

**IDAHO IDFG OF FISH AND GAME**

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**Surveys and Inventories**

**FY2018 Statewide Report**



**BIGHORN SHEEP**

July 1, 2017 to June 30, 2018

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## **STATEWIDE REPORT SURVEYS AND INVENTORY**

**JOB TITLE:** Bighorn Sheep Surveys and Inventories

**STUDY NAME:** Big Game Population Status, Trends, Use, and Associated Habitat Studies

**PERIOD COVERED:** July 1, 2017 to June 30, 2018

### **STATEWIDE**

Bighorn sheep are one of Idaho's most prized game animals. Idaho is home to 2 distinct populations of bighorn sheep. California bighorns occupy southern Idaho's canyon and rangelands south of Interstate 84. Rocky Mountain bighorns live north of Interstate 84 in mountainous terrain from Hells Canyon on the west side of the state to the Montana border on the east.

From historical records, bighorn sheep ranged widely in Idaho in the early 1800s and are believed to have been the most abundant game animal in the state. Beginning in the late 1800s, Idaho's bighorn sheep populations declined drastically. Idaho estimated 1,000 bighorns in the state in the early 1920s, mostly in the Salmon River drainage. By 1940 bighorn sheep were extirpated from the Owyhee River area. The 3 primary factors believed responsible for the large decline of bighorn sheep in Idaho were unregulated hunting, competition with domestic livestock for forage, and disease.

Idaho began efforts to reestablish bighorn sheep populations in the 1960s. Bighorn sheep from British Columbia were translocated to the East Fork Owyhee River drainage in 1963. Numerous bighorn sheep have been moved into and out of Idaho since then. In the early 1990s, Idaho Department of Fish and Game (IDFG) estimated there were about 5,000 bighorn sheep in the state.

Bighorn sheep distribution for this plan is defined as the geographic range regularly or periodically occupied by bighorn sheep. Not all areas within this range have sufficient suitable habitat to support persistent populations and bighorn sheep can and do occasionally move outside this area. Distribution can change through time as a consequence of changes in population density, habitat, or other factors. Bighorn sheep populations were separated into population management units (PMUs) based on current knowledge of distribution and connectivity between subpopulations and populations (Table 1). We divided the California bighorn sheep distribution into 6 PMUs (Figure 1). We divided the Rocky Mountain bighorn sheep distribution into 16 PMUs (Figure 13). Data is lacking for some of Idaho's bighorn sheep populations, additional information from radio telemetry, aerial surveys, ground surveys, etc. would be beneficial for population management.

Idaho plans to continue to manage bighorn sheep north and south of Interstate 84 separately and will continue to refer to them as California and Rocky Mountain bighorn sheep "trophy types." The California and Rocky Mountain bighorn sheep display differences in physical appearance and occupy different habitats. California bighorn sheep generally occupy canyon and desert

habitat while the Rocky Mountain bighorn sheep occupy rugged mountainous terrain. Currently, there are approximately 600 California and 2,000 Rocky Mountain bighorn sheep in Idaho.

### **California Bighorn Sheep**

During April 2017, 941 hunters applied for 23 tags for California bighorn sheep. Of these, 47% (444) of the applicants were non-residents. Twenty residents and 3 non-residents were successful in obtaining a tag for the fall 2017 hunting season.

Twenty-three (23) tags were issued for California bighorn sheep in 2017. Eighteen successfully harvested a ram for a hunter success rate of 78%, up from 71% in 2016. Successful hunters hunted an average of 3.4 days before harvesting a ram, as compared with 4.9 days in 2016. Harvested rams averaged 7.8 years of age (Figure 2). Horn measurements averaged 14.0 inches basal circumference and 32.0 inches in length.

### **Rocky Mountain Bighorn Sheep**

During April 2017 a total of 2,215 hunters applied for 74 Rocky Mountain bighorn sheep tags. Nonresidents comprised 58% (1,278) of the applications. Sixty-eight resident hunters and 6 non-resident hunters drew Rocky Mountain bighorn sheep tags for the fall 2017 hunting season.

Seventy-four (74) tags were issued for Rocky Mountain bighorn sheep in 2017. Two additional tags, 1 by auction through the Wild Sheep Foundation and 1 by lottery through the Idaho Chapter of the Wild Sheep Foundation, were also issued to hunt Rocky Mountain bighorns. Forty-five (45) hunters were successful (including the auction and lottery tag holders), for a hunter success rate of 59%. Successful hunters hunted an average of 7.4 days before they harvested a ram, up from 6.7 days in 2016. Age of harvested rams averaged 7.8 years of age, compared to 7.7 years of age in 2016. Horn measurements averaged 14.5 inches basal circumference and 33.6 inches (Figure 14).

Regional personnel checked all harvested bighorn sheep, and completed data collection forms for all reported bighorn sheep known to have died during the year, whether hunter-harvested or found dead due to other causes. Horns of all rams were individually pinned for future identification.

Statewide Bighorn Sheep population surveys between 2014 to present.

<b>Season</b>	<b>Females captured, radio-marked, and/or Monitored</b>	<b>Males captured, radio-marked, and/or Monitored</b>	<b>Lambs captured, radio-marked, and/or Monitored</b>	<b>GMUs Surveyed</b>
2014	43	26	0	14
2015	67	35	33	3
2016	72	42	75	5
2017				

Table 1. Predicted bighorn sheep supportable by habitat within bighorn sheep distribution, by PMU. Based on a density of 1.9 sheep/km<sup>2</sup> (Van Dyke 1983).

PMU	Total km <sup>2</sup> of predicted habitat within bighorn sheep distribution (A)	Bighorn sheep population supportable by (A)	Total km <sup>2</sup> of private land within (A)	Total km <sup>2</sup> of domestic sheep grazing or trailing allotments within (A)	Bighorn sheep population supportable by (A) without private land and allotments
Hells Canyon	1,474	2,802	580	77	1,555
Lower Salmon River	792	1,504	57	239	942
Selway	290	552	0	0	552
Middle Fork Salmon River	1,867	3,546	10	0	3,527
Lower Panther-Main Salmon	576	1,094	6	0	1,083
Tower-Kriley	24	46	6	0	35
North Beaverhead	137	261	0	0	261
South Beaverhead	212	402	2	58	287
North Lemhi	324	615	12	0	592
South Lemhi	322	612	2	24	565
Lost River Range	773	1,468	2	93	1,289
East Fork Salmon River	591	1,122	14	18	1,060
Middle Main Salmon River	595	1,130	28	0	1,077
Lionhead	27	51	0	0	51
Owyhee Front	526	999	48	14	880
Owyhee River	388	738	4	0	731
Jacks Creek	261	496	10	0	476
Bruneau-Jarbidge	410	779	10	0	759
South Hills	35	66	0	5	56
Jim Sage	56	107	3	0	102
Totals	9,679	18,390	794	528	15,880

# POPULATION MANAGEMENT UNITS CALIFORNIA BIGHORN SHEEP

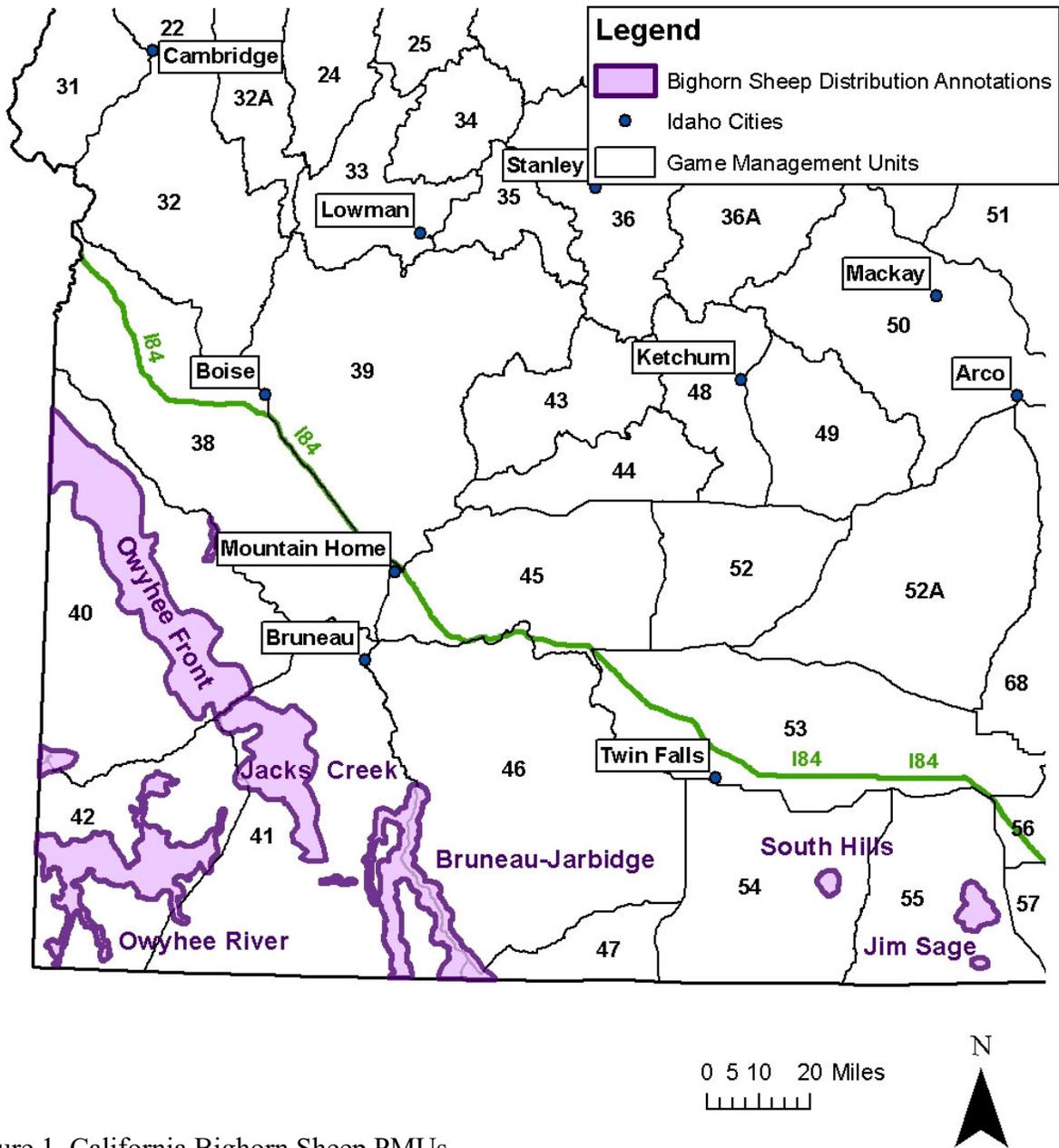


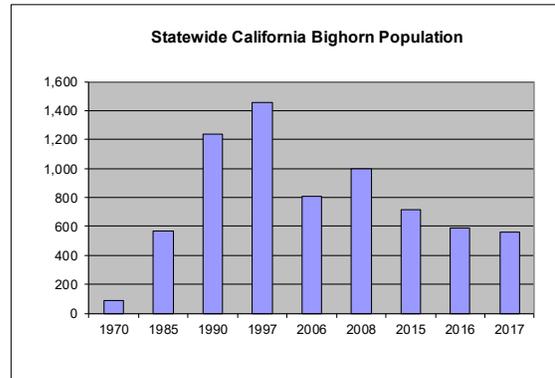
Figure 1. California Bighorn Sheep PMUs

## California Bighorn Sheep

### Population status

PMU	Observed						Modeled					Most Recent Survey
	Ewes	Lambs	Rams		Unclass	Total	Ewes	Lambs	Rams		Total	
			I, II	III, IV					I, II	III, IV		
Owyhee Front	0	0	0	0	0	31	n/a	n/a	n/a	n/a	n/a	2016
Owyhee River	0	0	0	0	0	158	0	0	0	0	0	2016
Jacks Creek	0	0	0	0	0	172	0	0	0	0	0	2016
Bruneau-Jarbidge	0	0	0	0	0	133	92	55	40	25	212	2018
South Hills	0	0	0	0	0	3	n/a	n/a	n/a	n/a	n/a	2018
Jim Sage	0	0	0	0	0	67	n/a	n/a	n/a	n/a	n/a	2018
<b>Total</b>	0	0	0	0	0	564	92	55	40	25	212	

Estimates of statewide population								
1970	1985	1990	1997	2006	2008	2015	2016	2017
90	570	1,240	1,460	810	1,000	716	586	564



### Hunting tags, applications, and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
Tags	22	21	21	21	21	21	21	23
Resident applicants	371	382	358	367	366	345	329	486
Nonresident applicants	427	417	414	338	338	442	366	444
Harvest	15	17	18	20	18	11	15	18
Hunter success (%)	68	81	86	95	86	52	71	78
Average ram age (yrs)	7.5	7.1	6.9	7.4	6.8	8.0	7.8	7.8

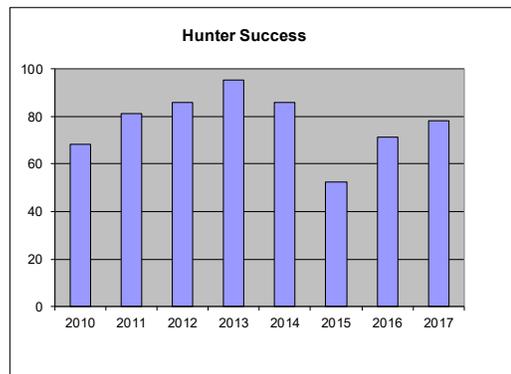
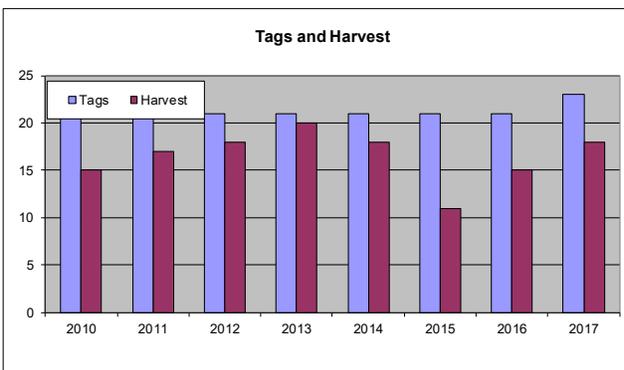
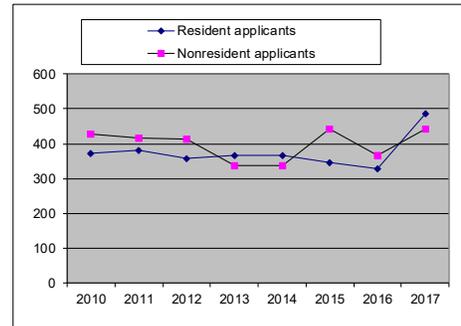


Figure 2. California Bighorn Sheep Statewide Population and Harvest

## **OWYHEE FRONT PMU GMU 40; Hunt Area 40**

### **Historical Background**

The first bighorn sheep to colonize the Owyhee Front after extirpation in the early 1900s are thought to have immigrated from Oregon's Leslie Gulch following a wildfire in the 1980s. The sheep occupying the Castle Creek drainage likely colonized from Shoofly Creek in GMU 41. Until 2009, GMU 40 was included in the Little Jacks hunt area, but only 1 ram had ever been taken in GMU 40. To better distribute hunting pressure, a hunt in GMU 40 was created in 2009.

### **Management Objectives**

The management objective is to maintain or increase this bighorn sheep population, provided the increase occurs in portions of the PMU where separation from domestic sheep can be maintained. This sheep population will continue to be managed conservatively, offering hunters a reasonable chance to harvest a mature ram.

### **Habitat Management and Monitoring**

The Owyhee Front is characterized by scattered pockets of suitable escape terrain in sagebrush (*Artemisia* spp.)-steppe dominated foothills above the Snake River plain. Reynolds Creek and Castle Creek are the main drainages bighorn sheep occupy. Ewes and lambs occupy the most rugged and broken country, whereas rams seek out areas that provide abundant forage and isolation from human disturbance, often using low rock outcroppings or steep slopes in the absence of "typical" escape terrain. This PMU differs from other California bighorn sheep habitat in Idaho in that it lacks the deep canyon topography which typifies much of the bighorn habitat in Owyhee County. While much of the Owyhee Front is managed by the Bureau of Land Management (BLM), approximately 1/3 is privately owned rangeland.

Habitat degradation, due to increased and unregulated off-road motorized vehicle use, the spread of invasive annual grasses, wildfires, and risk of disease threaten this bighorn sheep population. A proposed transmission line on the Owyhee Front may affect bighorn sheep and habitat. Livestock grazing is also prevalent, both on private and public lands, and a large herd of feral horses occupy habitat near suitable bighorn sheep habitat. Competition with domestic livestock and feral horses is a concern, particularly due to the limited nature of bighorn sheep habitat.

### **Biological Objectives**

#### ***Capture, Radio-mark, and/or Telemetry***

Nine bighorn sheep were captured in February 2011 as part of a previous study. Those radio-collared sheep were tracked until the collar batteries died in the spring of 2016. These sheep made long distance movements between available habitats, and biologists tracked movement patterns and travel corridors, identified critical habitats, documented population size and status,

located additional bighorn sheep herds, and determined cause-specific mortality. Staff documented movements of one ram into Shoofly Creek in GMU 41 and determined that rams have moved between Reynolds Creek and Castle Creek in GMU 40, a distance of over 30 miles. Additionally, what was believed to be small, individual bands of sheep in the Reynolds Creek area is likely one herd moving between drainages. The small bands of sheep were moving between isolated pockets of habitat, and were not distinct herds like previously thought.

In March of 2016, IDFG captured and radio-collared 5 bighorn sheep in GMU 40. IDFG staff fitted all sheep with a GPS collar, and collected biological samples to test for current and previous exposure to pneumonia (specifically *Mycoplasma ovipneumoniae*). One ram was captured and radio-collared in Reynold's Creek, and two rams and two ewes in Castle Creek. One additional yearling ram was captured and sampled in Castle Creek but was released un-collared. All samples tested negative for pneumonia. IDFG monitored collared sheep survival status, movements, spatial and habitat use, and ultimately causes of mortality for the life of the collars. The last collar battery failed in April 2018.

### ***Population Surveys and Monitoring***

Population surveys were not conducted in FY 2018.

### **Hunting and Harvest Characteristics**

One ram tag is issued for this PMU, and the hunter was able to harvest a mature ram. Harvest success in recent years has been 100%. The harvested ram's horn length was 34.5 inches, with a circumference of 14.25 inches.

### **Capture and Translocation**

IDFG did not capture and translocate any bighorn sheep on the Owyhee Front.

### **Disease Monitoring**

In general, disease has been an important factor contributing to the extirpation of bighorn sheep in Idaho, and pneumonia continues to be a risk to bighorn populations. The effects of respiratory disease on bighorn sheep populations can include high rates of mortality in all age classes, high rates of mortality restricted to lambs (especially during summer), and chronic, low level, sporadic adult mortality. Pneumonia can be spread from domestic sheep, goats, and other bighorn sheep.

Bighorn sheep, especially rams, are known to make long distance movements between areas of suitable habitat. Bighorn sheep have been documented crossing GMU boundaries and the Oregon state line. These movements increase risk of disease transmission, poaching, and likely predation. A domestic sheep trailing route crosses a portion of this PMU, and efforts have been made to reduce contact between bighorns and domestic sheep. Additionally, due to the prevalence of roads, trails, and off-road vehicle use in the area, bighorn sheep migration corridors are threatened by human recreation, and the ability of bighorn sheep to move undisturbed between patches of habitat is reduced.

Harvested rams are tested for pneumonia each year, and hunters are asked to report sightings of any bighorn sheep showing symptoms.

### **Management Discussion**

The Owyhee Front is close to the largest human population center in Idaho, and the area is used year-round for recreational off-road vehicle use, hiking, hunting, trapping, horseback riding, wildlife viewing, sightseeing, and recreational shooting.

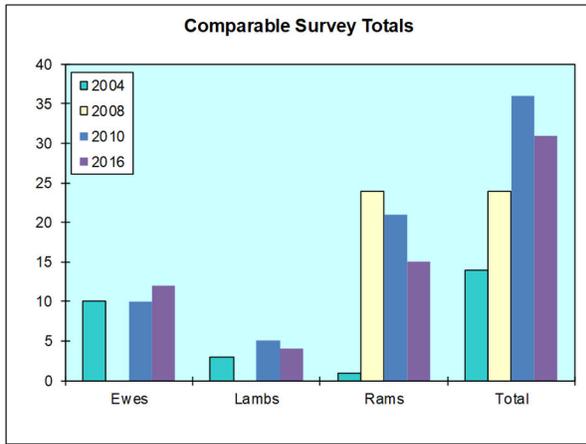
Little population data is available for the sheep occupying the Owyhee Front in GMU 40. In 2016, 35 sheep were observed occupying the Owyhee Front, including 4 collared ewes that were not observed during the spring aerial survey. Within current distribution, modeled habitat comprises 464 km<sup>2</sup>, which could support approximately 880 animals (assuming all habitat is suitable year-round and relatively high densities of 1.9/sheep/km<sup>2</sup>). It is likely that the lack of lambing habitat and escape terrain would limit this bighorn sheep population, and bighorn sheep numbers would remain lower than the currently predicted population estimate. Additionally, much of the area within bighorn sheep distribution in this PMU is used primarily for travel corridors between isolated patches of suitable habitat.

### **Management Actions**

1. Provide technical assistance to the BLM on travel management in Owyhee County.
2. Work with willing domestic sheep permittees, and BLM to use BMPs to maintain separation between bighorn sheep and domestic sheep and goats.
3. Continue disease monitoring efforts by collecting biological samples on bighorn sheep mortalities.

## California Bighorn Sheep

### Owyhee Front GMU 40; Hunt Area 40



#### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
40	2004	10	3	1	0	1	0	14
	2008	0	0	7	17	24	0	24
	2010	10	5	4	17	21	0	36
	2016	12	4	4	11	15	0	31
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>			<b>33</b>	<b>33</b>	<b>92</b>	<b>125</b>		

\*2016 Surveys were conducted in March rather than July due to a disease outbreak in nearby Oregon populations.

Sheep counted as lambs in the March survey would have been counted as adults in a July survey, and there are no new 2016 lambs included in the survey.

#### Hunting tags and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags</b>	2	2	2	2	2	1	1	1
<b>Harvest</b>	1	2	1	2	2	1	1	1
<b>Hunter success</b>	50	100	50	100	100	100	100	100
<b>Ave ram age</b>	9.5	7.5	7.5	7.0	8.5	10.5	6.5	6.5

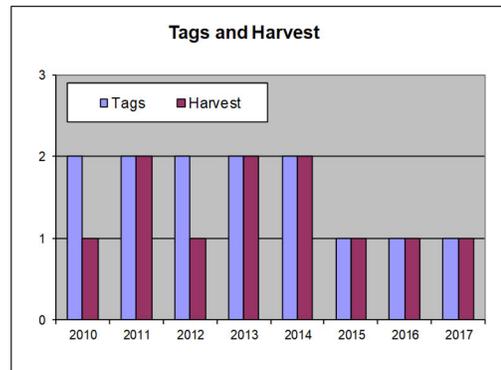
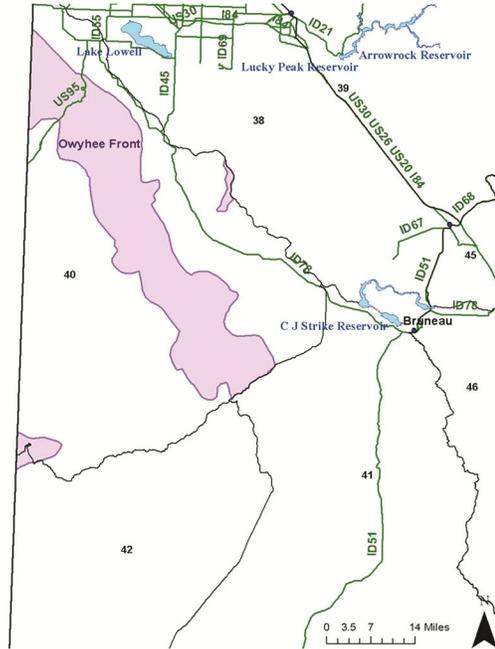


Figure 3. Owyhee Front Population Survey and Harvest

## **OWYHEE RIVER PMU**

### **GMU 42; Hunt Areas 42-1, 42-2**

#### **Historical Background**

Bighorn sheep were extirpated from this area in 1927. Subsistence hunting by mining camps, heavy grazing by domestic livestock, and diseases introduced by domestic livestock led to the end of this native sheep population. Three releases of bighorn sheep in the 1960s, translocated from British Columbia, provided the nucleus for this reintroduced herd. By 1982, the sheep population was well enough established to be used as a source population for translocations to other parts of Idaho, in addition to 3 other states. Translocations from the PMU continued through 2003. This sheep population increased to a high of near 750 animals in 1992, but declined after the severe winter of 1992-1993 (>200 sheep were also translocated from this area in 1990-1993). The population has remained relatively stable at approximately 250-300 animals since 2004 (Figure 4). Recently the bighorn population has declined in Idaho along the Oregon border; although numbers have remained stable in the upper portions of the river.

#### **Management Objectives**

The management objective for this PMU is to maintain or increase the bighorn sheep population. This sheep herd will continue to be managed conservatively, offering a hunter with a reasonable chance at harvesting a mature ram.

#### **Habitat Management and Monitoring**

This PMU encompasses GMU 42 in southwestern Idaho. Most of the habitats suitable for bighorn sheep are managed by the BLM, although a few private- and state-owned parcels exist in the area. The majority of currently occupied sheep habitat occurs within the Owyhee River Wilderness, which was created by the Omnibus Public Land Management Act and signed into law in March 2009. This GMU is characterized by large expanses of sagebrush-steppe habitat intersected by steep drainages that are 300-400 m deep. Grass-covered benches and terraces within these rugged canyons provide foraging areas preferred by California bighorn sheep, although it is common to see sheep foraging over a mile away from canyon rims. Sheep are found within the East Fork Owyhee River, Deep Creek, and Battle Creek.

The steep and rugged canyon terrain and isolation of some forage areas by rimrock reduces competition between bighorn sheep and domestic livestock. However, the potential for conflict may exist adjacent to the canyons, and in portions of canyons accessible to cattle. Competition for forage may increase as bighorn or cattle numbers increase, or as forage availability decreases due to drought, grazing pressure, wildfire, or invasion of unpalatable exotic weeds or grasses. Anecdotal observations of elk wintering along the East Fork Owyhee River (300-500 animals) appear to be increasing, and elk may be competing with bighorn sheep for forage in winter as well. In addition, feral horses occupy habitat adjacent to canyons in sections of the PMU.

Evidence of illegal off-road vehicle use in bighorn sheep habitat and along canyon rims has increased over the last 20-25 years. Enforcement is challenging due to the remoteness of the

area, but the wilderness designation may have helped assuage some of the illegal use by off-road vehicles.

This area is used by the Air Force for training missions. Impacts of military overflights to bighorn sheep are not fully understood. Agreements have been made to mitigate the potential impacts to bighorn sheep (e.g., flights will take place perpendicular to the canyons and not parallel to them), but monitoring and compliance is unknown. Expanded use of the area for military training could have negative impacts to bighorn sheep, especially during critical times of year (e.g., lambing, winter).

## **Biological Objectives**

### ***Capture, Radio-mark and or Telemetry***

In 2015, eastern Oregon experienced a pneumonia outbreak that reduced their population by over 60% (personnel communication, ODFW). In response, IDFG conducted a population survey and capture events to determine if pneumonia had spread into neighboring GMU 42. From 2016 to 2018, we captured 48 bighorn sheep in the Owyhee River PMU, tested them for pneumonia, and fitted them with GPS tracking collars.

In 2017, IDFG and University of Idaho expanded this project to study lamb survival and nutritional quality in the Owyhee River and East Fork Salmon populations in Idaho. As part of the study, MS Candidate Nicole Bilodeau conducted vegetation sampling and regional staff conducted monthly lamb surveys to determine early survival of collared ewes' lambs. IDFG will continue to monitor collared sheep survival status, movements, spatial and habitat use, and ultimately causes of mortality for the life of the collars.

In 2018, we captured 5 bighorn sheep ewes for the lamb nutrition and survival study. We monitored survival of 32 collared sheep, and conducted lamb surveys each summer for all ewes.

### ***Population Surveys and Monitoring***

We did not conduct population surveys in FY 2018; however, we did collect herd composition data on all sheep groups observed during summer lamb surveys.

### **Hunting and Harvest Characteristics**

Six ram tags were issued in the Owyhee River PMU, and 4 hunters were able to harvest. Recent hunter success rates have been approximately 66%. Three hunters harvested rams in the early 42-1 season, and 1 harvested in the late 42-2 season. The early season rams averaged 31 inches for horn length and 14 inches circumference. The late season ram had 32 inch long horns with a circumference of 13.75 inches.

## **Capture and Translocation**

IDFG did not capture and translocate any bighorn sheep in the Owyhee River PMU.

## **Disease Monitoring**

The potential exists for disease outbreaks due to the proximity of private inholdings in or adjacent to bighorn sheep habitat. There are no domestic sheep grazing allotments in Idaho near the Owyhee River sheep population, but there is no way to regulate or monitor small farm flocks on private land. In addition, disease transmission is possible from neighboring bighorn sheep populations.

Harvested rams are tested for pneumonia each year, and hunters are asked to report sightings of any bighorn sheep showing symptoms.

## **Management Discussion**

The predicted bighorn population of 731 sheep that is supportable by habitat within current distribution (Table 1) is similar to the population high observed in early 1990s. However, seasonal habitats (winter range) and specific habitat needs (lambing areas) are not accounted for in the habitat model. Further refinement of the habitat model will likely result in a lower estimate of potential population size.

## **Management Actions**

1. Provide technical assistance to the BLM on travel management in Owyhee County.
2. Work with BLM to enforce motorized travel restrictions in the wilderness area.
3. Increase knowledge of movement patterns, habitat use, survival, etc. using radio-collared bighorn sheep.
4. Continue disease monitoring efforts by collecting biological samples on bighorn sheep mortalities.

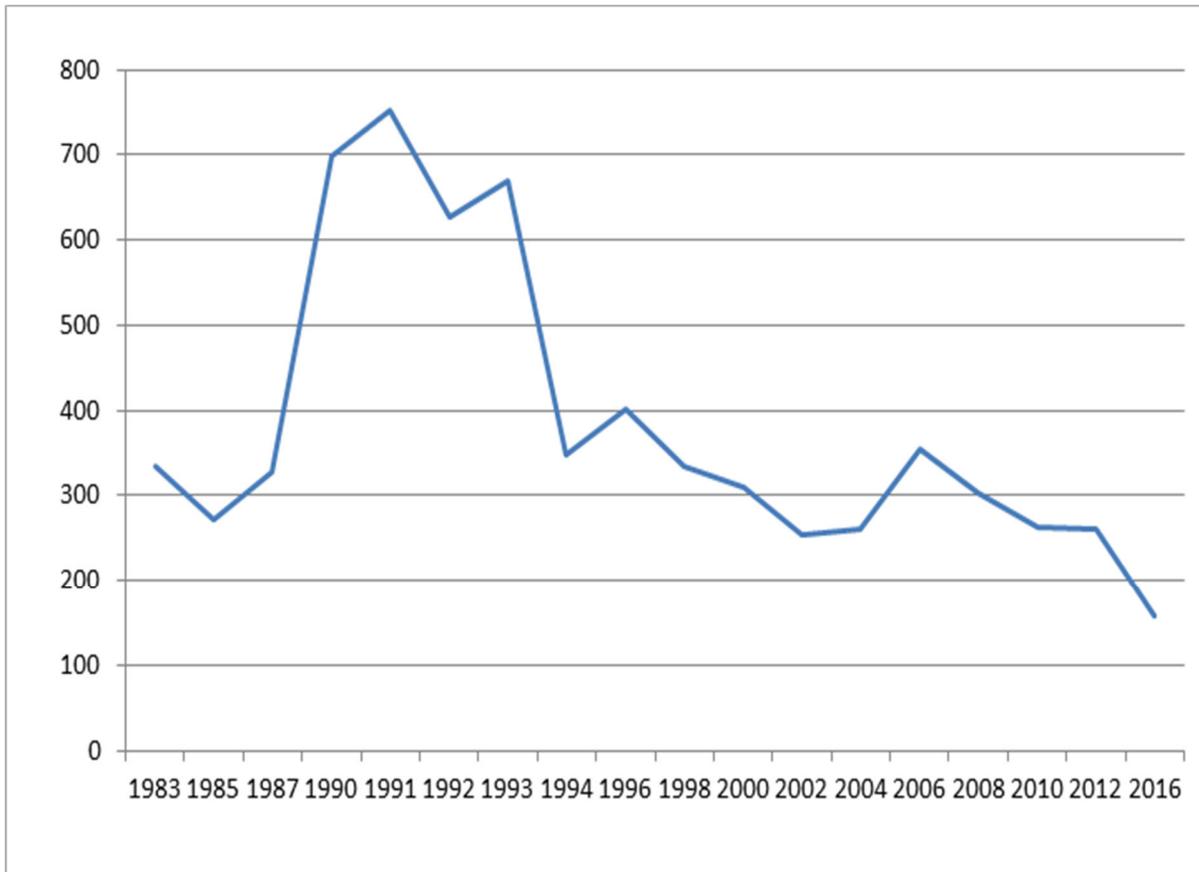
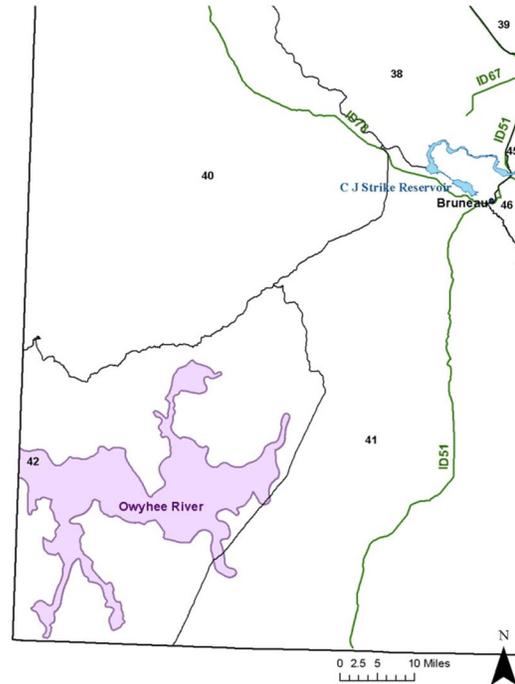
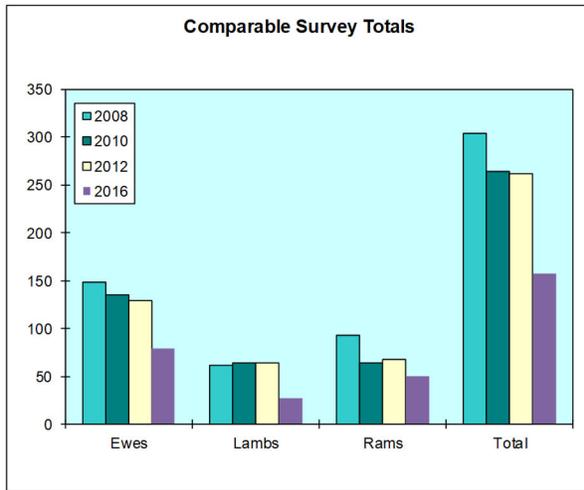


Figure 4. Total bighorn sheep observed (or estimated in years without surveys) during aerial surveys, GMU 42, Owyhee River PMU, 1983-present. These numbers represent actual counts and are considered minimum population estimates. The 2016 surveys were conducted in March rather than July due to a disease outbreak in nearby Oregon populations. Sheep counted as lambs in the March survey would have been counted as adults in a July survey, and there are no new 2016 lambs included in the survey. Therefore, the lower number of sheep counted in 2016 may not indicate an actual decline in population.

**California Bighorn Sheep**  
**Owyhee River**  
 GMU 42; Hunt Areas 42-1,42-2



**Population surveys**

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
42	2008	149	62	37	56	93	0	304
	2010	136	64	40	24	64	0	264
	2012	130	64	36	32	68	0	262
	2016	79	28	23	28	51	0	158
<b>Modeled estimate</b>		172	91	44	42	86	0	349
<b>Per 100 ewes observed</b>			<b>35</b>	<b>29</b>	<b>35</b>	<b>65</b>		

\*2016 Surveys were conducted in March rather than July due to a disease outbreak in nearby Oregon populations.

Sheep counted as lambs in the March survey would have been counted as adults in a July survey, and there are no new 2016 lambs included in the survey.

**Hunting tags and harvest information**

		2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags</b>	42-1	6	4	4	4	4	4	4	3
	42-2	6	4	4	4	4	4	4	3
	<b>Total</b>	12	8	8	8	8	8	8	6
<b>Harvest</b>	42-1	3	3	3	4	3	0	4	3
	42-2	4	2	2	3	2	2	2	1
	<b>Total</b>	7	5	5	7	5	2	6	4
<b>Hunter success</b>		58	63	63	88	63	25	75	67
<b>Ave ram age</b>		6.8	5.5	5.5	8.0	7.3	4.5	6.7	7.5

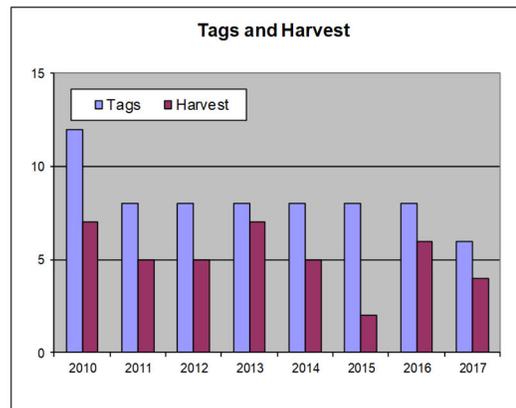


Figure 5. Owyhee River Population Survey and Harvest

## **JACKS CREEK PMU**

### **GMU 41; Hunt Areas 41-1, 41-2**

#### **Historical Background**

Bighorn sheep were abundant in southwestern Idaho prior to European settlement, but numbers began to decline following the mining boom of the late 1800s. Several causes have been implicated in this decline, including competition from cattle, disease introduced by domestic sheep, and indiscriminate hunting to provide meat for mining camps. The last reported sighting of a native bighorn sheep in Owyhee County occurred in 1927.

The first release of California bighorns into Jacks Creek occurred in 1967, when 12 sheep from British Columbia were released into Rattlesnake Creek, a tributary of Little Jacks Creek. Sheep were reintroduced into Big Jacks Creek in 1988. The Jacks Creek population of California bighorn sheep grew from those 12 animals to 392 animals observed on a 1999 helicopter survey. Following 1999, however, the number began to decline (Figure 6). Since 2004, the observed population has hovered around 170-230.

#### **Management Objectives**

The management objective for this PMU is to maintain or increase the bighorn sheep population. This sheep population will continue to be managed conservatively, offering hunters a reasonable chance to harvest a mature ram.

#### **Habitat Management and Monitoring**

This area ranges 1,100-1,900 m in elevation, and includes Big Jacks, Little Jacks, and Shoofly creeks. These perennial streams cut through terraced canyons that average 300 m deep, and are generally characterized by cliff bands interspersed with vegetated benches. The vegetative community is dominated by sagebrush, rabbitbrush (*Chrysothamnus* spp.), cheatgrass (*Bromus tectorum*), and bluebunch wheatgrass (*Pseudoroegneria spicata*).

A wildfire burned approximately 50,000 acres between Big Jacks and Little Jacks Creek in the summer of 2012. This fire burned a considerable amount of bighorn sheep habitat in both drainages, and it is uncertain how it will affect bighorns long-term. If native grasses and forbs can reestablish, the burn could prove favorable. However, if invasive annual grasses colonize the burn, the effectiveness of the habitat to support bighorn sheep will be diminished. Additionally, rush skeleton weed was documented in Big Jacks Creek in 2014. This weed has the potential to establish across thousands of acres, and could severely impact bighorn sheep habitat in the area.

The steep and rugged canyon terrain and isolation of some forage areas by rimrock reduces competition between bighorn sheep and domestic livestock. However, the potential for conflict may exist adjacent to the canyons and in portions of the canyons accessible by cattle. Competition for forage may increase as bighorn or cattle numbers increase, or as forage availability decreases due to drought, grazing pressure, wildfire, or invasion of unpalatable exotic weeds or grasses.

The majority of occupied bighorn sheep habitat occurs within the Big Jacks Creek Wilderness and Little Jacks Creek Wilderness. The wilderness designations were signed into law March 2009. Enforcement of illegal off-road vehicle use in sheep habitat and along the canyon rims is challenging due to the remoteness of the area, but the wilderness designation may have helped assuage some of the illegal use by off-road vehicles.

This area is used by the Air Force for training, and impacts to bighorn sheep are not fully understood. Agreements have been made to mitigate the potential impacts to bighorn sheep, particularly during lambing season (e.g. flights will take place perpendicular to the canyons and not parallel to them). Expanded use of the area for military training could have negative impacts to bighorn sheep, especially during critical times of the year (e.g. lambing, winter). Compliance with overflight agreements are unknown and difficult to document.

## **Biological Objectives**

### ***Capture, Radio-mark and or Telemetry***

In February 2011, 31 sheep were captured in Shoofly, Little Jacks, and Big Jacks drainages. Thirty adult ewes were fitted with VHF radio collars, and 1 ram was fitted with a GPS radio collar. Movements of sheep between Big Jacks and Little Jacks have been documented, in addition to the ram moving into GMU 40 and summering with rams from Castle Creek. Mountain lions were the highest source of mortality, killing 7 ewes. Three ewes died of unknown causes/non-predation, and 3 died of unknown causes. IDFG continued tracking radio-collared sheep until the collar batteries died in late 2016.

### ***Population Surveys and Monitoring***

We did not conduct population surveys in FY 2018.

## **Hunting and Harvest Characteristics**

Six tags were issued for rams in the Jacks Creek PMU, and all hunters were able to harvest. In recent years, the average hunter success rate for this PMU is 88%. The average horn length for rams harvested in 41-1 in 2017 was 33.31 inches, with a circumference of 14 inches. In 41-2, average horn length was 30.94 inches, with a circumference of 13.88 inches.

## **Capture and Translocation**

IDFG did not capture and translocate any bighorn sheep in the Jacks Creek PMU.

## **Disease Monitoring**

While this sheep population has been unaffected by recent disease and die-offs, the potential exists due to the proximity of private inholdings in or adjacent to bighorn sheep habitat. There are no domestic sheep grazing allotments near Jacks Creek; however, there is no way to regulate

or monitor small farm flocks on private land. In addition, disease transmission is possible from neighboring bighorn sheep populations.

Harvested rams are tested for pneumonia each year, and hunters are asked to report sightings of any bighorn sheep showing symptoms.

### **Management Discussion**

These herds have been stable since 2004 at approximately 170-230 sheep (Figure 6). The Little Jacks herd experienced a population decline following the severe winter of 1992-1993 after peaking in the early 1990s. It is estimated approximately 475 sheep could occupy the Jacks Creek PMU based on suitable habitat within current sheep distribution (Table 1). This estimate is similar to the population high observed in early 1990s. However, seasonal habitats (winter range) and specific habitat needs (lambing areas), are not accounted for in the habitat model. Further refinement of the habitat model will likely decrease the estimated potential population size.

### **Management Actions**

1. Provide technical assistance to the BLM on travel management in Owyhee County.
2. Work with BLM to enforce motorized travel restrictions in the Owyhee Initiative area.

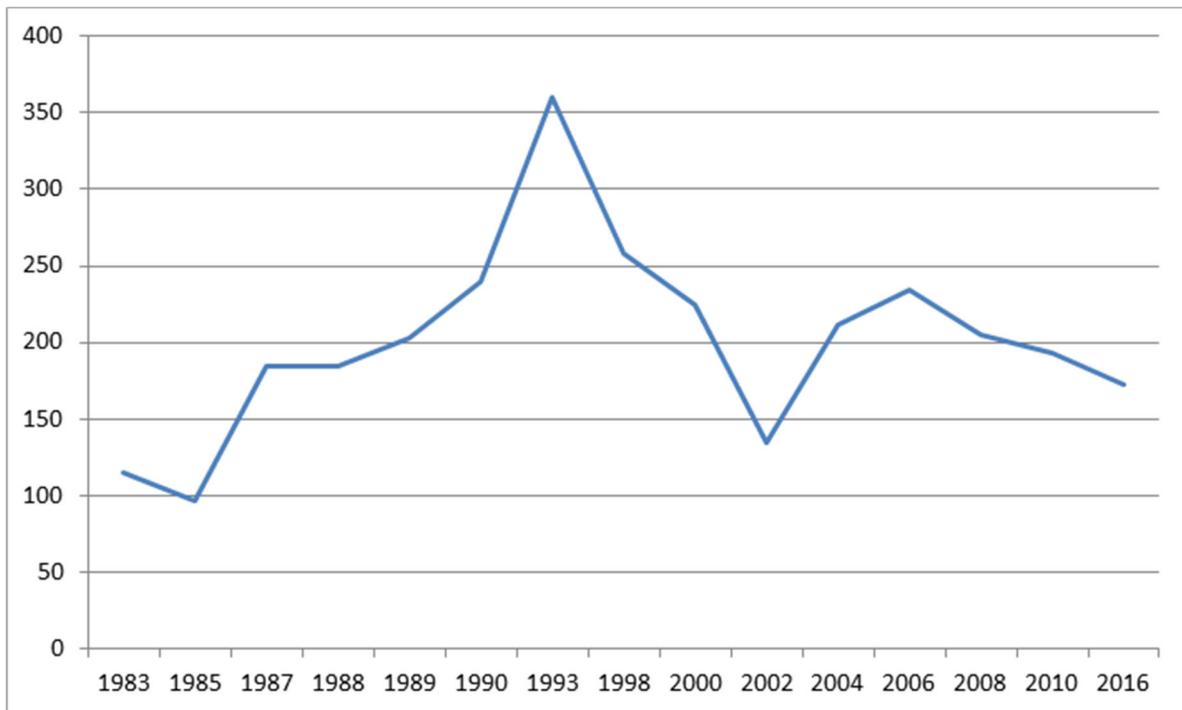


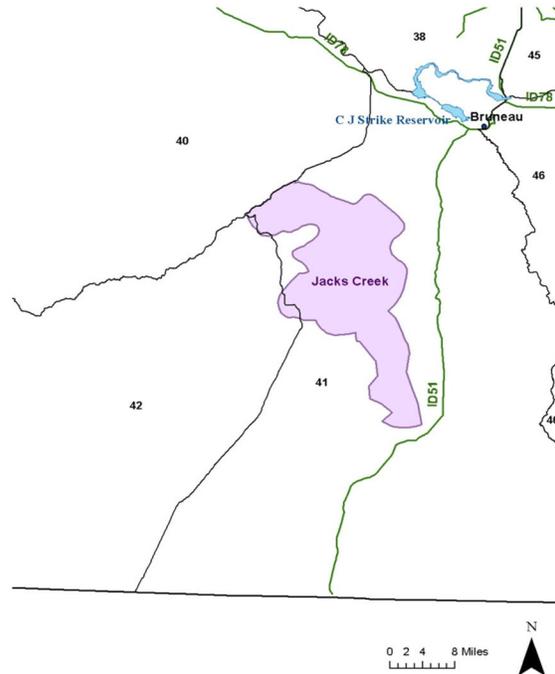
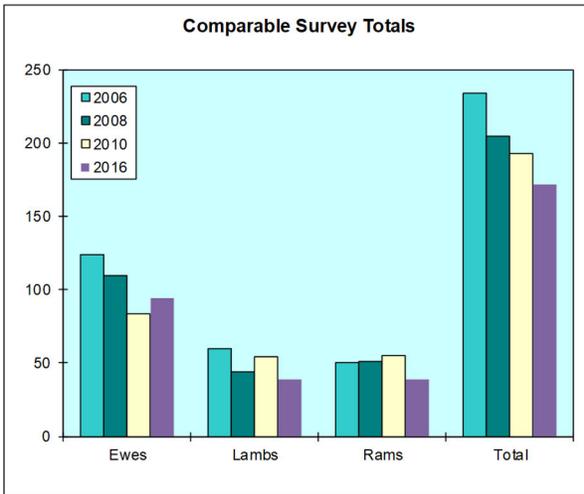
Figure 6. Total bighorn sheep observed during aerial surveys, GMU 41, Jacks Creek PMU, 1983-present.

These numbers represent actual counts and are considered minimum population estimates. The 2016 surveys were conducted in March rather than July due to a disease outbreak in nearby Oregon populations. Sheep counted as lambs in the March survey would have been counted as adults in a July survey, and there are no new 2016 lambs included in the survey. Therefore, the lower number of sheep counted in 2016 may not indicate an actual decline in population.

## California Bighorn Sheep

### Jacks Creek

GMU 41; Hunt Areas 41-1, 41-2



#### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
41	2006	124	60	36	14	50	0	234
	2008	110	44	33	18	51	0	205
	2010	84	54	21	34	55	0	193
	2016	94	39	11	28	39	0	172
<b>Modeled estimate</b>		113	72	29	43	72	0	257
<b>Per 100 ewes observed</b>		41	12	30	41			

\*2016 Surveys were conducted in March rather than July due to a disease outbreak in nearby Oregon populations.

Sheep counted as lambs in the March survey would have been counted as adults in a July survey, and there are no new 2016 lambs included in the survey.

#### Hunting tags and harvest information

		2010	2011	2012	2013	2014	2015	2016	2017
Tags	41-1	2	2	2	2	2	2	2	2
	41-2	2	3	3	3	3	4	4	4
	Total	4	5	5	5	5	6	6	6
Harvest	41-1	2	2	2	2	2	2	2	2
	41-2	1	2	4	3	3	2	2	4
	Total	3	4	6	5	5	4	4	6
<b>Hunter success</b>		75	80	120	100	100	67	67	100
<b>Ave ram age</b>		7.8	6.3	6.3	8.4	7.9	8.3	8.0	8.0

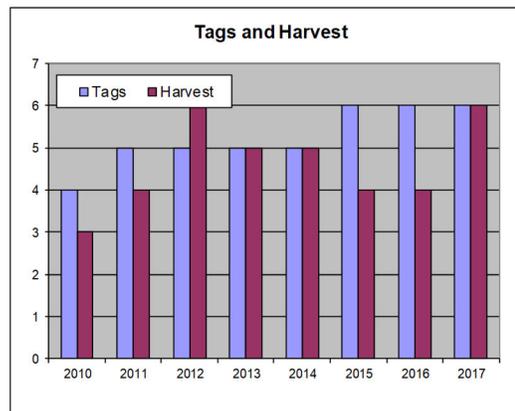


Figure 7. Jacks Creek Population Survey and Harvest

## **BRUNEAU-JARBIDGE PMU**

### **GMU 41 (east), 46, 47; Hunt Area 46**

#### **Historical Background**

Bighorn sheep were extirpated from southern Idaho in the early 1900s. In the 1960s, IDFG initiated a program to reestablish California bighorn sheep populations in the Owyhee River and Little Jacks Creek drainages in Owyhee County. These early releases were successful and bighorn sheep populations increased and expanded their range in southwest Idaho.

From 1982-1993, IDFG and Nevada Department of Wildlife (NDOW) released nearly 100 California bighorn sheep into portions of the Jarbidge and Bruneau. The bighorn sheep released by NDOW in 1982 and 1984 moved north into the Jarbidge River Canyon in Idaho. Bighorn sheep have also been released by IDFG near the confluence of the Jarbidge and West Fork Bruneau Rivers, at Dorsey Creek, and near Black Rock Pocket on the West Fork Bruneau Canyon. Currently, bighorn sheep are distributed throughout the Jarbidge and West Fork Bruneau canyons upstream from their confluence. Bighorns have been observed as far north in the Bruneau Canyon at Cave Draw and are occasionally observed in the Sheep Creek and Marys Creek drainages.

#### **Management Objectives**

The management objective is to increase the Bruneau-Jarbidge sheep population.

#### **Habitat Management and Monitoring**

This population includes bighorn sheep in GMUs 46, 47, and that portion of 41 east of Highway 51. Bighorn sheep in this area primarily use lands managed by the BLM, but occasionally use private lands. Elevations in the area used by bighorn sheep range from 1,100 m in canyon bottoms to approximately 1,500 m on desert plateaus. The landscape is characterized by steep, rugged canyons that are 300-400 m deep. Vegetation is almost exclusively shrub-steppe, with some riparian shrub communities along river corridors. Road densities in the area are relatively low, and the distance and difficulty of travel serve as natural limitations on human use of the area. Bighorn sheep in this area do not exhibit seasonal migratory movements.

Cheatgrass and medusa head are becoming more common in the Bruneau and Jarbidge River Canyons, reducing the capacity of the habitat to support bighorn sheep. Additionally, several different wildfires burned in the area in 2018, and these fires have the capacity to reduce the habitat effectiveness for bighorns, depending on fire rehabilitation and if recovery is dominated by native vegetation or annual grasses and weeds.

Illegal off-road ATV and UTV use is common in the area, despite most of it being a designated wilderness area. This increase in motorized activity has been rapidly accelerating as UTVs have become more popular, upland game birds numbers have been high, and elk permits have dramatically increased. Increasing human activities in and surrounding the Bruneau-Jarbidge River canyons lessen the suitability of existing habitat and could jeopardize the long-term

viability of the herd. Other adverse effects of this increase in human use, primarily from motorized travel, include transporting noxious weeds, creating high levels stress and increasing sheep movements. All these factors have the potential to threaten this sheep herd and make it more susceptible to a disease outbreak.

### **Biological Objectives**

Maintain a biologically sustainable bighorn sheep population.

#### ***Capture, Radio-mark and or Telemetry***

Sheep will be opportunistically captured and marked to collect disease samples and monitor survival and movements of the herd.

#### ***Population Surveys and Monitoring***

Population surveys in 1998 and 2000 indicated poor recruitment and a downturn in the Bruneau-Jarbidge bighorn population. The substantial and rapid decline of this sheep population suggested a disease die-off, although no conclusive evidence was available. Possible sources of disease for the Bruneau-Jarbidge herd were identified in the Marys Creek and Contact, Nevada, areas. The decline in bighorn sheep numbers prompted the closure of the hunting season in 2001 and 2002.

Results from aerial surveys in 2006 and 2008 indicated that the population was increasing (Figure 8). During a June 2015 survey, 116 individual sheep were observed—38 fewer sheep (primarily rams) than the previous (2010) survey. Lush green habitat conditions and use of a Hughes 600, rather than a Bell 47, may have influenced survey results. The more powerful ship proved to be less maneuverable and may have influenced survey results. We had no reason to believe that the population has declined. From 2005 to 2013, 3 tags were offered annually in Hunt Area 46. Beginning in 2011, 5 tags were offered annually in 2 temporally separate hunts.

In 2017 and 2018, 2 hunter harvested rams tested positive for respiratory disease. In response, a January sheep survey was conducted which revealed 67 observed sheep with lower number of lambs and rams than expected. As a result, the Commission reduced tags from 5 to 3 in 2018. In summer 2018 the survey was repeated. Again, 67 total sheep were observed and but ram and lamb numbers were lower than expected. Both surveys were flown with a Bell 47, but the January survey took place with poor visibility conditions (partial rain and flat light), and the July survey occurred during the hottest days of the year.

Because of the respiratory disease issue, continued monitoring of population trends and productivity are warranted. IDFG staff met with domestic sheep producers during the spring of 2016 to revise separation agreements and update contact information.

### **Hunting and Harvest Characteristics**

From 2010–2014, hunter success was 100%. Hunter success was 60% from 2015–2017, and was 67% in 2018. Average age of harvested rams ranged from 6.5 to 7.7 years from 2010–2015, but

increased to 9.5 in 2016 and 8.5 in 2017 and 2018. The increase in average age of harvested rams may be indicative decreased recruitment and subsequent declining ram numbers due to a disease-related die-off.

### **Capture and Translocation**

No capture or translocation occurred during this reporting period.

### **Disease Monitoring**

Two hunter harvested rams, one each in 2017 and 2018, tested positive for *M. ovi*. The 2017 ram had thick nasal discharge and the hunter observed another ram with similar nasal discharge. The *M. ovi* strain type was domestic origin thought to be responsible for a bighorn die-off on Currant Mountain in south-central Nevada. How it got to Idaho is unknown. We will continue to sample hunter-harvested sheep and collect any other opportunistic samples.

### **Management Discussion**

Within current distribution, modeled habitat comprises 400 km<sup>2</sup>, which could support approximately 759 animals (assuming all habitat is suitable year-round and relatively high densities of 1.9/sheep/km<sup>2</sup>). However, these models were not developed for desert-dwelling bighorn sheep, and do not account for small-scale variation in habitat quality or for specific habitat needs such as lambing and winter habitat. Thus, further refinement of habitat models and available habitat will likely reduce the estimate of potential population size (Table 1).

Given previous survey data, the Bruneau-Jarbidge area seems capable of supporting  $\geq 200$  bighorn sheep. The overall management goal will be to maintain or increase the current population. No portion of the Bruneau-Jarbidge PMU overlaps any domestic sheep or goat grazing or trailing allotments. However, in those portions of bighorn sheep distribution that overlap private lands, management will focus on minimizing potential contact between bighorn sheep and domestic sheep and goats. Management will also focus on providing hunters the opportunity to take 5-6 year-old rams with an annual hunter success  $\geq 50\%$ .

In 2016, NDOW observed over 3,900 elk in the Bruneau and Jarbidge River Canyons with an additional 1,000 elk in the Inside Desert. How these elk are competing with bighorns is unknown, but elk are frequently observed wintering in bighorn sheep habitat. Efforts are being taken to reduce this elk herd.

### **Management Actions**

1. Work with private land owners to minimize potential contact between bighorn sheep and domestic sheep and goats.
2. Refine habitat modeling to more accurately characterize sustainable population levels.
3. Continue collecting disease samples from hunter harvested sheep.
4. Evaluate additional tag reductions during the 2019-2020 season setting cycle.

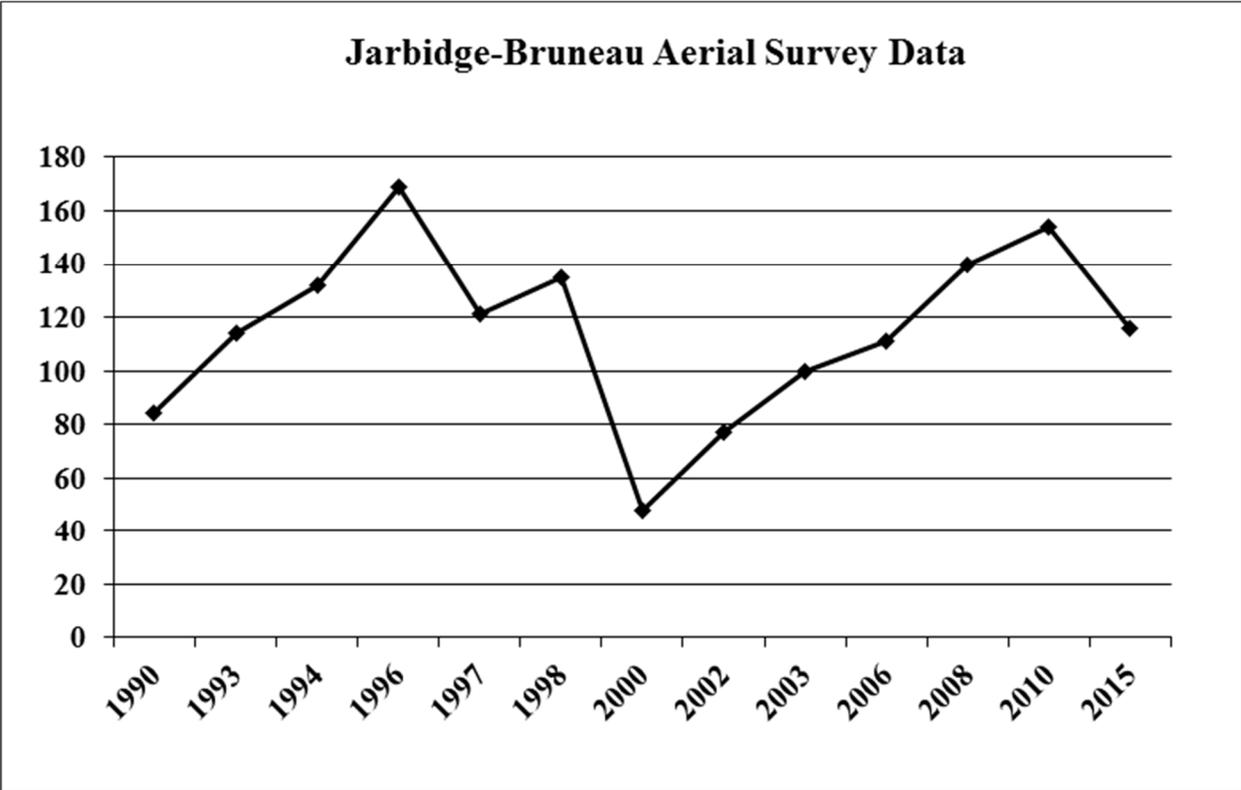
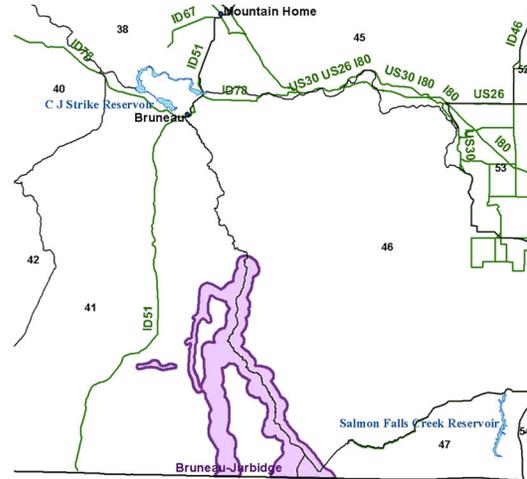
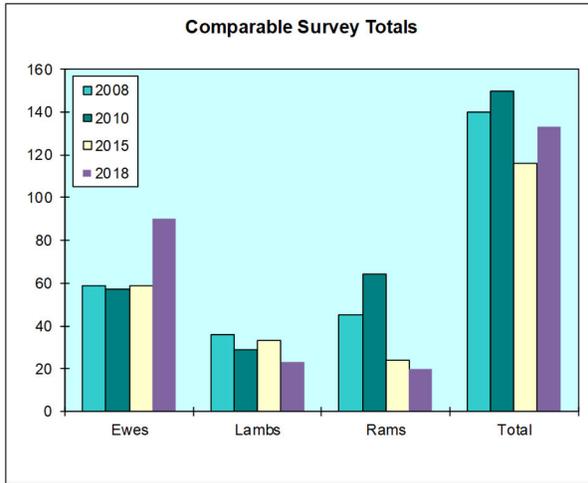


Figure 8. Total bighorn sheep estimated (modeled) during aerial surveys, Bruneau-Jarbidge PMU, 1990-present.

# California Bighorn Sheep

## Bruneau-Jarbidge

GMUs 41 (east), 46, 47; Hunt Area 46



### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
Total	2008	59	36	26	19	45	0	140
	2010	57	29	32	32	64	0	150
	2015	59	33	6	18	24	0	116
	2018	90	23	8	12	20	0	133
<b>Modeled estimate</b>		92	55	40	25	65	0	212
<b>Per 100 ewes observed</b>			26	9	13	22		

### Hunting tags and harvest information

		2010	2011	2012	2013	2014	2015	2016	2017
Tags	46	3							
	46-1		3	3	3	3	3	3	3
	46-2		2	2	2	2	2	2	2
	<b>Total</b>	3	5	5	5	5	5	5	5
Harvest	46	3							
	46-1		3	3	3	3	3	2	2
	46-2		2	2	2	2	0	1	1
	<b>Total</b>	3	5	5	5	5	3	3	3
<b>Hunter success</b>		100	100	100	100	100	60	60	60
<b>Ave ram age</b>		6.8	6.7	6.5	7.0	7.7	7.2	9.5	8.5

Note: Hunt Area 46 season was split into two hunts in 2011.  
An early hunt Aug 30 - Sep 14 and a late hunt Sep 22 - Oct 8

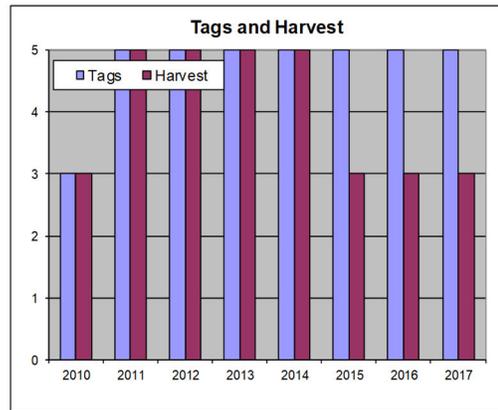


Figure 9. Bruneau-Jarbidge Population Survey and Harvest

## **SOUTH HILLS PMU**

### **GMU 54**

#### **Historical Background**

Bighorn sheep were extirpated from southern Idaho, including the South Hills, in the early 1900s. In 1963, IDFG initiated a successful program to reestablish California bighorn sheep populations in Owyhee County. By the mid-1980s, the healthy bighorn populations in Owyhee County provided a source for many translocations, including efforts to reestablish bighorns in the South Hills.

From 1986–1993, 50 California bighorn sheep were released into the Big Cottonwood drainage and 24 bighorns were released into the East Fork of Dry Creek. In 1989, the bighorns in Big Cottonwood experienced a die-off and despite additional releases, numbers continued to decline. Currently, <5 bighorn sheep persist in GMU 54 and reintroduction efforts are impractical due to the proximity of domestic sheep and risk of disease transmission to wild bighorns. In addition, high motorized road and trail densities and increasing levels of motorized recreation which compromised otherwise suitable lambing and winter habitat.

A controlled hunt with 3 ram permits was offered in 2017-2018 in GMU 54. This herd is not considered sustainable and plans are to eliminate this herd. The potential for contact with domestic sheep is too high in this PMU, as managers are concerned with a sheep making a foray into an adjacent PMU and spreading disease.

#### **Management Objectives**

The objective is to eliminate this herd to reduce risk of contact with domestic sheep and prevent spread of disease to adjacent bighorn sheep herds.

#### **Habitat Management and Monitoring**

The South Hills PMU (GMU 54) is an isolated mountain range of approximately 1,600 km<sup>2</sup>. The landscape is characterized by low mountains bisected by moderately rugged canyons. Lower elevations and south and west facing slopes feature predominately shrub-steppe vegetation and juniper woodlands. Lodgepole pine (*Pinus contorta*) and quaking aspen (*Populus tremuloides*) communities occur at higher elevations (Figure 10).

Suitable habitat for bighorn sheep occurs in the Rock Creek, Dry Creek, and Big Cottonwood Creek drainages. In recent years most bighorn sheep use has been confined to a relatively small area in the lower portions of Big Cottonwood and Big Cedar canyons. Six bighorn sheep (4 rams and 2 ewes) were observed during a deer survey in the Cottonwood Creek drainage in February 2017. While most bighorn sheep use is on the Sawtooth National Forest, bighorns also use lands managed by the BLM, IDL, and IDFG. Bighorn sheep range in elevations from 1,400 m to 2,100 m. Motorized road and trail densities in bighorn sheep habitat are moderate to high. Bighorn sheep in this area do not exhibit seasonal migratory movements.

Issues affecting the suitability of the South Hills for bighorn sheep include 1) risk of contact with domestic sheep, 2) increasing human recreational activities in sheep habitat, and 3) the expansion of juniper in the lower reaches of the canyons (although the 2011 Cave Canyon fire removed several thousand acres of juniper).

### **Biological Objectives**

Objectives are to eliminate this sheep herd to prevent disease transmission to adjacent sheep herds.

### ***Capture, Radio-mark and or Telemetry***

No captures occurred during this reporting period.

### ***Population Surveys and Monitoring***

Currently only 4 sheep are known to be in this PMU. No sheep were observed during a July 2018 helicopter survey of Big Cottonwood and Big Cedar creeks.

### **Hunting and Harvest Characteristics**

Three hunters harvested 3 rams in 2017, including the potential state record California bighorn sheep. This ram was 13.5 years old.

### **Capture and Translocation**

No captures occurred during this reporting period.

### **Disease Monitoring**

Wild bighorns were reported to have contacted domestic sheep on 2 occasions: once near Big Cottonwood Canyon, and once near Dry Creek. Characteristics of the subsequent population declines in both areas suggest that disease may have played a role. However, in March 1991, 5 bighorn sheep were captured and tested for disease; all results were negative. In November, 2012, there were several observations of bighorn sheep outside their traditional range. Many of these observations were within 2 miles of a domestic sheep band that was trailing through the area, and there was one confirmed observation of contact between a bighorn ewe and domestic sheep. Significant efforts were made to locate the bighorns following this incident, with the intent to remove the ewe from the population, but those efforts were unsuccessful.

During spring 2008, IDFG staff worked with representatives of the USFS, BLM, ISDA, and 2 domestic sheep permittees to craft the *Strategy for managing separation between bighorn sheep and domestic sheep and goats in the South Hills* (Strategy). The Strategy is designed to improve the monitoring of and decrease the likelihood of contact between bighorn and domestic sheep in GMU 54. All parties endorsed the final plan, and aspects of the plan have been incorporated into the permittees' annual operating instructions. Bighorn-domestic interaction response protocols in the Strategy figured prominently in IDFG's response to the November, 2012 observations of bighorn sheep in proximity to domestic sheep.

IDFG staff met with domestic sheep producers during the spring of 2016 to revise separation agreements and update contact information. In spring 2018, annual operating plans for domestic sheep allotments were revised again to reflect the change in management direction for bighorn sheep in GMU 54.

### **Management Direction**

Given the long unsuccessful history and all the issues bighorn sheep face within this GMU, the decision was made to allow sportsman the opportunity to take whatever rams they desire and then develop a plan to remove any and all remaining sheep from this GMU. IDFG maintains healthy sheep populations to the east (Jim Sage) and west (Bruneau and Jarbidge canyons) of this population and will strive to eliminate any possibility of sheep from GMU 54 mixing with these other populations.

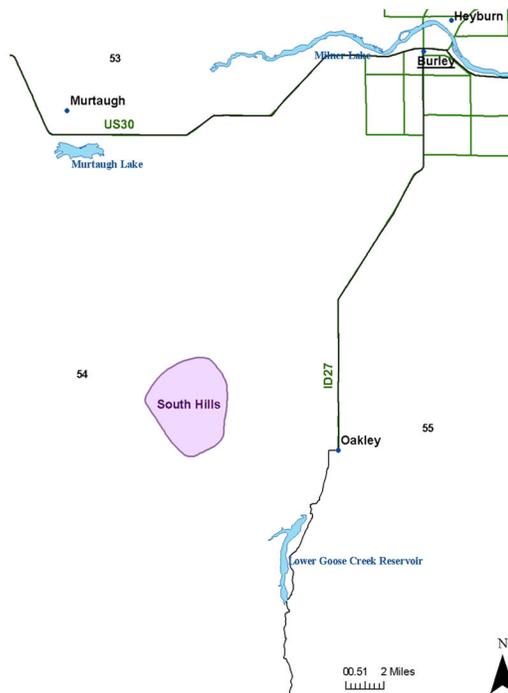
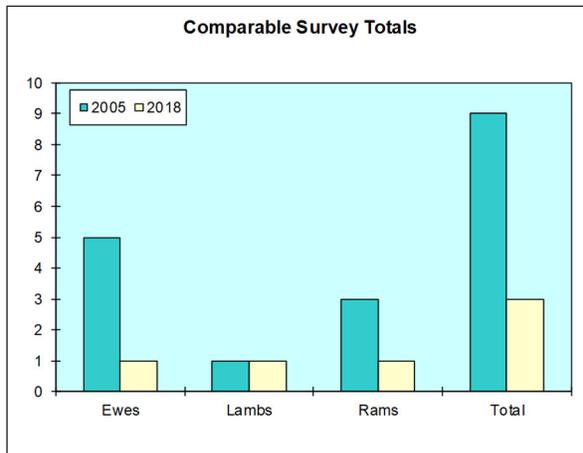
### **Management Actions**

The Commission has approved 3 bighorn sheep ram tags for GMU 54 starting in the fall of 2017. Three hunters harvest rams in 2017, but only one hunter was successful in 2018. Currently only 4 sheep are known to reside in the GMU. Current proposals are to eliminate sheep hunts in GMU 54. No plans to remove the remaining sheep via agency control or other means is planned at this time, but may occur in the future.

# California Bighorn Sheep

## South Hills

GMU 54



### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
54	2005	5	1	2	1	3	0	9
	2008	4	1	4	3	7	0	12
	2018	1	1	1	0	1	0	3
Modeled estimate								<15
Per 100 ewes observed		100	100	0	100			

### Hunting tags and harvest information

		2010	2011	2012	2013	2014	2015	2016	2017
Tags	54-1								1
	54-2								2
	Total	0	0	0	0	0	0	0	3
Harvest	54-1								1
	54-2								2
	Total	0	0	0	0	0	0	0	3
Hunter success									100
Ave ram age									9.5

Note: No hunting in these areas prior to 2017.

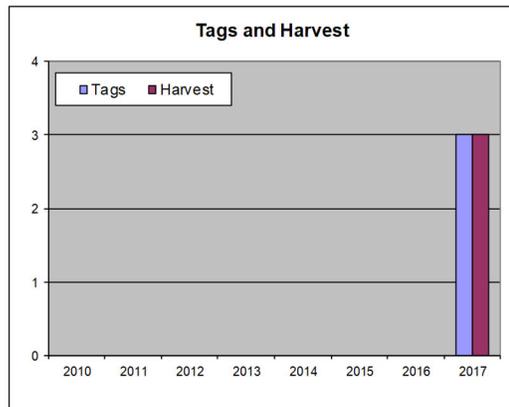


Figure 10. South Hills PMU

## **JIM SAGE PMU**

### **GMU55; Hunt Area 55**

#### **Historical Background**

Bighorn sheep were extirpated from southern Idaho in the early 1900s. In the 1960s, IDFG initiated a program to reestablish California bighorn sheep populations in the Owyhee River and Little Jacks Creek drainages in Owyhee County. By the 1980s the healthy bighorn sheep population in Owyhee County was providing sheep for translocation programs in several western states including Idaho. From 1988 through 2004, IDFG embarked on a program to reestablish California bighorns into historic range in several locations in Cassia County including the Jim Sage and Albion mountains.

During 1999, domestic sheep grazing on federal grazing allotments in GMU 55 was eliminated, clearing the way for bighorn sheep releases. From 2000 to 2004, 93 bighorns were released into historic habitat on the Jim Sage and Albion mountains. The Jim Sage population has increased steadily to an estimated 100–120 bighorns. The Albion Mountain releases were unsuccessful. Released sheep began dispersing immediately from the habitat selected for them and no sheep are known to currently exist in the area.

#### **Management Objectives**

Manage for a disease-free and biologically sustainable bighorn sheep population.

#### **Habitat Management and Monitoring**

This population includes bighorn sheep in GMU 55. Jim Sage Mountain is one of many small, isolated mountain ranges that occur throughout southern Idaho. Bighorn sheep primarily use lands managed by the BLM, but also occasionally use private land. Bighorn sheep range in elevations from 1,500 to 2,400 m. The landscape is characterized by moderately rugged canyons and low mountains. Lower elevations and south slopes feature predominately shrub-steppe vegetation. Many slopes on the southern and western portions of Jim Sage Mountain exhibit thick juniper cover. Road densities in the area used by bighorn sheep are moderate. Bighorn sheep in this area typically do not exhibit seasonal migratory movements. However, one large ram was documented summering in GMU 54 and moving to Jim Sage during the rut for many years. In 2005, this ram was captured as a yearling in a gravel pit near Oakley and released in Big Cedar Canyon in GMU 54. This ram was recognizable from his green ear tag, a scar on his nose, and large horns. He was frequently seen in and around Castle Rock State Park and was harvested in GMU 54 in 2017.

Key to maintaining a wild sheep population on Jim Sage Mountain will be minimizing contact with domestic sheep. Additionally, adverse effects of an increasing human population in the surrounding mountain valleys also threatens this herd. Increasing human activities on and surrounding the mountain would be expected to lessen the suitability of existing habitat and could jeopardize the long-term viability of the herd.

Thick juniper cover occurs on portions of Jim Sage Mountain, reducing the amount of available suitable habitat. While bighorn sheep on Jim Sage Mountain tend to avoid thick juniper habitats, the junipers likely serve as a buffer to discourage bighorn movements to areas with increased human activities. A long-term juniper management program designed to improve bighorn sheep habitat, while considering the needs of mule deer and other wildlife, has been implemented. Over the last decade, BLM has conducted juniper removal projects within bighorn sheep range on Jim Sage Mountain. Two wildfires burned several hundred acres of junipers in 2018 and will likely improve bighorn habitat if invasive annual grasses can be controlled.

### **Biological Objectives**

Maintain a biologically sustainable bighorn sheep population.

### ***Capture, Radio-mark and or Telemetry***

No sheep were captured or marked during this reporting period.

### ***Population Surveys and Monitoring***

The 2006, 2009, 2012, and 2015 helicopter surveys suggested that the population had increased to 100–120 individuals (Figure 11); probably near or exceeding the carrying capacity of the existing habitat. Another survey in 2018 documented 67 sheep, but this survey was flown during the hottest part of the summer and sheep were shaded up and not readily visible. Until approximately 2007, a small farm flock of domestic sheep occurred near the south end of Jim Sage Mountain. A few of the bighorn sheep from Jim Sage had migrated to this area, and still spend much of their time on 2 low hills just south of the Narrows Road. Although no contact between domestic and bighorn sheep was confirmed, there is a chance contact may have occurred. Currently, the landowner no longer has domestic sheep on his private land; however, the close proximity of private land and the potential of previous contact warrant some monitoring.

### **Hunting and Harvest Characteristics**

Two permits were offered in 2017-2018 and hunter success is generally high in this small mountain range.

### **Capture and Translocation**

The 2003 and 2004 releases of bighorn sheep on the Albion Mountains appear unsuccessful in establishing a new wild sheep population. Presently there are no known wild sheep remaining in the release area.

In light of the high rate of dispersal away from the Albion Mountains release sites, it is apparent that the bighorn sheep habitat model developed in the Jim Sage Mountains failed to accurately predict bighorn habitat in the Albion area. In addition, habitat differences between source locations and release locations may have exacerbated the disorientation experienced by sheep in the new terrain. Specifically, the release site exhibited taller, shrubby vegetation than the source sites; this difference may have contributed to the rejection of the area by the translocated sheep.

## **Disease Monitoring**

During the summer of 2015, IDFG received a call from a concerned individual about 5 domestic goats that were observed on Jim Sage Mountain near bighorn sheep. IDFG put together a team and the following day lethally removed all 5 goats. Biological samples were taken and sent to the lab for testing.

In early October 2016 we received a report that a bighorn sheep was observed with a band of domestic sheep on Black Pine Mountain in GMU 57. A team was sent out to locate and remove this animal from the population. Samples were sent to the lab for testing. This ram had a typical array of bacterium, but *M. ovi* was not detected.

## **Management Direction**

Within current distribution, modeled habitat comprises 53 km<sup>2</sup>, which could support approximately 102 animals (assuming all habitat is suitable year-round and relatively high densities of 1.9/sheep/km<sup>2</sup>). However, specific habitat needs such as lambing and seasonal habitats are not accounted for in these figures. Thus, further refinement of habitat models and available habitat could reduce the estimate of potential population size (Table 1).

Given the isolated nature and limited amount of suitable habitat on Jim Sage Mountain, it is likely that this herd is approaching or exceeding carrying capacity. The habitat-based population modeling approach detailed in the habitat section of this plan supports this theory as it yields a population goal of 102 bighorn sheep. Furthermore, because releases in the Albion Mountains have proven unsuccessful, future releases are not currently under consideration. Due to these factors, management will likely focus on maintaining, or slightly decreasing the bighorn sheep population on Jim Sage Mountain. In those portions of bighorn sheep distribution that overlap or abut domestic sheep and goat grazing or trailing allotments, and within those portions that overlap private lands, management will focus on minimizing potential contact between bighorn sheep and domestic sheep and goats.

## **Management Actions**

1. Work with domestic sheep and goat owners to minimize potential contact with bighorn sheep.
2. Work with BLM staff to discuss bighorn sheep habitat on Jim Sage Mountain, with particular emphasis on juniper management within bighorn sheep habitat.
3. Refine habitat modeling to more accurately characterize sustainable population levels.

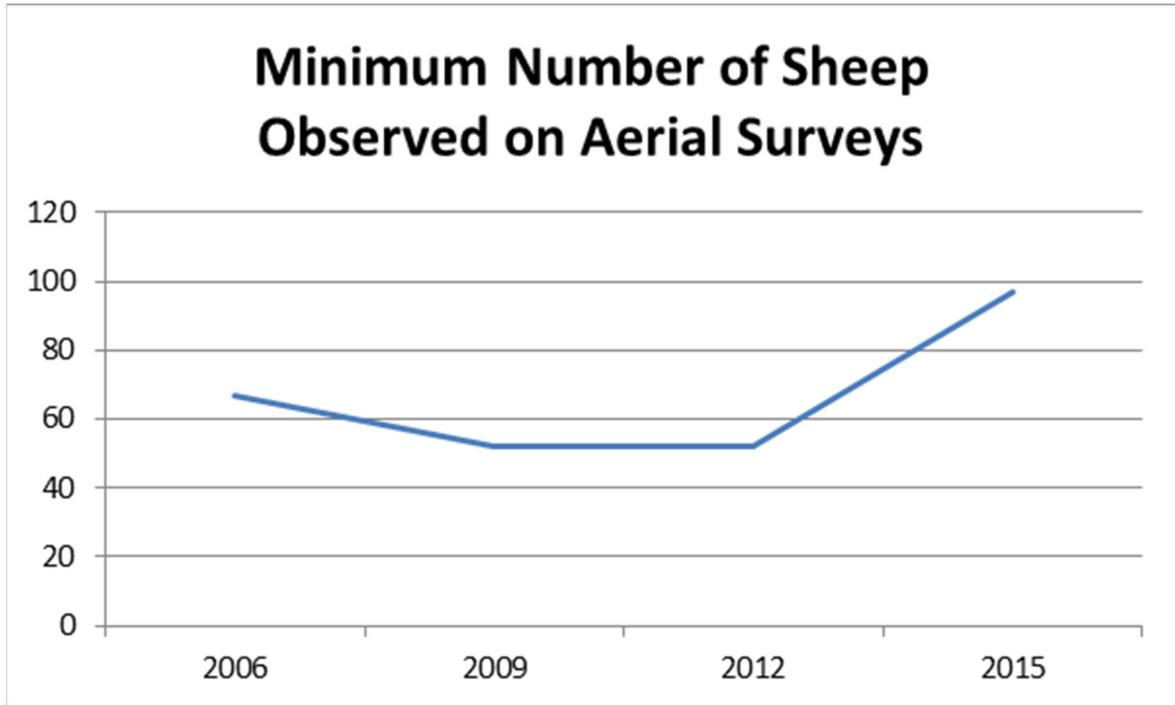
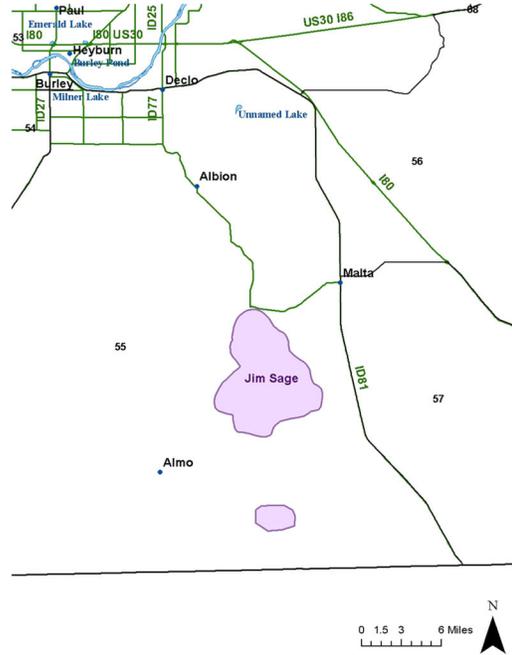
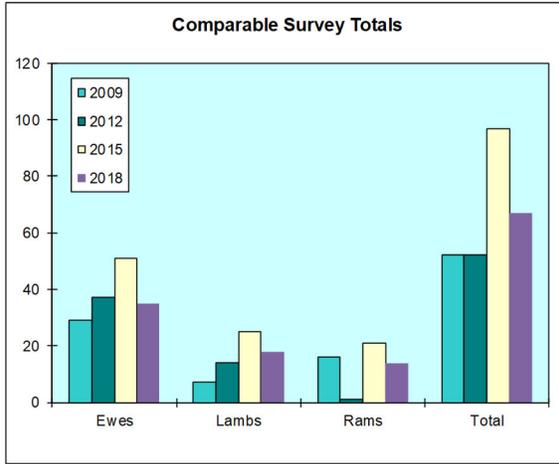


Figure 11. Total bighorn sheep estimated during aerial surveys, Jim Sage PMU, 2004-present.

# California Bighorn Sheep

## Jim Sage

GMU 55; Hunt Area 55



### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
55	2009	29	7	13	3	16	0	52
	2012	37	14	1	0	1	0	52
	2015	51	25	8	13	21	0	97
	2018	35	18	6	8	14	0	67
Modeled estimate								
Per 100 ewes observed			51	17	23	40		

### Hunting tags and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
Tags	1	1	1	1	1	1	1	2
Harvest	1	1	1	1	1	1	1	1
Hunter success	100	100	100	100	100	100	100	50
Ave ram age	6.5	9.5	8.5	6.5	2.5	9.5	8.5	6.5

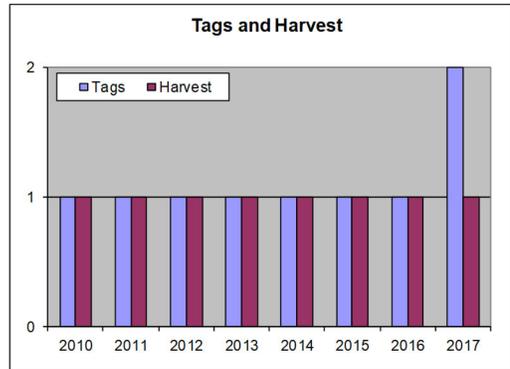


Figure 12. Jim Sage Population Survey and Harvest

# POPULATION MANAGEMENT UNITS ROCKY MOUNTAIN BIGHORN SHEEP

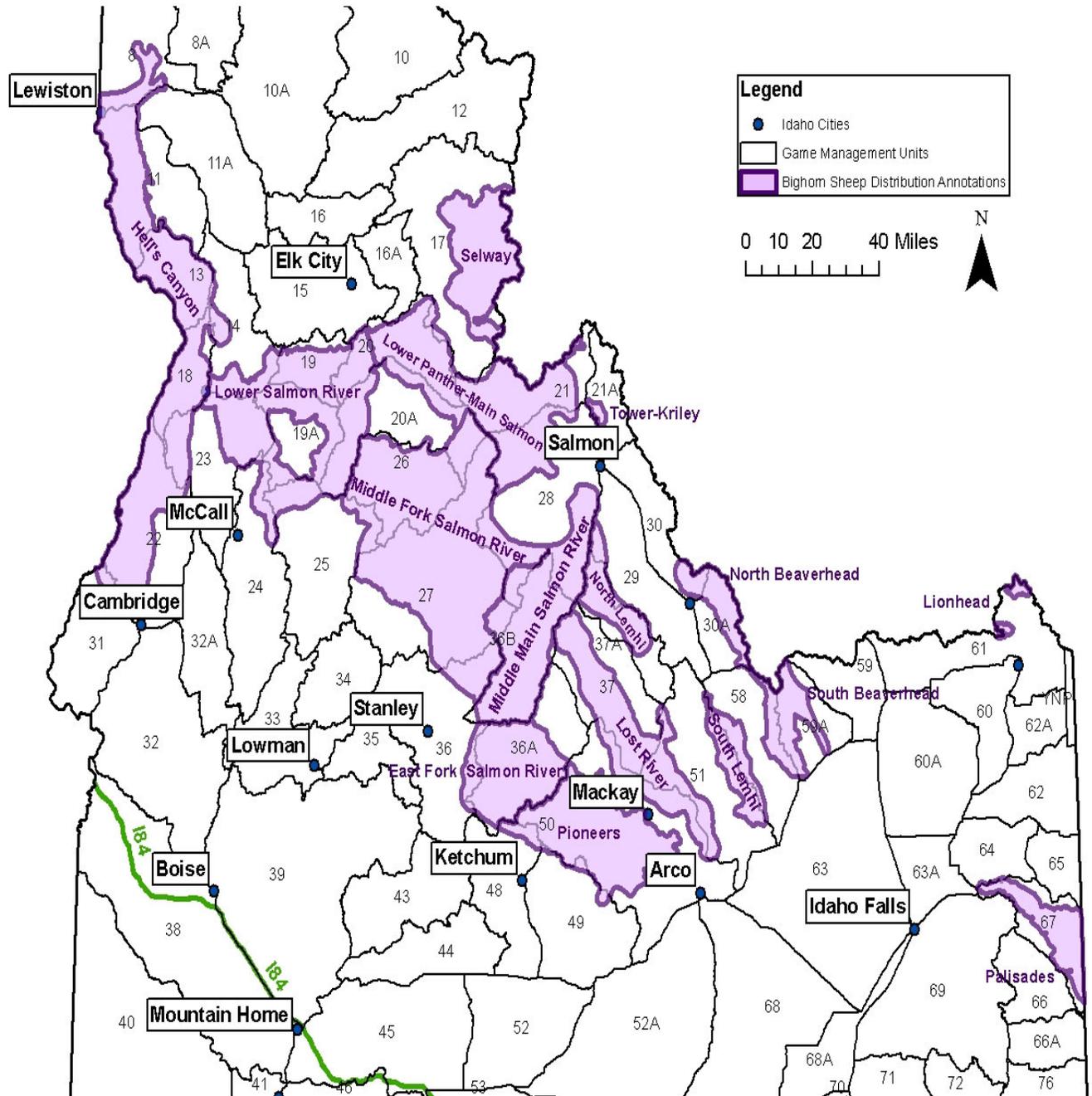


Figure 13. Rocky Mountain Sheep PMUs

# Rocky Mountain Bighorn Sheep

## Population status

PMU	Observed							Modeled				Most recent survey
	Ewes	Lambs	Rams			Unclassifieds	Total	Ewes	Lambs	Rams		
			I, II	III, IV	Total					I, II	III, IV	
Hells Canyon	66	8	11	30	41	0	115					2014
Lower Salmon	208	63	26	53	79	0	350					2013
Selway	21	1	3	1	4	0	26					2007
Middle Fork Salmon	273	68	70	65	135	1	477					2017
Panther-Main Salmon	101	32	22	18	40	0	173					2016
Tower-Kriley	18	3	8	6	14	0	35					2016
North Beaverhead <sup>2</sup>	43	24	22	11	45	4	116					2016
South Beaverhead <sup>1</sup>	10	3	2	1	3	20	36					2016*
North Lemhi	57	20	29	22	51	1	129					2018
South Lemhi <sup>1</sup>	20	8	6	7	13	0	41					2016*
Lost River	114	49	32	61	93	0	256					2016
East Fork Salmon <sup>3</sup>	49	19			32	0	102					2017
Middle Main Salmon	75	18	19	10	29	0	122					2016
Pioneers												
Palisades												
Lionhead												
<b>Total</b>	<b>1,055</b>	<b>316</b>	<b>250</b>	<b>285</b>	<b>579</b>	<b>26</b>	<b>1,978</b>					

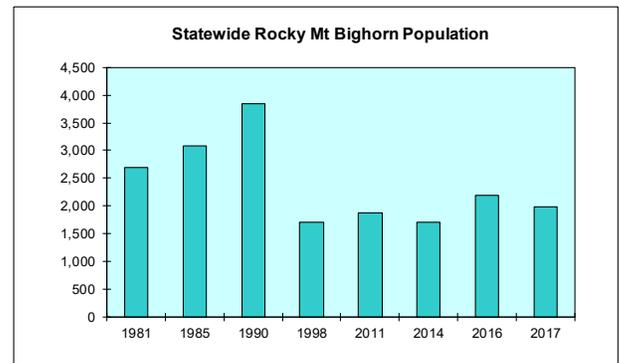
incomplete survey  
incomplete survey

<sup>1</sup>Incidental to elk survey

<sup>2</sup>Total ram count includes 12 unclassified rams

<sup>3</sup>Mark-resight ground survey estimate in December 2017

Estimates of statewide population							
1981	1985	1990	1998	2011	2014	2016	2017
2,690	3,080	3,850	1,710	1,883	1,708	2,199	1,978



## Hunting tags, applications, and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
Tags*	64	67	64	66	66	70	71	76
Resident applicants	607	663	682	663	687	716	789	937
Nonresident applicants	804	829	898	939	1,091	1,027	1,072	1,278
Harvest	33	36	36	36	39	39	49	45
Hunter success (%)	52	54	56	55	59	56	69	59
Average ram age (yrs)	6.3	7.0	8.1	8.0	8.2	7.2	7.4	7.3

\*Includes auction and/or lottery tags.

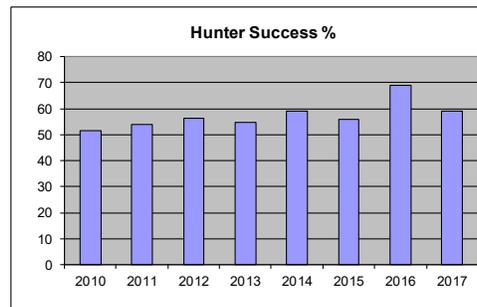
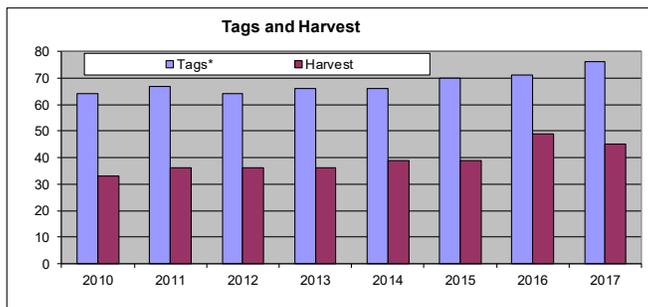
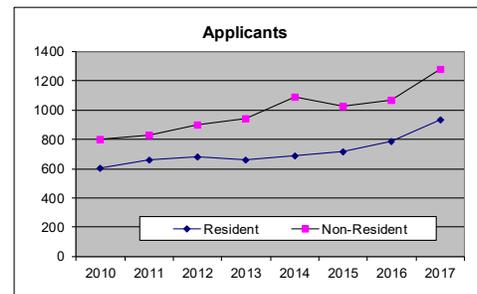


Figure 14. Rocky Mountain Bighorn Sheep Statewide Population Survey and Harvest.

## **HELLS CANYON PMU**

### **GMUs 11, 13, 18, 22; Hunt Area 11**

#### **Historical Background**

Bighorn sheep were native to Hells Canyon, but were extirpated in the early part of the 20<sup>th</sup> century. The last-known native bighorn sheep in GMU 18 was observed in 1932. Speculation at that time attributed the loss of bighorn sheep to over-hunting by miners for subsistence and disease outbreaks associated with domestic sheep contact.

Bighorn sheep were reintroduced into Hells Canyon beginning with a translocation of bighorn sheep from the upper Salmon River into GMU 18 in 1975 and continued with releases in GMUs 11, 13, and 18 through 2002. Since reintroduction, populations in GMU's 13 and 18 and 22 have experienced significant mortality from all-age disease outbreaks. All populations have experienced intermittent adult mortality and poor lamb recruitment due to pneumonia-caused mortalities.

In 1984, 17 sheep from Wyoming were released on the Craig Mountain Wildlife Management area in GMU 11. There were no surveys until 1992 when 57 animals were observed. The herd remained stable until the late 1990's when the population started increasing and reached 148 total sheep in 2002 (Figure 15). Intermittent poor lamb survival from 1998 through 2008 and low adult survival in 2005 resulted in a decline. There were 85 bighorn sheep counted in 2012 in GMU 11 and 91 in 2013. The primary cause of mortality in recovered dead lambs and in adults that died in 2005 was pneumonia.

After translocations in 1997 and 1999, the GMU 13 population was estimated at a high of 45 sheep in summer 2000. Disease outbreaks in adults between 2000 and 2003 due to scabies infection (2000) and pneumonia (2000–2003), and low recruitment of lambs (2000–2012) have resulted in a decline in this population. In 2012 and 2013, only 19 and 21 sheep were observed, respectively.

Five translocations occurred in GMUs 18 and 22 from 1975–2002. Access is difficult and survey data are limited, however a high count of 87 sheep was tallied in 1982. Disease outbreaks were observed in 1983 and 1991. Since 1992, there have been 20–35 sheep observed in GMU 18. In 2013, 8 bighorn sheep were observed in GMU 18 and GMU 22 below Hells Canyon Dam. By 2015, only 3 ewes were known to remain in GMU 22. Because prior disease testing indicated these ewes were likely infected with bacterial pneumonia, they were removed in a joint effort with Oregon in February, 2015.

Bighorn sheep translocated by the ODFW to the west side of the Snake River below Brownlee Reservoir 1990–1995, and above and below Hells Canyon Dam 1971–1999 periodically cross the river into GMU 22. The sheep released across from the extreme southern end of the GMU in 1990 and 1995 spend a significant portion of time in Dukes Creek. This population peaked at 76 sheep in 1998. In 1999, an all-age disease outbreak occurred and the population has not recovered due to lack of lamb recruitment and sporadic chronic pneumonia mortality in adults.

Ten sheep were counted in 2011, while in 2012 and 2013 10 and 9 total sheep were counted respectively.

Hunting was initiated in GMU 11 in 1993. A controlled hunt with 2 tags was offered in 1993 and 1994. The likelihood of participation by the state auction or lottery tag holder in the GMU 11 hunt, as occurred from 1993–1996, led to a reduction in the number of tags offered in the hunt from 2 to 1 in 1995. Beginning in the late 1990s, the GMU 11 hunt has consistently produced some of the largest rams taken statewide. The Idaho state record bighorn ram was picked up in 1997 after probably having died in 1996. Many record book rams have been harvested in this hunt, including the largest ever taken in Idaho. Consequently, tags are highly sought after. Drawing odds reached an all-time high of 1 in 345 in 2006, with many out-of-state applicants. No bighorn sheep hunts have been offered in GMU 13 or 22.

Hunts were offered in GMU 18 beginning in 1984. Tag levels were reduced in subsequent years concurrent with the population decline. The hunt was closed in 1993.

### **Management Objectives**

Objectives in this PMU include:

- 1.) Maintain or increase bighorn sheep populations.
- 2.) Manage for separation between bighorn sheep and domestic sheep and goats.
- 3.) Manage hunting to maximize bighorn sheep hunting opportunity while maintaining the highly desirable nature of this hunt.

### **Habitat Management and Monitoring**

The Hells Canyon PMU includes sheep in at least 4 populations in GMUs 11, 13, 18, and 22 (Figure 13). Extensive bighorn sheep habitat in these GMUs consists of dry, bunchgrass vegetation and rocky cliffs along the Snake and Salmon River breaks and their tributaries. Land ownership in GMU 11 is primarily public along the Snake River and includes IDFG's Craig Mountain Wildlife Management Area (CMWMA). There are also several significant blocks of private land, including one of the primary lambing areas for the population. The Salmon River breaks in GMU 11 and both the Snake and Salmon River breaks in GMU 13 are predominantly in private ownership, although the BLM manages much of the river corridor along the Salmon River and most of the Snake River corridor is protected by conservation easements with the USFS. The USFS is the major land manager in the Snake River corridor portion of GMUs 18 and 22 which includes portions of the Hells Canyon National Recreation Area and wilderness. Idaho Power manages the reservoirs and adjacent access sites in GMU 22 above Hells Canyon Dam. Road access into occupied sheep habitat is extremely limited in all 4 GMUs. Bighorn sheep provide a valuable viewing resource for river recreationists in the Hells Canyon area.

### **Biological Objectives**

#### ***Capture, Radio-mark and or Telemetry***

No bighorn sheep were captured, radio-marked or monitored for management purposes, however research did capture, radio-mark and monitor bighorn sheep this reporting period (see research PR report).

### ***Population Surveys and Monitoring***

The Hells Canyon sheep are part on a multi-State disease research project. This means they have been monitored by various methods over the years. All the Units were monitored annually between 2009 and 2014. Over that time frame total bighorn sheep numbers in GMU 11 varied from 85–115 and in 2014 the population was estimated at 92. Over that same time period GMU 13 had a population that varied between 16–22 and was 19 in 2014. GMU 18 has had a sheep population that has varied between those same years of 8–21 bighorn sheep and last good count only found 8 in 2013. GMU 22’s bighorn sheep population varied from 4–11 during the early 2000s. The remaining 3 ewes were removed during a capture effort in 2015. Sheep in the Hells Canyon PMU are set to return to a management survey rotation which would be low density units would be surveyed incidental to deer and elk surveys and GMU 11 would be every 5 years using a helicopter. However, with the ongoing disease research many sheep have individual marks and a ground based survey method is being considered which would allow annual estimates in GMU 11.

### **Hunting and Harvest Characteristics**

Sheep in the Hells Canyon are only hunted in Hunt Area 11. In 2017 all of GMUs 13 and 18 were added to the GMU 11 Hunt area by the Idaho Fish and Game Commission. This hunt is the most desired hunt in Idaho. In 2017 there were 343 1<sup>st</sup> choice applicants for 1 sheep tag. Additionally, Idaho offers a lottery tag and an auction bighorn sheep tag. These are not allowed hunt in hunt area 11 on the same year. Consequently hunt area 11 has 2 tags annually and harvest is 100%. In 2017 both bighorn rams were harvest out GMU 13. This expanded hunt area will need additional monitoring to insure the small populations in GMUs 13 and 18 and not over harvested.

### **Capture and Translocation**

The only captures were those mentioned above and no translocations occurred this reporting period

### **Disease Monitoring**

Disease is the largest issue facing bighorn sheep in the Hells Canyon PMU. The very low or absence of recruitment because of sporadic lamb die offs and pneumonia in adults is the reason populations in this PMU have not grown. Currently, all populations in this PMU are disease limited. Increases in elk herds in this PMU could theoretically cause increased competition but currently little spatial overlap is observed. High rates of reproduction and large body and horn size in bighorn sheep suggest forage is not limiting.

## **Management Direction**

GMU 11 is the only GMU in the Hells Canyon PMU that currently has a sheep population large enough to support a hunt. The hunt in GMU 11 is the most sought-after sheep hunt in the state. The recipient of the auction and raffle tag (alternate years) have consistently hunted in GMU 11 and drawing odds are the most difficult in Idaho (0.29% in 2017). Despite relatively difficult access, hunter success is usually 100% (Figure 16).

Hunting opportunity in GMU 11 will be managed to provide the opportunity to harvest large mature rams. Poor lamb recruitment due to disease issues represents the largest threat to continued bighorn sheep hunting opportunity in this GMU. As a result, tag levels will remain conservative as a response to limited ram availability. Access for hunting bighorns in GMU 11 is considered fair to moderately difficult. In 2017 the commission included GMUs 13 and 18 in hunt area 11. This will need to be watched closely to avoid over exploitation on rams in these GMUs.

Within current distribution, modeled habitat comprises approximately 817 km<sup>2</sup>, which could support approximately 1,550 bighorn sheep (assuming that all habitat is suitable year-round at bighorn sheep densities of 1.9 km<sup>2</sup>). There is extensive lambing and year round habitat in this PMU but further refinement of habitat models could reduce estimates of available habitat and potential population size (Table 1).

Noxious weeds, especially yellow-starthistle, have become established in a significant portion of this PMU. Currently IDFG is working with cooperative weed management groups and aggressively spraying weeds and using biological controls on IDFG managed ground to improve wildlife habitat.

Cooperation with wildlife agencies in Oregon and Washington, public land management agencies including USFS and BLM, and private individuals is necessary to manage habitat and bighorn sheep in the Hells Canyon PMU.

## **Management Actions**

1. Continue work with the Hells Canyon Initiative research.
2. Improve bighorn sheep habitat by working to reduce noxious weeds.
3. Improve bighorn sheep habitat by working to limit timber encroachment.
4. Refine habitat modeling to more accurately characterize sustainable population levels.
5. Use radio-marked sheep to provide data points for sightability modeling.
6. Implement management actions as possible to reduce impacts of disease.

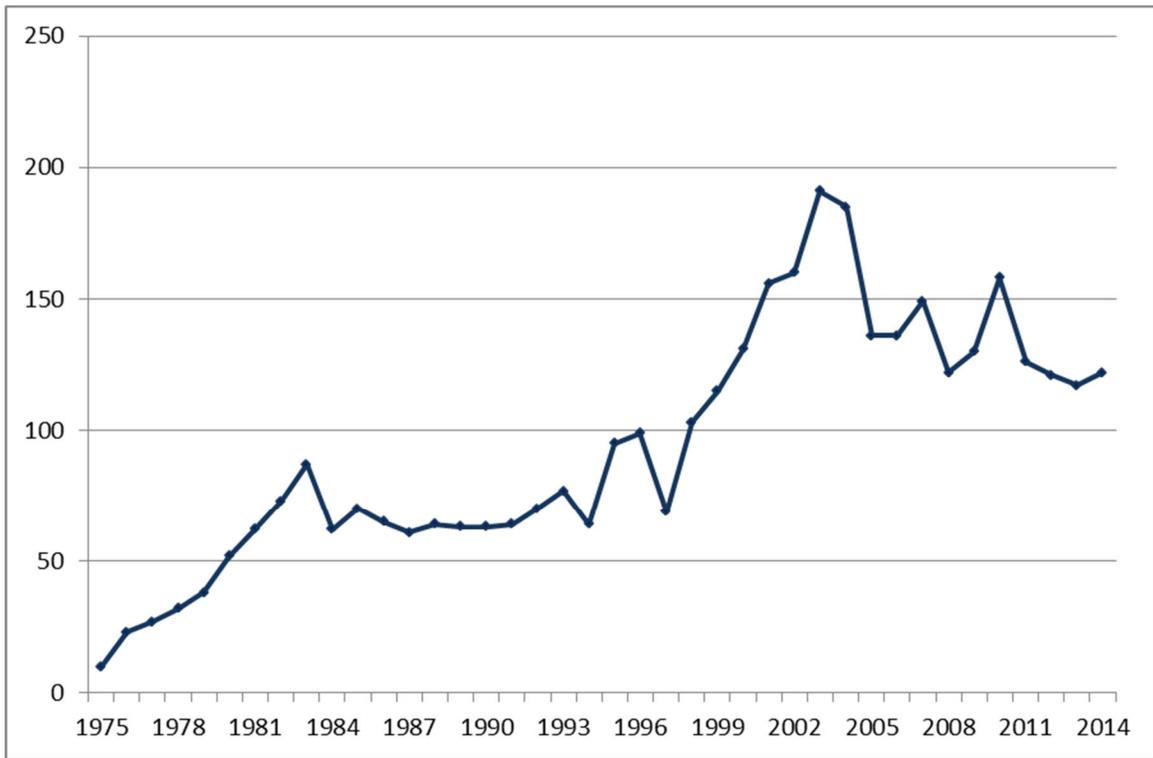


Figure 15. Total bighorn sheep observed or estimated between surveys, Hells Canyon PMU, 1975-present.

## Rocky Mountain Bighorn Sheep

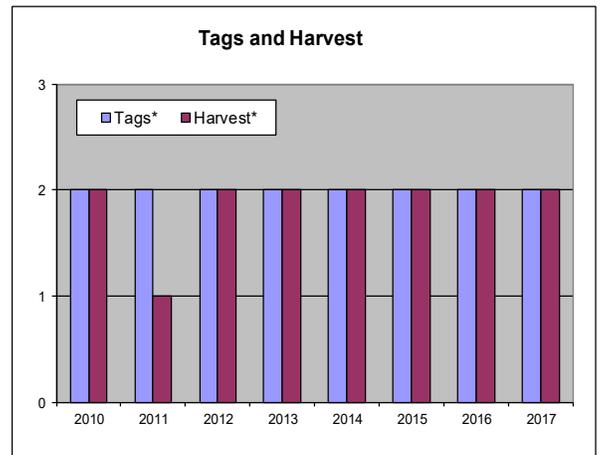
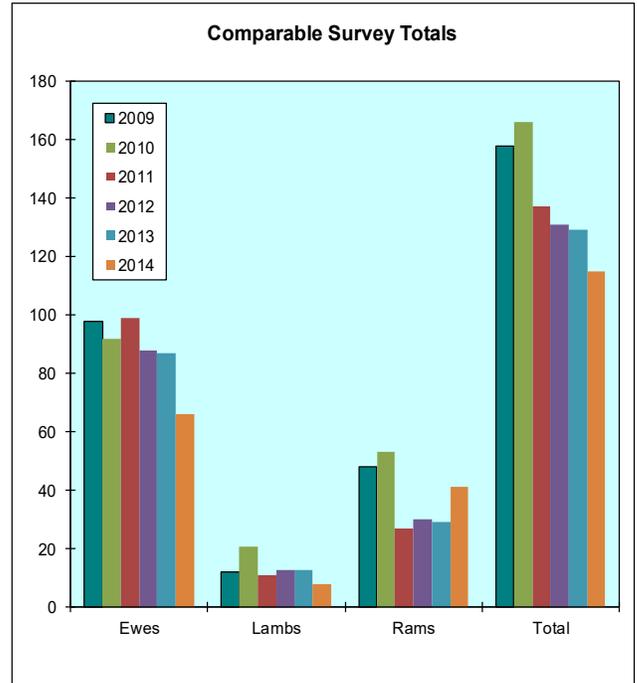
### Hells Canyon

GMUs 11, 13, 18, 22; Hunt Area 11

#### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
11	2009	63	9	5	25	30	0	102
	2010	59	17	21	18	39	0	115
	2011	69	9	7	10	17	0	95
	2012	58	8	6	13	19	0	85
	2013	63	8	9	11	20	0	91
	2014	53	8	8	23	31	0	92
13	2009	9	1	3	3	6	0	16
	2010	12	3	1	6	7	0	22
	2011	12	1	1	5	6	0	19
	2012	11	3	1	4	5	0	19
	2013	11	4	2	4	6	0	21
	2014	9	0	3	7	10	0	19
18	2009	12	2	2	4	6	0	20
	2010	14	0	3	4	7	0	21
	2011	8	1	1	3	4	0	13
	2012	9	2	1	5	6	0	17
	2013	4	1	0	3	3	0	8
	2014	NA	NA	NA	NA	NA	NA	NA
22	2009	10	0	0	1	1	0	11
	2010	7	1	0	0	0	0	8
	2011	10	0	0	0	0	0	10
	2012	10	0	0	0	0	0	10
	2013	9	0	0	0	0	0	9
	2014	4	0	0	0	0	0	4
Total	2009	98	12	10	38	48	0	158
	2010	92	21	25	28	53	0	166
	2011	99	11	9	18	27	0	137
	2012	88	13	8	22	30	0	131
	2013	87	13	11	18	29	0	129
<sup>a</sup>	2014	66	8	11	30	41	0	115
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>			<b>12</b>	<b>17</b>	<b>45</b>	<b>62</b>		

<sup>a</sup>Survey not conducted in GMU 18 during 2014



#### Hunting tags and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags*</b>	2	2	2	2	2	2	2	2
<b>Harvest*</b>	2	1	2	2	2	2	2	2
<b>Hunter success</b>	100	50	100	100	100	100	100	100
<b>Ave ram age</b>	10.0	9.5	9.0	10.5	11.5	9.5	11.5	8.5

Figure 16. Hells Canyon Population Survey and Harvest

## **SELWAY PMU**

### **GMU 17; Hunt Area 17L**

#### **Historical Background**

In February 1989, a total of 29 bighorns from Morgan Creek in GMU 36B were translocated into 2 sites along the Selway River in GMU 17. Both of these releases were made outside of currently occupied bighorn range within the GMU. Recent surveys and observations have suggested that neither translocation was successful.

Most bighorn sheep surveys have been conducted by helicopter coincidental to elk sightability surveys in January or February. Bighorns have been counted in GMU 17 since 1981 (Figure 17). The highest counts were obtained in 1982, 1983 and 1984, and were 121, 99 and 109 total sheep, respectively. Since that time, counts have ranged between 26 and 52 total sheep. During the most recent survey, conducted in 2007, 26 sheep were observed. There is concern that the currently employed survey methodology may not accurately reflect current population status.

Bighorn sheep were hunted under a general season framework in the Clearwater Region between 1952 and 1970. This season framework allowed more accessible populations to be overexploited. The general season bighorn sheep hunt was discontinued in this PMU in 1971, and no hunting occurred in the Selway PMU until 2007 when a new hunt with 1 tag was initiated as Hunt Area 17L. Hunter success has been low; no sheep were harvested in the first 3 years of this hunt. However, rams were harvested in 3 out of the last 4 years (Figure 18). The late timeframe of this hunt (14–31 October) was established to ensure enough time for bighorns to move from their summer range on the Idaho-Montana border back into Idaho where they would be available to Idaho hunters.

#### **Management Objectives**

- 1) Objectives in this PMU include:
- 2) Maintain or increase bighorn sheep populations.
- 3) Develop a better understand of of this population.
- 4) Manage hunting to maximize bighorn sheep hunting opportunity.

#### **Habitat Management and Monitoring**

The Selway PMU includes the upper portion of the Selway River drainage in GMU 17. Bighorn sheep occurred naturally in this area. Sheep in GMU 17 move between Idaho and Montana. Summer range lies along the border of the 2 states, with most animals moving down into Idaho to winter (between Indian Creek and White Cap Creek and on the east side of the Selway River). In some years, some of these sheep may winter in Montana. Sheep marked by Klaver (1978) were observed in both states over several years.

Sheep habitat in GMU 17 consists of dry, bunchgrass habitat types. Land ownership is almost entirely USFS, with just a few small in-holdings of private land. The area is encompassed by the

Selway-Bitterroot and Frank Church River of No Return wilderness areas. The only road access in this area is provided by USFS roads 468 and 6223 which runs from Nez Perce Pass on the Idaho-Montana border, down Deep Creek to the Selway River, and downstream along the Selway to White Cap Creek.

## **Biological Objectives**

### ***Capture, Radio-mark and or Telemetry***

No animals were captured, radio-marked or monitored this reporting period.

### ***Population Surveys and Monitoring***

Low lamb survival and recruitment rates have been an issue in some years since the early 1980s. The timing and causes of this low survival are poorly understood.

### **Hunting and Harvest Characteristics**

Sheep in the Selway PMU have had one hunt tag since 2010. The rugged remote nature of this wilderness hunt area make it a difficult hunt. This has been further complicated by the fact that sheep here are found in relatively low numbers. Recent (the last ten years) fires have open more habitat allow sheep spread over a large geographic area. The sheep in the summer are found on the Montana State line with some summering in Montana. The first 3 years this hunt was offered there was no rams harvested. However, in the last 5 years' rams were take on 3 of the 5 years (60% success over the last 5 years).

### **Capture and Translocation**

No animals were capture or translocated this reporting period.

### **Disease Monitoring**

Little is known about this sheep population but being located in the Selway-Bitterroot Wilderness provides them some protection from normal risks such as domestic sheep. However, there may be some limited risk of exposer from domestic sheep on the Montana side. There also be some unknown risk of potential disease exposer from pack goats in the wilderness.

### **Management Direction**

Bighorn sheep have been hunted in a portion of GMU 17 (Hunt Area 17L) since 2007. Since inception of the hunt, only 1 tag has been offered annually. Hunt Area 17L will be managed primarily to provide limited bighorn sheep hunting opportunity. Given the short duration of this relatively new hunt and a general lack of reliable population data, future emphasis will be placed on improving knowledge of population status. IDFG has in the past and will continue in the future to work with and encourage the USFS to improve bighorn sheep habitat in this PMU through prescribed burning, let burn policies, and management of weeds.

Within current distribution, modeled habitat occupies approximately 290 km<sup>2</sup>, which could support approximately 550 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9 km<sup>2</sup>). However, there are limitations based on specific habitat needs such as lambing and wintering habitat. Thus, further refinement of habitat models and available habitat will likely reduce the estimate of potential population size. The current objective in this PMU is to increase bighorn sheep populations (Table 1).

### **Management Actions**

1. Conduct an aerial survey specifically for bighorn sheep.
2. Improve bighorn sheep habitat by working to reduce noxious weeds.
3. Improve bighorn sheep habitat by working to limit timber encroachment.
4. Increase knowledge of movement patterns, habitat use, survival, etc. using radiomarked bighorn sheep.
5. Refine habitat modeling to more accurately characterize sustainable population levels.
6. Use radiomarked sheep to provide data points for sightability modeling.

### **Literature Cited**

Klaver, R. W. 1978. A management-oriented study of the ecology of bighorn sheep in the Bitterroot Mountains, Montana and Idaho. Thesis, University of Montana, Missoula, USA.

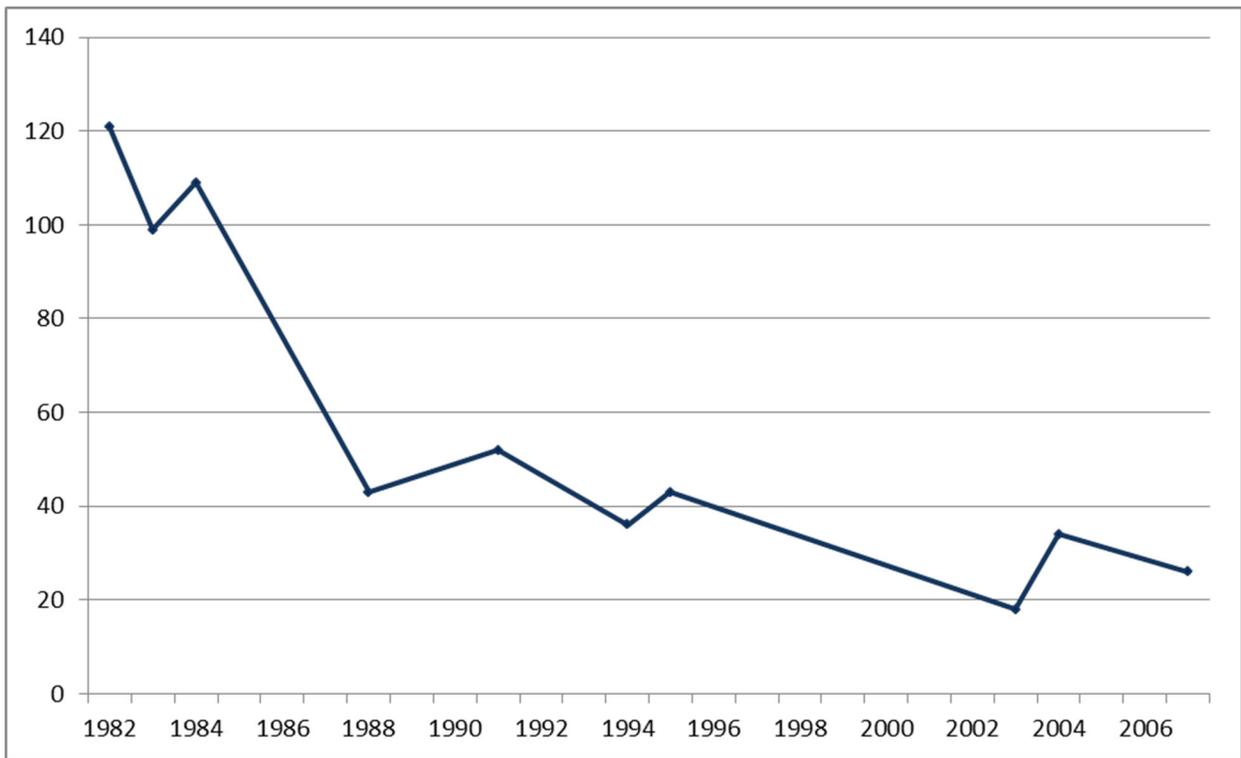


Figure 17. Approximate total bighorn sheep observed, Selway PMU, 1982-present.

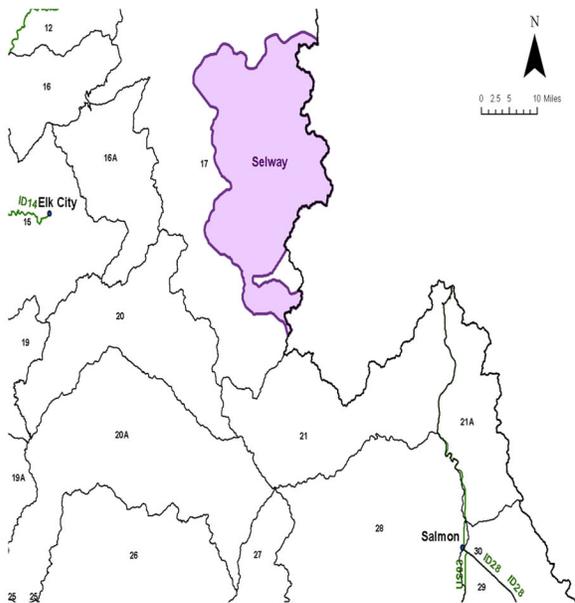
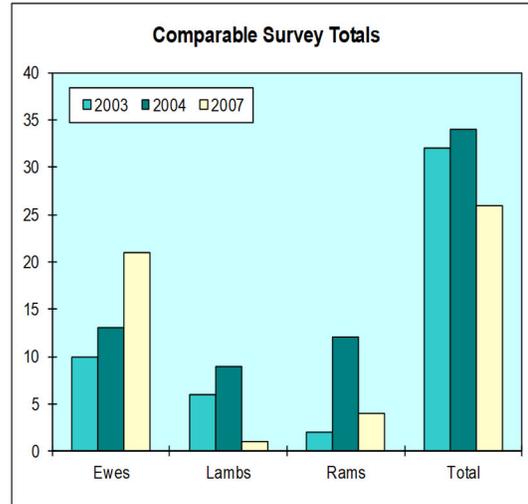
# Rocky Mountain Bighorn Sheep

## Selway

GMU 17; Hunt Area 17L

### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
17	2003	10	6	2	0	2	14	32
	2004	13	9	4	8	12	0	34
	2007	21	1	3	1	4	0	26
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>		<b>5</b>	<b>14</b>	<b>5</b>	<b>19</b>			



### Hunting tags and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags</b>	1	1	1	1	1	1	1	1
<b>Harvest</b>	0	0	1	0	0	0	1	0
<b>Hunter success</b>	0	0	100	0	0	0	100	0
<b>Ave ram age</b>	0.0	0.0	4.5	0.0	0.0	0.0	5.5	0.0

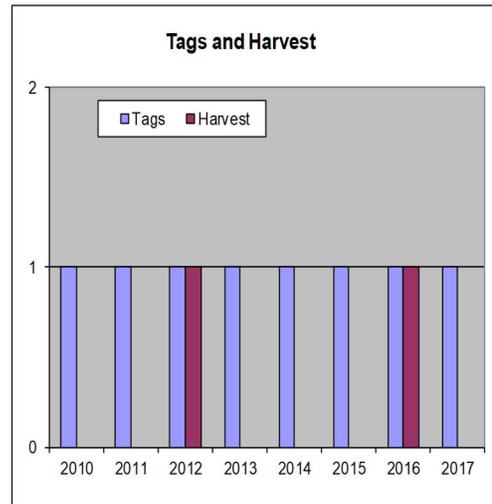


Figure 18. Selway PMU Population Survey and Harvest

## **LOWER SALMON RIVER PMU**

### **GMUs 14, 19, 19A, 20 (west), 20A (west); Hunt Area 19**

#### **Historical Background**

Bighorn sheep are native to these GMUs and were not extirpated in the early 1900s. No reintroductions or augmentations have occurred in the PMU.

Beginning in 1952 and lasting until 1970, bighorn sheep hunting in the Lower Main Salmon PMU was offered on a general hunt basis. From 1971 to present, all sheep hunting in these GMUs has been by controlled hunts. Season structure and tag levels were modified starting in 1993 to reflect the decline in total numbers of sheep and lamb recruitment. Currently, there are 2 hunts offered in this area Hunt Area 19 consists of portions of GMUs 14, 19 and 20 and has 4 tags with success averaging over 75% during the last 5 years (see figure 20). Hunt area 19A consists of portions of GMUs 19A and 20A. This hunt was established in 2015 with 2 tags. During 2017, one hunter harvested a ram for a success rate of 50%.

#### **Management Objectives**

Objectives in this PMU include:

- 1.) Maintain or increase bighorn sheep populations.
- 2.) Manage for separation between bighorn sheep and domestic sheep and goats.
- 3.) Manage hunting to maximize bighorn sheep hunting opportunity.

#### **Habitat Management and Monitoring**

The Lower Salmon River PMU includes GMUs 14, 19, 19A, 20 (western portion), 20A (western portion), 23, 24, and 25 (Figure 13). Bighorn sheep habitat in these GMUs consists of dry, bunchgrass habitat types along the Salmon River breaks and some high elevation, alpine summer habitat. Habitat along this river corridor is primarily under USFS ownership with the eastern portions of this PMU occurring within the Gospel Hump and Frank Church River of No Return wilderness areas. Habitat also occurs on some BLM land and small in-holdings of private land. Road access is extremely limited with the exception of the Salmon River Road downstream of Vinegar Creek (primarily in GMU 14).

#### **Biological Objectives**

##### ***Capture, Radio-mark and or Telemetry***

No bighorn sheep were captured, radio-marked or monitored in this PMU during the reporting period.

##### ***Population Surveys and Monitoring***

Bighorn sheep have usually been surveyed by helicopter coincidentally with elk sightability surveys (up until 2009 when bighorn sheep only surveys were started) which likely

underestimated bighorn sheep. Total numbers of bighorn sheep observed during surveys have declined in GMUs 19 and 20 since the early to mid-1980s. These surveys have yielded very conservative bighorn sheep population estimates for this PMU. IDFG is developing a sightability model for bighorn sheep surveys in this area to increase precision of population estimates (see Research Bighorn Sheep PR Report for details).

In GMU 19, between 122 and 136 bighorn sheep were observed during 1983 and 1984 elk surveys. However, only 40–60 were observed in 1992, 1993, 1996, 2001 and 2007. Surveys conducted since 2009 were flown strictly as a bighorn sheep surveys. In the 2012 survey 112 animals were observed, while during 2013 there were 133 bighorn sheep observed. This estimate reflects an attempt to collect more precise data rather than an actual change in the population. In GMU 14, 29 sheep were observed in 2011, 38 sheep in 2012, and 36 sheep in 2013. In GMU 20 (west), 12 sheep were observed in 2011, 38 sheep in 2012, and 36 sheep in 2013.

In the South Fork of the Salmon River (east part of GMU 19A and west part of GMU 20A), complete surveys were conducted between 2011 and 2013. These surveys indicate the population in this portion of the GMU was fairly stable, with 122–144 total sheep observed. A survey conducted in February, 2017 in the South Fork of the Salmon River recorded 185 total sheep, indicating the population may be growing despite the addition of a hunt.

### **Hunting and Harvest Characteristics**

Sheep in the Lower Salmon River PMU are hunted in 2 hunt areas within only a portion of the total PMU area. Hunt Area 19 consists of portions of GMUs 14, 19, and 20. This hunt will continue to be managed primarily to maximize bighorn sheep hunting opportunity. Hunter success has averaged over 75% in Hunt Area 19 over the last 5 years despite difficult access (Figure 20). New hunt area 19A was established in 2015. Hunter success was 100% in each of the first two years, and 50% in 2017. Bighorn sheep in this PMU will continue to be monitored for impacts from disease and conflicts with domestic sheep operations.

### **Capture and Translocation**

No bighorn sheep were captured or translocated within this PMU during the reporting period.

### **Disease Monitoring**

Low recruitment rates and overall declines in sheep numbers over the years in these GMUs may have been caused by disease and habitat conditions. Population numbers have dwindled in the western portion of this PMU (GMU 14) that is closest to active domestic sheep allotments. Disease has resulted in low lamb survival in adjacent herds along the Salmon River. Respiratory disease is the most significant disease, resulting in negative effects on population dynamics through increased adult and lamb mortality.

### **Management Direction**

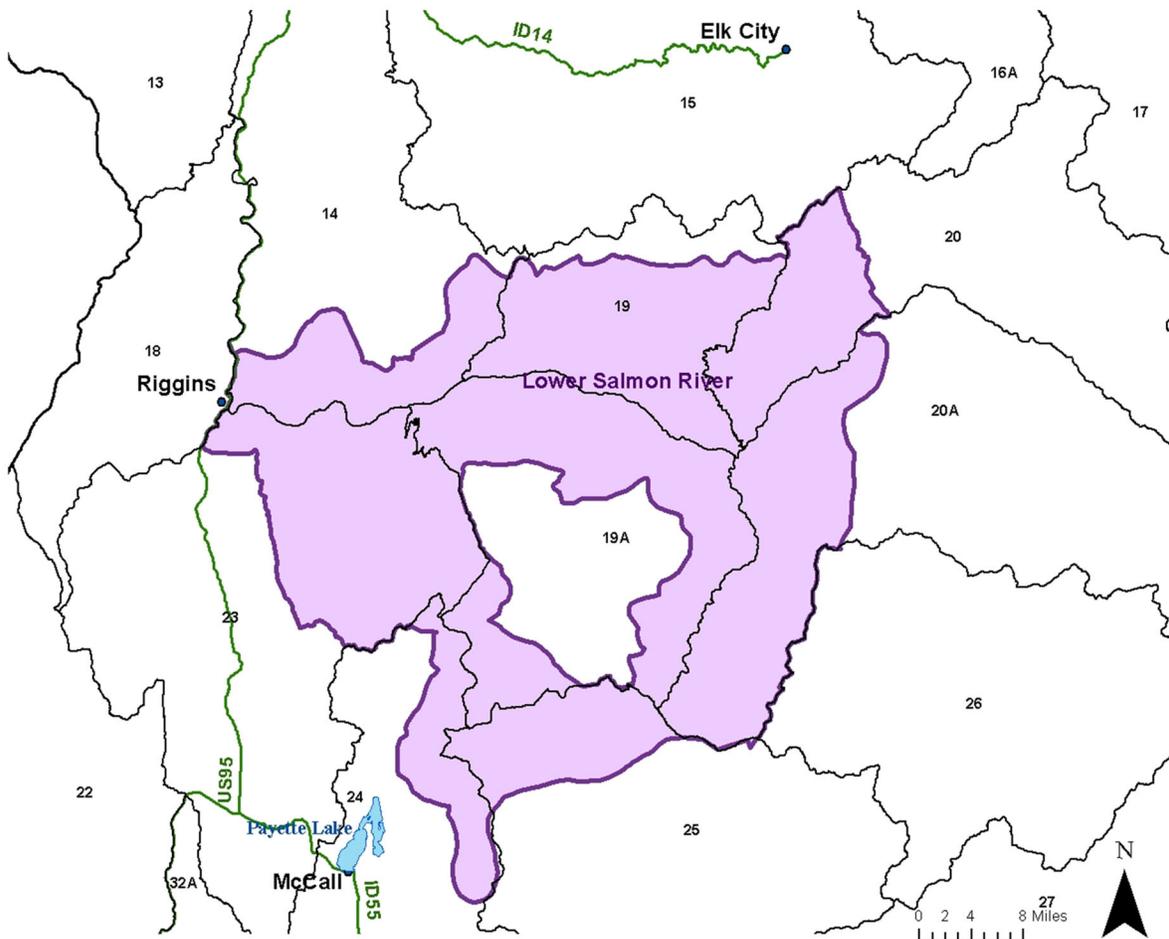
In this PMU the current management strategy for bighorn sheep is to manage for separation from domestic sheep and goats using BMPs as outlined in the health section of the Bighorn Sheep

Management Plan. The BMP agreements will be evaluated annually and adjusted as necessary to try to achieve this goal.

Within current distribution, modeled habitat comprises approximately 496 km<sup>2</sup>, which could support approximately 950 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9 km<sup>2</sup>). However, there are limitations based on specific habitat needs such as lambing and wintering habitat. Thus, further refinement of habitat models and available habitat will likely reduce the estimate of potential population size. The current objective in this PMU is to maintain or increase bighorn sheep populations (Table 1).

### Management Actions

1. Work with willing domestic sheep permittees, USFS, and BLM to use BMPs to maintain separation between bighorn sheep and domestic sheep and goats.
2. Refine habitat modeling to more accurately characterize sustainable population levels.
3. Conduct regular aerial surveys to determine whether portions of this sheep population could sustain additional hunting pressure.



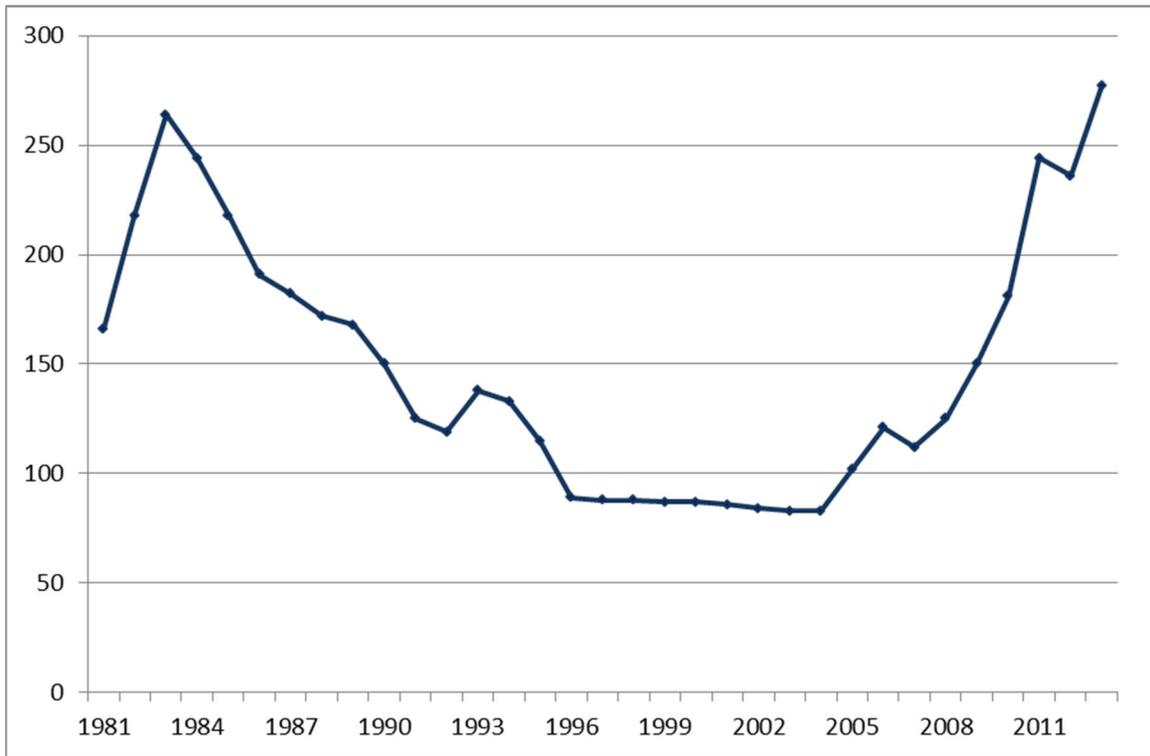


Figure 19. Approximate total bighorn sheep observed or estimated, Lower Salmon River PMU (GMUs 19, 19A, and 20A west), 1981-present.

## Rocky Mountain Bighorn Sheep

### Lower Salmon River

GMUs 14,19, 19A, 20 (west), 20A (west); Hunt Area 19 and 19A

#### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
14	2009	10	1	5	7	12	0	23
	2010	18	0	2	8	10	0	28
	2011	20	1	2	6	8	0	29
	2012	25	6	2	5	7	0	38
	2013	25	6	2	3	5	0	36
19	2009 <sup>a</sup>	55	17	6	0	6	0	78
	2010	81	6	15	13	28	0	115
	2011	79	8	12	24	36	0	123
	2012	65	18	7	22	29	0	112
	2013	82	22	10	19	29	0	133
19A	2006	13	7	1	0	1	0	21
	2010	27	9	2	6	8	0	44
	2011	26	8	7	6	13	0	59
	2012	34	11	4	9	13	0	58
	2013	44	19	6	8	14	0	77
	2017	47	6	7	9	16	0	69
20 West	2007	11	1	1	6	7	0	19
	2010	3	2	9	10	19	0	24
	2011	6	0	1	5	6	0	12
	2012	25	0	2	11	13	0	38
	2013	14	3	3	16	19	0	36
20A West	2006	34	13	4	6	10	0	57
	2010 <sup>a</sup>	24	1	3	5	8	0	33
	2011	41	23	3	6	9	2	75
	2012	37	13	8	8	16	0	66
	2013	43	13	4	7	11	0	67
	2017	70	22	11	13	24	0	116
Total	2009	138	49	22	24	46	2	235
	2010	153	18	31	42	73	0	244
	2011	172	40	25	47	72	2	286
	2012	186	48	23	55	78	0	312
	2013	208	63	26	53	79	0	350
	2017	117	28	18	22	40	0	185
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>		<b>30</b>	<b>13</b>	<b>25</b>	<b>38</b>			

#### Hunting tags and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags</b>	4	4	4	4	4	6	6	6
<b>Harvest</b>	3	3	2	4	3	6	6	3
<b>Hunter success</b>	75	75	50	100	75	100	100	50
<b>Ave ram age</b>	6.2	5.7	5.8	8.0	5.5	9.0	9.0	7.5

<sup>a</sup> New hunt 19A with 2 tags added in 2015.

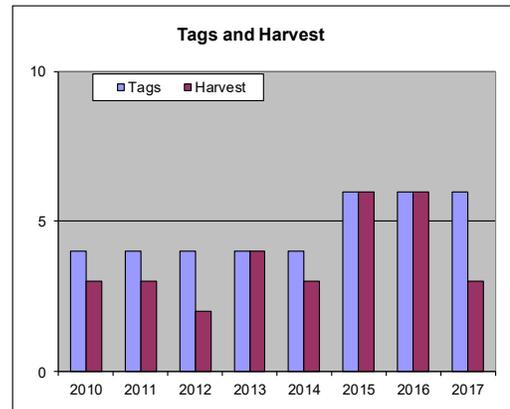
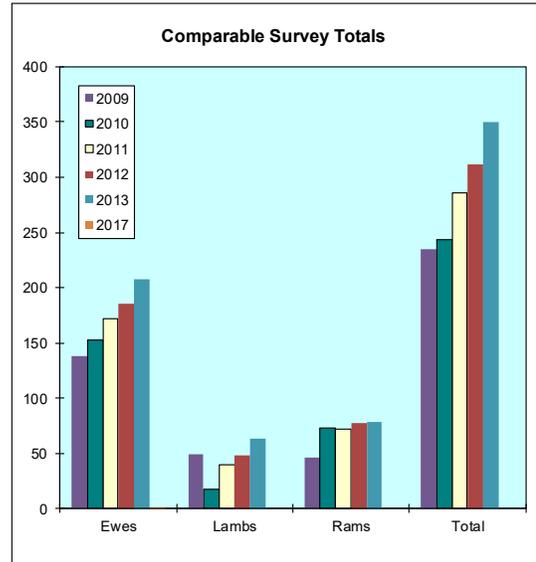


Figure 20. Lower Salmon River Population Survey and Harvest

## **MIDDLE FORK SALMON RIVER PMU**

### **GMUs 20A (east), 26, 27, 36 (northeast)**

#### **Hunt Areas 20A, 26, 26L, 27-1, 27-2, 27-3, 27-4, 27L**

#### **Historical Background**

Subsistent hunting by Native Americans occurred on Bighorn sheep in this area over a 5,000 year period, and ended with settlement in the late 1880s. This nomadic tribe was called the Sheepeater Indians by other tribes. Bighorn sheep populations in this area were somewhat protected from pressures of early settlement by the remote nature of the area and thus were better able to maintain viable population levels when most front-country populations were extirpated. However, subsistence hunting for mining camps and intensive livestock grazing in the late 1800s produced some negative impacts. Grass ranges important to bighorn sheep were converted to shrub habitats in the early part of the 20<sup>th</sup> century and bighorn populations declined to a low of perhaps 200-500 animals in the late 1920s (Smith 1954).

No translocations have taken place in the Middle Fork PMU and most consider the area one of the few native bighorn sheep populations in North America that was not extirpated. Hunting occurred under various combinations of controlled and general season frameworks from the early 1950s through 1970 and under a controlled hunt system since 1971.

Land and resource use changed after the mining boom; subsistence hunting and livestock use decreased and many shrub-dominated ranges began reverting to grasslands. The bighorn sheep population increased to approximately 1,000 animals by 1990, but declined by roughly 50% after a disease-driven, all-age die-off in the early 1990s. The current population remains between 450–600 bighorn sheep (Figure 21). Some early estimates were derived from historical observations by USFS and IDFG personnel. More recent values are primarily observed numbers from IDFG aerial surveys. All of these values should be interpreted as a minimum population estimate.

#### **Management Objectives**

The overall management objective for this PMU is to maintain or increase bighorn populations. Because hunter success tends to be quite low and access is difficult, Hunt Area 27-1 will be managed primarily to maximize bighorn sheep hunting opportunity. Remaining hunt areas will be managed to maintain moderate success rates in a remote, wilderness setting. Late hunts are managed for high success.

#### **Habitat Management and Monitoring**

This population includes sheep in GMUs 20A (east), 26, and 27, as well as smaller portions of northeast 25, southwest 28, and northeast 36 (Figure 13). The majority of the area is managed by the U.S. Forest Service (USFS) and falls within the Frank Church River-of-No-Return Wilderness. The area is typified by steep, rugged canyons and dry, coniferous forest-grassland habitats with very low road densities. Access into most occupied bighorn sheep habitats is limited. Most bighorn sheep in the area winter along the river breaks corridor and migrate to sub-

alpine habitats during summer. However, some bighorn sheep remain along the Middle Fork Salmon River during summer, where they provide a valuable viewing resource for river float recreationists.

Although modern land management activities in the wilderness are minimal, the landscape and productivity of habitats are continually changing. Wildfire has been prevalent during the last decade. Over ¼ of the area in this PMU has burned since 2000. In some cases, fires have likely benefited wild sheep by reducing conifer encroachment and promoting grass and forb production. However, because of the semi-arid nature of parts of the landscape, habitat response to fire may be slow or negative, particularly on winter ranges where invasive cheatgrass and noxious weeds such as knapweed, rush skeletonweed, and leafy spurge are significantly impacting winter range productivity. Elk populations have declined since peaks during the late 1990s, but competition with a large elk herd may impact habitat capacity for bighorns.

## **Biological Objectives**

### ***Capture, Radio-mark and or Telemetry***

No capture, radio-marking, or telemetry occurred in the Middle Fork PMU during the reporting period.

### ***Population Surveys and Monitoring***

No population surveys or monitoring occurred in the Middle Fork PMU during the reporting period. Past surveys are summarized in Figure 23.

### **Hunting and Harvest Characteristics**

There are 8 hunt areas in the Middle Fork PMU that include a total of 36 tags. With the exception of hunt area 27-1 (managed to maximize opportunity), these areas are managed for moderate hunter success rates. Hunter success has averaged 43% since 2010 but has bumped above 50% the last two years. Average age of harvested rams (2010–2017) is 7.7 years. Most of the hunts run from August 30–October 13. However, late hunts 26L and 27L span October 14–31.

### **Capture and Translocation**

No capture or translocations occurred in the Middle Fork PMU during the reporting period.

### **Disease Monitoring**

Currently, the Middle Fork population appears to still be disease-limited, as evidenced by chronically low lamb:ewe ratios since the die-off in the early 1990s (Figure 22). Ratios declined from an average of almost 37:100 (range 11-74) between 1973 and 1989 to 22:100 (range 5–38) since 1990. 2017 survey data (not a full survey, only GMUs 20A, 26, and 27) indicates this lamb ratio may be slowly increasing again with a lamb:ewe ratio of 26:100.

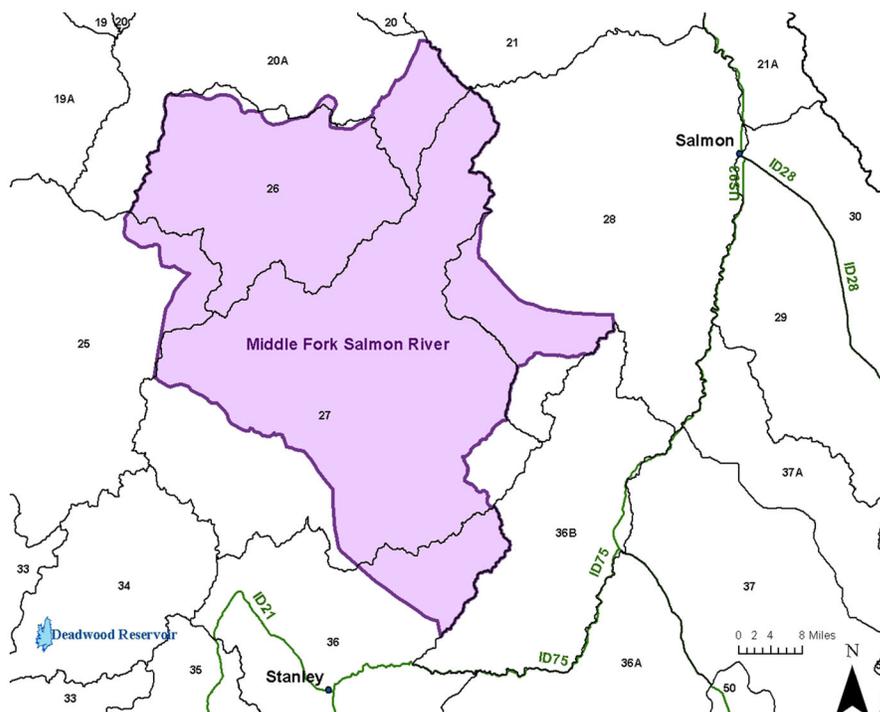
## Management Direction

Because of the size of the area and population and access limitations, a variety of hunting experiences are available. During the standard season framework, hunter success is typically lower than in more accessible areas. Recent average hunter success ranged from 13% to 75% depending on area and year.

Within current distribution, modeled habitat occupies approximately 1,856 km<sup>2</sup>, which could support approximately 3,525 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9/km<sup>2</sup>). However, there are limitations based on specific habitat needs such as lambing and wintering habitat. Thus, further refinement of habitat models and available habitat will likely reduce the estimate of potential population size. Regardless, historic and recent data indicates the PMU can sustain significantly more bighorn sheep and management direction will be to increase population levels (Table 1). Mule deer and elk objectives are also to increase population levels. The increase of all 3 species may create competition for the same resources.

## Management Actions

1. Work with USFS to maintain or improve habitat for bighorn sheep.
2. Work with USFS and other partners to control or reduce invasive annual grasses and noxious weed occurrence.
3. Increase knowledge of movement patterns among hunt areas and adjacent PMUs to better understand metapopulation characteristics (connectivity and genetic exchange).
4. Refine habitat modeling to more accurately characterize sustainable population levels.



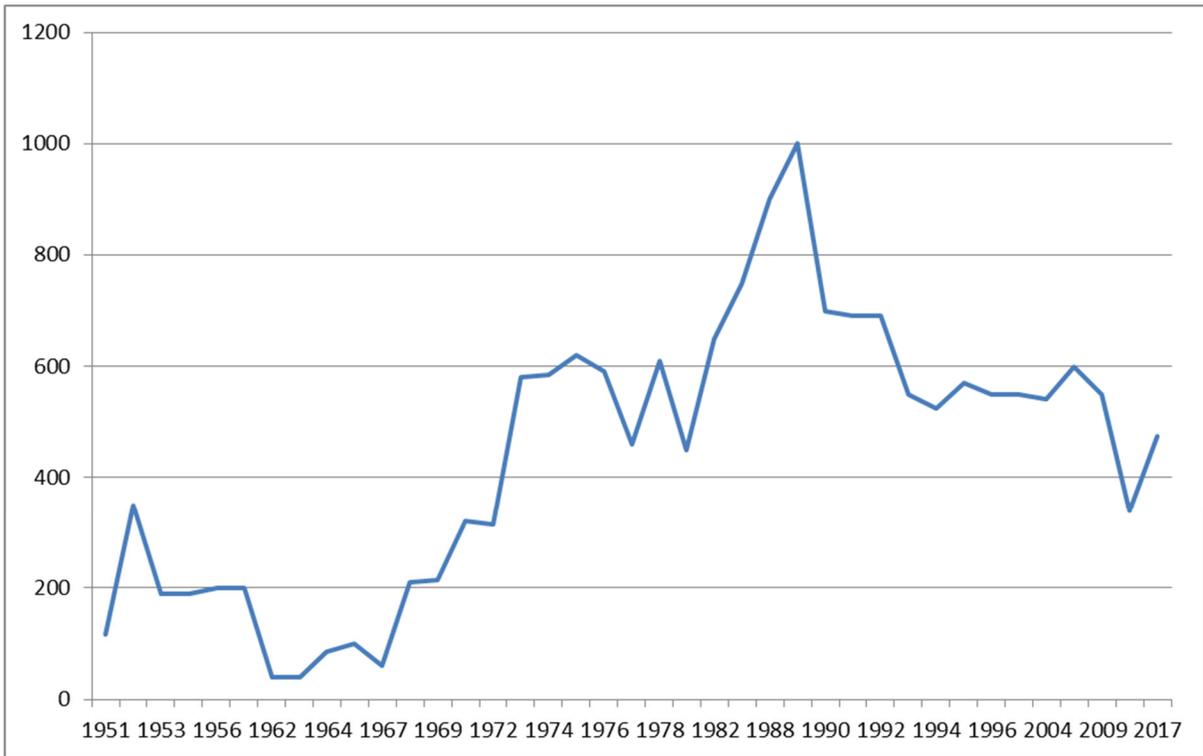


Figure 21. Approximate total bighorn sheep observed or estimated, Middle Fork Salmon River PMU (1951-72 includes only GMU 27 estimates), 1951-present.

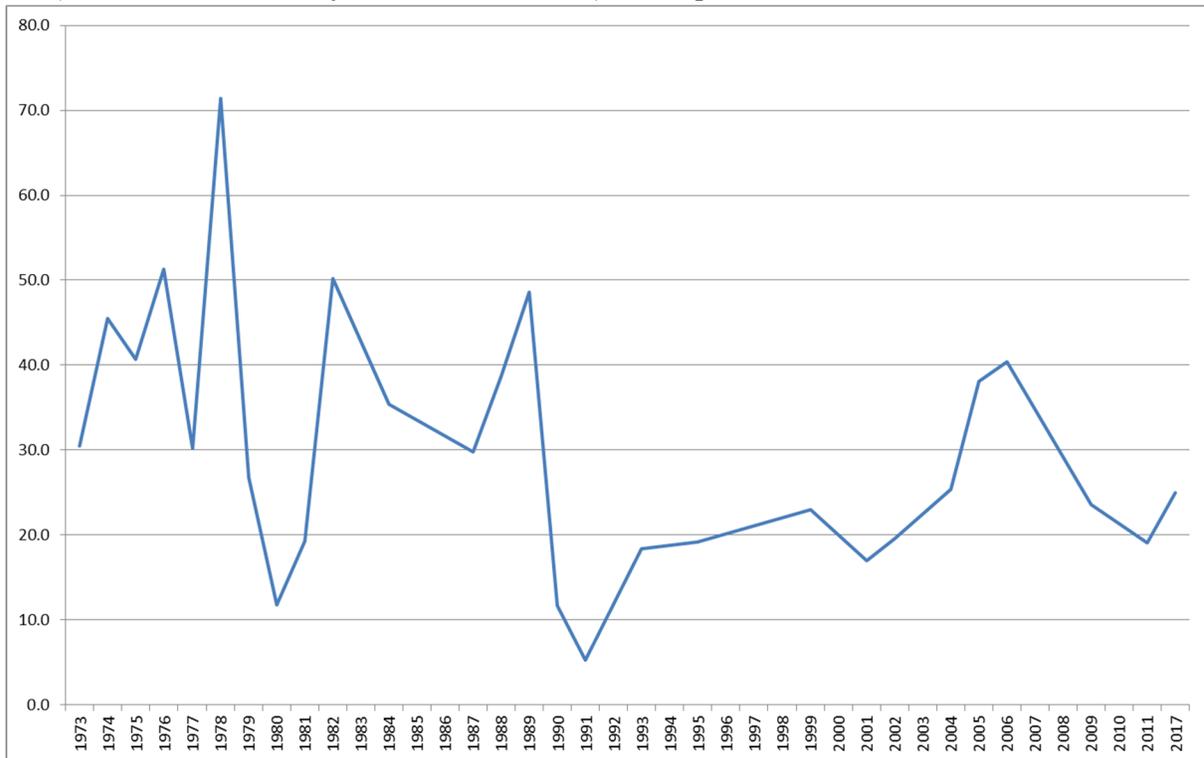


Figure 22. Observed bighorn sheep lamb:100 ewe ratios, Middle Fork Salmon River PMU, 1973-present.

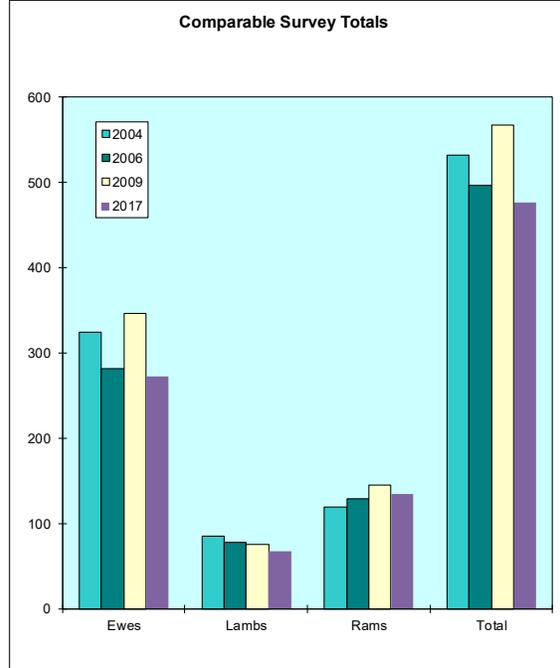
## Rocky Mountain Bighorn Sheep

### Middle Fork Salmon River

GMUs 20A (east), 26, 27, 36 (northeast); Hunt Areas 20A, 26, 26L, 27-1, 27-2, 27-3, 27-4, 27L, 36

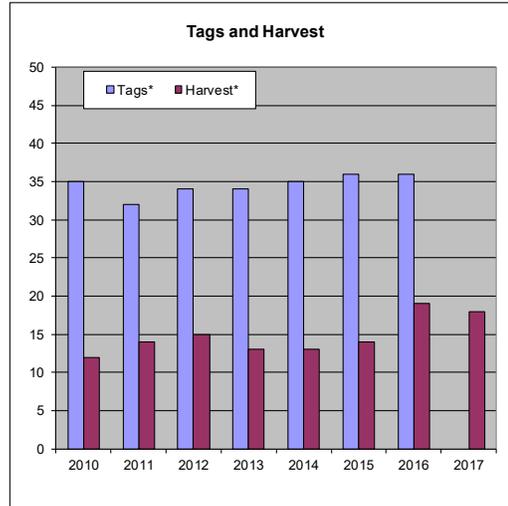
#### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
20A	2004	21	8	5	2	7	0	36
	2006	48	9	6	5	11	0	68
	2009	47	15	8	7	15	0	77
	2017	65	16	19	7	26	0	107
26	2004	90	23	19	12	31	0	144
	2006	120	23	10	33	43	0	186
	2009	63	4	5	14	19	0	86
	2017	40	12	13	17	30	0	82
27-1	2004	100	24	15	24	39	0	163
	2006	50	16	16	18	34	0	100
	2009	102	21	35	14	49	0	172
	2017	58	9	15	15	30	0	97
27-2	2004	44	9	5	9	14	0	67
	2006	23	14	6	5	11	0	48
	2009	61	20	10	7	17	1	99
	2017	42	15	14	11	25	0	82
27-3	2004	57	13	10	14	24	4	98
	2006	31	11	10	9	19	7	68
	2009	41	5	12	11	23	0	69
	2017	33	11	15	22	37	1	82
27-4	2004	12	8	2	2	4	0	24
	2006	10	5	2	9	11	0	26
	2009	33	10	11	11	22	0	65
	2017	55	13	7	9	16	0	84
Total	2004	324	85	56	63	119	4	532
	2006	282	78	50	79	129	7	496
	2009	347	75	81	64	145	1	568
	2017	273	68	70	65	135	1	477
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>		<b>25</b>	<b>26</b>	<b>24</b>	<b>49</b>			



#### Hunting tags and harvest information

		2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags*</b>	20A	2	2	2	3	3	2	2	2
	26	4	4	4	4	4	4	5	5
	26L	2	2	2	2	2	2	2	2
	27-1	12	12	12	12	12	12	12	12
	27-2	6	6	6	6	6	6	6	6
	27-3	4	4	4	4	4	4	4	4
	27-4	3	3	0	0	0	2	2	2
	27L	2	2	2	2	2	2	2	2
	36 **				1	1	1	1	1
	Total	35	35	32	34	34	35	36	36
<b>Harvest*</b>	20A	2	0	0	3	3	2	2	1
	26	1	1	1	1	1	3	2	3
	26L	1	1	2	1	1	1	2	2
	27-1	2	2	5	1	1	3	5	2
	27-2	2	3	2	3	3	0	1	2
	27-3	1	4	2	3	3	2	2	3
	27-4	2	1	1	0	0	1	2	3
	27L	1	2	2	1	1	2	2	2
	36				0	0	0	1	0
	Total	12	14	15	13	13	14	19	18
<b>Hunter success</b>	34	40	47	38	38	40	53	50	
<b>Ave ram age</b>	7.2	7.1	6.9	8.0	7.9	8.5	8.4	7.4	



\*Includes auction and/or raffle tags and rainchecks

\*\* Hunt area 36 added in 2013

Figure 23. Middle Fork Salmon River Population Survey and Harvest

## **LOWER PANTHER–MAIN SALMON RIVER PMU**

### **GMUs 20 (east), 21, 28 (north); Hunt Areas 20, 21, 28-1, 28-3**

#### **Historical Background**

Bighorn sheep populations in this area were somewhat protected from pressures of early settlement by the remote nature of the area and, thus, were better able to maintain viable population levels when most front-country populations were extirpated. However, subsistence hunting for mining camps and intensive livestock grazing in the late 1800s produced some negative impacts. Grass ranges important to bighorn sheep were converted to shrub habitats in the early part of the 20<sup>th</sup> century. Land and resource use changed after the mining boom: subsistence hunting and livestock use decreased and many shrub-dominated ranges began reverting to grasslands. Smith (1954) estimated approximately 290 animals occupied the area in the early 1950s.

Bighorn sheep populations in GMUs 21 and 28 were considered high-quality herds, exhibiting high lamb production and herd growth through the 1970s. However, populations along Panther Creek experienced a decline in the early 1980s, probably due to weather-related mortality. The same herd suffered a major population decline (approximately 50%) during 1989-1990, likely caused by pneumonia (Figure 24). Some early estimates were derived from historical observations by USFS and IDFG personnel. More recent values are primarily observed numbers from IDFG aerial surveys. Low lamb recruitment followed the decline and persisted for several years. The population has displayed a gradual, long-term decline, however, nearly 260 sheep were observed during deer surveys in 2011. About 180 sheep were observed during an elk survey in winter, 2016, with a comparable lamb:ewe ratio and higher ram:ewe ratio to the 2011 observations.

Hunting occurred under various combinations of controlled and general season frameworks from the early 1950s through 1970 and under a controlled hunt system since 1971.

#### **Management Objectives**

The overall objective for this PMU is to increase the population and offer additional hunting and viewing opportunity. One issue that needs to be addressed to achieve this objective is access. GMUs 21 and 28 have high road densities, with potential for copper and cobalt mining, geothermal development, and timber harvest, which could lead to even more development and roads. Increased road densities can lead to high levels of unregulated harvest. However, viewing and photographing bighorn sheep along Salmon River and Panther Creek are popular recreational pastimes. We expect this type of non-consumptive use to increase in importance.

#### **Habitat Management and Monitoring**

This population includes sheep in GMUs 20 (east), 20A (north-central), 21, and 28 (northwest) (Figure 1). The majority of the area is managed by the USFS and a significant portion falls within the Frank Church River-of-No-Return Wilderness. The area is typified by rugged canyons and dry, coniferous forest-grassland habitats with very low to moderate road densities. Access

into occupied bighorn sheep habitat within wilderness is limited, whereas sheep can be observed along roads in some portions of the PMU. Most bighorn sheep in the area winter along the river breaks corridor. Some animals migrate to sub-alpine habitats during summer, but many remain along the main Salmon River during summer.

Wildfire has been prevalent during the last decade. Tens of thousands acres within the area have burned since 2000. In some cases, fires have likely benefited wild sheep by reducing conifer encroachment and promoting grass and forb production. However, because of the semi-arid nature of parts of the landscape, habitat response to fire may be slow or negative, particularly on winter ranges where noxious weeds such as knapweed, rush skeletonweed, and leafy spurge could ultimately have significant impacts on winter range productivity. In several areas where fire occurred at mid to low elevations invasive cheat grass has replaced the more nutritious perennial grasses. Coordination with the Forest Service to address noxious weed infestations is ongoing. Elk populations have declined somewhat since peaks during the mid-2000s, but competition with a large elk herd may impact habitat capacity for bighorns.

### **Biological Objectives**

Population management objectives are based on historic documented population levels consistent with suitable range availability. Management is directed at allowing populations to grow to levels determined by the habitat and range conditions. Lamb:ewe ratios, ram:ewe ratios, and lamb survival are all monitored to determine if population growth objectives are being reached.

### ***Capture, Radio-mark and or Telemetry***

Bighorn sheep are sometimes captured and fitted with GPS collars to provide population monitoring data.

Five rams were captured and collared in December, 2011 in GMU 21 to determine movements and distribution within the PMU. In addition, samples were obtained to ascertain the health status of sheep.

### ***Population Surveys and Monitoring***

As part of the Department's bighorn sheep population monitoring program, population surveys are conducted periodically. While there is no specific protocol for timing of aerial surveys, most PMU's are monitored every 4–6 years and sometimes more often if coordinated with a scheduled deer or elk survey. These surveys generate a minimum count estimate as there is no sightability model. Ground counts are conducted for some PMU's.

The population appeared to be on an upward trend between the 2008 and 2011 aerial surveys, however the 2016 survey indicated a decline. Part of this can be attributed to no survey data from GMU 20 which may contribute up to 60 sheep. Even with those sheep added to the survey, the total still shows a decline from 2011 and only a slight increase over the 2008 survey.

## **Hunting and Harvest Characteristics**

Harvest success for this PMU has averaged 70% and tag numbers have varied between 7 and 10 over the last 5 years. Twenty-eight rams have been harvested during this same time period. Native American harvest occurs in portions of the PMU, but harvest levels are unknown.

## **Capture and Translocation**

The Panther Creek bighorn sheep population was the primary source of Rocky Mountain bighorn sheep for translocation to other sites; nearly 125 were captured and moved between 1975 and 1985. However, capture and translocation have been curtailed since populations and productivity declined. Only one translocation into the PMU has occurred (16 sheep from northeast Oregon were released near Shoup in 1984).

## **Disease Monitoring**

Currently, the population appears to still be disease-limited, as evidenced by generally low lamb:ewe ratios since the die-off in the early 1990s (Figure 25). Ratios declined from an average of 46:100 (range 22–76) between 1974 and 1989 to 23:100 (range 11–33) since 1990 (for years in which >50 sheep were classified).

## **Management Direction**

Because the PMU encompasses diverse access and land management objectives, hunting opportunity and experiences vary considerably. Hunter success rates can be quite low in predominantly wilderness hunt areas and range near 100% in areas with road access. Hunt area boundaries have been adjusted several times to better match sub-population groupings and access, as well as improve hunter and harvest distribution. Average age of harvested rams in 2016 dropped considerably from the previous year. Harvest data from 2017 should be closely analyzed to see if this trend continues.

Within current distribution, modeled habitat occupies approximately 570 km<sup>2</sup>, which could support approximately 1,075 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9/km<sup>2</sup>). However, there are limitations based on specific habitat needs such as lambing and wintering habitat. Thus, further refinement of habitat models and available habitat will likely reduce the estimate of potential population size. .

## **Management Actions**

1. Work with USFS to maintain or improve habitat for bighorn sheep.
2. Work with USFS and other partners to control or reduce noxious weed occurrence.
3. Increase knowledge of movement patterns among hunt areas and adjacent PMUs to better understand metapopulation characteristics (connectivity and genetic exchange).
4. Refine habitat modeling to more accurately characterize sustainable population levels.
5. Use radiomarked sheep to provide data points for sightability modeling.

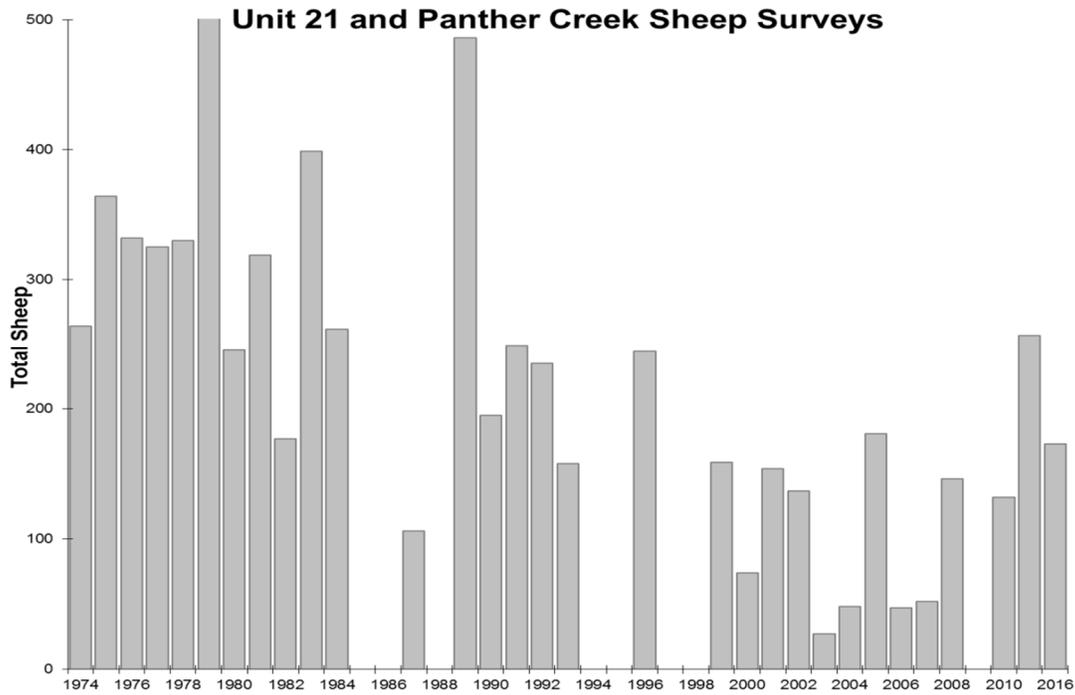


Figure 24. Approximate total bighorn sheep observed or estimated, Lower Panther-Main Salmon River PMU (GMU 20 included only from 1982 forward), 1974-present.

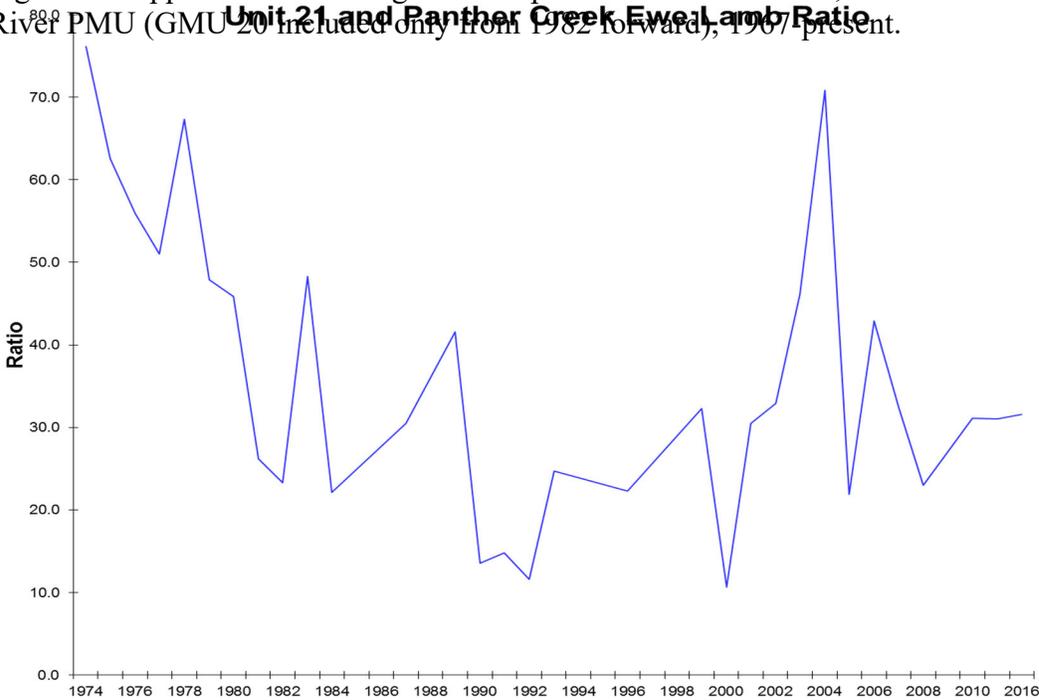
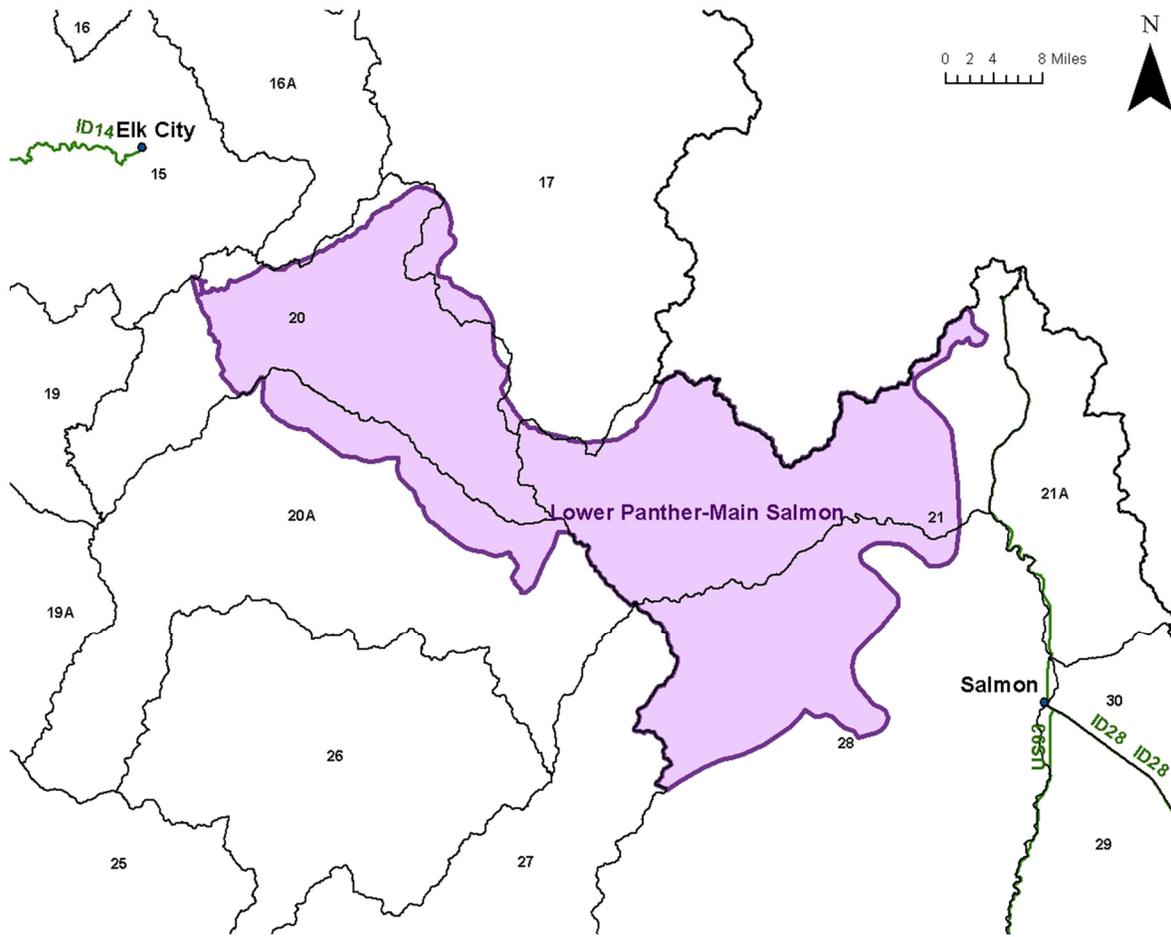


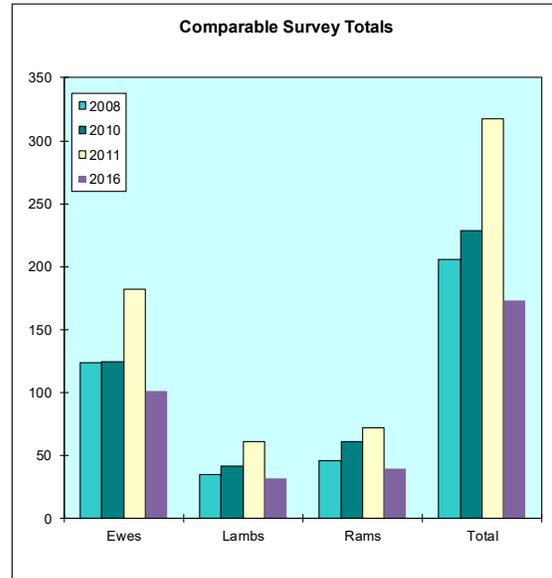
Figure 25. Observed bighorn sheep lamb:100 ewe ratios, GMUs 21 and 28, Lower Panther-Main Salmon River PMU, 1974-present.



**Rocky Mountain Bighorn Sheep**  
**Lower Panther-Main Salmon River**  
 GMUs 20 (east), 21, 28 (north); Hunt Areas 20, 21, 28-1, 28-3

**Population surveys**

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
20	2001	22	6	10	13	23	0	51
	2007 <sup>b</sup>	11	1	1	6	7	0	19
	2011	24	12	12	11	23	1	60
	2016	0	0	0	0	0	0	0
21	2008	78	19	13	4	17	0	114
	2010	75	24	11	13	24	0	123
	2011	98	31	16	8	24	1	154
	2016	61	22	11	10	21	0	104
E Panther	2008	14	1	3	1	4	0	19
	2010	15	2	8	2	10	0	27
	2011	55	16	9	4	13	0	84
	2016	31	7	6	5	11	0	49
W Panther	2008	8	3	2	0	2	0	13
	2010	11	4	4	0	4	0	19
	2011	5	2	5	7	12	0	19
	2016	9	3	5	3	8	0	20
Total	2008	124	35	30	16	46	1	206
	2010	125	42	35	26	61	1	229
	2011	182	61	42	30	72	2	317
	2016	101	32	22	18	40	0	173
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>			<b>32</b>	<b>22</b>	<b>18</b>	<b>40</b>		



**Hunting tags and harvest information**

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags</b>	20	2	2	2	2	2	2	2
	21	3	3	3	3	3	3	3
	28-1	2	2	2	2	2	2	3
	28-3*	1	1	1	1	1		2
	<b>Total</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>7</b>	<b>7</b>
<b>Harvest</b>	20	1	1	0	2	0	1	1
	21	3	3	0	3	3	1	3
	28-1	2	0	1	1	2	2	1
	28-3*	0	0	1	1	1	0	0
	<b>Total</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>7</b>	<b>6</b>	<b>4</b>	<b>5</b>
<b>Hunter success</b>	75	50	25	88	75	57	71	60
<b>Ave ram age</b>	4.0	6.0	7.0	7.7	6.0	7.3	4.3	7.2

\*Hunt area 28-3 not offered in 2015/2016

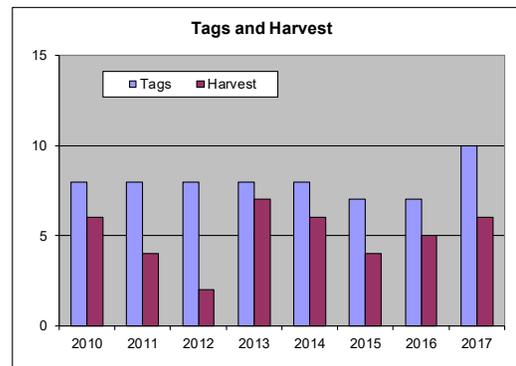


Figure 26. Lower Panther-Main Salmon River Populations ‘Survey and Harvest

## **TOWER-KRILEY PMU**

### **GMU 21A**

#### **Historical Background**

This general area along the Salmon River was occupied bighorn sheep range through approximately the 1930s (Smith 1954). Bighorns re-colonized the area in the 1990s; the source is unknown, but was most likely the Lower Panther-Main Salmon population. No translocations have taken place in the Tower-Kriley PMU and the number of bighorns in the area has varied between 10 and 35 (Figure 27). The number of sheep observed in 2016 was the highest recorded since 1998.

Because of sporadic bouts of vehicle collisions, managers made 1 unsuccessful attempt to capture and move this small herd. Motorist warning signs were deployed (twice), but were quickly stolen. A collaborative effort among Idaho Outfitters and Guides Association, Idaho Chapter Wild Sheep Foundation, IDFG, and several other entities resulted in development of a bighorn sheep viewing station at Red Rock Access Site in 2009. Unfortunately, a change in land ownership and land use practices on adjacent property appears to have deterred wild sheep use of the viewing area.

#### **Management Objectives**

The overall objective for this PMU is to increase the population and offer additional hunting and viewing opportunity.

The greatest threat to persistence is likely the small population size which makes it unstable in the face of random environmental impacts. Vehicle collisions contribute to mortality and may prevent further population increases, as well as Native American harvest. Continued development and encroachment on areas used by these sheep also contribute to reduced likelihood of long-term persistence. Lastly, potential for exposure to domestic sheep or goats in local farm flocks is high.

#### **Habitat Management and Monitoring**

This small, relatively isolated population occupies a small portion of GMU 21A, primarily along the east side of the Salmon River between Tower Creek and Fourth of July Creek. The majority of the area is managed by the BLM, with some interspersed private land. The area is typified by sagebrush hills and cliffs; U.S. Highway 93 parallels the river. Because of their habit of using sites immediately adjacent to the highway, these sheep provide some viewing opportunity, but are subject to vehicle collisions.

The Department will work with BLM to maintain and improve habitat and reduce noxious weeds.

## **Biological Objectives**

Population management objectives are based on historic documented population levels consistent with suitable range availability. Management is directed at allowing populations to grow to levels determined by the habitat and range conditions. Lamb:ewe ratios, ram:ewe ratios, and lamb survival are all monitored to determine if population growth objectives are being reached.

### ***Capture, Radio-mark and or Telemetry***

Bighorn sheep are sometimes captured and fitted with GPS collars to provide population monitoring data.

No sheep have been captured or collared during the reporting period.

### ***Population Surveys and Monitoring***

As part of the Department's bighorn sheep population monitoring program, population surveys are conducted periodically. While there is no specific protocol for timing of aerial surveys, most PMU's are monitored every 4-6 years and sometimes more often if coordinated with a scheduled deer or elk survey. These surveys generate a minimum count estimate as there is no sightability model. Ground counts are conducted for some PMU's.

The population for this PMU hovered around 20 animals between 2002 and 2008. A survey in 2016 indicated a minimum estimate of 35 sheep with a ewe:lamb ratio of 17:100 (Figure 28).

## **Hunting and Harvest Characteristics**

This PMU was added to hunt area 28-3 for the 2017 season. No rams were harvested from this population in 2017.

## **Capture and Translocation**

No sheep have been translocated into or out of this PMU.

## **Disease Monitoring**

There is high risk for disease transmission from nearby farm flocks. Bighorns are disease tested opportunistically, primarily from highway mortalities.

## **Management Direction**

Because of the small size of the area and population, few management options exist. Within current distribution, modeled habitat comprises approximately 18 km<sup>2</sup>, which could support approximately 35 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9/km<sup>2</sup>). As a result of the 2017-18 season setting process, this population was added to a new hunt area that encompasses portions of GMU's 21 and 28. The multiple risk factors mentioned above could lead to the extirpation of this population. For that reason, IDFG biologists decided to offer additional hunting opportunity even though this is a very small population. In addition, another value of this population is to enhance public knowledge and

appreciation of bighorn sheep and their habitat through active information and education projects. Therefore, management direction will be to maintain or increase population levels (Table 1).

### Management Actions

1. Continue to promote viewing and educational opportunities associated with this small, but visible, population.
2. Work with USFS to maintain or improve habitat for bighorn sheep.
3. Work with USFS and other partners to control or reduce noxious weed occurrence.
4. Increase knowledge of movement patterns among hunt areas and adjacent PMUs to better understand metapopulation characteristics (connectivity and genetic exchange).

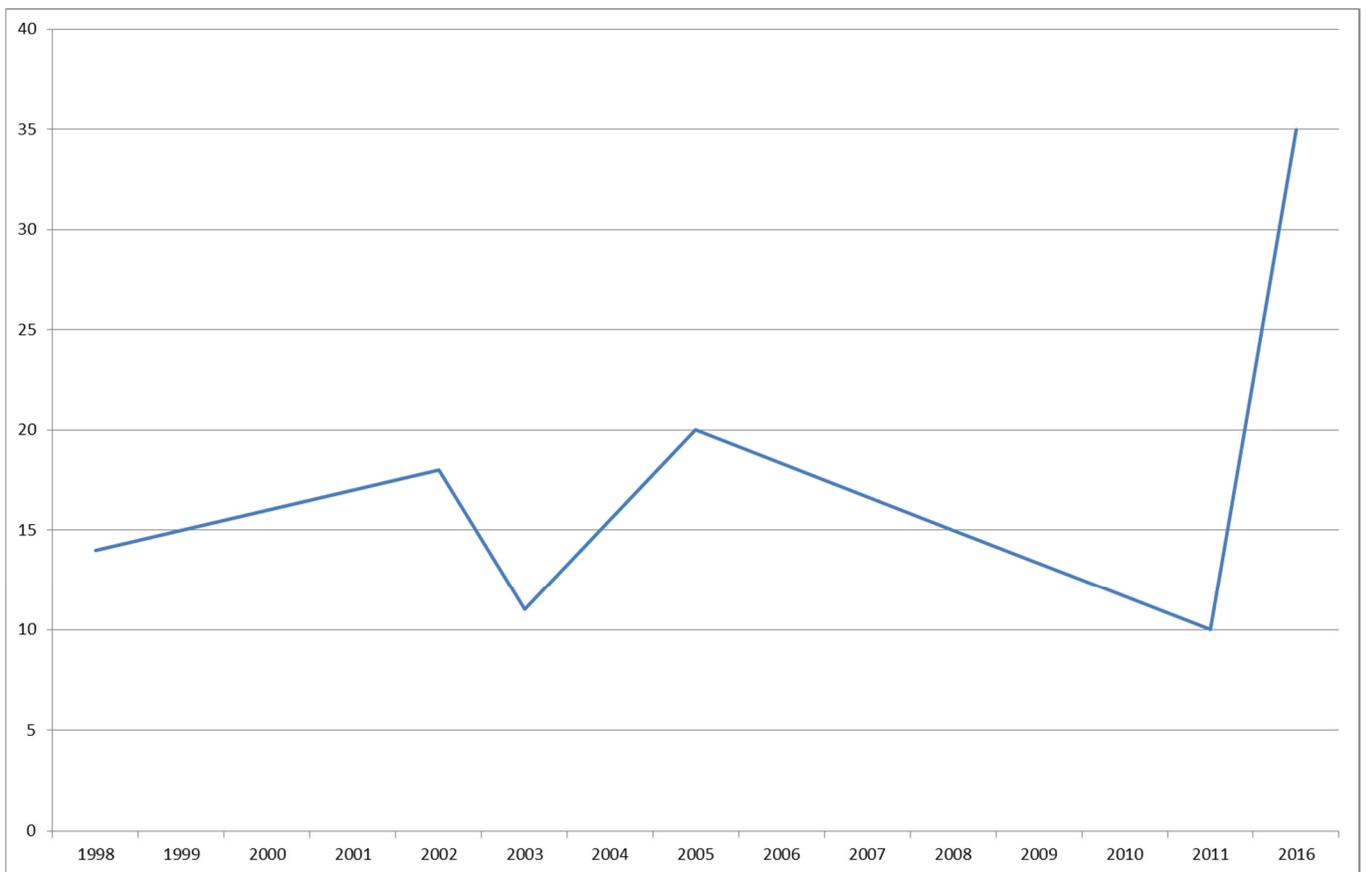
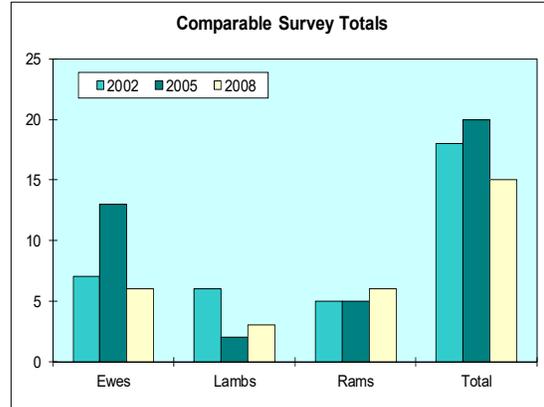


Figure 27. Bighorn sheep observed during IDFG aerial surveys, Tower-Kriley PMU, 1998-present.

**Rocky Mountain Bighorn Sheep**  
**Tower-Kriley**  
**GMU 21A**

**Population surveys**

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
21A	2002	7	6	3	2	5	0	18
	2005	13	2	4	1	5	0	20
	2008	6	3	6	0	6	0	15
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>			<b>50</b>	<b>100</b>	<b>0</b>	<b>100</b>		



Hunting tags and harvest information No hunting season in this area.

Figure 28. Tower-Kriley PMU Population Survey

## **NORTH BEAVERHEAD PMU**

### **GMUs 30, 30A; Hunt Area 30**

#### **Historical Background**

As with most front-country populations, bighorn sheep in this area were extirpated in the late 1800s to early 1900s (Smith 1954). Restoration began with 2 translocation events in the mid-1980s. Little population growth occurred after the translocations until the late 1990's. Biologists observed 84 bighorns during a sightability survey in 2014 and observed a minimum of 116 sheep in 2016 during an elk survey indicating an upward trend in the population (Figure 29). Both rams and ewes were fitted with GPS collars to refine habitat use, determine movements between adjacent populations, and determine health status in 2013 and 2014.

#### **Management Objectives**

The overall objective for this PMU is to increase the population and offer additional hunting and viewing opportunity. Currently, the area occupied by the North Beaverhead population can likely support more bighorn sheep. However, domestic in Montana adjacent to or overlapping summer range is a risk factor. For a number of wildlife species, including bighorn sheep, the Beaverhead Range forms a potential travel corridor between the Yellowstone ecosystem and ecosystems farther north and west. If populations increase, bighorns may move along the length of the Beaverhead Range and form a more stable metapopulation. Conversely, the movement corridor could also provide an avenue for spread of diseases or parasites among sub-populations.

#### **Habitat Management and Monitoring**

This population includes sheep in GMUs 30 and 30A. The majority of the area is managed by the USFS with some bighorn sheep range on BLM lands. The area is typified by rugged canyons and dry, coniferous forest-grassland habitats with moderate road densities. There is generally motorized access to or near much of the occupied bighorn sheep habitat. Bighorn sheep in the area winter in and around the mouths of small canyons between Stroud Gulch and Hawley Creek. The animals migrate to sub-alpine and alpine habitats to the south and east during summer, moving as far south as upper Eighteen-mile Creek. Some sheep cross into Montana during summer and autumn.

Livestock grazing is a major land use in this PMU and may impact habitat, particularly winter range. Input on allotment management plans offers a way to influence habitat management.

#### **Biological Objectives**

Population management objectives are based on historic documented population levels consistent with suitable range availability. Management is directed at allowing populations to grow to levels determined by the habitat and range conditions. Lamb:ewe ratios, ram:ewe ratios, and lamb survival are all monitored to determine if population growth objectives are being reached.

#### ***Capture, Radio-mark and or Telemetry***

Bighorn sheep are sometimes captured and fitted with GPS collars to provide population monitoring data.

Both rams and ewes were fitted with GPS collars to refine habitat use, determine movements between adjacent populations, and determine health status in 2013 and 2014.

### ***Population Surveys and Monitoring***

As part of the Department's bighorn sheep population monitoring program, population surveys are conducted periodically. While there is no specific protocol for timing of aerial surveys, most PMU's are monitored every 4-6 years and sometimes more often if coordinated with a scheduled deer or elk survey. These surveys generate a minimum count estimate as there is no sightability model. Ground counts are conducted for some PMU's. This population declined between the 2004 and 2007 surveys. This trend was reversed by 2016 when a complete survey was conducted with a minimum count of 116 sheep and a very high ewe:lamb ratio (Figure 30).

### **Hunting and Harvest Characteristics**

Harvest success for this PMU has averaged 70% and tag numbers have remained stable at 2 over the last 5 years. Seven rams have been harvested during this same time period.

### **Capture and Translocation**

A total of 39 sheep were translocated into this PMU in the late 80's; 22 in 1985 and 17 in 1988.

### **Disease Monitoring**

This population has tested positive for movi. However, domestic sheep in Montana that is adjacent to or overlaps summer range poses a high risk of disease transmission.

### **Management Direction**

Modern hunting seasons were established in 2001. Because the risk of an all-age die-off is relatively high, IDFG will continue to offer ram harvest even though the population does not exceed 100 individuals. Hunter success has been 100% in most years since the Hunt Area was opened.

The relatively small amount of occupied habitat and number of sheep somewhat limit management options. Within current distribution, modeled habitat occupies approximately 137 km<sup>2</sup>, which could support approximately 250 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9/km<sup>2</sup>). However, there are limitations based on specific habitat needs such as lambing and wintering habitat. Thus, further refinement of habitat models and available habitat will likely reduce the estimate of potential population size. Regardless, recent data indicate the PMU can sustain more bighorn sheep and management direction will be to increase population levels (Table 1).

## Management Actions

1. Work with USFS to maintain or improve habitat for bighorn sheep.
2. Increase knowledge of movement patterns among hunt areas and adjacent PMUs to better understand metapopulation characteristics (connectivity and genetic exchange).
3. Refine habitat modeling to more accurately characterize sustainable population levels.
4. Use radiomarked sheep to provide data points for sightability modeling.

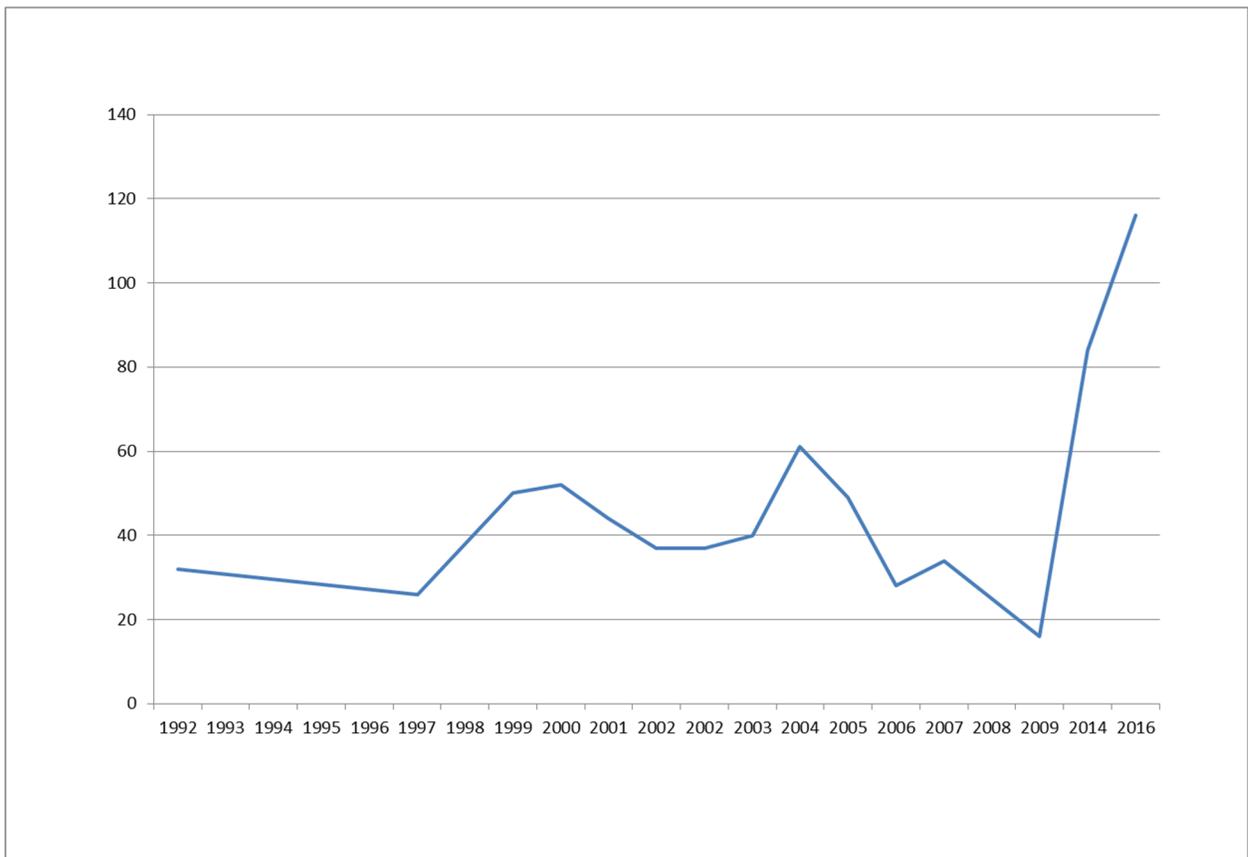


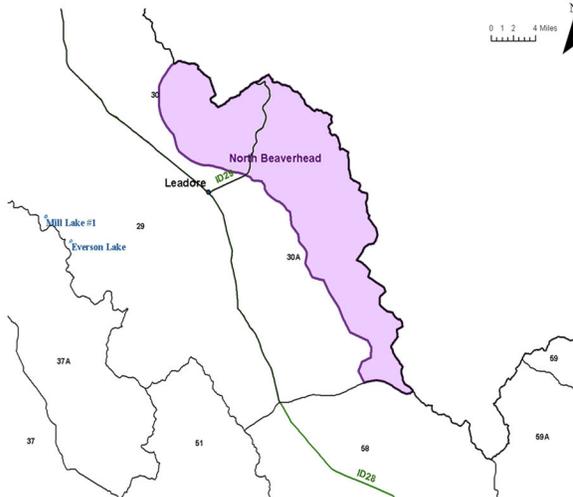
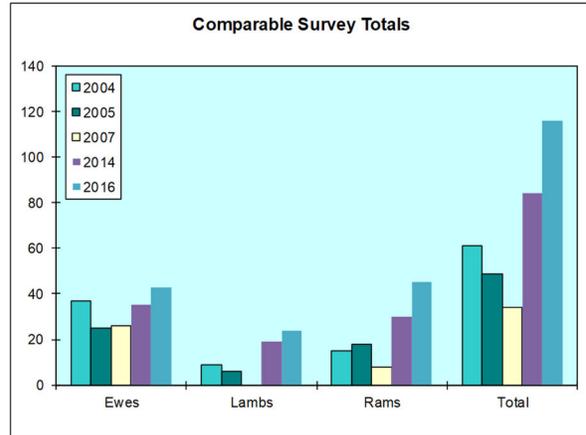
Figure 29. Total bighorn sheep observed during IDFG aerial surveys, North Beaverhead PMU, 1992-present.

## Rocky Mountain Bighorn Sheep

**North Beaverhead**  
GMUs 30, 30A; Hunt Area 30

### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
30, 30A	2004	37	9	4	11	15	0	61
	2005	25	6	5	13	18	0	49
	2007	26	0	7	1	8	0	34
	2014	35	19	25	5	30	0	84
	2016	43	24	22	11	45	4	116
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>			<b>56</b>	<b>51</b>	<b>26</b>	<b>105</b>		



### Hunting tags and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags</b>	2	2	2	2	2	2	2	2
<b>Harvest</b>	0	1	2	2	1	2	1	1
<b>Hunter success</b>	0	50	100	100	50	100	50	50
<b>Ave ram age</b>	0.0	4.5	8.5	5.0	7.5	5.5	6.5	6.5

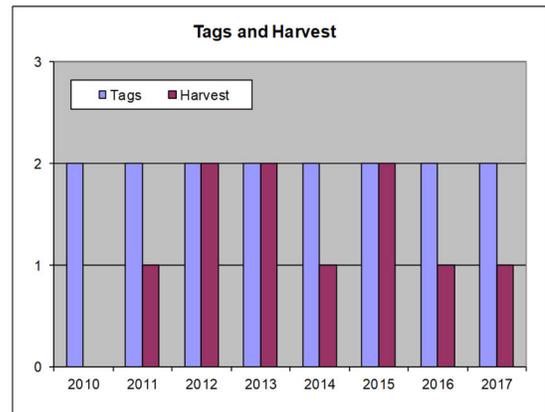


Figure 30. North Beaverhead Population Survey and Harvest

## **SOUTH BEAVERHEAD PMU**

### **GMUs 58 (east), 59, 59A**

#### **Historical Background**

There is little historic data available for Rocky Mountain bighorn sheep in the South Beaverhead PMU. The journals of early trappers, settlers, miners, and other sources indicate that sheep were more plentiful and widely distributed than what is currently observed (Seton 1929, Smith 1954, and Russell 1955). By the early 1900s, bighorn sheep were eliminated from most of the area and severely reduced in the remaining habitats. Vegetative changes due to livestock use on winter ranges, loss to disease, and indiscriminate harvest by settlers and miners probably were the main causes of bighorn sheep declines.

Subsistence and indiscriminate harvest of bighorn sheep by early settlers and pioneering travelers was greatly reduced after establishment of IDFG in 1937. Changes in federally controlled domestic sheep grazing allotments, habitat improvement projects, water developments, and bighorn sheep translocations have all been implemented in hopes of increasing wild sheep populations in the southern Beaverhead Range.

Forty-one bighorn sheep from GMU 28 were released into Long, Skull, and Bloom canyons of GMU 58 in 4 translocations between 1976 and 1982.

Counts in this PMU have generally been made incidental to aerial surveys for other big game species and, therefore, do not represent thorough population surveys or composition trends (Figure 31). Bighorns have been observed across the southern Beaverheads. The largest concentration of observations are centered around the Skull canyon area, but there are observations from Crooked Creek, Horsethief Ridge, Snakey Canyon, the TNC ranch, Sullivan Ridge, Irving Creek, and numerous other locations throughout the area.

#### **Management Objectives**

#### **Habitat Management and Monitoring**

Bighorn sheep in the South Beaverhead PMU primarily occur in GMUs 58 (east), 59A, and 59. Habitats in the South Beaverhead PMU are diverse, generally mountainous types with bighorn sheep summering mostly at higher elevations on alpine and sub-alpine ranges. The winter ranges are mostly sagebrush-grass or curl-leaf mountain mahogany (*Cercocarpus ledifolius*) types where snow depth is low. The USFS generally administers summer ranges, whereas both USFS and BLM manage winter ranges. Bighorn sheep are observed consistently in the southern Beaverhead Range.

The bighorn sheep population in the south Beaverhead Range commonly uses private land on the Waggoner, Simmons, and Taylor ranches from Goddard canyon north to Bruce canyon during

the rut and early winter. These ranches no longer have domestic sheep operations, but the bighorns still come to the area and often feed with corralled cattle. Some of the bighorns often move south into Bloom, Deadman, and Peterson canyons as winter progresses, but the majority seem to stay on the slopes from Goddard canyon north to Bruce canyon (near the Simmons Ranch). Rams have been documented moving through Reno Point in November 2015.

## **Biological Objectives**

### ***Capture, Radio-mark and or Telemetry***

IDFG radio-collared 10 bighorn sheep (7 rams (1 recaptured and collared twice) and 3 ewes) in the south Beaverhead PMU during 5 capture efforts in December 2011, February 2012, January 2014, November 2015 and November 2016. The information gathered from the satellite GPS collars has been used to evaluate spatial and temporal use of the area, summer lamb survival, and to eventually gain some sightability points for the sightability model. IDFG will also use these points to evaluate the Payette Summer Habitat Model that we used to predict habitat in the Statewide Bighorn Sheep Management Plan. The radio collared bighorn sheep were sampled for disease and those samples were sent to the Wildlife Health Laboratory for analysis. This project is funded with BLM Challenge Cost Share money and IDFG matching funds.

### ***Population Surveys and Monitoring***

Low lamb survival and recruitment rates have been an issue in some years since the early 1980s. The timing and causes of this low survival are poorly understood. Regional personnel surveyed this area for bighorn sheep in March 2014. A total of 13 bighorn sheep were observed; 7 ewes, 3 lambs, and 3 rams. Staff also surveyed for bighorn sheep in conjunction with Beaverhead elk zone survey during the winter of 2015-2016 and counted a total of 36 individuals. Ground observations of up to 14 sheep have been documented on Andy Wagner's ranch in March and April.

## **Hunting and Harvest Characteristics**

This population is not hunted.

## **Capture and Translocation**

There were 5 bighorn sheep radio marked in December 2017. This is in addition to 2 other marked individuals in this PMU. These animals have been ground darted on a private property near Skull Canyon. The overall goal of this marking is to track movements and survival of the individuals in this population.

## **Disease Monitoring**

Risk of contact with domestic sheep exists near allotments on USFS and BLM lands in GMUs 58 and 59A (Bernice, Mahogany Butte, Nicholia/Chandler, Snakey, Kelly, and Crooked Creek). Domestic sheep on private land near bighorn sheep habitat within the PMU are also a potential source of contact. All captured animals were tested for disease by the Wildlife Health Lab.

## **Management Direction**

IDFG is working with federal agencies and willing domestic sheep producers in the South Beaverhead PMU to reduce risk of contact (using BMPs outlined in this plan) between domestic and bighorn sheep, particularly for active domestic sheep allotments that overlap bighorn sheep distribution in this area. Management priority in this PMU is to maintain separation between bighorn sheep and domestic sheep and goats.

Within current distribution, modeled habitat is limited to approximately 151 km<sup>2</sup>, which could support approximately 275 bighorn sheep (assuming all habitat is suitable and relatively high densities of 1.9/km<sup>2</sup>). There is no current population estimate for this PMU, but incidental observations appear to show a decline in bighorn sheep numbers since the mid-1990s.

Management direction is to maintain populations and increase them in areas of the PMU where separation can be maintained (Table 1).

There have been no bighorn hunts in the South Beaverhead PMU and none are planned until the population increases enough to allow hunting.

## **Management Actions**

1. Work with willing domestic sheep permittees, USFS, and BLM to use BMPs to maintain separation between bighorn sheep and domestic sheep and goats.
2. Increase knowledge of movement patterns, habitat use, survival, etc. using radiomarked bighorn sheep.
3. Conduct an aerial survey specifically for bighorn sheep.
4. Refine habitat modeling to more accurately characterize sustainable population levels.
5. Use radiomarked sheep to provide data points for sightability and habitat modeling.

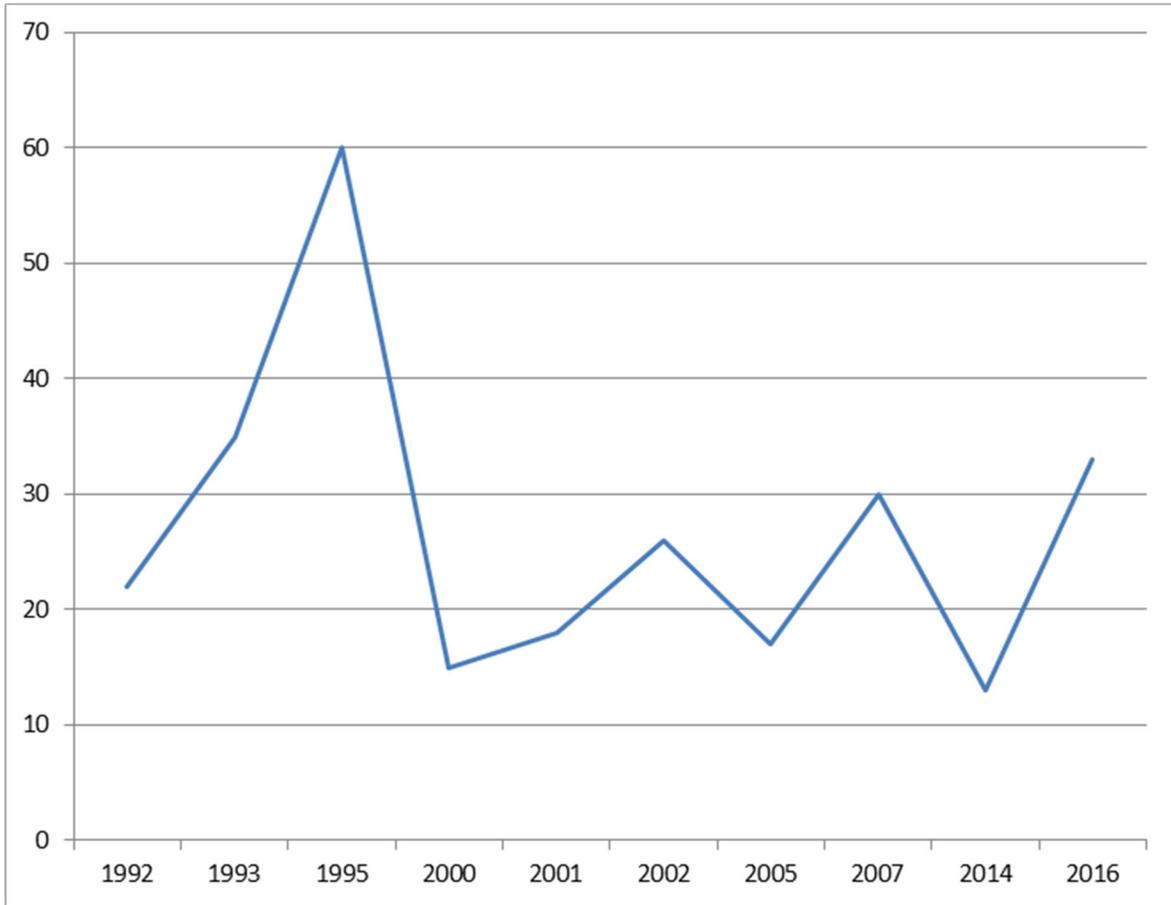


Figure 31. Total bighorn sheep observed (primarily during mule deer and elk surveys), South Beaverhead PMU, 1992-present.

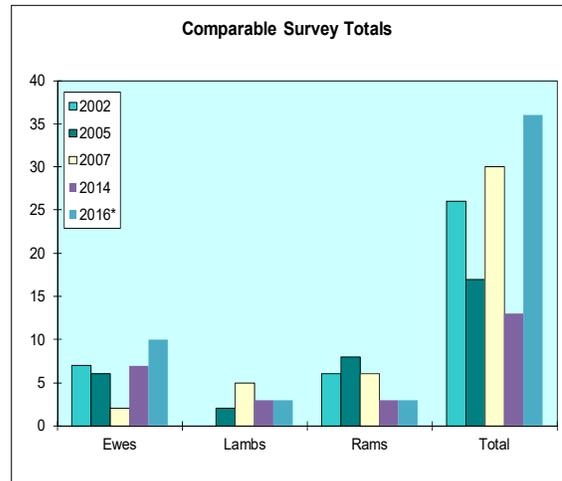
**Rocky Mountain Bighorn Sheep**  
**South Beaverhead**  
 GMUs 58 (east), 59, 59A

**Population surveys**

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
58/59A	2002	7	0	5	1	6	13	26
	2005	6	2	4	4	8	1	17
	2007	2	5	1	5	6	17	30
	2014	7	3	2	1	3	0	13
	2016*	10	3	2	1	3	20	36
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>			<b>30</b>	<b>20</b>	<b>10</b>	<b>30</b>		

*NOTE: All aerial counts are incidental to other surveys (not representative of populations).*

*\*incidental to aerial elk survey*



**Hunting tags and harvest information**

*No hunting season in this area.*

Figure 32. South Beaverhead PMU Population Survey

## **NORTH LEMHI PMU**

### **GMUs 29, 37A; Hunt Area 37A**

#### **Historical Background**

Bighorn sheep populations in this area were essentially extirpated during the early 20<sup>th</sup> century. Occasional sightings of small numbers of sheep in the 1960s-early 1980s likely resulted from temporary movements of animals from the adjacent Middle Main Salmon River or Lost River Range PMUs. The current population resulted from 3 translocation events between 1986 and 1989. Sheep numbers appeared rather stagnant for 10-15 years following translocation, but increased to  $\geq 112$  animals in 2007 (Figure 33). Bighorn numbers have ranged between 80 and 130 animals since 2007. The survey data from 2016 indicate an extremely high ram:ewe ratio and a high lamb:ewe ratio. One should note that there were 45 unclassified animals counted during the survey which may skew the ratios. A hunting season was established in 2005. Both rams and ewes were fitted with GPS collars to refine habitat use, determine movements between adjacent populations, and determine health status in 2013 and 2014.

Elk populations in this area expanded rapidly in the 1970s–1980s and remain at relatively high numbers. Competition with this large elk herd may impact habitat capacity for bighorns.

#### **Management Objectives**

The overall objective for this PMU is to increase the population and offer additional hunting and viewing opportunity. The 2018 survey indicates that this is a growing population and 2 new tags are proposed for the 2019-2020 seasons. However, disease risk and highway mortality are two negative factors that should be monitored.

#### **Habitat Management and Monitoring**

Habitat used by this population occurs primarily in GMU 37A, but includes some areas in GMU 29. Although the USFS manages most of the bighorn range, important portions of the winter and year-round range occur on BLM-managed lands. The area is a combination of the rugged Salmon River canyon to the west and the equally rugged southwest flank of the Lemhi Range to the east. Habitat varies from sagebrush-steppe at lower elevations through dry coniferous forest-grassland to alpine at the highest elevations. U.S. Highway 93 parallels the Salmon River along the western edge of the PMU, but few other roads provide access to occupied bighorn sheep range. Bighorn sheep in the area winter along the river breaks corridor and lower elevation south-southwest facing slopes in the Pahsimeroi Valley. Some bighorns remain in these areas during summer, whereas others apparently migrate to higher elevation sub-alpine and alpine habitats.

#### **Biological Objectives**

Population management objectives are based on historic documented population levels consistent with suitable range availability. Management is directed at allowing populations to grow to levels determined by the habitat and range conditions. Lamb:ewe ratios, ram:ewe ratios, and lamb survival are all monitored to determine if population growth objectives are being reached.

### ***Capture, Radio-mark and or Telemetry***

Bighorn sheep are sometimes captured and fitted with GPS collars to provide population monitoring data.

Both rams and ewes were fitted with GPS collars to refine habitat use, determine movements between adjacent populations, and determine health status in 2013 and 2014.

### ***Population Surveys and Monitoring***

As part of the Department's bighorn sheep population monitoring program, population surveys are conducted periodically. While there is no specific protocol for timing of aerial surveys, most PMU's are monitored every 4-6 years and sometimes more often if coordinated with a scheduled deer or elk survey. These surveys generate a minimum count estimate as there is no sightability model. Ground counts are conducted for some PMU's.

Survey data indicates a gradual but steady increase since 2007. The 2018 survey was a complete survey with a minimum count of 129 and a ewe:lamb ratio of 35:100 (Figure 34).

### **Hunting and Harvest Characteristics**

Harvest success for this PMU has averaged 80% and tag numbers have remained stable at 2 over the last 5 years. Nine rams have been harvested during this same time period. Average age of those harvested rams was 8.4 years.

### **Capture and Translocation**

Fifty-four sheep were translocated into the PMU between 1986 and 1989. No sheep have been translocated out of the PMU.

### **Disease Monitoring**

Risk of contact with domestic sheep or goats is relatively high in this PMU, primarily related to "farm flocks" on adjacent private land. One domestic sheep allotment occurs near potential bighorn habitat.

### **Management Direction**

Because of the relatively high risk of contact with domestic sheep and goats, a hunting season was established before the total population reached 100 individuals. Limited access and rugged terrain provide opportunity for a semi-wilderness hunting experience. Since the area was opened for hunting, 7 of 8 hunters have been successful.

Within current distribution, modeled habitat occupies approximately 312 km<sup>2</sup>, which could support approximately 600 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9/km<sup>2</sup>). However, there are limitations based on specific habitat needs such as lambing and wintering habitat. Thus, further refinement of habitat models and available habitat will likely reduce the estimate of potential population size. Given recent growth

rates, the population is expected to continue growing in the near future and management direction will be to increase population levels (Table 1).

### Management Actions

1. Work with USFS to maintain or improve habitat for bighorn sheep.
2. Work with USFS, BLM, and other partners to control or reduce noxious weed occurrence.
3. Increase knowledge of movement patterns among hunt areas and adjacent PMUs to better understand metapopulation characteristics (connectivity and genetic exchange).
4. Refine habitat modeling to more accurately characterize sustainable population levels.
5. Use radiomarked sheep to provide data points for sightability modeling.
6. Work with domestic sheep owners/permittees to employ BMPs designed to maintain separation of wild and domestic sheep.

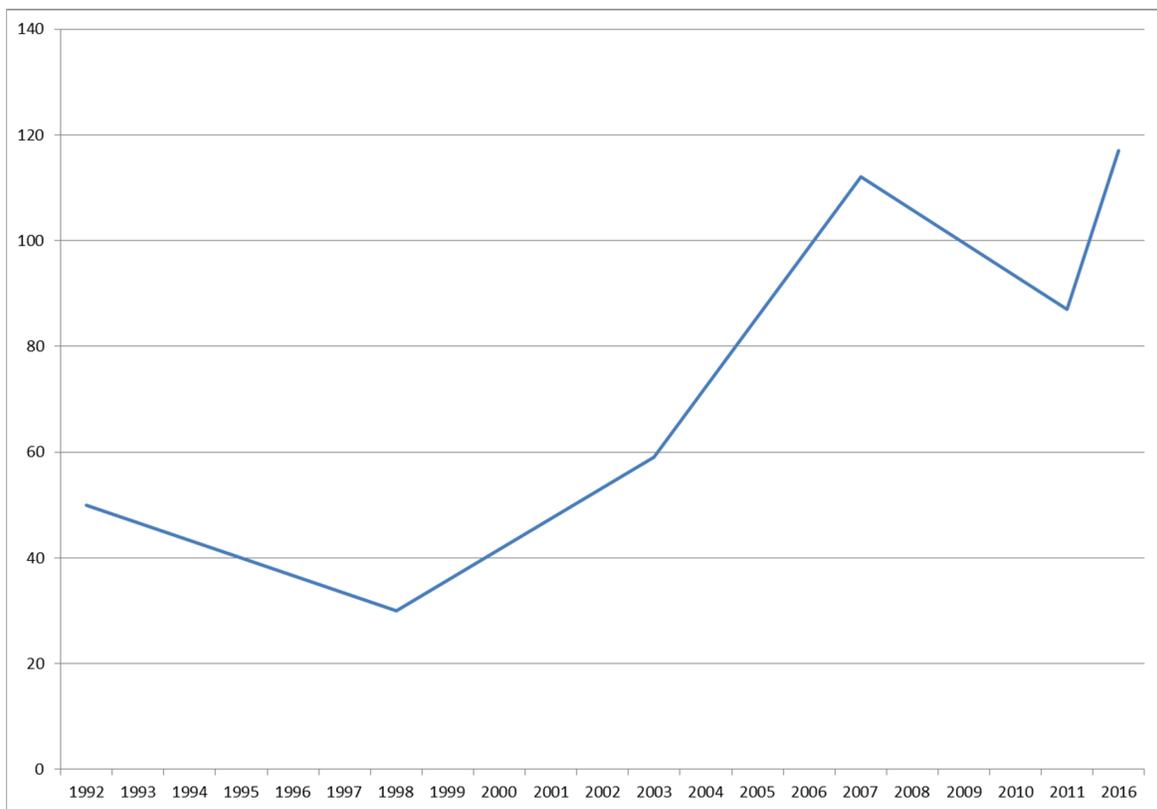


Figure 33. Total bighorn sheep observed during IDFG aerial surveys, North Lemhi PMU, 1992-present.

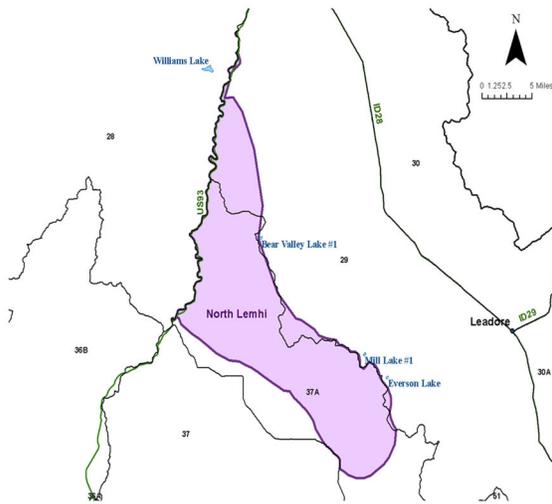
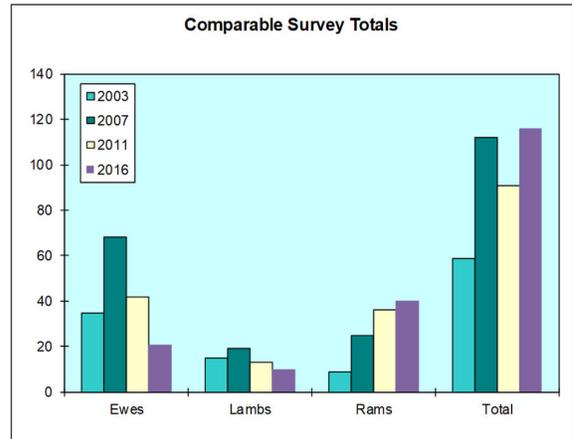
## Rocky Mountain Bighorn Sheep

### North Lemhi

GMUs 29, 37A; Hunt Area 37A

#### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
Total	2003	35	15	6	3	9	0	59
	2007	68	19	11	14	25	0	112
	2011	42	13	15	21	36	0	91
	2016	21	10	12	28	40	45	116
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>			<b>48</b>	<b>57</b>	<b>133</b>	<b>190</b>		



#### Hunting tags and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags*</b>	2	2	2	2	2	2	3	2
<b>Harvest</b>	1	2	2	2	2	0	3	2
<b>Hunter success</b>	50	100	100	100	100	0	100	100
<b>Ave ram age</b>	6.5	5.5	9.5	10.5	7.5	0.0	7.7	8.0

\* Includes raincheck 2016.

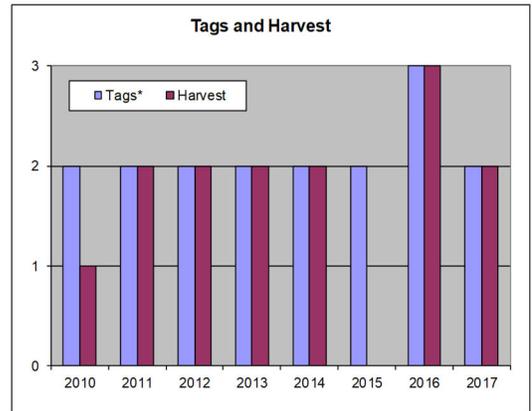


Figure 34. North Lemhi Population Survey and Harvest

## **SOUTH LEMHI PMU**

### **GMUs 51 (east), 58 (west)**

#### **Historical Background**

Similar to some other areas in central Idaho, historic data for Rocky Mountain bighorn sheep in the southern Lemhi Range is lacking. The journals of early trappers, settlers, miners, and other sources indicate that sheep were more plentiful and widely spread than what is currently observed. By the early 1900s, bighorn sheep were eliminated from most of the area and severely reduced in the remaining habitats. Vegetative changes due to livestock use on winter ranges, loss to disease, and indiscriminate harvest by settlers and miners probably were the main causes of bighorn sheep declines.

Subsistence and indiscriminate harvest of bighorn sheep by early settlers and pioneering travelers was greatly reduced after establishment of IDFG in 1937. Changes in federally controlled domestic sheep grazing allotments, habitat improvement projects, water developments, and wild bighorn translocations have all been implemented in hopes of increasing wild sheep populations in the Lemhi Range.

There have been 2 bighorn sheep translocations in the South Lemhi PMU. All of the sheep (41 total) were captured from the Whiskey Basin population in Wyoming and were released in Badger Creek and Uncle Ike Creek on the west side of the Lemhi range in 1983 and 1984. Counts of these sheep have generally been made incidental to aerial surveys for other big game species and therefore do not represent complete population surveys or composition trends (Figure 35).

#### **Management Objectives**

##### **Habitat Management and Monitoring**

Bighorn sheep in the South Lemhi PMU primarily occur in GMUs 51 (east) and 58 (west). Habitats are diverse, generally mountainous types with bighorn sheep summering mostly at higher elevations on alpine and sub-alpine ranges. Winter ranges are mostly sagebrush-grass or curl-leaf mountain mahogany types where snow accumulation is light. The USFS generally administers summer ranges, whereas both USFS and BLM manage winter ranges. Bighorn sheep have been observed throughout the southern Lemhi Range.

##### **Biological Objectives**

###### ***Capture, Radio-mark and or Telemetry***

Radio-collaring efforts for bighorn sheep in the south Lemhi PMU began in January and February of 2012 and continued in January of 2013. In total, 15 GPS radio-collars have been deployed on bighorn sheep in the South Lemhis over the last two years (2012 – 3 ewes and 3

rams; 2013 – 4 ewes and 5 rams). The information gathered from the satellite GPS collars has been used to evaluate spatial and temporal use of the area, summer lamb survival, and to eventually gain some sightability points for the sightability model. This information has and will continue to be used evaluate the Payette Summer Habitat Model that we used to predict habitat in the Statewide Bighorn Sheep Management Plan. Health samples were taken from radio-collared bighorn sheep and those samples were sent to the Wildlife Health Laboratory for analysis. This project has been funded with BLM Challenge Cost Share money and IDFG matching funds.

### ***Population Surveys and Monitoring***

Regional personnel surveyed this area for bighorn sheep in March 2014. A total of 45 bighorn sheep were counted; 20 ewes, 5 lambs, and 20 rams. Staff also surveyed for bighorn sheep in conjunction with Mountain Valley mule deer PMU survey during the winter of 2015-2016 and counted 40 individuals.

### **Hunting and Harvest Characteristics**

### **Capture and Translocation**

### **Disease Monitoring**

There is risk of contact between domestic and wild sheep in parts of the Lemhi Range. There are both “farm flocks” on private land and active domestic sheep allotments (Bernice, Mahogany Butte, Eightmile) that overlap bighorn sheep distribution in this area. One known farm flock of approximately 100 domestic sheep is located in the Deep Creek area. Domestic sheep allotments that occur on Idaho National Laboratory land may also be a source of potential contact.

Although information about the number of bighorn sheep is poor, the small numbers observed in recent years suggest the population may currently be at risk of extirpation.

### **Management Discussion**

IDFG will continue to work with federal agencies and willing domestic sheep producers in the South Lemhi PMU to reduce risk of contact between domestic and bighorn sheep, particularly for active domestic sheep allotments that overlap or abut bighorn sheep distribution in this area. Management direction will focus efforts on maintaining separation between bighorn sheep and domestic sheep and goats.

Within current distribution, modeled habitat occupies approximately 297 km<sup>2</sup>, which could support approximately 550 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9/km<sup>2</sup>). However, there are limitations based on specific habitat needs such as lambing and wintering habitat. Thus, further refinement of habitat models and available habitat will likely reduce the estimate of potential population size. There is no current population estimate for this PMU, but incidental observations appear to show a decline since

1992. Management direction is to maintain populations and increase them in areas of the PMU where separation can be maintained (Table 1).

There have been no bighorn hunts in the South Lemhi PMU and none are planned until the population increases enough to allow hunting.

More information is needed to manage this population; including use areas, seasonal movements, a population estimate, survival rates, and production. IDFG will pursue funding to initiate a study to gather this type of data in the South Lemhi PMU.

### **Management Actions**

1. Work with willing domestic sheep permittees, USFS, and BLM to use BMPs to maintain separation between bighorn sheep and domestic sheep and goats.
2. Increase knowledge of movement patterns, habitat use, survival, etc. using radiomarked bighorn sheep.
3. Conduct an aerial survey specifically for bighorn sheep.
4. Refine habitat modeling to more accurately characterize sustainable population levels.
5. Use radiomarked sheep to provide data points for sightability modeling.

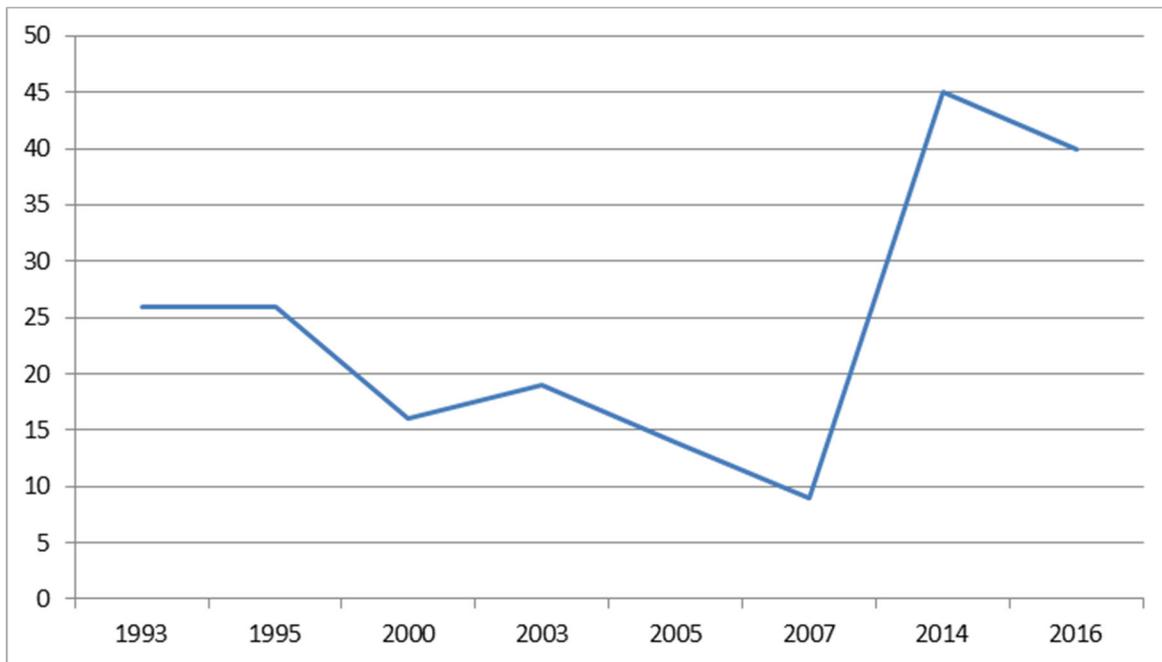


Figure 35. Total bighorn sheep observed, South Lemhi PMU, 1993-present.

**Rocky Mountain Bighorn Sheep**  
**South Lemhi**  
 GMUs 51(east), 58 (west)

**Population surveys**

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
51	2003	10	5	3	1	4	0	19
	2005	6	3	2	3	5	0	14
	2007	1	1	0	0	0	7	9
	2014	20	5	5	15	20	0	45
	2016*	20	8	6	7	13	0	40
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>		<b>40</b>	<b>30</b>	<b>35</b>	<b>65</b>			

*NOTE: All aerial counts are incidental to other surveys (not representative of populations).*

\*incidental to aerial deer survey

**Hunting tags and harvest information**

*No hunting season in this PMU.*

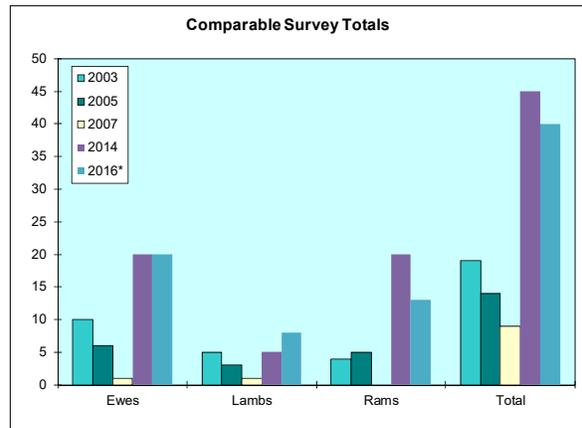


Figure 36. South Lemhi Population Surveys

## **LOST RIVER RANGE PMU**

### **GMUs 37, 50 (east), 51 (west); Hunt Area 37**

#### **Historical Background**

There are no quantitative historical data for the number of bighorn that occurred on the Lost River Range. However, by the 1950s bighorn throughout the central Idaho area had declined substantially. In the Lost River area where Seton (1929) reported thousands of bighorn sheep in the late 1800s, Smith (1954) reported there were only a few dozen bighorn left.

Initial releases of Rocky Mountain bighorn sheep into the Lost River Range began in 1969 and continued through 1980; a large augmentation occurred in 2005. All releases were considered successful. Prior to the 2005 augmentation, IDFG entered into a Memorandum of Understanding (MOU) with the BLM and USFS to foster enhanced management of bighorn sheep in the Lost River Range. The MOU was spurred by removal of domestic sheep from grazing allotments within and adjacent to occupied bighorn sheep range.

Bighorn numbers on the Lost River Range appear to increase steadily until the early 1980s, reaching a high of 182 observed during a 1980 survey. The population remained near that level through the late 1980s. However, by 1992 the population appeared to have suffered the same decline and persistent low recruitment as other bighorn sheep populations in the region (Figure 54). Recovery from a period of low recruitment and augmentation with 62 wild sheep from Montana apparently spurred significant population growth; a record high 240 (since reintroduction) bighorn sheep were observed during the most recent survey in 2010. In response to the increases in this sheep population, IDFG increased the bighorn sheep tags available for harvest from 3 to 6 in 2011 and then to 8 tags in 2017. Bighorn sheep surveys conducted in March of 2016 showed continued growth to this population with 260 total sheep observed.

#### **Management Objectives**

#### **Habitat Management and Monitoring**

This population occurs on the Lost River Range in GMUs 37, 50, and 51. Although USFS manages most of the bighorn range, there is some use of BLM-managed lands. The area is typified by dry coniferous forest-grassland and alpine habitats with low motorized road or trail densities. Access into most occupied bighorn sheep habitats is limited. Bighorn sheep primarily summer at higher elevations in alpine ranges. Winter ranges extend from the lower elevation foothills to mountain ridges >11,000 feet and include multiple habitat types. Bighorn sheep are observed consistently throughout this PMU.

#### **Biological Objectives**

### ***Capture, Radio-mark and or Telemetry***

IDFG radio-collared 20 bighorn sheep (6 rams and 14 ewes) on the north end of the Lost River Range PMU in March 2017. At the same time in 2018, we radio-collared 54 bighorn sheep (10 rams and 44 ewes) across the Lost River Range PMU. The information gathered from the satellite GPS collars will be used to evaluate spatial and temporal use of the area, summer lamb survival, and to eventually gain some sightability points for the sightability model. IDFG will also use these points to evaluate the Payette Summer Habitat Model that we used to predict habitat in the Statewide Bighorn Sheep Management Plan. Health samples were taken from radio-collared bighorn sheep and those samples were sent to the Wildlife Health Laboratory for analysis.

### ***Population Surveys and Monitoring***

Bighorn sheep surveys conducted in March of 2016 showed continued growth to this population with 256 total sheep observed. There were 114 ewes, 49 lambs, and 93 rams counted.

### **Hunting and Harvest Characteristics**

This population has had an increase in hunting opportunity since 2010. A total of 3 tags were allocated in 2010 and in 2017 there were 9 tags allocated. Hunter success has been near 100% most years. Average ram age in this PMU has ranged from 6.9 years old in 2011 to 9.5 years old in 2015. The rams here exhibit quality horn size and is an area lottery tag winners select to hunt some years (2015, 2017).

### **Capture and Translocation**

See *Capture, Radio-mark and or Telemetry* under Biological Objectives above.

### **Disease Monitoring**

Although reduced by several changes in land management practices in recent years, risk of contact with domestic sheep remains an issue. At the time of the augmentation release, IDFG and USFS staff developed a response plan to address and reduce wild sheep-domestic contact in the event bighorns left the defined project area.

The Lost River Range is relatively dry and availability of surface water is sporadic. The USFS has developed some water sources (guzzlers) to address potentially limited natural water distribution. With current available information and considering the potential of increased disease risk, IDFG currently discourages the development of water sources.

### **Management Direction**

Within current distribution, modeled habitat occupies approximately 678 km<sup>2</sup>, which could support approximately 1,290 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9/km<sup>2</sup>). Point agreement with the habitat model is low (~60%), indicating sheep have spent significant time outside of predicted habitat areas. Conversely, there could be greater limitation based on specific habitat needs such as lambing and wintering habitat. Thus, further refinement of habitat models and available habitat will likely reduce the estimate of

potential population size. Regardless, the PMU can sustain more bighorn sheep and IDFG will continue to manage for an increase in population in the PMU (Table 1).

### Management Actions

1. Work with USFS to maintain or improve habitat for bighorn sheep.
2. Work with USFS, BLM, and other partners to control or reduce noxious weed occurrence.
3. Increase knowledge of movement patterns among hunt areas and adjacent PMUs to better understand metapopulation characteristics (connectivity and genetic exchange).
4. Refine habitat modeling to more accurately characterize sustainable population levels.
5. Work with domestic sheep owners or permittees to employ BMPs designed to maintain separation of wild and domestic sheep.

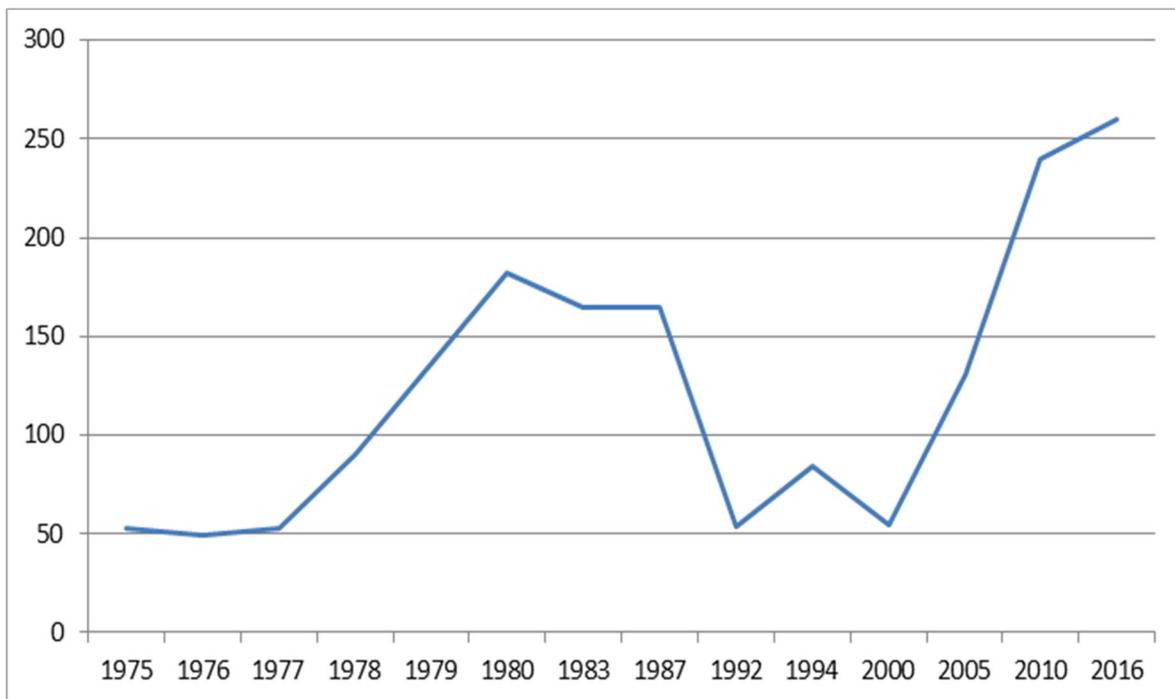


Figure 37. Total bighorn sheep observed during IDFG aerial surveys, Lost River Range PMU, 1975-present.

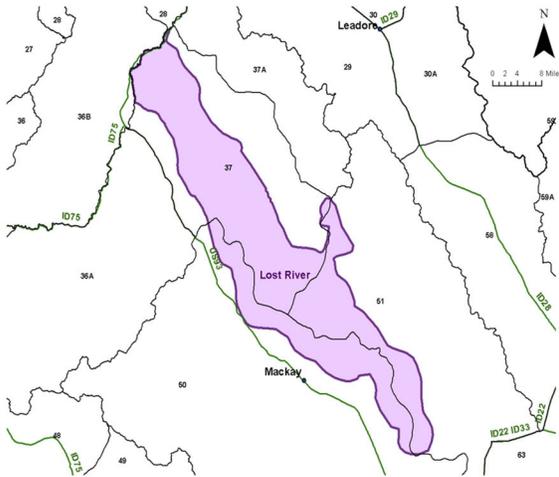
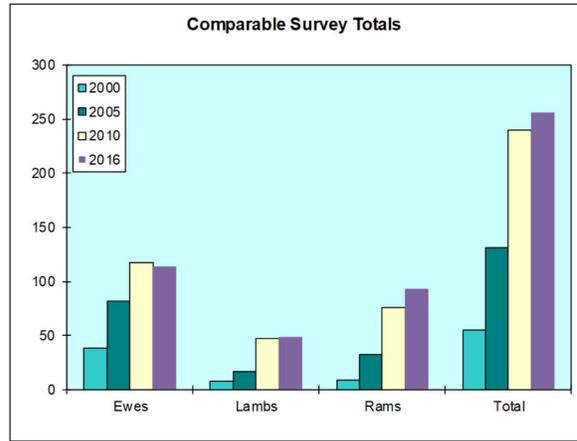
## Rocky Mountain Bighorn Sheep

### Lost River Range

GMUs 37, 50 (east), 51 (west); Hunt Area 37

#### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
37, 50, 51	2000	38	8	5	4	9	0	55
	2005	82	17	19	13	32	0	131
	2010	117	47	38	38	76	0	240
	2016	114	49	32	61	93	0	256
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>			<b>43</b>	<b>28</b>	<b>54</b>	<b>82</b>		



#### Hunting tags and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags</b>	3	6	6	6	6	7	6	9
<b>Harvest</b>	3	5	5	2	6	3	6	8
<b>Hunter success</b>	100	83	83	33	100	43	100	89
<b>Ave ram age</b>	7.2	6.9	7.3	8.0	8.8	9.5	8.3	8.9

2015 and 2017 include auction or lottery tags.

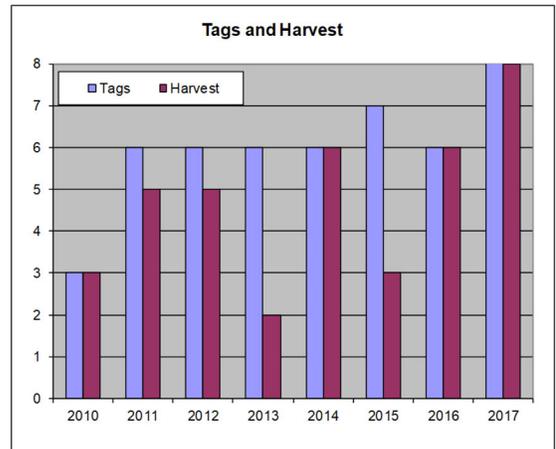


Figure 38. Lost River Range Population Survey and Harvest

## **EAST FORK SALMON RIVER PMU GMUs 36 (southeast), 36A; Hunt Area 36A**

### **Historical Background**

Bighorn sheep populations in this area persisted despite pressures of early settlement. However, subsistence hunting for mining camps and intensive livestock grazing in the late 1800s reduced numbers to low levels. Estimated sheep numbers from various sources in the early 20<sup>th</sup> century ranged from 50 to 150. Sheep in this PMU became the subject of much social and political interest in the 1960s and 1970s, resulting in several research and habitat enhancement projects, as well as a cooperative management agreement between BLM and IDFG.

No animals have been translocated into this native population and only 1 translocation out of the PMU has occurred. Population estimates for the PMU varied considerably over time (50-150 in the early-mid 20<sup>th</sup> century) depending on the source (USFS, private landowners, IDFG). Annual variations included some that do not appear biologically feasible. Regardless, the population apparently reached a modern peak in 1990 (191 observed), a level higher than estimates from earlier in the century (Figure 40). Some early estimates were derived from historical observations by USFS and IDFG personnel. More recent values (1978 forward) are primarily observed numbers from IDFG aerial surveys. The population suffered an all-age die-off along with surrounding PMUs and declined by 50% by 1993. Hunting was permitted through 1996, but closed until 2007 because of low sheep numbers. Recent surveys in 2013 and 2017 indicate a low number of sheep with poor recruitment. However, it should be noted that the 2013 survey was incomplete and the 2017 survey occurred soon after a capture effort took place. Because aerial surveys of this population have become problematic, the Department implemented a mark-resight estimate in December 2017. This estimate indicated an increasing population trend with decent recruitment.

A research project was implemented in winter of 2016. Thirty-four sheep were fitted with GPS collars to determine movements, habitat use, health status, and lamb survival. An additional 6 GPS collars were deployed on ewes in 2017. Nineteen GPS collars were fitted to 17 ewes and 2 rams in 2018. Currently, there are 24 active GPS collars in the population.

### **Management Objectives**

The overall objective for this PMU is to increase the population and offer additional hunting opportunity. However, quantity and quality of winter range may be important limiting factors to achieving population growth. Although grazing management has changed over time, the winter range is quite dry and vegetative production appears low. In addition, elk numbers in the East Fork drainage increased dramatically beginning in the 1970s and competition with a large elk herd may impact habitat capacity for bighorns.

### **Habitat Management and Monitoring**

This population includes sheep in GMUs 36A and 36 (southeastern portion) (Figure 1). Ownership of bighorn range is split between USFS (summer range) and BLM (winter range).

The area is typified by dry, coniferous forest-grassland habitats with low motorized road-trail densities. Access into most occupied bighorn sheep habitats is limited. Bighorn sheep in the area winter in a relatively small area of shrub-steppe habitat west of the East Fork Salmon River between Joe Jump Basin and Big Boulder Creek. Sheep migrate west into the White Cloud Mountains to summer in sub-alpine to alpine habitats.

### **Biological Objectives**

Population management objectives are based on historic documented population levels consistent with suitable range availability. Management is directed at allowing populations to grow to levels determined by the habitat and range conditions. Lamb:ewe ratios, ram:ewe ratios, and lamb survival are all monitored to determine if population growth objectives are being reached.

### ***Capture, Radio-mark and or Telemetry***

Bighorn sheep are sometimes captured and fitted with GPS collars to provide population monitoring data. Approximately 59 ewes and rams have been collared in this PMU since 2016. Currently, there are 24 active GPS collars in the population. This collaring effort has allowed managers to collect high quality lamb survival data among other research objectives.

### ***Population Surveys and Monitoring***

As part of the Department's bighorn sheep population monitoring program, population surveys are conducted periodically. While there is no specific protocol for timing of aerial surveys, most PMU's are monitored every 4-6 years and sometimes more often if coordinated with a scheduled deer or elk survey. These surveys generate a minimum count estimate as there is no sightability model. Ground counts are conducted for some PMU's.

An aerial survey was conducted for the East Fork PMU in winter, 2017 with poor results; only 39 sheep were observed. Biologists believe that two consecutive winters of capture made sheep highly sensitive to helicopter presence, causing them to be very hard to detect from the air. Biologists took advantage of the large number of collars in the population to conduct a mark-resight ground count in December, 2017. The estimate calculated from this effort was 102 sheep. This survey was believed to be a better estimate of the true population.

### **Hunting and Harvest Characteristics**

Currently, 2 tags are offered for this PMU. The 5 year average success rate is 60% and average horn length and circumference are around 32 and 14 inches, respectively. In addition, the average age of harvested rams over the last 5 years is about 9. These measures indicate that a pool of mature rams continue to be available for harvest.

### **Capture and Translocation**

No bighorn sheep have been translocated into this PMU. In 1988, 13 sheep were translocated from the East Fork to the Lemhi Range.

## **Disease Monitoring**

Contact with domestic sheep is a risk factor at the edges of occupied summer range near USFS allotments. Risk could increase in the event individuals of either species wander. BMP agreements have been developed to minimize risk of contact.

Lastly, the East Fork population appears to still be disease-limited, as evidenced by very low lamb:ewe ratios since the die-off in the early 1990s (Figure 40). Ratios declined from an average of 57:100 (range 22–88) between 1977 and 1990 to <9:100 (range 3–15) since 1991 (for years in which >50 sheep were classified). In 2013, a lamb:ewe ratio of 40 was observed by a partial survey. A targeted survey was conducted in 2017 which indicated the lamb:ewe ratio went back down to 12. Mark resight survey in December 2017 indicated a lamb:ewe ratio of 39:100.

## **Management Direction**

Hunting seasons were closed for 10 years and reopened in 2007 because adequate numbers of rams were available to support limited harvest. Only one of the 2 tags was filled in 2016 and the age of that harvested ram was much lower than the average age in the previous 7 years. This may call for careful scrutiny of 2017 harvest data.

Within current distribution, modeled habitat occupies approximately 558 km<sup>2</sup>, which could support approximately 1,060 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9/km<sup>2</sup>). However, with the current restricted winter range, total sheep numbers that can be supported in this PMU are likely much lower. Regardless, historic and recent data indicates the PMU can sustain significantly more bighorn sheep and management direction will be to increase population levels (Table 1).

## **Management Actions**

1. Work with USFS and BLM to maintain or improve habitat for bighorn sheep.
2. Work with USFS, BLM, and other partners to control or reduce noxious weed occurrence.
3. Increase knowledge of movement patterns among hunt areas and adjacent PMUs to better understand metapopulation characteristics (connectivity and genetic exchange).
4. Refine habitat modeling to more accurately characterize sustainable population levels.
5. Use radiomarked sheep to provide data points for sightability modeling and determining limiting factors to population growth.
6. Work with domestic sheep owners or permittees to employ BMPs designed to maintain separation of wild and domestic sheep.

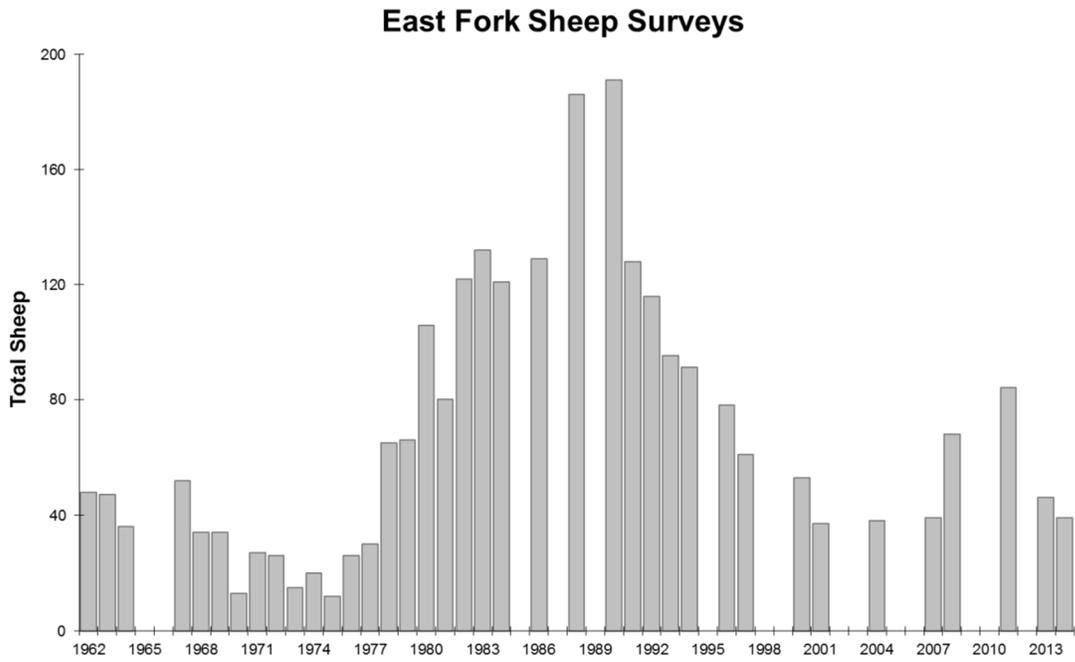


Figure 39. Approximate total bighorn sheep estimated or observed, East Fork Salmon River PMU, 1920-present

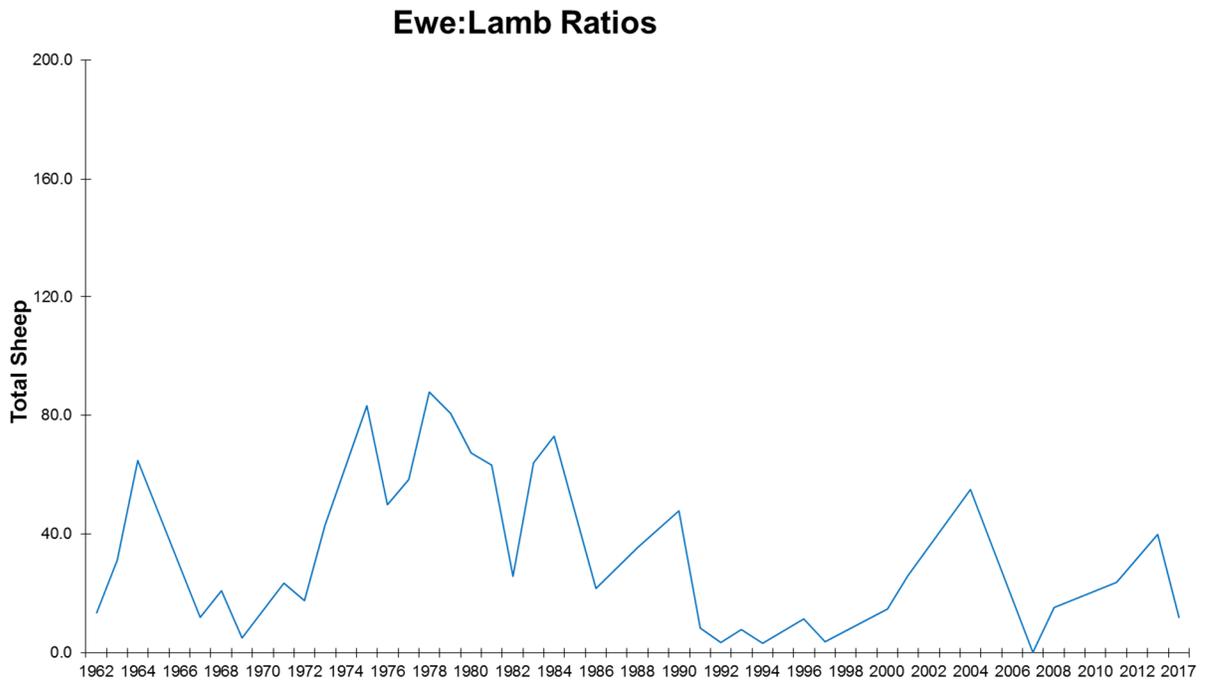


Figure 40. Observed bighorn sheep lamb:100 ewe ratios, East Fork Salmon River PMU, 1962-present.

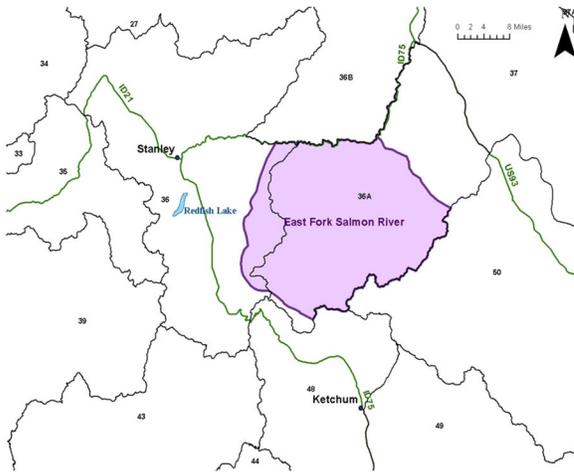
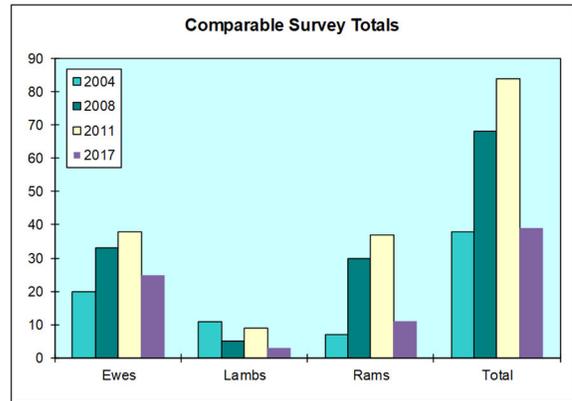
## Rocky Mountain Bighorn Sheep

### East Fork Salmon River

GMUs 36 (southeast), 36A; Hunt Area 36A

#### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
36A	2004	20	11	4	3	7	0	38
	2008	33	5	16	14	30	0	68
	2011	38	9	12	25	37	0	84
	2017	25	3	1	10	11	0	39
<b>Modeled estimate</b>								
<b>Per 100 ewes observed</b>			<b>12</b>	<b>4</b>	<b>40</b>	<b>44</b>		



#### Hunting tags and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Tags*</b>	2	2	2	2	2	2	2	2
<b>Harvest*</b>	1	1	1	1	2	2	1	0
<b>Hunter success</b>	50	50	50	50	100	100	50	0
<b>Ave ram age</b>	8.5	8.5	10.5	9.0	8.8	9.5	5.5	

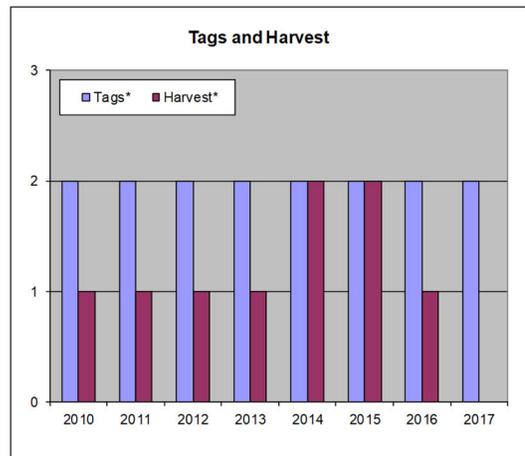


Figure 41. East Fork Salmon River Population Survey and Harvest

## **MIDDLE MAIN SALMON RIVER PMU**

### **GMUs 28 (southeast), 36B, 27 (southeast); Hunt Areas 28-2, 36B**

#### **Historical Background**

Even though they were near human population centers, bighorn sheep in this area persisted when most front-country populations were extirpated. Like most areas, subsistence hunting for mining camps and intensive livestock grazing in the late 1800s produced some negative impacts. Little information about historic population trends exists.

The native population of the Middle Main PMU provided a source of animals for translocation within and outside Idaho for >20 years. A small number of sheep were moved from the adjacent Lower Panther-Main Salmon PMU to augment the Birch Creek sub-population.

Land and resource use changed after the mining boom: subsistence hunting and livestock use decreased and many shrub-dominated ranges began reverting to grasslands. The bighorn population increased to approximately 300 animals by 1988, but declined by roughly 50% after a disease-driven, all-age, die-off in the early 1990s and remains between 130–160 sheep (Figure 42). Values are primarily observed numbers from IDFG aerial surveys.

In March 2016, 10 bighorn sheep were fitted with GPS collars in Morgan Creek primarily to determine movements and connectivity between this PMU and Middle Fork PMUs.

#### **Management Objectives**

The overall objective for this PMU is to increase the population and offer additional hunting and viewing opportunity. Several issues outlined below may be affecting population growth and need to be addressed to achieve this objective.

Because bighorns in this PMU occupy less rugged winter ranges than typical of wild sheep, predation risk from wolves may be somewhat higher than in other PMUs. Some farm flocks of domestic sheep occur in and near the PMU, creating a risk of contact. Several animals from the Birch Creek sub-population spend most of the year in close proximity to Highway 75 just south of Challis and are subject to mortality due to vehicle collisions. Past attempts to reduce vehicle collisions by drawing sheep farther west of the highway with habitat improvements have met with limited success, as have highway signage. In April 2010, a sheep viewing station was opened to enhance public knowledge and appreciation of bighorn sheep and their habitat (a collaborative effort among Idaho Outfitters and Guides Association, Idaho Chapter Wild Sheep Foundation, IDFG, and several other entities).

#### **Habitat Management and Monitoring**

The Middle Main population includes sheep in GMU 36B and small portions of GMUs 27 (upper Warm Springs and Camas creek drainages) and 28 (Hat Creek and upstream) (Figure 1). Three subpopulations exist: the smaller Birch Creek subpopulation occupies the area from Challis upstream to approximately Sink Creek; the Morgan Creek herd ranges downstream from

Challis to Hat Creek in GMU 28; and the Williams Lake herd ranges downstream from Hat Creek to Perreau Creek. Ownership is split between the BLM and USFS, including some area within the Frank Church River-of-No-Return Wilderness. Habitat grades from sagebrush-steppe at lower elevations though dry, coniferous forest-grassland to alpine at the highest elevations. This PMU contains some of the least rugged terrain occupied by bighorns in eastern Idaho. Highways 93 and 75 parallel the Salmon River along the eastern edge of the PMU; some gravel roads provide access to occupied bighorn sheep range. Bighorn sheep in the area winter along the main Salmon River corridor. Some bighorns remain in these areas during summer, whereas others migrate to higher elevation sub-alpine and alpine habitats.

Wildfire has impacted some portions of the PMU, particularly since 2007. In some cases, fires have likely benefited wild sheep by reducing conifer encroachment and promoting grass and forb production. However, because of the semi-arid nature of parts of the landscape, habitat response to fire may be slow or negative, particularly on winter ranges where cheatgrass and noxious weeds such as knapweed, rush skeletonweed, and leafy spurge could ultimately have significant impacts on winter range productivity. Elk populations have declined somewhat since peaks during the mid-2000s, but competition with a large elk herd may impact habitat capacity for bighorns.

### **Biological Objectives**

Population management objectives are based on historic documented population levels consistent with suitable range availability. Management is directed at allowing populations to grow to levels determined by the habitat and range conditions. Lamb:ewe ratios, ram:ewe ratios, and lamb survival are all monitored to determine if population growth objectives are being reached.

### ***Capture, Radio-mark and or Telemetry***

Bighorn sheep are sometimes captured and fitted with GPS collars to provide population monitoring data.

In March 2016, 10 bighorn sheep were fitted with GPS collars in Morgan Creek primarily to determine movements and connectivity between this PMU and Middle Fork PMUs.

### ***Population Surveys and Monitoring***

As part of the Department's bighorn sheep population monitoring program, population surveys are conducted periodically. While there is no specific protocol for timing of aerial surveys, most PMU's are monitored every 4–6 years and sometimes more often if coordinated with a scheduled deer or elk survey. These surveys generate a minimum count estimate as there is no sightability model. Ground counts are conducted for some PMU's.

The population was relatively stable between 2005 and 2010; however the 2016 survey indicated a decline. Part of the difference can be attributed to some areas being missed during the 2016 survey. Lamb:ewe ratio was 23:100 and ram:ewe ratio was 39:100.

## **Hunting and Harvest Characteristics**

Harvest success for this PMU has averaged 82% and tag numbers have varied between 5 and 6 over the last 5 years. Twenty-three rams have been harvested during this same time period. Native American harvest occurs in portions of the PMU, but harvest levels are unknown.

## **Capture and Translocation**

The Middle Main PMU was a primary source of Rocky Mountain bighorn sheep for translocation to other sites; nearly 104 were captured and moved between 1969 and 1992. However, capture and translocation have been curtailed since populations and productivity declined. Only one translocation into the PMU has occurred (8 sheep from GMU 28 were released in Birch Creek in 1982).

## **Disease Monitoring**

The population was disease-limited, as evidenced by the die-off in the early 1990s. Since that time, lamb:ewe ratios have hovered around 30:100, indicating that disease is playing a lesser role in this PMU compared to others in the region.

## **Management Direction**

Because of relatively easy access to much of the hunt area, hunter success tends to be high most years. Backcountry hunting experiences are available within wilderness portions of the hunt area. As a result of the 2017-2018 season-setting process the boundary for hunt area 28-2 was adjusted, but number of tags available stayed constant.

Within current distribution, modeled habitat occupies approximately 567 km<sup>2</sup>, which could support approximately 1,075 bighorn sheep (assuming all habitat is suitable year-round and relatively high densities of 1.9/km<sup>2</sup>). However, there are limitations based on specific habitat needs such as lambing and wintering habitat. Thus, further refinement of habitat models and available habitat will likely reduce the estimate of potential population size.

## **Management Actions**

1. Work with USFS and BLM to maintain or improve habitat for bighorn sheep.
2. Work with USFS, BLM, and other partners to control or reduce noxious weed occurrence.
3. Work with USFS to reduce fire occurrence on winter range in areas where a seed source exists for cheat grass.
4. Increase knowledge of movement patterns among hunt areas and adjacent PMUs to better understand metapopulation characteristics (connectivity and genetic exchange).
5. Refine habitat modeling to more accurately characterize sustainable population levels.
6. Use radiomarked sheep to provide data points for sightability modeling.
7. Work with domestic sheep owners to employ BMPs designed to maintain separation of wild and domestic sheep.

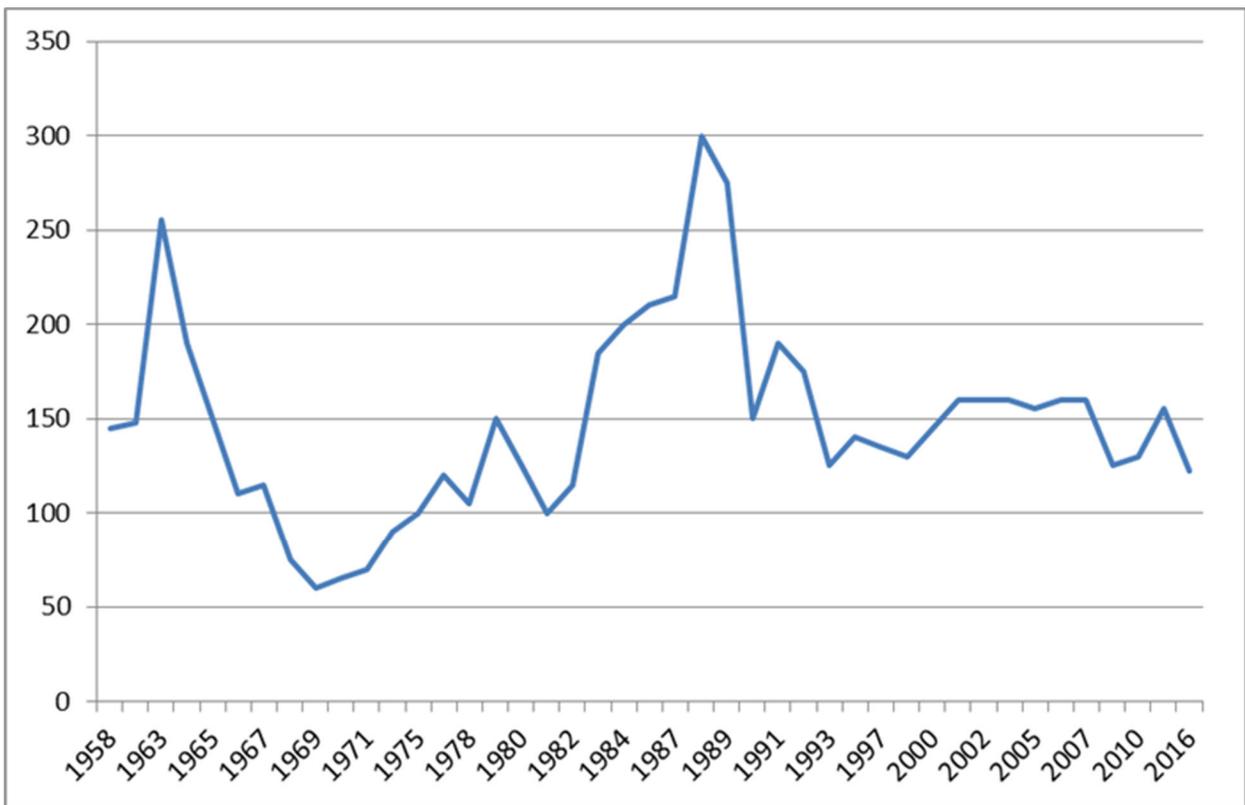


Figure 42. Approximate total bighorn sheep observed or estimated, Middle Main Salmon River PMU, 1958-present.

## Rocky Mountain Bighorn Sheep

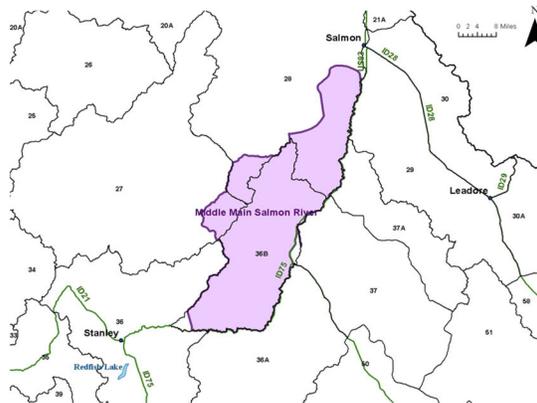
### Middle Main Salmon River

GMUs 28 (southeast), 36B, 27 (southeast); Hunt Areas 28-2, 36B

#### Population surveys

Area	Year	Ewes	Lambs	Rams			Unclass	Total
				I, II	III, IV	Total		
Morgan Cr.	2005	76	18	26	13	39	0	133
	2008	61	18	10	19	29	0	108
	2010	55	22	19	7	26	0	103
Birch Cr.	2005	21	2	5	4	9	0	32
	2008	22	6	2	4	6	0	34
	2010	6	2	4	2	6	0	14
SE 28	2005	28	8	9	5	14	0	50
	2008	51	10	10	10	20	0	81
	2010	60	12	4	8	12	0	84
Total	2005	125	28	40	22	62	0	215
	2008	134	34	22	33	55	0	223
	2010	121	36	27	17	44	0	201
Modeled estimate								
Per 100 ewes observed			24	25	13	39		

Note: Numbers corrected per past data summaries; of note, this population status graph is comprised of partial and "total" surveys, the 2005, 2008, and 2010 are total surveys. Total" = most of the PMU surveyed.



#### Hunting tags and harvest information

	2010	2011	2012	2013	2014	2015	2016	2017
Tags	28-2	1	1	1	1	1	2	2
	36B	4	4	4	4	4	4	4
	Total	5	5	5	5	5	6	6
Harvest	28-2	1	1	1	1	1	2	2
	36B	4	4	3	2	3	4	4
	Total	5	5	4	3	4	6	5
Hunter success	100	100	80	60	80	100	83	83
Ave ramage	7.7	7.8	6.6	8.0	7.0	6.2	7.1	4.5

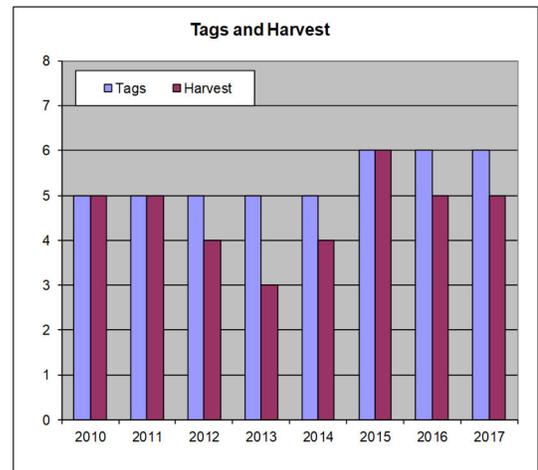
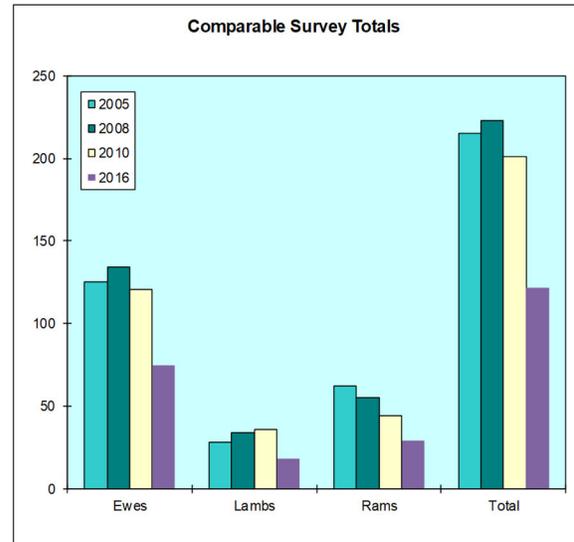


Figure 43. Middle Main Salmon River Population Survey and Harvest

# LIONHEAD PMU

## Description

This area includes portions of GMU 61 near Henry's Lake (Figure 13). There is a small population of bighorn sheep that occurs on the Idaho-Montana border. Montana's state plan refers to this as the Hilgards population. These sheep spend varying amounts of time in Idaho. Montana has periodically issued hunting tags for this herd. Idaho authorized a 5-tag controlled hunt on this population in 1962, 1964, 1965, and 1966. Currently this population of bighorn sheep is not hunted in Idaho and has a high nonconsumptive value, particularly to those recreating in the Targhee Creek area.

## Management Direction

Management direction is to document observations and provide for nonconsumptive use. IDFG does not currently manage this sheep population for hunting but there has been interest in the past to try to provide limited opportunity that is shared cooperatively between Montana and Idaho.

## Management Action

1. Document bighorn sheep locations to better understand their use of this area.
2. Provide information to those interested in bighorn sheep viewing opportunities.

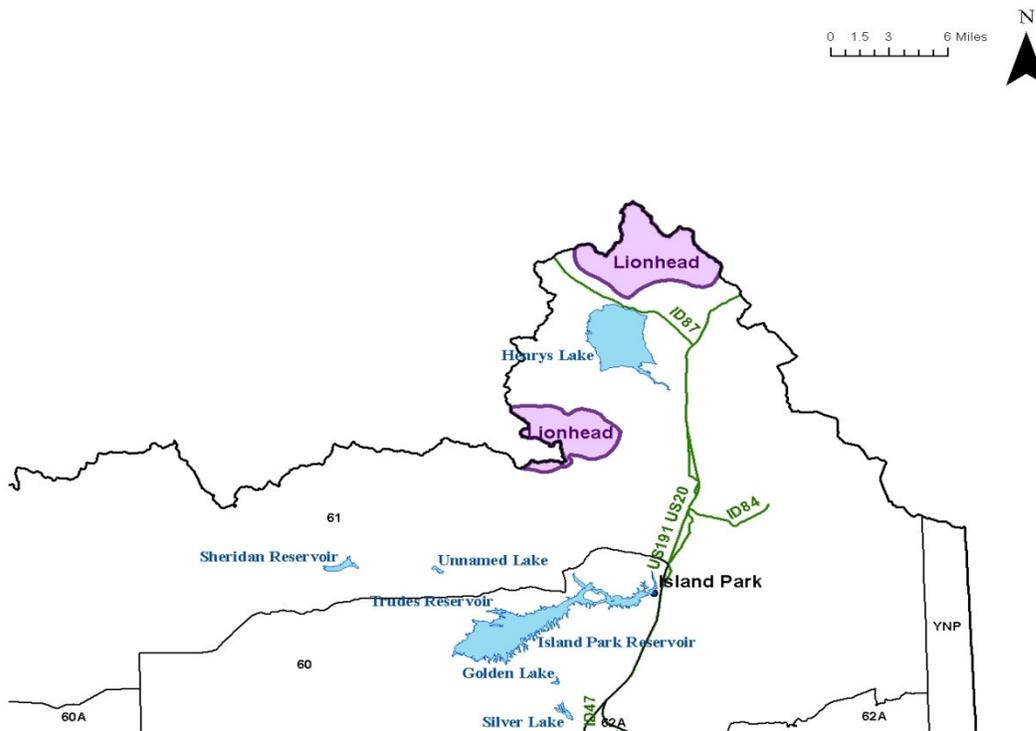


Figure 44. Lionhead PMU (GMU 61)

## **PALISADES PMU**

### **Description**

This area includes portions of GMUs 64 and 67 (Figure 13). Periodically bighorn sheep are observed in this area. There are reports of bighorn sheep that have been in the area for a short duration during the last decade. The individual sheep are usually seen a few times and then apparently leave the area. These sheep most likely come from Wyoming but this has not been confirmed with telemetry data. There is not a persistent bighorn sheep population in the Palisades PMU.

### **Management Direction**

IDFG does not manage to maintain a population of bighorn sheep in the Palisades PMU. Management will focus on minimizing potential contact between bighorn sheep and domestic sheep and goats, and preventing bighorn sheep that contact domestic sheep in this area from returning to an established population of bighorn sheep. If possible, the bighorn sheep that wander into this area will be captured, radiocollared, and monitored to learn more about their travel routes and source population(s). Management may also include lethal removal of bighorn sheep that have contact with domestic sheep.

### **Management Action**

1. IDFG will work to establish direction for communication between the USFS, Wyoming Game and Fish, permittees, the public, and IDFG so that bighorn sheep sightings are reported promptly to appropriate personnel.
2. When possible, radiocollar bighorn sheep to learn more about their movements and source population(s).
3. Remove bighorn sheep that have contact with domestic sheep.

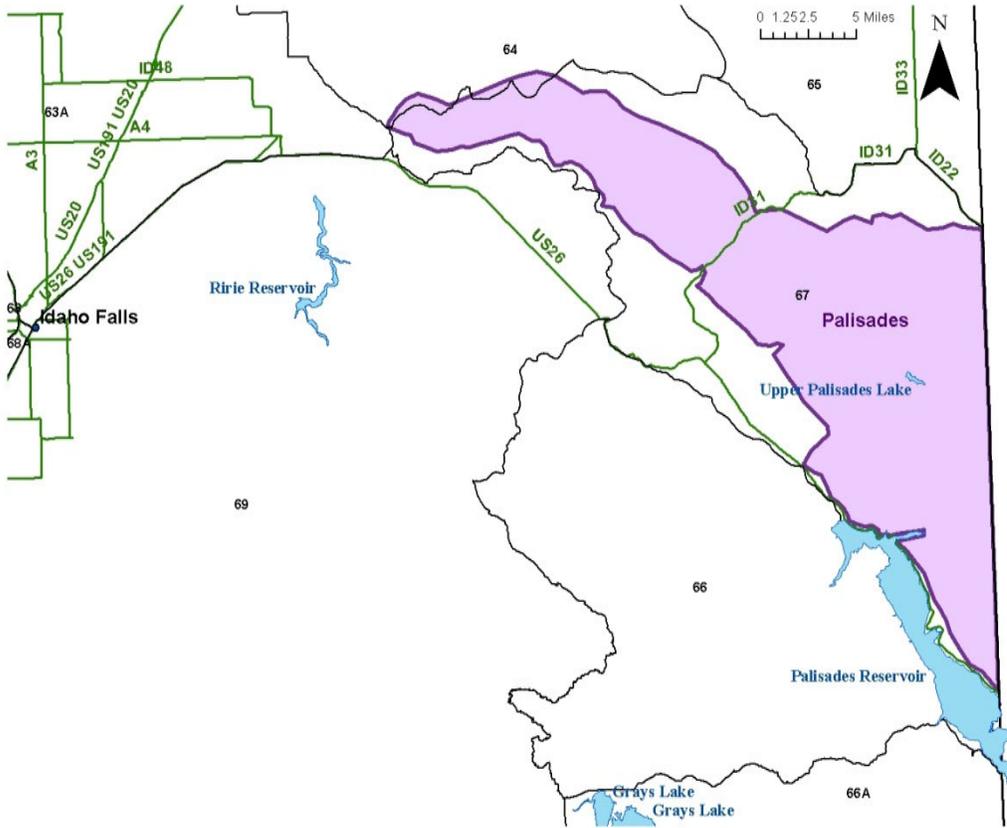


Figure 45. Palisades PMU (GMUs 64 and 67)

## **PIONEERS PMU**

### **Description**

This area includes portions of GMUs 48, 49, and 50 (Figure 13). On average, there are confirmed sightings of bighorn sheep in this area every 2-3 years. Often, these sheep are young rams which are observed once or a few times, but then apparently leave the area. IDFG staff is uncertain of the source populations for these sheep; they may migrate from either the East Fork Salmon River population or the Lost River population. There does not appear to be a persistent bighorn sheep population in the Pioneers PMU.

### **Management Direction**

IDFG does not manage to maintain a population of bighorn sheep in the Pioneers PMU. Management will focus on minimizing potential contact between bighorn sheep and domestic sheep and goats, and preventing bighorn sheep that contact domestic sheep in this area from returning to an established population of bighorn sheep. To this end, IDFG has BMP agreements with all of the known domestic sheep producers who operate within this PMU. These BMPs focus on prompt communication of bighorn sightings and minimizing the likelihood of contact between domestic and bighorn sheep. Furthermore, the BMPs outline tools IDFG may use when a bighorn sheep is sighted. These tools include monitoring, deploying a radio collar on, or euthanizing the bighorn sheep.

### **Management Action**

1. Continue to collect observation data on bighorn sheep that move into the Pioneers PMU. If the opportunity arises, this may include deploying radio collars on bighorn sheep to learn about movements, source herds, and other bighorn sheep that may use the Pioneers PMU.

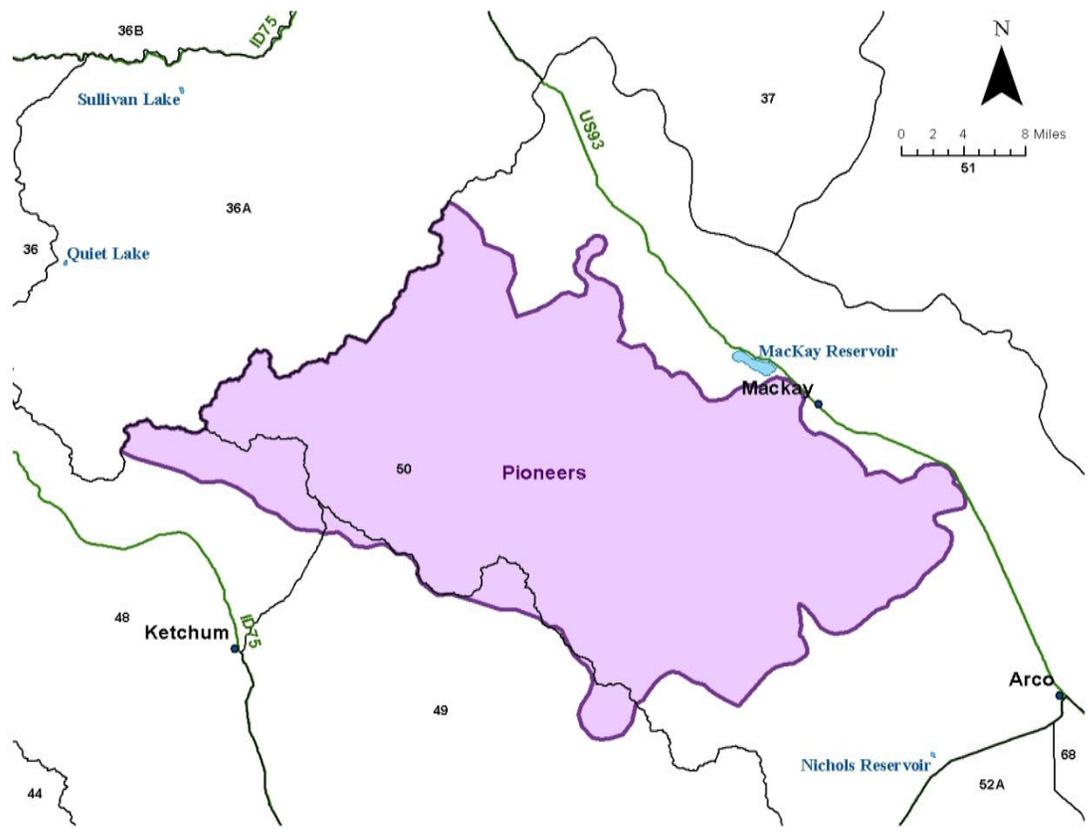


Figure 46. Pioneers PMU (GMUs 48, 49, and 50)

**Appendix A**  
IDAHO  
2017 SEASON  
BIGHORN SHEEP RULES

# Idaho Moose, Bighorn Sheep & Mountain Goat

2017 & 2018 Seasons & Rules



Controlled Hunt Application Period  
April 1-30

[idfg.idaho.gov](http://idfg.idaho.gov)



## 2017 & 2018 BIGHORN SHEEP HUNTING SEASONS

### Mandatory Check and Report Requirements

Any hunter killing a bighorn sheep ram must present the horns and have a big game mortality report completed at an Idaho Fish and Game regional office within 10 days of the date of the kill. Fish and Game's headquarters office is not equipped to check in bighorn sheep. In the Boise area, these animals can be checked at the Fish and Game regional office in Nampa (3101 S. Powerline Rd, 208-465-8465) weekdays between the hours of 8 a.m. and 5 p.m. or by appointment at the Garden City facility, 109 W. 44th St., 208-327-7095.

A hunter may authorize another person to comply with the above report requirements if that person possesses the necessary information to accurately complete the necessary form, see page 32.

Unsuccessful hunters must present or mail their unused tags to a Fish and Game office within 10 days after the close of

the season for which the tag was valid. Tags can be mailed to: Idaho Fish and Game, Attn: Wildlife Bureau, PO Box 25, Boise, ID 83707. Cancelled tags will be returned to the hunter upon request. Failure to report may result in future ineligibility in bighorn sheep drawings.

No person may harvest more than one Rocky Mountain and one California bighorn sheep in Idaho during their lifetime. Lottery and Auction tag winners are exempt from the once in a lifetime provision.

**Drawing Odds:** To review drawing odds and more detailed information about number of applicants please visit our website at <http://idfg.idaho.gov/CHodds>.

## SHEEP

### 2017 & 2018 Bighorn Sheep Controlled Hunts - Rams Only 99 Total Tags Including Special Lottery and Auction Tag

#### Rocky Mountain Bighorn Rams: North of Interstate Highway 84 69 Tags

Hunt No.	Controlled Hunt Area	Tags	Season Dates
5001	11*	1	Aug 30 - Oct 13
5002	19*	4	Aug 30 - Oct 13
5003	19A*	2	Aug 30 - Oct 13
5004	20*	2	Aug 30 - Oct 13
5005	20A <sup>4</sup>	2	Aug 30 - Oct 13
5006	21	3	Aug 30 - Oct 13
5007	26*	4	Aug 30 - Oct 13
5008	27-1	12	Aug 30 - Oct 13
5009	27-2 <sup>4</sup>	6	Aug 30 - Oct 13
5010	27-3*	4	Aug 30 - Oct 13
5011	27-4	3	Aug 30 - Oct 13
5012	28-1	3	Aug 30 - Oct 13
5013	28-2	2	Aug 30 - Oct 13
5014	28-3*	2	Aug 30 - Oct 13
5015	30*	2	Aug 30 - Oct 13
5016	36*	1	Aug 30 - Oct 13
5017	36A*	2	Aug 30 - Oct 13

Hunt No.	Controlled Hunt Area	Tags	Season Dates
5018	36B*	4	Aug 30 - Oct 13
5019	37*	4	Aug 30 - Sep 20
5020	37*	4	Sep 21 - Oct 13
5021	37A	2	Aug 30 - Oct 13

#### Rocky Mountain Bighorn Rams: Late Controlled Hunts North of Interstate Highway 84 5 Tags

Hunt No.	Controlled Hunt Area	Tags	Season Dates
5022	17L	1	Aug 30 - Oct 31
5023	26L	2	Oct 14 - Oct 31
5024	27L*	2	Oct 14 - Oct 31

<sup>4</sup> This wilderness hunt area encompasses extreme terrain with limited access, but provides good hunting opportunity, but lower harvest success rates are expected.

\* See controlled hunt area descriptions. This hunt includes other units or parts of other units.

## 2017 & 2018 BIGHORN SHEEP HUNTING SEASONS



### 2017 & 2018 Bighorn Sheep Controlled Hunts - continued

California Bighorn Rams: South of Interstate Highway 84 23 Tags			
Hunt No.	Controlled Hunt Area	Tags	Season Dates
7001	40	1	Aug 30 - Oct 8
7002	41-1	2	Aug 30 - Oct 8
7003	41-2	4	Aug 30 - Oct 8
7004	42-1	3	Aug 30 - Sep 14
7005	42-2	3	Sep 22 - Oct 8
7006	46-1*	3	Aug 30 - Sep 14
7007	46-2*	2	Sep 22 - Oct 8
7008	54	1	Aug 30 - Sep 14
7009	54	2	Sep 22 - Oct 8
7010	55	2	Aug 30 - Oct 8

\* See controlled hunt area descriptions. This hunt includes other units or parts of other units.

SHEEP

## NOXIOUS WEEDS ARE A SERIOUS THREAT TO IDAHO'S LANDS & WILDLIFE

THESE NOXIOUS WEEDS MAY BE DESTROYING YOUR FAVORITE HUNTING LOCATIONS!

Please join Idaho in the fight against noxious weeds! For more information about Idaho's noxious weeds and how you can help stop their spread, log on to the Idaho Weed Awareness Campaign's website at:

[WWW.IDAHOWEEDAWARENESS.COM](http://WWW.IDAHOWEEDAWARENESS.COM)

Leafy Spurge



Yellow Starthistle



Spotted Knapweed



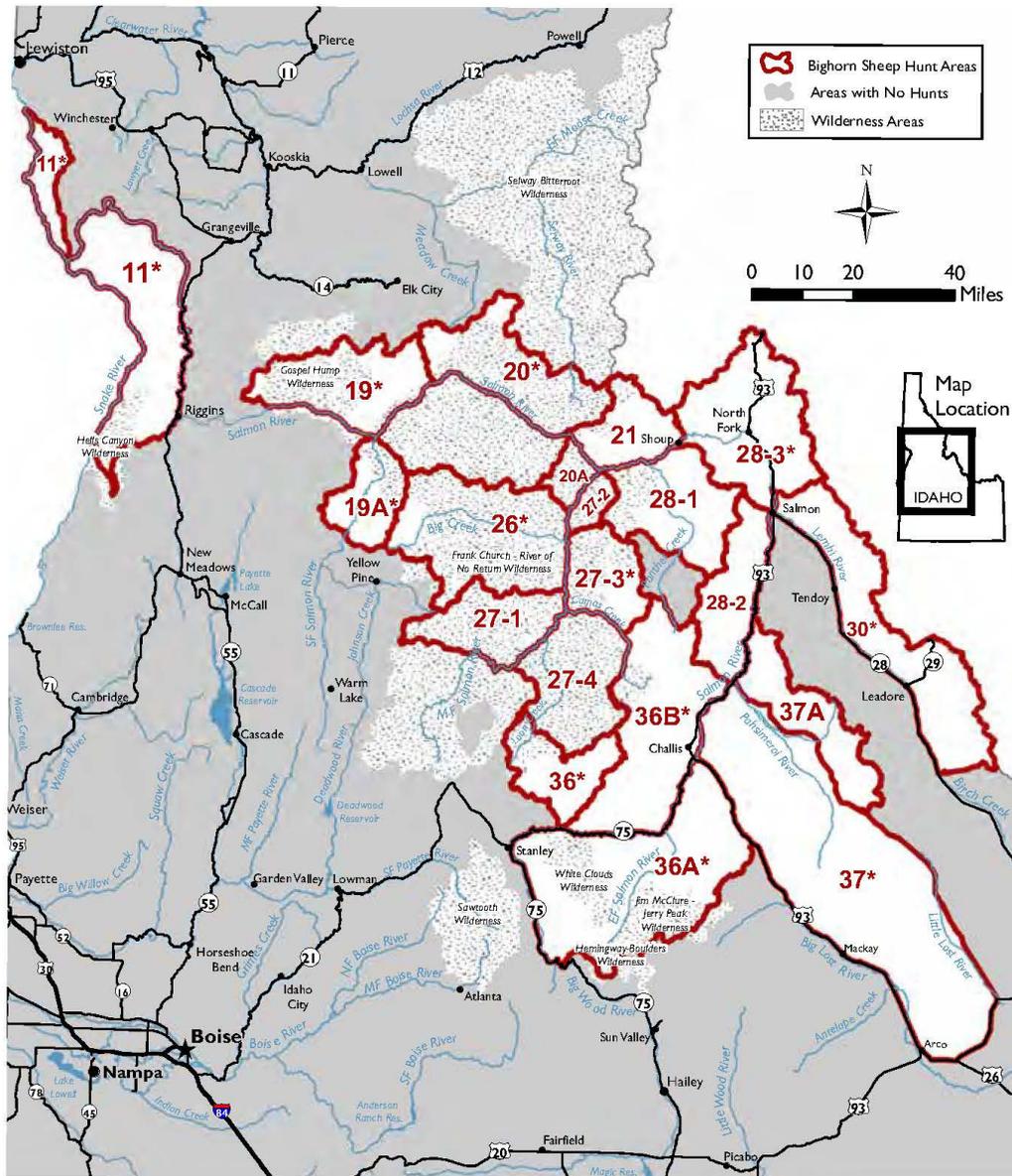
Rush Skeletonweed



# 2017 & 2018 BIGHORN SHEEP HUNTING SEASONS

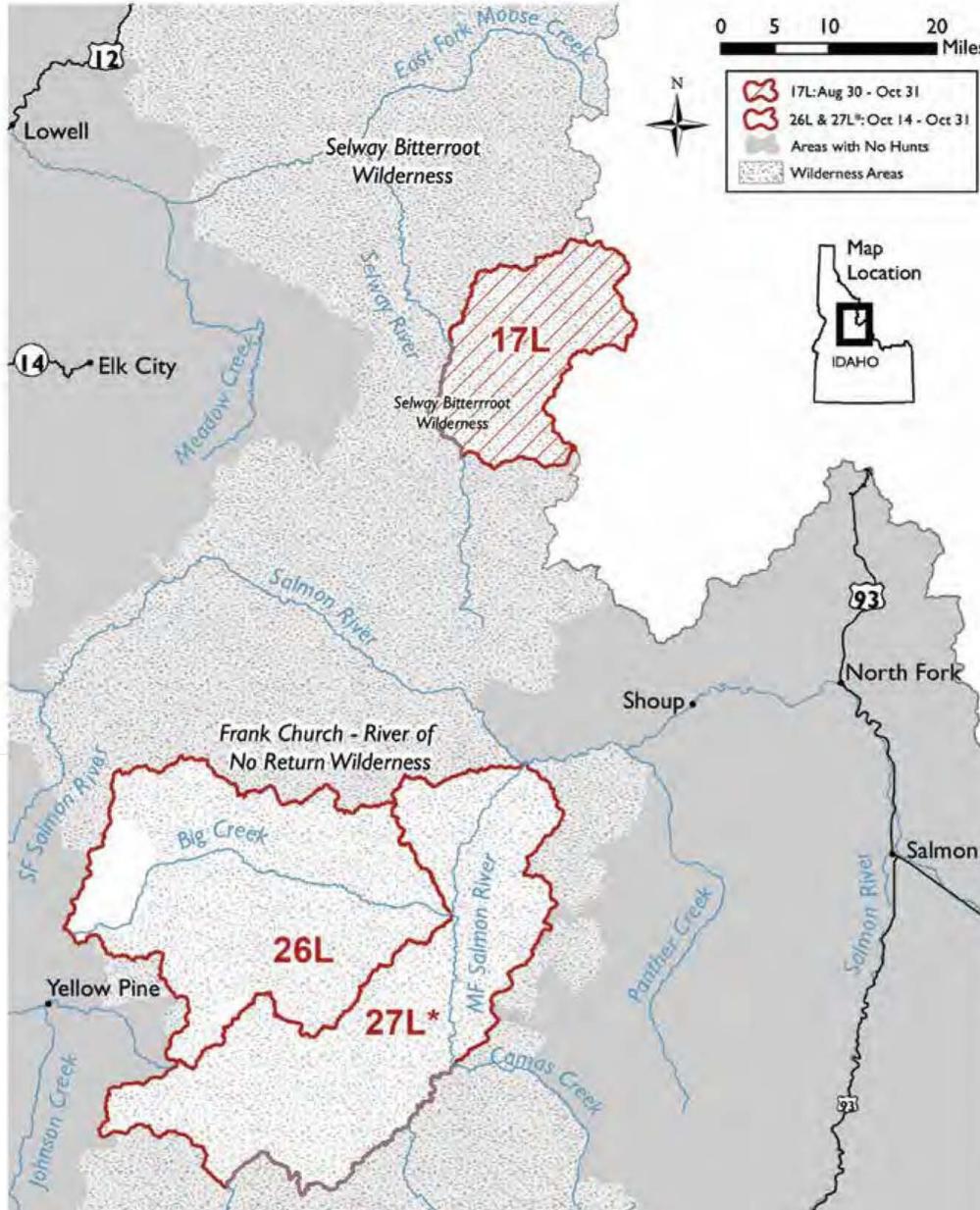
## Rocky Mountain Bighorn Sheep Hunts

SHEEP





# Rocky Mountain Bighorn Sheep Hunts



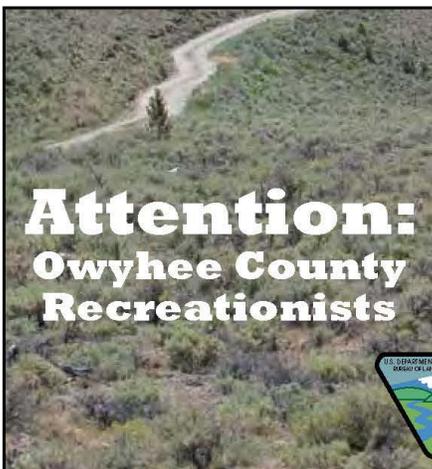
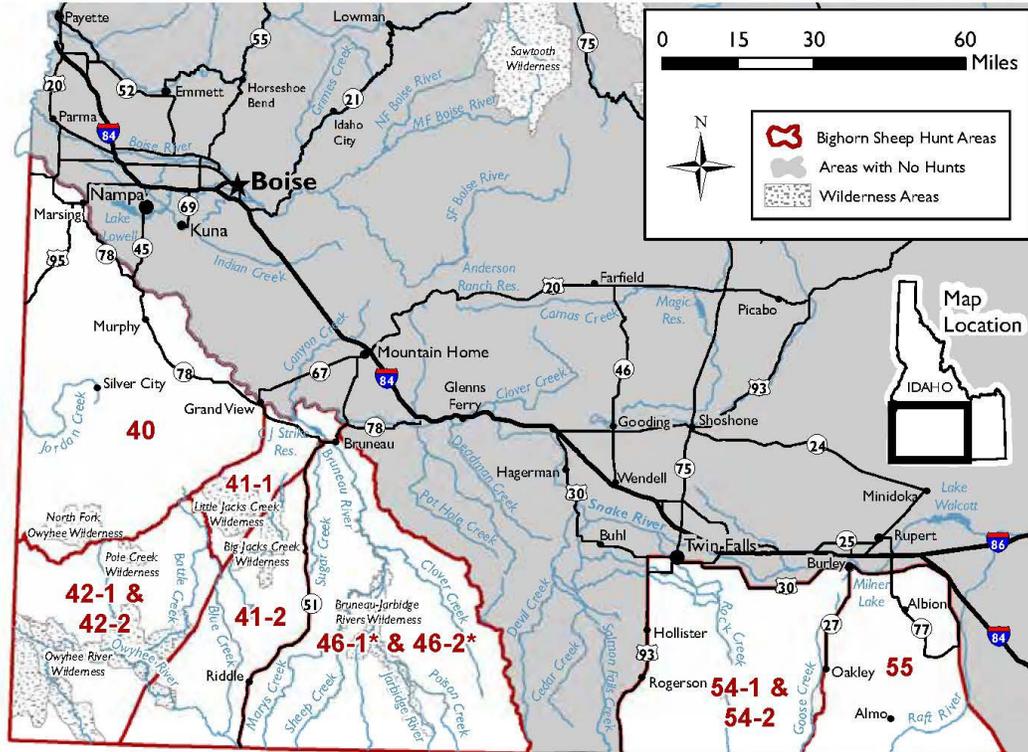
**SHEEP**



## 2017 & 2018 BIGHORN SHEEP HUNTING SEASONS

# California Bighorn Sheep Hunts

**SHEEP**



### Attention: Owyhee County Recreationists



Legislation approved in 2009 designated major portions of Owyhee County as wilderness, where access by motorized vehicles is forbidden by law.

A number of access routes were preserved for hunter access. Please check your maps and abide by wilderness regulations.

Maps showing wilderness boundaries can be found at Bruneau, Owyhee and Jarbidge offices of the Bureau of Land Management.

For More Information, Please Contact  
**BLM Boise District @ 208-384-3300 or the  
BLM Twin Falls District @ 208-736-2350;  
or visit the website @ [www.id.blm.gov](http://www.id.blm.gov)**

Submitted by:

Clay Hickey  
Regional Wildlife Manager

Rick Ward  
Regional Wildlife Manager

Regan Berkley  
Regional Wildlife Manager

Mike McDonald  
Regional Wildlife Manager

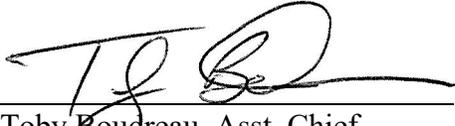
Curtis Hendricks  
Regional Wildlife Manager

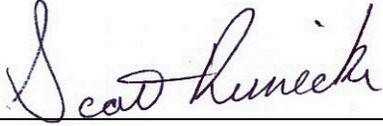
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Summer Crea  
Data Coordinator

Approved by: IDAHO IDFG OF FISH AND GAME

  
Toby Boudreau, Asst. Chief  
Bureau of Wildlife

  
Scott Reinecker, Chief  
Bureau of Wildlife

## FEDERAL AID IN WILDLIFE RESTORATION

The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sale of handguns, sporting rifles, shotguns, ammunition, and archery equipment. The Federal Aid program then allots the funds back to states through a formula based on each state's geographic area and the number of paid hunting license holders in the state. The Idaho IDFG of Fish and Game uses the funds to help restore, conserve, manage, and enhance wild birds and mammals for the public benefit. These funds are also used to educate hunters to develop the skills, knowledge, and attitudes necessary to be responsible, ethical hunters. Seventy-five percent of the funds for this project are from Federal Aid. The other 25% comes from license-generated funds.

