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**CHAPTER 3: DALL SHEEP MANAGEMENT REPORT**

From: 1 July 2010  
To: 30 June 2013<sup>1</sup>

**LOCATION**

**GAME MANAGEMENT UNIT:** 11 (12,784 mi<sup>2</sup>)

**GEOGRAPHIC DESCRIPTION:** Wrangell Mountains, east of the Copper River

**BACKGROUND**

Dall sheep inhabit most alpine and subalpine areas of the Wrangell Mountains in Unit 11 and have a long hunt history by both local and nonlocal hunters. Dall sheep in the Wrangell Mountains, which cross the Alaska-Canada border, exhibit a wide variety of morphology and population characteristics. The northern portion of the range is known for relatively high densities of sheep, while the southern portion of the range typically has lower densities of sheep. Dall sheep harvests were not monitored prior to 1962. However, since then, harvest reports have provided managers with harvest numbers and trends.

In late 1978 the Wrangell Mountains and the eastern Chugach Mountains in Unit 11 were designated as national monument lands. In 1980 the Alaska National Interest Lands and Conservation Act permanently designated the lands as the Wrangell-St. Elias National Park and Preserve. Very little state and private land remains within Unit 11.

The harvest of Dall sheep on park lands is limited to federal subsistence hunting by rural residents of designated communities in Units 11, 13, and a portion of 12. Rural residents can also hunt under federal subsistence regulations on preserve lands while state hunting regulations provide opportunity for residents and nonresidents to hunt sheep on preserve lands, as well as state and private land in Unit 11. All state and federal sheep hunting in Unit 11 during the regular general season is reported under the state harvest ticket system.

Sheep numbers in the Wrangell Mountains prior to the 1950s are unavailable. While sheep surveys were done during the late 1950s and 1960s, they are generally not comparable to more recent surveys because early survey intensity and specific area boundaries are unknown. Specific count areas and techniques for aerial surveys were established in 1973, when sex and age composition surveys were flown over large portions of the Wrangell and Chugach Mountains. These surveys have continued to date in select areas.

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<sup>1</sup> At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

## MANAGEMENT DIRECTION

### MANAGEMENT OBJECTIVE

- Maintain a sheep population that will sustain an annual harvest of 60 rams.

### METHODS

During this reporting period, aerial surveys were conducted to determine sex and age composition and population trends of sheep in selected trend count areas (TCA) within Unit 11. All hunters were required to submit post-hunt harvest ticket reports which provided information on the location, timing, and magnitude of effort and harvest. Harvested rams were sealed, and detailed horn measurements and genetic samples were taken.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

#### *Population Status*

Given the size of Unit 11, unitwide sheep population data are limited. National Park Service (NPS) estimated 26,286 sheep  $\pm$  4,473 (95% CI) within the entire Wrangell-St. Elias National Park and Preserve in 1990, 27,796 sheep  $\pm$  6,448 (95% CI) in 1991, and 17,455  $\pm$  3,883 sheep in 1993 (McDonald et al. 1991, Strickland et al. 1993). The NPS Central Alaska Network used distance sampling techniques (Schmidt et al. 2012) in 2010 and 2011 to survey the entire Wrangell Mountain range. A population estimate of 12,428 sheep was determined for Wrangell-St. Elias National Park and Preserve (NPS 2013).

#### *Population Trends*

Population trends for sheep across Unit 11 are documented periodically using TCAs (Table 1).

Sheep in TCA 11 declined steadily from the early 1980s, when 557 sheep were observed, through 2002. The population has remained relatively stable since then. The total number of sheep observed ranged from 149 to 207 during this reporting period.

Up through the late 1990s, TCA 12 had stable high numbers of sheep, with count observations ranging 490–601. Since then, sheep numbers have declined. Similar to TCA 11, sheep numbers in this area have remained relatively stable since 2002. The total number of sheep observed ranged from 165 to 267 during this reporting period.

Additional survey areas in the southwest Wrangell Mountains include TCA 10 (Mount Drum) and TCA 14 (Crystalline Hills). TCA 10 has not been flown consistently and was last surveyed in 2002. TCA 14 was consistently flown until 2005, at which time it appeared to have stabilized with sheep counts between 50 and 73.

Population information for the southeast portion of the Wrangell Mountains is collected from TCA 21 (MacColl Ridge), TCA 22 (Canyon Creek to Barnard Glacier), and TCA 23 (Barnard Glacier to Anderson Glacier) in the upper Chitina River drainage (TCA 3 West). Since 1970, sheep counts in TCA 21 have ranged from 180 in 1974 to 357 in 1981, with an average of 237 sheep observed. During this reporting period, TCA 21 was only flown once in 2010 when a

record low number of 161 sheep were observed. In TCA 22, total sheep numbers since the early 1980s have ranged from 202 to 305 (average = 254). In 2011, 246 sheep were counted in TCA 22. TCAs 3 West and 23 were not flown during this reporting period.

### *Population Composition*

Composition data for sheep TCAs are presented in Table 1. While sheep numbers have been low and stable in TCA 11 for nearly a decade, the population composition has varied annually. The ram-to-ewe ratio averaged 32 rams:100 ewes during 2000–2004, but declined to an average of 18 rams:100 ewes during 2007–2009. In 2011, 31 rams:100 ewes were observed. Of the total rams observed from 2000 to 2008, an average of 36% were full curl or greater. The percentage of rams full curl or greater dropped to 13% in 2009. In 2011, 17% of rams observed were judged to be full curl or greater. Summer lamb counts in this area have been consistently moderate, averaging 28 lambs:100 ewes from 2000 to 2011.

In adjacent TCA 12, the ram:ewe ratio is generally higher due to lower hunting pressure, averaging 55 rams:100 ewes since 2000. Of the total rams observed between 2000 and 2011, an average of 41% were full curl or greater. Lamb-to-ewe ratios in this area are variable. Since 2000, the observed range has been 11–39 lambs:100 ewes (average = 25 lambs:100 ewes). More recently the average lamb:100 ewes has risen to 31 (range = 25–38).

The MacColl Ridge area (TCA 21) has had relatively stable sheep numbers over time, although counts are intermittent. During the most recent count in 2010, 49 rams:100 ewes and 54 lambs:100 ewes were observed. The most noticeable differences between the 2010 survey and the previous 2005 survey were a drop in ewe numbers from 136 down to 80, and a shift from 31% of rams being full curl or greater down to 10%.

From Canyon Creek to the Barnard Glacier (TCA 22) sheep numbers have been relatively stable since 2000. During the most recent count in 2011, 57 rams:100 ewes and 41 lambs:100 ewes were observed. Of the rams observed, 28% were classified as full curl or greater, similar to previous years.

## **MORTALITY**

### *Harvest*

Seasons and Bag Limits. The state season for all sheep hunters is 10 August–20 September. Prior to regulatory year (RY; regulatory year begins 1 July and ends 30 June, e.g., RY79 = 1 July 1979–30 June 1980) 1979, the Unit 11 bag limit was 1 ram with  $\frac{3}{4}$ -curl or larger horns for all hunters. Beginning in RY79 the minimum horn size was increased to  $\frac{7}{8}$ -curl or larger.

In RY89 the bag limit was changed to 1 sheep for state subsistence hunters and 1 ram with full curl or larger horns for other hunters (nonlocal resident and nonresident hunters).

Until RY89, subsistence hunters for state hunts were defined as rural Alaska residents that have a customary and traditional use of a particular species of game in a particular area. Late that year, the rural priority was struck down in a decision on the McDowell appeal.

Due to the discrepancy between state and federal law pertaining to rural subsistence priority, the Federal Subsistence Board implemented federal subsistence hunting regulations for local rural residents on federal lands beginning in RY90. The federal subsistence sheep season in Unit 11 is 10 August–20 September, and the bag limit is 1 sheep. Federal regulations prohibit the use of aircraft for hunting on park lands, which limits access and harvest of sheep in much of Unit 11.

Between RY91 and RY00, the state bag limit for resident hunters was 1 sheep. Due to declining sheep numbers, the regulation was changed to 1 ram in RY01, and then to  $\frac{3}{4}$ -curl or larger in RY03. The nonresident bag limit has remained full curl or larger since RY89; guides are required.

In RY98 the Federal Subsistence Board implemented an additional federal season for hunters over the age of 60. The season for this hunt is 21 September–20 October; the bag limit is 1 sheep. This hunt is administered through a federal registration permit system, while all other Unit 11 sheep hunts are administered through the state harvest ticket system.

Board of Game Actions and Emergency Orders. No Board of Game actions were taken for Unit 11 during this reporting period.

Harvest by Hunters. The reported sheep harvest declined steadily in Unit 11 from the peak harvest in RY91 (146 rams and 24 ewes), until RY10, when the harvest appears to have stabilized with an average of 44 sheep during RY10–RY12. Harvest data are presented in Table 2. Since 2007, sheep sealing requirements have allowed for the distinction between full curl and sub full-curl rams, which allows for average horn length comparisons with other hunt areas. The average horn length of full-curl rams harvested in Unit 11 was very consistent between RY07 and RY12, with an average of 37.3 inches.

Ewe harvest dropped during this reporting period, with 1 ewe harvested in RY10, no ewes in RY11, and 1 ewe in RY12. Since RY01, ewes have been legal only under federal subsistence regulations.

Hunter Residency and Success. Sheep hunter residency and success in Unit 11 is presented in Table 3. Since RY91, success rates have oscillated between 44% and 26%, with an average of 36%.

The number of sheep hunters in Unit 11 peaked in the early 1990s, and has steadily declined to a low of 120 hunters in RY12. During this reporting period, the average number of hunters per season was 130.

During the 1990s, local residents were taking 22–43 sheep per year. Nonlocal residents took 54–100 sheep per year, and nonresidents took 20–42 per year during the same time period. During this reporting period, the average harvests by locals, nonlocal residents, and nonresidents were 16, 18, and 9 respectively. Local hunter success rates averaged 39%, while nonlocal hunter success rates averaged 25% and nonresident success averaged 62%. Nonresidents remain the most successful group of hunters in Unit 11.

Hunter effort is summarized in Table 4. The average number of days hunted annually by successful hunters ranged from 4.3 to 4.6 days during this reporting period. The average number of days hunted by unsuccessful sheep hunters ranged from 5.4 to 5.7 days.

Harvest Chronology. Harvest chronology data for sheep taken in Unit 11 are presented in Table 5. Between RY95 and RY05, much of the harvest (average = 44%) occurred during the first week of the season. In RY06, a very wet hunting season, substantial harvest occurred through the third week of the season. A more typical pattern was observed in RY07 and RY08, but since then harvest chronology has been less predictable. During this reporting period, an average of 35% of harvest occurred during the first week of each season, with the remaining harvest largely occurring in the second and fourth weeks of the season. In RY11, 23% of harvest occurred in the last week of the season.

Transportation Methods. Aircraft is the primary mode of transportation of successful hunters (Table 6). An annual average of 11 successful hunters (25%) used 4-wheelers, 18 (41%) used aircraft, and 9 (21%) used boats during RY10–RY012.

#### *Other Mortality*

No studies of natural mortality of sheep in Unit 11 have been conducted. Predation by wolves, wolverines, grizzly bears, coyotes, and golden eagles on Dall sheep has been documented in the Alaska Range (Scotton 1997, Arthur 2003), and has been observed in the Wrangell Mountains as well. Species-specific predation rates have not been estimated in Unit 11.

Other sources of natural mortality common to sheep populations include accidents, avalanches, and starvation. Prior to 1993, snow depths were only available from 2 sites - Sanford River and Dadina Lake in the western Wrangell Mountains. In 1993, 3 additional locations in the southern Wrangells were added: Lost Creek, Chokosna, and May Creek. All snow survey sites are located in low-lying areas which may not accurately represent snow depths in sheep habitat. During this reporting period, snow depths reached severe levels at Dadina Lake in 2010 and 2011. All other sites and dates showed snow depths below the 30" index that signifies severe.

## **CONCLUSION AND RECOMMENDATIONS**

Annual sheep surveys have been difficult to maintain in Unit 11 due to the large size of the unit as well as budget, weather, and time constraints. Many of the surveys flown during the early 1990s were funded by NPS; the most recent surveys have been funded by a combination of NPS and ADF&G funds. In the future, an emphasis should be placed on maintaining annual counts of at least 3 count areas to provide yearly recruitment and survival estimates for lambs in various regions of the Wrangell Mountains. In addition to annual summer trend counts between June and July, early summer trend counts in May would be useful to document early lamb production.

Unless sheep numbers increase, overall sheep hunter numbers are expected to remain relatively low and stable in Unit 11. During this reporting period, ram harvest dropped below the management objective of 60 rams. Sheep numbers remained fairly stable showing an increase in some areas, however 2 count areas showed a decline in the number of full-curl rams observed. Hunter numbers also decreased during this reporting period reaching a historic low for Unit 11. Sheep population demographics should continue to be monitored to determine if full-curl ram

numbers rebound or remain low. Currently it is unclear if harvest is below management objectives due to a lack of opportunity, a decrease in hunter effort, or some other factor.

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Table 1. Wrangell Mountains, Unit 11 Dall sheep composition counts, Alaska, calendar years 2008–2012.

Trend count area (TCA)	Calendar year	Full curl (%) <sup>a</sup>	Total rams	Ewes and yearling rams	Lambs (%) <sup>b</sup>	Lambs: 100 Ewes	Rams: 100 Ewes	Total sheep observed
TCA 11	2008	8 (33)	24	132	47 (23)	35.6	18.2	203
Dadina to Long Glacier	2009	2 (13)	15	114	20 (13)	17.5	13.2	149
	2011	7 (17)	41	131	35 (17)	26.7	31.3	207
TCA 12	2008	29 (53)	55	90	35 (19)	38.9	61.1	180
Long Glacier to Kuskulana	2009	25 (39)	64	81	20 (12)	24.7	79	165
	2011	13 (19)	68	152	47 (18)	30.9	44.7	267
TCA 21 MacColl Ridge	2010	4 (10)	38	80	43 (27)	53.8	47.5	161
TCA 22 Hawkins Glacier	2011	20 (28)	71	124	51 (21)	41.1	57.3	246

<sup>a</sup> Percent full curl is calculated as a proportion of total rams.

<sup>b</sup> Percent lambs is calculated as a proportion of total sheep observed.



Table 2. Wrangell Mountains, Unit 11 Dall sheep harvest, Alaska, regulatory years<sup>a</sup> 2008–2012.

Regulatory year	Average horn length (inches) of full-curl		% All ram horn lengths $\geq$ 40 inches	Ewes	Total sheep
	Rams	rams			
2008	54	37.6	9	4	58
2009	62	37.4	6	2	64
2010	48	37.4	8	1	49
2011	48	37.0	13	0	48
2012	33	37.0	9	1	34

<sup>a</sup> Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2008 = 1 July 2008–30 June 2009.

Table 3. Wrangell Mountains, Unit 11 Dall sheep hunter residency and success, Alaska, regulatory years<sup>a</sup> 2008–2012.

Regulatory year	Successful				Unsuccessful				Total hunters
	Local <sup>b</sup> resident	Nonlocal resident	Nonresident	Total (%)	Local <sup>b</sup> resident	Nonlocal resident	Nonresident	Total (%)	
2008	15	38	5	58 (28)	34	105	8	151 <sup>c</sup> (72)	209 <sup>c</sup>
2009	15	35	14	64 (32)	38	85	13	136 (68)	200
2010	18	21	10	49 (35)	34	50	9	93 (65)	142
2011	22	16	10	48 (37)	22	57	3	82 (63)	130
2012	9	18	7	34 (28)	19	61	6	86 (72)	120

<sup>a</sup> Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2008 = 1 July 2008–30 June 2009.

<sup>b</sup> Local means residents of Units 11 and 13.

<sup>c</sup> Four (4) unsuccessful hunters did not specify residency.

Table 4. Wrangell Mountains, Unit 11 reported Dall sheep hunting effort, Alaska, regulatory years<sup>a</sup> 2008–2012<sup>b</sup>.

Regulatory year	Successful hunters			Unsuccessful hunters			Total hunters		
	No. hunters	Total days	Average days	No. hunters	Total days	Average days	No. hunters	Total days	Average days
2008	56	253	4.5	148	832	5.6	204	1,085	5.3
2009	64	372	5.8	134	778	5.8	198	1,150	5.8
2010	47	204	4.3	89	510	5.7	136	714	5.3
2011	47	214	4.6	80	439	5.5	127	653	5.1
2012	34	117	3.4	86	468	5.4	120	585	4.9

<sup>a</sup> Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2008 = 1 July 2008–30 June 2009.

<sup>b</sup> Represents only reports with hunter effort data.

Table 5. Wrangell Mountains, Unit 11 Dall sheep harvest chronology percent by harvest periods, Alaska, regulatory years<sup>a</sup> 2008–2012<sup>b</sup>.

Regulatory year	Harvest chronology percent by periods						<i>n</i>
	8/10–8/16	8/17–8/23	8/24–8/30	8/31–9/6	9/7–9/13	9/14–9/20	
2008	43	13	9	16	7	11	55
2009	27	20	16	9	16	13	64
2010	33	22	8	16	14	6	49
2011	31	15	15	10	6	23	48
2012	41	24	0	18	3	15	34

<sup>a</sup> Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2008 = 1 July 2008–30 June 2009.

<sup>b</sup> Represents only reports with date of kill.

Table 6. Wrangell Mountains, Unit 11 Dall sheep harvest percent by transport method, Alaska, regulatory years<sup>a</sup> 2008–2012<sup>b</sup>.

Regulatory year	Harvest percent by transport method								<i>n</i>
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Airboat	
2008	43	0	17	29	0	2	9	0	58
2009	42	2	13	27	0	3	14	0	64
2010	39	0	20	27	0	0	14	0	49
2011	40	0	23	27	0	6	4	0	48
2012	44	0	18	24	0	9	6	0	34

<sup>a</sup> Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2008 = 1 July 2008–30 June 2009.

<sup>b</sup> Represents only reports with transportation data.