

2016 - JCR Evaluation Form

SPECIES: Bighorn Sheep

PERIOD: 6/1/2016 - 5/31/2017

HERD: BS106 - TARGHEE

HUNT AREAS: 6

PREPARED BY: ALYSON COURTEMANCH

	<u>2011 - 2015 Average</u>	<u>2016</u>	<u>2017 Proposed</u>
Harvest:	1	1	1
Hunters:	2	2	2
Hunter Success:	50%	50%	50%
Active Licenses:	2	2	2
Active License Success:	50%	50%	100%
Recreation Days:	25	8	20
Days Per Animal:	25	8	10
Males per 100 Females:	105		
Juveniles per 100 Females	28		

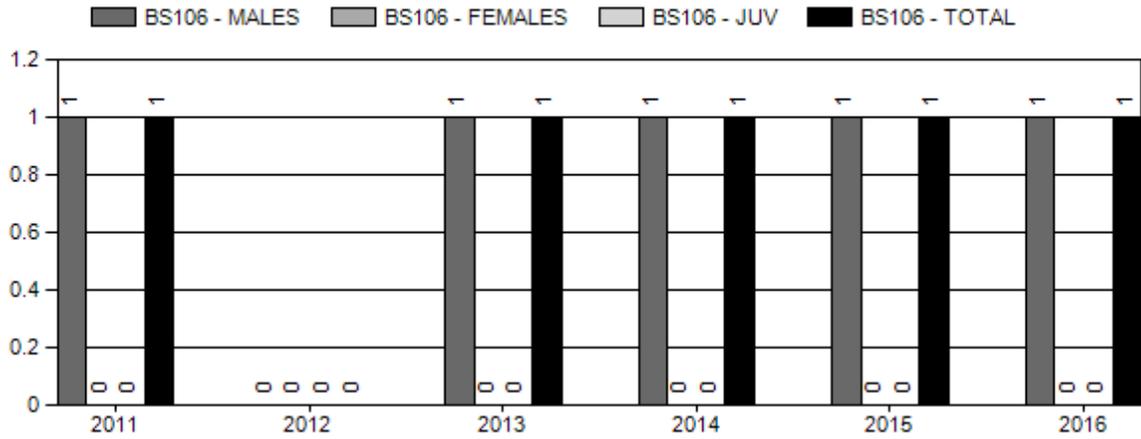
Management Strategy:	Special
Percent population is above (+) or (-) objective:	0%
Number of years population has been + or - objective in recent trend:	0

Population Objective Type: Alternative, Bighorn Sheep

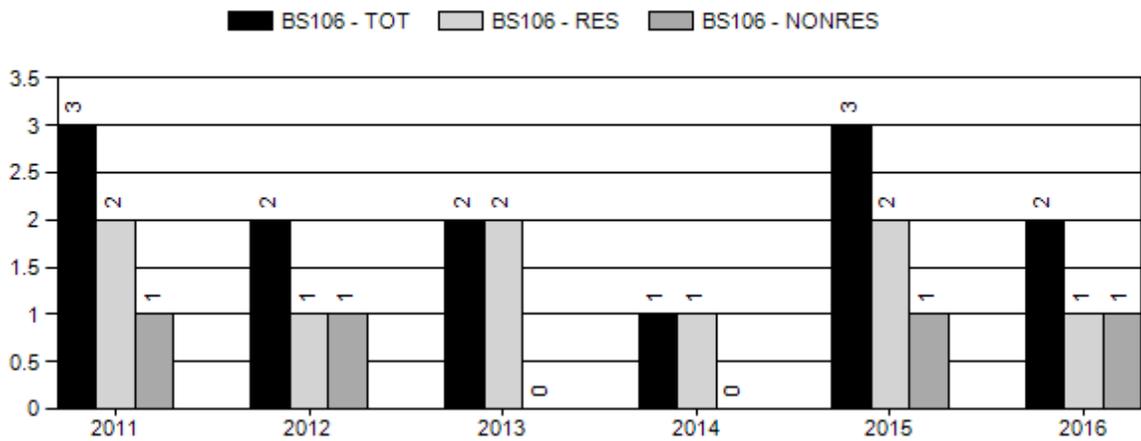
Objectives:

1. Achieve a 5-year average harvest age of 6-8 years,
2. Achieve a 5-year average hunter success of $\geq 50\%$, and
3. Document occurrence of adult rams in the population, especially on National Forest lands.

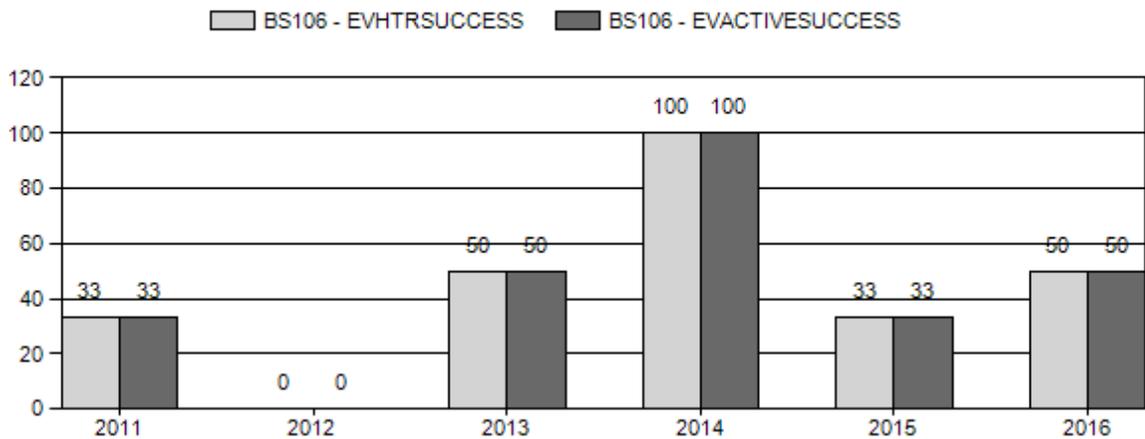
Harvest



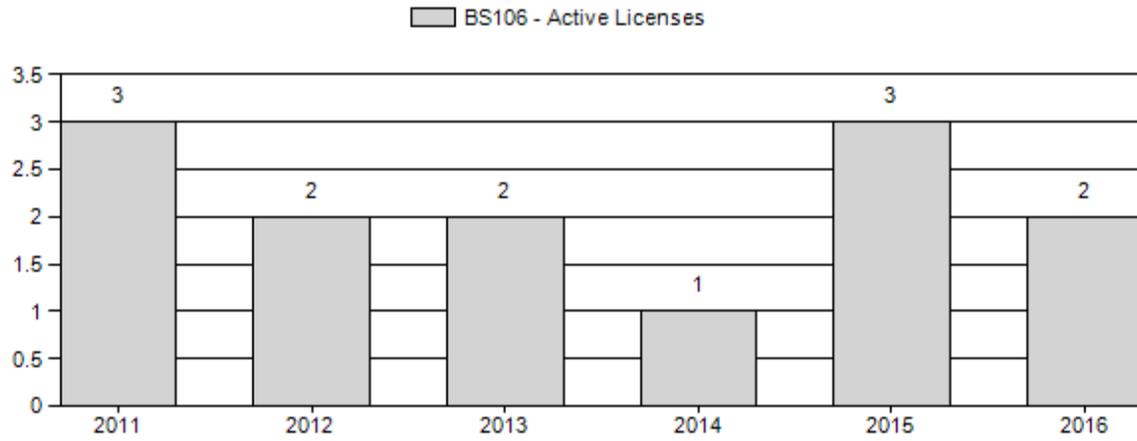
Number of Hunters



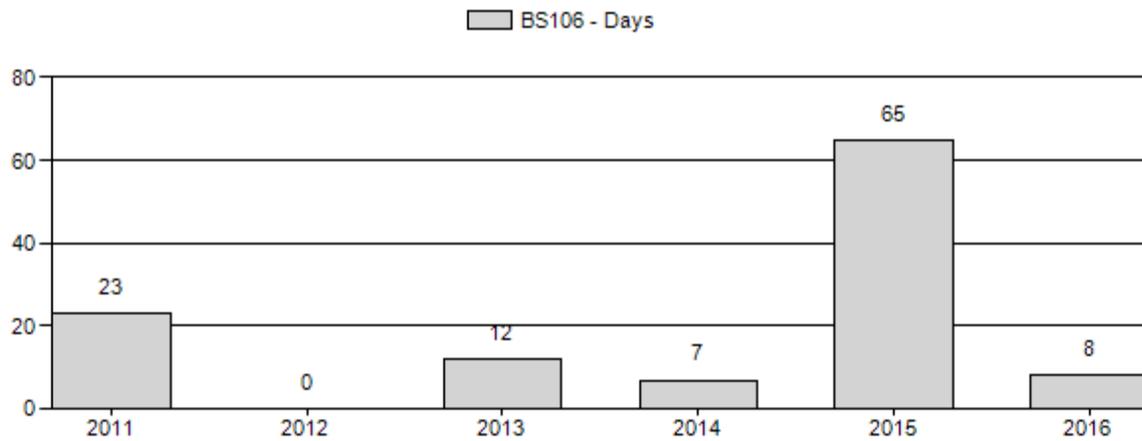
Harvest Success



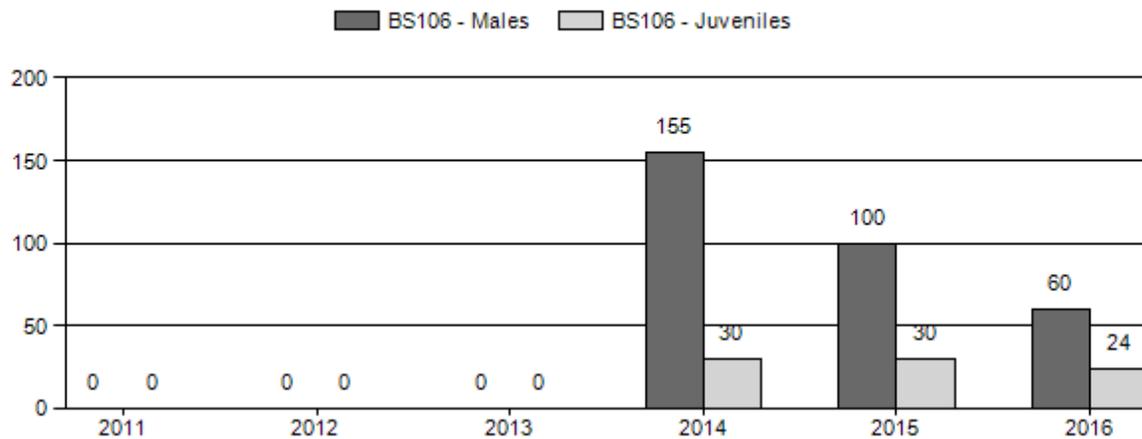
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2011 - 2016 Postseason Classification Summary

for Bighorn Sheep Herd BS106 - TARGHEE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	0	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	±0	0	±0	0
2012	125	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	±0	0	±0	0
2013	125	0	0	0	0%	0	0%	0	0%	0	0	0	0	0	±0	0	±0	0
2014	125	3	28	31	54%	20	35%	6	11%	57	123	15	140	155	±42	30	±13	12
2015	125	1	19	20	43%	20	43%	6	13%	46	120	5	95	100	±0	30	±0	15
2016	80	0	15	15	33%	25	54%	6	13%	46	0	0	60	60	±0	24	±0	15

**2017 HUNTING SEASONS
TARGHEE BIGHORN SHEEP HERD (BS106)**

Hunt Area	Type	Dates of Seasons		Quota	License	Limitations
		Opens	Closes			
6	1	Aug. 15	Oct. 31	2	Limited quota	Any ram (2 residents)

Special Archery Seasons

Hunt Area	Season Dates	
	Opens	Closes
6	Aug. 1	Aug. 14

Summary of Change in License Number

Area	Type	Quota change from 2016
6	1	No Changes
Herd Unit Total	1	No Changes

Management Evaluation

Management Strategy: Special

Population Objective Type: Alternative, Bighorn Sheep

Objectives:

1. Achieve a 5-year average harvest age of 6-8 years,
2. Achieve a 5-year average hunter success of $\geq 50\%$, and
3. Document occurrence of adult rams in the population, especially on National Forest lands.

The Wyoming Game and Fish Department (WGFD) proposed changing the objective for the Targhee Bighorn Sheep Herd from a postseason population objective to an alternative population objective in 2014. The objective change was needed because the herd is rarely surveyed due to budget constraints, challenging weather conditions, and spreadsheet models do not appear to adequately simulate observed population trends. Alternative population objectives were adopted in 2014 after public review (listed above).

Two hunters hunted in the Targhee Herd in 2016 (1 resident and 1 non-resident). The non-resident hunter harvested a 6.5 year-old ram. The 5-year average age of harvested rams is 6 years-old (Fig. 1). Therefore, the first objective of a 5-year average harvest age of 6-8 years is currently met. However, average age of harvest rams has decreased in this herd unit from 2002 to present. This trend will continue to be monitored in future years.

In 2016, hunter success was 50%. The 5-year average hunter success is 46.6%, which is below the objective of $\geq 50\%$ (Fig. 2). Therefore, the second objective is not met. Success is highly variable year to year due to extremely challenging terrain and movement of sheep between Caribou-Targhee National Forest (CTNF) and Grand Teton National Park (GTNP). Hunter success has improved since 2002 in this herd unit, from an average of only 16.6% from 2002-2006.

WGFD and GTNP staff conducted 3 days of bighorn sheep ground surveys in GTNP and Hunt Area 6 during August 2016. Several groups of ewes and lambs were observed in Hunt Area 6 but no rams. However, several ram groups were observed in GTNP, which likely move back and forth into the open hunt area at times. Winter aerial surveys of the Targhee Bighorn Sheep Herd were conducted in March 2015 and February 2016. A total of 46 sheep were observed during the 2016 survey (20 ewes, 6 lambs, 1 yearling ram, and 19 mature rams (11 of these had $>3/4$ curl horns)). A total of 57 sheep were observed during the 2015 survey (20 ewes, 6 lambs, 3 yearling rams, 18 rams with $< 3/4$ curl horns, and 10 rams with $> 3/4$ curl horns). Sightability of sheep was difficult both years due to the unusually warm weather, which caused sheep to move off their high elevation winter ranges early and onto open, south-facing slopes at mid-elevations during the survey. As a result, sheep were widely distributed and difficult to track and observe from the air, which led to lower counts than expected. The third objective was met in 2016 because rams were documented using areas on National Forest lands in winter, although not in summer.

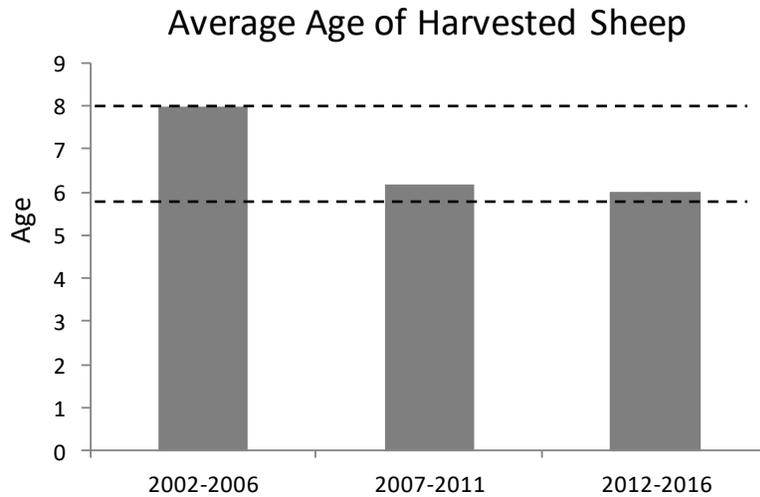


Fig 1. Five-year averages of age of harvested bighorn sheep in the Targhee Herd, 2002-2016. Dashed lines represent objective range of 6-8 years old.

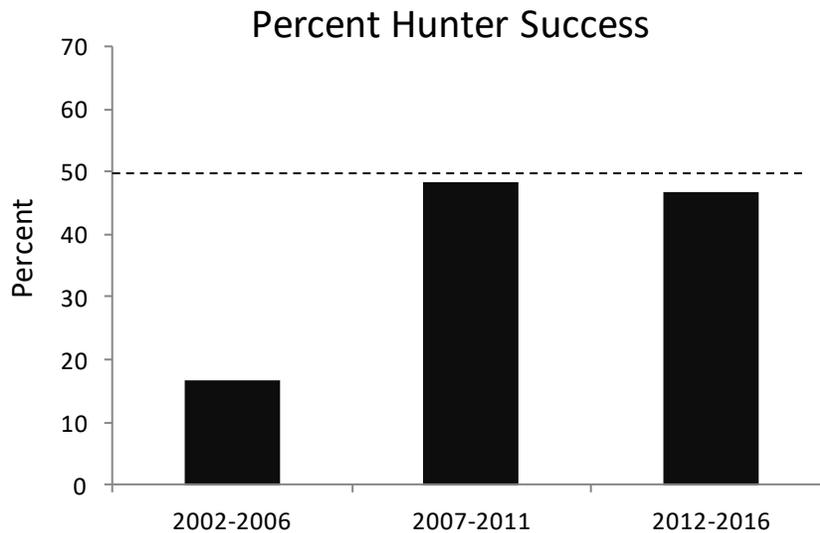


Fig. 2. Five-year averages of percent hunter success in the Targhee Herd, 2002-2016. Dashed line represents objective of $\geq 50\%$ success.

Herd Unit Issues

Current bighorn sheep occupied habitat is located at high elevations year-round in the Teton Range, mostly in GTNP. Bighorn sheep winter on high elevation, windswept ridgelines in upper Jensen Canyon, Mt. Hunt, Prospectors Mountain, Static Peak, Mt. Wister, Ranger Peak, Doane Peak, and Elk Mountain. Winter habitat is most likely the limiting factor for this population. Transitional and summer ranges also include Darby, Fox, Moose and Teton Creeks on CTNF. Historically, this population was migratory and wintered at low elevations around Jackson Hole and Teton Valley, Idaho. In the past, hunters have had a difficult time locating sheep outside of GTNP. However, bighorn sheep have recently increased their use of habitats on CTNF due to

willing-seller buy-outs of domestic sheep allotments brokered by the Wyoming Wild Sheep Foundation. In 1997 the revised CTNF Plan called for the retirement of the domestic sheep allotments on the west side of the Tetons. In 2004, the fifth and final domestic sheep allotment was bought with bighorn sheep conservation funds and closed by CTNF. Recently, data from radio-collared bighorn sheep have showed the importance of these areas, especially during the spring.

Mountain goat sightings have been increasing north of Wyoming Highway 22 indicating that their distribution is expanding north from the Snake Range into the Teton Range. In 2008, the first confirmed sighting of a nanny with kids was reported, suggesting an establishing population. It is estimated that approximately 60 mountain goats currently occupy the Teton Range. GTNP deployed radio-collars on 5 mountain goats in December 2014. Disease sampling of those individuals found that they carry the respiratory bacteria *Bibersteinia trehalosi*. Six bighorn sheep ewes were captured and GPS-collared in January 2017 in GTNP. These ewes tested negative for primary respiratory pathogens, including *Mycoplasma ovipneumoniae*, *Mannheimia haemolytica*, and *Bibersteinia trehalosi*. In the future, field managers may need to consider potential impacts of an expanding mountain goat population on this small, native bighorn sheep herd.

Expanding winter backcountry recreation also impacts available winter habitat for bighorn sheep. Recent research from the Wyoming Cooperative Research Unit indicates that Targhee bighorn sheep avoid backcountry ski routes, even if they are in otherwise high quality habitat. This further constricts available winter habitat for bighorn sheep (Courtemanch, 2014).

Additional bighorn sheep and mountain goat captures are planned for 2017. Objectives of the research are to capture and collar additional sheep, obtain respiratory disease samples and blood samples to test pregnancy, and monitor movements and habitat use in relation to collared mountain goats. GTNP is currently developing a mountain goat management plan that is expected to be released for public comment in 2017.

Weather

Summer 2016 was very dry. Precipitation in July was only 50% of average. September and October were rainy, resulting in a late-season flush of forage production. November was relatively warm and mild with no significant snowfall until early December. However, the region received significant snowfall and freeze/thaw events in late December through January, causing severe winter conditions. In addition, avalanche danger was extreme for several weeks in January and February, which may cause above-average mortality in the Targhee Herd. Several rain events and warmer temperatures in February resulted in slopes melting out in some areas on native winter ranges. At the time of the mid-winter survey in February 2017, winter snowpack was reported at 131% of average in the Snake River Basin. Please refer to the following web sites for specific weather station data.

<http://www.wrds.uwyo.edu/wrds/nrcs/snowprec/snowprec.html> and
<http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html>

Habitat

A habitat treatment in Teton Canyon is currently in the planning stages to improve historical bighorn sheep winter and summer habitat. The WGFD is assisting Caribou-Targhee National Forest (CTNF) with vegetation monitoring pre and post-treatment. Please refer to the 2016 Annual Report Strategic Habitat Plan Accomplishments for Jackson Region habitat improvement project summaries (<https://wgfd.wyo.gov/Habitat/Habitat-Plans/Strategic-Habitat-Plan-Annual-Reports>).

Field Data

WGFD and GTNP staff conducted 5 days of bighorn sheep ground surveys in GTNP and Hunt Area 6 during August 2016. Several groups of ewes and lambs were observed in Hunt Area 6 but no rams. However, several ram groups were observed in GTNP, which likely move back and forth into the open hunt area at times.

Winter aerial surveys of the Targhee Bighorn Sheep Herd were conducted in March 2015, February 2016, and March 2017. A total of 48 sheep were observed during the 2017 survey (25 ewes, 6 lambs, 15 mature rams (9 of these had >3/4 curl horns), and 2 unclassified sheep). A total of 46 sheep were observed during the 2016 survey and 57 sheep in the 2015 survey. Sightability of sheep was difficult in 2015 and 2016 due to the unusually warm weather, which caused sheep to move off their high elevation winter ranges early and onto open, south-facing slopes at mid-elevations during the survey. As a result, sheep were widely distributed and difficult to track and observe from the air, which led to lower counts than expected. However, survey conditions during 2017 were excellent due to good weather and sheep being concentrated on high elevation, wind-blown ridges. The low count in 2017, despite good sightability conditions, suggests that this herd has declined in recent years.

Six bighorn sheep ewes were captured and GPS-collared in January 2017 from GTNP. These collars will provide movement and habitat use data. These ewes tested negative for primary respiratory pathogens, including *Mycoplasma ovipneumoniae*, *Mannheimia haemolytica*, and *Bibersteinia trehalosi*. Additional sheep captures are planned for winter 2017/2018 in this herd.

Harvest Data

In 2016, there were 2 hunters in the Targhee Herd (1 resident and 1 non-resident). The non-resident hunter harvested a 6 year-old ram. The hunter spent 8 days in the field.

Population

This population has been stable around 100-125 individuals since periodic aerial surveys began in the 1990s. However, fewer sheep have been observed during aerial surveys in the past three

years, indicating that the herd has declined. The herd is currently estimated to be approximately 80 animals.

Management Summary

Two licenses will be available for this herd in 2017 (2 residents). No changes are proposed to the 2017 hunt season. This bighorn sheep population is distributed both within GTNP and along its boundary in remote steep terrain making it difficult for hunters to locate and stalk sheep. As a result, harvest levels have remained low and on some years no sheep are harvested. Given the limited number of ram-only licenses available and periodic harvest, hunting is likely not having an impact on this population. Managers will consider reducing licenses in 2018 in light of the recent observed population decline.

Bibliography

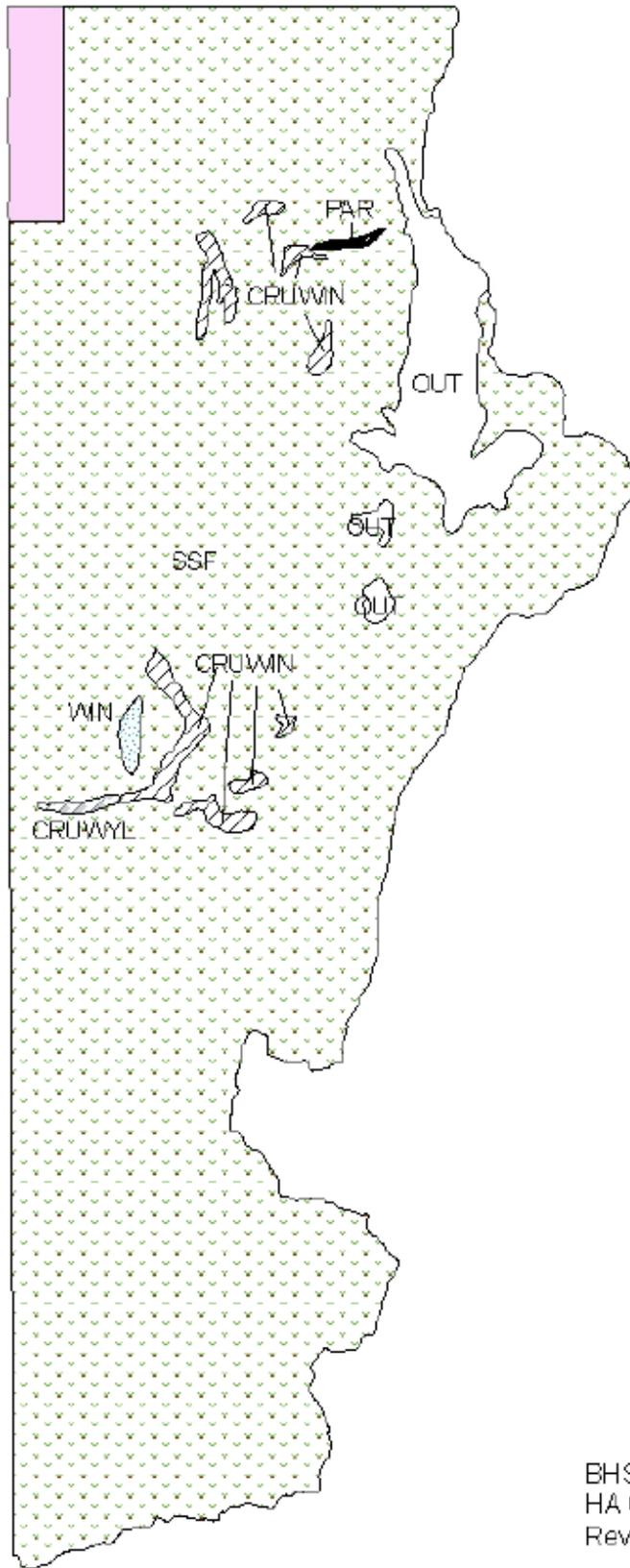
Courtemanch, A.B. 2014. Seasonal habitat selection and impact of winter backcountry recreation on a formerly migratory bighorn sheep population in northwest Wyoming. M.S. Thesis. University of Wyoming, Laramie, WY, USA.

Courtemanch, A.B., M.J. Kauffman, S. Kilpatrick, and S.R. Dewey. *In press*. Alternative foraging strategies enable a mountain ungulate to persist after migration loss. *Ecosphere*

Fitzsimmons, N., S.W. Buskirk, and M.H. Smith. 1995. Population history, genetic variability and horn growth in bighorn sheep. *Conservation Biology* 9:314-323.

Kardos, M.D., S. Dewey, S.J. Amish, J. Stephenson, and G. Luikart. *In prep*. Strong fine-scale population structure of Grand Teton National Park bighorn sheep suggests important role of philopatry in bighorn population subdivision.

Whitfield, M.B. 1983. Bighorn sheep history, distributions and habitat relationships in the Teton Mountain Range, Wyoming. M.S. Thesis. Idaho State University, Pocatello, Idaho, USA.



2016 - JCR Evaluation Form

SPECIES: Bighorn Sheep

PERIOD: 6/1/2016 - 5/31/2017

HERD: BS107 - JACKSON

HUNT AREAS: 7

PREPARED BY: ALYSON COURTEMANCH

	<u>2011 - 2015 Average</u>	<u>2016</u>	<u>2017 Proposed</u>
Trend Count:	327	371	400
Harvest:	9	11	12
Hunters:	11	11	12
Hunter Success:	82%	100%	100 %
Active Licenses:	11	11	12
Active License Success	82%	100%	100 %
Recreation Days:	91	139	100
Days Per Animal:	10.1	12.6	8.3
Males per 100 Females:	59	36	
Juveniles per 100 Females	32	34	

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

Management Strategy: Special

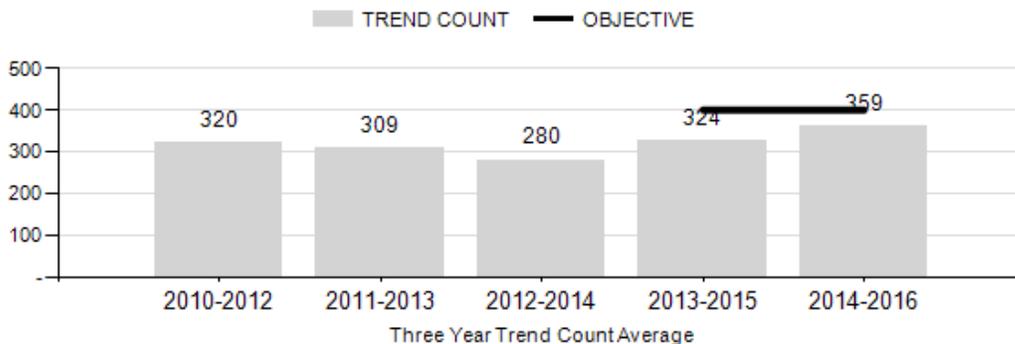
Percent population is above (+) or (-) objective: -7.2%

Number of years population has been + or - objective in recent trend: 5

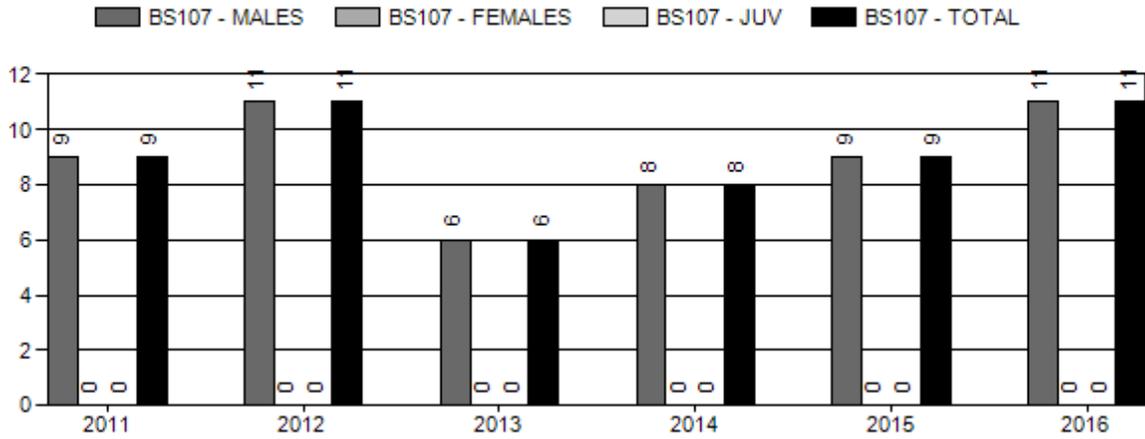
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females \geq 1 year old:	na%	na%
Males \geq 1 year old:	na%	na%
Juveniles (< 1 year old):	na%	na%
Total:	na%	na%
Proposed change in post-season population:	na%	na%

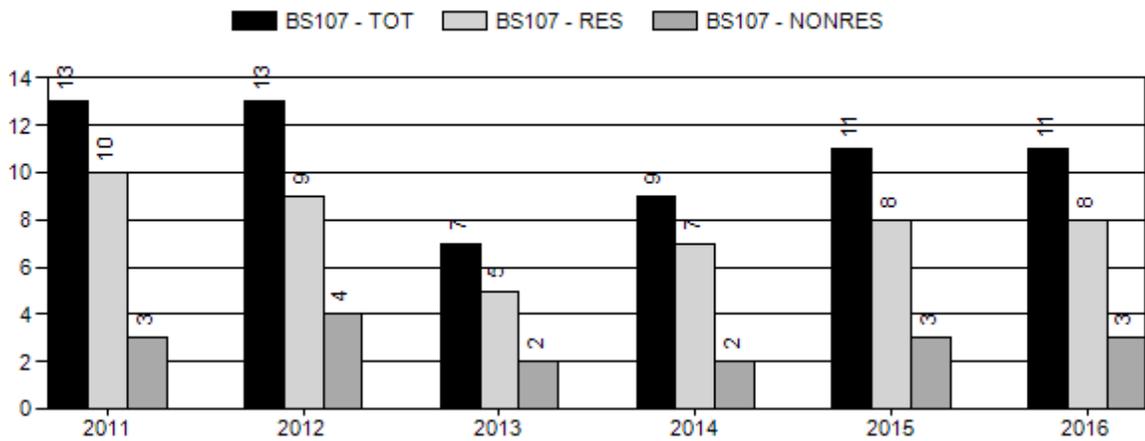
BS107 Trend Count



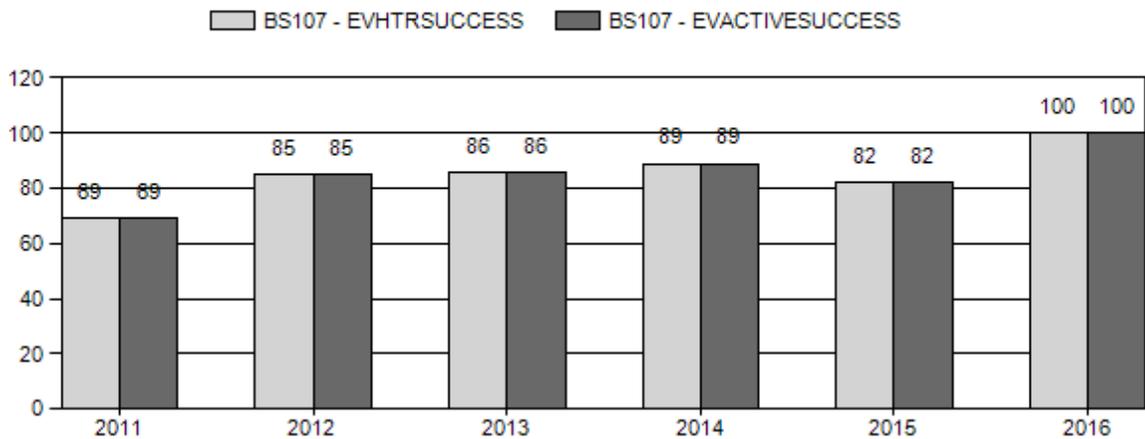
Harvest



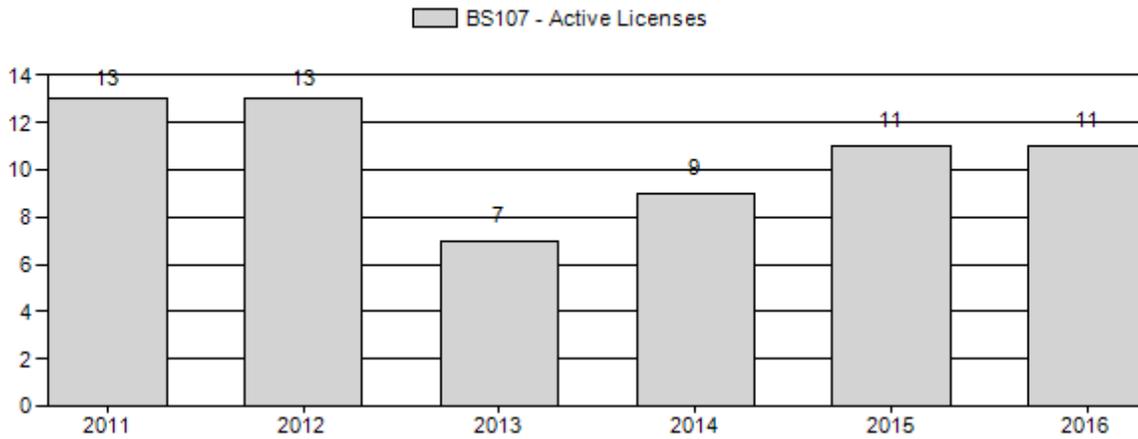
Number of Hunters



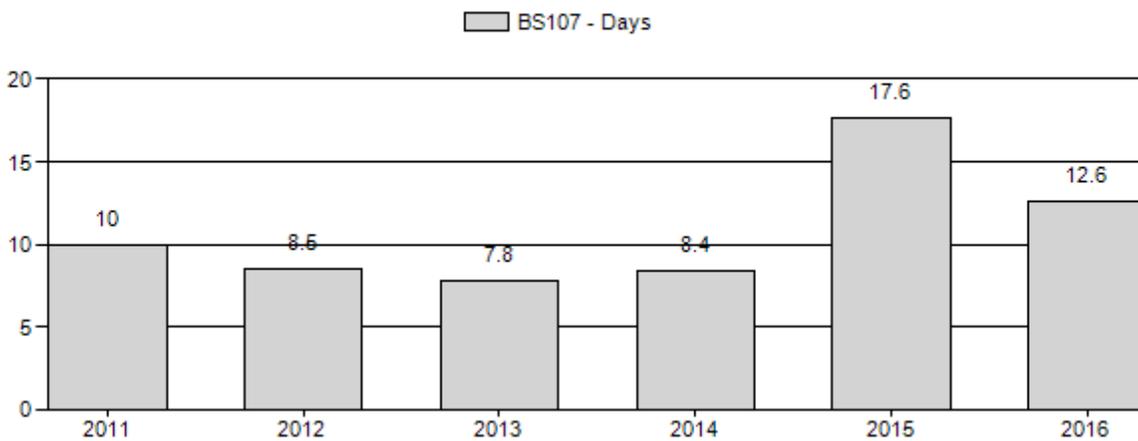
Harvest Success



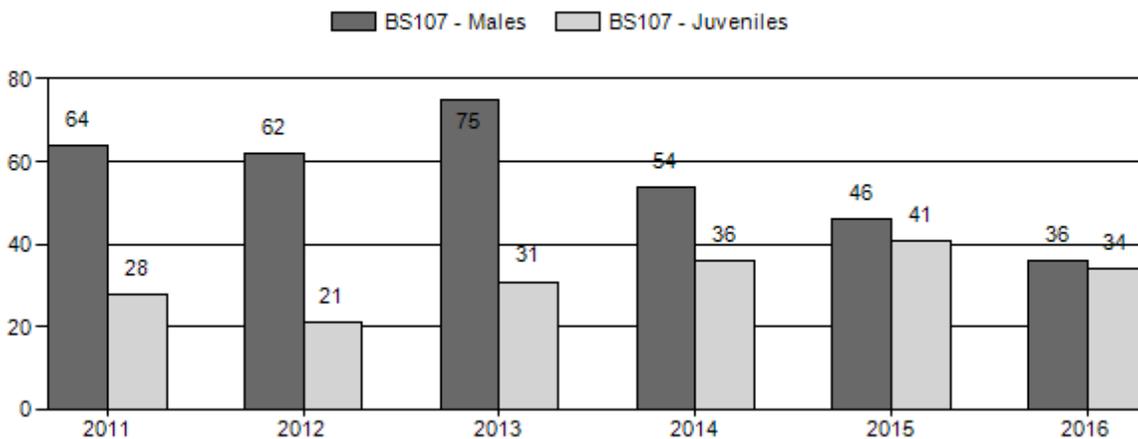
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2011 - 2016 Postseason Classification Summary

for Bighorn Sheep Herd BS107 - JACKSON

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			YIng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2011	454	18	121	139	33%	217	52%	61	15%	417	349	8	56	64	± 3	28	± 1	17
2012	350	17	65	82	34%	133	55%	28	12%	243	256	13	49	62	± 6	21	± 3	13
2013	350	14	84	98	37%	130	49%	40	15%	268	292	11	65	75	± 6	31	± 3	18
2014	400	10	84	94	28%	173	52%	63	19%	330	285	6	49	54	± 4	36	± 3	24
2015	375	12	75	87	25%	188	53%	77	22%	352	0	6	40	46	± 0	41	± 0	28
2016	371	7	70	77	21%	215	59%	74	20%	366	221	3	33	36	± 0	34	± 0	25

**2017 HUNTING SEASONS
JACKSON BIGHORN SHEEP HERD (BS107)**

Hunt Area	Type	Season Dates		Quota	License	Limitations
		Opens	Closes			
7	1	Sep. 1	Oct. 31	12	Limited quota	Any bighorn sheep
	Archery	Aug. 15	Aug. 31			Refer to Section 3 of this Chapter

Summary of Changes in License Number

Area	Type	Quota change from 2016
7	1	No Changes
Herd Unit Total	1	No Changes

Management Evaluation

Mid-Winter Trend Count Objective: 400 ± 20% (320-480 sheep)

Secondary Objective: Maintain a 3-year running average age of harvest rams 6-8 years old

Management Strategy: Special

2016 Mid-Winter Trend Count: 371

3-Year Mid-Winter Trend Average (2014-2016): 359

The mid-winter trend count objective for the Jackson Bighorn Sheep Herd is 400 sheep ± 20% (320-480 sheep). The management strategy is special and the objective and management strategy were last revised in 2015. The herd objective was publicly reviewed in 2015 and changed to a mid-winter trend count objective of 400 sheep because spreadsheet models do not adequately

simulate population trends. The current trend count is 371 sheep, which is within the objective range.

The secondary objective for the herd is to maintain a 3-year running average age of harvested rams between 6-8 years old. Currently, this objective is being met. The average age of harvested rams in 2016 was 7.7 years (max = 10.3 years). The average age from 2014-2016 is 7.1 years.

Herd Unit Issues

This population is currently within the objective of 400 sheep \pm 20% (320-480 sheep). Although the trend count is within \pm 20% of the objective, managers would like to see this herd continue to grow. The population experienced a pneumonia-related die-off in 2002 and again in 2012. An estimated 30% of the population died during the latest pneumonia event. However, lamb survival rebounded within a couple of years after both outbreaks, leading to relatively quick herd recoveries. There is ongoing surveillance in the herd to detect pneumonia infections and another potential die-off event.

Weather

Summer 2016 was very dry. Precipitation in July was only 50% of average. September and October were rainy, resulting in a late-season flush of forage production. November was relatively warm and mild with no significant snowfall until early December. However, the region received significant snowfall and freeze/thaw events in late December through January, causing severe winter conditions. These conditions caused bighorn sheep to concentrate at low elevations. Several rain events and warmer temperatures in February resulted in slopes melting out in some areas on native winter ranges. At the time of the mid-winter survey in February 2017, winter snowpack was reported at 131% of average in the Snake River Basin. Please refer to the following web sites for specific weather station data.

<http://www.wrds.uwyo.edu/wrds/nrcs/snowprec/snowprec.html> and
<http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/pdiimage.html>

Habitat

The Wyoming Game and Fish Department (WGFD) and Bridger-Teton National Forest (BTNF) initiated a project in 2012 to evaluate the short-term and long-term nutritional changes in bighorn sheep forage after wildfire. This project will track the nutritional content over 10 years of key forage species that burned at different fire severities during the Red Rock Fire in the Gros Ventre. Other than this project, there are no established vegetation transects in this herd unit.

The Bryan Flats Habitat Enhancement and Fuels Reduction Project is scheduled for implementation in fall 2017. This prescribed burn project is led by BTNF and will improve bighorn sheep habitat in the Hoback Canyon area. Please refer to the 2016 Annual Report

Strategic Habitat Plan Accomplishments for Jackson Region habitat improvement project summaries (<https://wgfd.wyo.gov/Habitat/Habitat-Plans/Strategic-Habitat-Plan-Annual-Reports>).

Field Data

In the Gros Ventre drainage, approximately 30% of radio-collared bighorn ewes died during a pneumonia outbreak in 2012 and lamb ratios declined from a high of 50 lambs:100 ewes in late June 2012 to 15:100 by February 2013. Carcasses retrieved during the summer indicated that sheep likely died from pneumonia. Additional sampling of live sheep during and after the outbreak indicates that Jackson sheep carry *Mycoplasma ovipneumoniae*, leukotoxin-positive *Mannheimia spp.*, and leukotoxin-positive *Bibersteinia spp.*. Helicopter captures in March 2016, as part of a study with the Wyoming Cooperative Fish and Wildlife Research Unit, found several ewes with contagious ecthyma. Additional ground observations of sheep on Miller Butte recorded approximately 60% of sheep in some groups with symptoms. However, sheep appeared to have cleared the infection by the time they were recaptured in December 2016. Additional research is planned for 2017 to track respiratory pathogens, seasonal body condition, movements, pregnancy, and lamb recruitment of individual ewes over time in collaboration with WGFD Vet Services and Wyoming Cooperative Fish and Wildlife Research Unit.

In February 2017, classification surveys were flown over both low and high elevation winter ranges. Bighorn sheep on Miller Butte and Camp Creek were classified from the ground. A total of 371 sheep were observed including 215 females, 74 lambs, 70 adult males, 7 yearling males, and 5 unclassified sheep. Herd unit ratios in 2016 were 34 lambs:100 ewes, 33 adult rams:100 ewes and 3 yearling rams:100 ewes. The lamb ratio is lower than last year's ratio of 41:100, however it still represents herd growth.

Harvest Data

Data from the 2016 harvest survey indicate that 11 hunters harvested 11 rams (100% success). The median age of harvested rams in 2016 was 7.7 years (max = 10.3 years), similar to 2015 at 7.2 years. The number of licenses was increased for the 2015 season from 8 to 11 in response to the growing population and strong ram to ewe ratio. Licenses were further increased to 12 in 2016. Based on classification surveys and the number of mature rams observed in February 2017 (n=70; 48 rams > ¾ curl horns), ram harvest has not affected the ability of the population to grow. Given the recent trend of population recovery, managers are maintaining licenses at 12 for 2017.

Population

The mid-winter trend count observed 371 sheep. Past trends seem to indicate that pneumonia outbreaks occur when the population reaches 500-600 animals. Currently, the population is increasing due to relatively high lamb:ewe ratios and may approach this number within 5 years.

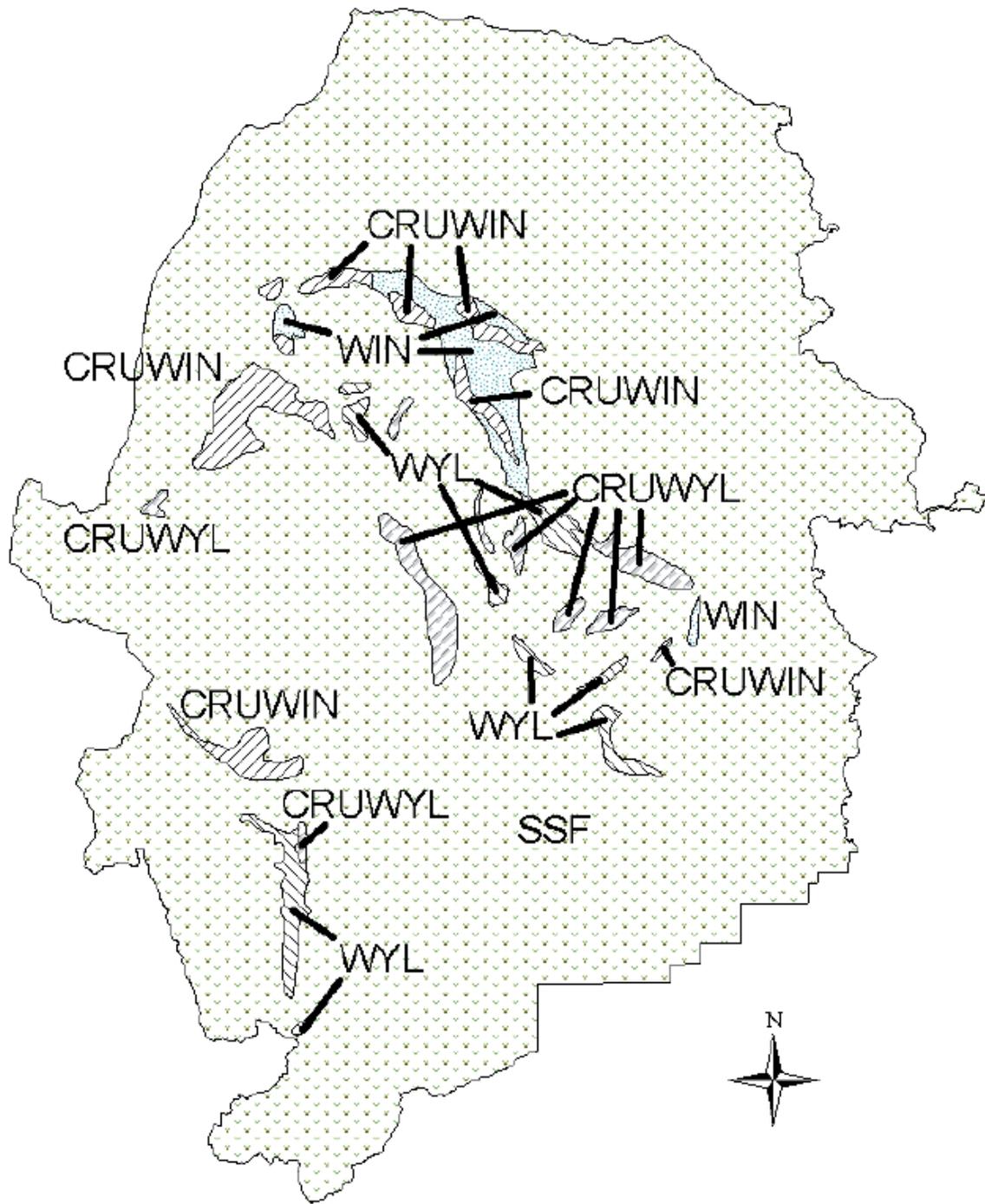
Therefore, the public and managers should monitor the herd closely and anticipate another pneumonia outbreak in the near future.

Management Summary

Trend data indicate that the Jackson Bighorn Sheep Herd is recovering relatively quickly from a pneumonia outbreak in 2012. Overall numbers have increased in the past 3 years and lamb:ewe ratios continue to improve. Based on past history, pneumonia outbreaks seem to occur when the population reaches 500-600 animals. Therefore, another outbreak could be expected within 5 years. Due to the population growth and availability of rams, 12 licenses will be offered in 2017. Although this level of ram harvest is not expected to affect population increase, it will provide hunters with harvest opportunities before another pneumonia outbreak occurs. The WGFD plans to continue to monitor the population using radio-collars, disease sampling, and body condition measurements in 2017 to learn more about the interaction of respiratory pathogens, body condition, and population density in causing pneumonia outbreaks.

References

Honess, R.F. and N.M. Frost. 1942. A Wyoming bighorn sheep study. Wyoming Game and Fish Department Bulletin No. 1, 127 pp.



BHS107 - Jackson
 HA 7
 Revised 9/02