
 - Currently Met: 2018-2022 Harvest Mean Age- 8 years of age
- 3) Documented occurrence of adult rams in the population
 - Currently Met: > 12 adult rams observed in 2022

2023 Management Summary

1.) Hunting Season Evaluation The 2022 hunting season structure provided one resident hunter and one nonresident hunter the opportunity to harvest mature rams in hunt areas 18 or 21. One ram was harvested in hunt area 18 and the other in hunt area 21. The 2023 hunting season structure will provide three resident hunters the opportunity to harvest mature rams in hunt area 18. Based on frequent observations of mature rams in Douglas Creek (hunt area 18) and Encampment River (hunt area 21), managers elected to forgo the traditional season structure and provide more opportunity by allocating separate license quotas for each hunt area. We expect hunters will have a high likelihood of success and this herd will continue to meet the bighorn sheep limited opportunity management objectives.

2.) Management Objective Review: The management objective for the Douglas Creek Herd Unit is a limited opportunity. The herd management objective was reviewed in 2021 and will be reviewed again in 2026.

3.) Research: We collared 19 adult ewes, including 6 recaptures, from the Douglas Creek Herd Unit on February 12, 2022. The median age was 4.5, with the oldest being 9.5, and the youngest 3.5. Ambient temperatures during capture were between -5 and +32 degrees that day, however we still had 7 of the 19 ewes come in at over 105 degrees. All were cooled quickly with alcohol, and only one had to be released due to temps not declining. We discussed this with the crew and decreased chase times and herds were given more time between captures. We did have a few injuries including a bloody mouth, cut on leg, and a nasty torn scalp between horns, which were all treated. We did not have any post capture mortalities. To date we have had three mortalities, with the first mortality documented on July 5th. I was unable to get to the site in time to determine the cause of death. The second mortality was on September 7th. This ewe was found next to the Platte River near another older mortality of an unmarked yearling ewe. During the field necropsy

it was discovered that she had a severe case of pneumonia. *M. ovi* was not found during the first testing of Douglas Creek sheep in 2019, but unfortunately it was found in 12 of the 19 ewes sampled in 2022 (appendix A).

Additionally we are seeing an increased movement into areas of the burn that were not previously utilized which is encouraging, but they still have strong fidelity to an old burn scar between the Platte and Savage Wilderness areas. Lamb surveys have proven difficult during the summer, but the best count was around 50:100 lambs to ewes.

4.) Habitat Annual precipitation in Hunt Area 18 was below normal in 2022. Winter severity was light to moderate, likely resulting in little to no significant mortality events. While no NOAA weather stations are close to the vicinity of occupied bighorn sheep habitats in Hunt Area 18, weather stations in Laramie and Rawlins reported declines in annual precipitation by 37% and 23%, respectively.

In September 2020, the Mullen Fire burned approximately 176,800 acres in the Snowy Range, including two wilderness areas. The western third of the burn area encompasses occupied bighorn sheep habitat. The wildfire likely increased line of sight visibility and created more open travel corridors for bighorn sheep, aiding their movements to escape terrain and lambing habitats. High fire severity in places is a continued cause for concern for cheatgrass invasion in Savage Run and Platte River wilderness areas, as well as other areas adjacent to North Platte River. In 2021, 10,334 acres on the western slope of the Snowy Range were aerially treated with the herbicide Rejuvra. A large-scale monitoring effort was completed by USFS, WGFD, and USGS in 2022 to evaluate herbicide efficacy one year post-treatment. Native, perennial grass recovery looks promising thus far. Plant species diversity was comparable pre- and post-treatment with the exception of a few native annual forbs. Cheatgrass was documented in areas where soil movement had occurred. Additionally, high densities of cheatgrass were documented within the no-spray buffer around the North Platte River. We will continue to monitor herbicide efficacy in 2023 and evaluate the need for retreatment.

Antelope bitterbrush, serviceberry, and big sagebrush seedlings were observed throughout the burn scar, which is a promising sign for shrub recovery. Several thousand mixed mountain shrub seedlings were planted west of the North Platte River in the fall of 2021 and 2022 by USFS, WGFD, and volunteers to aid in recovery. Collars affixed to bighorn sheep in Hunt Area 18 will provide useful information on resource use and habitat selection pre- and post-fire.

Appendix A

Disease Sampling Report



Douglas Creek 2022 BHS Herd Health Surveillance Report

Animal ID	Date Sampled	Location	Nasal culture/PCR final	Tonsil culture/PCR final
22-031	2/12/2022	A bar A Ranch	M. ovipneumoniae	LKT+ Mannheimia haemolytica/glucosida, LKT+ Mannheimia sp., P. multocida
22-032	2/12/2022	A bar A Ranch	M. ovipneumoniae	LKT+ Mannheimia haemolytica/glucosida, LKT+ Mannheimia sp., P. multocida
22-033	2/12/2022	A bar A Ranch	NSP	LKT+ Mannheimia sp., P. multocida
22-034	2/12/2022	A bar A Ranch	M. ovipneumoniae	LKT+ Mannheimia sp., P. multocida
22-035	2/12/2022	A bar A Ranch	M. ovipneumoniae	LKT+ Mannheimia sp.
22-036	2/12/2022	A bar A Ranch	NSP	LKT+ Mannheimia sp., P. multocida
22-037	2/12/2022	A bar A Ranch	NSP	hemolytic B. trehalosi (no leukotoxin)
22-038	2/12/2022	A bar A Ranch	NSP	LKT+ Mannheimia haemolytica/glucosida, LKT+ Mannheimia sp.
22-039	2/12/2022	A bar A Ranch	M. ovipneumoniae	LKT+ Mannheimia sp., P. multocida
22-040	2/12/2022	A bar A Ranch	M. ovipneumoniae	LKT+ Mannheimia sp., P. multocida
22-041	2/12/2022	State line	NSP	LKT+ Mannheimia sp.
22-042	2/12/2022	State line	NSP	LKT+ Mannheimia sp., P. multocida
22-044	2/12/2022	A bar A Ranch	NSP	NSP

Animal ID	Date Sampled	Location	Nasal culture/PCR final	Tonsil culture/PCR final
22-045	2/12/2022	A bar A Ranch	M. ovipneumoniae	LKT+ Mannheimia sp., P. multocida
22-046	2/12/2022	A bar A Ranch	M. ovipneumoniae	LKT+ Mannheimia sp.
22-048	2/12/2022	A bar A Ranch	M. ovipneumoniae	LKT+ Mannheimia sp., P. multocida
22-049	2/12/2022	A bar A Ranch	M. ovipneumoniae	LKT+ Mannheimia sp.
22-105	2/12/2022	Douglas Creek	M. ovipneumoniae	
22-106	2/12/2022	Douglas Creek	M. ovipneumoniae	

NSP = No significant pathogens NA = No samples received

2022 - JCR Evaluation Form

SPECIES: Bighorn Sheep

PERIOD: 6/1/2022 - 5/31/2023

HERD: BS517 - LARAMIE PEAK

HUNT AREAS: 19

PREPARED BY: KEATON
WEBER

	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Population:		N/A	N/A
Harvest:	8	6	8
Hunters:	8	7	10
Hunter Success:	100%	86%	80%
Active Licenses:	8	7	10
Active License Success:	100%	86%	80%
Recreation Days:	83	97	140
Days Per Animal:	10.4	16.2	17.5

Limited Opportunity Objective:

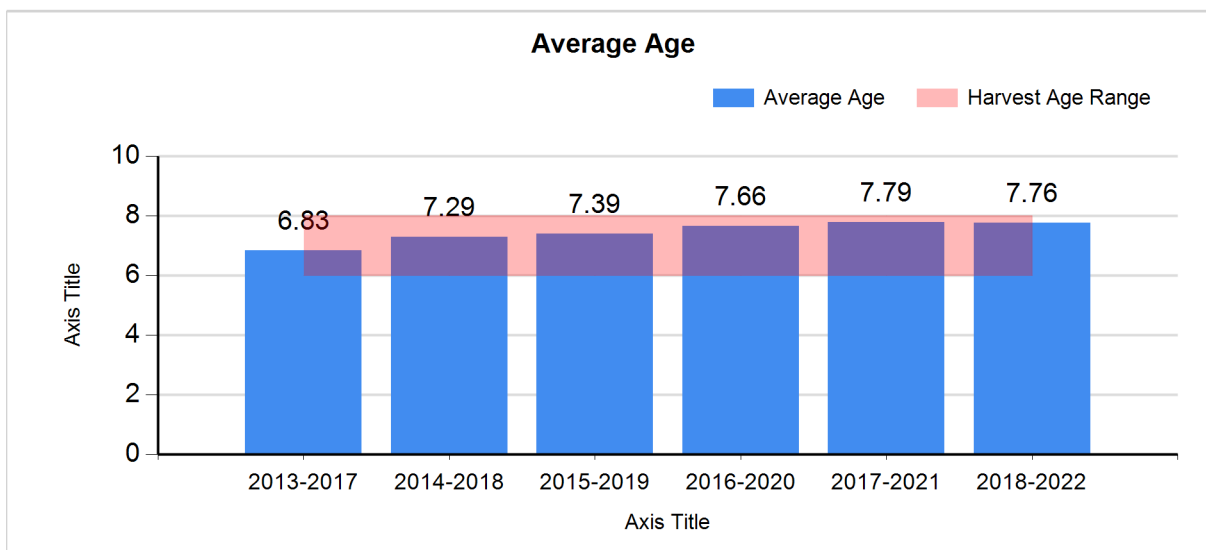
5-year average of > 75% hunter success

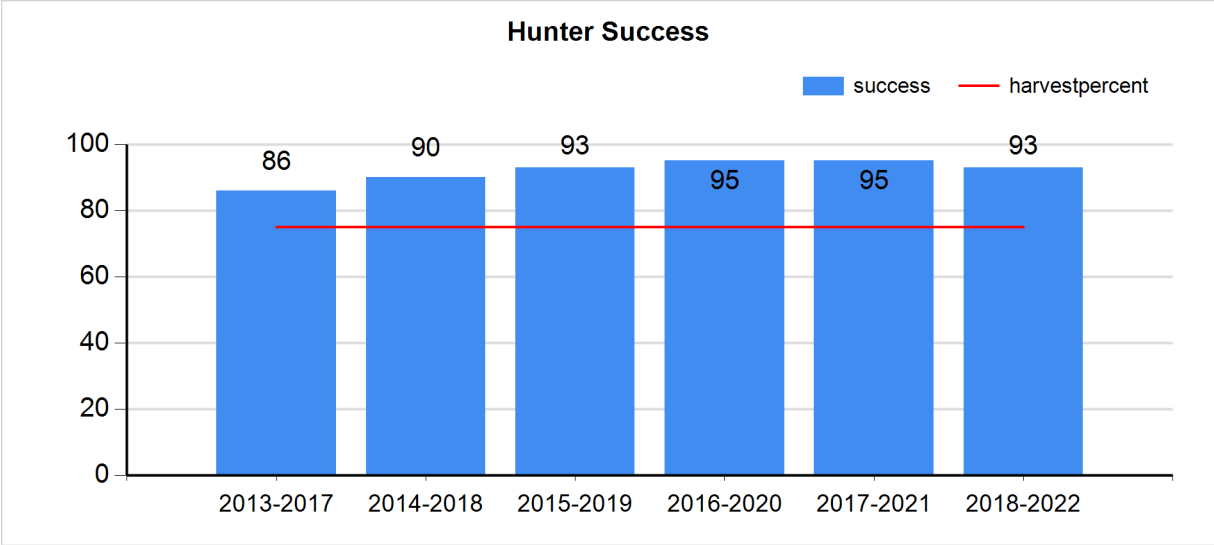
5-year average harvest age of 6-8 years

Secondary Objective:

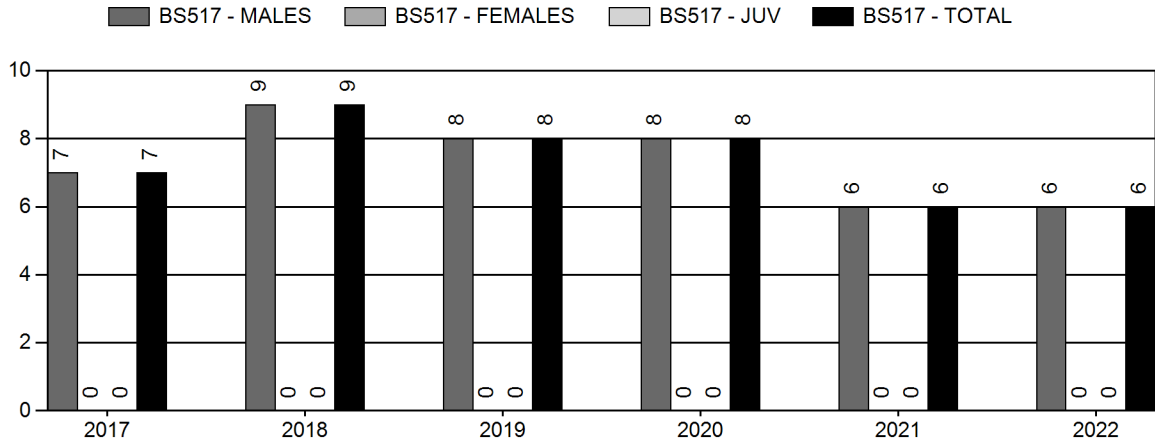
Management Strategy:

Special

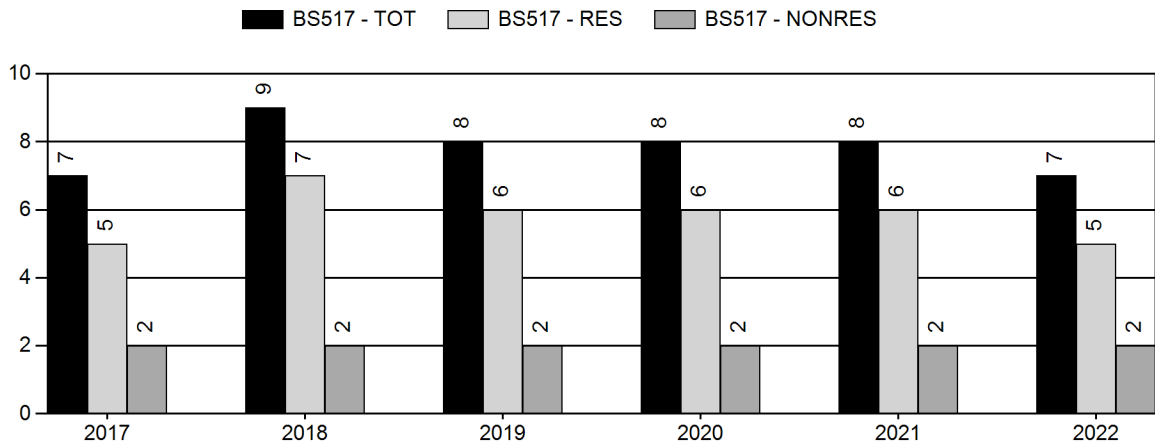




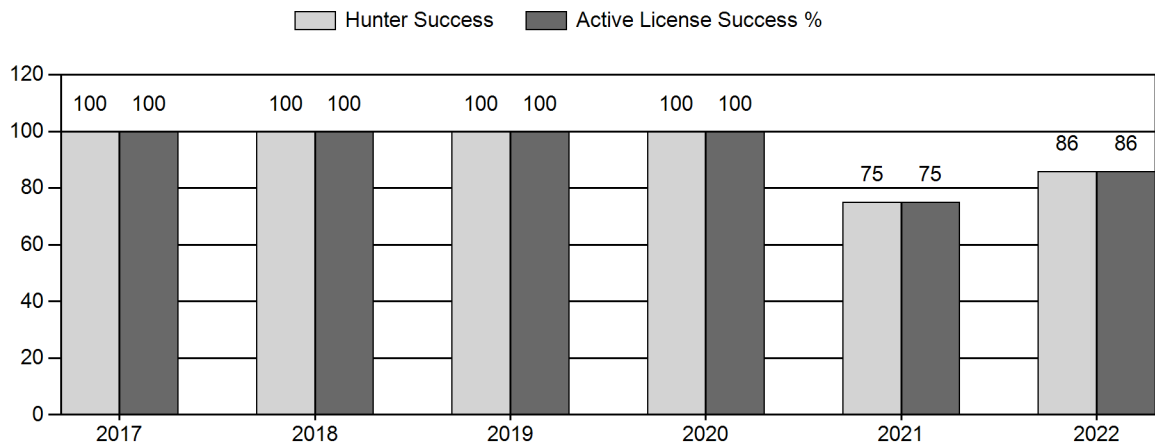
Harvest



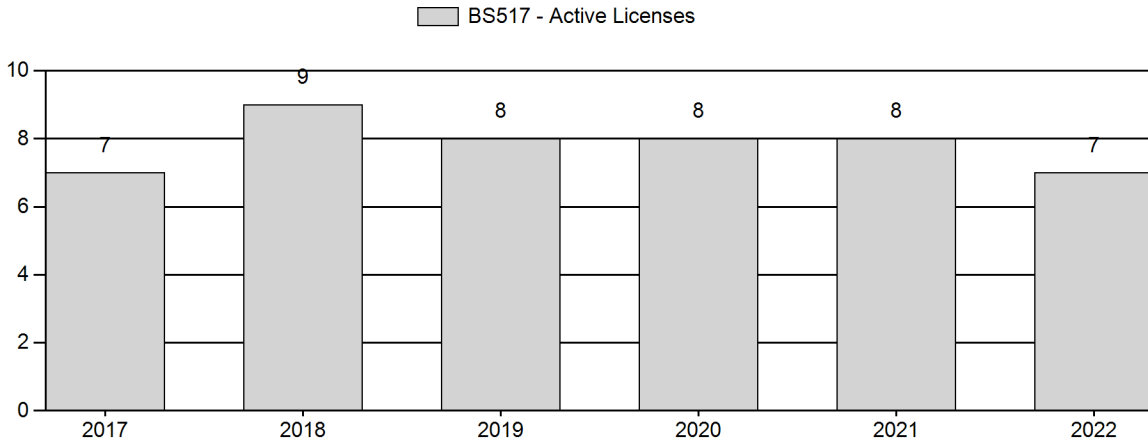
Number of Hunters



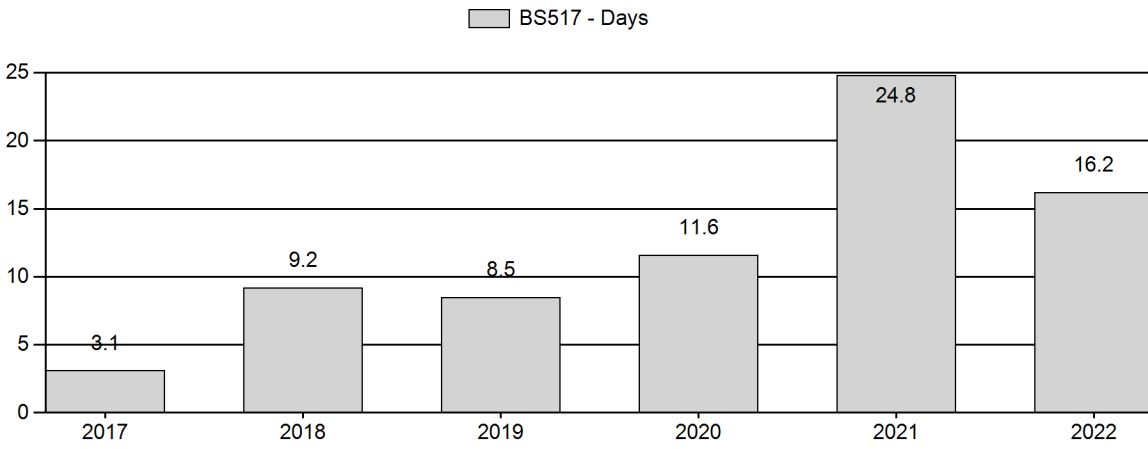
Harvest Success



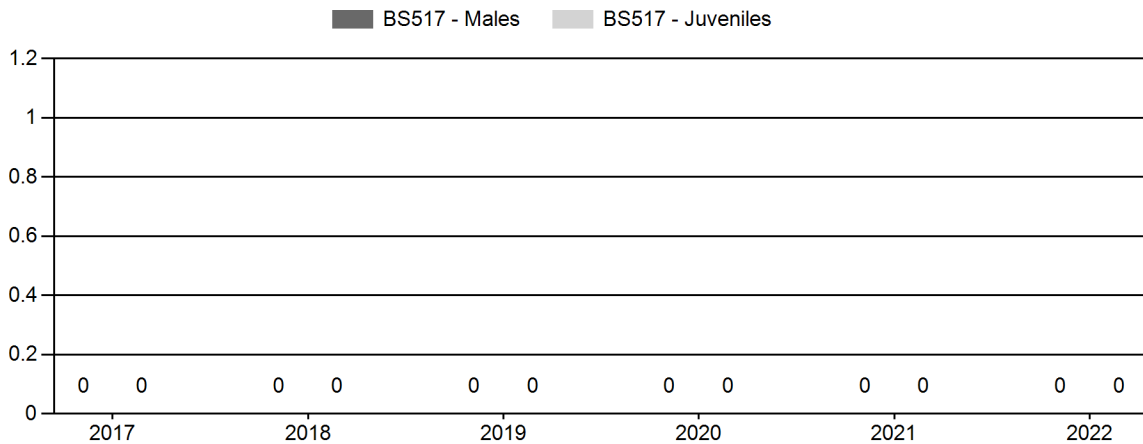
Active Licenses



Days Per Animal Harvested



Preseason Animals per 100 Females



**2023 Hunting Seasons
Laramie Peak Bighorn Sheep Herd Unit (BS517)**

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
19	1	Aug. 15	Aug. 30	Sept. 1	Oct. 31	10	Any ram (9 residents, 1 nonresident)

Current Management Objective:

- 1) **5-year running average of >75% hunter success - 90%**
- 2) **5-year running average age of harvested rams between 6 and 8 years of age - 8**
- 3) **Documented occurrence of adult rams in the population - 25**

2022 Management Summary

1) Hunting Season Evaluation: New for 2023, 90% of bighorn sheep licenses in the state will be allocated to residents and 10% will be allocated to nonresidents. To meet the requirement of this 90/10 split in license allocation for residents and nonresidents, the quota has been increased to 10 licenses (9 resident, 1 nonresident). There are still a healthy number of older age rams within the population to maintain the management objective and absorb the increase by two licenses. Hunter success was 75% in 2022. Only 7 of the 8 licenses were active due to one hunter being at an older age where they could not hunt. Access to the wild sheep remains difficult due to large tracts of private land within occupied sheep habitat. Hunter success will be closely monitored in the coming years to see if the increase in licenses causes overcrowding on the limited public lands and consequently a decrease in hunter success.

2.) Management Objective Review: The herd objective was reviewed in 2019 and will be reviewed again in 2024.

3.) Ongoing Research: GPS collars have been deployed throughout this herd as part of the statewide bighorn sheep disease surveillance effort, to garner baseline information on the various respiratory pathogens within Wyoming’s wild sheep populations. For the Laramie Peak herd unit (Hunt Area 19), the primary goal is to better monitor respiratory disease outbreaks that could potentially cause large or small scale die-offs. Additionally, this collar data will assist in identifying seasonal movement patterns, crucial winter ranges, habitat selection, lambing areas, and cause specific mortality and survival estimates.

The following captures have taken place within the Laramie Peak Herd Unit:

- **2017:** 6 ewes in the Iron Mountain sub-herd
- **2019:** 16 ewes, only 15 collared, 5 from the Sybille Canyon sub-herd and 10 from the Duck Creek sub-herd
- **2021:** 7 ewes, 3 from Sybille Canyon sub-herd and 4 from the Duck Creek sub-herd
- **2022:** 10 ewes, 3 from Sybille Canyon sub-herd and 7 from the Duck Creek sub-herd
- **2023:** 10 new collars and 2 redeployments from mortalities

As of February 2023, there have been 10 mortalities within the Sybille Canyon and Duck Creek sub-herds. There were two mortalities throughout 2022. One mortality was in March of 2022 and it was determined that this ewe had succumbed to starvation due to a large sarcoma abscess

(cancer) in her jaw. The second mortality occurred in October of 2022, and it was determined that the ewe was predated by a mountain lion.

Within the herd unit, there have been wild and prescribed fires in which location data will be used to determine if sheep are utilizing habitat within these burn scars more or less frequently. More specifically, burned areas and unburned areas with high sheep use have been treated for cheat grass. Collar location data will help managers determine if sheep are selecting for these treated habitats more often post-treatment.

The primary concern with this herd unit is outbreaks of respiratory pathogens. In 2019, there was a small scale die-off due to a pneumonia outbreak within the Sybille Canyon sub-herd and these collars will aid in monitoring future disease outbreaks and mortalities. Mortality notifications from collars will assure managers if there are any major die-offs occurring. As of March 3, 2023, there are 25 collars online.

4) Weather and Habitat: Precipitation in this herd unit was below normal in 2022. Most of this herd unit experienced fairly normal precipitation patterns, as far as timing of moisture events, but were less in amount. No significant winter storms occurred in 2022, and overall winter severity was considered normal or below normal for most of the herd unit. While no NOAA weather stations are close to the vicinity of occupied bighorn habitats in Area 19, weather stations in Laramie, Cheyenne, and Douglas, all reported declines in annual precipitation, from 37%, 55%, and 26% from normal respectively.

Cheatgrass control efforts completed in the last 3 years in Sybille Canyon and other areas directly west of Wheatland, continue to show real promise in recovery of native vegetation. Additional cheatgrass spraying efforts using the herbicides Rejuvra and Plateau in occupied habitats occurred in Summer 2022 on the Thorne / Williams WHMA and adjacent private, state, and federal lands totaling 5,688 acres. Additional bighorn sheep habitats in Palmer Canyon were treated with a tank combination of Plateau and Rejuvra on private lands encompassing an additional 900 acres. Areas impacted by the Britannia wildfire have been taken over by cheatgrass in many places. This is cause for concern and future monitoring and surveillance is necessary. Future treatments will be planned where necessary and funding and time allows for proper project planning and implementation.

Fence conversion efforts are underway on the Thorne/Williams and Laramie Peak WHMA. Conversions from woven wire to barbed/smooth wire will result in improved movements of all wild ungulates, including bighorn sheep.

2022 - JCR Evaluation Form

PERIOD: 6/1/2022 - 5/31/2023

HERD: BH720 (Non-Herd Unit)

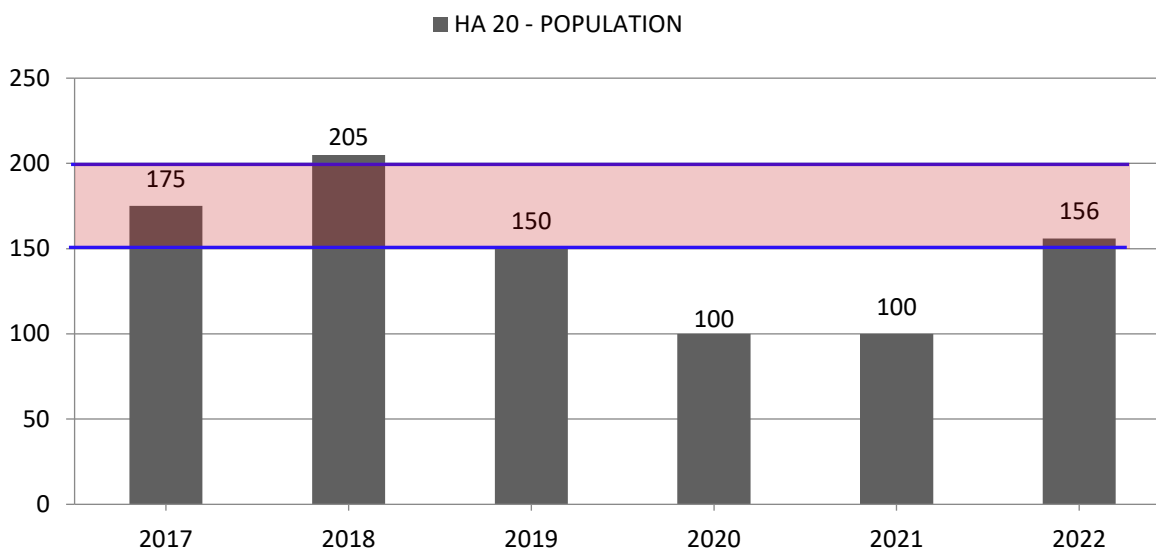
HUNT AREAS: 20 (Kouba Canyon)

PREPARED BY: JOE SANDRINI

	<u>2017 - 2022 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Population:	148	156	175
Harvest:	2.5	1	2
Hunters:	2.5	1	2
Hunter Success:	100%	100%	100%
Active Licenses:	2.5	1	2
Active License Success:	100%	100%	100%
Recreation Days:	9.2	5	7
Days Per Animal:	3.7	5.0	3.5
Males per 100 Females ¹	104	98	
Juveniles per 100 Females ²	39	60	

Population Objective (± 20%): 150-200
 Management Strategy: Joint Management with South Dakota
 Percent population is above (+) or below (-) objective: At Objective
 Number of years population has been + or - objective in recent trend: 1
 Model Date: No Model
 (population est. from ground survey)

Population Size - Postseason



¹ Based on mean of observed values, 10/01/22 – 02/01/2023

² Based on mean of observed values, 10/01/22 – 02/01/2023

2023 HUNTING SEASONS

BIGHORN SHEEP HUNT AREA 20 (KOUBA CANYON)

BH720 (NON-HERD UNIT)

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
20	1	Aug. 15	Sep. 30	Oct. 1	Nov. 30	2	Any ram (2 resident)

2022 Hunter Satisfaction: *Bighorn Sheep (BHS) Hunters Not Surveyed*

2023 Management Summary

1) Hunting Season Evaluation: At the start of the 2021 bio-year, there were 24 ewes and 17 rams with active VHF radio collars in this herd. Over the next 12 months, five of the collared ewes and eight of the collared rams died, yielding an annual mortality rate 21% for collared ewes and 47% for collared rams, with two of the collared rams being harvested by hunters. Bighorn sheep observations during the 2021-22 winter indicated a large proportion of radio-collared sheep in the herd and virtually no lambs. Poor lamb survival and lower numbers of observed sheep suggested this herd had declined. A sightability flight flown in mid-February of 2022 detected 75 total sheep, including 22 of the 23 collared sheep known to be in the survey area. However, it did not produce a useable population estimate. In November of 2022, South Dakota Game Fish and Parks (SDGF&P) ran five ground based surveys in this herd. The fifth and final survey produced the best results with 76 bighorn sheep observed. This survey also yielded the most precise mark-resight estimate of 156 sheep, with a 95% confidence interval of 96 – 254, relying on a Poisson distribution. The age and sex classifications made during the final ground based survey yielded a ratio of 58 rams:100 ewes: 47 lambs, while the total of all the classifications made during the surveys yielded 98 rams: 100 ewes: 60 lambs. Also of note, the sole Wyoming hunter in 2022 reported seeing 30 - 40 different mature rams.

Following the perceived population decline in bio-year 2021, this hunt area went from three Wyoming licenses available to one for the 2022 season, while SDGF&P continued to issue three licenses. After discussions with SDGF&P, it was decided to issue two Wyoming licenses for the 2023 hunting season. This should provide success for two resident hunters. In addition, three rams will likely be harvested in South Dakota, as they are on the second year of their 2-year regulation cycle that calls for three licenses. If the combined interstate harvest objective of five rams is met in 2023, it probably will meet the management objective of harvesting no more than 10% of the rams or 50% of the class IV rams.

2) Management Objective: In 2012, joint management criteria for this herd were agreed upon with SDGF&P. This management framework includes an interstate population objective of 150 to 200 sheep. Additionally, hunting seasons are to be implemented when there is a combined Wyoming and South Dakota population of at least 75 to 100 sheep. These seasons are intended to provide trophy ram hunting, such that harvest of rams in relation to population

demographics allows for replacement of Class IV ($\frac{3}{4}$ curl) rams taken. To this end, harvest should not normally exceed 50% of the known number of Class IV rams, and annual harvest should not exceed 10% of the total rams.

3) Population Estimation and Research Projects: Garnering an accurate population estimate of this herd is vital to its management, and three methods have been tried, all with limited success:

- A ground-based mark-resight survey relying on radio-collared BHS was developed as part of a graduate student project in 2013. Most years, this method has produced estimates with very wide confidence intervals due to the limited number of radio-collared sheep available. Mark-resight data have been analyzed using a modified Lincoln-Peterson estimate, and one based upon a Poisson distribution, along with a detection rate function. Completing these surveys as designed in recent years has become difficult due to more restricted access to private land. However, it did produce a useable estimate for 2022.
- A forward-looking infrared (FLIR) survey was attempted in June, 2018. However, the FLIR system was not able to effectively detect BHS.
- Between December 2019 and February 2022, a project was piloted to develop a helicopter-based sightability model for this herd. The study was conducted in tandem with SDGF&P. In mid-February of 2022, a sightability flight was flown. However, detection of sheep along survey transects not relying on radio collar signals was extremely low, resulting in an estimate with exceedingly wide confidence intervals. It appeared that the bighorn sheep were very sensitive to the presence of a helicopter and sought hiding cover to avoid detection. As such, this method was deemed untenable for producing a reliable population estimate.

2022 - JCR Evaluation Form

SPECIES: Bighorn Sheep

PERIOD: 6/1/2022 - 5/31/2023

HERD: BS519 - ENCAMPMENT RIVER

HUNT AREAS: 21

PREPARED BY: TEAL
CUFAUDE

	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Population:		N/A	N/A
Harvest:	1	0	2
Hunters:	1	0	2
Hunter Success:	100%	0%	100%
Active Licenses:	1	0	2
Active License Success:	100%	0%	100 %
Recreation Days:	4	0	30
Days Per Animal:	4	0	15

Limited Opportunity Objective:

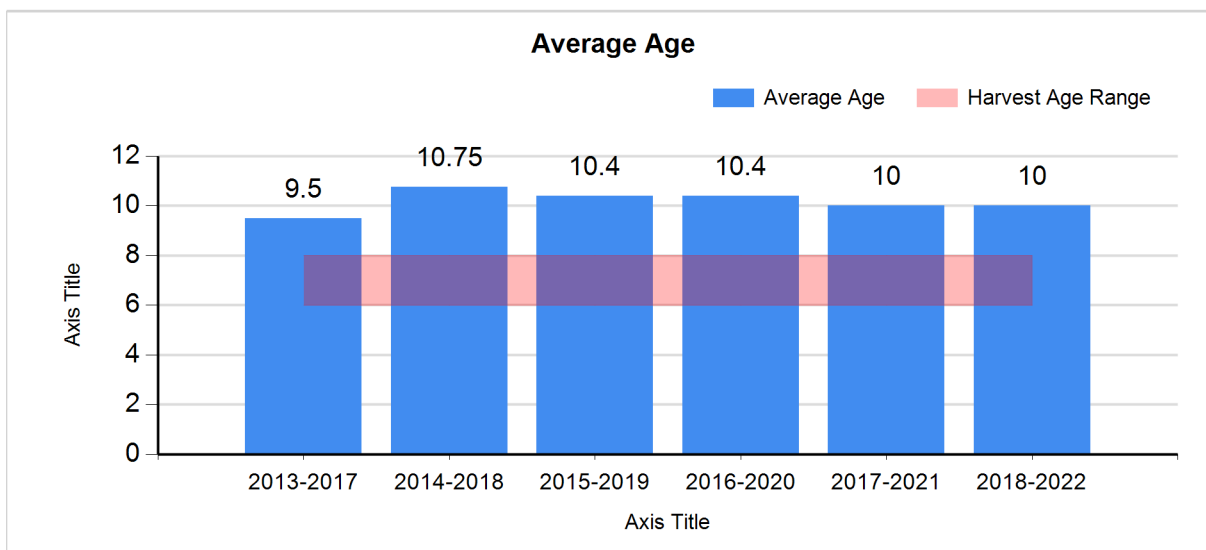
5-year average of > 75% hunter success

5-year average harvest age of 6-8 years

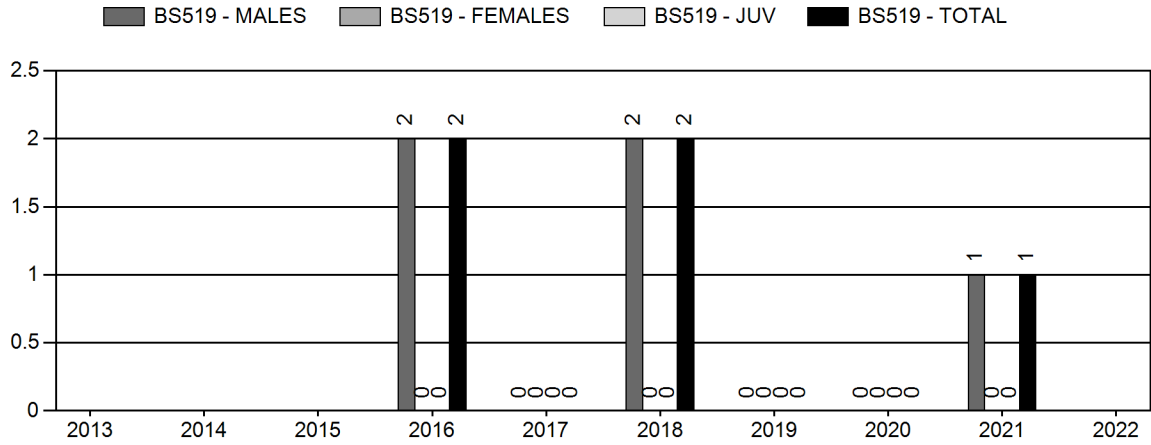
Secondary Objective:

Management Strategy:

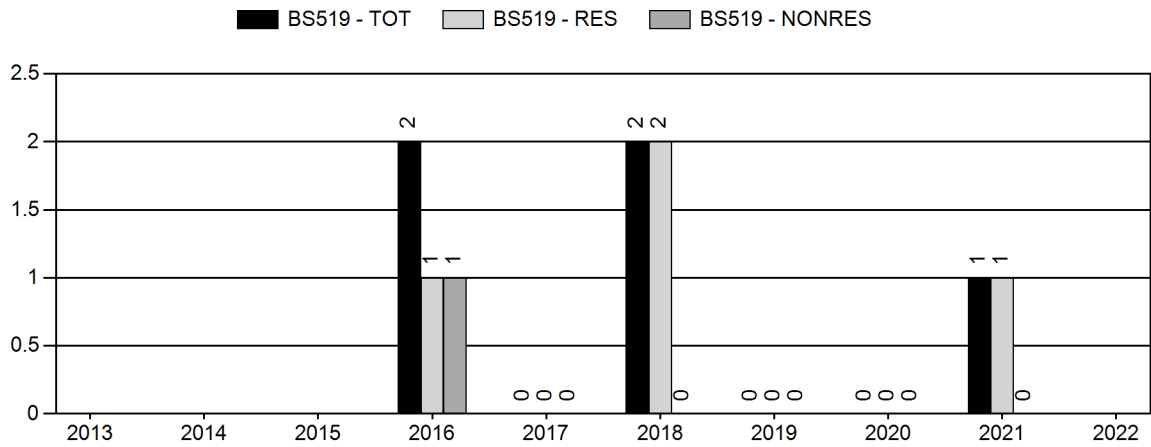
Special



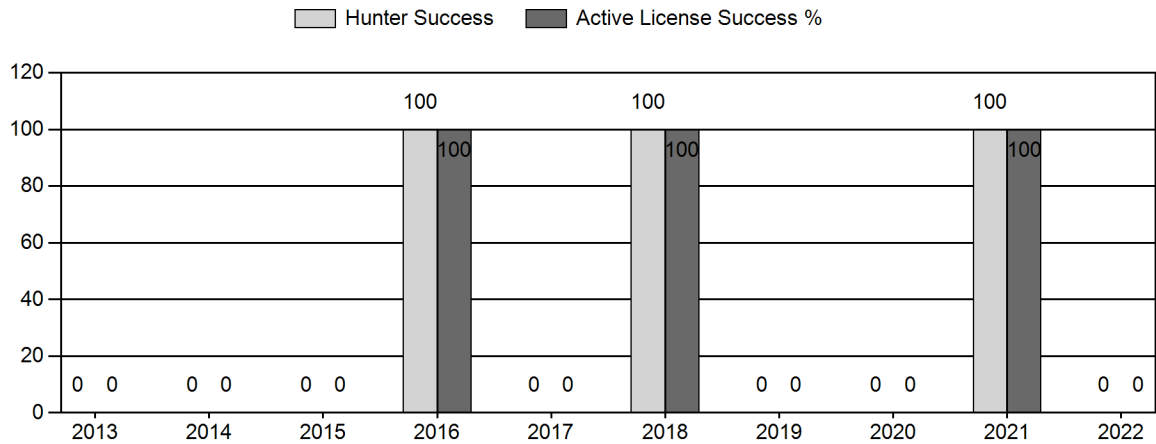
Harvest



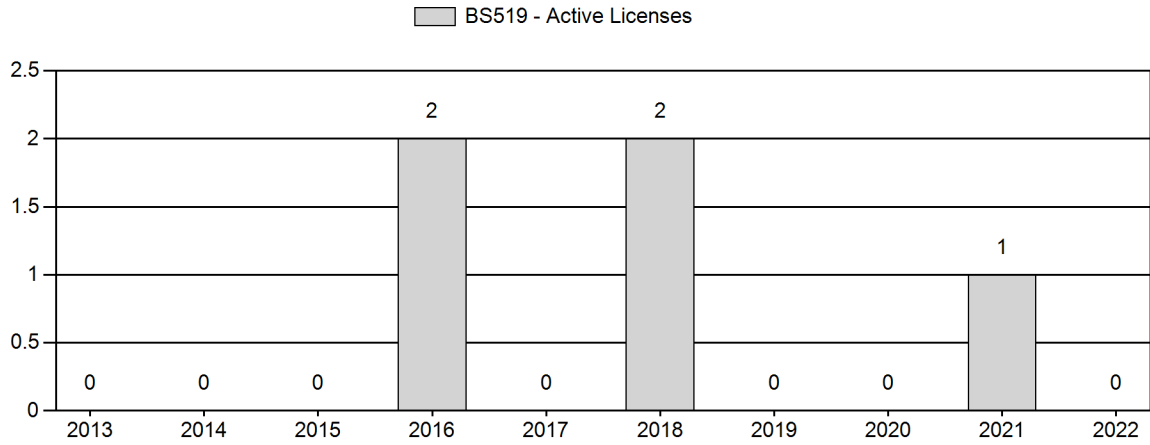
Number of Hunters



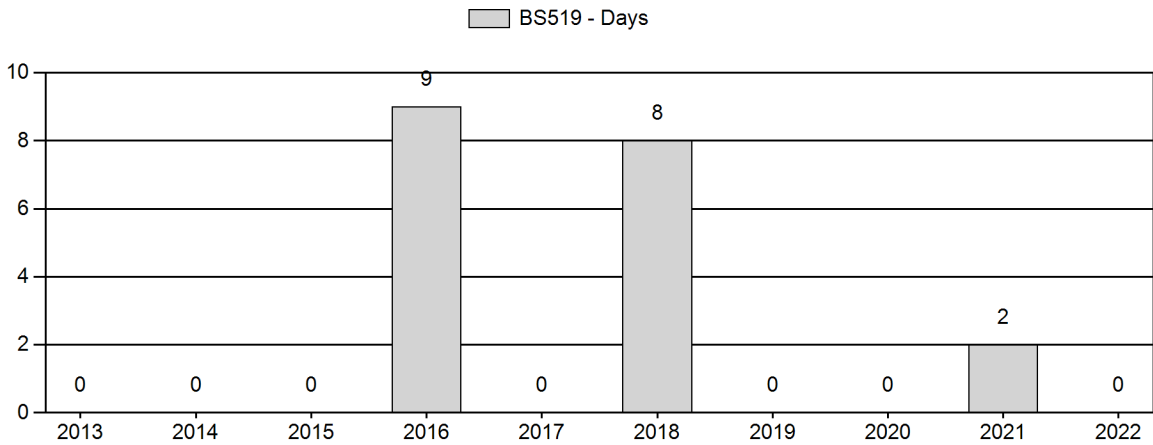
Harvest Success



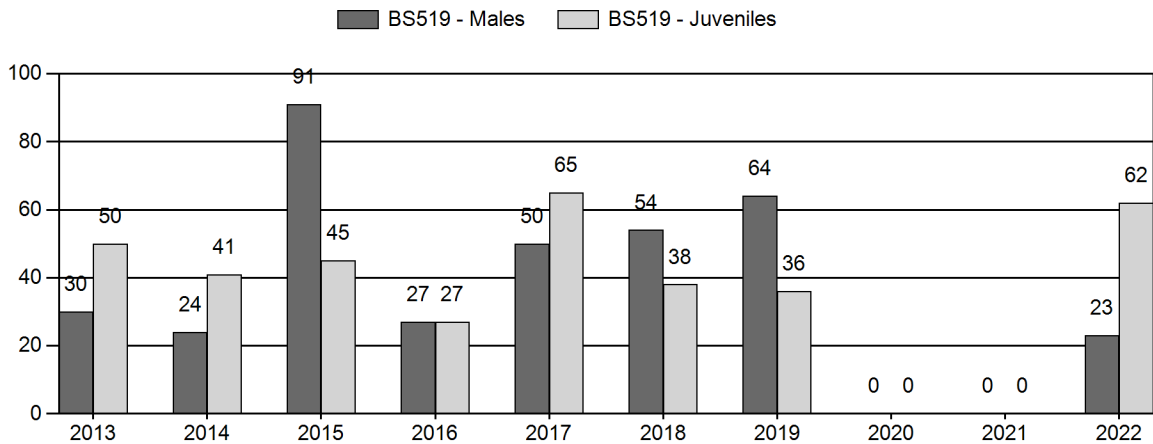
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



**2023 Hunting Seasons
Encampment River Bighorn Sheep (BS519)**

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
21	1	Aug. 15	Aug. 31	Sep. 1	Oct. 31	2	Any ram (1 resident, 1 nonresident)

Current Management Objective: Bighorn Sheep Limited Opportunity

- 1) 5-year running average of >75% hunter success
 - Currently Met: 2018-2022 Hunter Success- 100%
- 2) 5-year running average age of harvested rams between 6 and 8 years of age
 - Currently Met: 2018-2022 Harvest Mean Age- 10 years of age
- 3) Documented occurrence of adult rams in the population
 - Currently Met: >10 adult rams observed in 2022

2023 Management Summary

1.) Hunting Season Evaluation: The 2023 hunting season structure provided one resident hunter and one nonresident hunter the opportunity to harvest mature rams in hunt area 21. Based on frequent observations of mature rams in Douglas Creek (hunt area 18) and Encampment River (hunt area 21), we elected to forgo the traditional season structure and provide more opportunity by allocating separate license quotas for each hunt area. We expect hunters will have a high likelihood of success and this herd will continue to meet the bighorn sheep limited opportunity management objectives.

2.) Management Objective: The herd management objective was reviewed in 2021 and will be reviewed again in 2026.

3.) Weather/Habitat: Precipitation was below normal in biological year 2022. Moderate to severe drought conditions persisted throughout the year. The nearest NOAA weather station, located in Rawlins, reported a 23% decline in annual precipitation. Winter conditions remained mild throughout fall and early winter, with no persistent snow accumulations. No major habitat disturbances were documented within the herd unit in 2022. The lack of natural disturbances has resulted in shrub communities trending towards late seral stages with older, decadent age classes and conifer encroachment, which may be limiting habitat availability. Cheatgrass continues to be an issue on the southeast facing slopes at lower elevations within this herd unit.

4.) Research: WGFD conducted several capture and collar events from 2018-2021 in this herd unit as part of a statewide disease assessment effort. Data gathered from 21 collared bighorn ewes will also be used for habitat selection analyses beginning in 2023.

5.) Disease: In late summer and early fall 2022, there were several observations of bighorn sheep in close proximity to bands of domestic sheep west of the Continental Divide, however we were not able to locate the reported bighorn sheep. There remains a high risk of commingling with domestic sheep herds in this area, so we will continue to monitor and respond to any reports of bighorn sheep west of the Continental Divide.

2022 - JCR Evaluation Form

SPECIES: Moose

PERIOD: 6/1/2022 - 5/31/2023

HERD: MO545 - SNOWY RANGE

HUNT AREAS: 38, 41

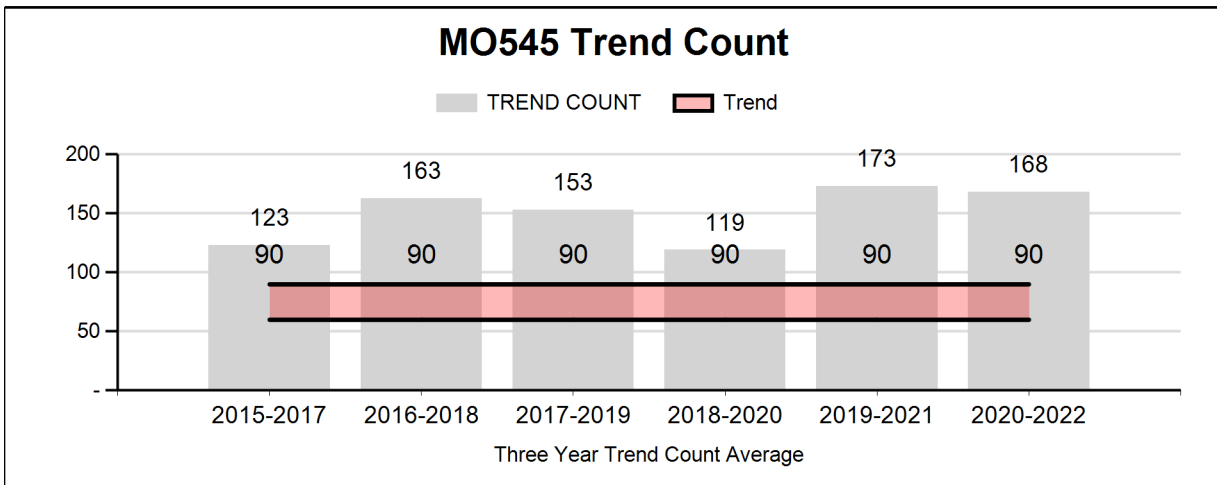
PREPARED BY: TEAL CUFAUDE

	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Trend Count:	162	154	0
Harvest:	39	51	52
Hunters:	42	53	54
Hunter Success:	93%	96%	96 %
Active Licenses:	42	53	54
Active License Success	93%	96%	96 %
Recreation Days:	350	334	350
Days Per Animal:	9.0	6.5	6.7
Males per 100 Females:	84	79	
Juveniles per 100 Females	45	29	

Trend Based Objective (± 20%) 75 (60 - 90)
 Management Strategy: Special
 Percent population is above (+) or (-) objective: 105%
 Number of years population has been + or - objective in recent trend: 8

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

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



2022 - JCR Evaluation Form

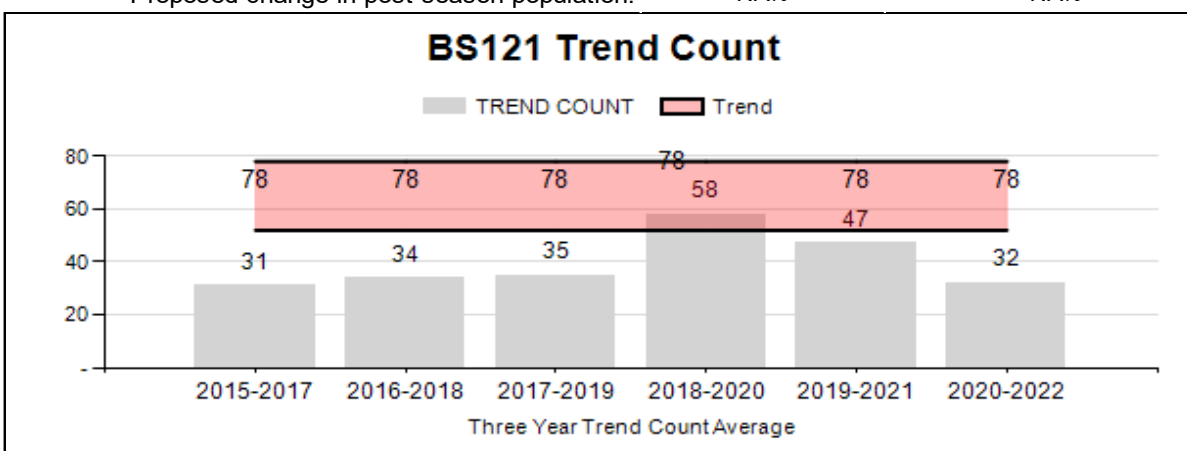
SPECIES: Bighorn Sheep
 HERD: BS121 - DARBY MOUNTAIN
 HUNT AREAS: 24

PERIOD: 6/1/2022 - 5/31/2023
 PREPARED BY: GARY FRALICK

	<u>2017 - 2021 Average</u>	<u>2022</u>	<u>2023 Proposed</u>
Trend Count:	51	79	60
Harvest:	1	2	1
Hunters:	1	2	1
Hunter Success:	100%	100%	100%
Active Licenses:	1	2	1
Active License Success	100%	100%	100%
Recreation Days:	4	8	4
Days Per Animal:	4	4	4
Males per 100 Females:	83	44	
Juveniles per 100 Females	40	31	
Trend Based Objective (± 20%)			65 (52 - 78)
Management Strategy:			Special
Percent population is above (+) or (-) objective:			N/A%
Number of years population has been + or - objective in recent trend:			2

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

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	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%



**2023 HUNTING SEASON
DARBY MOUNTAIN HERD UNIT - BHS121**

Hunt Area	Type	Archery Dates		Season Dates		Quota	Limitations
		Opens	Closes	Opens	Closes		
24	1	Aug.15	Aug.31	Sep. 1	Oct.31	1	Any ram (1 resident)

2022 Hunter Satisfaction: 100%

2023 Management Summary

1.) Hunting Season Evaluation: The 2023 bighorn sheep hunting season will be open for hunting for the 8th consecutive year. The number of licenses issued in 2023 will revert back to one (1) license issued to a resident hunter after two licenses were issued to a resident and nonresident hunter in 2022. This hunting season will likely result in the harvest of one adult ram 2+-years old. The posthunt 2023 population trend count is projected at approximately 60 sheep.

2.) Management Objective Review: The 3-year trend-based objective of 65 sheep was approved by the Wyoming Game and Fish Commission in 2016, and was last reviewed in 2021 when no changes were recommended.

3.) Herd Unit Evaluation: The most comprehensive posthunt helicopter survey since 2017 was conducted on March 3, 2021. A total of 67 sheep were observed. The age/sex composition of these sheep were as follows: 24 2+ year old rams, 1 yearling ram, 30 ewes, and 12 lambs. A sufficient number of rams were observed to justify the issuance of one (1) license for any ram in the 2021 hunting season and two (2) licenses in 2022.

A spring helicopter survey was conducted on April 23, 2023 to document sheep on winter ranges prior to annual dispersal to spring and summer ranges. During the most current survey, a total of 79 sheep were observed in hunt area 24. The number, location, and age/sex of the sheep are provided in Table 1.

Table 1. A trend count summary of the Darby Mountain bighorn sheep herd, April 2023.

Location	Adult Rams	Yearling Rams	Ewes	Lambs	Total
Box Canyon	2	0	8	0	10
Straight Cr.	7	1	1	1	10
Darby Mtn	1	1	0	0	2
Fish Cr Mtn	4	2	17	7	30
Lunch Cr.	0	0	2	0	2
Roaring Fk	0	1	14	5	20
Marten Cr.	1	0	3	1	5
Total	15	5	45	14	79

The hunting season in the Darby herd was closed in 2013 due to an apparent lack of mature rams in the population. The season was re-opened in 2016, and mature rams have been harvested in every season thereafter. During the 2022 season, a 7 and a 9 year old ram were harvested, and the age of harvested rams since 2016 has been 7.5 years or older.