

**IDAHO DEPARTMENT OF FISH AND GAME**

**Cal Groen, Director**

**Project W-160-R-34**

**Progress Report**



**STATEWIDE UNGULATE ECOLOGY**

**Study IV: Hells Canyon Bighorn Sheep**

July 1, 2006 to June 30, 2007

By:

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Boise, Idaho



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**PROGRESS REPORT  
STATEWIDE WILDLIFE RESEARCH**

**STATE:** Idaho                      **JOB TITLE:** Statewide Ungulate Ecology  
**PROJECT:** W-160-R-34  
**SUBPROJECT:** \_\_\_\_\_              **STUDY NAME:** Hells Canyon Bighorn Sheep  
**STUDY:** IV  
**PERIOD COVERED:** July 1, 2006 to June 30, 2007

**HELLS CANYON BIGHORN SHEEP**

**Abstract**

The Hells Canyon Initiative is a state, federal, and private partnership to restore Rocky Mountain bighorn sheep *Ovis canadensis canadensis* in the Hells Canyon area of Oregon, Idaho, and Washington. One hundred seventy radio-collared bighorn sheep (134 ewes, 36 rams) were monitored in 12 herds from 1 June 2006 to 30 May 2007. Ten radio-collared adult bighorn sheep (6 ewes, 4 rams) died during this period. Average annual survival of radio-collared ewes was 0.92 and rams was 0.83. Lamb survival was highly variable among populations. Pneumonia-caused mortality of lambs was confirmed in 3 populations and suspected in 5 others. Approximately 900 bighorn sheep are estimated to occur in 16 herds or populations within the project area, similar to the estimate of 870 bighorn sheep in 2005-2006.

Collaborative research projects were continued in 2006-2007 between the Hells Canyon Initiative bighorn sheep restoration project and the University of Idaho Caine Veterinary Teaching Center (CVTC) and Washington State University (WSU) School of Veterinary Medicine to incorporate field data from Hells Canyon bighorn sheep and laboratory analysis and experiments to better understand causes of pneumonia in bighorn sheep.

**Introduction**

The Hells Canyon Initiative was started in 1995 as a program to accelerate restoration of bighorn sheep in Hells Canyon and the surrounding areas of Idaho, Oregon, and Washington and to focus research applicable to bighorn sheep restoration and management throughout the western United States and Canada. The concept was formalized in 1997 with the completion of an interagency memorandum of agreement and restoration plan (Hells Canyon Bighorn Sheep Restoration Committee 1997). The restoration plan was updated in 2004 (Hells Canyon Bighorn Sheep Restoration Committee 2004).

**Project Area**

The Hells Canyon Initiative project area encompasses 2,273,194 ha (5,617,062 ac) in the Snake River drainage in Oregon, Idaho, and Washington from the mouth of Clearwater River, Idaho, south to Brownlee Reservoir. It is bounded on the east by the hydrologic divide between the

Salmon and Snake rivers near Riggins, Idaho, south to Brownlee Creek on the Payette National Forest, Idaho, and extends just west of the Eagle Cap Wilderness, Wallowa-Whitman National Forest, Oregon. Major drainages include the Snake, Grande Ronde, Imnaha, and lower Salmon rivers. There are currently 16 bighorn sheep populations, or herds, established in the project area (Figure 1). Over 1.3 million acres (24%) of the project area is potential bighorn sheep habitat, 68% of which is publicly owned, primarily managed by the U.S. Forest Service. Other public land managers are the states of Oregon, Idaho, and Washington and the Bureau of Land Management.

### **Capture, Radio Collar, and Sampling**

Twelve bighorn sheep were captured and released and seven males were radio-collared December 2006 and March 2007. Capture was by corral trap (6) and helicopter net-gun (6). Six 1 to 3 year-old rams in the Wenaha and Imnaha populations received GPS collars; the seventh in the Lostine population was collared with a VHF radio. Pharyngeal swab samples collected at capture were submitted to the CVTC for culture of *Pasteurella*, *Mannheimia*, and *Mycoplasma* spp. bacteria. Blood serum samples were collected for testing for exposure to respiratory viruses and bacteria at the Idaho State Bureau of Animal Health Laboratory. Blood and serum were also collected for evaluation of trace element levels at the University of Idaho Holm Research Laboratory. Fecal samples and ear swabs were collected and submitted to the Washington Animal Disease and Diagnostic Laboratory for analysis of internal and external parasites. Body condition was estimated through palpation at the withers, ribs, and rump on a score of 1 (emaciated) to 5 (obese).

### **Survival and Movements**

#### **Adult Survival**

One hundred seventy radio-collared bighorn sheep (134 ewes, 36 rams) were monitored in 12 herds from 1 June 2006 to 30 May 2007. Ten radio-collared adult bighorn sheep (6 ewes, 4 rams) died during this period. Three pneumonia-caused mortalities were documented: 2 ewes and 1 ram, all in the Redbird, Idaho, population. These are the first cases of pneumonia-caused mortality detected in adults in 10 years of monitoring this population. The most common causes of mortality were pneumonia, injury, and human-caused. No predation was detected (Figure 2). Annual survival of radio-collared ewes averaged 0.92 and ram survival averaged 0.83. Annual survival of ewes in 9 herds with 5 to 15 radio-collared females in each herd, ranged from a low in Asotin of 73% to 100% in the Black Butte, Lostine, Imnaha, Mountain View, and Sheep Mountain herds (Tables 1 and 2).

#### **Lamb Survival**

Lamb survival was highly variable among herds. With the exception of the Imnaha population, summer lamb survival in the 3 herds where lambs were diagnosed with pneumonia (see below) was 50% or less (Table 3), and recruitment in these herds ranged from 0 to 33 lambs/100 ewes (Table 4). Pneumonia-caused lamb mortality was suspected in another 5 herds where summer

survival was 14% or less and recruitment was 0 to 22 lambs/100 ewes (Table 3), although no dead lambs were recovered.

### **Population Monitoring**

Hells Canyon bighorn sheep were surveyed by the states of Oregon, Idaho, and Washington from a helicopter (Robinson 44 and Hughes 500) and on the ground in 2006-2007. Approximately 900 bighorn sheep are estimated to occur in 16 herds or populations within the project area (Table 4), similar to the estimate of 870 bighorn sheep in 2005-2006. In 2006, most populations remained stable or changed slightly.

### **Disease Research and Management**

Collaborative research projects were continued in 2006-2007 between the Hells Canyon Initiative bighorn sheep restoration project and the CVTC, and WSU School of Veterinary Medicine to incorporate field data from Hells Canyon bighorn sheep and laboratory analysis and experiments to better understand causes of pneumonia in bighorn sheep. The projects with CVTC are scheduled to continue for 5 years and those with WSU for 2 years.

In 2006 and 2007, 2 collaborative projects were conducted: investigation of pneumonia in lambs and biochemical and molecular typing of *Pasteurella* isolated from bighorn sheep with pneumonia and healthy bighorn sheep.

#### Pneumonia in lambs

Nine lambs were collected from the Black Butte, Imnaha, and Sheep Mountain populations prior to or during pneumonia outbreaks in Oregon and Washington June 2006 – May 2007 and another 5 intact dead lambs were recovered at Black Butte, Saddle Creek, and Sheep Mountain (Table 5). All lambs were diagnosed with bronchopneumonia except for 1 4-day-old lamb collected at Sheep Mountain. Traditional culture techniques were applied to respiratory tissue and a nonculture technique (16S rDNA amplification and clone library analyses) was conducted on bronchoalveolar lavage. *Mycoplasma ovipneumoniae* was detected as a predominant member of the pneumonic lung flora in lambs with early lesions of bronchopneumonia. Although initially negative on culture, subsequent to molecular detection, *M. ovipneumoniae* was also cultured from the lungs of 5 animals. Lung lesions and middle ear infections were consistent with *M. ovipneumoniae* infection and there were strong indications that this bacteria is an important cause of disease in lambs. Work is continuing on a challenge trial and strain typing.

#### Pasteurella associated with pneumonia

Biochemical and molecular characteristics of *Pasteurella* and *Mannheimia* spp. bacteria isolated from the lungs of 35 adult and juvenile bighorn sheep with pasteurellosis pneumonia were compared with 1) bacteria in these genera collected from healthy bighorn sheep in the same populations, and 2) isolates from sympatric domestic sheep (*O. aries*). We used pulsed-field gel electrophoresis (PFGE) to investigate the genetic profiles of *Pasteurella* spp. associated with disease in bighorn sheep and to assess the spatial and temporal dynamics of these bacteria in a free-ranging bighorn sheep metapopulation. We found multiple biovariants and genetic profiles associated with pneumonia, and we found that organisms with the same genetic profiles were

isolated from both sick and healthy bighorn sheep within the same populations. We did not find any common genetic profiles in bighorn and domestic sheep. We also found no association of genes for known virulence factors leukotoxin (*lktA* gene) and superoxide dismutase (*sodC* gene) with pneumonia. Work is continuing with additional isolates from pneumonia cases and healthy individuals.

### **Public Information and Outreach**

A brochure on Hells Canyon bighorn sheep restoration was produced by the Idaho Chapter of the Foundation for North American Wild Sheep (FNAWS). Articles on the Hells Canyon Initiative appeared regularly in the FNAWS National and Chapter publications in 2006-2007, and the Initiative had an informational booth at the National FNAWS convention in Salt Lake City, Utah, and at the Idaho and Oregon FNAWS chapter banquets. In June, Oregon, Idaho, and Washington FNAWS sponsored the fifth annual meeting of the Washington, Oregon, and Idaho FNAWS chapters in Hells Canyon.

### **Harvest**

A total of 292 rams have been harvested by 307 draw permit holders and auction or lottery tag holders in the project area since the first season in 1978 (Table 6), including 14 rams in 2006. Success rate has exceeded 90%. Hunting is by controlled permit and limited to rams only in all 3 states. Washington herds must have at least 8 mature rams, of which 2 are at least 6 years old or  $\frac{3}{4}$  curl (WDFW 1995). In Idaho, permits can be issued for no more than 20% of mature ( $\frac{3}{4}$  curl or greater) rams (IDFG 1990). In Oregon, the number of tags authorized for a hunt is based on the number of mature rams available in the unit area and the size of the hunt area (ODFW 2003). Nez Perce tribal members have treaty rights to hunt in all 3 states within the project area. The number of bighorn sheep harvested by tribal hunting is unknown. The Nez Perce tribe received authorization to issue a tag in the Redbird, Idaho, population in 2006 but apparently did not exercise this option. In 2006, the second Blue Mountain lottery tag winner in Washington harvested a ram in the Wenaha herd. Over 50 rams greater than 180 Boone and Crockett points have been taken by tag holders in the Hells Canyon area.

## **Restoration Committee**

The Hells Canyon Bighorn Sheep Initiative is conducted by the Hells Canyon Bighorn Sheep Restoration Committee. The committee is comprised of state, federal, tribal, and private organizations, of which each provide an administrative (A) and technical (T) committee member. Organizations and committee members in 2006 are:

### **Idaho Department of Fish and Game**

- Dale E. Toweill, Wildlife Program Coordinator (A)
- Frances Cassirer, Tri-State Coordinator/Wildlife Research Biologist (T)

### **Oregon Department of Fish and Wildlife**

- Don Whitaker, Program Coordinator (A)
- Vic Coggins, District Wildlife Biologist (T)

### **Washington Department of Fish and Wildlife**

- Donny Martorello, Big Game Program Manager (A)
- Paul Wik, Wildlife Biologist (T)

### **USDA Forest Service**

- Bob Rock, Natural Resources Staff, Wallowa-Whitman National Forest (A)
- Tim Schommer, Forest Biologist, Wallowa-Whitman National Forest (T)

### **USDI Bureau of Land Management**

- John Augsburger, Wildlife Biologist, Idaho State Office(A)
- Craig Johnson, Wildlife Biologist, Salmon-Clearwater Resource Area (T)

### **Foundation for North American Wild Sheep**

- Raymond Lee, President/CEO (A)
- Lloyd Oldenburg and Rick Brigham, Members (T)

### **Nez Perce Tribe**

- Loren Kronemann, Wildlife Biologist (A)
- Marcie Carter, Wildlife Biologist (T)

### **Literature Cited**

Hells Canyon Bighorn Sheep Restoration Committee. 1997. Restoration of Bighorn Sheep to Hells Canyon: The Hells Canyon Initiative. Technical Bulletin 97-14, Bureau of Land Management.

Hells Canyon Bighorn Sheep Restoration Committee. 2004. The Hells Canyon Initiative: Hells Canyon bighorn sheep restoration plan. Idaho Department of Fish and Game, Lewiston, USA.

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Oregon Department of Fish and Wildlife. 2003. Oregon's bighorn sheep and Rocky Mountain goat plan. Salem, Oregon, USA.

Washington Department of Fish and Wildlife. 1995. Washington state management plan for bighorn sheep. Wildlife Management Program, Washington Department of Fish and Wildlife, Olympia, USA.

# Hells Canyon Bighorn Sheep Project Area

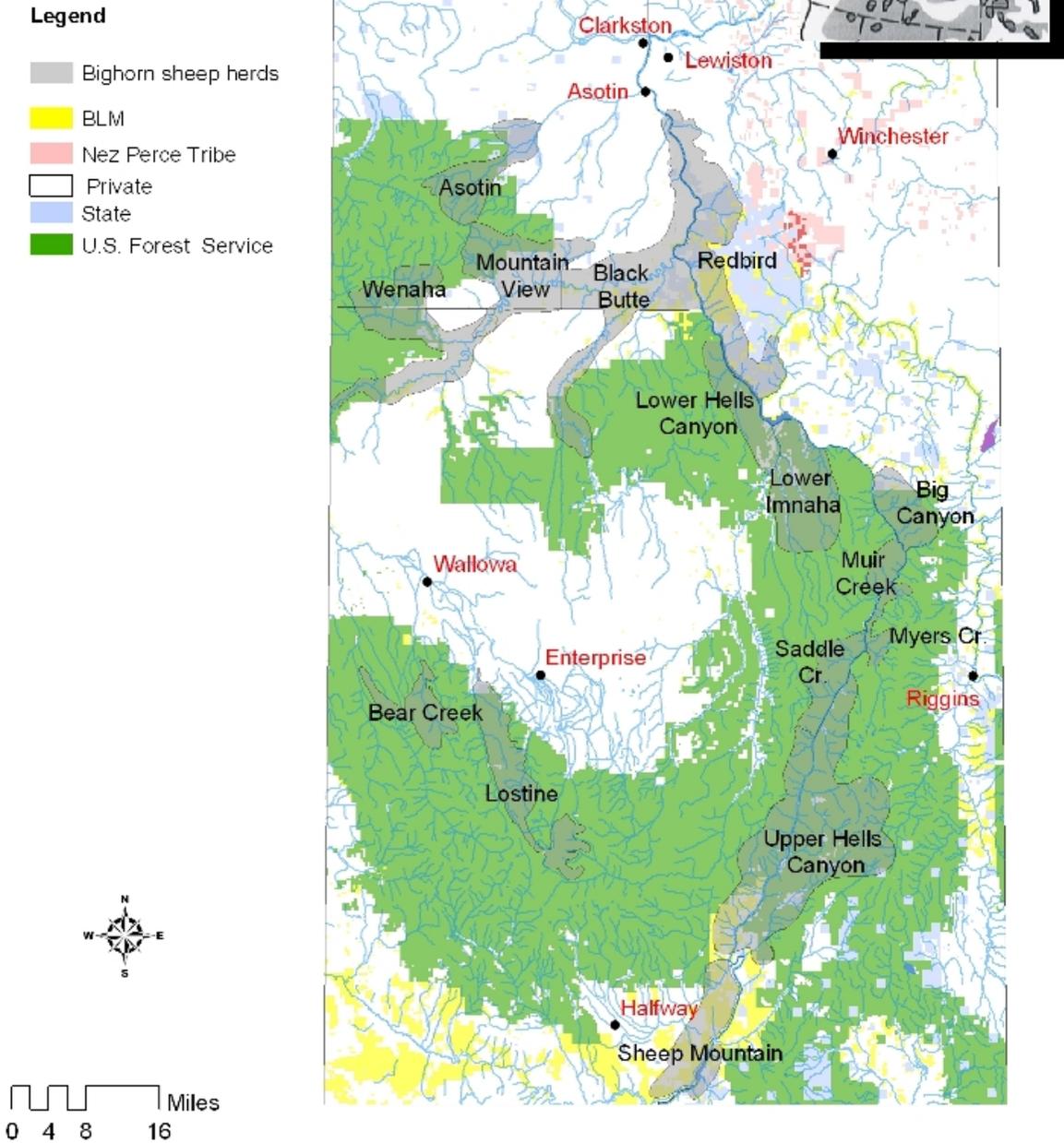


Figure 1. Hells Canyon Initiative Project Area.

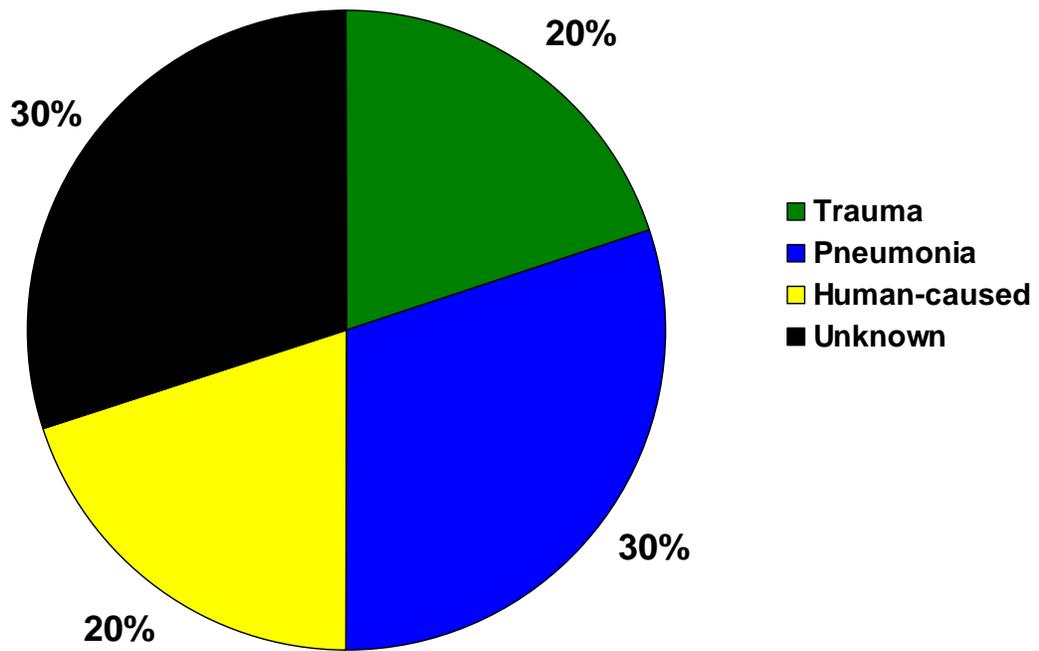


Figure 2. Causes of mortality of 10 adult radio-collared bighorn sheep in Hells Canyon, 1 June 2006 to 31 May 2007.

Table 1. Annual ewe survival in 10 Hells Canyon bighorn sheep populations, 1 June 1997 to 31 May 2007.

Year	Black Butte	Redbird	Wenaha	Asotin	Lostine	Imnaha	Big Canyon	Muir Creek	Mtn. View	Sheep Mtn.
1997-1998	0.92	1.00	0.83							
1998-1999	1.00	1.00	1.00	0.88			1.00	1.00		
1999-2000	0.58	1.00	1.00	0.86			0.93	0.93		
2000-2001	0.71	1.00	0.73	1.00	1.00	0.85	0.60	0.71		
2001-2002	0.80	0.92	1.00	1.00	1.00	1.00	1.00	1.00		
2002-2003	1.00	0.91	1.00	1.00	0.94	1.00	0.91	0.56		
2003-2004	0.84	0.75	0.75	0.83	0.93	0.73	0.22	1.00		
2004-2005	0.75	1.00	1.00	0.57	0.82	0.92	1.00	1.00		
2005-2006	1.00	1.00	1.00	1.00	0.86	0.91	1.00	0.71		
2006-2007	1.00	0.83	0.91	0.73	1.00	1.00	1.00	1.00	1.00	1.00
Average	0.86	0.94	0.92	0.87	0.94	0.92	0.85	0.88	1.00	1.00

Table 2. Annual ram survival in 10 Hells Canyon bighorn sheep populations, 1 June 1998 to 31 May 2007.

Year	Black Butte	Redbird	Wenaha	Asotin	Lostine	Imnaha	Big Canyon	Muir Creek	Mtn. View	Sheep Mtn.
1998-1999							1.00	1.00		
1999-2000							1.00	0.83		
2000-2001	1.00	1.00	0.67		0.80	0.71	0.80	0.50		
2001-2002	0.80	0.80	1.00		1.00	1.00	0.80	1.00		
2002-2003	0.30	0.75	1.00		0.80	1.00	0.50			
2003-2004	0.50	0.83	1.00	0.80	0.64	0.50	0.67	1.00		
2004-2005	1.00	0.60	0.86	0.75	0.60	0.50				
2005-2006		1.00	1.00	0.33	0.67					
2006-2007	1.00	0.88	0.80	1.00	0.88	1.00			1.00	
Average	0.76	0.84	0.90	0.72	0.77	0.79	.79	0.87	1.00	

Table 3. Observed productivity and summer lamb survival in 13 herds in Hells Canyon, 2006.

Herd	No. radio-collared ewes observed with lambs (%)	Percent summer survival <sup>a</sup>
Asotin Creek, WA	6/8 (75)	67
Big Canyon, ID	1/1 (100)	100
Black Butte, OR/WA	12/15 (80)	<b>0</b>
Imnaha, OR	13/14 (93)	<b>69</b>
Lostine, OR	6/11 (55)	66
Mountain View, WA	5/5 (100)	100
Muir Creek, OR	6/6 (100)	0
Myers Creek, ID	2/2 (100)	50
Redbird, ID	8/10 (80)	0
Saddle Creek, OR	3/3 (100)	0
Sheep Mountain, OR	6/9 (67)	<b>0</b>
Upper Hells Canyon, OR	1/1 (100)	0
Wenaha, OR/WA	10/15 (67)	90

<sup>a</sup> Survival from birth to 1 October. Herds in bold are those where lambs were recovered with pneumonia.

Table 4. Hells Canyon bighorn sheep population counts, 2006-2007.

Herd	Survey date(s)	Total				Estimated population
		bighorns	Ewes	Lambs	Rams	
Asotin, WA <sup>a</sup>	4/11/07	59	30	10	19	65
Bear Creek, OR	7/17/06	38	21	11	6	45
Big Canyon, ID <sup>a</sup>	3/16/07	17	8	5	4	20
Black Butte, OR <sup>a</sup>	3/18/07	20	15	2	3	30
Black Butte, WA <sup>a</sup>	4/5/07	45	24	4	17	45
Lostine, OR <sup>a</sup>	3/1/07	78	44	4	30	85
Lower Hells Canyon, OR	3/17/07	24	17	7	0	35
Lower Imnaha, OR <sup>a</sup>	3/16/07	166	84	28	54	185
Mountain View, WA <sup>a</sup>	4/4/07	38	19	12	7	40
Muir Creek, OR <sup>a</sup>	3/16/07	23	15	0	8	25
Myers Creek, ID	3-4/2007	9	5	1	3	10
Redbird, ID <sup>a</sup>	3/13/07	117	65	14	37	130
Saddle Creek, OR	1/7/07	20	12	4	4	25
Sheep Mountain, OR <sup>a</sup>	6/20/07	25	20	1	4	25
Upper Hells Canyon, ID	<sup>b</sup>					20
Upper Hells Canyon, OR	4/14/07	15	10	0	5	20
Wenaha, OR/WA <sup>a</sup>	3/18/07	76	31	23	22	95
Total						900
Average						56

<sup>a</sup> Populations monitored intensively under the Hells Canyon Initiative.

Table 5. Bighorn lambs recovered and collected June 1, 2006 – May 31, 2007.

Hells Canyon ID #	WADDL ID#	CVTC ID#	Mortality Date	Herd	Location	Sex	Age (days, approx)	Weight (kg)	Type
06OR01	2006-6627	06-1091	6/3/2006	Sheep Mtn.	Black Canyon	F	28	9	recovered
06OR02	2006-6782	06-1109	6/6/2006	Sheep Mtn.	Black Canyon	F	30		collected
06OR03	2006-7096	06-1150	6/8/2006	Sheep Mtn.	Black Canyon	M	28		collected
06OR04	2006-7232	06-1165	6/10/2006	Imnaha	Trough Gulch	M	10	8	collected
	2006-7440								
06OR05	2006-7233	06-1165	6/10/2006	Imnaha	Trough Gulch	F	28	9	collected
	06-7440								
06WA01			6/17/2006	Black Butte	Grande Ronde Mouth	M	28		found
06WA02	2006-7401	06-1179	6/19/2006	Black Butte	Grande Ronde Mouth	M	33	10	recovered
06WA03	2006-7402	06-1179	6/20/2006	Black Butte	Grande Ronde Mouth	F	35	10	collected
06WA04	2006-7473	06-1193	6/22/2006	Black Butte	Grande Ronde Mouth	F	35	12	recovered
06WA05	2006-7528	06-1193	6/23/2006	Black Butte	Grande Ronde Mouth	M	35	8	recovered
06WA06	2006-7753	06-1223	6/29/2006	Black Butte	Grande Ronde Mouth	F	44	13	collected
06WA07			7/17/2006	Black Butte	Grande Ronde Mouth		83		found
06WA08	2006-8716	06-1347	7/21/2006	Black Butte	Grande Ronde Mouth	F	68	11	collected
07OR05	2007-6406		5/20/2007	Saddle Creek	Yreka Creek	F		6	recovered
07OR06	2007-6845	07-922	5/29/2007	Sheep Mtn.	Below Black Canyon	M	17	10	collected
07OR07	2007-6844	07-922	5/29/2007	Sheep Mtn.	x Wilson Cr.	M	4	7	collected

Table 6. Permits and harvest of bighorn sheep in Hells Canyon through 2006.

State	Herd	Total permits	Total number harvested <sup>a</sup>	2006 Permits	2006 Season
Washington <sup>b</sup>	Black Butte/ Joseph Creek	17	20	0	None
	Mountain View	8	6	0	None
	Wenaha	16	15	0	9/15-10/10
Idaho	Redbird	15	26	2	8/30-10/13
	Upper Hells Canyon	20	11	0	None
Oregon	Black Butte/ Joseph Creek	9	7	0	None
	Bear Creek	7	6	1	9/6-17
	Lostine	79	73	2	9/6-17
	Lower Hells Canyon	3	3	0	None
	Lower Imnaha	100	97	6	9/6-17, 10/18-28
	Sheep Mountain	9	8	0	None
	Wenaha	12	13	1	10/13-10/31
Total		293	278	12	

<sup>a</sup> Number of bighorns harvested includes auction and lottery tags.

<sup>b</sup> Blue Mountain tag established in 2005. Allows take of 1 ram in these Washington populations and the Tucannon population annually.

Submitted by:

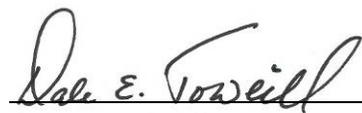
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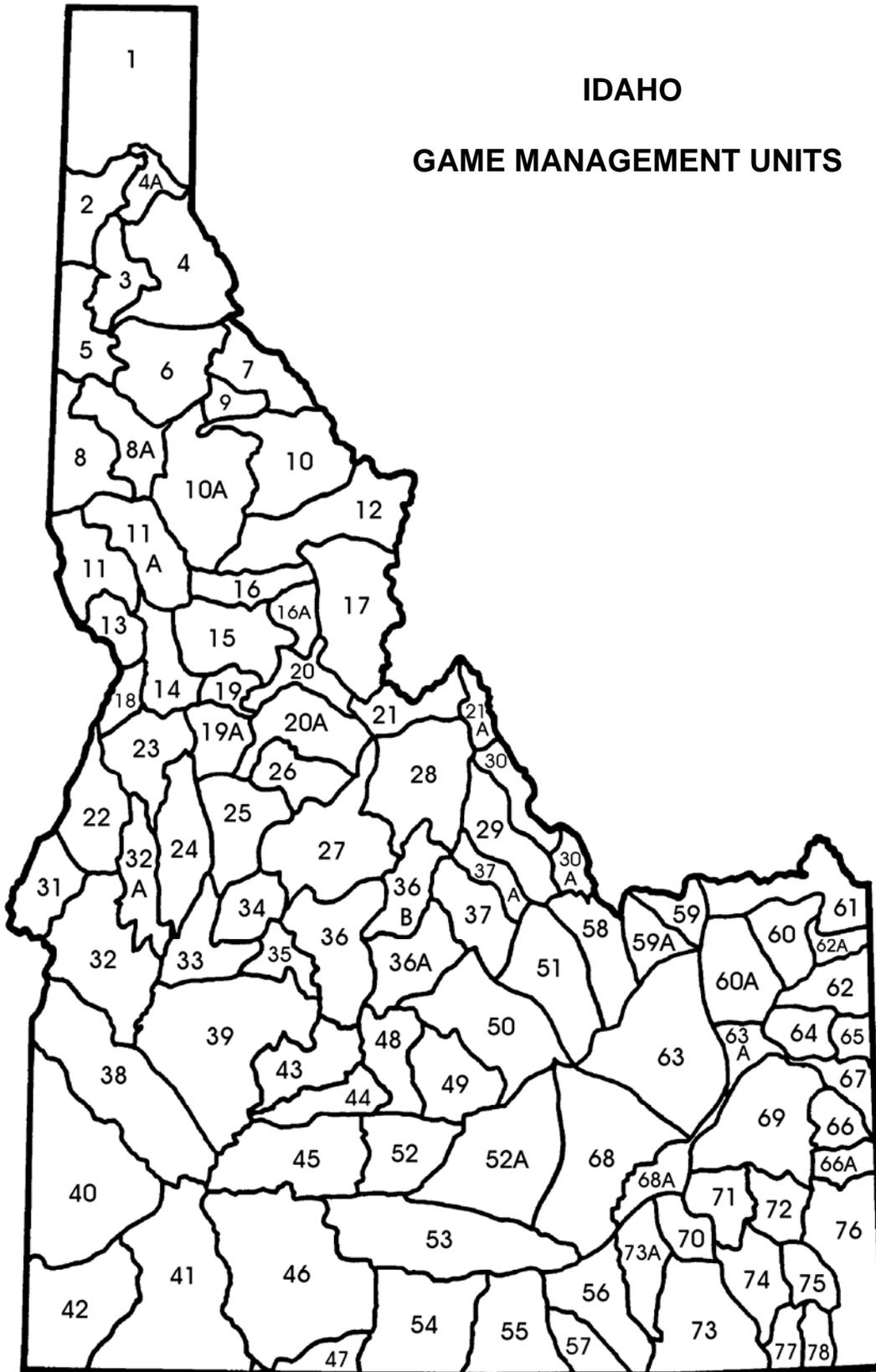


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James W. Unsworth, Chief  
Bureau of Wildlife

# IDAHO

## GAME MANAGEMENT UNITS



## 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 Department 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.

