Species Management Report ADF&G/DWC/SMR-2014-3

Mountain Goat Management Report of Survey-Inventory Activities, 1 July 2011–30 June 2013

Patricia Harper, editor

2014 Set

Alaska Department of Fish and Game Division of Wildlife Conservation

Species Management Report ADF&G/DWC/SMR-2014-3

Mountain Goat Management Report of Survey-Inventory Activities, 1 July 2011–30 June 2013

Alaska Department of Fish and Game
Division of Wildlife Conservation
P.O. Box 115526
Juneau, Alaska 99811-5526

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Any information taken from this report should be cited with credit given to authors and the Alaska Department of Fish and Game. Authors are identified at the end of each unit section.

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

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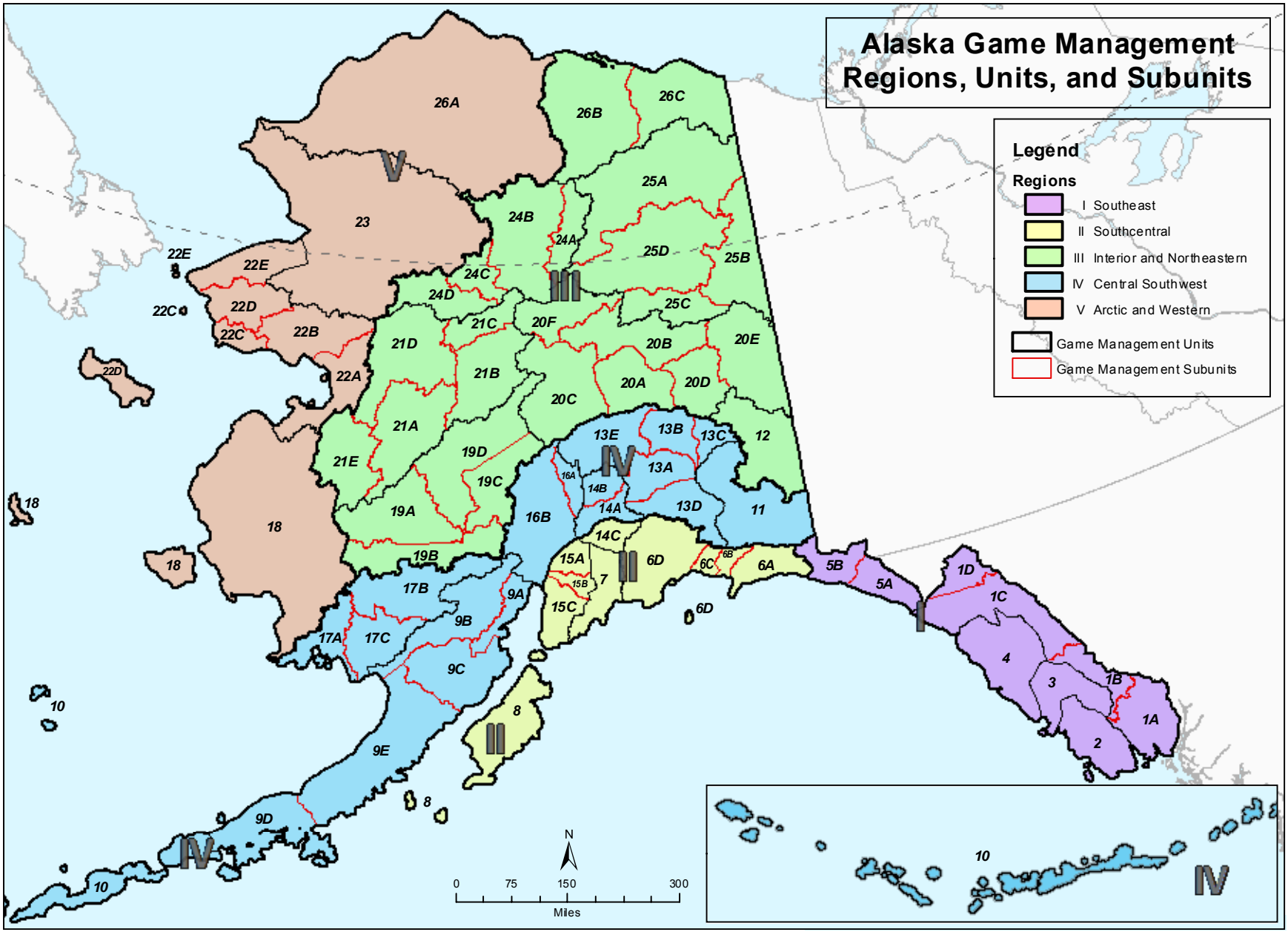
Alaska Game Management
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SPECIES

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 1A (5,000 mi^2)

GEOGRAPHIC DESCRIPTION: Ketchikan area including mainland areas draining into Behm and Portland Canals

BACKGROUND

Severe winter weather conditions during 1968–1975 resulted in up to 90% reductions in Unit 1A mountain goat (*Oreamnos americanus*) populations (Smith 1984). Subsequent moderating weather enabled populations to recover and we believe they are currently stable at moderate levels throughout most of the unit.

Steep glacial valleys and peaks in Unit 1A provide important escape terrain for goats from predating wolves and bears. Alpine vegetation consists of heath fields and provides goats with nutritious forb-sedge meadows. At lower elevations dense stands of old-growth forest provide necessary cover, and shrubs and evergreen forbs provide goats with important foods during critical winter months.

Although goats historically inhabited only the subunit's mainland, they now occur on Revillagigedo (Revilla) Island as a result of goat introductions to Swan Lake (17 goats) in 1983 (Smith and Nichols 1984) and Deer Mountain (15 goats) in 1991 (Paul 2009).

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

1. Maintain goat population densities that provide greater than 20 goats per hour of survey time during fall surveys, and when not achieved determine probable causes.

2. Survey goats often in established trend count areas (TCA) throughout Unit 1A.

3. Monitor sex composition of the harvest and manage for < 6 points per 100 goats using a weighted harvest point system (males = 1 point, females = 2 points).

METHODS

We attempt to survey at least 3 to 6 of the unit's 14 established TCAs each fall as weather and work schedules allow. TCAs vary in size 23–200 mi^2. We generally initiate surveys during late July, August or September, and begin daily survey efforts during 0500–0800 or 1700–1900 hours. This report contains a summary of the 2011 and 2012 aerial survey data.

We obtain hunt and harvest information through mandatory reporting associated with the unit 1A registration permit hunt RG001 and drawing permit hunts DG005, DG006 and DG007 near Ketchikan. Information collected on hunt reports includes: the general location and numbers of days hunted, hunter success, dates of hunts and kills, transport methods, and commercial services used. Successful Unit 1A hunters are also asked to voluntarily provide their goat horns to the Ketchikan Fish and Game office for aging. During the sealing process we obtain genetic samples, age the goat by counting growth annuli, and measure horn base circumferences and each individual annulus length.

Guideline harvest levels are established for goats within each TCA. To accomplish this we use the number of goats observed within a TCA during annual fall surveys, then apply a guideline harvest of 6 harvest points per 100 adult goats observed. This is dependent on the survey conditions being good enough to consider the survey reliable. Points are weighted more heavily for females (2 points) than for males (1 point). A weighted point system is applied to the 3-year running average of the annual harvest to determine a guideline harvest level. For instance, if 6 points are allowed in a hunt area, then for any given 3-year period, the cumulative points for an area should not exceed 18. In this way, if 7 points are taken one year, and 8 the next, then the third year point allowance would be reduced to 3. Hunt areas that reach the harvest level are closed by emergency order. Smith (1983**)** stressed the need to monitor both short- and long-term environmental fluctuations and subsequent variations in population parameters to assist in making management decisions. If we sustain a severe winter we assume that some animals die during the winter and consequently fewer animals would be available for the following hunting season. Our management strategy of using 6 points per 100 goats on a 3-year running average and careful monitoring of environmental conditions throughout the unit assures that we keep hunter harvest and mortality associated with environmental factors at a level the population can withstand.

Data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY11 = 1 July 2011 through 30 June 2012).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

During fall 2011 we completed aerial surveys in 2 of the TCAs: K-6 Cleveland, and K-13 Deer Mountain. During fall 2012 we completed aerial surveys in 4 of the TCAs: K-6 Cleveland, K-12A Mirror Lake to Swan Lake, K-12B Swan Lake to Reid Mountain, and K-13 Deer Mountain (Table 1).

Compiling these surveys during 2011 and 2012 we observed 497 goats in 6.0 hours of flying. Although we were not able to complete as many aerial survey hours during the past 2 years due to aircraft availability and suitable flying weather, the 98 goats/hour rate observed during 2012

was higher than in recent years. The ratio of 29 kids per 100 adults for this report period was within the range of 17–47 from the previous 7 years (RY 2004 survey data incomplete) (Table 2).

Population Size

Although we have data from numerous goat surveys in recent years, the results of these types of aerial mountain goat surveys can be interpreted only as minimum population values (Ballard 1975), and not as a population estimate. However, because of our strategy of managing goat harvest conservatively, we use these minimum counts as the basis of setting our guideline harvest levels. We developed population estimates for goats inhabiting Unit 1A using historical survey data (ADF&G unpublished report, 1990, Ketchikan) and the sightability correction factor developed by Smith and Bovee using radiocollared goats (1984). To derive our estimate, we first delineated the percentage of each Wildlife Analysis Area (WAA) that we believed contained suitable goat habitat. Then we applied our survey-derived estimate of 1.27 goats/mi^2 to these areas, which resulted in a mainland estimate of 3,000–4,000 goats. This estimate is based on evaluating all goat habitats in the unit and an average goat density in good habitat calculated from previous aerial surveys. This assumes that goats inhabit all suitable goat habitat in the unit which we realize is extremely optimistic. However, without a better estimate or method we believe this is the best overall estimate available for Unit 1A goat numbers. We also estimate goat numbers in the DG005, DG006 and DG007 drawing hunt areas each fall season after completing aerial surveys to use as a reference when establishing numbers of offered drawing permits. We do not attempt to estimate annual goat numbers in the remainder of Unit 1A, which is managed under registration permit (RG001).

Population Composition

A series of mild winters, likely resulting in only moderate bear and wolf predation, and good habitat conditions, have all contributed to healthy goat numbers in this unit as a whole. We will continue to keep a close watch on these survey trends and issue drawing permit numbers accordingly.

Distribution and Movements

We continue to be concerned about disturbance to goats in these drawing hunt areas located on Revilla Island because of the high number of daily over flights by both fixed wing and rotary aircraft. This area is directly in the flight path of extensive tourist flights going and returning from Misty Fiords National Monument, a popular cruise ship passenger flight seeing destination.

The Cleveland Peninsula portion of Unit 1A remains closed to goat hunting (Porter 2004). To better understand this small population of goats we initiated a research project along the lower Cleveland Peninsula in fall of 2009. This project was designed to help develop a sightability index and will be used as adjust annual aerial surveys counts in this unique habitat type (White and Pendleton 2009). Seven goats were fitted with Global Positioning Satellite (GPS) radio collars and are providing us with good sightability information, and providing sources of mortality and habitat use information (White *et al*. 2010). We have completed 3 sightability flights since the collars were deployed on goats and this data along with our annual goat survey counts will help provide a measure of overall goat numbers. The GPS collar data from study

animals will also help identify critical winter habitat and provide the first information describing seasonal habitat use along the Cleveland.

One Cleveland study animal was confirmed dead during spring of 2013 with the likely cause a vertical snow slide during mid winter. We detected another goat collar on mortality mode at low elevation with no signs of trauma to the goat. We believe this goat may have slipped its collar prematurely. The remaining GPS collars are programmed to drop off June 30, 2014 and will be recovered for data downloads.

Currently our estimate of goat numbers remains at about 50 total animals for the entire Cleveland area and numbers do not appear to be increasing at this time. Mountain goat populations are sensitive to overharvest and many mountain goat researchers advocate no harvest, or very low periodic harvest, of native goat populations containing less than 50 individuals (Côté and Festa-Bianchet 2003; Hamel *et al*. 2006). This area produced world class trophy goats in the past; some of the top 10 Boone and Crocket record book goats were historically harvested from the Cleveland Peninsula.

Sealaska Native Corporation began clear cut timber harvesting along the western slope of the Cleveland Peninsula near Jim Creek during summer 2010 and will continue building roads and harvesting a large section of old growth timber for several years. Once we recover dropped GPS radio collars from study goats in this active timber harvest area we will have better ability to assess how this winter habitat loss and fragmentation of vertical travel corridors will affect Cleveland goats in the future. We expect this clear cut timber harvest and removal of important goat winter habitat will have a negative affect on mountain goats, especially near Ship and Black Bear Mountains, and result in fewer goats using this area after the current timber harvest.

MORTALITY

Harvest

Season and Bag Limit	Resident and nonresident hunters
Unit 1(A), Revillagigedo Island, except that portion west of Carroll Inlet and Creek, west of the divide between Carroll Creek and the south fork of Orchard Creek, south of Orchard Creek, Orchard Lake, Shrimp Bay, and Gedney Pass:	
1 goat by registration permit only	1 August–31 December

Unit 1A, remainder of Revillagigedo Island:	
1 goat by drawing permit only DG005, DG006, DG007	15 August–31 December

Alaska Board of Game (BOG) Actions and Emergency Orders. During the 2010 BOG meeting in Ketchikan there was public interest in harvesting goats from a previously closed area north of Deer Mountain near Neets Bay. Starting fall 2011 (RY11) the board discontinued hunt DG003 and replaced it with three separate drawing hunts on Revilla Island: a new hunt (DG007) located near Neets Bay on the north extending south to encompass the area between George and Carroll inlets; and hunts DG005 and DG006 include portions of the old hunt DG003.

Hunter Harvest. Registration permit hunt RG001: Eighty-five permits and 90 permits were issued for registration permit hunt RG001 in Unit 1A during RY11 and RY12, respectively (Table 3). Forty-four hunters killed 10 goats in RY11 and 48 hunters killed 23 goats during RY12. The RY11 harvest was well below the previous 8 years' average of 19 goats and RY12 was slightly above the average (range 14–27). The total numbers of RG001 goat hunters in the field during RY11 and RY12 are similar to those of the previous 8 years (range 37–53; Table 4).

The number of permits available for the Unit 1A mountain goat drawing hunts (DG005, DG006, and DG007) has remained consistent during the report period (Table 5). However, slightly more applicants have applied for the Ketchikan area goat drawing permits. During the past 2 years 81% of hunters who obtained drawing permits actually spent time in the field and 46% of those hunters were successful at harvesting a goat (Table 5).

Hunter Residency and Success. Alaska Statutes require nonresident hunters to be accompanied by a licensed Big Game Guide, or a relative within the second degree of kindred, to hunt mountain goats. Six and 2 nonresidents hunted goats successfully in Unit 1A (RG001) during RY11 and RY12 respectively, while 1 and 4 nonresidents were unsuccessful during the same period (Table 4). Typically local hunters make up about 50 percent of the RG001 goat harvest each season, however for the first time ever, during RY11, no local residents harvested goats from the RG001 hunt. In contrast, the following year 61% of the RY12 RG001 harvest was by local hunters residing within the subunit. Overall, Alaska residents were responsible for 33% of the RY11 harvest and 91% of the RY12 goat harvest (Table 4). We continue to educate both resident and nonresident hunters on the value of targeting male goats over females. We currently have helpful reference materials on our state Fish and Game website and in paperback brochure form available to goat hunters to help them identify male goats in the field.

Harvest Chronology. The majority of goat harvest in the RG001 permit area is split between August and September with a few animals taken during October, depending on weather patterns. During RY11 and RY12 the harvest shifted slightly and was distributed between October (40%), September (24%) and August (11%). During this 2-year report period 18% of the hunt reports did not provide an accurate date of kill (Table 6). During the previous 8-year period the harvest was evenly distributed between August, September and October with only a few goats taken during the remainder of the season. Successful goat hunting requires that hunters' opportunities

to go hunting coincide with good weather to reach hunting areas, good visibility on the mountain tops, luck in locating goats, and finally the ability to reach those goats safely.

Drawing hunt effort and success are more widely distributed over the fall season than for registration hunts, and include some goats taken in November. The dispersed nature of this drawing permit harvest chronology is due to hunters having easy highway access to the hunt areas for DG005 and DG006. These two drawing hunts near Ketchikan are accessible via maintained hiking trails that start from paved roads near Ketchikan. Drawing permit hunters are not limited by poor boating and flying weather as are registration hunt hunters who pursue goats in most of the remainder of the unit.

Transport Methods. Airplanes accounted for 40% of the transportation used by hunters in the registration hunt RG001 during the past two seasons (Table 7). Airplanes have accounted for 76% of the transportation used by Unit 1A hunters during the previous 8 seasons (range 50–100%). The balance of goat hunters used boats to access hunting areas. RG001 hunters have no road access to Unit 1A mountain goats without first using a boat to reach a few short logging roads not linked to the main Ketchikan road system.

Drawing Permit Hunts DG005, DG006, DG007: Goat hunting in Unit 1A was historically managed solely by registration permit for 27 years. After opening a new area to hunting because of increasing numbers of goats, the Board of Game instituted a drawing permit (DG003) for the first time during RY06 for the area on Revillagigedo Island near Deer Mountain. More recently, after some discussion at the BOG in 2010 the board decided to split the DG003 hunt area into 2 parts with DG006 comprising the south and west portions of the old hunt area, and the DG005 the eastern portion. The board added drawing hunt (DG007) area near Neets Bay on the north end of Revilla Island that had been previously closed to goat hunting. We require all drawing permit winners to visit our office for a brief hunt orientation before going afield. We take that opportunity to educate them about the importance of harvesting male goats and about good techniques for estimating shooting range in the alpine. We also emphasize the importance of being respectful of other user groups in the hunt area, especially during the early part of the fall hunting season when hikers and campers are using this same alpine area near Ketchikan for nonhunting recreation activities.

CONCLUSIONS AND RECOMMENDATIONS

Mountain goat populations appear to be stable throughout most of Unit 1A. We will continue to monitor goat numbers on the Cleveland Peninsula, a portion of Unit 1A west of Ketchikan that remains closed to hunting because of goat population viability concerns. We will continue to collect data for the new sightability study on the Cleveland and make multiple aerial counts each year to monitor changes. Sealaska Native Corporation's timber harvest along the Cleveland will remove critical winter habitat important for goats and reduce carrying capacity for Cleveland goats in the near future.

Our objective for the remainder of the unit of maintaining goat densities greater than 20 goats per hour of survey time has been met consistently. We will continue to monitor the new drawing hunts and determine the number of permits to offer based on prior year fall aerial survey counts.

We will continue to monitor disease outbreaks and educate hunters prior to their handling goats during the hunting season. Also, we will continue to educate hunters about the importance of harvesting male goats, and how to identify male goats in the field.

The new drawing permit hunts have been very popular with about 50% hunter success each year. We remain concerned about air traffic disturbance, both fixed wing and helicopter, to goats in the drawing area near Ketchikan. This herd is close to town and directly in the flight path of the high volume tourist flights going out and returning from Misty Fiords National Monument. We continue to monitor the helicopter and fixed wing flight activity in this area.

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Table 1. Unit 1A mountain goat trend count area surveys, regulatory years 2003 through 2013.

Survey Area	Year	Adults	Kids	Total Goats	Survey Time (hrs)	Goats Observed/hr	Kids:100 Adults	Sets of Twins
K-3	2010	83	22	105	1.5	70	27	2
	2006	115	28	143	1.5	95	24	0
	2001	86	27	113	1.8	63	31	2
	2000	60	13	73	1.5	48	22	0
K-5	2009	89	34	123	1.7	72	38	1
	2003	101	40	141	1.9	74	40	3
	2002	150	26	176	1.5	117	17	2
	2001	182	45	227	1.9	119	25	1
	2000	14	3	17	1.0	17	21	0
K-6	2012	12	3	15	1.0	15	25	0
	2011	10	3	13	1.0	13	30	0
	2009	22	7	29	1.0	29	32	0
	2008	11	7	18	1.0	18	64	0
	2007	22	6	28	0.8	35	27	0
	2006	30	6	36	0.8	45	20	0
	2005	22	7	29	1.0	29	32	0

Table 1. continued.

Survey Area	Year	Adults	Kids	Total Goats	Survey Time (hrs)	Goats Observed/hr	Kids:100 Adults	Sets of Twins
K-6 cont.	2004	9	7	16	1.1	15	78	0
	2003	10	7	17	1.0	17	70	0
	2001	8	2	10	1.0	10	25	0
	2000	14	3	17	1.0	17	21	0
K-7	2009	38	18	56	1.7	33	47	1
	2006	43	10	53	1.5	35	23	0
	2005	67	10	77	1.5	51	15	0
	2003	60	26	86	2.0	43	43	2
	2002	57	15	72	1.5	48	26	1
	2001	58	15	73	1.4	52	26	0
K-9	2010	85	22	107	2.0	54	26	0
	2009	41	11	52	1.7	31	27	0
	2007	64	12	76	1.5	51	19	4
	2003	19	5	24	0.9	27	26	1
	2002	37	7	44	1.3	34	19	0
	2001	29	6	35	1.0	34	21	2

Table 1. continued.

Survey Area	Year	Adults	Kids	Total Goats	Survey Time (hrs)	Goats Observed/hr	Kids:100 Adults	Sets of Twins
K-12A	2012	57	21	78	0.7	111	37	0
	2010	75	22	97	1.0	97	29	1
	2009	51	24	75	0.4	188	47	0
	2002	21	8	29	0.3	97	38	2
	2000	26	7	33	0.8	41	27	0
K-12B	2012	56	19	75	0.8	94	34	0
	2010	56	20	76	1.0	76	36	2
	2009	54	18	72	1.4	51	33	1
	2007	60	15	75	1.0	75	25	2
	2004	56	20	76	1.0	76	36	1
	2002	35	16	51	0.5	102	46	0
	2000	76	21	97	1.2	81	28	0
K-13	2012	130	34	164	1	164	26	3
	2011	112	30	142	1	142	27	0
	2010	97	35	132	1.0	132	36	0
	2009	80	5	85	1.0	85	6	0
	2008	61	27	88	1.0	88	44	1
	2007	106	31	137	1.0	137	29	2
	2006	60	16	76	0.8	95	27	0
	2005	95	14	109	1.0	109	15	0
	2003	67	19	86	0.5	172	28	1
	2002	46	18	64	0.8	80	39	0

Table 2. Unit 1A mountain goat survey data, regulatory years 2003 through 2012.

Survey Dates	Nr Kids	Nr. Adults	*Total Goats*	Kids:100 Adults	Count Time (hrs.)	Goats/ Hour
Aug 5–Sept 22, 2003	134	345	479	39	6.6	73
Aug 16–Aug 25, 2005	31	184	215	17	3.5	61
Aug 16–Oct 3, 2006	60	248	308	24	4.5	68
Aug 16–Oct. 5, 2007	78	295	373	26	4.8	78
Aug 10–Oct 2, 2008	34	72	106	47	2.0	53
Sept 25–Oct 7, 2009	153	507	660	30	10.4	79
July 28–Sept 15, 2010	121	396	517	31	6.5	80
July 30–Oct 17, 2011	33	122	155	27	2.0	78
Aug 15–Oct 10, 2012	77	255	332	30	3.5	95
Average	80	269	351	30	4.9	74

Table 3. Unit 1A mountain goat harvest data, registration permit hunt RG001, regulatory years 2003 through 2012.

Hunt	Regulatory Year	Permits issued	Did not hunt	Unsuccessful hunters	Successful hunters	Harvest						Total harvest
						Males	(%)	Females	(%)	Unk	(%)	
RG001												
	2003	138	85	35	18	10	(56)	8	(44)	0	(0)	18
	2004	121	79	20	22	16	(73)	6	(27)	0	(0)	22
	2005	106	54	25	27	13	(48)	12	(44)	2	(7)	27
	2006	101	56	31	14	11	(79)	3	(21)	0	(0)	14
	2007	98	56	29	13	10	(77)	3	(23)	0	(0)	13
	2008	118	74	25	19	16	(84)	3	(16)	0	(0)	19
	2009	100	56	13	22	16	(73)	6	(27)	0	(0)	22
	2010	102	54	24	14	8	(57)	6	(43)	0	(0)	14
	2011	85	41	34	9	7	(78)	3	(22)	0	(0)	10
	2012	90	42	25	23	11	(48)	11	(48)	1	(4)	23
	Average	106	60	26	18	12	(66)	6	(34)	0	(0)	18

Table 4. Unit 1A mountain goat hunter residency and success, regulatory years 2003 through 2012, hunt RG001.

	Successful					Unsuccessful					
Regulatory Year	Local[a] resident	Nonlocal resident	Non-resident	Total	(%)	Local[a] resident	Nonlocal resident	Non-resident	Total	(%)	Total hunters
2003	9	3	6	18	(34)	25	6	4	35	(66)	53
2004	14	7	1	22	(52)	19	1	0	20	(48)	42
2005	13	9	5	27	(52)	20	3	2	25	(48)	52
2006	4	2	8	14	(31)	22	3	6	31	(69)	45
2007	4	0	9	13	(31)	24	4	1	29	(69)	42
2008	7	4	8	19	(43)	15	3	7	25	(57)	44
2009	16	4	2	22	(79)	5	1	0	6	(21)	28
2010	6	4	4	14	(27)	18	2	3	23	(63)	37
2011	0	3	6	9	(24)	20	7	1	28	(76)	37
2012	14	7	2	23	(52)	11	6	4	21	(48)	44
Average	9	4	5	18	(43)	18	4	3	24	(57)	42

[a] Local resident hunters reside in Unit 1A.

Table 5. DG005, DG006, DG007 drawing permit hunts, regulatory years 2011–2012.

Regulatory Year	Hunt #	Applications	Number permits issued	Harvest male	Harvest female	Hunted	Did not hunt
2011	DG005	243	4	2	0	4	0
2011	DG006	275	16	6	0	8	5
2012	DG005	238	4	3	0	4	0
2012	DG006	299	15	7	5	13	2
2012	DG007	119	2	0	0	0	1
Average		224	7	3	<1	5	11

Table 6. Unit 1A goat harvest chronology percent by month, regulatory years 2003 through 2012, hunt RG001.

Regulatory Year	Aug	(%)	*Sep*	(%)	Oct	(%)	Nov	(%)	Dec	(%)	Unk	(%)	*n*
2003	4	(22)	8	(44)	5	(28)	1	(6)	0	(0)	0	(0)	18
2004	9	(41)	6	(27)	7	(32)	0	(0)	0	(0)	0	(0)	22
2005	10	(37)	7	(26)	7	(26)	2	(7)	1	(4)	0	(0)	27
2006	3	(21)	3	(21)	7	(50)	0	(0)	0	(0)	1	(8)	14
2007	2	(15)	6	(46)	4	(31)	1	(8)	0	(0)	0	(0)	13
2008	3	(16)	11	(58)	5	(26)	0	(0)	0	(0)	0	(0)	19
2009	9	(41)	5	(23)	8	(36)	0	(0)	0	(0)	0	(0)	22
2010	6	(43)	6	(43)	2	(14)	0	(0)	0	(0)	0	(0)	14
2011	1	(11)	5	(56)	3	(33)	0	(0)	0	(0)	0	(0)	9
2012	4	(11)	6	(17)	15	(42)	2	(6)	1	(2)	8	(22)	36
Average	5	(26)	6	(32)	6	(32)	1	(3)	<1	(1)	1	(5)	20

Table 7. Unit 1A mountain goat harvest percent by transport method, regulatory years 2003–2012.

Regulatory	Harvest percent by transport method						
year	Airplane	Air (%)	Boat	Boat (%)	Unk	Unk. (%)	n
2000	18	(75)	6	(25)	0	(0)	24
2001	16	(73)	6	(27)	1	(4)	23
2002	12	(75)	4	(25)	0	(0)	16
2003	18	(100)	0	(0)	0	(0)	18
2004	11	(50)	10	(45)	1	(5)	22
2005	22	(81)	5	(19)	0	(0)	27
2006	12	(86)	2	(14)	0	(0)	14
2007	10	(77)	2	(16)	1	(7)	13
2008	18	(95)	1	(5)	0	(0)	19
2009	12	(55)	10	(45)	0	(0)	22
2010	10	(71)	4	(39)	0	(0)	14
2011	19	(51)	14	(38)	4	(11)	37
2012	19	(33)	22	(38)	17	(29)	58
Average	15	(64)	7	(28)	2	(8)	24

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: Unit: 1B (3,000 mi^{2})

GEOGRAPHIC DESCRIPTION: Southeast Alaska mainland, Cape Fanshaw to Lemesurier Point.

BACKGROUND

HABITAT DESCRIPTION

Mountain goats in Southeast Alaska use alpine, subalpine and heavily forested habitats (Fox 1983, Schoen and Kirchhoff 1982, Smith 1986), typically in proximity to steep escape terrain that provides security from predators. Considered generalist feeders (Dailey et al. 1984), goats take advantage of a wide variety of plant types for food (Geist 1971, Adams and Bailey 1982).

The Alaska Department of Fish and Game (ADF&G) does not have an estimate for the amount of suitable goat habitat in Unit 1B. About 850 square miles is forest habitat, some of which serves as important goat winter range, particularly during periods of severe winter weather.

In spring, goats occupy avalanche chutes and low elevation south-facing slopes, where they forage on alder, rhizomes, and new shoots of ferns. As snow melts in the summer, goats move to high elevation alpine and subalpine habitats where they feed on newly exposed and highly nutritious sedges and forbs (Fox et al. 1989).

During winter, goats in the colder mainland areas of Southeast Alaska occupy steep or windswept slopes with little snow cover, whereas those in the warmer coastal areas typically descend to forest habitats during periods of heavy snowfall. Winter is a period of severe nutritional deprivation and food scarcity for mountain goats (Fox et al. 1989). Forage availability and selection are influenced to a large extent by snowpack depth and density. During winter, goats feed on conifers, mosses, and lichens, and to lesser degree shrubs, forbs, ferns, and grasses (Smith 1986). As a result of high annual precipitation, the majority of goat winter range in Southeast Alaska is limited to forested habitats. During periods of severe winter weather and heavy snowfall goats may even descend to forested coastal shorelines.

The largest threats to mountain goat habitat are development activities associated with logging, mining, and hydroelectric power (Fox et al. 1989). To date, an estimated 14,000 acres of forested habitat in the subunit have been logged and are now clearcuts in various stages of seral habitats that include some logging roads. Clearcuts and pole stands are considered poor goat winter habitat and roads can make goats vulnerable to exploitation due to increased human access.

HUMAN–USE HISTORY

Mountain goats are indigenous to Unit 1B and are distributed throughout appropriate habitat. They have traditionally been hunted for food and trophies. Information about goats in the subunit is derived from aerial surveys, harvest records, anecdotal public reports, and observations by ADF&G staff.

REGULATION HISTORY

Prior to 1975, all Unit 1 subunits were managed under the same goat season and bag limit. After statehood in 1959, season dates varied and normally fell between 1 August and 31 January, and the resident and nonresident bag limit was 2 goats. Since 1973, the Unit 1B goat season has remained 1 August to 31 December. In the late 1960s and early 1970s, a succession of severe winters greatly reduced the goat population in the unit. Since 1975, the subunit has been managed separately from the remainder of Unit 1 and the bag limit has fluctuated from 1 to 2 goats.

Since 1980, a registration permit has been required to hunt goats in Unit 1B. From 1991 to the present the subunit has been divided into 2 separate registration hunts. RG001 is that portion of Unit 1B south of the North Fork Bradfield River, while RG004 is that portion of the subunit north of the North Fork Bradfield River.

In July 1989 a law was enacted requiring all nonresident goat hunters to employ the services of a big game guide. Since then, the percentage of goats taken by guided nonresidents has increased annually, with significant increases during the mid- to late-1990s.

Due to conservation concerns, in fall 2002 the BOG closed the resident and nonresident mountain goat season (RG001) in that portion of Game Management Unit 1(A) and 1(B) on the Cleveland Peninsula south of the divide between Yes Bay and Santa Anna Inlet. This closure remains in effect today. In a separate action, the Board also reduced the bag limit under state regulations from 2 goats to 1 goat in that portion of Unit 1B south of the Bradfield Canal and the North Fork Bradfield River. However, federal subsistence regulations continue to allow rural residents of Units 1B and 3 to harvest a second goat, by federal permit, in that portion of Unit 1B located south of Le Conte Bay and north of the North Fork Bradfield River.

In fall 2006, the Board of Game adopted a department-sponsored proposal prohibiting the taking of nannies accompanied by kids in Units 1–5. Since 2006, no additional changes to goat hunting regulations in unit 1B have taken place.

Historical harvest patterns

From 1973 to 2000, the Unit 1B harvest averaged 30 goats per year, ranging from a low of 15 goats in 1975 to a high of 50 goats in 1990. Since 2000 the unitwide harvest has gradually declined averaging 17 goats per year for the 10-year period ending in 2010. The overwhelming majority of the annual harvest occurs in RG004, that portion of the subunit north of the North Fork Bradfield River (Table 1).

Historical hunter residency patterns

Petersburg and Wrangell residents have historically represented the largest group of hunters and traditionally harvested most of the goats taken in the unit each year. However, those trends have

weakened in recent years. For the first time in 2001, and again during 7 of the last 10 years (RY01–RY10), the harvest by nonresidents has exceeded that of local residents (residents of Petersburg, Wrangell, or Kake). In 2010, for the first time since 2004, and at least 1984 before that, the number of goats harvested by nonlocal residents also exceeded the number taken by local residents (Table 2).

Harvest chronology

Annual differences in fall and winter weather conditions and the number of guided hunts can have a profound influence on harvest chronology in the subunit. Between 1985 and 1998, most goat harvest during the 5-month season occurred during September and August. Since then, however, we have seen an increase in the percentage of the annual harvest taken during the late season. This appears to be the result of an increasing desire on the part of hunters to harvest goats with prime winter pelage, and/or take advantage of easy hunting opportunities.

In 2000, the proportion of the annual harvest taken in December surpassed that of any other month for the first time. Despite increasing interest in taking a late season goat with prime pelage, it was not until 2009 that the number of goats taken in December once again surpassed that of any other month (Table 3). Inclement winter weather frequently hampers late-season goat hunting effort and success by restricting boat travel and reducing goat sightability. Also, because of the early season closure within the drainages of Le Conte Bay and the Wilkes Range in 2004 and Horn Cliffs, Thunder Mountain, Le Conte Bay and Wilkes Range in 2005, late season hunting in these areas was not an option. In recent years, interagency efforts to limit the number of guided hunts during the late season have reduced the percentage of the harvest occurring during the late season. (See Nonregulatory management problems/needs below.)

Historical harvest locations

Since 1985 the largest percentages of the Unit 1B goat harvest have occurred in Le Conte Bay, Stikine River, and Thomas Bay. Hunters have limited access to most goat habitat in the subunit, so hunting pressure tends to be focused near saltwater access points. Hunters access goat habitat by hiking up from saltwater, boating on river drainages, or driving logging roads, or by using floatplanes to fly into a few usable subalpine and alpine lakes in the subunit. The few high elevation lakes suitable for landing aircraft are generally accessible only during the early season before lakes freeze over.

Goats can become increasingly accessible to hunters from saltwater later in the season when snow typically forces them to lower elevation winter range. In Unit 1B these areas include Horn Cliffs, Le Conte and Thomas bays, and the Patterson River. Because of increased accessibility and vulnerability to harvest in some areas we monitor the late season harvest closely.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES:

- Conduct aerial surveys to establish the minimum number of goats needed to maintain harvest opportunities for the Le Conte Bay management area.

- Conduct aerial surveys to establish the minimum number of goats needed to maintain harvest opportunities for the Thomas Bay management area.

- Conduct aerial surveys to establish the minimum number of goats needed to maintain harvest opportunities for the Cleveland Peninsula management area.

- Maintain a guideline harvest not to exceed 6 points per 100 goats observed (where male goats = 1 point, and female goats = 2 points) during at least 2 consecutive surveys in management areas.

METHODS

We flew aerial surveys within established trend count areas to obtain the number of goats and the percentage of kids in the population. We used the results of the aerial surveys to establish harvest objectives for specific mountain goat populations within each registration hunt area. These objectives allow for a harvest quota of 5–6 points per 100 goats observed based on the most recent aerial survey and population trend data. Male goats count as 1 point and females 2 points toward the allowable harvest quota. Once the harvest quota has been achieved for a specific goat population, emergency orders are issued closing the goat hunting season in that area. To avoid localized depletion of goats, the 5–6 point harvest quota may be applied to small discrete areas within larger registration hunt areas.

We monitored hunter harvest through a registration permit system. All permit holders are required to report, and those hunting reported the location and duration of their hunts and/or kills, transportation used, and date and sex of kill. We also recorded anecdotal information from hunters and guides.

Harvest and other data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY11 = 1 July 2011–30 June 2012).

RESULTS AND DISCUSSION

Population Status and Trend

Data are insufficient to determine precise goat population trends in Unit 1B. Although data specific to goats in Unit 1B are scarce, available information indicates that with the exceptions of the Cleveland Peninsula where populations have declined, and the Thunder Mountain area where populations have recently increased, most Unit 1B goat populations have remained relatively stable since RY00.

The portion of Game Management Units 1(A) and 1(B) on the Cleveland Peninsula south of the divide between Yes Bay and Santa Anna Inlet closed to hunting in RY02 will remain closed until such time as the goat population recovers sufficiently to provide harvest opportunity.

Population Size

Precise population estimates are not available for goats in the subunit. U.S. Forest Service (USFS) and ADF&G biologists estimated that Unit 1B could support approximately 1,219 goats based on the availability of suitable winter habitat indicated by a mountain goat habitat capability model (Suring 1993).

Population Composition

Table 4 shows the past 9 years of age composition data from aerial trend counts. Differences in sample size occur because of annual differences in survey coverage and because inclement weather frequently makes complete surveys difficult. In June 2011, ADF&G conducted a goat kidding survey in the vicinity of a proposed hydroelectric development at Swan Lake/Cascade Creek. A total of 56 goats was observed, including 42 adults and 14 kids (25%). During the October 2011 survey, 98 goats were observed with 21% of the goats classified as kids. In September 2012, the USFS Petersburg District Biologist conducted a goat survey in the vicinity of the Swan Lake/Cascade Creek hydro project counting 29 goats with 2 (7%) of them kids. In ADF&G's October 2012 surveys, 451 goats were observed, of which 62 (14%) were kids. Annual differences in survey coverage and uncertainties about the sightability of goats during aerial surveys make it difficult to develop precise population estimates for the entire unit. Nonetheless, aerial surveys provide valuable information with which to establish harvest guidelines and monitor population trends within select portions of the broader unitwide goat population. Because not all of the 27 individual trend count areas in Unit 1B can be surveyed annually, survey efforts typically focus on trend count areas that receive the most hunting pressure.

Distribution and Movements

Until recently, quantitative data on goat movement patterns and winter diet were limited to data obtained from radiotelemetry studies conducted in Unit 1C (Schoen 1979), Unit 1A, and the extreme southern portion of Unit 1B (Smith 1982). Radiotelemetry studies currently underway in subunits 1A, 1B, 1C, and 1D are beginning to provide valuable information on the seasonal movement patterns and survival rates of goats on the Unit 1 mainland (White 2006, White et al. 2007, White and Barten 2008, 2009, White et al. 2012a, White et al. 2012b, White et al. 2012c, 2013). Southeast Alaska mountain goats occur on most mainland ridge complexes. Goat distribution information in the subunit is limited to observations made during aerial surveys, observations by staff, and anecdotal reports from the public. Although widely distributed across the subunit, in some areas goats are notably absent or present in small numbers despite the availability of apparently suitable habitat.

Goats typically occupy subalpine and alpine habitats from spring until fall. Depth and duration of snow cover can significantly influence winter movements of goats. In winter goats use windblown slopes or steep slopes with little snow cover and may descend to low elevation forested areas during deep snow periods.

There appear to be sex-linked differences in movements and home range size (Smith 1982) in Southeast Alaska goats. Males move between major ridge complexes, whereas females remain on ridges where they were captured. Inter-ridge movement by males appears to be associated with the rut and contributes to relatively large winter home ranges. Inter-ridge movements by males may be important for preventing problems associated with inbreeding.

During spring goats generally move to lower elevation south-facing rock cliffs, brush, and forest habitats, presumably to take advantage of newly emergent vegetation. Throughout the summer, goats disperse to a variety of habitat types with an increase in elevation and greater use of northerly exposures. During fall goats move to lower elevations but still use north-facing exposures and inhabit forest, alpine, subalpine, and cliff habitats. Throughout winter goats use a

wide range of elevations, concentrating at mid-elevations and southern exposures on alpine and rock-cliff habitats with less forested habitat. However, goats use a substantial amount of steep, broken terrain throughout the year (Schoen 1979).

MORTALITY

Harvest

Season and bag limit	Resident and nonresident hunters
Unit 1B, that portion north of Bradfield Canal and the north fork of the Bradfield River 1 goat by registration permit only	1 August–31 December (General hunt only)
Units 1(A) and 1(B), that portion on the Cleveland Peninsula south of the divide between Yes Bay and Santa Anna Inlet	No open season
Remainder of Unit 1B 1 goat by registration permit only	1 August–31 December (General hunt only)

Alaska Board of Game (BOG) Actions and Emergency Orders. The Board of Game took no actions affecting Unit 1B goat hunting, and we issued no emergency orders during this report period.

Hunter Harvest. The 2011 and 2012 Unit 1B harvests of 15 and 10 goats, respectively, were each below the mean harvest of 17 goats annually during the preceding 10-year period (RY01–RY10) (Table 1). The harvest of 15 goats in 2011 and 10 goats in 2012 were the fifth and second lowest goat harvests, respectively, in Unit 1B since at least 1984. We do not believe the relatively low harvest during the report period is indicative of a significant population decline; rather it is primarily attributed to reduced hunter effort. It should be noted that the continued season closure in that portion of RG001 on the Cleveland Peninsula south of the divide between Yes Bay and Santa Anna Inlet likely limited the harvest to some degree. Hunter success was 38% in 2011 and 29% in 2012, improved from the previous report period, but still below the preceding 10-year average (RY01–RY10) 31% success rate. In 2011 and 2012 males composed 87% and 80% of the harvest, respectively. The sex of harvested goats was obtained from registration hunt reports and was not verified by checking hunter kills. We distributed literature and made available videotapes designed to help hunters identify male goats in the field and encouraged them to select males.

In 2011 a total of 15 nonresidents hunted goats in Unit 1B, all of whom employed the services of a big game guide (Table 2). In 2012, 10 nonresidents hunted goats. Of those, 8 employed big game guides, and 2 were accompanied by next-of-kin. The number of goats harvested by guided hunters during the report period was 9 in 2011 and 3 in 2012.

Since RY02, we have witnessed a general decline in the number of local resident goat hunters taking to the field each year (Table 2). Local participation in goat hunting decreased from 34 in RY09, to 26 in RY10 before declining further to 18 in RY11, and 13 in RY12. The 18 local residents who took to the field in RY11, and 13 local residents who hunted in RY12, represent the second lowest and lowest, respectively, local resident participation since at least 1984 and were both well below the preceding 10-year average (RY01– RY10) of 31 local resident hunters annually in Unit 1B.

Federal subsistence regulations allow qualified local residents to take a second goat in that portion of Unit 1B located south of Le Conte Bay and north of the North Fork Bradfield River. During the report period, no federal permits were issued for the taking of a second goat in the unit.

Hunter Residency and Success. During both years of the report period the harvest by nonresidents exceeded that of local residents (Table 2). In 2012, most Unit 1B goats were harvested by nonlocal residents, followed by nonresidents and local residents, respectively. We believe the continued decline in local resident participation in Unit 1B goat hunting is largely responsible for the decline in the number of goats taken annually by local residents.

Local residents traditionally represent the largest group of unsuccessful hunters, and this remained the case during this report period. Local residents had 16% success; nonlocal residents had 47% success, and guided nonresidents 48% success. Many local residents hunt primarily from the beach during the late season, hoping for an easy opportunity to harvest a goat. During the report period, the overall success rate for those permittees who hunted was 38% in 2011 and 29% in 2012. From 2001to 2010, the average success rate for guided hunters in Unit 1B was 52% and ranged from 20% to 82%. During this report period the success rate for guided nonresident hunters was 60% in 2011 and 25% in 2012. Because of the guide requirement, nonresident hunters typically enjoy the highest success rate, and this was the case in 2011. In 2012, however, unguided nonlocal residents enjoyed the highest success rate at 55 percent.

Geographical Locations of Harvest. Goat harvest occurred in 6 Unit 1B Wildlife Analysis Areas (WAAs) during this report period. These include WAAs in the Stanton Peak (#1602), Thomas Bay (#1603), Patterson River to Thunder Mountain (#1605), Horn Cliff and Le Conte Bay (#1706), and Stikine River (#1707 and 1708) areas. In 2011, harvest occurred in 5 WAAs, with WAA #1605 providing 47% of the harvest, followed by #1603 with 27%, #1706 with 13% and WAAs #1602 and #1707 each with 7% of the unit's total annual harvest. In 2012, harvest occurred in 4 WAAs with #1706 providing 50% of the total harvest, followed by #1603 with 30%, and #1605 and #1708 each with 10% of the unit's total annual harvest.

Harvest Chronology. Winter weather, particularly during the late season, can have a profound influence on harvest chronology. The greatest proportion of the 2011 harvest occurred in October and November, each with an equal percentage of the harvest, followed by December. The largest

percentage of the 2012 harvest occurred in September and October, each with an equal percentage of the harvest, followed by November (Table 3).

Transport Methods. In recent years, the majority of successful hunters have reported using boats to access their hunt areas, and this was also the case during the report period. In 2011, 53% of successful hunters reported using boats, and 20% reported using airplanes, and 27% reported using other means of transportation to access their hunting area. In 2012, 60% of hunters reported using boats, and 40% reported using airplanes. (Table 5).

Other Mortality

Although we received no reports of goat mortality unrelated to hunting, other sources of mortality can include predation by wolves, bears, and bald eagles, malnutrition, disease, and injury or death as a result of mishaps and avalanches.

Although the disease is believed to be rare, goats displaying symptoms of contagious ecthyma, commonly called "orf," have been occasionally reported in the Horn Cliffs area of Unit 1B. Orf is a virus that causes blisters and scabs to form on the body of infected animals, primarily affecting the head, mainly the lips, mouth, nose, eyelids, and ears. The virus is spread by direct contact with scabs on infected animals, but can also be contracted through direct contact with scabs that have fallen to the ground. The disease can be fatal but no mortalities were documented in the subunit as a result of the disease during this report period.

HABITAT

Assessment

The loss of winter range resulting from timber harvest continues to pose the most serious threat to goat habitat in the unit. Roads associated with logging increase hunter access and can make goats increasingly vulnerable to harvest. Department staff routinely review, and comment on, proposed timber sales in an attempt to minimize the effects of logging on important goat winter range.

During the report period, the Federal Energy Regulatory Commission did not renew a preliminary permit granting Cascade Creek, LLC of Bellingham, Washington exclusive rights to pursue hydroelectric development at Thomas Bay. Because any such development would involve construction of hydroelectric facilities and infrastructure amid prime goat habitat at Swan Lake, the potential impacts of potential hydroelectric development on mountain goat populations in the Thomas Bay area remains a concern for Unit 1B goat managers.

Enhancement

No habitat enhancement projects for goats have been attempted in the subunit.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

As described in past management reports (Lowell 2008) the results of aerial goat surveys can be interpreted only as minimum numbers of goats. Annual goat surveys performed only once in a trend count area may not accurately reflect population and composition trends (Ballard 1975). Variables that influence survey results are numerous and for the most part unquantifiable. Uncertainty about the sightability of goats during aerial surveys remains a primary concern.

Research is currently being conducted to develop reliable methods of inventorying goat populations in Southeast Alaska (White and Pendleton 2010, 2012, 2013).

A persistent management issue is the potential for localized overharvest and potential conflicts between guided nonresident hunters and federally qualified subsistence hunters. The USFS has been concerned about maintaining sufficient harvest opportunity for federally qualified subsistence hunters. In an effort to halt the steady increase in the number of goats harvested annually by guided nonresidents in the GUA 01-06 portion of Unit 1B, action was taken in a 2006 cooperative agreement to both reduce and stabilize the number of guided hunts occurring annually (Lowell 2008).

To ensure adequate goat hunting opportunity for local residents, in 2006 the USFS also modified GUA 01-06 guide use permits to exclude guided goat hunts within the drainages of Horn Cliffs, Thunder Mountain, Le Conte Bay, and the Wilkes Range unless specifically authorized by USFS and ADF&G managers. As part of this arrangement guides were informed that their permits could be amended in-season to allow limited guide use activity in this area if it appeared the goat population was likely to be underutilized by resident hunters. This was the case late in the RY11 season when 3 permitted guides requested and were granted authority to conduct 2 late-season goat hunts within the drainages of Horn Cliffs, Thunder Mountain, Le Conte Bay and the Wilkes Range. During the late RY12 season 3 permitted guides were again given authority to conduct 1 late-season goat hunt each in the area. During the report period there were no guided big game hunts conducted in the GUA 01-07 portion of Unit 1B.

Wounding loss, including nonreporting of goats mortally struck by hunters but unrecovered due to inaccessible terrain, remains a management concern.

CONCLUSIONS AND RECOMMENDATIONS

Variation in fall and winter weather conditions can have a profound influence on the annual goat harvest in Southeast Alaska. Following record snowfall in RY06, and well above average snowfall in RY07–RY08, winter weather was more moderate during the report period and hunter success improved in Unit 1B.

The 2011 and 2012 Unit 1B harvest of 15 and 10 goats, respectively, were below the mean harvest of 17 goats annually during the preceding 10-year period (RY01–RY10). The harvest of just 10 goats in 2012 was the second lowest unitwide harvest total since at least 1984. Since RY04, the number of hunters taking to the field in search of Unit 1B goats has fallen well below the preceding 10-year average (RY94–RY03) of 72 hunters per year. From RY04 to RY10 the number of hunters taking to the field averaged just 48 hunters per year. The 39 hunters in 2011, and 34 hunters in 2012, were the third lowest and second lowest number of goat hunters since at least 1984. The Board of Game's closure of the goat hunting season on the Cleveland Peninsula south of the divide between Yes Bay and Santa Anna Inlet in fall 2003 has probably limited the Unit 1B harvest to some extent, but declines in the overall number of hunters going afield are at least partially responsible for the relatively low unitwide harvest in recent years. Uncertainty about the sightability of goats during aerial surveys remains a primary concern with regard to establishing harvest guidelines for individual goat populations. Research currently underway in Units 1A, 1B, 1C, and 1D may provide a reliable sightability correction factor for use in

estimating the total number of goats present based on the number observed during aerial census flights.

Wounding loss and nonreporting of goats mortally struck by hunters but not recovered due to inaccessible terrain remains a management concern. Because of the increased vulnerability of goats during the late season, and possible localized overharvest in areas easily accessible from saltwater, we continue to monitor the harvest carefully, particularly within the drainages of Horn Cliffs, Thunder Mountain, Le Conte Bay, and Wilkes Range. Based on aerial survey data and hunter reports, goat populations appear stable in most of Unit 1B. Unitwide, hunting pressure is generally low, and tends to be concentrated close to communities in areas with easy access.

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Lowell, R. 2014. Unit 1B mountain goat management report. Pages 18–35 [*In*] P. Harper, editor. Mountain goat management report of survey and inventory activities 1 July 2011–30 June 2013. Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/2014-3 Juneau.

Table 1. Unit 1B mountain goat harvest data by permit hunt, regulatory years 2000 through 2012.

Hunt	Regulatory Year	Permits [a] issued	Nr hunted	(%) Did not hunt	Nr successful hunters	(%) successful hunters	Nr males	(%) males	Nr females	Total harvest
RG001	2000		13		4	(31)	4	(100)	0	4
	2001		4		3	(75)	3	(100)	0	3
	2002		5		0	(0)	0	(0)	0	0
	2003		5		1	(20)	0	(0)	1	1
	2004		5		2	(40)	1	(50)	1	2
	2005		0		0	(0)	0	(0)	0	0
	2006		1		0	(0)	0	(0)	0	0
	2007		0		0	(0)	0	(0)	0	0
	2008		0		0	(0)	0	(0)	0	0
	2009		1		1	(0)	0	(0)	0	0
	2010		0		0	(0)	0	(0)	0	0
	2011		0		0	(0)	0	(0)	0	0
	2012		0		0	(0)	0	(0)	0	0
RG004	2000	127	63	(50)	23	(37)	14	(61)	9	23
	2001	130	64	(51)	21	(33)	16	(76)	5	21
	2002	135	67	(50)	14	(21)	9	(64)	5	14
	2003	115	64	(44)	20	(31)	17	(85)	3	20
	2004	103	46	(55)	21	(46)	15	(71)	6	21
	2005	92	47	(49)	27	(57)	20	(74)	7	27
	2006	100	52	(48)	16[b]	(31)	15	(88)	2	17
	2007	102	54	(57)	12	(22)	8	(67)	4	12
	2008	71	32	(55)	6	(19)	6	(100)	0	6
	2009	99	52	(53)	13	(25)	12	(92)	1	13
	2010	107	43[a]	(60)	11	(26)	7	(64)	4	11
	2011	99	39	(61)	15	(38)	13	(87)	2	15
	2012	88	34	(61)	10	(29)	8	(80)	2	10

Table 1 continued.

Hunt	Regulatory Year	Permits [a] issued	Nr hunted	(%) Did not hunt	Nr successful hunters	(%) successful hunters	Nr males	(%) males	Nr females	Total harvest
Combined	2000		76		27	(36)	18	(67)	9	27
	2001		68		24	(35)	19	(79)	5	24
	2002		72		14	(19)	9	(64)	5	14
	2003		69		21	(30)	17	(81)	4	21
	2004		51		23	(45)	16	(70)	7	23
	2005		47		27	(57)	20	(74)	7	27
	2006		53		16[b]	(30)	15	(88)	2	17
	2007		54		12	(22)	8	(67)	4	12
	2008		32		6	(19)	6	(100)	0	6
	2009		53		13	(25)	12	(92)	1	13
	2010		43[c]		11	(26)	7	(64)	4	11
	2011		39		15	(38)	13	(87)	2	15
	2012		34		10	(29)	8	(80)	2	10

[a] Number of permits issued for 1B in hunt number RG001 is unknown because this hunt includes part of Unit 1A.
[b] One hunter killed 2 goats, second goat via federal subsistence permit.
[c] Although the registration permit summary in WinfoNet shows that 44 people hunted, there are only 43 verifiable records.

Table 2. Unit 1B mountain goat hunter residency and success, regulatory years 2000 through 2012.

	Successful					Unsuccessful					
Year	Local[a] resident	Nonlocal resident	Nonresident	Total	(%)	Local[a] resident	Nonlocal resident	Nonresident	Total	(%)	Total hunters
2000	12	6	9	27	(36)	26	11	12	49	(64)	76
2001	7	4	13	24	(35)	32	2	10	44	(65)	68
2002	5	1	8	14	(19)	40	9	9	58	(81)	72
2003	11	8	2	21	(31)	26	7	14	47	(69)	68
2004	6	8	9	23	(45)	20	3	5	28	(55)	51
2005	11	4	12	27	(57)	12	3	5	20	(43)	47
2006	9	2	5	16	(30)	20	7	10	37	(70)	53
2007	5	3	4	12	(22)	30	4	8	42	(78)	54
2008	1	0	5	6	(19)	19	5	2	26	(81)	32
2009	5	0	8	13	(25)	29	3	8	40	(75)	53
2010	2	3	6	11	(26)	24	3	5	32	(74)	43
2011	4	2	9	15	(38)	14	4	6	24	(62)	39
2012	1	6	3	10	(29)	12	5	7	24	(71)	34

[a] Residents of Petersburg, Wrangell, and Kake.

Table 3. Unit 1B mountain goat harvest chronology, percent by month, regulatory years 2000 through 2012.

	Month										
	August		September		October		November		December		Total
Year	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	harvest
2000	4	(15)	6	(22)	3	(11)	6	(22)	8	(30)	27
2001	5	(21)	5	(21)	4	(17)	9	(38)	1	(4)	24
2002	4	(29)	2	(14)	5	(36)	1	(7)	2	(14)	14
2003	6	(29)	6	(29)	8	(38)	1	(5)	0	(0)	21
2004	8	(35)	1	(4)	5	(22)	7	(30)	2	(9)	23
2005	11	(41)	6	(22)	3	(11)	5	(19)	2	(7)	27
2006	3	(18)	5	(29)	3	(18)	4	(24)	2	(12)	17
2007	3	(25)	0	(0)	4	(33)	2	(17)	3	(25)	12
2008	0	(0)	1	(17)	0	(0)	5	(83)	0	(0)	6
2009	1	(8)	1	(8)	2	(15)	4	(31)	5	(38)	13
2010	2	(18)	3	(27)	1	(9)	4	(36)	1	(9)	11
2011	1	(7)	1	(7)	5	(33)	5	(33)	3	(20)	15
2012	1	(10)	3	(30)	3	(30)	2	(20)	1	(10)	10

Table 4. Unit 1B summer aerial mountain goat composition counts, regulatory years 2002 through 2012.

Regulatory Year[a]		Adults	(%)	Kids	(%)	Unknown	Kids: 100 adults	Total goats observed	Goats /hour
2002	(Aug 2002)	89	(73)	33	(27)	0	37	122	81
2003	(Aug 2003)	132	(78)	37	(22)	0	28	169	56
	(Sep 2003)	84	(83)	17	(17)	0	20	101	53
2004	(Aug 2004)	446	(79)	120	(21)	0	27	566	33
2005	(Aug 2005)	480	(78)	135	(22)	0	28	615	70
2006	(Oct 2006)	343	(83)	68	(17)	0	20	411	62
2007		0	0	0	0	0	0	0	0
2008	(Oct 2008)	117	(81)	27	(19)	0	23	144	60
2009	(Sep 2009)	211	(78)	60	(22)	0	28	271	60
2010	(Sep 2010)	477	(79)	130	(21)	0	27	607	95
2011	(Jun 2011)	42	(75)	14	(25)	0	33	56	40
	(Oct 2011)	77	(79)	21	(21)	0	27	98	52
2012	(Sep 2012)	27	(93)	2	(7)	0	7	29	33
	(Oct 2012	389	(86)	62	(14)	0	16	451	88

[a] Different portions of the unit are flown in different years; data not directly comparable.

Table 5. Unit 1B mountain goat harvest, percent by transport methods, regulatory years 2000 through 2012.

	Percent of harvest						
Year	Airplane		Boat		Other		Total harvest
	n	(%)	*n*	(%)	*n*	(%)	
2000	7	(26)	19	(70)	1	(4)	27
2001	11	(46)	12	(50)	1	(4)	24
2002	4	(29)	10	(71)	0	(0)	14
2003	13	(62)	8	(38)	0	(0)	21
2004	10	(44)	12	(52)	1	(4)	23
2005	9	(33)	18	(67)	0	(0)	27
2006	4	(24)	13	(76)	0	(0)	17
2007	5	(42)	6	(50)	1	(8)	12
2008	1	(17)	5	(83)	0	(0)	6
2009	2	(15)	11	(85)	0	(0)	13
2010	4	(36)	7	(64)	0	(0)	11
2011	3	(20)	8	(53)	4	(27)	15
2012	4	(40)	6	(60)	0	(0)	10

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 1C (7,600 mi^2)

GEOGRAPHIC DESCRIPTION: The Southeast Alaska mainland and the islands of Lynn Canal and Stephens Passage lying between Cape Fanshaw and the latitude of Eldred Rock, including Sullivan Island and the drainages of Berners Bay.

BACKGROUND

There are three main concerns regarding mountain goat management in Unit 1C: guided hunting, commercial helicopter tourism, and construction activity. Although goats are distributed throughout the Unit 1C mainland, hunting efforts are usually concentrated in areas where access is relatively easy. Because of this, guided hunts in Tracy and Endicott arms have become a major factor in the Unit 1C goat harvest. This is one of few areas in the world where hunters can stay in comfort aboard large boats and make day hunts for goats along steep cliffs lining fjords. This use predominates late in the season, when snow often forces goats to lower elevations. The interest from registered guides to hunt goats in this area remains high, and may require the Alaska Department of Fish and Game (ADF&G) to address the high nonresident harvest through changes in management strategies to keep the nonresident harvest within acceptable limits. ADF&G continues to work with the U.S. Forest Service (USFS) in allocating an appropriate number of permits, and distributing hunting effort in the Tracy and Endicott Arm area.

Since their origin in the early 1980s, helicopter flightseeing tours have become the signature adventure for cruise ship tourists while visiting Juneau. A heli-skiing company is operating in the Juneau area during the winter months. The effects these overflights have on mountain goat populations are unknown, but negative influence of this industry on goats is a concern. ADF&G continues to work cooperatively with USFS to address helicopter overflight complaints, and to accomplish aerial mountain goat surveys on and near the Juneau icefield.

Construction activities associated with the Kensington Mine as well as the road infrastructure associated with the mine and the Juneau Access project have raised some concerns about the disturbance of goats on low elevation winter habitats. Coeur Alaska and the Alaska Department of Transportation (DOT) continue to provide funding to study mountain goat ecology in the mine and proposed Juneau Access Road Corridor. Sweetheart Lake, located in the southern portion of Unit 1C, has been identified as a possible hydroelectric site. Department staff have discussed mountain goat data needs and possible research associated with the project.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Population management objectives identified by staff for Unit 1C are as follows:

- Maintain goat densities so at least 30 goats per hour are seen during fall surveys.
- Use pamphlets, videos, and other educational materials to ensure a male:female harvest of at least 2:1.
- Maintain goat viewing opportunities along the Juneau road system.
- Identify discrete geographic areas and manage within these areas.
- Maintain a guideline harvest not to exceed 6 points (billy = 1 pt., nanny = 2 pt.) per 100 goats observed.
- Conduct aerial surveys at least every 3 years in areas of high harvest.

METHODS

We flew aerial surveys within established trend count areas to obtain the number of goats and the percentage of kids in the population. We used the results of the aerial surveys to establish harvest objectives for specific mountain goat populations within each registration hunt area. These objectives allow for a harvest quota of 6 points per 100 goats observed based on the most recent aerial survey and population trend data. Male goats (billies) count as 1 point and females (nannies) 2 points toward the allowable harvest quota. Once the harvest quota has been achieved for specific goat populations, emergency orders are issued closing the goat hunting season in that area. To avoid localized depletion of goats, the point based harvest quota may be applied to small discrete areas within larger registration hunt areas.

We monitored hunter harvest through a registration permit system. All permit holders are required to report, and those hunting reported the location and duration of their hunts and/or kills, transportation used, and date and sex of kill. We also recorded anecdotal information from hunters and guides.

Harvest and other data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY11 = 1 July 2011–30 June 2012).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Information on Unit 1C mountain goat populations was gathered from aerial surveys. Mountain goat populations seem to be at medium to high densities when compared to historical data over most of the range, based on the number of goats seen per hour, as well as the general numbers seen during aerial surveys (Table 1). Aerial population surveys were conducted in the following locations during this report period: Tracy Arm, Endicott Arm, Mount Kluchman (Taku River), Sweetheart Lake, and the Chilkat Range in the western portion of the Unit. Tracy and Endicott Arm goat hunts are managed under registration hunt RG013; hunts in the area between Taku Glacier and Mount Bullard are managed under an archery only registration permit (RG014); only the RG014 hunt area is open in the portion of Unit 1C adjacent to Juneau's population and business centers. Additional surveys were flown in conjunction with research being conducted in

Lynn Canal, including portions of Unit 1C and Unit 1D. White et. al. (2012) documented decreased survival in mountain goats in the study area. They reported that decreased survival is most likely due to severe winter weather conditions during the report period. When assessing population health and determining guideline harvest levels for mountain goats, we also need to consider the survival rate of the population.

Although these surveys represent a small portion of Unit 1C, other indications such as hunter effort and harvest information and anecdotal information from hunters, pilots, commercial guides, and ADF&G personnel suggest that goat populations are generally healthy throughout the unit.

MORTALITY

Harvest

Season and bag limits	Resident and nonresident hunters
Unit 1(C), that portion draining into Lynn Canal and Stephens Passage between Antler River and Eagle Glacier and River 1 goat by registration permit only; the taking of nannies with kids is prohibited	1 October–30 November
Unit 1(C), that portion including all drainages of the Chilkat Range south of the south bank of the Endicott River 1 goat by registration permit only; the taking of nannies with kids is prohibited	1 September-30 November
Unit 1(C), that portion bounded by Montana Creek Trail, McGinnis Creek to its Headwaters, then due north to the Edge of the south side of the Mendenhall Glacier, then north and west along the edge Of the Mendenhall and Herbert Glacier, then Along; the southwest side of the Herbert Glacier And River back to the Montana Creek trail 1 goat, by drawing permit only; up to 10 permits may be issued; the taking of nannies with kids is prohibited	1 October-30 November

Unit 1C, that portion draining into Stephens Passage between Eagle Glacier and River and Point Salisbury	No open season.
Unit 1(C), that portion draining into Stephens Passage and Taku Inlet between Point Salisbury and Taku Glacier 1 goat by registration permit by bow and arrow only; the taking of nannies with kids is prohibited	1 October–30 November (General hunt only)
Remainder of Unit 1C 1 goat by registration permit only; the taking of nannies with kids is prohibited	1 August–30 November

Board of Game Actions and Emergency Orders. Three Emergency Orders to close mountain goat hunting seasons were issued in 2011 and included the area between Eagle Glacier and Davies Creek on the Juneau road system; Davies Creek to the Antler River in the Berners Bay area; and Mount Kluchman in the Taku River Drainage. One Emergency Order was issued in 2012 for the area between Eagle Glacier and Sawmill Creek.

The Board of Game Actions took no acions during the report period concerning mountain goat hunting in Unit 1C.

Hunter Harvest. Sixty five goats were taken during this report period, 33 in RY11 and 32 in RY12 (Table 2); this period's harvest level is slightly lower than the previous report period, and is well below the mean annual harvest of 43 goats taken during RY03–RY12. For all of Unit 1C, 89 and 65 points were available in RY11 and RY12, respectively. In RY11, 37 points were taken, and 33 were taken in RY12. The harvest points available during this reporting period were reduced based on aerial survey data collected prior to the hunting season and the closure of some hunt areas prior to the start of the season (e.g., Eagle Glacier to Sawmill Creek). In-season management of goat hunts in Southeast Alaska is common. Once harvest point levels have been reached department staff uses emergency orders to close the season. Goat hunters in Unit 1C generally check with the department prior to going into the field to hunt to get the current status of the hunt.

Males again made up a large part of the harvest (94%), higher than the previous report period of 90%. The predominantly male harvest resulted from guided hunts within the area. Registered guides are adept at differentiating male from female goats, and guided hunters prefer a male goat

because of its trophy status. Also, guides are aware that females are counted more heavily than males against harvest guidelines, and that it is in their best interest to take billies.

Because we do not require hunters to present goats for sealing, there is a possibility that the reported harvest of male goats is inflated, as hunters are sometimes reluctant to admit to killing a nanny. Region I research staff has developed a mountain goat identification quiz handout to assist hunters in selecting male goats to harvest. The quiz has been made available at all area wildlife offices and on the department's website. Research staff conducts phone surveys of goat hunters in order to improve educational materials available to goat hunters. Several important attributes to goat hunting have been identified through the surveys; less experienced hunters take more female goats; take longer shots; and were less likely to use spotting scopes to determine goat gender (Jeff Jemison, personal communication). One of the primary focuses of the department's mountain goat education material is to reduce the harvest of female mountain goats. Data collected by phone survey indicates 42% of hunters who harvested a female goat did so intentionally (ADF&G unpublished data). The mountain goat quiz is very popular with goat hunters and serves as an excellent opportunity to interact with hunters and develop relationships that will benefit both the department and hunters into the future.

As has been the case during the previous report periods, much of the harvest took place in 2 Wildlife Analysis Areas (WAA's) (Table 3). The WAAs representing Tracy and Endicott arms (2824 and 2825) accounts for 78% of the harvest for the period. WAA's 2824 and 2825 are combined for guideline harvest (points) purposes. Twelve to 28 to points are available in this area; 24 points were taken in 2011 and 27 points in 2012. While the harvest is often high in this area, hunters typically take male goats. As mentioned above, this can be attributed to the requirement that nonresidents must have a guide to hunt mountain goats. One goat was unrecovered. The guide accompanying the nonresident hunter was confident the goat was a male so the take was considered to be a male goat. Both of these areas are accessible by boat and receive significant commercial guiding effort. The remaining harvest (42 goats) was taken in widely distributed WAAs; 2517 (bow hunt area), 2518 (upper Taku River), 2306 (lower Chilkat Range), and 2409 (Berners Bay and lower Lynn Canal). Sporadic harvest in most areas of the unit other than Tracy and Endicott arms is normal. Weather and access direct mountain goat hunting. This, combined with the challenges of hunting this species, limit the overall harvest in most areas.

Permit Hunts. Registration permit hunts RG012 (north Juneau road system), RG013 (south of Taku Inlet & northern Chilkat Range), and RG014 (bow hunt area), are combined under a single registration permit (RG012). The mean number of permits issued annually during this report period (201) is nearly the same as the previous reporting period (208) (Table 4). The mean annual number of hunters during this report period was 66, lower than the previous period (74). Roughly half the people who get registration permits actually hunt. Compliance with reporting requirements has been good, but we continue to resort to reminder letters and enforcement action to obtain information from some hunters.

At the November 2010 meeting the Alaska Board of Game (board) established a drawing permit hunt (DG011) in the area of McGinnis Creek, an area between Mendenhall Glacier and Herbert Glacier. Two permits were awarded and the first hunt in this area occurred in the fall of 2012. Both hunters were successful, each taking a female goat. This area is accessible from the Juneau

road system and local trails. One hunter spent 1 day hunting to take a goat, and the other 2 days. Managers anticipate that this hunt will be extremely popular with local goat hunters. Approximately 140 applications were received for the 2012 DG011 mountain goat hunt.

Hunter Residency and Success. The average success rate of all hunters was 49% during this report period. Alaska resident hunters harvested fewer than half the number of goats taken by nonresident during the report period (Table 5). Nonresident hunter success rates were also much higher than resident hunters. Eighty-five percent of nonresident hunters successfully harvested a goat compared to only 24% of resident hunters. This reflects the requirement that nonresidents hunt with a guide. Most guides are better equipped to hunt goats than the average local resident hunter. Successful hunters spent an average of 2.7 days afield per goat during the report period, a bit longer than the 2.4 days during previous report period (Table 4). Unsuccessful hunters spent an average of 3.6 days in the field.

Harvest Chronology. The November harvest continued to be the highest of the 4-month season, accounting for 72% of the take during the report period. October was the month with the second highest harvest followed by August and then September. The preponderance of late season kills reflects the availability of goats at lower elevations and hunter desire to take a fully-furred goat. In addition, the majority of the guided harvest, which accounts for more than half the goats harvested, takes place later in the season.

Transport Methods. Boats have historically been the primary means of transportation for successful goat hunters in the unit. This trend continued during the report period, with 82% of successful hunters using boats as their mode of transportation (Table 6). Other means of transportation included airplanes (5%), and highway vehicles (11%). Highway vehicles were used along the Juneau road system and airplanes are used to access high-elevation lakes.

Commercial Services. Commercial services use increased slightly from the previous report period, with 48% of hunters using a commercial service compared to 36% during RY09–RY10 (Table 7). Eighty-three percent of hunters who used commercial services used a guide, and 14% used commercial transportation to the field. This is not surprising since most huntable areas are accessible only by airplane or boat. Resident hunters most often used commercial services for transportation (almost entirely air charter), whereas nearly all nonresidents used a registered guide, which is required by law unless accompanied by a second degree blood relative who is a resident of Alaska.

Other Mortality

Severe winter weather continued in both years of the report period; 2011 received 134.4 inches of snow, and 2012 saw 117.2 inches of snow measured at the Juneau Weather Forecasting Office. Snowfall for both years of the report period is above the average snowfall of 94.4 inches measured at the Juneau Airport between 1949 and 2005. Deep snow forced many goats to low elevations in close proximity to downtown Juneau. Fewer goat mortalities (1), believed to be weather related, were documented along Juneau trails during this report period compared to the previous period (3). The single adult goat mortality was reported in the Gold Creek drainage east of downtown Juneau. Little other data is available concerning natural mortality. Holroyd (1967) cited several instances of goats killed in falls, rockslides, and avalanches. Wounding loss may be responsible for additional deaths, but we have not gathered data related to this cause. White and

Barten (2009) visited several mortality sites along Lynn Canal but were unable to determine cause of death for most because carcasses had been scavenged.

HABITAT

Assessment

Unit 1C winter and summer goat range is extensive and goats appear to be occupying most of this range. (See Lowell 2008 for a detailed description of mountain goat habitat in mainland Southeast Alaska). Helicopter traffic near goat habitat and its potential to drive goats away from preferred habitat remains a concern. There are fewer requests for additional flights and landings, but there are consistent requests to relocate landings and their associated flight routes. Goats disturbed and displaced from preferred habitat areas could suffer reduced fitness, which may ultimately play a role in population declines. However, little is known about the long-term effects of helicopter noise on goat populations.

CONCLUSIONS AND RECOMMENDATIONS

Aerial surveys were completed in several areas we considered most important due to hunting pressure. Management objectives were met or surpassed in most areas, except for the need for aerial surveys. As weather and funding permit, we should continue aerial surveys to determine population trends throughout the unit, especially in areas that receive the brunt of the hunting pressure. If possible, these areas should be surveyed on a 3- to 4-year cycle and more often if anecdotal information suggests the populations have declined. There appears to be an increasing interest among Juneau area goat hunters to hunt areas adjacent to Juneau; these areas should be surveyed routinely in anticipation of Board of Game proposals to open areas to goat hunting that are currently closed.

During the report period we accomplished part of our goal of dividing Unit 1C into goat aerial survey units that also serve as management units. By managing goats in these smaller units we will be able to track harvest and survey data for each of these discrete areas more easily. This will prevent hunters from concentrating their harvest in easily accessible areas and potentially compromising the health of goat herds in those areas. Prior to the current report period the RG012 hunt area was divided at Davies Creek on the Juneau road system. Excessive harvest in the Davies Creek and south side of Sawmill Creek drainages led managers to move the existing hunt area divide to the north side of Sawmill Creek. By making this change, managers can provide some goat hunting opportunity on the Juneau road system (Eagle Glacier to Sawmill Creek), and provide a longer hunt period in the northern portion of RG012 if the area adjacent to the road system is closed by EO. A boundary at Sawmill Creek provides an easily identified boundary for hunters, and hunting can continue along the Berners Bay shoreline when the road system portion of the hunt is closed.

The total number of mountain goat hunters continues to decrease in Unit 1C along with the number of goats taken annually. This trend has been consistent through 2 report periods, but the cause for the decline in mountain goat hunters is unknown. The percentage of successful hunters remains high even though fewer goats are being taken. In both years of the report period hunters predominantly killed male goats. Although the percentage of nannies harvested was low, we should continue to emphasize directing hunting pressure away from females. We will continue to use harvest guidelines established for each permit hunt area, which should further encourage

hunters to select males. We may soon implement a sealing requirement for goats. With the guideline harvest being approached in several areas in the past few years, sealing may be necessary to ensure accurate reporting of male and female goats.

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Table 1. Unit 1C mountain goat aerial survey data, regulatory years 2000 through 2012.

Year	Number Adults	Number Kids	Total Goats	Kids:100 Adults	Percent Kids	Goats/Hr.	Location Description
2000	57	3	60	5	5	47	Lake Dorothy
2000	143	30	173	21	17	36	Chilkat Range
2001	464	113	577	24	20	132	S.Tracy/ N. Endicott
2001	174	57	231	33	25	139	North of Tracy Arm
2001	20	7	27	35	26	20	S. Speel/ N. Whiting
2001	18	1	19	6	5	27	Bart Lake
2002	163	47	210	29	22	82	Endicott to Houghton
2002	152	26	178	17	15	85	Chilkat Range
2003	52	12	64	23	19	213	Lions Head Mt.
2003	98	14	112	14	13	170	Antler Lake
2004					No Survey		
2005	226	39	265	17	15	101	East Lynn Canal
2005	15	1	16	7	6	15	Border Lake
2006	203	33	236	16	14	16	Chilkat Range
2006	50	16	66	32	24	NA	Lemon Glacier
2006	45	4	49	9	8	NA	Herbert Glacier
2006	60	22	82	37	27	NA	Eagle Glacier
2007	15	0	15	0	0	14	Lake Dorothy
2007	196	36	232	18	16	80	Cape Fanshaw
2007	179	18	197	10	9	39	South of Endicott Arm
2008	8	4	12	50	33	10	Lake Dorothy
2008	121	43	164	36	26	44	Endicott Arm
2009	235	67	302	29	22	110	Taku Glacier to Bullard
2009	306	62	368	20	17	123	S. Tracy/ N. Endicott
2009	86	11	97	13	11	108	N. Tracy Arm
2010	56	10	66	18	15	29	N. Tracy Arm
2010	85	21	106	25	20	29	S. Tracy/ N. Endicott
2011	8	1	9				Sweetheart Lake
2011	129	33	162	26	20	88	N. Tracy Arm
2011	256	46	302	18	15	88	S. Tracy/ N. Endicott
2011	223	44	267	20	16	67	Chilkat Range
2011	26	7	33	27	21	66	Taku/ Klutchmen
2012	134	25	159	19	16	51	N. Tracy Arm
2012	191	38	229	20	17	54	S. Tracy/ N. Endicott
2012	7	1	8	-	-	-	Sweetheart Lake

Table 2. Unit 1C annual goat harvest, regulatory years 2003 through 2012.

Year	Males	Females	Unknown	Total
2003	40	4	0	44
2004	40	7	0	47
2005	39	10	0	49
2006	35	7	0	42
2007	36	4	0	40
2008	37	4	1	42
2009	28	2	0	30
2010	36	5	0	41
2011	30	3	0	33
2012	31	1	0	32

Table 3. Unit 1C mountain goat harvest from all Wildlife Analysis Areas (WAAs), regulatory years 2003 through 2012.

WAA	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
2202											-
2203	1									1	2
2304				1							1
2305		1		1		1		1			4
2306	1	1		4	1		1	5	1	2	16
2307											-
2408	1		2			2					5
2409	2	1	2			2		1		1	9
2410	1										1
2411											0
2412											-
2413		2		3							5
2514	5	2	1	3		1	4		4		20
2515				1							1
2517	1		5		1	2	2	1	1	1	14
2518	5	5	4	2	2	1		3	3		25
2519	1	5	3								9
2722											-
2823			1				1				2
2824	15	16	17	13	14	15	12	13	13	12	140
2825	10	13	11	13	19	16	9	16	11	15	133
2926											0
2927	1	1	3	1	3	2	1	1			13
Unk											-
Total	44	47	49	42	40	42	30	41	33	32	400

Table 4. Unit 1C goat hunter effort and success, regulatory years 2003 through 2012.

		Successful hunters			Unsuccessful hunters			Total hunters		
Year	Permits issued	Nr hunters	Total days	Avg. days	Nr hunters	Total days	Avg. days	Nr hunters	Total days	Avg. days
2003	248	44	102	2.3	72	192	2.7	116	294	2.5
2004	217	47	113	2.4	35	89	2.5	82	202	2.5
2005	201	49	102	2.1	47	113	2.4	96	215	2.2
2006	191	42	103	2.5	30	80	2.7	72	183	2.5
2007	213	40	92	2.3	58	153	2.6	98	245	2.5
2008	216	42	98	2.3	51	106	2.1	93	204	2.2
2009	228	30	59	2.0	44	116	2.6	74	175	2.4
2010	187	41	108	2.6	33	103	3.1	74	211	2.9
2011	207	33	89	2.7	39	145	3.7	72	234	3.3
2012	194	32	85	2.7	28	98	3.5	60	183	3.1

Table 5. Unit 1C goat hunter success by community of residence, regulatory years 2003 through 2012.

		Successful hunters			Unsuccessful hunters		
Year	Percent success	Unit resident	Other AK	Non resident	Unit resident	Other AK	Non resident
2003	38	19	4	21	55	12	5
2004	57	18	2	27	27	3	5
2005	51	20	6	23	32	10	5
2006	58	13	5	24	21	5	4
2007	41	12	2	26	43	7	8
2008	45	14	0	28	40	8	3
2009	41	11	1	18	30	9	5
2010	55	8	6	27	27	4	2
2011	46	7	5	21	26	8	5
2012	53	7	0	25	23	2	3

Table 6 Unit 1C transport methods used by successful goat hunters, regulatory years 2003 through 2012.

Year	Airplane		Boat		Foot		Hwy. vehicle		Other	
	Total	(%)	Total	(%)	Total	(%)	Total	(%)	Total	(%)
2003	6	(14)	36	(82)	1	(2)	1	(2)	0	(0)
2004	12	(26)	33	(70)	1	(2)	1	(2)	0	(0)
2005	8	(16)	38	(78)	0	(0)	3	(6)	0	(0)
2006	5	(12)	31	(74)	0	(0)	4	(9)	2	(5)
2007	3	(8)	36	(90)	0	(0)	1	(2)	0	(0)
2008	1	(2)	38	(91)	0	(0)	3	(7)	0	(0)
2009	1	(3)	24	(80)	0	(0)	5	(17)	0	(0)
2010	4	(10)	32	(78)	1	(2)	1	(2)	3	(8)
2011	2	(6)	25	(76)	0	(0)	5	(15)	1	(3)
2012	1	(3)	28	(88)	0	(0)	2	(6)	1	(3)

Table 7. Commercial services used by Unit 1C goat hunters, regulatory years 2003 through 2012.

	Unit residents		Other AK residents		Nonresidents		Total use		Registered		
Year	No	Yes	No	Yes	No	Yes	No	Yes	guide	Transporter	Other
2003	72	2	15	0	1	25	88	27	25	2	0
2004	34	11	5	0	1	31	40	42	30	12	0
2005	43	8	10	6	2	26	55	40	26	12	2
2006	27	7	9	0	0	28	36	35	27	8	0
2007	51	4	8	1	2	32	61	37	29	8	0
2008	52	2	8	0	2	29	62	31	29	2	0
2009	40	1	9	1	1	22	50	24	22	2	0
2010	33	2	10	0	1	28	44	30	28	2	0
2011	28	5	11	2	0	26	39	33	27	5	1
2012	26	4	1	1	3	25	30	30	25	4	1

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 1D (2,700 mi^2)

GEOGRAPHIC DESCRIPTION: The Southeast Alaska mainland north of the latitude of Eldred Rock, excluding Sullivan Island and the drainages of Berners Bay.

BACKGROUND

Mountain goat hunting is very popular in Unit 1D. Unlike many areas of Alaska where goats are hunted as a trophy species, most goats harvested in Unit 1D are taken for food. Hunters are generally interested in taking the first goat that can be successfully harvested. This results in a female goat harvest higher than desired, but Unit 1D hunters typically harvest more male than female goats, and have been responsive to department efforts encouraging male selection. An extensive road system in the Haines area provides access to goat hunting areas and the majority of hunting in other areas of the unit occurs from boats. Mountain goat habitat ranges from alpine areas of densely forested mountains in coastally influenced areas to brushy benches in areas influenced more by interior Yukon, Canada climate conditions. In addition, there are isolated areas, such as Takhin Ridge, where movement of goats is restricted by rivers and developed roads (Haines Highway).

There are 3 separate registration permit hunts with separate hunt areas in Unit 1D (RG023-Takshanuk Mountains, RG024-Upper Chilkat River and Skagway area, and RG026-Takhinsha Mountains and northern Lynn Canal). Few hunters pursue goats in the early season (1 August), and effort significantly increases in mid-September when areas accessible by road are open to goat hunting. A significant number of hunters pursue goats late into the season (November and December) when goats have moved down slope to wintering areas in forested habitat along Lynn Canal.

In some areas of Unit 1D goat numbers persist at low levels offering limited opportunity to harvest. As in other Southeast Alaska locations, the unit has been subdivided into smaller, unique geographical areas for management purposes. The intent of each management area is to provide an additional opportunity to hunt if other locations in a hunt area (e.g., RG023) are closed because the guideline harvest level has been obtained. Prior to the start of the mountain goat hunting season biologists review point allocations for each management area. We may make changes to the allowable points based on survey and harvest information. Based on aerial survey data, mountain goat populations appear to be stable or increasing slightly in parts of the unit.

MANAGEMENT DIRECTION

REGION 1 MANAGEMENT GOAL

- Manage Southeast Alaska goat populations to provide for sustained annual use by hunters and wildlife viewers.

MANAGEMENT OBJECTIVES

- Continue working towards identifying discrete geographic areas for use as goat trend count and management areas;
- Maintain a guideline harvest within management areas not to exceed 6 points (male = 1 pt., female = 2 pt.) per 100 adult goats observed during aerial surveys;
- Conduct aerial surveys to establish the minimum number of goats needed to provide harvest opportunities for the Skagway Pie management area;
- Maintain goat-viewing opportunities along the Haines and Skagway road systems.

METHODS

Alaska Department of Fish and Game (ADF&G) management staff conducted aerial surveys in locations identified for high hunter effort during the reporting period. Additional aerial surveys were conducted by research staff during a cooperative project with the Borough of Land Management (BLM) in a response to the increase in commercial helicopter tourism activities to assess mountain goat movement patterns and population monitoring in the Haines and Skagway area (White et al. 2011). A single registration permit (RG023) was used to administer hunts RG023, RG024, and RG026. Harvest parameters, including hunter success, effort, access, and transportation, were determined for each hunt.

Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY11 = 1 July 2011–30 June 2012).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Given that we survey only a portion of Unit 1D in any 1 year, it is difficult to evaluate the population on a unit wide basis. We generally use available time and resources to target areas of greatest concern due to human use and/or disturbance. Survey results vary year-to-year due to the intensity and scope of the surveys and survey conditions and timing (Tables 1a, 1b, and 1c). We do our best to approach each survey with similar weather conditions, timing, and aircraft to eliminate as much variability as possible.

In fall 2010, department research staff began a project in cooperation with BLM to monitor mountain goat populations and movement patterns in response to the impacts of increasing commercial helicopter tourism activities on local mountain goat populations. Helicopter tourism is increasing in popularity during summer sight-seeing/glacial tours originating in Skagway and helicopter skiing operations in the winter originating out of 3 different locations in the Chilkat Valley near Haines. Concerns that the operations may alter behavior, movement patterns,

reproduction, and affect mountain goats' survival prompted additional research in Unit 1D. The department captured and deployed radio/GPS collars on mountain goats in order to learn more about spatial and temporal habitat use. During the report period a sample of collared goats were maintained in the study area. In addition, mountain goat reproduction, survival and sightability data gathered through aerial surveys for collared goats will provide invaluable information about mountain goat populations in the study area. In order to better estimate sightability during aerial surveys, monitor survival, and develop population estimates for survey areas, VHF radio collars will remain on goats in the study area once research activities have ended.

Mountain goat populations seem to be at medium to high densities in those areas we routinely survey, based on the number of goats seen per hour as well as the general numbers seen during aerial surveys compared over years (Tables 1a, 1b, and 1c). In areas that were not surveyed during this report period, we used hunter effort and success as well as previous survey information as indicators of population status.

Population Composition

We used aerial surveys to monitor population trends and composition (kid-to-adult ratios) in certain areas within the unit during this report period. We concentrated our effort in 2 of the most heavily hunted areas, Takhin Ridge (Table 1c) and Takshanuk Mountains (Table 1b), and included the Skagway Pie area (Table 1a), which was changed to an archery-only hunt during the 2008 Alaska Board of Game meeting. We also surveyed other portions of hunt areas RG023 and RG024 (Table 1b). A growing helicopter skiing and summer tourist industry has increased our concerns about potential effects of human activity on mountain goats in the unit. Based on the total number of goats, percent of kids, and number of goats seen per hour of survey time, the goat population appears healthy overall at this time.

MORTALITY

Harvest

Season and Bag Limits	Resident and Nonresident Hunters
Unit 1D, that portion between Taiya Inlet and River and the White Pass and Yukon Railroad by bow and arrow only	15 September–15 November (General hunt only)
Unit 1D, that portion north and east of the Chilkat River, south of the Canadian border, and south and west of the Ferebee River and Glacier 1 goat by registration permit only	15 September–15 November (General hunt only)
Unit 1D, that portion north of the Haines Highway and west of the Chilkat River, between the Ferebee River and Glacier and	1 September–30 November (General hunt only)

Taiya River and Inlet, and between
the White Pass and Yukon
Railroad and the Katzehin River

1 goat by registration permit only

Remainder of Unit 1D — 1 August–31 December
1 goat by registration permit only — (General hunt only)

Board of Game action and Emergency Orders (EO). The Board of Game received no proposals related to mountain goats for this report period.

In RY11 we closed the Tukgahgo, East Chilkoot Lake, and the Takshanuk Mountain portion of the RG023 hunt area by Emergency Order (EO) when guideline harvest levels, based on harvest point allocation, were reached. Mountain goats in the area are more accessible than other locations due to the proximity to the Haines Highway. In addition, we closed the north portion of Dayebas Creek (RG024) by EO as well as the Katzehin River south to Yeldagalga Creek in RG026. In total, 5 discreet areas were closed to goat hunting prior to the scheduled end of the season. These closures were spaced out over the duration of the season. In RY12 we closed 6 discreet hunting areas by EO when guideline harvest levels were reached. These areas included: Tukgahgo Mountain, Takshanuk Mountains, East Chilkoot Lake, Halutu Ridge, East Fork south of the Skagway River, and Dayebas Creek north. As in RY11, the closures during the RY12 hunt season were spread throughout the season.

Hunter Harvest. A total of 50 goats was harvested during the report period; 27 in RY11 and 23 in RY12 (Table 2). The RY11 harvest consisted of 17 male (63%) and 10 female (37%) goats. In RY12, 18 male (78%) and 5 female (22%) goats were taken. The total harvest during RY11 and RY12 was less than the last report period (69, Table 2). Harvest levels required the use of emergency orders (see Board of Game action and Emergency Orders above) to close the hunting season in several locations in Unit 1D once the allocated harvest points had been taken. For example, in the Takshanuk Mountains (RG023) in RY 10, 11 goats were taken before an EO was issued (10 points authorized) and in this case 5 female goats were harvested, putting the harvest 6 points over the allotted authorization. In RY 11 and RY12, only 8 goats were harvested before we closed the area by EO (10 points authorized); because the harvest included 2 female goats (male=1 point, female=2 points). Taking female goats generally reduces the length of the hunting seasons so hunters are encouraged to take males.

Unit 1D hunters continue to select more male goats vs. females, which is important for successful management of local goat populations. The female portion of the harvest is higher in Unit 1D than some other units because more hunters take goats for food rather than for trophies (Jemison, unpublished data, ADF&G). Department staff has developed sex identification material and a quiz to assist hunters in selecting male goats, and will conduct follow-up interviews with successful goat hunters to assess the utility of these materials. Summary data from interviews will be provided in future management reports.

Permit Hunts. Unit 1D mountain goat hunting is regulated under 3 registration permit hunts administered by a common hunt report. The main reason for maintaining 3 hunts in the subunit is

to allow different opening and closing dates while attempting to adjust for relative differences in hunting pressure. These 3 hunt areas are further divided into smaller management units that are assigned guideline harvest levels using point values (male=1 point, female=2 points) based on aerial survey information. This finer scale of management accomplishes 2 goals: 1) it protects goats in easily accessible areas from being overharvested, and 2) it provides hunters with the maximum amount of opportunity by closing only small accessible areas while allowing other portions of the unit to remain open. We issued an average of 173 permits per year during the 2 years of the report period, slightly more than the previous 8-year mean of 166 permits/year (Table 3).

Hunter Residency and Success. Local residents continue to be the majority of Unit 1D goat hunters. In RY11 and RY12, residents of the subunit took 19 goats in both report years which represents 70% and 83% of harvested goats, respectively, while nonlocal residents took 4 (15%) goats in RY11, and 1 (4%) in RY12 (Table 4). Unit 1D is a popular hunting destination for nonlocal Alaska residents because hunting areas are accessible by road. Seven nonresident hunters participated in a Unit 1D goat hunt during the 2011 season; 6 in 2012. Nonresident hunters took 4 and 3 goats in each year of the reporting periods, 15% and 13% of the harvest during RY11 and RY12, respectively.

Twenty-nine percent of all Unit 1D goat hunters were successful during the report period (Table 4). Fifty-four percent of nonresident hunters were successful compared to 27% of all Alaska resident hunters (unit residents and nonlocals). The higher rate of success for nonresident hunters is due to Alaska law requiring nonresidents to hunt with a licensed big game guide. Overall hunter success decreased, nonresident success was stable, and resident success decreased slightly from the previous report period.

Harvest Chronology. Goats can be hunted in Unit 1D from 1 August through 31 December, but seasons vary between the 3 hunt areas. Over the years, hunters have taken most goats from late September to early November. During this report period 40% of the goats were harvested in September, 28% in October, 26% in November, 4% in August, and 2% in December. Although the percentages listed above represent the harvest chronology for this reporting period, harvests by month vary year to year and are influenced by many factors, such as weather and snow conditions.

Transport Methods. Boats and highway vehicles continue to be the transport methods used most often by successful hunters, accounting for 44% and 42%, respectively, of transport during the report period (Table 5). A high percentage of successful hunters use highway vehicles because hunting areas are close to the Haines Highway and other developed roads. Boats are used in both fresh water and marine environments to access goat hunting areas. Several rivers provide good access to hunting areas, and mountain goat hunting opportunities adjacent to saltwater bodies are available along Lynn Canal and Taiya Inlet, where goats can be found during late fall and early winter.

Commercial Services. Because most Unit 1D goat hunters are local residents and have access to either a vehicle or boat for their transportation there is little use of commercial services (Table 6). During the report period 12 nonresident hunters and 1 resident hunter reported using commercial services. The only nonresident hunter not using commercial services took advantage

of using a second degree level of kindred relative to serve as their guide. The number of guides offering mountain goat hunts has remained the same for a number of years. However, large tracts of state-managed land and the absence of a guide use area system on state lands mean there is potential for an increase in guide numbers in Unit 1D. We need to monitor any increases in guiding effort to ensure guideline harvest levels are not exceeded when combined with harvests from other user groups (local and nonlocal Alaska residents).

Location of Harvest. Goat harvest by Wildlife Analysis Area (WAA) is provided in Table 7. Accessibility of mountain goat hunts is likely the most important factor in determining vulnerability of goats to hunters. The Takshanuk Mountains, which are skirted by the Haines Highway, have consistently borne much of the goat harvest in the unit. Also, the east side of Taiya Inlet that is readily accessible by boat can also experience a high level of harvest depending on weather conditions. By establishing point values that discourage the taking of females, we are able to more precisely manage areas that are used intensively.

Mountain Goat Research

In August–October 2011 and 2012, ADF&G and BLM staff radiocollared 17 goats in continuation of a cooperative mountain goat research project in upper Lynn Canal (Takhin Ridge, Porcupine Mtn., Four Winds Mtn., Takshanuk Ridge, Chilkoot River, Ferebee River and the upper Nourse River). The intent of this 3-year study is to gather mountain goat distributional data in order to characterize key seasonal habitats used by mountain goats in this area. Acquisition of these data is intended to supplement a data-based framework used to guide resource management decisions relative to regulation of summer and winter helicopter tourism and mountain goat management.

Since this project is still underway, data are not yet available to discern whether goats in distinct localities exhibit a predisposition for particular wintering strategies, although our hypothesis is they do.

CONCLUSIONS AND RECOMMENDATIONS

Fine-scale mountain goat management continues to be necessary in Unit 1D as hunting pressure remains at a high level. We will continue to use a single permit and report for the 3 hunts in the subunit. Careful population and harvest monitoring is necessary, and emergency closures may be required to avoid excessive harvest. Composition surveys should be conducted at least every 3 years in high use areas. Finally, permanent trend count areas with well-defined boundaries should be established to enhance comparable surveys from year to year.

Helicopter activities have increased annually in Unit 1D for the past 10 years. Our concerns grow over their immediate and long-term effects on mountain goats. Flightseeing is expected to continue to increase, as is the use of helicopters to access remote areas for hiking and mountaineering. Over the 2 years of this report period, staff spent increased time working on ways to address agency and public concerns about effects of these activities on goats in the area. Cote's (1996) research concerning mountain goat responses to helicopter activity indicates that we should investigate ways of monitoring these various uses of goat habitat. ADF&G continues to work with the BLM on a research project in response to increasing summer tourism-related commercial helicopter activities on federal land in Unit 1D. (The majority of winter helicopter activity occurs on state-managed land.) ADF&G and BLM deployed 17 additional GPS-

equipped radio collars on goats during this reporting period to compare model predictions to data collected from marked goats. These data will help ADF&G and other resource management agencies respond to proposed new activities in the area that may affect mountain goats.

Mountain goats continue to be an important source of game meat for unit residents and hunting effort from all demographics appears to be stable or slightly increasing in portions of the unit. We should continue efforts to reduce the female goat harvest to help ensure the viability of this resource in Unit 1D.

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Table 1a. Unit 1D mountain goat composition counts, Skagway Pie area, regulatory years 1981 through 2012.

Year	Number adults	Number kids	Total goats	Kids:100 adults	(%) kids	Goats/hour
1981	73	22	95	30	23	60
1983	26	5	31	19	16	56
1984	27	13	40	48	33	36
1985	29	3	32	10	9	25
1986	13	5	18	38	28	28
1987	7	0	7	0	0	55
1988	No survey					
1989	17	6	23	35	26	35
1990	No survey					
1991	No survey					
1992	1	0	1	0	0	3
1993	No survey					
1994[a]	11	5	16	45	31	20
1995[b]	21	7	28	33	25	N/A
1996-2000	No survey					
2001	32	7	39	22	25	93
2002-2007	No survey					
2008	99	19	118	19	16	59
2009[c]	No survey					
2010	No survey					
2011	27	4	31	15	13	31
2012	No survey					

[a] Skagway Pass side only, goats/hour is for the entire survey that included a portion of hunt area RG023.

[b] Includes only the west side of closed area, adjacent to the Taiya River.

[c] First year open for goat harvest - archery only.

Table 1b. Unit 1D mountain goat composition counts, hunt areas RG023 and RG024, regulatory years 1989 through 2012.

Year	Number adults	Number kids	Total goats	Kids:100 adults	(%) Kids	Goats/ hour
Klukwah Mt. (K) and Ferebee Glacier/River (F) to Chilkoot Inlet						
1989 (K)	26	9	35	35	(26)	60
1993	No survey					
1994 (K,F) [a]	111	21	132	19	(16)	45
1995 [b]	52	15	67	29	(22)	89
1996–1997	No survey					
1998	69	23	92	33	(25)	58
1999–2002	No survey					
2003	140	44	184	31	(24)	141
2004–2009	No survey					
2010 (K,F)	134	41	175	31	(23)	58
2011	172	34	206	20	(17)	75
2012	136	37	173	27	(21)	N/A
Takshanuk Mtns. (E, W)						
1989 (E,W)	40	16	56	40	(29)	34
1993 (W)	27	7	34	26	(21)	59
1994 (E,W)	48	5	53	10	(9)	17
1995	19	4	23	21	(17)	N/A
1996–1997	No survey					
1998	22	6	28	27	(21)	20
1999–2000	No survey					
2001	150	39	189	26	(21)	122
2002–2006	No survey					
2007 (E,W)	219	45	264	21	(17)	165
2008	No survey					
2009 (E,W)	168	37	205	22	(18)	205
2010 (E,W)	311	73	384	24	(19)	85
2011	275	90	365	33	(25)	N/A
2012	225	50	275	22	(18)	N/A
North of the Klehini River and West of the Chilkat River						
1989	23	6	29	26	(21)	70
1993	No survey					
1994	58	4	62	7	(6)	69
1995	55	9	64	16	(14)	116
1996–2003	No survey					
2004	34	8	42	24	(19)	84
2005–2011	No survey					
2012	23	1	24	4	(25)	N/A

Table 1b. continued.

Year	Number adults	Number kids	Total goats	Kids:10 0 adults	(%) Kids	Goats/ hour
East of Ferebee Glacier/River (F), Chilkoot/Taiya Inlet						
1989 (F,C)	39	17	56	44	(30)	40
1992 (F,C)	30	10	40	33	(25)	19
1993	No survey					
1994 (F,C)	119, 130	21, 33	140, 163	18, 25	(15, 20)	46, 59
1995–2009	No survey					
2010 (F,C)*	28	8	36	29	(22)	12
2011	52	3	55	6	(5)	N/A
2012	33	6	39	18	(15)	N/A
*Not a complete survey of western Taiya Inlet						
Harding Mountain to upper West Cr., upper Norse R., and Chilkoot Pass						
1995	64	9	73	14	(12)	50.5
1996–2009	No survey					
2010	30	3	33	10	(10)	43
2011	65	6	71	9	(8)	N/A
2012	41	6	47	15	(13)	N/A
Twin Dewey Peaks, Skagway Pass, Warm Pass						
1995	20	6	26	30	(23)	20
1996–2012	No survey					
Katzehin River north to Twin Dewey Peaks						
1994	121	32	153	26	(21)	102
1995	No survey					
1996	101	26	129	25	(20)	105
1997	96	15	111	16	(14)	80
1998–1999	No survey					
2000	97	21	118	22	(19)	83
2001[c]	60	13	73	22	(18)	77
2002–2009	No survey					
2010	66	19	85	29	(22)	28
2011	No survey					
2012	126	20	146	16	(14)	N/A

[a] First survey listed conducted by the BLM in a PA-18 aircraft; this survey does not overlap with the ADF&G survey.

[b] Includes only the Chilkoot River side of the mountain range from Klukwah Mt. to Chilkoot Inlet.

[c] Partial survey from Kasidaya Creek north

Table 1c. Unit 1D mountain goat composition counts, hunt area RG026, regulatory years 1974 through 2012.

Year	Number adults	Number kids	Total goats	Kids:100 adults	(%) kids	Goats/hour
Tsirku River (T) and Takhin Ridge (N,S)						
1983 (T)	67	23	90	34	(26)	29
1985 (S)	41	13	54	32	(24)	69
1987 (N,S)	14	4	18	29	(22)	11
1989 (N,S)	111	33	144	30	(23)	126
1993 (N,S)	100	21	121	21	(17)	112
1994 (T,N,S)[a,b]	129	29	158	22	(18)	48
1995–2001	No survey					
2002 (N,S)	79	17	96	22	(18)	87
2003 (T)	34	15	49	44	(31)	58
2003 (N,S)	104	27	131	26	(21)	95
2004 (T)	55	17	72	31	(24)	81
2004 (N,S)	97	23	120	24	(19)	114
2005-2006	No survey					
2007 (N,S)	67	16	83	24	(19)	104
2008 (N,S)	84	19	103	23	(18)	103
2009 (N,S)	49	11	60	22	(18)	150
2010-2011	No survey					
2012	79	22	101	28	(22)	N/A
Remainder of Area West of Chilkat Inlet						
1974	39	3	42	8	(7)	72
1975	20	9	29	45	(31)	---
1993	No survey					
1994	184	32	216	17	(15)	49
1995–2012	No survey					
East of Chilkoot Inlet-Katzehin River South						
1993	No survey					
1994	32	10	42	31	(24)	98
1995–1996	No survey					
1997	5	2	7	40	(29)	N/A
1998–2012	No survey					

[a] First survey listed conducted by the BLM in a PA-18 aircraft.

[b] Survey consisted of a significantly larger area than previous surveys represented.

Table 2. Unit 1D annual mountain goat harvest, regulatory years 2003 through 2012

Year	Males	Females	Unknown	Total
2003	27	7	1	35
2004	32	6	1	39
2005	20	10	0	30
2006	20	11	0	31
2007	33	10	0	43
2008	16	10	0	26
2009	21	10	0	31
2010	24	14	0	38
2011	17	10	0	27
2012	18	5	0	23

Table 3. Unit 1D mountain goat hunter effort and success, regulatory years 2003 through 2012.

		Successful hunters			Unsuccessful hunters			Total hunters		
Year	Permits issued	No. hunters	Total days	Avg days	No. hunters	Total days	Avg days	No. hunters	Total days	Avg # days
2003	170	35	76	2.2	69	223	3.2	104	299	2.9
2004	147	39	83	2.1	45	115	2.6	84	198	2.4
2005	150	30	68	2.3	48	115	2.4	78	183	2.4
2006	165	31	52	1.7	57	145	2.5	88	197	2.2
2007	153	43	97	2.3	57	161	2.8	100	258	2.6
2008	168	26	53	2.0	59	184	3.1	85	237	2.8
2009	188	31	64	2.1	66	227	3.4	97	291	3.0
2010	190	38	80	2.1	78	231	3.0	116	311	2.7
2011	185	27	34	1.3	64	178	2.8	91	212	2.3
2012	160	23	42	1.8	61	209	3.4	84	251	3.0

Table 4. Unit 1D goat hunter success by community of residence, regulatory years 2003 through 2012.

		Successful hunters			Unsuccessful hunters		
Year	Percent success	Unit resident	Non-local	Non-resident	Unit resident	Non-local	Non-resident
2003	34	24	4	7	45	20	4
2004	46	24	5	10	39	4	2
2005	39	15	7	8	40	4	4
2006	35	20	7	4	42	7	8
2007	43	29	7	7	43	12	2
2008	31	18	1	7	49	7	3
2009	32	23	2	6	49	12	5
2010	33	26	6	6	58	15	5
2011	30	19	4	4	53	8	3
2012	27	19	1	3	50	8	3

Table 5. Unit 1D transport methods used by successful goat hunters, regulatory years 2003 through 2012.

	Airplane		Boat		Foot		Hwy vehicle		Other[a]	
Year	Total	(%)	Total	(%)	Total	(%)	Total	(%)	Total	(%)
2003	0	(0)	15	(43)	0	(0)	12	(34)	8	(23)
2004	1	(3)	15	(38)	1	(3)	15	(38)	7	(18)
2005	1	(3)	12	(40)	3	(10)	9	(30)	5	(17)
2006	3	(10)	11	(35)	0	(0)	15	(48)	2	(7)
2007	1	(2)	22	(51)	0	(0)	14	(33)	6	(14)
2008	0	(0)	13	(50)	0	(0)	9	(35)	4	(15)
2009	0	(0)	19	(61)	1	(3)	7	(23)	4	(13)
2010	0	(0)	13	(34)	3	(8)	18	(47)	4	(11)
2011	0	(0)	14	(52)	0	(0)	11	(41)	2	(7)
2012	0	(0)	8	(35)	0	(0)	10	(43)	5	(22)

[a] Includes 3- and 4- wheelers and unknown transportation

Table 6. Unit 1D commercial services reported by goat hunters, regulatory years 2003 through 2012.

	Unit residents		Other AK residents		Non-residents		Total use				
Year	No	Yes	No	Yes	No	Yes	No	Yes	Registered Guide	Trans-porter	Other
2003	69	0	24	0	1	10	94	10	10	0	0
2004	64	0	9	0	0	12	73	12	11	0	1
2005	69	0	24	0	1	10	94	10	10	0	0
2006	64	0	9	0	0	12	73	12	11	0	1
2007	71	1	19	0	1	8	91	9	8	1	0
2008	67	0	7	1	1	9	78	10	9	1	0
2009	72	0	14	0	0	11	86	11	11	0	0
2010	84	0	21	0	3	8	108	8	8	0	0
2011	71	1	12	0	1	6	84	7	6	1	0
2012	69	0	9	0	0	6	78	6	6	0	0

Table 7. Unit 1D Goat harvest by Wildlife Analysis Areas (WAA), regulatory years 2003 through 2012.

	WAA						
Regulatory year	4302	4303	4405	4406	4407	4408	*Total*
2003	11	1	11	0	10	2	35
2004	19	5	5	0	9	1	39
2005	13	3	5	0	8	1	30
2006	10	2	10	0	6	3	31
2007	22	1	5	0	12	3	43
2008	15	0	3	0	7	1	26
2009	13	1	6	0	9	2	31
2010	21	2	5	2	8	0	38
2011	12	0	5	0	6	4	27
2012	11	1	5	0	6	0	23

SPECIES

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO Box 115526
Juneau, AK 99811-5526

MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: Unit 4 (5,800 mi2)

GEOGRAPHIC DESCRIPTION: Admiralty, Baranof, Chichagof, and adjacent islands

BACKGROUND

Mountain goat populations were established on Baranof Island (~1,865 square miles) in 1923, when 18 animals were transplanted from Tracy Arm in Game Management Unit 1 (Paul 2009). Goats were not believed to have been indigenous to the island, although early written Russian history is confusing with references to "white deer." Recently, tissue samples from goats in Unit 4 were analyzed and compared to regional goat populations using DNA analysis. The genetic makeup of most Unit 4 goats is similar to that of goats in Tracy Arm from where Baranof goats were transplanted. However, several of the goats had DNA that was different enough to suggest they originated from a relict population preceding the transplanted stock (Shafer 2011). Further DNA analysis has indeed established that there are 2 different mountain goat genotypes on Baranof Island. In the mid-1950s goats were transplanted to Chichagof Island (~2,218 square miles) (Paul 2009), but populations did not become established. The last report of a goat on Chichagof was in 1978 (Johnson 1981); mountain goat populations do not exist on Admiralty (~1,693 square miles) or any other island in the unit. Mountain goat hunting on Baranof Island was implemented in 1949 and seasons have continued through the present. In 1976 a registration permit (RG150) system was initiated. Since that time the harvest has ranged from 28 to 75 goats per year. In March 2004, the Federal Subsistence Board (FSB) issued permits through the U.S. Forest Service to the Sitka Tribe of Alaska to allow the spring harvest of 3 goats. The goats will be used for obtaining goat hair for spinning and weaving ceremonial robes as a cultural/education project. The FSB authorized renewal permits good for 5 years in 2009.

The effects of severe winters on goat populations are poorly understood. Consistent goat surveys are needed to better understand the effects of varying snow accumulations. Throughout most goat habitat on Baranof Island, hunter access is limited and difficult. Weather patterns and hunter access during open goat seasons play important roles in regulating the harvest.

Research involving the capture and radiocollaring of goats in the areas containing the hydroelectric projects at the Blue Lake and Takatz Lake began in the fall of 2010. Focus of the research is to determine possible impacts of the development projects, characterize habitat selection and seasonal movement patterns, monitor reproductive success, analyze movement data and better census the island population.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Manage Baranof Island goat populations to provide for maximum sustained annual use by hunters and wildlife viewers.

MANAGEMENT OBJECTIVES

- Maintain an island-wide population in excess of 1,000 goats.
- Monitor sex composition of the harvest and manage for 6 points per 100 goats observed during aerial surveys, using a weighted harvest point system (males = 1 point, females = 2 points).

Harvest guidelines are based on population trend data; number of kids observed per 100 adults counted; nanny (female) to billy (male) harvest ratio; and age of harvested goats.

Management objectives were revised in 2006 to be more consistent region wide. The objectives are based on a point system, setting a maximum allowable harvest of 6 points (males=1 point, females=2 points) per 100 goats observed during aerial surveys. Thus, the objective is no more than 6 males, or 3 females per 100 goats, or any combination of those points not exceeding 6 per 100 goats.

The point system was implemented with the fall 2006 registration hunt and modified in 2010 to establish a point total where the female component was capped at a set number. The point system established allowed significantly more males to be harvested, but if nannies were taken, the points available decreased (also counting directly against the maximum goat harvest cap). For example, the 2010 hunt was established at 56 points, or 18 females; whichever occurred first.

Despite department efforts to produce and distribute educational materials to aid hunters in field identification of male and female goats, the point system was not sufficient to reduce the high female harvest component. We made an extensive public outreach effort in July 2011 to consider management issues and options. It resulted in closures to all goat hunting in the Blue Lake-Medvejie Lake drainages and the south fork of the Katlian River watershed. Three other watersheds and 5 multi-watershed zones were capped with goat harvest targets to significantly restrict female harvest. We issued Emergency Orders (EO) to close watersheds and zones when targets were met.

A multi-year trend, which showed slight increases in the number of guided nonresident hunters over the last decade, experienced a brief downturn in 2007–2008. The downturn in national economic conditions and decline in discretionary spending was believed to be the primary factor in that brief decline. However, the watershed closures in 2011 and 2012, coupled with subsequent EOs, restricted the flexibility of registered guides to move hunters to open areas. Many nonresident hunters were unwilling or unable to alter scheduled travel plans as the hunt season changed.

Mountain goat research efforts, tied into the expansion of hydroelectric projects at the existing Blue Lake dam and a potential site on Baranof's eastern side at Takatz Lake, may help to refine our understanding of goats on the island. Aspects of the research may help characterize habitat

selection and seasonal movement patterns by goats. It may also help us to better understand parameters of reproductive success, analyze movement data and provide better methodology to census the population.

METHODS

All Unit 4 goat hunting is administered through registration permit (RG150). Hunters obtain permits without charge and successful hunters are required to report within 5 days of taking a goat. All other permittees are required to report by mid-January. Information from the reports includes the area and number of days hunted, kill date, sex of goat harvested, transportation used, and any use of commercial services. Since 1998 successful hunters had been encouraged to voluntarily bring in the horns from their goat for age determination. Hunter participation in the voluntary program dropped to 72% prior to the 2006 and 2007 seasons. Once the point system was put in place in 2006, the percentage of hunters bringing in horns climbed to 91%. However, because of increases in harvest during late December and the need to have an accurate and timely count of male and female goats throughout the season, the horn measurements became a mandatory condition of the permit hunt beginning with the 2008 season.

Up to 3 federal permits for goats are issued through the Forest Service to the Sitka Tribe of Alaska. The permits are used by designated tribal hunters to harvest goats primarily for their hair to make cultural items, although the meat is shared with tribal members. During this reporting period, 1 male goat was harvested under a federal permit in May 2012. The goat harvest is included in the overall harvest for the island but is not reflected in the data tables (Tables 1-4) related to the state registration hunt RG150.

We conduct mid to late summer aerial surveys periodically island-wide or in selected trend count areas. Survey platforms have ranged from larger fixed-wing aircraft using multiple observers to smaller fixed-wing aircraft with a pilot and observer, and helicopters. We've divided the island into historical trend count areas that can be used when island-wide surveys are not possible due to budget constraints, aircraft availability, and poor weather conditions.

During August 2004 we conducted an extensive survey of the island by helicopter under optimal conditions to estimate total goat numbers, number of kids, and distribution island-wide. A follow-up survey was conducted in August 2005 with the primary purpose of looking at the expansion of goats on the southern one-third of the island. During 2005–2008, only partial surveys were completed due to poor weather and aircraft availability. Nearly complete aerial surveys were accomplished in 2009–2010 on the northern third of the island. Partial surveys during 2011–2012 targeted key areas known to have higher concentrations of goats over the last 80 years than other portions of the island.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The extensive aerial survey of goat distribution on Baranof Island conducted during August 2004, resulted in a tally of 1,300 goats and an estimated population of 1,530 goats (see Mooney 2008 for details on this and earlier surveys). Since the 2004 island-wide survey, only partial

surveys have been completed due to budget, weather, and aircraft availability. For example, in August 2005, a Piper Super Cub was used as the survey platform and the priority was to survey southern one-third of the island (south of the Great Arm of Whale Bay). In 2007 and 2008, following record snowfall, poor weather prevented extensive surveys. In 2009, surveys via helicopter were accomplished for the northern third of the island on established trend count routes and tallied 348 goats. More importantly, the number of kids per 100 adult goats sighted dropped to 18%, a 4% decline from the 2004 survey. In 2010 and 2011, surveys via helicopter were accomplished for the northern third of the island on established trend count routes and tallied 513 and 517 goats respectively. The number of kids per 100 goats sighted dropped to 16% in 2010 and increased to 18% in 2011. Additional survey effort could be expended in future years to determine sightability efficiency, or the survey count could function independently of sightability and the variation could be considered as a conservative population trend. Survey data in trend count areas within the goat research area in 2012 was 23% lower than 2011 with a decline in kids from 18% to 10%. Some stability in numbers was evident in the Katlian River watershed but counts in Blue Lake, Nakwasina, and Glacial River watersheds declined. Poor weather in the early fall of 2012 prevented additional surveys on the island.

Until the beginning of 2007, goat populations continued to expand both spatially and numerically on Baranof Island. Record winter snowpack during the winters of 2006 through 2008, along with 3 consecutive late and cold springs, have contributed to reduce the goat population. During this report period, winter weather was considered average but population numbers have not recovered to 2006 levels. Because of differences in observers, pilots, area surveyed, and type of aircraft used, it is difficult to infer goat abundance from the number of goats observed per hour of survey time.

Summer alpine range and winter range may be affected by proposed developments of hydroelectric projects in Sitka and Takatz Bay. A decision by the City and Borough of Sitka to raise the height of the Blue Lake dam will directly affect some wintering goats due to habitat loss. The project may provide hunters with improved boat launching at the dam and better access to goat winter range, affecting goat vulnerability. A second proposed hydroelectric development on the eastern side of the island at Takatz Bay could include multiple dams and an overland transmission line route across the island to a tie-in with the Green Lake-Blue Lake transmission line. This development has the potential for direct impacts to the movement of goats on summer and winter range.

Areas on the northern one-third of Baranof Island (where an estimated 60–70% of the goat population resides) show an extensive network of trails and dig-outs. Dig-outs are areas of soft, damp ground where goats dig up the ground to bed and cool off. We have discussed the potential for a cooperative agency habitat assessment project to determine the impact of goats on the alpine summer range with the US Forest Service. As of this report date, funding for a project has not been secured.

E. L. Young estimated a Baranof Island population of 1,000 goats in 1991 (cited by Faro 1994). Whitman (2002) estimated the population at 1,350, and the estimate from the 2004 surveys was 1,529 goats (Mooney 2004). Survey and harvest data during 2009–2010 indicate a continuing decline with an estimated population of 700-850 goats. Harvest data refers to information collected from hunters related to locations hunted, effort, and success. Their information is used

in conjunction with aerial survey information to look for trends. Surveys in 2011–2012 indicate a further decline with an estimated population of 650-750 goats and a decrease in the number of kids per 100 adults to 10%.

Population Composition

Kid percentages in the observed segment of the goat population have varied widely, from a low of 10% to a high of 41%. Surveys conducted in 2004–2005 produced combined results with an average of 22%. Surveys conducted in 2010 saw a decline to 16% with a slight increase in 2011 to 18%. These data should be viewed cautiously because of differences in observers, pilots, type of aircraft used, and timing of surveys. Although kids and adults can be differentiated during aerial surveys, male and female goats cannot be differentiated using the aerial survey methodology. Therefore the sex ratio of goats on the landscape is unknown. Harvest data is available, but, since hunters are encouraged to select males, the harvest sex ratios do not reflect population-wide sex ratios.

From 1976 to 2012, 1,237 hunter-harvested goats have been classified by sex. With the exception of kids and yearlings, it is probable that hunters are not selecting for any specific age class of goat. Generally, males are selected over females but the percentage of females taken is high. The 2011 harvest resulted in 7 female and 11 male goats taken. The 2011 mean ages by sex of harvested goats were 5 years for males and 4 years for females. In 2012, hunters harvested 17 male and 2 female goats. The mean ages by sex of harvested goats were 4 years for males and 4 years for females. The age structure for both males and females is noteworthy and could be indicative of missing younger age cohorts due to declining recruitment.

In 2011 and 2012, only 2 harvested females were $\geq$ 6.5 years of age, and 1 of those was 9.5 years of age. In 2011, 4 males were older than 7.5 years of age, with the oldest being 8.5 years of age. For 2012, 4 males were 5.5 years or older with the oldest at 8.5 years of age. Compared to the 2009–2010 reporting period when approximately 81% of all harvested females and 82% of all harvested males were between the ages of 1.5 and 5 years, 22% of the harvested females and 71% of the harvested males were between 1.5 and 5 years of age during this reporting period.

With the goal of encouraging hunters to select billies (male goats) over nannies (female goats), we show hunters a series of close-up photographs of goats on Baranof Island at the Sitka office to help identify characteristics of the sexes in the field. This effort complements a region-wide brochure on the subject, issued in the summer of 2008 and revised in 2009, which is available to hunters.

Distribution and Movements

Mountain goats inhabit all available summer range on Baranof Island north of Port Herbert and Snipe Bay. Goat densities in various alpine areas are unknown, but recent surveys indicate that some goat habitat is densely occupied, especially areas north of Blue Lake and south/southeast of Rodman Creek. Until 2007 public reports and survey observations of goats south of Whale and Gut bays were increasing yearly. Contiguous goat habitat is limited south of Whale and Gut bays and plays a part in slowing the range expansion and population growth of the goats in this area. Winter habitat is more difficult to define, but south-facing cliffs are generally preferred. The extreme winters of 2006 through 2008 most likely adversely affected goats in less than optimal

habitat. Continuing island-wide surveys is an important priority for the next reporting period because management harvest guidelines are derived from population surveys and hunter harvest numbers.

Horn Growth Rates

In an effort to better understand growth characteristics of Unit 4 goats, hunters were requested to voluntarily submit horns for aging and measuring from 1998 through 2007. Beginning in 2008, hunters were required to submit horns. A total of 579 goats from the 1998–2012 seasons yielded data on horn growth and have been aged based on discreet annuli in horns (Brandborg 1955).

While it may be possible that horn growth reflects body growth patterns, there are some confounding factors. Because no annuli are discernible until a goat reaches 1.5 years of age, and this annulus encompasses 2 years of growth (0–0.5 and 0.5–1.5), the data cannot be used for analyses of single-year growth. Likewise, growth from the year of death cannot be reliably used, as growth may not be completed during that particular year. Also, after 6 years of age, growth annuli are so small that accurate measurements can be difficult.

Despite earlier indications that incremental horn growth may reflect winter severity (Whitman 2000), analysis of horn growth data from 1999 through 2010 suggests there is no correlation between horn growth and winter severity.

MORTALITY

Harvest

Season and bag limit	Resident and nonresident hunters
1 goat by registration permit only	1 August–31 December (General hunt only)

Regulations adopted by the Federal Subsistence Board (FSB) are identical to state regulations. Up to 5 permits per year are granted by the FSB to the Sitka Tribe of Alaska to harvest goats primarily for their hair to meet cultural needs. Male goats have been targeted for these hunts in the spring (May and early June) and only 2 goats were harvested during this reporting period.

Board of Game Actions and Emergency Orders (EO). In 2012, a proposal to penalize a hunter taking a female goat with the loss of the ability to hunt for goats in Unit 4 from 3 to 5 years was discussed but not adopted.

We issued emergency orders in 2011 and 2012 to close the hunting season in the Blue Lake-Medvejie Lake drainages and also in the south fork of the Katlian River watershed.

In 2011, we issued in-season emergency orders to close the Green Lake watershed, the north fork of the Katlian River watershed and the Mt. Furuhelem-Mt. Ada zone when harvest targets were met.

In 2012, an in-season emergency order closed the Nakwasina River watershed.

Hunter Harvest. During 2011 and 2012, 127 and 166 registration permits were issued, respectively (Table 1). A total of 18 (2011) and 19 (2012) goats were legally harvested. Thirty-five percent of permittees hunted in 2011 and 33% hunted in 2012. For those hunters going afield, the success rate was 40% in 2011 and 35% in 2012. The 5-year average for the period 2008–2012 was: 206 permits issued, 84 hunters afield, and 26 goats reported harvested. Hunters reported 61% male goats in the harvest in 2011 and 89% in 2012. With the current Unit 4 population estimate for goats at 700 animals, documented harvest during the report period accounts for 5.2% of the population annually.

Hunter Residency and Success. Baranof Island residents continue to be the primary users of Unit 4 goats. Thirty-eight hunters were local residents during 2011 and 42 local residents hunted in 2012 (Table 2). The proportion of nonresident guided hunters was 4% in 2011; the percent of nonresident guided hunters rose to 13% in 2012.

Harvest Chronology. Weather and access are the primary factors controlling hunter effort and chronology for mountain goats in Unit 4. Historically, few goats were harvested during November and December, when frequent low-pressure systems bombard Southeast Alaska with rain and/or snow. In the last decade however, hunters have elected to hunt after early-season snows drive goats to lower elevations. The 2011 season saw the late season pattern swing back to an early harvest strategy with 14 (78%) goats harvested prior to November and 4 (22%) in December. During 2012, 18 goats (95%) were harvested before November, and 1 goat (5%) was harvested in December (Table 3). Emergency orders issued in 2011 may have encouraged hunters to hunt earlier in the season in 2012 because of concerns the season would be closed prior to the onset of winter weather which drives goats to lower elevation.

Transport Methods. Boats continue to be the main mode of transportation for Unit 4 goat hunters. During 2011, 8 (44%) successful hunters used boats for primary access. In 2012, 13 (68%) successful hunters used boats for primary access (Table 4). The use of airplanes increased to 44% in 2011, and decreased slightly to 21% in 2012.

Other Mortality

Quantitative estimates of extent or cause of other goat mortality is unknown. Brown bear-caused mortality occurs but to what extent is unknown. During aerial surveys bears have been observed at elevations between 3,000–4,200 feet lying prone in the rocks above goats; these bears may have been waiting in apparent ambush. Baranof Island's deer and goat populations on summer alpine range appear to provide an opportunistic resource for bears. Bald eagles have been observed hazing young goats and kids as they cross over narrow ridges, similar to behavior exhibited by golden eagles in other locales. Winter starvation and accidental deaths due to falls, rockslides, and avalanches undoubtedly take some toll on the population.

HABITAT

Assessment

A preliminary 2004 sampling effort of three sites on Baranof found that dwarf blueberry (*Vaccinium caespitosum),* fireweed *(Epilobium sp.),* and oatgrass *(Trisetum sp.)* were grazed at each location (see Mooney 2008 for more details). An additional habitat survey was conducted during the summer of 2011 on southern Baranof Island at Avoss Lake. Red-stemmed saxifrage

(*Saxifraga lyallii)* and deer cabbage (*Fauria crista-galli*) were found to be regularly grazed by goats.

Enhancement

No habitat enhancement activities were conducted on goat range during this report period. In cooperation with U.S. Forest Service Sitka Ranger District biologists, ADF&G continues to seek funding to develop projects for goat habitat assessment and enhancement work.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Efforts should continue to monitor timber extraction activities and additional road building associated with logging and hydroelectric projects. On Baranof Island, habitat degradation activities are currently of minor concern; however, the Blue Lake and Takatz Lake hydroelectric projects proposed by the City and Borough of Sitka may have some negative impacts to goats. Research work involving radio-collared goats began in the summer of 2010 to address project impacts (City and Borough of Sitka 2012).

CONCLUSIONS AND RECOMMENDATIONS

The management objective of maintaining an island-wide population in excess of 1,000 was not met during this report period.

The Unit 4 mountain goat population appears to be in a significant decline at this time. We recommend that current state regulations remain in effect concerning season dates and bag limits. The current registration permit hunt works well and hunters seem to readily accept the hunt conditions and reporting responsibilities. If the proportion of harvested females continues to increase, a review of the voluntary status of targeting of males will need to be considered. The new department brochure to help hunters with sex identification of goats will continue to be used. The mandatory horn measurement requirement as part of the registration permit reporting requirements for successful hunters is providing good information and filling in the voids from the earlier voluntary program, and provides an opportunity for us to collect small tissue samples for DNA analysis with little additional work.

To help develop long term management strategies, we need to explore ways to determine goat sightability during aerial survey efforts. Knowing sightability factors will allow us to better estimate the goat population size on the Baranof Island. Mountain goat habitat assessments should be undertaken to determine habitat capabilities for mountain goats on Baranof Island. This information will assist managers in determining an appropriate goat population size and finer scale geographic harvest management.

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Table 1. Unit 4 mountain goat harvest data for registration permit hunt RG150, regulatory years 2008-2012.

Year	Permits issued	Did not report	Did not hunt	Unsuccess-ful hunters	Successful hunters	Males	Females	Sex unk.	Illegal	Total Harvest
2008	285	2	159	92	32	22	10	0	0	32
2009	241	3	133	74	31	12	19	0	0	31
2010	209	0	120	61	28	16	12	0	0	28[a]
2011	127	1	81	27	18	11	7	0	0	18
2012	166	1	110	36	19	17	2	0	0	19[b]

[a] Does not include 2 male goats taken under Sitka Tribe of Alaska permits.

[b] Does not include 1 male goat taken under Sitka Tribe of Alaska permits.

Table 2. Unit 4 mountain goat hunter residency and success for registration permit hunt RG150, regulatory years 2008–2012.

Year	Successful				Unsuccessful				Total hunters
	Local[a] resident	Nonlocal resident	Nonres	Total	Local[a] resident	Nonlocal resident	Nonres	Total	
2008	18	3	11	32	70	11	10	91	123
2009	23	2	6	31	60	10	4	74	105
2010	19[b]	1	8	28	47	5	9	61	89
2011	13	3	2	18	25	2	0	27	45
2012	15	0	4	19	27	6	3	36	55[b]

[a] Residents of Baranof Island.

[b] Does not include 2 residents with Sitka Tribe of Alaska permits.

Table 3. Unit 4 mountain goat harvest chronology by month for registration permit hunt RG150, regulatory years 2008–2012.

Year	Month					Total
	August	September	October	November	December	
2008	7	6	3	6	10	32
2009	4	4	5	7	11	31
2010	9	6	1	6	6	28[a]
2011	4	5	5	0	4	18
2012	8	5	5	0	1	19

[a] Does not include 2 male goats taken in May by Sitka Tribe of Alaska permits.

Table 4. Unit 4 mountain goat harvest by transport method used by successful hunters for registration permit hunt RG150, regulatory years 2008–2012.

Year	Airplane	Boat	Snow machine	Off-road Vehicle[a]	Vehicle	Walked	Total
2008	4	22	0	2	3	1	32
2009	5	21	0	3	2	0	31
2010	4	20	0	3	1	0	28[b]
2011	8	8	0	2	0	0	18
2012	4	13	0	1	0	1	19[c]

[a] Off-road vehicle includes ¾ wheeler & off-road vehicle.

[b] 2 goats taken by Sitka Tribe of Alaska permits are not included.

[c] 1 goat taken by Sitka Tribe of Alaska permits is not included.

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 5 (5,800 mi^2)

GEOGRAPHIC DESCRIPTION: Cape Fairweather to Icy Bay, eastern Gulf of Alaska coast

BACKGROUND

The Alaska Department of Fish and Game (ADF&G) first conducted aerial goat surveys in this unit in 1971. By 1973 Division of Game biologists had documented a significant decline in goat numbers in the area, attributed primarily to severe winter weather. This was a common occurrence throughout Southeast Alaska during the early 1970s. During the 1980s Unit 5A surveys and anecdotal accounts from guides, pilots, and hunters indicated that goat numbers were higher than recorded in the early 1970s. In the 1990s no aerial surveys were conducted, but anecdotal information from hunters and guides suggested goats were relatively abundant throughout the area. In the late 1990s a dramatic decline in Unit 5A goat numbers prompted both ADF&G and the United States Forest Service (USFS) to close their respective hunting seasons in this area beginning in 2000. ADF&G omitted "Nunatak Bench" from the legal hunt area of RG170, thereby closing it to goat hunting under state regulation. At present this population remains at a low level and likely will not support a hunt for many years to come.

Nearly all Unit 5 hunting effort is concentrated in Unit 5A for several reasons. Much of Unit 5B is in Wrangell–St. Elias National Park and closed to hunting for mountain goats (the associated national preserve remains open to hunting). The primary unit 5B goat habitat open to hunting is at Icy Bay and is difficult to access.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain goat densities so at least 30 goats per hour are seen during fall surveys.
- Use pamphlets, videos, and other educational materials to ensure a male:female harvest of at least 2:1.
- Identify discrete geographic areas and manage within these areas.
- Maintain a guideline harvest not to exceed 6 points (males = 1 point and females = 2 points) per 100 goats observed.
- Conduct aerial surveys at least every 3 years in areas of high harvest.

- Continue to monitor the Nunatak Bench goat population through aerial surveys.

METHODS

In consultation with the department, the U.S. Forest Service (USFS) conducted 3 aerial surveys within the unit during this report period (Table 1). Because of our concern with low goat numbers at Nunatak Bench and areas west of Harlequin Lake, we made it a priority to survey these areas. A complete survey was conducted at Nunatak Bench and the western Brabazon Range (west of Harlequin Lake) in 2011. Weather and staff availability precluded a complete survey of the western Brabazon Range (Table 1) in 2012.

Unit 5 has both a state registration permit hunt and a federal subsistence regulations hunt for goats. The federal subsistence goat hunt is managed by the U. S. Forest Service under a federal subsistence registration permit. Season dates for the federal hunt are 1 August to 31 January. The state hunt opens 1 August and ends on 31 December. ADF&G receives information from all successful hunters and unsuccessful hunters in the state hunt, but information from federal permittees is often difficult to obtain because the reporting requirement is not strictly enforced.

Information collected from registration reports included the number of days hunted, method of transportation used, hunt dates, commercial services used, and sex and date of kill. We also gathered anecdotal information from hunters, ADF&G field personnel, and USFS personnel stationed in Yakutat.

Harvest and other data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY11 = 1 July 2011–30 June 2012).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Table 1 shows the results from aerial surveys of the Nunatak Bench and Brabazon Range in Unit 5A. Based on this survey data, it appears the goat population at Nunatak Bench remains depressed in spite of the hunting closure that has been implemented each year since 2000. The area east of Harlequin Lake was not surveyed during the report period but based on the 2010 survey the goat population appears to be sufficient to provide hunting opportunity. The western Brabazon Range (west of Harlequin Lake) was surveyed completely in 2011 and the data suggests a continuing decline in goat numbers in the area. We will continue to monitor these areas through aerial surveys, and take management actions (hunt reinstatement, harvest quota reduction, hunt closure, etc.) based on the number of goats detected.

MORTALITY

Harvest

Season and bag limits	Resident and nonresident hunters
1 goat by registration permit only	1 August–31 December (General hunt only)

Board of Game Actions and Emergency Orders (EO). We issued Emergency Orders in both 2011 and 2012 closing the western Brabazon Range (west of Harlequin Lake) to goat hunting due to declining numbers of goats detected in aerial surveys (Table 1).

Federal Subsistence Board Actions and Emergency Orders (EO). During each year of the report period, the USFS issued an emergency order to close the Nunatak Bench to goat hunting prior to any harvest taking place. At present, the USFS continues to address our desire for no harvest in this area by using EOs and Special Action Requests to close the federal season.

Hunter Harvest. A single male goat was taken in Unit 5A during the report period. Areas that were open to mountain goat hunting during the report period generally allowed 5–6 points to be taken (male=1 point and female=2 points). The mountain goat harvest has been extremely low in Unit 5B and a harvest point quota has not been established in this unit. The department has spent a considerable amount of time encouraging mountain goat hunters to take male goats, and has provided several resources to hunters to assist in determining the sex of goats in the field. For the previous 4 report periods the proportion of male goats harvested has ranged between 50% and 100%; maintaining a high proportion of males in the harvest may assist in rebuilding herd numbers in areas with depressed populations. The low harvest in RY11 and RY12 is consistent with recent report periods (Table 2). The closure at Nunatak Bench is at least partly responsible for this low harvest as is the more recent closure of that area west of Harlequin Lake. The Nunatak Bench hunt had consistently been the favorite by locals as well as guided hunters because of the ease of attaining goats from the cliffs above salt water.

Goat hunting has never attracted a lot of outside attention in Yakutat, probably due to the cost and logistical difficulty of hunting goats there. During the period RY01–RY10 the mean annual Unit 5 mountain goat harvest was 3 goats per year. An illegal guiding operation on Nunatak Bench boosted harvest numbers for several years, including RY99 when 19 goats were taken. With the removal of the illegal guide harvest numbers declined and are closer to the long-term mean annual harvest of 3 goats per year (RY01—RY10).

Hunter Residency and Success. No hunters hunted in RY11. The goat hunter success rate was 25% in RY12 (Table 3). Only 4 permit holders hunted in the report period however, so one should be cautious in drawing conclusions from the success rate. Success rates in Unit 5 are extremely variable and have ranged from 14% to 55% since 2003. Weather and access drive goat hunting activity in most locations and may also account for the variability in success rate in Unit 5. A nonresident hunter took the only goat harvested during the report period. Historically, nonresidents have taken the majority of goats in Unit 5. Nonresidents are not eligible for the federal hunt. Overall, 2 resident and 2 nonresident hunters indicated they hunted mountain goats in Unit 5 during the report period (Table 3).

Permit Hunts. Fifteen and 10 registration permits were issued during RY11 and RY12, respectively. The number of permits issued during the report period (25) was fewer than the number of permits issued during the previous report period (34, Table 4). Hunting effort was minimal with only 4 people hunting, all hunting occurred in 2012. Often hunters will get a registration permit to hunt mountain goats in hopes of having an opportunity. Access to goat hunting areas in Unit 5 is difficult and expensive. This, combined with low numbers of goats in

areas where at least boat access is possible, likely contributes to the lack of interest in goat hunting in the unit.

Harvest Chronology. During the report period the single goat taken was harvested in November. The Unit 5 goat harvest is traditionally spread throughout the season, with the greatest number of goats typically taken during October and November when goats may be found at lower elevations.

Transport Methods. An airplane was used as transportation for the 1 successful goat hunter during the report period (Table 5). Local residents continued to favor boats as their preferred mode of transportation. Local and nonlocal residents use commercial services in the form of charter aircraft to fly them into remote airstrips that provide access to hunting areas (Table 6). Nonresident hunters must have a guide to hunt mountain goats in Alaska, and the few guides offering goat hunts in Unit 5 typically use aircraft to access hunting areas; however, during the current report period all guided nonresident goat hunters were transported by boat.

Other Mortality

The decline in goat numbers at Nunatak Bench and areas southeast to Harlequin Lake, despite hunt closures, suggests something unrelated to hunting is limiting goat numbers in those areas. Winter severity may be an additive factor contributing to the continued decline, but numbers began to dip prior to the extreme winter of RY06—RY07. In cooperation with the USFS, the department is attempting to survey the area annually to determine current trends for the goat population in the area.

CONCLUSIONS AND RECOMMENDATIONS

Obtaining mountain goat population information through aerial sex and age composition counts was a priority during this report period. These data, along with data collected since 1999, have allowed us to gain some understanding of goat population levels, as well as herd composition and distribution. Few of the Unit 5 mountain goat management objectives are quantifiable. Of the 2 objectives that are quantifiable, harvest point levels and goat per hour observations, only harvest level guidelines were met. Goats per hour must be considered in the context of the overall number of goats observed, percentage of kids, and areas surveyed. We achieved other management objectives by providing hard-copy and internet-based mountain goat sex identification resources for hunters, and conducting multiple surveys in areas with depressed mountain goat numbers. These efforts should continue, especially for hunting areas at Nunatak Bench and in the western Brabazon Range, where the population appears to be persistently low. Like many areas in Southeast Alaska, the mountain goat habitat capability in Unit 5 is unknown. Future research should focus on the development of habitat capability models for Southeast Alaska. The Nunatak Bench and areas west of Harlequin Lake will remain closed to hunting until aerial survey results suggest goat numbers have increased to near 80 on Nunatak Bench and 100 in the area west of Harlequin Lake.

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Table 1. Unit 5 mountain goat aerial survey data, regulatory years 2000–2012.

Year	Number Adults	Number Kids	Total Goats	Kids:100 Adults	Percent Kids	Goats/Hr.
			Nunatak Bench			
2000	69	13	82	19	16	91
2000	40	6	46	15	13	52
2001	37	11	48	30	23	20
2001	37	2	39	5	5	54
2002	25	4	29	16	14	19
2003	29	14	43	48	33	40
2004				No Survey		
2005			19			
2006				No Survey		
2006	26	7	33	27	21	48
2007	17	6	23	35	26	31
2008	35	9	4	6	21	25
2010	22	6	28	27	21	25
2011	18	2	20	11	10	22
2012				No Survey		
			East Harlequin Lake (Eastern Brabazon Range)			
2000	103	20	123	19	16	41
2001	119	31	150	26	21	52
2002-2006				No Survey		
2007[e]	55	5	60	9	8	103
2008[f]	164	25	189	15	13	145
2010	126	31	157	25	20	87
2011-2012				No Survey		
			West Harlequin Lake (Western Brabazon Range)			
2003	63	21	84	33	25	126
2004				No Survey		
2005[a]	122	28	150	23	19	75
2006[b]	103	13	116	13	11	82
2007[d]	57	9	66	16	14	33
2008[e]	38	14	52	37	27	29
2010[g]	10	2	12	-	-	-
2011	32	6	38	19	16	21
2012[h]	25	8	33	32	24	66

[a] Survey of Chaix Hills, Unit 5B.

[b] Nunatak Fiord south to Miller Creek.

[c] Mt. Reaburn to Italio Lake.

[d] Crescent Mountain to W. Nunatak Glacier.

[e] Nunatak to Harlequin Lake.

[f] Harlequin Lake to Nunatak Glacier.

[g] Incomplete survey 2010.

[h] Incomplete survey 2012.

Table 2. Unit 5 annual goat harvest, regulatory years 2003 through 2012.

Year	Males	Females	Unknown	Total
2003	2	1	0	3
2004	1	1	0	2
2005	6	0	0	6
2006	3	0	0	3
2007	2	1	0	3
2008	4	0	0	4
2009	0	1	0	1
2010	1	0	0	1
2011	0	0	0	0
2012	1	0	0	1

Table 3. Unit 5 goat hunter success by community of residence, regulatory years 2003 through 2012.

		Successful hunters			Unsuccessful hunters		
Year	Percent success	Unit resident	Other AK	Non-resident	Unit resident	Other AK	Non-resident
2003	30	0	0	3	5	0	2
2004	14	0	0	2	0	8	4
2005	55	0	0	6	1	4	0
2006	33	0	0	3	3	2	1
2007	30	1	0	2	3	0	4
2008	44	3	0	1	2	1	2
2009	17	0	0	1	1	1	3
2010	50	1	0	0	1	0	0
2011	0	0	0	0	0	0	0
2012	25	0	0	1	0	2	1

Table 4. Unit 5 goat hunter effort and success, regulatory years 2003 through 2012.

		Successful hunters			Unsuccessful hunters			Total hunters		
Year	Permits Issued	Nr hunters	Total days	Avg Nr days	Nr hunters	Total days	Avg Nr days	Nr hunters	Total days	Avg Nr days
2003	33	3	4	1.3	7	21	3.0	10	25	2.5
2004	37	2	11	5.5	12	62	5.2	14	73	5.2
2005	29	6	17	2.8	5	15	3.0	11	32	2.9
2006	35	3	3	1.0	6	19	3.2	9	22	2.4
2007	27	3	5	1.7	7	29	4.1	10	34	3.4
2008	23	4	15	3.8	5	21	4.2	9	36	4.0
2009	23	1	1	1.0	5	19	3.8	6	20	3.3
2010	11	1	1	1.0	1	1	1.0	2	2	1.0
2011	15	0	0	0	0	0	0	0	0	0
2012	10	1	1	1.0	3	7	2.3	4	8	2.0

Table 5. Unit 5 transport methods used by successful goat hunters, regulatory years 2003 through 2012

	Airplane		Boat		Snowmachine		Highway vehicle		Foot	
Year	Total	%	Total	%	Total	%	Total	%	Total	%
2003	0	0	3	100	0	0	0	0	0	0
2004	0	0	2	100	0	0	0	0	0	0
2005	1	17	5	83	0	0	0	0	0	0
2006	0	0	2	67	0	0	0	0	1	33
2007	2	67	1	33	0	0	0	0	0	0
2008	0	0	4	100	0	0	0	0	0	0
2009	0	0	1	100	0	0	0	0	0	0
2010	0	0	1	100	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0
2012	1	100	0	0	0	0	0	0	0	0

Table 6. Unit 5 Commercial services used by goat hunters, regulatory years 2003 through 2012.

	Unit Residents		Other AK Residents		Nonresidents		Total Use	
Year	Yes	No	Yes	No	Yes	No	Yes	No
2003	5	0	0	0	0	5	5	5
2004	0	0	3	5	0	6	3	11
2005	1	0	0	4	0	6	1	10
2006	3	0	0	2	0	4	3	6
2007	4	0	0	0	0	6	4	6
2008	3	2	1	0	0	3	4	5
2009	0	1	0	1	4	0	4	2
2010	0	2	0	0	0	0	0	2
2011	0	0	0	0	0	0	0	0
2012	0	0	0	2	2	0	2	2

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 6 (10,140 mi^2)

GEOGRAPHIC DESCRIPTION: Prince William Sound and North Gulf Coast

BACKGROUND

Mountain goats are endemic to the mainland in Unit 6 and to Bainbridge, Culross, and Knight islands. Captain Cook in 1785 (Beaglehole 1966), Edmond Heller in 1908 (Heller 1910), and Cordova district staff in contributions to Alaska Game Commission reports (Clarence Rhode, Alaska Game Commission 1938; Fred Robards, Alaska Game Commission 1952) documented their presence in one or more of these areas. Robards estimated a population size of 4,350 goats between Cape Fairfield and Bering Glacier, which includes most of Unit 6. Coastal mountain goat populations were reduced by hunting pressure during much of the twentieth century, probably starting in the 1940s when Art Sheets (ADF&G biologist) reported military personnel stationed in Whittier reduced goat numbers in Port Wells. Goat numbers remained low during the late 1970s and 1980s because of hunter harvest (Griese 1988a) and predation (Reynolds 1981, Griese 1988b).

Habitat for mountain goats includes steep escape terrain for refugia from predators in proximity to areas with adequate forage. In the spring, goats utilize avalanche chutes and low elevation south-facing slopes. During the summer when most of the snowpack has melted, they use the high elevation alpine and subalpine habitats. Deep winter snow pushes goats into heavily forested areas or to windswept slopes with little snow cover. During some heavy snow events, goats may even descend to forested coastlines (Fox et al. 1989). While winter snow depth can influence goat survival, hot summer temperatures may also affect survival the following winter (White et al. 2011).

Goats are considered generalist feeders, taking advantage of a wide range of foods including alder, rhizomes, new shoots of ferns, early emergent sedges, and forbs. Winter diet is severely limited but may include conifers, mosses, lichens, shrubs, forbs, ferns, and grasses (Fox and Smith 1988).

Mountain goats exhibit lower fecundity compared with other ungulates. Females generally do not reach sexual maturity until 4 years of age and rarely produce twins. The mean number of kids produced in a nanny's lifetime averages 5.7 goats (Festa-Bianchet and Côté 2008). Monitoring kids:100 adults gives managers an indication of population robustness. Observations of between

15 and 17 kids per 100 adults may indicate stability. Observations above or below this range may indicate growth or decline respectively.

Harvest management evolved and important lessons were learned as biologists recognized the need to manage mountain goats based on small geographic units (Foster 1977) to reduce harvest and to distribute hunting pressure. Long seasons with bag limits of 1–2 goats were in effect from statehood through 1975. The bag limit was reduced to 1 goat in 1976, and the first permit hunt was established in 1980. By 1986 the present system of registration permit hunts was in place. By 1987 the goat population had declined to 3,400 and continued downward to 3,000 by 1994, even with the implementation of more conservative management, such as reduced harvest and no hunting of small groups of goats (<60,Nowlin 1996). Conservative harvest strategies finally allowed the population to rebound to approximately 4,000 goats by 1999.

Following the success of a tracking harvest strategy (Caughley 1977, Smith 1984) on the Kenai Peninsula (Del Frate and Spraker 1994), Nowlin (1998) established one for Unit 6 to guide goat management decisions. The three important elements for implementation of the strategy were (1) improved aerial survey methods for obtaining trend information, (2) registration permit hunts allowing careful monitoring of harvest distribution and magnitude, and (3) a formalized minimum population objective of 2,400 goats for Unit 6.

The Alaska Department of Fish and Game (ADF&G) began flying aerial surveys in 1969 to determine mountain goat population size and sex and age composition. Griese (1988a) improved and standardized methods in 1986 by establishing count areas that were systematically searched. From the late 1980s to the late 1990s extensive aerial surveys were flown with most survey areas flown every year. However, since that time, fuel costs have increased and budgets have not kept pace. The current budget allows for flying only a sample of areas. Therefore, interpolation is required between survey years and is questionable at best. During the last decade the population has probably remained between 3,500 and 4,000, declining somewhat during winters of heavy snow and recovering after mild winters.

Harvest has been monitored since 1972 using hunter reports. Both successful and unsuccessful hunters have been required to report, except during 1980 through 1985, when only successful hunters reported. Annual harvest reached an historic high of 182 animals in regulatory year 1983 and declined to an historic low of 35 goats in regulatory year 1996. During regulatory years 2003–2012 the annual harvest averaged 66 goats, ranging from 52 to 88.

MANAGEMENT OBJECTIVES

- Maintain a minimum population of 2,400 goats.
- Achieve a minimum of 70% males in the harvest.

METHODS

We conducted aerial surveys to estimate mountain goat population size, trend, and composition in permit hunt areas (Fig. 1). Individual hunt areas are surveyed during August and September and are prioritized based on management priorities that consider factors such as high harvest, high participation, or high nanny take. Each area was divided into one or more sample units.

Units were 5 to 70 mi^2 and encompassed alpine cover types above 1,000 ft elevation. Large glaciers (>1 mi^2) were excluded from sample units. However, the edges of glaciers were searched (up to 300 ft), and goats observed were included in the count. Where possible, sample units were separated by geographic barriers to minimize variability due to movement of goats among units. Boundaries were drawn on 1:63,360 scale topographic maps. In 2013, survey boundaries were also imported onto GPS units using Mapedit, cGPSmapper, and img2gps (all freeware).

Sample units were searched using a Piper Super Cub (PA-18) aircraft on wheels with pilot and 1 observer onboard. The pilot maintained airspeed of 60 to 70 mph and stayed 300 to 500 ft from slopes or cliffs. Ideally, flights were made in the morning within 3 hours after sunrise or in the evening within 3 hours of sunset. Flight lines followed contours, starting at the tops of ridges and repeating passes downward in elevation, or starting at treeline and repeating passes upward in elevation. Width of the search area between passes was limited to no more than 500 ft elevation or 1/8 mile. Observations were generally made on the side of the aircraft toward steep topography. Searches were completed drainage by drainage to avoid duplicate counts and to insure systematic coverage.

The observer recorded start and stop times and calculated search effort (minutes/mi^2) for each survey. Number of kids and goats older than kids were recorded for each group and a waypoint was taken. We also recorded environmental conditions during the survey to evaluate survey quality as excellent, good, or poor. We noted cloud cover, turbulence, wind speed, and light type and intensity.

Results of minimum count goat surveys can be extremely variable (Ballard 1975, Fox 1977). We attempted to minimize variability by standardizing methods and by surveying mostly during excellent or good conditions. In between survey years, it is impossible to reliably guess what goat populations are doing. Therefore, the last good minimum count is used until updated data is collected. Survey data that has been collected after this reporting period may be included in this report

We monitored harvest through permit hunt reports required from all hunters. Hunters who failed to report were sent up to 2 reminder letters. In addition to standard ADF&G harvest parameters, we calculated a weighted total harvest by multiplying the number of females taken by 2, and lost goats or unknowns by 1.5 (unless the lost goat was identified by sex by a guide). Weighted harvest is also referred to as “goat units” taken per hunt area (Del Frate 1992). Harvest data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g. RY12 = 1 July 2012–30 June 2013).

We established a maximum allowable harvest (MAH) for each year for each permit hunt. It was calculated as a percentage of goats observed during the most recent survey. The percent applied ranged from 2.2% to 5.5%, depending on population trend, estimated mortality, and elapsed time since the last survey. Permit hunts were closed by emergency order if weighted harvest reached MAH.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

We flew complete or partial aerial surveys in 8 of 15 open permit hunt areas during this reporting period (Table 1). In 2010 surveys were flown in RG206, Brower Ridge, RG232, RG252, and RG266. Poor survey conditions, pilot availability limitation, and scheduling conflicts prevented the completion of surveys in RY09, RY11, and RY12. In 2013, surveys were flown in RG242, RG231, RG230, and RG248. Data from these surveys is presented with historical minimum counts for comparison (Figures 2–9.) Minimum counts were among the highest on record in RG206, RG248 (despite being a partial count), and RG252. Brower Ridge was surveyed for the first time since 1995. At that time, the population was dramatically reduced and had experienced high harvest that was related to commercial activities in the area. Since that time, the hunt has been closed and there is no longer a logging operation in the vicinity. The number of goats was more than double the last count and was comparable to numbers before the decline. In future years, Brower Ridge will be included in the hunt area for RG204.

Survey data fell within the "normal range" in RG230, RG242, and RG231. Survey results were lower than expected in RG232 and RG266 although both surveys were incomplete. Both areas are priorities for the coming survey season.

Goat survey data are patchy and old for many areas. Therefore, estimating the unitwide goat population reliably is impossible. Compiling the most recent minimum counts for each area gives an estimate of about 2,700 goats. Recognizing that this is conservative, the actual population is probably between 2,500 and 3,500 goats.

Goat densities are highest in Unit 6D with 1–3 goats observed per square mile of habitat. Goat densities are lowest in the 2 hunt areas within Unit 6B, with densities around 0.1 goats/mi$^{2.}$ Unit 6A has approximately 1.7 goats/mi^2 and Unit 6C has 0.8 goats/mi^2.

Population Composition

Fewer kids were observed in RY13 surveys than in RY10. All surveys in RY13 ranged 15– 18 kids:100 adults, whereas in RY10 kids observed ranged 20–34:100 adults. Numerous weather events may have influenced this. For example, the winter of RY11 set records for snow depth and retention. The summer of 2013 was one of the hottest on record.

Distribution and Movements

There are no current projects monitoring the movement and distribution of goats in Unit 6.

MORTALITY

Harvest

Seasons and Bag Limits. The mountain goat season in Units 6A and 6B was 20 August–31 January with no seasons closing by emergency order during this period. Unit 6D hunts opened 15 September (except in RG248 which opened 1 October). Hunts in Unit 6C opened 7 October. All hunts in Unit 6C closed early by emergency order as did many in Unit 6D (Table 2). Those hunts that did not close early closed 31 January by regulation.

The bag limit was 1 goat by registration permit only, the taking of nannies accompanied by kids was prohibited. Permit hunts were opened in at least 1 of the 2 years, except for RG215, which was closed both years. RG231 remained closed during this reporting period because of high nanny harvest in the preceding years. Seasons are closed as maximum allowable harvest (MAH) is met.

Weighted mountain goat harvests (goat units) during the reporting period for Units 6A and 6B were well below the MAH (Tables 3 and 4). In Unit 6C, harvest met the MAH or fell just below it in all years of this reporting period (Table 5). In Unit 6D, harvest was under the MAH in all areas except RG245, RG249, and RG266 during this reporting period (Table 6). The likelihood of exceeding the MAH is greatly increased by nanny harvest and/or delayed reporting.

Unit 6A and Unit 6B had no harvest of females during this reporting period. In Unit 6C, harvest of nannies exceeded 30% in all hunt areas in all years of this reporting period (Table 5). The department will likely institute a mandatory education requirement using discretionary permit authority to participate in hunts in Unit 6C. In Unit 6D, nanny harvest exceeded 30% in at least one of the years of the reporting period in RG244, RG249, RG252, and RG266 (Table 6). The harvest included 17–23 % females overall, which was within the objective of 30% maximum females in the harvest.

Board of Game Actions and Emergency Orders. There were no changes implemented by the Board of Game during this reporting cycle. Twelve emergency orders were issued this reporting period to close registration permit hunts when MAH was reached (Table 2). The shortest season was RG248 which was two days long. The longest seasons were in Units 6A and 6B, where no areas closed early.

Permit Hunts. Registration permits issued were similar to previous years (Table 3–6). RG242 and RG266 have the highest number of permits issued. RG242 has the highest MAH, which probably drives interest. RG266 does not have a high MAH and probably experiences a disproportionate amount of interest. RG243 was open for state harvest during RY10 for the first time since 1989.

Hunter Residency and Success. Participation is usually highest in Unit 6D with 83 and 88 hunters for RY11 and RY12 respectively, and is comparable to previous years (Table 7). Participation in the remaining units was down during this reporting period. Unit 6C dropped after RY09, the last year RG231 was open. Participation in Unit 6B may have been influenced by the closure of the Copper River Highway at mile 36 in August in 2011, due to bridge failure.

Nonresidents focus their efforts in Unit 6A and Unit 6D primarily. Nonlocal residents also focus their time primarily in Unit 6D. Local residents primarily hunt in Unit 6C and, to a lesser extent, Unit 6D (Table 7).

Unitwide success rates over the past five years have averaged about 50% (Table 7). Success rates are highest in Unit 6A and Unit 6D, probably due to the preponderance of guided hunters. Other units may be influenced by proximity to goat habitat access, a high proportion of first-time hunters, and the ease and affordability of “day trips.”

Harvest Chronology. Most goats are harvested in September and October (Table 8). Unit 6A has a significant number of hunters that take advantage of the season in August. Unit 6B has not seen participation in August since the road closed. The Unit 6C season duration is greatly influenced by weather. If hunting conditions are poor in the fall, the MAH will not be reached even into the snow season. At that time, hunters can access goat habitat with snow machines and harvest may take place through the end of the season.

Transport Methods. Airplanes were the most important means of hunter transport in Units 6A and Unit 6B (Table 9). In Unit 6C highway vehicles were the primary means of transportation with 3- or 4-wheelers also popular. In Unit 6D boats are the most commonly used means of transportation. Airplanes are also used to access hunt areas. Unitwide, airplanes and boats are the most commonly used means of transportation.

Other Mortality

Predation studies on goats in Unit 6 have not been conducted. However, many local residents and long-time guides are concerned about the potential for wolf predation, particularly in lower lying areas such as the Don Miller Hills and Suckling Hills that have seen population declines. Predation by carnivores undoubtedly occurs, but the magnitude of it is unknown at this time.

HABITAT

Assessment

There were no habitat assessment projects for goats in Unit 6 during the reporting period.

Enhancement

There were no habitat enhancement activities for goats in Unit 6 during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

An increasing number of operators using helicopters to support backcountry skiing and other activities are utilizing areas of Unit 6. Evidence suggests that goats are impacted by helicopters (Goldstein et al. 2005). Helicopter exposure effects may be exacerbated in winter when goats are in reduced body condition. While any given operation may be relatively low impact, the cumulative effects of these activities should be considered. As these businesses become more prevalent, the Alaska Department of Fish and Game should develop guidelines for minimizing impacts. This may limiting commercial use of helicopters or access in critical wintering areas, or developing travel corridors that focus use on areas not utilized by goats.

CONCLUSIONS AND RECOMMENDATIONS

Previously management reports stated that areas were to be surveyed on a 2–3 year rotation (Crowley 2004). However, the average length of time between surveys is 10 years. While survey schedules can be severely limited by difficult weather, distance to survey areas, and pilot availability, more frequent collection of population data is necessary for setting appropriate harvest levels.

We achieved our objective to maintain a minimum population size of 2,400 goats. The estimated number of goats at the end of this reporting period is between 3,500 and 4,000 goats. The

population has probably been stable within this reporting period, suggesting that weighted harvest rates have been appropriate. While overall the objective to achieve 70% or more males in the harvest was met, some areas routinely experience high nanny take that results in large reductions in MAH (e.g., RG231, RG232, and RG266). Using its discretionary permit authority, permits ADF&G issues for Unit 6C will have an online education requirement. Hunters will need to pass a quiz before receiving a permit. If this program is successful in reducing nanny take, it may be used in other hunt areas.

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Table 1. Unit 6 summer mountain goat composition and minimum counts, RY09-RY13.

Unit	Area	Year	Survey coverage	Older goats	(%)	Kids	(%)	Kids:100 older goats	Total goats observed	Last Minimum Count (Year)
6A	RG202	RY09-RY13	None	--	--	--	--	--	--	77 (1998)
	RG204	RY09-RY13	None	--	--	--	--	--	--	193 (1993)
	RG206[a]	RY10	Full	216	(78)	61	(22)	28	277	174 (1997)
	RG208	RY09-RY13	None	--	--	--	--	--	--	21 (1999)
	RG212	RY09-RY13	None	--	--	--	--	--	--	80 (2002)
	RG215	RY09-RY13	None	--	--	--	--	--	--	4 (2008)
	Brower	RY10	Full	60	(79)	16	(21)	27	76	37 (1995)
6B	RG220	RY09-RY13	None	--	--	--	--	--	--	71 (1999)
	RG226	RY09-RY13	None	--	--	--	--	--	--	89 (2008)
6C	RG230	RY13	Full	98	(86)	16	(14)	16	114	127 (2004)
	RG231	RY13	Full	105	(87)	16	(13)	15	121	82 (2010)
	RG232	RY10	Partial	52	(82)	11	(18)	21	63	194 (2003)
6D	RG242	RY13	Full	350	(85)	64	(15)	18	414	381 (2008)
	RG243	RY09-RY13	None	--	--	--	--	--	--	141 (2001)
	RG244	RY09-RY13	None	--	--	--	--	--	--	121 (2000)
	RG245	RY09-RY13	None	--	--	--	--	--	--	77 (2003)
	RG248	RY13	Partial	90	(86)	15	(14)	17	105	66 (2005)
	RG249	RY09-RY13	None	--	--	--	--	--	--	147 (2008)
	RG252	RY10	Full	231	(75)	79	(25)	34	310	231 (2004)
	RG266	RY10	Partial	103	(83)	21	(17)	20	124	340 (1997)

[a] Additional areas of RG206 were flown that had not been flown before but have always been designated for consideration. An additional 12 kids and 31 adults were observed.

Table 2. Season length in days for hunt areas that were closed early in Unit 6.

Year	Hunt Area[a]									
	RG220	RG230	RG231	RG232	RG243	RG245	RG248	RG249	RG252	RG266
RY08	164	116	92	116		138	2	9	20	134
RY09	62	14	9	113		31	1	7	14	138
RY10	164	44	0	21	138	138	0	3	138	7
RY11	164	13	0	18	138	15	0	6	138	138
RY12	164	116	0	5	49	33	0	27	138	40

[a] Season was not closed early in areas RG202, RG204, RG206, RG212, RG226, RG242, and RG244

Table 3. Unit 6A mountain goat harvest data by permit hunt, RY08–RY12.

Hunt area	Year	Permits Issued	(% Did not hunt)	Nr Hunters	Success (%)	M (%)	F (%)	Unk.	Total Goats	Total Units[a]	MAH
RG202	RY08	30	(50)	15	(33)	4 (80)	1 (20)	0	5	6	4
	RY09	14	(79)	3	(100)	3 (100)	0 (0)	0	3	3	4
	RY10	16	(75)	4	(50)	2 (100)	0 (0)	0	2	2	4
	RY11	9	(67)	3	(100)	2 (100)	0 (0)	1	3	4	4
	RY12	7	(71)	2	(0)	0 (0)	0 (0)	0	0	0	4
RG204	RY08	13	(77)	3	(67)	2 (100)	0 (0)	0	2	2	9
	RY09	15	(47)	8	(88)	7 (100)	0 (0)	0	7	7	9
	RY10	16	(44)	9	(89)	8 (100)	0 (0)	0	8	8	9
	RY11	11	(55)	5	(80)	4 (100)	0 (0)	0	4	4	9
	RY12	9	(67)	3	(67)	2 (100)	0 (0)	0	2	2	9
RG206	RY08	4	(75)	1	(100)	1 (100)	0 (0)	0	1	1	10
	RY09	7	(29)	5	(60)	2 (67)	1 (33)	0	3	4	10
	RY10	5	(40)	3	(67)	1 (100)	0 (0)	1	2	3	10
	RY11	16	(56)	7	(71)	5 (100)	0 (0)	0	5	5	10
	RY12	6	(33)	4	(100)	4 (100)	0 (0)	0	4	4	10
RG212	RY08	0	(0)	0	(0)	0 (0)	0 (0)	0	0	0	5
	RY09	2	(100)	0	(0)	0 (0)	0 (0)	0	0	0	5
	RY10	3	(100)	0	(0)	0 (0)	0 (0)	0	0	0	5
	RY11	3	(67)	1	(0)	0 (0)	0 (0)	0	0	0	5
	RY12	1	(100)	0	(0)	0 (0)	0 (0)	0	0	0	5

[a] Goat units are calculated with males counted as 1, females counted as 2 and unknowns counted as 1.5; rounded to the next highest whole number.

Table 4. Unit 6B mountain goat harvest data by permit hunt, RY08–RY12.

Hunt area	Year	Permits Issued	(% did not	Hunters	(% Success)	M (%)	F (%)	Unk.	Total Goats	Total Units[a]	MAH
RG220	RY08	18	(78)	4	(25)	1 (100)	0 (0)	0	1	1	11
	RY09	37	(65)	13	(23)	2 (67)	1 (33)	0	3	4	11
	RY10	15	(47)	8	(13)	0 (0)	0 (0)	1	1	2	11
	RY11	6	(83)	1	(0)	0 (0)	0 (0)	0	0	0	11
	RY12	2	(100)	0	(0)	0 (0)	0 (0)	0	0	0	11
RG226	RY08	6	(33)	4	(0)	0 (0)	0 (0)	0	0	0	6
	RY09	8	(88)	1	(0)	0 (0)	0 (0)	0	0	0	6
	RY10	19	(79)	4	(50)	1 (50)	1 (50)	0	2	3	6
	RY11	9	(56)	4	(75)	3 (100)	0 (0)	0	3	3	6
	RY12	10	(70)	3	(33)	1 (100)	0 (0)	0	1	1	6

[a] Goat units are calculated with males counted as 1, females counted as 2 and unknowns counted as 1.5; rounded to the next highest whole number.

Table 5. Unit 6C mountain goat harvest data by permit hunt, RY08–RY12.

Hunt area	Year	Permits Issued	(% did not hunt)	Hunters	(% Success)	M (%)	F (%)	Unk.	Total Goats	Total Units[a]	MAH
RG230	RY08	40	(28)	29	(14)	3 (75)	1 (25)	0	4	5	8
	RY09	21	(38)	13	(46)	4 (67)	2 (33)	0	6	8	8
	RY10	23	(30)	16	(38)	4 (67)	2 (33)	0	6	8	8
	RY11	21	(62)	8	(75)	4 (67)	2 (33)	0	6	8	8
	RY12	25	(36)	16	(31)	3 (60)	2 (40)	0	5	7	8
RG231[b]	RY08	31	(26)	23	(26)	2 (33)	4 (67)	0	6	10	7
	RY09	16	(63)	6	(83)	3 (60)	2 (40)	0	5	7	7
RG232	RY08	16	(50)	8	(38)	3 (100)	0 (0)	0	3	3	11
	RY09	69	(57)	30	(27)	4 (50)	4 (50)	0	8	12	11
	RY10	9	(78)	2	(100)	1 (50)	1 (50)	0	2	3	2
	RY11	13	(69)	4	(25)	0 (0)	1 (100)	0	1	2	2
	RY12	6	(17)	5	(20)	0 (0)	1 (100)	0	1	2	2

[a] Goat units are calculated with males counted as 1, females counted as 2 and unknowns counted as 1.5; rounded to the next highest whole number.

[b] Season closed RY10-RY12 due to high nanny take and subsequent population decline.

Table 6. Unit 6D mountain goat harvest data by permit hunt, RY08–RY12.

Hunt area	Year	Permits Issued	(% did not hunt)	Hunters	(% Success)	M	(%)	F	(%)	Unk.	Total Goats	Total Units[a]	MAH[b]
RG242	RY08	35	(54)	16	(38)	5	(100)	0	(0)	1	6	7	28
	RY09	55	(45)	30	(40)	9	(82)	2	(18)	1	12	15	28
	RY10	45	(67)	15	(53)	7	(87)	1	(13)	0	8	9	28
	RY11	59	(61)	23	(78)	15	(83)	3	(17)	0	18	21	28
	RY12	54	(83)	9	(44)	3	(75)	1	(25)	0	4	5	28
RG243[c]	RY10	14	(43)	8	(75)	5	(83)	1	(17)	0	6	7	3
	RY11	17	(82)	3	(100)	3	(100)	0	(0)	0	3	3	3
	RY12	12	(75)	3	(100)	3	(100)	0	(0)	0	3	3	3
RG244	RY08	17	(47)	9	(33)	1	(33)	2	(67)	0	3	5	9
	RY09	31	(65)	11	(36)	3	(75)	1	(25)	0	4	5	9
	RY10	18	(67)	6	(33)	2	(100)	0	(0)	0	2	2	9
	RY11	30	(67)	10	(50)	3	(60)	2	(40)	0	5	7	9
	RY12	21	(76)	5	(0)	0	(0)	0	(0)	0	0	0	9
RG245	RY08	19	(74)	5	(40)	0	(0)	2	(100)	0	2	4	7
	RY09	24	(79)	5	(100)	3	(60)	2	(40)	0	5	7	7
	RY10	39	(67)	13	(23)	3	(100)	0	(0)	0	3	3	7
	RY11	16	(56)	7	(86)	5	(83)	1	(17)	0	6	7	7
	RY12	29	(48)	15	(53)	8	(100)	0	(0)	0	8	8	7
RG248[d]	RY08	20	(40)	12	(25)	2	(67)	1	(33)	0	3	4	6
	RY09	37	(46)	20	(40)	6	(75)	2	(25)	0	8	10	6
RG249	RY08	18	(44)	10	(80)	6	(75)	2	(25)	0	8	10	9
	RY09	17	(47)	9	(89)	7	(88)	1	(13)	0	8	9	9
	RY10	15	(60)	6	(100)	4	(67)	2	(33)	0	6	8	9
	RY11	19	(32)	13	(54)	3	(43)	4	(57)	0	7	11	9
	RY12	37	(46)	20	(35)	5	(71)	2	(29)	0	7	9	9
RG252	RY08	45	(40)	27	(44)	11	(100)	0	(0)	1	12	13	11
	RY09	27	(56)	12	(100)	8	(73)	3	(27)	1	12	16	11
	RY10	46	(45)	20	(65)	13	(100)	0	(0)	0	13	13	16
	RY11	29	(45)	16	(94)	14	(93)	1	(7)	0	15	16	16
	RY12	31	(48)	16	(63)	6	(60)	4	(40)	0	10	14	16
RG266	RY08	44	(77)	10	(40)	4	(100)	0	(0)	0	4	4	11
	RY09	44	(87)	5	(80)	4	(100)	0	(0)	0	4	4	11
	RY10	33	(58)	14	(64)	4	(44)	5	(56)	0	9	14	6
	RY11	31	(68)	10	(50)	5	(100)	0	(0)	0	5	5	6
	RY12	42	(57)	18	(39)	4	(67)	2	(33)	1	7	10	6

[a] Goat units are calculated with males counted as 1, females counted as 2 and unknowns counted as 1.5; rounded to the next highest whole number.

[b] MAH are jointly managed between state and federal biologists. Federal MAH are as follows: RG242-2, RG243-4, RG244-2, RG249-4, RG252- 1, and RG266-4.

[c] Season not opened RY08–RY09.

[d] Season closed RY10-RY12 due to high nanny take and inadequate population data.

Table 7. Unit 6 mountain goat hunter residency and success, regulatory years RY08–RY12.

		Successful					Unsuccessful					
Unit	Year	Local resident	Nonlocal resident	Nonres	Total	(%)	Local resident	Nonlocal resident	Nonres	Total	(%)	Total hunters
6A	RY0	0	0	8	8	(42)	0	2	9	11	(58)	19
	RY0	0	4	9	13	(81)	0	0	3	3	(19)	16
	RY1	0	2	10	12	(75)	0	0	4	4	(25)	16
	RY1	0	0	12	12	(75)	0	1	3	4	(25)	16
	RY1	0	0	6	6	(67)	0	3	0	3	(33)	9
6B	RY0	0	0	1	1	(13)	2	1	4	7	(88)	8
	RY0	0	1	2	3	(21)	4	6	1	11	(79)	14
	RY1	1	0	2	3	(25)	4	2	3	9	(75)	12
	RY1	0	0	3	3	(60)	1	0	1	2	(40)	5
	RY1	0	0	1	1	(33)	0	0	2	2	(67)	3
6C	RY0	11	2	0	13	(22)	34	13	0	47	(78)	60
	RY0	12	6	1	19	(39)	19	11	0	30	(61)	49
	RY1	4	3	1	8	(44)	7	3	0	10	(56)	18
	RY1	4	2	0	6	(55)	4	1	0	5	(45)	11
	RY1	5	1	0	6	(32)	11	2	0	13	(68)	19
6D	RY0	7	10	24	41	(45)	12	31	8	51	(55)	92
	RY0	6	19	28	53	(58)	15	23	1	39	(42)	92
	RY1	2	19	25	47	(56)	10	22	4	36	(43)	84[a]
	RY1	8	22	30	60	(72)	4	17	2	23	(28)	83
	RY1	2	14	23	39	(44)	5	32	12	49	(56)	88
Unit 6	RY0	18	12	33	63	(35)	48	47	21	116	(65)	179
Total	RY0	18	30	40	88	(51)	38	40	5	83	(49)	171
	RY1	7	24	38	70	(54)	21	27	11	59	(45)	130 [a]
	RY1	12	24	45	81	(70)	9	19	6	34	(30)	115
	RY1	7	15	30	52	(44)	16	37	14	67	(56)	119

[a]Total includes unknown residency.

Table 8. Unit 6 mountain goat harvest chronology percent by month, regulatory years RY08–RY12.

Unit	Year	August	September	October	November	December	January	n
6A	RY08	38	24	38	0	0	0	8
	RY09	38	8	23	31	0	0	13
	RY10	33	33	17	17	0	0	12
	RY11	33	42	25	0	0	0	12
	RY12	50	17	33	0	0	0	6
6B	RY08	100	0	0	0	0	0	1
	RY09	33	0	67	0	0	0	3
	RY10	0	67	0	0	0	33	3
	RY11	0	100	0	0	0	0	3
	RY12	0	100	0	0	0	0	1
6C	RY08	0	0	31	31	15	23	13
	RY09	0	0	68	5	0	26	19
	RY10	0	0	88	13	0	0	8
	RY11	0	0	100	0	0	0	6
	RY12	0	0	100	0	0	0	6
6D	RY08	0	41	44	0	7	7	41
	RY09	0	47	47	6	0	0	53
	RY10	0	69	18	11	2	0	45
	RY11	0	53	40	2	3	2	60
	RY12	0	37	63	0	0	0	38
Unit 6 Total	RY08	6	30	40	6	8	10	63
	RY09	7	30	49	9	0	6	88
	RY10	6	54	25	12	1	1	68
	RY11	5	49	41	1	2	1	81
	RY12	6	31	63	0	0	0	51

Table 9. Unit 6 mountain goat harvest percent by transport method, regulatory years RY08–RY12.

Subunit	Year	Airplane		Boat		3- or 4-wheeler		Snowmachine		ORV		Highway vehicle		Unknown		Total
		n	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*
6A	RY08	5	(63)	0	(0)	1	(13)	0	(0)	2	(25)	0	(0)	0	(0)	8
	RY09	12	(92)	0	(0)	1	(8)	0	(0)	0	(0)	0	(0)	0	(0)	13
	RY10	10	(83)	0	(0)	1	(8)	0	(0)	1	(8)	0	(0)	0	(0)	12
	RY11	9	(75)	0	(0)	0	(0)	0	(0)	3	(25)	0	(0)	0	(0)	12
	RY12	6	(100)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	6
6B	RY08	1	(100)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	1
	RY09	1	(33)	0	(0)	0	(0)	0	(0)	0	(0)	2	(67)	0	(0)	3
	RY10	2	(67)	0	(0)	0	(0)	1	(33)	0	(0)	0	(0)	0	(0)	3
	RY11	3	(100)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	3
	RY12	1	(100)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	1
6C	RY08	0	(0)	0	(0)	3	(23)	0	(0)	0	(0)	10	(77)	0	(0)	13
	RY09	0	(0)	1	(5)	1	(5)	5	(26)	0	(0)	12	(63)	0	(0)	19
	RY10	0	(0)	0	(0)	1	(13)	0	(0)	0	(0)	7	(88)	0	(0)	8
	RY11	0	(0)	0	(0)	1	(17)	0	(0)	0	(0)	5	(83)	0	(0)	6
	RY12	0	(0)	0	(0)	2	(33)	0	(0)	0	(0)	4	(67)	0	(0)	6
6D	RY08	12	(29)	25	(61)	0	(0)	2	(5)	0	(0)	2	(5)	0	(0)	41
	RY09	15	(28)	30	(57)	1	(2)	0	(0)	0	(0)	7	(13)	0	(0)	53
	RY10	14	(30)	31	(67)	0	(0)	1	(2)	0	(0)	0	(0)	0	(0)	46
	RY11	23	(38)	36	(60)	0	(0)	0	(0)	0	(0)	1	(2)	0	(0)	60
	RY12	16	(41)	21	(54)	0	(0)	0	(0)	0	(0)	2	(5)	0	(0)	39
Unit 6 Total	RY08	18	(29)	25	(40)	4	(6)	2	(3)	2	(3)	12	(19)	0	(0)	63
	RY09	28	(32)	31	(35)	3	(3)	5	(6)	0	(0)	21	(24)	0	(0)	88
	RY10	26	(38)	31	(45)	2	(3)	2	(3)	1	(1)	7	(10)	0	(0)	69
	RY11	35	(43)	36	(44)	1	(1)	0	(0)	3	(4)	6	(7)	0	(0)	81
	RY12	23	(44)	21	(40)	2	(4)	0	(0)	0	(0)	6	(12)	0	(0)	52

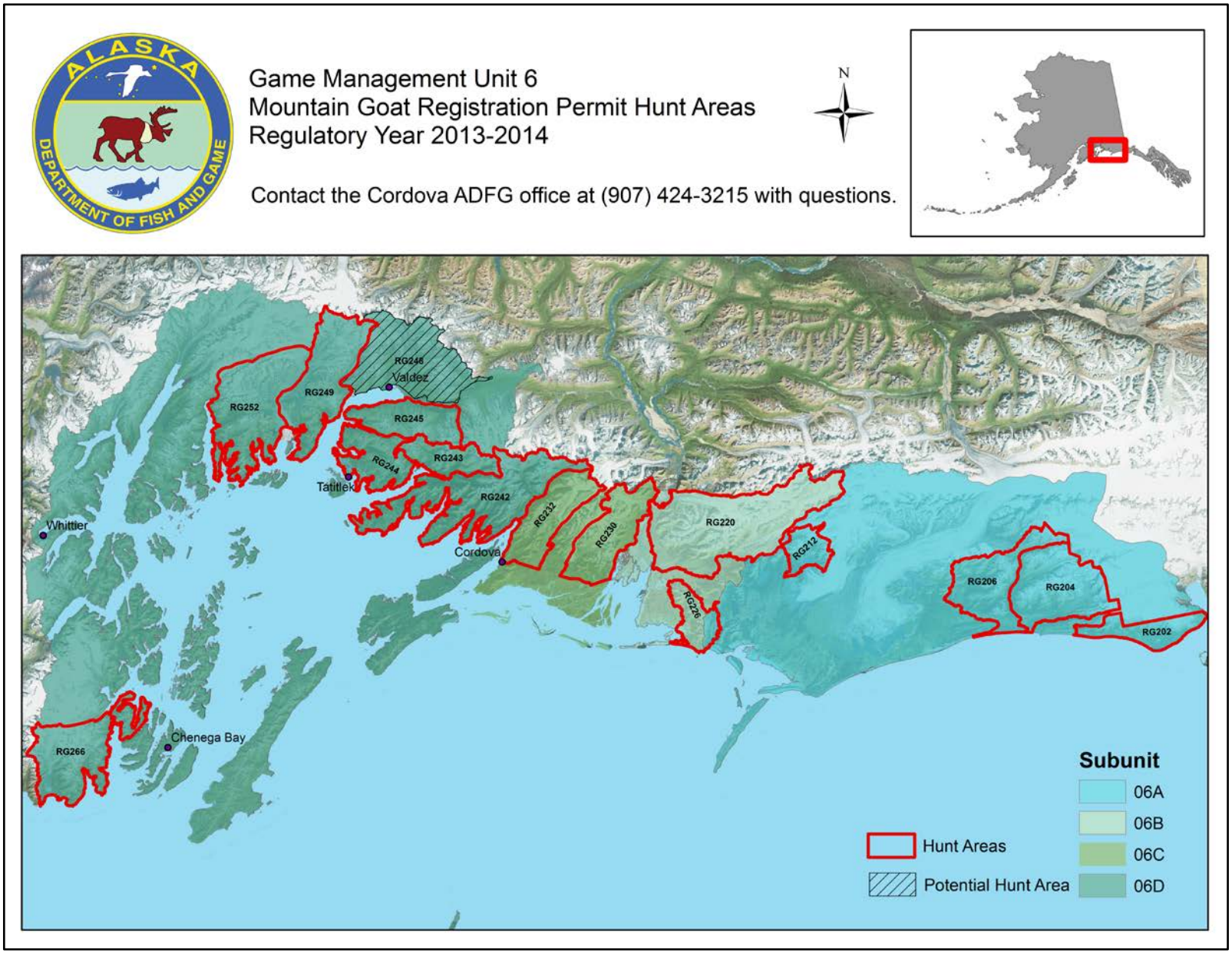

Figure 1. Hunt areas in Unit 6.

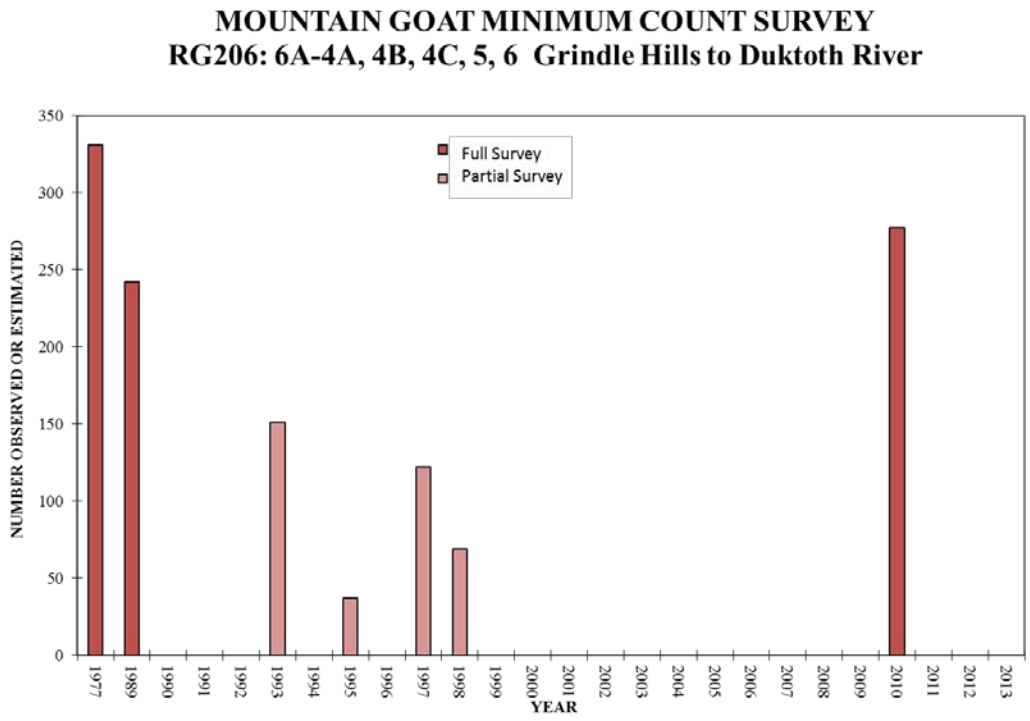

Figure 2. Mountain goat minimum count survey results, RG206, 1977–2013.

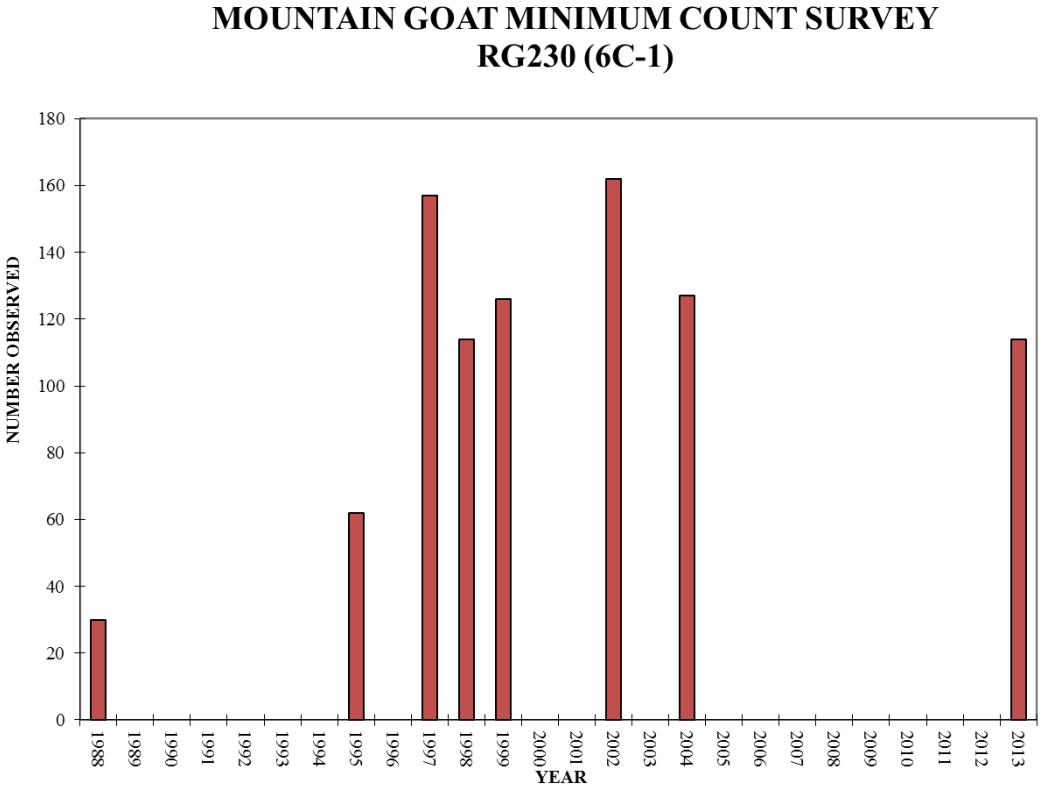

Figure 3. Mountain goat minimum count survey results, RG230, 1988–2013.

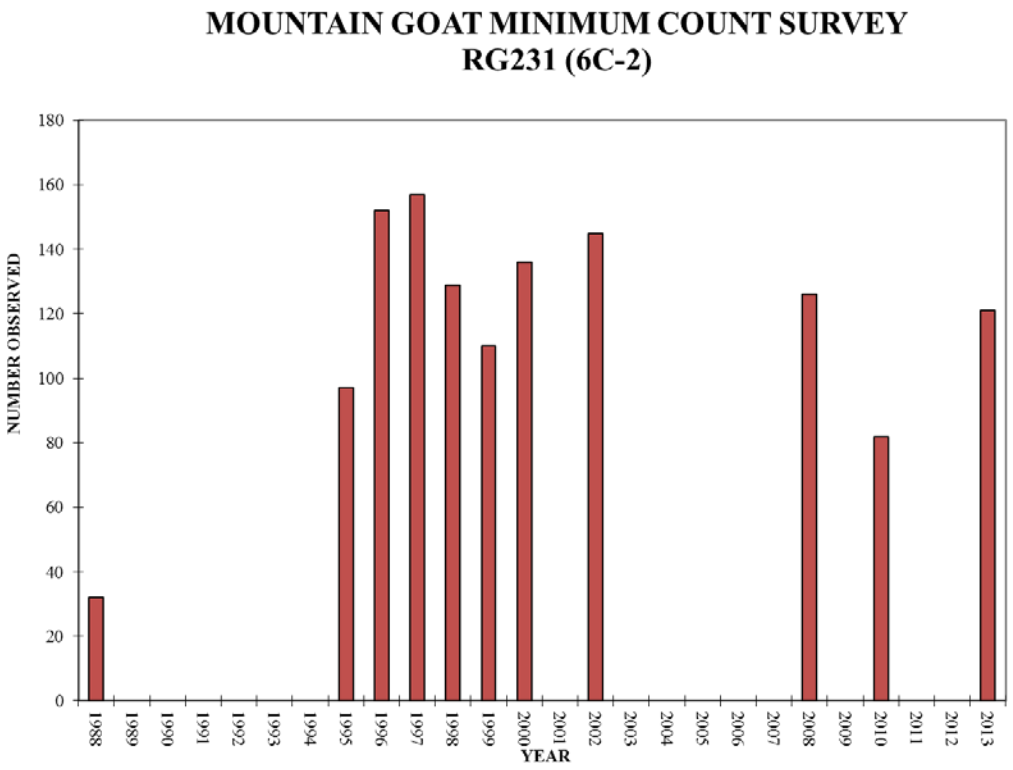

Figure 4. Mountain goat minimum count survey results, RG 231, 1988–2013.

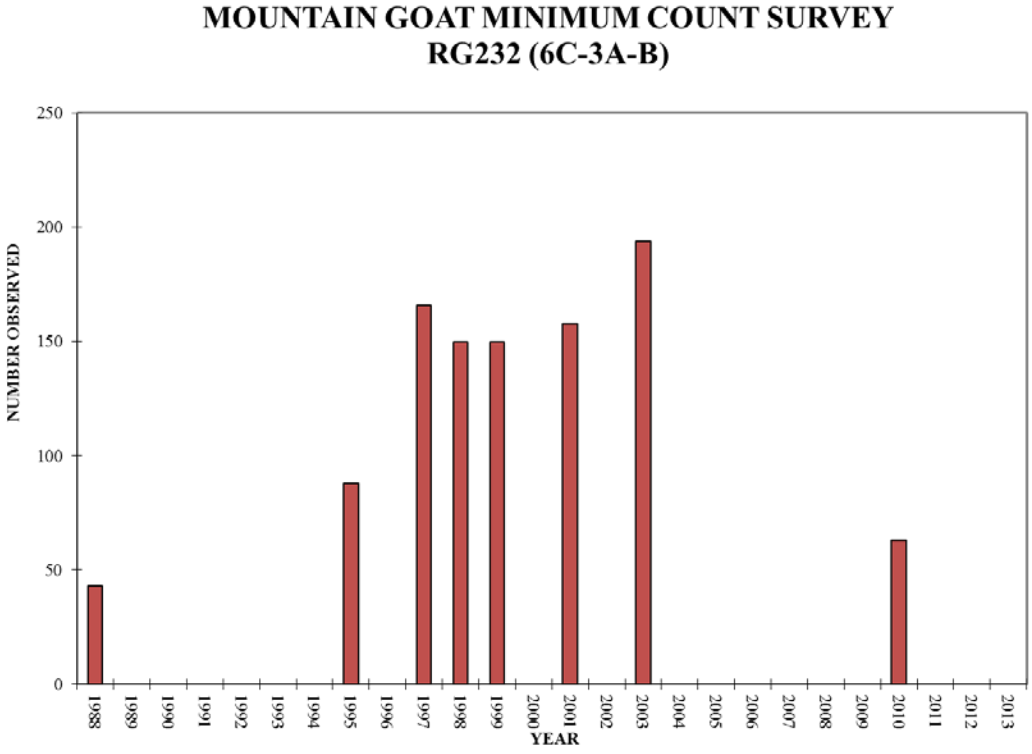

Figure 5. Mountain goat minimum count survey results, RG 232, 1988–2013.

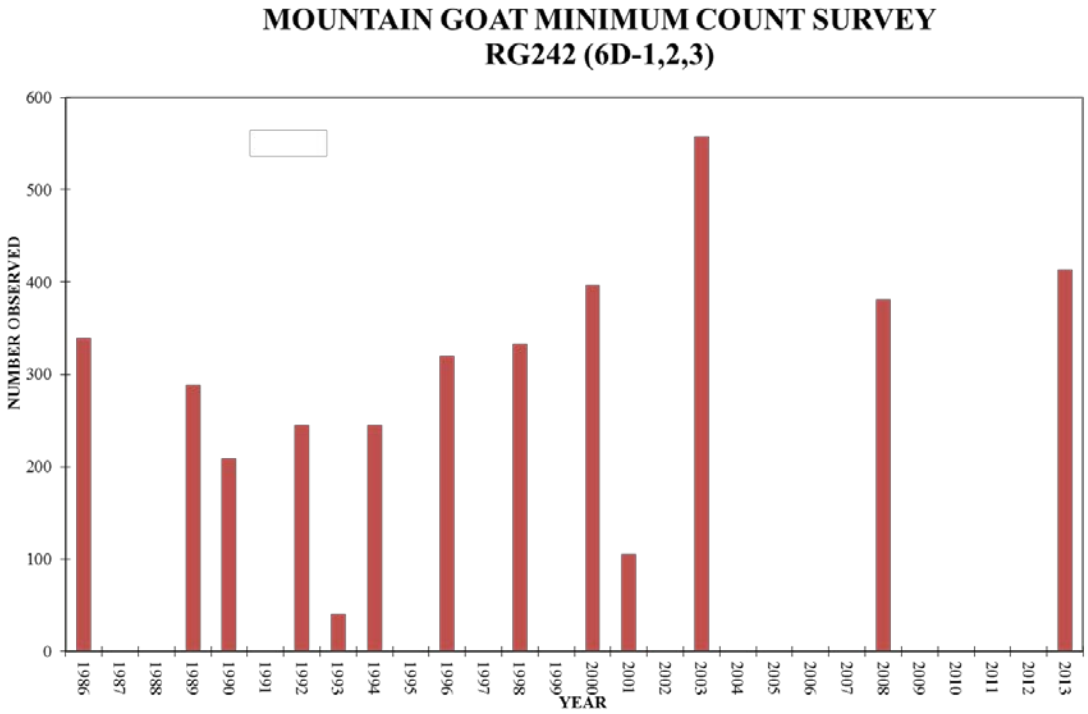

Figure 6. Mountain goat minimum count survey results, RG242, 1986–2013

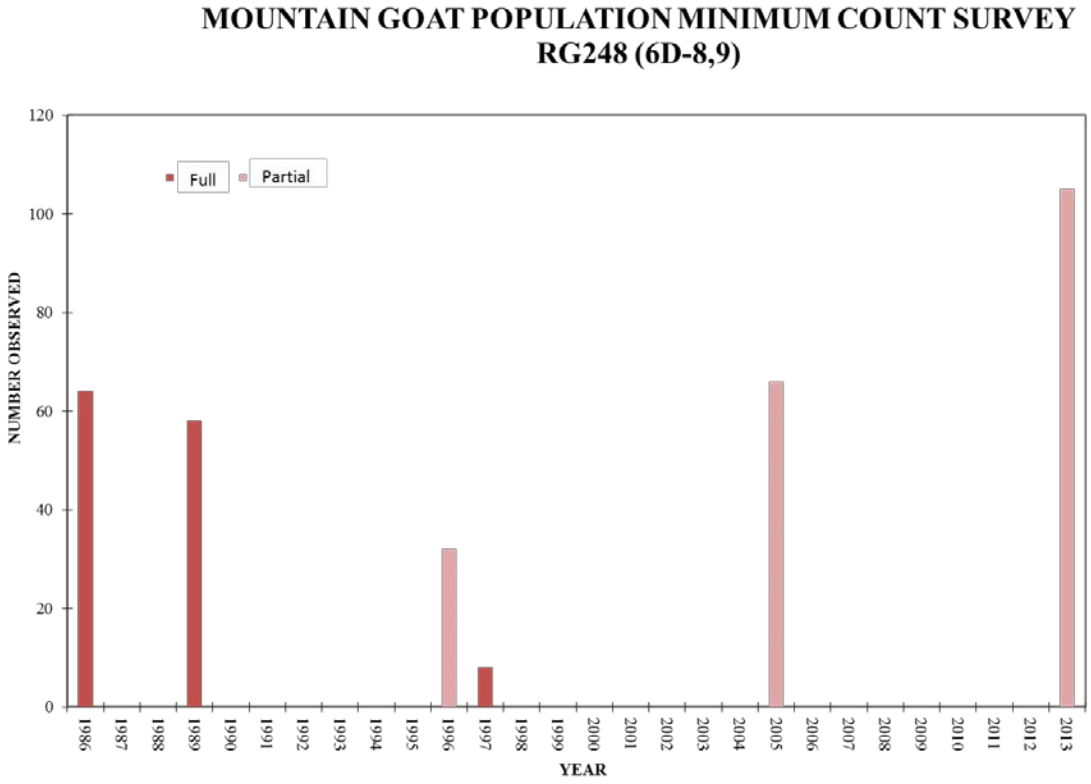

Figure 7. Mountain goat minimum count survey results, RG 248, 1986–2013.

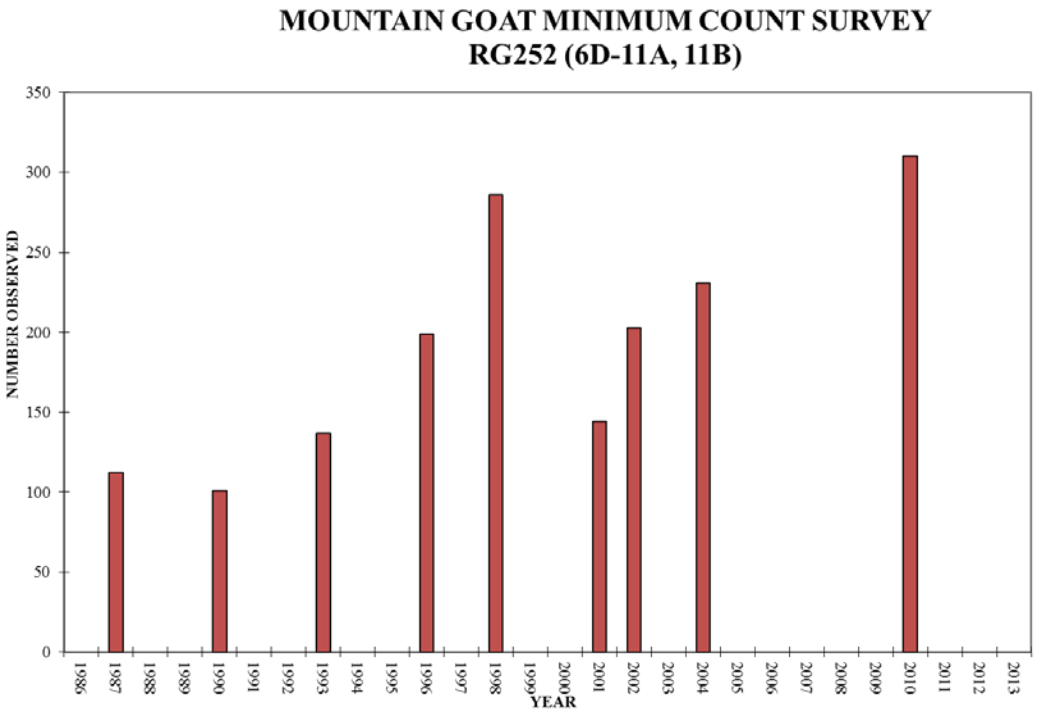

Figure 8. Mountain goat minimum count survey results, RG252, 1986–2013.

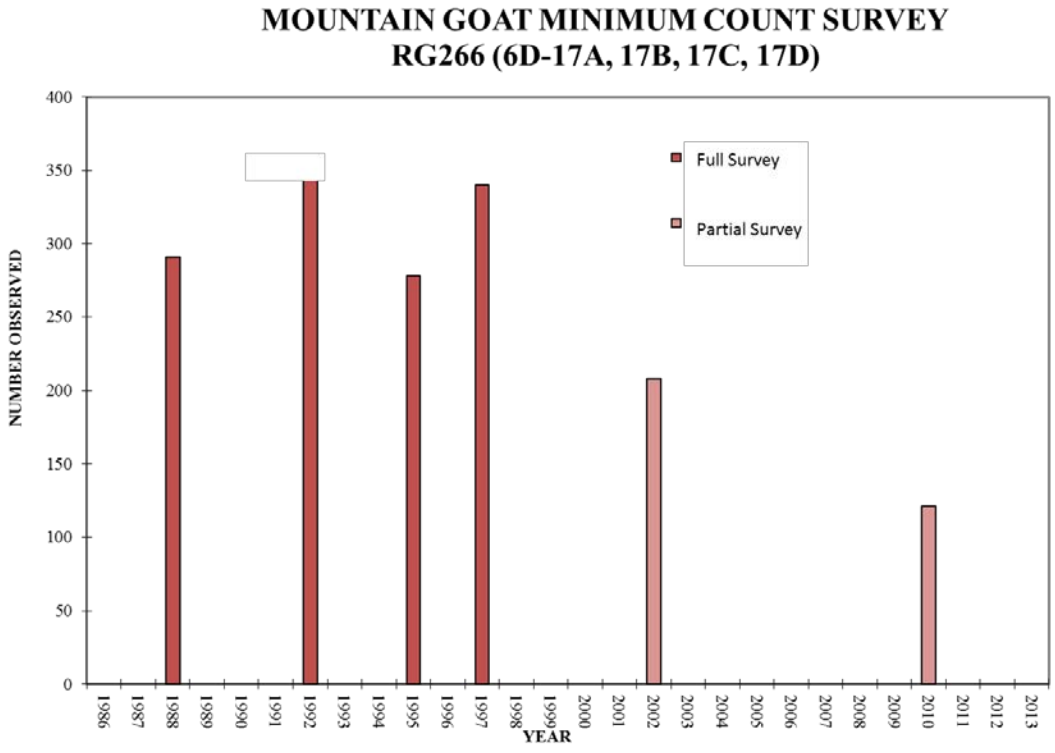

Figure 9. Mountain goat minimum goat count survey results, RG266, 1986–2013.

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 7 and 15 (8,397 mi^2)

GEOGRAPHIC DESCRIPTION: Kenai Peninsula

BACKGROUND

Mountain goats inhabit most areas of the Kenai Mountains. Goat densities are highest along the coastal mountains and lowest in the interior portions of the Kenai Mountains, where they coexist with Dall sheep. Nearly all the goat habitat on the Kenai Peninsula is within the Kenai Fjords National Park (KFNP), the Kenai National Wildlife Refuge, Chugach National Forest, or Kachemak Bay State Park. Hunting goats within KFNP was abolished when the park was established in 1980.

Hunters that take a goat on the Kenai Peninsula are required to bring in the horns for measuring and sex confirmation. The results of a goat horn study comparing growth on the Kenai Peninsula, a native population, with Kodiak, a relatively new population, showed that horn growth can be used as a measure of habitat quality (McDonough et al. 2006). Kenai goats showed lower horn growth than Kodiak goats, especially for females.

We currently take a conservative approach to managing goat hunts, due to a population decline from the early 1990s through 2006, and recent information on sustainable harvest rates (Hamel et al. 2006). The protocol to determine the number of hunting permits to issue each year per area considers past hunting success, population size and trends, the age of survey data, past harvest rates, the age structure of the harvest, the number of females taken each year and in successive years, ease of access, and other factors. Details of this strategy were outlined by McDonough and Selinger (2008).

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Our management objectives are to monitor population trends, maintain a low proportion of nannies in the harvest, and restrict or liberalize hunting permits and allowable harvest based on conservative assessments of minimum population size and population trends.

METHODS

The Kenai Peninsula mountain goat range, excluding KFNP, is divided into 35 individual count areas that correspond to hunt areas (Table 1). Hunts have been held in 23 of these areas during the past 5 seasons (Table 2). Four management areas have been closed to hunting due to land access issues since their establishment, including 348, 349, 350, and 351. Since the early 1970s, ADF&G has monitored goat populations through aerial surveys typically conducted July–October (Table 3). In recent years, surveys have been conducted more frequently during the latter portion of this survey period, when conditions are more conducive to counting goats. Optimally, each area is surveyed at least once every 3 years. Surveys distinguish kids (<5 months old) from adults. To protect the female proportion of the population, each nanny harvested is counted as 2 goats and a male as 1 goat when determining permit allocations and sustainable harvest levels.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

The overall population decreased 30% to 50% from the early 1990s to 2006 based on fall trend count results. Populations in areas 331–333, 335–338, 343, 353, 355, and 356 decreased to levels that prompted managers to either close the hunts or greatly reduce the number of permits. Since 2006, the overall population has been steadily increasing and has returned to numbers not seen since the late 1990s. Some areas, however, have stabilized at low numbers and a few continue to decline (Table 1).

MORTALITY

Season and Bag Limit. For the past 2 decades, goat hunting on the Kenai Peninsula has been managed by a combination of drawing and registration permit hunts. Since 2001, the drawing permit season has been 10 August–15 October and the registration permit season has been 1–30 November. Most of the harvest opportunity is provided through drawing permits. At the end of each drawing season, hunt areas can be opened to a registration permit hunt if the area can sustain additional harvest. The number of permits issued in the registration hunts is limited to reduce the chance of overharvest. The bag limit has been 1 goat per season since 1974.

Board of Game Actions. In March 2009, the board changed the bag limit. If a nanny is taken by a hunter in Units 7 and 15, that hunter is prohibited from hunting any goats in Units 7 and 15 for 5 regulatory years. This change was proposed by the Alaska Department of Fish and Game (department) in order to reduce the negative impact of nanny harvests and help hunters actively determine management actions.

Hunter Harvest. During the past 5 seasons (RY09–RY13), the annual average harvest was 51 goats during the drawing season and 13 goats during the registration season (Table 4). Individual statistics for each drawing and registration hunt are shown in Table 2.

Hunter Residency and Success. Each year for the past decade, less than 5% of the hunters for the drawing season were nonresidents. The 5-year average (RY09–RY13) of annual success rates was 37% for drawing hunts and 50% for registration hunts (Table 4).

Harvest Chronology. The harvest chronology for drawing hunts was spread throughout the season with the highest take in September and is a reflection of seasonal weather conditions (Table 5).

CONCLUSIONS AND RECOMMENDATIONS

Goat populations are highly vulnerable to overharvest compared to other ungulates. The harvest of even a few females from small populations can be unsustainable (Hamel et al. 2006). The taking of female goats during the drawing season often prevents registration hunts from opening and may decrease future permit allocations. For many years, ADF&G has attempted to educate hunters on how to distinguish males from females. We now have an online quiz on the department's website that helps educate hunters in determining the gender of goats. (http://www.adfg.alaska.gov/index.cfm?adfg=quiz.overview&quiz_id=3). Continued education, such as posting information at trailheads and talking to hunters, is required to further reduce nanny take as new hunters enter the user group.

Even with increased harvest restrictions 4 populations continue to decline, 332, 334, 336, and 346. Two factors that may be contributing to these declines include consistent helicopter traffic and increased winter recreation. Goats have been shown to be susceptible to disturbance by helicopters (Cote et al. 2013), and as with many species winter is the most stressful period for goats with the highest known instance of mortality during this period (White et al. 2011). Future research should focus on efforts to obtain seasonal movement data and sightability correction factors for survey flights. Seasonal movement data could be used to help better delineate distinct management populations and to delineate important wintering habitat in order to limit disturbance during this critical time period.

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Table 1. Number and description of hunt/count areas on the Kenai Peninsula.

Area Number	Unit	Area Description	Current Trend
331	7	Resurrection Creek West	increasing
332	7	Gilpatrick Mt.	decreasing
333*	7	Seattle Creek	stable
334	7	Mills Creek	decreasing
335*	7	Placer River West	stable
336	7	Spencer Glacier	decreasing
337	7	Cooper Mt.	increasing
338	7	Crescent Lake	increasing
339*	7	Grant Lake	stable
340*	7	Kings River	stable
341	7	Cecil Rhodes Mt.	increasing
342	7	Lost Lake	stable
343*	7	Victor Creek (Andy Simmons Mts.)	stable
344	7	Nellie Juan Lake	stable
345*	7	Whidbey Bay	stable
346	7	Resurrection Peninsula	decreasing
347	7	West Seward	stable
348	15C	Aialik Peninsula	unknown
349	15C	Holgate Glacier	unknown
350	15C	Harris Bay	unknown
351	15C	Petrof Lake	unknown
352	7&15C	Brown Mt.	stable
353*	15B	Surprise Creek	stable
354*	15B	Skilak Glacier	stable
355	15B	Twin Lakes	increasing
356	15B	Indian Creek	increasing
357	5C	Tustumena Glacier	increasing
358	15C	Fox River	increasing
359*	15C	Bradley Lake	stable
360	15C	Dixon Glacier	stable
361	15C	Halibut Cove	increasing
362	15C	Sadie Cove	increasing
363	15C	Port Dick	stable
364	15C	Seldovia	increasing
365	15C	English Bay	stable

*Stable at low numbers.

Table 2. Mountain goat harvest by management area for the Kenai Peninsula (Units 7 and 15), regulatory years 2009–2013.

		Drawing Hunts						Registration Hunts					
Area	Year	Billy	Nanny	Total	Permits Issued	# Hunted	% Success	Billy	Nanny	Total	Permits Issued	# Hunted	% Success
331	2009				0						0		
	2010				0						0		
	2011				0						0		
	2012	0	1	1	5	3	33				0		
	2013	2	1	3	5	3	100				0		
332	2009				0						0		
	2010				0						0		
	2011				0						0		
	2012				0						0		
	2013				0						0		
333	2009	0	0	0	2	2	0				0		
	2010	1	0	1	2	1	100				0		
	2011	0	0	0	2	1	0				0		
	2012	0	0	0	2	1	0				0		
	2013	0	0	0	2	0	na				0		
334	2009	0	2	2	15	12	17				0		
	2010	1	1	2	15	9	22				0		
	2011	7	1	8	15	13	62				0		
	2012	3	1	4	15	11	36				0		
	2013	3	2	5	15	9	56				0		
335	2009				0						0		
	2010				0						0		
	2011				0						0		
	2012				0						0		
	2013				0						0		

Table 2. Continued.

		Drawing Hunts						Registration Hunts					
Area	Year	Billy	Nanny	Total	Permits Issued	# Hunted	% Success	Billy	Nanny	Total	Permits Issued	# Hunted	% Success
336	2009	3	1	4	30	14	29				0		
	2010	3	2	5	30	18	28				0		
	2011				0						0		
	2012				0						0		
	2013				0						0		
337	2009				0						0		
	2010				0						0		
	2011				0						0		
	2012				0						0		
	2013				0						0		
338	2009				0						0		
	2010				0						0		
	2011				0						0		
	2012				0						0		
	2013				0						0		
339	2009	0	2	2	6	6	33				0		
	2010	1	0	1	2	2	50				0		
	2011	0	0	0	2	0	na				0		
	2012	0	0	0	2	2	0				0		
	2013	0	0	0	2	1	0				0		
340	2009	0	0	0	20	4	0				0		
	2010	0	0	0	20	2	0				0		
	2011	2	0	2	20	4	50				0		
	2012	0	0	0	20	4	0				0		
	2013	0	0	0	20	4	0				0		

Table 2. Continued.

		Drawing Hunts						Registration Hunts					
Area	Year	Billy	Nanny	Total	Permits Issued	# Hunted	% Success	Billy	Nanny	Total	Permits Issued	# Hunted	% Success
341	2009	1	1	2	2	2	100				0		
	2010	0	0	0	2	1	0				0		
	2011	1	0	1	2	2	50				0		
	2012	0	0	0	4	4	0				0		
	2013	0	3	3	4	4	75				0		
342	2009	2	0	2	15	11	18	2	3	5	12	11	45
	2010	1	3	4	15	14	29				0		
	2011	4	1	5	15	11	45				0		
	2012	4	1	5	15	11	45				0		
	2013	3	0	3	15	11	27				0		
343	2009				0						0		
	2010				0						0		
	2011				0						0		
	2012				0						0		
	2013				0						0		
344	2009	2	0	2	10	4	50				0		
	2010	0	0	0	10	5	0				0		
	2011	1	0	1	10	2	50				0		
	2012	1	0	1	10	4	25				0		
	2013	1	0	1	10	3	33				0		
345	2009	4	0	4	25	11	36	2	0	2	20	7	29
	2010	2	1	3	25	10	30	0	0	0	3	0	0
	2011	2	2	4	35	13	31				0		
	2012	3	0	3	35	9	33				0		
	2013	0	0	0	35	4	0				0		

Table 2. Continued.

		Drawing Hunts						Registration Hunts					
Area	Year	Billy	Nanny	Total	Permits Issued	# Hunted	% Success	Billy	Nanny	Total	Permits Issued	# Hunted	% Success
346	2009	12	2	14	40	32	44				0		
	2010	6	3	9	40	21	43				0		
	2011	3	0	3	30	14	21	2	0	2	15	12	17
	2012	3	1	4	31	13	31				0		
	2013	1	3	4	24	17	24				0		
347	2009	1	3	4	20	13	31				0		
	2010	1	4	5	20	14	36				0		
	2011	0	2	2	20	6	33				0		
	2012	1	1	2	20	8	25				0		
	2013	1	4	5	20	10	50				0		
352	2009	2	0	2	30	13	15	2	0	2	20	4	50
	2010	2	0	2	30	9	22	0	0	0	2	0	0
	2011	5	1	6	30	10	60				0		
	2012	2	0	2	30	6	33				0		
	2013	2	1	3	30	5	60				0		
353	2009				0						0		
	2010				0						0		
	2011				0						0		
	2012				0						0		
	2013				0						0		
354	2009	0	0	0	2	1	0				0		
	2010				0						0		
	2011				0						0		
	2012				0						0		
	2013				0						0		

Table 2. Continued.

		Drawing Hunts						Registration Hunts					
Area	Year	Billy	Nanny	Total	Permits Issued	# Hunted	% Success	Billy	Nanny	Total	Permits Issued	# Hunted	% Success
355	2009				0						0		
	2010				0						0		
	2011				0						0		
	2012				0						0		
	2013				0						0		
356	2009				0						0		
	2010				0						0		
	2011				0						0		
	2012				0						0		
	2013				0						0		
357	2009				0						0		
	2010	1	0	1	2	1	100				0		
	2011	0	0	0	2	1	0				0		
	2012	0	0	0	4	1	0				0		
	2013	0	0	0	4	1	0				0		
358	2009	0	1	1	2	2	50				0		
	2010	0	0	0	2	0	na				0		
	2011	0	0	0	2	0	na				0		
	2012	1	0	1	2	2	50				0		
	2013	0	0	0	2	1	0				0		
359	2009	1	0	1	10	3	33				0		
	2010	1	0	1	10	6	17				0		
	2011	1	0	1	5	4	25				0		
	2012	0	0	0	5	0	NA				0		
	2013	0	1	1	5	4	25				0		

Table 2. Continued.

		Drawing Hunts						Registration Hunts					
Area	Year	Billy	Nanny	Total	Permits Issued	# Hunted	% Success	Billy	Nanny	Total	Permits Issued	# Hunted	% Success
360	2009	3	1	4	25	12	33				0		
	2010	3	2	5	25	14	36				0		
	2011	6	1	7	20	16	44				0		
	2012	8	1	9	25	12	75				0		
	2013	8	0	8	25	15	53				0		
361	2009	1	5	6	15	9	67				0		
	2010	1	0	1	5	1	100				0		
	2011	1	1	2	10	4	50				0		
	2012	0	0	0	15	7	0				0		
	2013	0	1	1	15	7	14	5	0	5	15	5	100
362	2009	2	2	4	18	9	44				0		
	2010	1	2	3	18	10	30				0		
	2011	4	3	7	15	10	70				0		
	2012	0	2	2	15	9	22				0		
	2013	5	1	6	15	8	75				0		
363	2009	5	0	5	30	12	42	0	0	0	20	3	0
	2010	1	3	4	30	10	40				0		
	2011	3	1	4	30	7	57	0	0	0	20	2	0
	2012	1	0	1	30	6	17	0	0	0	10	8	0
	2013	2	3	5	30	11	45				0		
364[a]	2009				0			5	0	5	10	9	56
	2010				0			1	0	1	10	9	11
	2011				0			1	0	1	10	5	20
	2012				0			2	0	2	10	9	22
	2013				0			4	0	4	15	8	50

Table 2. Continued.

		Drawing Hunts						Registration Hunts					
Area	Year	Billy	Nanny	Total	Permits Issued	# Hunted	% Success	Billy	Nanny	Total	Permits Issued	# Hunted	% Success
365[a]	2009				0			6	1	7	49	21	33
	2010				0			5	2	7	27	19	37
	2011				0			8	3	11	50	19	58
	2012				0			11	5	16	36	28	57
	2013				0			9	0	9	28	15	60

[a]Areas became registration only hunts in 2007.

Table 3. Mountain goat survey counts for the Kenai Peninsula (Units 7 and 15), 2009–2013.

Survey Year	Area	Adults	Kids	Total Goats
2013	334	32	9	41
	335	27	3	30
	339	18	7	25
	343	6	0	6
	346	125	30	155
	354	20	6	26
	355	35	9	44
	356	74	26	100
	358	58	16	74
	359	58	12	70
	360	118	46	164
	361	121	19	140
	362	114	31	145
	365	244	58	302
2012	334	40	10	50
	338	63	14	77
	342	92	24	116
	345	97	28	125
	347	95	25	120
	352	96	5	101
	363	179	37	216
	364	89	21	110
2011	331	69	12	81
	332	25	2	27
	333	40	8	48
	336	27	8	35
	337	31	6	37
	340	26	6	32
	341	60	9	69
	343	27	7	34
	344	66	12	78
	353	5	1	6
	354	24	8	32
	357	55	10	65
	358	27	7	34
	359	34	14	48

Survey Year	Area	Adults	Kids	Total Goats
2010	336	45	10	55
	339	54	4	58
	346	182	35	217
	355	7	2	9
	356	30	8	38
	359	53	7	60
	360	146	38	184
	361	84	15	99
	362	79	19	98
	364	62	12	74
	365	247	63	310
2009	334	71	19	90
	338	33	10	43
	339	36	6	42
	342	90	26	116
	345	148	27	175
	357	47	7	54
	363	170	37	207

Table 4. Harvest totals for mountain goat drawing and registration permits on the Kenai Peninsula (Units 7 and 15), 2009–2013.

Permit Type	Year	Permits Issued	# Hunted	Harvest			% Success
				Males	Females	Total	
Drawing	2009	317	172	39	20	59	34
	2010	303	148	26	21	47	32
	2011	265	118	40	13	53	45
	2012	284	113	29	8	37	33
	2013	327	143	42	19	61	43
Registration	2009	131	55	17	4	21	38
	2010	42	28	6	2	8	29
	2011	95	38	11	3	14	37
	2012	58	45	13	5	18	64
	2013	31	6	5	0	5	83

Table 5. Harvest chronology (% of harvest) for mountain goat drawing permits on the Kenai Peninsula (Units 7 and 15), regulatory years 2009–2013.

Year	August	September	October	Unspecified
2009	24	49	25	2
2010	26	53	21	0
2011	25	53	17	6
2012	38	38	24	0
2013	28	45	28	3

Alaska Department of Fish and Game
Division of Wildlife Conservation
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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 8 (5,097 mi^2)

GEOGRAPHIC DESCRIPTION: Kodiak and adjacent islands

BACKGROUND

The Unit 8 mountain goat (*Oreamnos americanus*) population originated from 11 females and 8 males relocated from the Kenai Peninsula to the Hidden Basin area during 1952 and 1953 (Hoffman 1953). One pregnant female died shortly after introduction, resulting in the successful introduction of 18 individuals (10 females, 8 males; Hoffman 1953). In 1964, 26 goats (13 adults, 13 kids) were observed in the Hidden Basin area (Hensel and Berns 1966) and by 1968 when the first hunting season opened 71 goats (57 adults, 14 kids) were observed (Hensel and Berns 1970). Beginning in 1968, mountain goat hunting permits were issued annually. To promote population growth, goat permits were initially limited by a restricted draw hunt occurring within a limited area. As the population expanded, the number of permits available each year and the areas open to hunting fluctuated as managers adjusted harvest strategies to reflect management objectives, population trends, and goat movements. Since establishment, mountain goat numbers on Kodiak Island have ranged from 4 goats observed in 1957 (Hensel and Berns 1966) to an estimated 2,390 in 2012 (ADF&G unpublished data).

From the late 1960s through 1970s, goat harvest was minimal to encourage colonization. Permits were allocated through a registration or drawing system with a harvest quota of up to 15 goats. During the 1980s, the population increased to more than 400 animals, with distribution extending into the southern end of the island (Van Daele and Crye 2012). As a result of increased numbers, the permit allocation process switched from a drawing system to a registration system in 1984 and 1985. In addition, in 1985 a Tier II (subsistence) area was added, providing subsistence harvest opportunities to qualified residents. However, these changes led to harvest concerns among local wildlife staff. Smith and VanDaele (1986) reported numerous inexperienced goat hunters going afield that year, resulting in increased hunter densities, reduced selectivity, herd shooting (not targeting an individual goat), and wanton waste. During the 1985 hunting season a number of emergency orders were issued for certain areas when harvest goals were reached. In 1986, the drawing system was reestablished and remained in place through the 1990s.

Throughout the 1990s, goat populations continued to grow, and the management scheme remained conservative. Populations were closely monitored, and permits were adjusted accordingly. Much of the southern portion of the island, which had been closed to facilitate

colonization, was opened to limited hunting in 1991. A new hunt area (DG478) close to the Kodiak road system opened to hunting in 1995. By 1999, the population increased to nearly 900 goats, and was believed to occupy all available goat habitats on the island (Van Daele and Crye 2001). In 2001 hunt area boundaries were modified to include all of Kodiak and Uganik Islands, and a new hunt area was also created (DG479, North Road System).

In 2000 the Federal Subsistence Regional Advisory Council (RAC) considered a proposal to list Kodiak Island goats as a "customary and traditional" resource, and to open Kodiak National Wildlife Refuge to subsistence goat hunting by registration permit. In 2002, a joint working group (Kodiak Fish and Game Advisory Committee and Kodiak-Aleutian RAC) was formed to explore ways to meet the subsistence needs of rural residents while retaining state harvest management. The U.S. Fish and Wildlife Service contracted the Division of Subsistence within the Alaska Department of Fish and Game to determine historic harvest patterns of Kodiak mountain goats (Williams 2003). In March 2003, the Board of Game approved a proposal submitted by the working group that increased the maximum number of drawing permits from 250 to 500 and established village-based registration hunts following the conclusion of the drawing hunt season, if an allowable surplus of goats existed. This prompted the Federal Subsistence Board to forgo actions that would have created a subsistence goat hunt on refuge lands.

Based on data from comprehensive aerial surveys in 2007–2008, goat population estimates on Kodiak Island neared 2,000. Expansion of goat populations into nearly all available habitats around Kodiak Island allowed for increased hunter opportunity. In March 2009, the Board of Game adopted a proposal expanding hunting opportunities to residents and nonresidents by combining hunt areas 475 and 477 to form registration hunt area 480 (Fig. 1). The creation of registration hunt area RG480 eliminated drawing permits from the southern portion of the island and allowed registration hunts throughout both the drawing and registration hunting seasons. Aerial surveys conducted in 2011–2012 identified approximately 2,500 goats on the island and warranted a harvest increase in certain areas.

In response to the continued growth in the central and southern portions of the island, a subcommittee within the Kodiak Advisory Committee proposed changes to Kodiak's mountain goat harvest regulations in hunt area 480 in 2012. The subcommittee was composed of ADF&G and Refuge biologists, members of the Subsistence Regional Advisory Council, the Kodiak Fish and Game Advisory Committee, and members of the public. In an effort to increase hunter opportunity, the subcommittee generated a harvest regulation change proposal which was adopted by the Kodiak Advisory Committee, supported by state and federal wildlife managers, and submitted to the Alaska Board of Game. The Board of Game approved a modified version of the proposal, which increased the annual bag limit in RG480 from 1 to 2 goats and extended the season closing date from 20 December to 20 March. These regulatory changes took effect on 1 July 2013.

Currently, 8 permit hunt areas are managed using drawing and registration permits (Fig. 1). Goat harvest quotas are established annually for each hunt area and vary with goat abundance and distribution. If harvest quotas are not met during the drawing permit season, registration permits are made available. Hunt restrictions and guidelines are established to minimize overharvest and reduce crowded hunting areas during registration hunts.

Mountain goats currently occupy much of the suitable goat habitat on the island, with confirmed reports as far south as Kaguyak Bay and west to Halibut Bay. Current goat populations on the southern portion of the island are rapidly increasing and should be closely monitored. During 2013, in an effort to investigate movements, distribution patterns, and habitat use of goats on Kodiak Island, the Alaska Department of Fish and Game in cooperation with the Kodiak National Wildlife Refuge fitted 15 mountain goats (7 females, 8 males) with Global Positioning System radio collars. Both agencies worked collaboratively to conduct aerial surveys to determine goat herd composition, distribution, and abundance. Based on data from 2012–2013 comprehensive aerial surveys, we estimate the Kodiak goat population at 2,390 goats.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a pre-hunting population of 1,000–2,500 goats island-wide, distributed in a manner that has minimal long-term impact on their habitat.

METHODS

Aerial Surveys

We conducted annual aerial survey composition counts with fixed-wing aircraft in July and August to estimate mountain goat abundance, distribution, and adult: kid ratios. Surveys were conducted using fixed wing aircraft with 2 observers (biologist and pilot). Survey efforts were focused in alpine habitats above shrub-line (approximately 300 m above sea level), in established mountain goat hunt areas on Kodiak Island. Surveys were flown at various above-ground distances to maximize goat sightability and identification. Once identified, goats were counted until independent counts of adults and kids were obtained. Counts and adult: kid ratios were compared between observers. If discrepancies occurred, goat groups were circled and recounted until consensus was reached. Observers recorded a Global Positioning System (GPS) waypoint when the aircraft was directly above the group or when the group was perpendicular to the aircraft's flight path. Estimated locations were documented accordingly. It is important to note detection during summer can be compromised when goats retreat to snowfields to avoid hot temperatures; therefore, observers were encouraged to scrutinize snowfields during surveys. To increase detection, surveys were flown in late summer when snow accumulation was at a minimum. To reduce potential interference to hunters, surveys were targeted for completion prior to the start of goat hunting season. Survey methodology was standardized between agencies to reduce variability and increase consistency. Survey areas were prioritized based on vicinity to transplant site, and management and population concerns. To obtain reliable population estimates and accurate distribution and composition information, future survey areas should be expanded to include all suitable goat areas.

Capture and Collaring

We aerial-darted mountain goats from 28–30 June 2013 using a Hughes 500 helicopter, an immobilizing dart gun, and immobilizing darts. Goats were injected with an intramuscular injection of carfentanil citrate (2.1 mg; ZooPharm, Windsor, Colorado). Prior to darting, goats were manipulated by helicopter into terrain that maximized darting efficiency (close range, safe induction terrain, good dart placement). After induction we weighed, sexed, ear-tagged, and collected blood, tissue, fecal, and hair samples from each animal. We outfitted immobilized

goats with 2 radiocollars; a very high frequency (VHF) radiocollar (Model-400, Telonics, Mesa, Arizona, USA) and a GPS radiocollar (Model TGW-4500 Generation IV SST, Telonics, Mesa, Arizona, USA) programmed to collect a location every 4 hours. To antagonize effects of carfentanil, we intramuscularly administered Naltrexone (241 mg; ZooPharm, Windsor, Colorado) and released goats near the induction location. GPS location data can be downloaded remotely from fixed-winged aircraft on Tuesday and Friday of each week for a 6- hour period (1100–1700 hours).

Harvest and Hunter Effort Data

In addition to aerial surveys and capture and collaring operations, we collected data on harvest and hunting effort from mandatory hunter reports and by examining goat horns brought in by successful hunters. Harvest data are organized by regulatory year. A regulatory year runs from 1 July through 30 June (e.g., RY11 = 1 July 2011–30 June 2012).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Cooperative survey flights with the U.S. Fish and Wildlife Service in 2011 covered approximately 95% of the goat range, yielding a total count of 2,364 goats including 1,963 adults and 401 kids. In 2012, we surveyed about 40% of the goat range and counted 1,265 goats including 1,041 adults and 224 kids. Surveys indicate a stable goat population on the northern and central portion of the island and an increasing population on the southern portion of the island. The estimated island-wide population in 2012 was approximately 2,390 with much of the available goat habitat occupied.

Population Composition

During this reporting period, the kid: adult ratio was 20:100 in regulatory year 2011 (RY11) and 22:100 in RY12 (previous 5-year average kid:adult ratio = 22:100; Table 1).

Distribution and Movements

During the first 3 decades following their introduction to Kodiak, mountain goats occupied suitable habitats near their release area, primarily in the Kizhuyak, Terror, and Hidden Basin drainages. As population density increased, goats began to colonize new areas. Although no radiotelemetry or movement studies had been conducted on Kodiak mountain goats until recently, research suggests male dispersal may be driven by competition for females (Stevens 1983). Further, female dispersal may be in response to reduced food availability (Stevens 1983). During the past decade, goats have expanded beyond what was previously considered the range of suitable goat habitat and moved into areas not typically considered suitable (lower elevations, reduced escape cover). Goats now occur, at least in small numbers, in most habitats on Kodiak Island.

Fifteen mountain goats (8 males, 7 females) were captured and radiocollared on Kodiak Island during 28–30 June 2013. Radiocollared goats will be monitored regularly and location data downloaded opportunistically as time and weather permits. Mountain goat distribution, movements, and resource use will be analyzed periodically as location data are collected.

Harvest

Season and Bag Limits. Goat hunting season for resident and nonresident hunters was open 20 August–25 October by drawing permit in the northern part of Kodiak Island. A registration hunt (1 November–15 December) following the drawing permit hunt was initiated in RY03 for Alaska residents only, with permits available during a limited time prior to the hunting season in the villages nearest the hunt area, and floatplane access restricted to saltwater. The southern part of Kodiak is included in a registration hunt (RG480; 20 August–15 December) and is available to both residents and nonresidents. Interested hunters can pick up permits throughout the season either from ADF&G offices or via the internet. The bag limit was 1 goat (either sex) for all areas, but nannies with kids could not be legally harvested.

Board of Game Actions and Emergency Orders.

During its March 2013 meeting, the Board of Game adopted a proposal changing the hunting season for hunt area RG480 from 20 August–15 December to 20 August –20 March. Within the same proposal the bag limit of 1 goat was increased to a 2 goats for hunt area RG480.

Permit Hunts. During this reporting period all goat hunting in Unit 8 was administered by issuing either a drawing or registration permit. In RY11 there were 7 drawing permit hunt areas, and 239 permits were issued. In RY12 there were 7 drawing permit hunts and a total of 254 permits were issued (Table 2). There were also 4 registration permit hunt areas open in RY11, and a total of 502 permits were issued. In RY12, 6 registration hunt areas were open and a total of 574 permits were issued (Table 3).

Hunter Residency and Success. Annual hunter success declined from a previous 5-year average of 46% to 43% in RY11 and 38% in RY12 (Table 4). The number of drawing permits available was lower in RY10 due to the creation of registration hunt RG480, which combined drawing/registration hunt areas 475 and 477. The annual percentage of nonresidents participating in hunts has remained stable when compared to the 5-year average (5-year average = 13%; RY11 = 12%; RY12 = 14%), while nonlocal resident participation has increased slightly (5-year average = 53.2%; RY11 = 55%; RY12 = 55%) and the proportion of local residents has decreased (5-year average = 35.6%; RY11 = 33%; RY12 = 30%).

Estimated age data, determined by horn annuli (i.e., rings), were obtained from hunter report cards (1994–2000, 2004–2011) and from mandatory horn inspections by department staff (1993, 2001–2003). During this reporting period the mean age of male goats harvested was 4.4 years in RY11 and 4.5 years in RY12 (5-year average = 4.7 years). Females averaged 4.6 years in RY11 and 6.6 years in RY12 (5-year average = 5.2 years; Table 5). Comparing results of a horn growth study between Kenai Peninsula and Kodiak Island goats suggests horn growth may be a useful index of habitat quality (McDonough et al. 2006).

Harvest Chronology. In recent years, October has been the preferred month for Unit 8 goat hunters (Table 6). Weather patterns, which affect hunter success and influence when hunters go into the field, largely determine the chronology of harvest.

Transport Methods. Similar to the previous 5 years (5-year average = 53.6%), aircraft was the predominant transportation method used by hunters during this reporting period (40% in RY11;

42% in RY12; Table 7). However, highway vehicles and off-road vehicles were the primary means of transportation for goat hunters along the road system near Kodiak city (DG/RG 478 and 479).

Other Mortality

Documenting mortality from sources other than hunting is difficult to gauge because of the remote, rugged, inaccessible nature of goat habitat. Predation by brown bears and golden eagles undoubtedly occurs, but is likely rare (Côté and Beaudoin 1997, Mollhagen et al. 1972). We suspect the low production of kids in some years is caused by severe winter weather (Bailey 1991), but it is unknown whether early postnatal mortality of kids or low initial productivity occurs. The severe winter of 1998–1999 yielded reports of winter-killed goats found along beaches in the Hidden Basin and Old Harbor areas. Mortality due to wounding loss and illegal harvest are estimated at 10% of the reported harvest (Van Daele and Smith 1998).

HABITAT

Assessment

Goat habitat on Kodiak Island is somewhat protected because of the remote physicality and costly access prohibiting commercial development. Construction and operation of the Terror Lake Hydroelectric Project enhanced access into goat habitat in northern Kodiak Island, but the overall impact to the goat population has been minimal (Smith and Van Daele 1987).

There has been no detailed analysis of goat range or carrying capacity on Kodiak Island, but survey data suggest the population is near carrying capacity in the north-central portion of the island, where goats first became established. In recently colonized areas of southern Kodiak Island the population appears to be below carrying capacity. In 2011, Kodiak National Wildlife Refuge began a pilot study to investigate the extent of the mountain goat range on Kodiak Island and gain a better understanding of goat habitat requirements and the potential impact goats may be having on the alpine habitat.

Winter severity is variable in maritime environments, where precipitation at lower elevations may occur as either rain or snow. Studying goats on northern Kodiak Island, Hjeljord (1973) observed goats at higher elevations in March during a winter when snow cover occurred at sea level; however, goats were also found at lower elevations during winters when snow was minimal. Smith and Van Daele (1987) determined winter distribution was strongly influenced by snow cover, with goats favoring southerly exposed slopes and cliff faces. The lack of a coniferous overstory at lower elevations may adversely affect goats on Kodiak during winters with high snowfall.

When snow conditions allow, winter recreation activities are increasingly common around Kodiak Island. Snowmachines are more abundant, and the sport of backcountry skiing and snowboarding is becoming more widespread. Kodiak National Wildlife Refuge limits snowmachine access in some areas; however, most of the recent activity is near the city of Kodiak outside of refuge boundaries. There have been no studies investigating the impacts of winter sports on Kodiak goats; however, there is a potential for disturbance (Cadsand 2005).

NONREGULATORY MANAGEMENT PROBLEMS

Fixed-winged aircraft seem to have little direct impact on goats, but helicopters typically solicit flight responses from both individuals and groups. In April of 2002, a memorandum of agreement between ADF&G, the U.S Fish and Wildlife Service, and the U.S. Coast Guard regarding flight operations over Kodiak was finalized. This agreement has spurred further cooperation between the Coast Guard and ADF&G to minimize mountain goat disturbances from helicopter flight operations, and department staff participates in annual presentations to air crews at the U.S. Coast Guard base in Kodiak.

Increased fuel costs, coupled with expanding goat numbers and range, are dramatically increasing the cost of conducting aerial surveys. U.S. Fish and Wildlife Service has assisted ADF&G in recent years by providing aircraft and observers, allowing continuation of established survey techniques. We are concerned; however, that our limited survey opportunities may not be able to provide data sufficient and sensitive enough to accurately determine population levels throughout the southern part of Kodiak.

CONCLUSIONS AND RECOMMENDATIONS

The goat population was stable in northern and central Kodiak and increasing on the southern end of the island. Based on aerial surveys in Unit 8, we estimate the goat population to be approximately 2,390 goats at the end of this reporting period. During this time period, goat harvest increased slightly due to the creation of registration hunt RG480, which combined 2 of the largest hunt areas on Kodiak, and allowed internet registration and nonresident participation. The drawing permit hunter success remained at 48% or above. Registration permit hunter success was lower in 2011 and 2012 (35% and 33%, respectively) due to hunters obtaining multiple permits, harsh weather during the hunting season, archery-only hunt areas, and permit access restrictions.

Kodiak Island is currently the most popular goat hunting destination in Alaska, accounting for 32% of the harvest in the state in RY10. With the increase in permit numbers and harvest, there has been a demographic shift of goat hunters on Kodiak. In RY06, local hunters composed 36% of the hunters afield, compared to 30% in RY12. The number of resident nonlocal hunters afield remained stable during the same time frame (56% in RY06; 55% in RY12). The decrease of local hunter participation was likely a result of liberalizing the registration hunt on the south end of the island and the elimination of drawing hunts in this area during the RY10 regulatory year.

We have reached a pivotal point in goat management on Kodiak Island as the population occupies much of the suitable habitat across the island, yet continues to expand in many areas. We are shifting our emphasis from facilitating range expansion and increased densities to limiting the population to a level that will provide sustained hunting opportunities while maintaining habitat quality. The addition of late season registration hunts has enhanced our ability to increase hunter opportunity and stabilize goat numbers, but we must consider other alternatives if these measures are insufficient. We must take into consideration habitat, hunting, and goat-viewing opportunities along the Kodiak road system and develop socially and biologically acceptable ways of balancing these potentially conflicting factors.

We recommend changes to our management strategy to reflect this shift in management objectives. The new recommendations are as follows:

Management Goal:

➢ Maintain a population of 1,000–2,500 goats island-wide, distributed in a manner that will provide sustained hunting opportunities while maintaining habitat quality.

To achieve this goal, we recommend the following management actions:

- Continue island-wide population trend surveys at a frequency to detect changes in population demographics.
- Work with Kodiak National Wildlife Refuge to expand the current radio-telemetry study investigating goat distribution, movements and resource use.
- Develop a habitat suitability model for the Kodiak Island goat population.
- Evaluate applicability of current goat hunt boundaries and develop harvest rates that will maintain habitat quality while preserving hunting opportunities.
- Work with hunters and nonconsumptive users to explore methods of establishing areas where goats can regularly be seen from the Kodiak road system.

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Table 1. Unit 8 aerial summer mountain goat composition counts and estimated population size within permit hunt areas, regulatory years 2004–2012.

Hunt Area	Regulatory Year	Adults (%)	Kids (%)	Kids: 100 adults	Total goats observed	Goats/ hour	Estimated population size
All	2004	519 (81)	125 (19)	24	644	132	1,560
permit	2005	1,367 (81)	319 (19)	23	1,686	85	1,900
hunt areas	2006	472 (82)	105 (18)	22	577	125	1,780
	2007	1,390 (83)	284 (17)	20	1,674	--	1,910
	2008	1,607 (81)	368 (19)	23	1,975	88	2,145
	2009	814 (79)	214 (21)	26	1,028	190	2,371
	2010	804 (85)	146 (15)	18	950	--	2,320
	2011	1963 (83)	401 (17)	20	2,364	--	2,426
	2012	1041 (82)	224 (18)	22	1,265	--	2,390
DG/RG 471	2004	158 (84)	31 (16)	20	189	195	200
Wild Creek	2005	145 (81)	35 (19)	24	180	168	190
Center Mtn	2006	103 (86)	17 (14)	17	120	--	140
	2007	137 (88)	18 (12)	13	155	--	175
	2008	72 (84)	14 (16)	19	86	--	110
	2009	114 (72)	44 (28)	39	158	--	160
	2010	102 (82)	23 (18)	23	125	--	125
	2011	103 (84)	20 (16)	19	123	--	130
	2012	108 (84)	21 (16)	19	129	--	130
DG/RG 472	2004	--	--	--	--	--	50
Crown Mtn	2005	21 (84)	4 (16)	19	25	--	30
	2006	31 (79)	8 (21)	26	39	--	40
	2007	--	--	--	--	--	40
	2008	30 (88)	4 (12)	13	34	--	40
	2009	37 (84)	7 (16)	19	44	--	50
	2010	--	--	--	--	--	50
	2011	39 (100)	0 (0)	0	39	--	50
	2012	19 (86)	3 (14)	16	22	--	40
DG/RG 473	2004	81 (87)	12 (13)	15	93	48	60
Hidden	2005	39 (80)	10 (20)	26	49	--	50
Basin	2006	30 (86)	5 (14)	17	35	--	60
Terror Lake	2007	45 (92)	4 (8)	9	49	49	60
	2008	51 (86)	8 (14)	16	59	59	60
	2009	49 (82)	11 (18)	22	60	--	75
	2010	--	--	--	--	--	75
	2011	57 (86)	9 (14)	16	66	--	70
	2012	48 (87)	7 (13)	15	55	--	60

Table 1 continued.

Area	Regulatory year	Adults (%)	Kids (%)	Kids: 100 adults	Total goats observed	Goats/ hour	Estimated population size
DG/RG 474	2004	--	--	--	--	--	120
Uganik River	2005 [a]	91 (81)	22 (19)	24	113	72	140
	2006	--	--	--	--	--	130
	2007	43 (81)	10 (19)	23	53	--	130
	2008	95 (82)	21 (18)	22	116	--	130
	2009	234 (86)	37 (14)	16	271	--	271
	2010	--	--	--	--	--	250
	2011	201 (83)	40 (17)	20	241	--	250
	2012 [a]	55 (83)	11 (17)	20	66	--	250
DG/RG 475	2004	--	--	--	--	--	300
Zachar River	2005	438 (81)	104 (19)	24	542	108	550
	2006	--	--	--	--	--	500
	2007	504 (84)	98 (16)	19	602	--	600
	2008	526 (85)	95 (15)	18	621	--	630
	2009	--	--	--	--	--	630
	2010 [a]	206 (87)	32 (13)	16	238	--	650
	2011	543 (83)	109 (17)	20	652	--	652
	2012	473 (82)	107 (18)	23	580	--	650
DG/RG 476	2004	95 (81)	23 (19)	24	118	--	130
Kiliuda Bay	2005	74 (86)	12 (14)	16	86	--	120
	2006	--	--	--	--	--	120
	2007	--	--	--	--	--	120
	2008	--	--	--	--	--	120
	2009	89 (86)	15 (14)	17	104	--	125
	2010	--	--	--	--	--	125
	2011	661 (82)	148 (18)	22	809	--	809
	2012 [a]	47 (81)	11 (19)	23	58	--	800
DG/RG 477	2004	--	--	--	--	--	300
Southwest	2005 [a]	302 (84)	59 (16)	20	361	97	400
Kodiak	2006	--	--	--	--	--	400
	2007	319 (80)	82 (20)	26	401	--	430
	2008	503 (79)	137 (21)	27	640	--	660
	2009	--	--	--	--	--	660
	2010 [a]	202 (90)	22 (10)	11	224	--	660
	2011	661 (82)	148 (18)	22	809	--	809
	2012 [a]	47 (81)	11 (19)	23	58	--	800

Table 1 continued.

Area	Regulatory year	Adults (%)	Kids (%)	Kids: 100 adults	Total goats observed	Goats/ hour	Estimated population size
DG/RG 478	2004	186 (76)	58 (24)	31	244	134	250
South Road	2005	174 (79)	46 (21)	26	220	144	230
System	2006	170 (77)	51 (23)	30	221	149	225
	2007	117 (80)	29 (20)	25	146	--	175
	2008	156 (76)	50 (24)	32	206	--	230
	2009	179 (73)	67 (27)	37	246	--	250
	2010	168 (81)	39 (19)	23	207	188	220
	2011	163 (79)	43 (21)	26	206	--	220
	2012	165 (82)	37 (18)	22	202	--	220
DG/RG 479	2004	94 (80)	24 (20)	26	118	--	120
North Road	2005	157 (80)	39 (20)	25	196	--	200
System	2006	138 (85)	24 (15)	17	162	--	165
	2007	130 (84)	25 (16)	19	155	--	170
	2008	92 (78)	26 (22)	28	118	--	145
	2009	112 (77)	33 (23)	29	145	--	150
	2010	126 (81)	30 (19)	24	156	208	165
	2011	97 (80)	24 (21)	25	121	--	130
	2012	126 (82)	27 (18)	21	153	--	150

[a] Partial survey

Table 2. Unit 8 mountain goat harvest data by drawing permit hunt, regulatory years 2004 through 2012.

Hunt Area	Regulatory Year	Permits Issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Males (%)	Female (%)	Unknown	Illegal	Total harvest
All drawing permit hunts	2004 [a]	338	39	34	66	88 (67)	43 (33)	1	1	133
	2005 [a]	340	38	33	67	84 (60)	55 (40)	0	0	139
	2006 [b]	498	43	45	55	95 (62)	59 (38)	1	0	155
	2007 [a]	500	47	50	50	89 (68)	41 (32)	1	0	131
	2008 [a]	499	46	52	48	80 (63)	46 (37)	2	1	129
	2009	493	54	36	64	92 (64)	51 (36)	1	1	145
	2010	237	49	56	44	33 (62)	20 (38)	0	0	53
	2011	239	40	45	55	58 (73)	21 (27)	0	0	79
	2012	254	49	52	48	43 (70)	18 (30)	1	0	62
DG 471 Wild Creek-Center Mountain	2004 [a]	40	42	45	55	6 (50)	6 (50)	0	0	12
	2005 [a]	40	58	35	65	6 (55)	5 (45)	0	0	11
	2006 [a]	40	38	52	48	7 (58)	5 (42)	0	0	12
	2007 [a]	39	28	64	36	4 (40)	6 (60)	0	0	10
	2008 [a]	40	45	73	27	5 (83)	1 (17)	0	0	6
	2009	40	58	65	35	5 (83)	1 (17)	0	0	6
	2010	30	45	81	19	1 (33)	2 (67)	0	0	3
	2011	30	53	71	29	4 (100)	0	0	0	4
	2012	35	71	60	40	2 (50)	2 (50)	0	0	4
DG 472 Crown Mountain	2004 [a]	10	60	25	75	3 (100)	0 (--)	0	0	3
	2005 [a]	12	58	20	80	2 (50)	2 (50)	0	0	4
	2006 [a]	10	60	25	75	3 (100)	0	0	0	3
	2007 [a]	10	70	0	100	3 (100)	0	0	0	3
	2008 [a]	10	20	50	50	3 (75)	1 (25)	0	0	4
	2009	10	80	0	100	2 (100)	0	0	0	2
	2010	11	73	0	100	1 (33)	2 (67)	0	0	3
	2011	12	36	57	43	2 (67)	1 (33)	0	0	3
	2012	12	58	0	100	3 (60)	2 (40)	0	0	5

Table 2 Continued.

Hunt Area	Regulatory year	Permits Issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Males (%)	Female (%)	Unknown	Illegal	Total harvest
DG 473	2004	8	0	38	62	3 (60)	2 (40)	0	0	5
Hidden	2005	8	50	0	100	2 (50)	2 (50)	0	0	4
Basin-	2006	10	40	0	100	4 (67)	2 (33)	0	0	6
E. Terror	2007	10	40	17	83	4 (80)	1 (20)	0	0	5
Lake	2008	10	40	50	50	1 (33)	2 (67)	0	0	3
	2009	10	60	56	50	2 (100)	0 (0)	0	0	2
	2010	12	75	67	33	1 (100)	0 (0)	0	0	1
	2011	12	42	57	43	2 (67)	1 (33)	0	0	3
	2012	12	50	33	67	3 (75)	1 (25)	0	0	4
DG 474	2004	15	33	30	70	6 (86)	1 (14)	0	0	7
Uganik	2005	15	27	9	91	8 (80)	2 (20)	0	0	10
River	2006	20	40	25	75	8 (89)	1 (11)	0	0	9
	2007	21	48	36	64	5 (71)	2 (29)	0	0	7
	2008	20	40	42	58	3 (43)	4 (57)	0	0	7
	2009	20	20	38	62	9 (90)	1 (10)	0	0	10
	2010	30	67	50	50	4 (80)	1 (20)	0	0	5
	2011	30	60	25	75	8 (89)	1 (11)	0	0	9
	2012	40	58	53	47	6 (75)	2 (25)	0	0	8
DG 475[b]	2004	90	51	49	51	17 (77)	5 (23)	0	0	22
Zachar	2005	90	44	50	50	11 (46)	13 (54)	0	0	24
River	2006	179	47	59	41	21 (55)	17 (45)	0	0	38
	2007	180	57	54	46	25 (74)	9 (26)	1	0	35
	2008	180	58	64	36	22 (81)	5 (19)	0	0	27
	2009	180	65	39	61	23 (61)	15 (39)	0	0	38

Table 2 continued.

Hunt Area	Regulatory year	Permits Issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Males (%)	Female (%)	Unknown	Illegal	Total harvest
DG 476	2004	20	63	43	57	4 (100)	0 (--)	0	0	4
Kiliuda	2005	20	50	33	67	5 (83)	1 (17)	0	0	6
Bay	2006	20	50	60	40	1 (25)	3 (75)	0	0	4
	2007	20	30	57	43	5 (83)	1 (17)	0	0	6
	2008	20	65	0	100	5 (71)	2 (29)	0	0	7
	2009	20	52	22	78	5 (71)	2 (29)	0	0	7
	2010	30	59	77	23	1 (33)	2 (67)	0	0	3
	2011	30	33	45	55	9 (82)	2 (18)	0	0	11
	2012	30	43	82	18	3 (100)	0 (--)	0	0	3
DG 477[b]	2004	60	52	14	86	20 (83)	4 (17)	0	0	24
Deadman	2005	60	40	31	69	13 (52)	12 (48)	0	0	25
Bay	2006	110	46	44	56	21 (64)	12 (36)	0	0	33
	2007	110	54	38	62	23 (74)	8 (26)	0	0	31
	2008	110	46	42	58	20 (61)	13 (39)	1	0	34
	2009	110	59	31	69	16 (52)	15 (48)	0	1	32
DG 478	2004	80	14	29	71	24 (52)	22 (48)	1	1	48
South	2005	80	21	31	69	29 (69)	13 (31)	0	0	42
Road	2006	59	29	37	63	15 (58)	11 (42)	0	0	26
System	2007	60	32	42	58	14 (61)	9 (39)	0	0	23
	2008	59	25	50	50	13 (59)	9 (41)	0	1	23
	2009	60	35	30	70	18 (72)	7 (28)	1	0	26
	2010	75	42	40	60	15 (60)	10 (40)	0	0	25
	2011	76	34	44	56	17 (61)	11 (39)	0	0	28
	2012	75	37	45	55	20 (77)	6 (23)	0	0	26

Table 2 continued.

Hunt Area	Regulatory year	Permits Issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Males (%)	Female (%)	Unknown	Illegal	Total harvest
DG 479	2004	15	13	38	62	5 (63)	3 (37)	0	0	8
North	2005	15	0	13	87	8 (62)	5 (38)	0	0	13
Road	2006	50	34	30	70	15 (65)	8 (35)	1	0	24
System	2007	50	32	68	32	6(55)	5 (45)	0	0	11
	2008	50	30	47	53	8 (47)	9 (53)	1	0	18
	2009	50	31	35	65	12 (55)	10 (45)	0	0	22
	2010	49	31	62	38	10 (77)	3 (23)	0	0	13
	2011	50	32	38	62	16 (76)	5 (24)	0	0	21
	2012	50	47	56	46	6 (55)	5 (45)	1	0	12

[a] Season Dates: 1 September–31 October
[b] DG475 and DG477 were combined in 2010-11 and merged into RG480

Table 3. Unit 8 mountain goat harvest data by registration permit hunt, regulatory years 2004 through 2012.

Hunt Area	Regulatory year	Permits Issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Males (%)	Female (%)	Unknown	Illegal	Total harvest
All registration permit hunts	2004	127	51	74	26	11 (69)	5 (31)	0	0	16
	2005	175	66	83	17	6 (60)	4 (40)	0	0	10
	2006	133	66	62	38	9 (53)	8 (47)	0	0	17
	2007	178	60	75	25	12 (71)	5 (29)	0	0	17
	2008	212	61	69	30	19 (76)	6 (24)	0	0	25
	2009	376	58	71	29	28 (62)	17 (38)	1	1	47
	2010	627	55	66	34	66 (69)	29 (31)	0	0	95
	2011	502	53	65	35	56 (68)	26 (32)	0	0	82
	2012	574	50	67	33	62 (67)	30 (33)	1	0	93
RG471	2004	12	75	100	0	0	0	0	0	0
	2005	16	81	100	0	0	0	0	0	0
	2006	7	100	0	0	0	0	0	0	0
	2007	12	100	0	0	0	0	0	0	0
	2008	10	100	0	0	0	0	0	0	0
	2009	1	100	0	0	0	0	0	0	0
	2010	10	100	0	0	0	0	0	0	0
	2011	3	100	0	0	0	0	0	0	0
	2012	1	100	0	0	0	0	0	0	0
RG472	2004	6	67	50	50	1 (100)	0	0	0	1
	2005	8	100	0	0	0	0	0	0	0
	2006	3	0	0	0	0	0	0	0	0
	2007	5	80	100	0	0	0	0	0	0
	2008	7	100	0	0	0	0	0	0	0
	2009	1	100	0	0	0	0	0	0	0
	2010	11	100	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0
	2012	0	0	0	0	0	0	0	0	0

Table 3 Continued.

Hunt Area	Regulatory year	Permits Issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Males (%)	Female (%)	Unknown	Illegal	Total harvest
	2004	10	80	100	0	0	0	0	0	0
RG473	2005	10	80	100	0	0	0	0	0	0
	2006 [b]	0	0	0	0	0	0	0	0	0
	2007	13	77	33	67	2 (100)	0	0	0	2
	2008	13	100	0	0	0	0	0	0	0
	2009	2	100	0	0	0	0	0	0	0
	2010	11	82	50	50	1 (100)	0	0	0	1
	2011	0	0	0	0	0	0	0	0	0
	2012	0	0	0	0	0	0	0	0	0
RG474	2004	1	100	0	0	0	0	0	0	0
	2005	0	0	0	0	0	0	0	0	0
	2006	1	0	100	0	0	0	0	0	0
	2007	3	100	0	0	0	0	0	0	0
	2008	2	100	0	0	0	0	0	0	0
	2009	1	100	0	0	0	0	0	0	0
	2010	9	89	100	0	0	0	0	0	0
	2011	1	0	0	100	1 (100)	0	0	0	1
	2012	0	0	0	0	0	0	0	0	0
RG475 [c]	2004	21	38	77	23	3 (100)	0	0	0	3
	2005	19	88	50	50	1 (100)	0	0	0	1
	2006	10	100	0	0	0	0	0	0	0
	2007	12	50	83	17	1 (100)	0	0	0	1
	2008	13	33	63	37	1 (33)	2 (67)	0	0	3
	2009	--	--	--	--	--	--	--		

Table 3 continued.

Hunt Area	Regulatory year	Permits Issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Males (%)	Female (%)	Unknown	Illegal	Total harvest
RG476	2004	15	67	80	20	1 (100)	0	0	0	1
	2005	10	80	50	50	1 (100)	0	0	0	1
	2006	25	88	100	0	0	0	0	0	0
	2007	23	65	63	37	1 (33)	2 (67)	0	0	3
	2008	31	44	53	47	5 (71)	2 (29)	0	0	7
	2009	12	42	0	0	0	0	0	0	0
	2010	8	63	67	33	1 (100)	0	0	0	1
	2011	0	0	0	0	0	0	0	0	0
	2012	18	17	71	29	1 (50)	1 (50)	0	0	2
RG477[c]	2004	27	27	63	37	4 (57)	3 (43)	0	0	7
	2005	30	62	55	45	2 (40)	3 (60)	0	0	5
	2006	40	55	50	50	6 (67)	3 (33)	0	0	9
	2007	29	48	53	47	7 (100)	0	0	0	7
	2008	43	51	69	31	5 (83)	1 (17)	0	0	6
	2009	--	--	--	--	--	--	--		

Table 3 continued.

Hunt Area	Regulatory year	Permits Issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Males (%)	Female (%)	Unknown	Illegal	Total harvest
RG478	2004	22	59	100	0	0	0	0	0	0
	2005	42	60	94	6	0	1 (100)	0	0	1
	2006	47	51	65	45	3 (38)	5 (62)	0	0	8
	2007	44	56	89	11	0	2 (100)	0	0	2
	2008	47	63	81	19	2 (67)	1 (33)	0	0	3
	2009	54	54	68	32	5 (63)	3 (37)	1	0	9
	2010	60	62	74	26	3 (50)	3 (50)	0	0	6
	2011	59	32	89	11	2 (67)	1 (33)	0	0	3
	2012	70	39	87	13	4 (100)	0	0	0	4
RG479	2004	13	31	56	44	2 (50)	2 (50)	0	0	4
	2005	40	48	90	10	2 (100)	0	0	0	2
	2006 [b]	0	0	0	0	0	0	0	0	0
	2007	37	53	88	12	1 (50)	1 (50)	0	0	2
	2008	46	52	73	27	6 (100)	0	0	0	6
	2009	31	77	100	0	0	0	0	0	0
	2010	57	70	88	12	0	2 (100)	0	0	2
	2011	0	0	0	0	0	0	0	0	0
	2012	70	66	79	21	3 (75)	1 (25)	1	0	5
RG480	2009	274	57	68	32	23 (62)	14 (38)	0	1	38
	2010	461	49	63	37	61 (72)	24 (28)	0	0	85
	2011	439	52	61	38	53 (68)	25 (32)	0	0	78
	2012	415	47	63	37	54 (66)	28 (34)	0	0	82

[a] Hunting areas RG472 and RG479 closed by emergency order 31 October 2003
[b] Hunting areas RG473 and RG479 closed by emergency order 26 October 2006
[c] RG475 and RG477 were curtailed in 2009-10 and merged into RG480
[d] Hunting areas RG472, RG473, RG476 and RG479 closed by emergency order 25 October 2011
[e] Hunting areas RG472 and RG473 closed by emergency order 1 November 2012

Table 4. Residence and success of hunters participating in Unit 8 mountain goat drawing/registration hunts, regulatory years 2004 through 2012.

	Successful					Unsuccessful					
Regulatory year[a]	Local resident	Nonlocal resident	Nonresident	Total	(%)	Local resident	Nonlocal resident	Nonresident	Total	(%)	Total hunters
2004	79	52	17	148	(57)	76	35	2	113	(43)	261
2005	68	67	15	150	(57)	59	53	2	114	(43)	264
2006	58	74	39	171	(52)	59	89	9	157	(48)	328
2007	45	76	27	148	(45)	81	91	11	183	(55)	331
2008	46	71	34	151	(44)	81	100	13	194	(56)	345
2009	48	107	35	190	(50)	70	118	3	191	(50)	381
2010	46	67	35	148	(37)	96	137	17	250	(63)	398
2011	53	79	29	161	(43)	73	128	15	216	(57)	377
2012	46	76	33	155	(38)	84	142	25	251	(62)	406

[a] Permits issued: 2004–05 - 465; 2005–06 - 515; 2006–07 - 631; 2007–08 - 678; 2008–09 - 711; 2009–10 - 869; 2010–11 - 864; 2011–12 - 741; 2011–12 - 827

Table 5. Unit 8 mountain goat harvest mean age data from horn annuli, regulatory years 2004 through 2012.

Regulatory Year	Males	(n)	Females	(n)
2004	4.5	(76)	4.9	(30)
2005	4.6	(52)	5.7	(32)
2006	4.6	(68)	4.5	(38)
2007	4.6	(80)	4.4	(30)
2008	4.6	(68)	5.1	(33)
2009	4.6	(78)	5.2	(37)
2010	5.0	(43)	6.4	(13)
2011	4.4	(58)	4.6	(22)
2012	4.5	(51)	6.6	(23)

Table 6. Unit 8 mountain goat harvest chronology percent by time period, regulatory years 2004 through 2012.

		Harvest periods					
Area	Regulatory year	Aug	Sep	Oct	Nov	Dec	*n*
All	2004	9	30	50	4	7	148
permit	2005	12	34	48	3	3	147
hunts	2006	11	32	47	6	4	170
	2007	13	34	42	7	4	147
	2008	16	32	35	14	3	150
	2009	13	28	35	18	6	186
	2010	11	16	53	17	3	148
	2011	8	29	50	12	1	160
	2012	8	18	60	11	3	154

[a] Drawing hunt season changed and registration hunt established.

Table 7. Unit 8 mountain goat hunter transport method (%), regulatory years 2004 through 2012.

Regulatory year	Transportation method							Total
	Aircraft	Boat	3 or 4 Wheeler	ORV	Highway vehicle	Snow-machine	Unknown	
2004	97 (37)	54 (21)	32 (12)	4 (2)	66 (25)	0 (--)	8 (3)	261
2005	111 (42)	23 (9)	43 (16)	6 (2)	56 (21)	0 (--)	25 (10)	264
2006	176 (54)	34 (10)	31 (10)	6 (2)	67 (20)	0 (--)	14 (4)	328
2007	148 (45)	57 (17)	34 (10)	4 (1)	81 (25)	0 (--)	7 (2)	331
2008	144 (42)	73 (21)	22 (6)	4 (1)	93 (27)	1 ((<1)	9 (3)	346
2009	181 (48)	89 (23)	24 (6)	1 (<1)	79 (21)	0 (--)	7 (2)	381
2010	171 (43)	102 (26)	22 (6)	5 (<1)	91 (23)	0 (--)	7 (2)	398
2011	150 (40)	108 (29)	17 (4)	5 (<1)	78 (21)	1 ((<1)	19 (5)	378
2012	171 (42)	96 (24)	23 (6)	3 (<1)	86 (21)	0 (--)	27 (7)	406

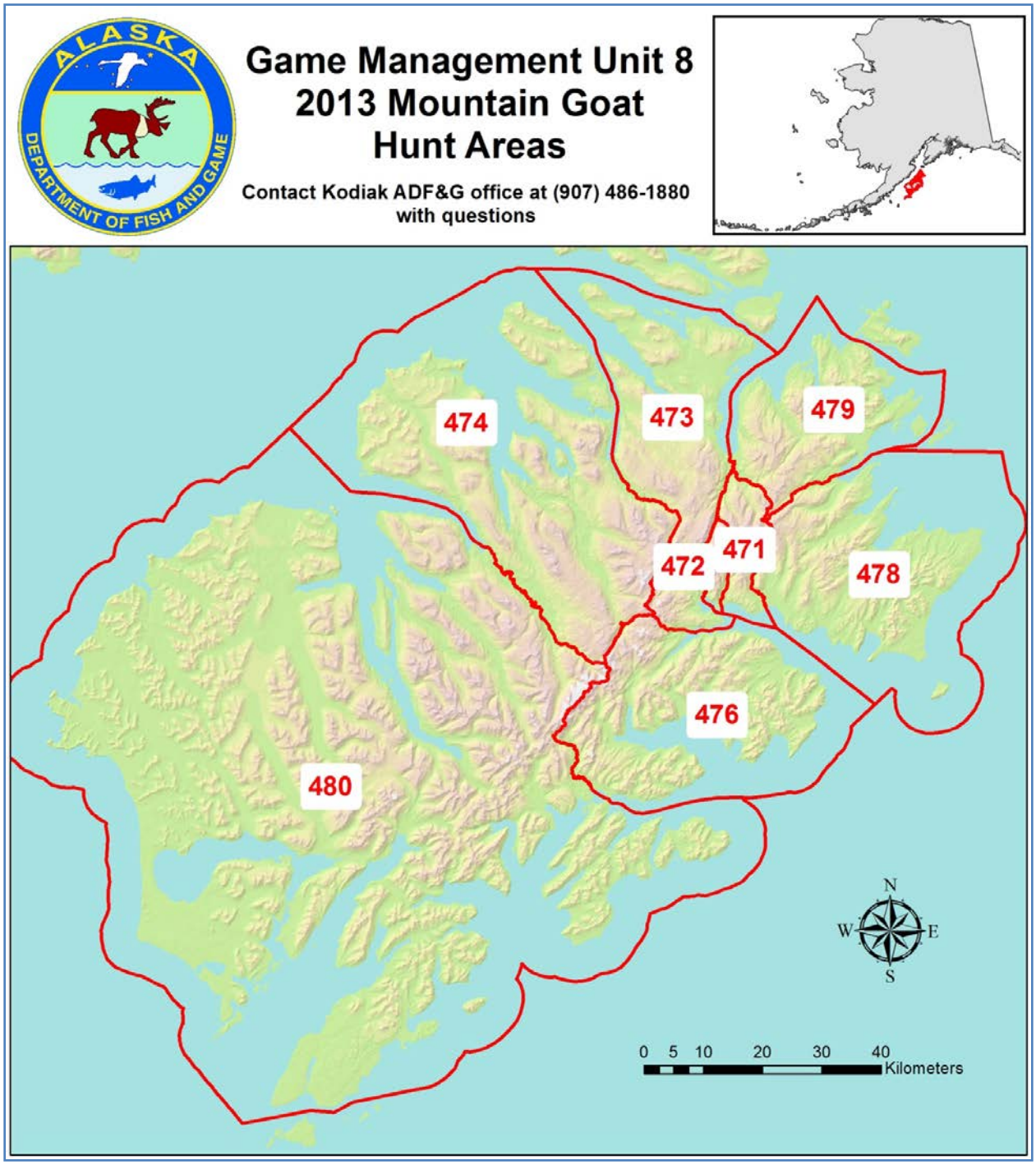

Figure 1. Kodiak Island mountain goat (*Oreamnos americanus*) hunt areas 2012-2013, Kodiak Island, Alaska.

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 11 (12,784 mi^2)

GEOGRAPHIC DESCRIPTION: Wrangell Mountains

BACKGROUND

The principal mountain goat habitat in Unit 11 can be found east of McCarthy in the glacial drainages along the Chitina River and in the Chugach Mountains south of the Chitina River. Harvest data for mountain goats in Unit 11 were first collected in 1972. Since regulatory year (RY) 1980 (RY80 = 1 July 1980 through 30 June 1981), a range of 3–30 mountain goats have been harvested annually in Unit 11.

The Wrangell Mountains and the eastern Chugach Mountains in Unit 11 were designated National Monument lands in 1978. Wrangell–St. Elias National Park and Preserve (WRST) was established in 1980, leaving very little state and private land remaining within Unit 11. The National Park Service administers a subsistence goat registration hunt for local residents in WRST, and an average of 2 goats have been harvested annually since the establishment of this hunt in 1998. The majority of goats harvested in Unit 11 are taken under state harvest regulations in the preserve portion of the WRST.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain an annual harvest of up to 10% of the estimated goat population.

METHODS

Department personnel conduct composition counts from fixed-wing aircraft annually to determine mountain goat sex and age composition, in addition to population trends. The MacColl Ridge count area, located north of the Chitina River, was designated a dedicated mountain goat trend count area in 1970. Additional mountain goat population data are collected in conjunction with Unit 11 Dall sheep surveys. Harvest and hunting effort data are collected through mandatory hunter reports, and harvest is controlled by registration permit.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The goat population, as indicated by the MacColl Ridge count area (CA 21) results maintained steady growth through the late 1990s. The population remained stable between 2000 and 2010. While no data are available for 2011, a record total of 82 goats were observed in 2012, an increase of 24% from the 66 goats counted in 2010 (Table 1). While this increase may indicate a degree of population growth, count fluctuations between years may also reflect the difficulty of surveying mountain goat populations. A survey was attempted in late June 2013, though summer leaf-out made detecting goats difficult, resulting in only 28 goats being observed.

An estimated 700 goats inhabit the southern Wrangell and Chugach Mountains in Unit 11. This estimate was obtained by combining results from surveys conducted between 1973 and 1984 in different Unit 11 count areas. If a count area was surveyed more than once, the highest count was used in the population estimate. This estimate has not been updated because goat counts over much of the unit have not been repeated due to budget constraints. Although the MacColl Ridge trend count area has shown no indication of population decline, declines are suspected in some areas and the overall population may be below this estimate.

Population Composition

The 2012 count of 15 kids (Table 1) was lower than the record of 20 in 2007, but consistent with the average of 14 kids observed during the previous 10 surveys (2002–2012). The ratio of 22 kids:100 adults in 2012 was lower than the 29 kids:100 adults observed during the most recent previous survey in 2010. While recruitment has fluctuated yearly, average recruitment has been more than adequate to maintain the overall population at a level sufficient to provide an annual harvest.

Distribution and Movements

In the past, observers have tallied approximately 400 mountain goats during aerial surveys in the Wrangell Mountains, north of the Chitina River between the Cheshnina River and the Canadian border. The Kennicott, Hawkins, and Barnard glaciers, MacColl Ridge, and McCarthy Creek supported the largest number of animals. Nearly 300 goats have been counted south of the Chitina River in that portion of the Chugach Mountains from the Copper River east to the Canadian border.

Information on movement is limited, and major rutting and kidding areas are unknown. Field observations indicate seasonal altitudinal movements; goats often use lower elevations during the winter. East–west movements also occur; animals have been observed traveling between the Kotsina and Kuskulana rivers and between Kennicott Glacier and McCarthy Creek. In 2013, department staff observed 5 goats west of the Chakina River, and south of the Chitina River, an area previously unknown to have goats.

MORTALITY

Harvest

Seasons and Bag Limits. The state mountain goat season in Unit 11 was 1 September–30 November for residents and nonresidents. The bag limit was 1 goat by registration permit only (RG580). The taking of nannies with kids was prohibited, and the taking of males encouraged. Nonresident goat hunters are required to hunt with a guide or a next-of-kin, resident hunter. The average harvest since RY01 has been 9 goats. Hunters killed 12 and 3 mountain goats in RY11 and RY12, respectively (Table 2). During RY11, the harvest included 8 billies (73%) and 3 nannies (27%), with 3 billies (100%) and no nannies harvested in RY12. Billies have accounted for 79% of the harvest over the last 10 years, likely as a result of their trophy value to hunters.

Board of Game Actions and Emergency Orders. Starting in RY07 the southeast portion of the Chugach Mountains south of the Tiekel River and east of a line beginning at the confluence of the Tiekel and Tsina rivers in Unit 13D was added to the Unit 11 mountain goat registration hunt RG580 through Board of Game action. This area was underutilized under the Unit 13D drawing permit. Interest in this area has been variable, with 7 goats taken in RY10, but none taken during RY11 or RY12.

Hunter Residency and Success. There were 59 state registration hunt (RG 580) permits issued in 2011 and 29 in 2012 (Table 2). The hunting effort reported by Unit 11 goat hunters has changed little each year, averaging 3–6 days of hunting per hunter. In RY11, successful hunters reported spending 4.3 days in the field, with unsuccessful hunters expending 5.9 days. Nonlocal resident hunters harvested the majority of goats during this reporting period, 75% in RY11 and 100% in RY12 (Table 3), ending a trend established in RY05 of greater nonresident success.

Harvest Chronology. During RY11 and RY12, 84% and 100% of the mountain goat harvest occurred during the first 3 weeks of the season. A high harvest in the first 3 weeks of September is consistent with recent chronology data for this hunt, and may be attributed to hunters combining sheep and goat hunts. If hunters were pursuing goats as their primary objective, more goats would likely be harvested later in the season and when goats are at lower elevations, easier to access, and have longer hair.

Transport Methods. The predominate means of transportation for successful hunters during the reporting period was aircraft (Table 5). Other means of transportation reported in the past include boat, highway vehicle, horse, and off-road vehicle. Transportation methods in Unit 11 have changed little over the years, with aircraft being the most often utilized means of transportation for successful hunters over the last 25 years.

Other Mortality

Little is known about predation on mountain goats in Unit 11. However, predation on goats by wolves has been reported anecdotally by local residents. Carnivore predation on mountain goats undoubtedly occurs, and may be common, though no rates of predation have been determined.

HABITAT

Assessment

The Wrangell Mountains and northwestern portion of the Chugach Mountains are part of the northernmost extent of mountain goat range in Alaska. Goat habitat is limited. A substantial number of goats live north of the Chitina River, from the Lakina River to the Canadian border. The remainder of the Wrangell Mountains west of the Lakina River is marginal goat habitat. Goat habitat in the Chugach Range south of the Chitina River may be more suitable. Overall, mountain goat densities in Unit 11 are much lower than in areas with more favorable habitat, such as the Kenai Peninsula or Southeast Alaska.

CONCLUSIONS AND RECOMMENDATIONS

Interpretation of annual survey data is difficult because we do not know if small annual changes in the number of goats observed on MacColl Ridge reflect actual population fluctuations or survey variables. MacColl Ridge is isolated for the most part, so movement is not considered a major factor in observed fluctuations. Counts are conducted at approximately the same time each year in an attempt to minimize the effect of seasonal altitudinal movements of goats on survey results. Mountain goats are among the most difficult big game species to count because of vegetation and rugged terrain in the trend count areas. Also, the behavioral response of mountain goats to approaching aircraft is to hide in caves, under ledges, and in dense vegetation. Goats were hunted throughout their range during the 1970s, and past hunting pressure has been greater than in recent times. National Park Service and Federal Subsistence Board hunting regulations now restrict nonsubsistence goat hunting to national preserve lands around McCarthy, MacColl Ridge, and Hawkins and Barnard glaciers. MacColl Ridge receives some of the heaviest hunting pressure in the unit, especially for guided hunts, and accounts for the most goats taken. However, during this report period, harvests were not concentrated enough in any one area, including MacColl Ridge, to result in localized overharvests. One benefit of having the Unit 11 goat harvest concentrated on federal lands is the exclusive guide use system still employed there. One guide has a much better chance to minimize overhunting if no other guides are competing for the same animals.

Goat harvest rates in more popular hunting areas of Unit 11 are, on occasion, as high as 10% of the observed population. This rate of harvest is probably sustainable because observed counts represent a minimum population estimate. However, heavy harvests from MacColl Ridge and Barnard and Hawkins glaciers during periods with low kid recruitment or increased predation could result in a decline in the goat population in those areas. In addition to the yearly trend count on MacColl Ridge, goats should be surveyed periodically in heavily hunted areas such as Hawkins and Barnard glaciers. Harvest rates have not been a recent concern in other areas in the unit. The annual harvest from Unit 11 should not exceed 35 goats for more than 1 year; if it does, we should recommend regulation changes to reduce the harvest.

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Robbins, W.F. 2014. Unit 11 mountain goat management report. Pages 148–154 [*In*] P. Harper, editor, Mountain goat management report of survey and inventory activities 1 July 2011–30 June 2013. Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/SMR 2014-3, Juneau.

Table 1. Unit 11 MacColl Ridge trend count area (CA 21) mountain goat composition counts and estimated population size, calendar years 2009 through 2013.

Area	Calendar Year	Adults (%)	Kids (%)	Unk.	Kids: 100 adults	Total goats observed	Estimated population size[a]
MacColl Ridge	2009	48 (81)	11 (19)	0	23	59	59
	2010	51 (77)	15 (23)	0	29	66	66
	2011	No survey					
	2012	67 (82)	15 (18)	0	22	82	82
	2013[b]	No survey					

[a] Estimate considered to be total count because all goat habitat on ridge counted.
[b] Survey was conducted after leaf-out, making goat observations difficult, only 28 goats (25 adults, 3 kids) were counted.

Table 2. Mountain goat harvest data by permit hunt, regulatory years 2008 through 2012.

Hunt	Regulatory year	Permits[a] issued	Percent[a] did not hunt	Percent[b] unsuccessful hunters	Percent[b] successful hunters	Males[b] (%)	Females[b] (%)	Unk.[b]	Illegal[b]	Total[b] harvest
RG580	2008	86	53	65	35	7 (58)	5 (42)	0	0	12
RG580	2009	63	43	59	41	9 (82)	2 (18)	0	0	11
RG580	2010	54	44	44	56	7 (70)	3 (30)	0	0	10
RG580	2011	59	47	56	44	8 (73)	3 (27)	1	0	12
RG580	2012	29	62	67	33	3 (100)	0	0	0	3

[a] Includes all RG580 permittees.
[b] Data includes only RG580 permittees that reported hunting in GMU 11.

Table 3. RG580 mountain goat hunter residency and success, regulatory years 2008 through 2012.

Regulatory year	Successful				Unsuccessful				Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Non-resident	Total (%)	
2008	1	5	6	12 (35)	2	14	6	22 (65)	34
2009	1	2	8	11 (41)	0	11	5	16 (59)	27
2010	1	3	6	10 (56)	2	4	2	8 (44)	18
2011	0	9	3	12 (44)	2	6	7	15 (56)	27
2012	0	3	0	3 (33)	1	4	1	6 (67)	9

[a] Local resident means resident of Unit 11, 13, or that portion of Unit 12 along the Nabesna Road.

Table 4. RG580 mountain goat harvest chronology percent by time period, regulatory years 2008 through 2012.

Regulatory year	September				October					
	1–7	8–15	16–23	24–30	1–7	8–15	16–23	24–31	1–30	*N*
2008	25	25	18	42	--	--	--	--	--	12
2009	36	9	18	9	19	18	--	--	--	11
2010	60	--	--	10	30	--	--	--	--	10
2011	42	--	42	--	16	--	--	--	--	12
2012	33	--	67	--	--	--	--	--	--	3

Table 5. RG580 mountain goat harvest percent by transport method, regulatory years 2008 through 2012.

Regulatory year	Percent of harvest							
	Airplane	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Horse	*n*
2008	83	--	--	--	--	--	17	12
2009	91	9	--	--	--	--	--	11
2010	100	--	--	--	--	--	--	10
2011	82	9	--	--	--	9	--	11
2012	100	--	--	--	--	--	--	3

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 13D

GEOGRAPHIC DESCRIPTION: Chugach Mountains

BACKGROUND

Mountain goat habitat in Unit 13 is found primarily in the glacial drainages of the central Chugach Mountains in Subunit 13D. Regulations for goats in Subunit 13D have varied over the years in efforts to maintain both the goat population and hunting opportunity. Seasons and bag limits were most liberal in the mid-1960s. In 1975 the bag limit for mountain goat in Subunit 13D was reduced from 2 goats to one, and 2 years later the area was closed to hunting. In regulatory year (RY) 1987 (RY87 = 1 July 1987 through 30 June 1988), Subunit 13D opened to a drawing permit hunt after a 10-year closure. The goat harvest was limited to billies for RY87 and RY88, but was expanded to either sex just prior to the RY89 season. Additional permit hunts have been added; two drawing permits are currently offered (DG718 and DG719), and the Board of Game added a portion of Subunit 13D to the hunt area for the Unit 11 registration permit hunt RG580, for hunts beginning in RY07. The mountain goat harvest in Subunit 13D is small but increasing.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain an annual harvest of up to 10% of the estimated goat population in Subunit 13D.

METHODS

Department personnel monitored age composition and population trends of goat populations through one dedicated goat aerial survey area, and in conjunction with sheep aerial surveys. Harvest and hunting effort data were collected through mandatory hunter reports, and harvest was controlled by draw or registration permit. Successful draw hunters were required to report their harvest within 10 days, while the mandatory reporting period for successful registration hunters was 5 days. Unsuccessful hunters participating in permit hunts were required to report within 15 days after the conclusion of the hunt.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Only one dedicated goat survey was flown in Subunit 13D during the period of this report. However, goat composition data was collected incidental to sheep surveys (Table 1). Due to infrequent or incomplete surveys, poor survey conditions, and challenges associated with conducting aerial wildlife surveys in montane habitats, it has been difficult to estimate the goat population for the central Chugach Mountains. An absence of consistent and comprehensive survey data makes detecting significant population trends difficult. However, the information available suggests that the goat population in Subunit 13D remains small and stable.

Age Distribution

Goats observed during aerial surveys were classified as kids or adults. Kids constituted 17% of the goats detected in 2011, and 15% in 2012 (Table 1). During the period of this report an average ratio of 18 kids:100 adults were observed.

Distribution and Movements

While the vast majority of mountain goats in Unit 13 are found in the central Chugach Mountains of Subunit 13D, goats are periodically observed in the Talkeetna Mountains in Subunit 13A, and a small number occur near Cantwell in the Chulitna Mountains. The terrain of the Talkeetna Mountains likely provides insufficient habitat overall to support a large goat population.

Mountain goats are distinctly adapted to rugged mountain habitats, featuring rocky broken terrain with steep cliffs. Topography of this type offers protection from predation, and goats are seldom observed far from areas that provide this escape terrain. Goat distribution during summer has been documented from aerial surveys. In summer, goats were found feeding in early mornings on grassy slopes adjacent to escape terrain. During midday goats seek relief from the heat in dense shrub cover, on ice fields or glaciers, and under rocky outcrops.

While seasonal differences in habitat use, including differences by sex, have been documented in mountain goats, seasonal habitat use is poorly understood in Subunit 13D. Though not well described within the subunit, lower elevation winter habitat is likely critical to the health of the goat population.

MORTALITY

Harvest

Seasons and Bag Limits. Starting in 2011 drawing hunts DG718 and DG719 were combined to make a single drawing hunt, DG720. The bag limit for DG720 was 1 goat, with the taking of nannies with kids prohibited. The taking of billies was encouraged. Guides were required for all nonresident goat hunters. The majority of goat hunting in Subunit 13D occurs during the drawing hunt from 10 August through 20 September. Additional hunting occurs in a small portion of Subunit 13D in registration hunt (RG580) 1 September–30 November. There is no open goat season in the remainder of Unit 13.

Alaska Board of Game Actions and Emergency Orders. There were no Board of Game actions during this reporting period.

Permit Hunts. A total of 35 drawing permits were issued each year of the report period in Subunit 13D. For the registration hunt that covers Unit 11 and includes an area of 13D (RG580), 59 permits were issued in RY11 and 29 in RY12. No information is available about how many of the permitted hunters intended to but did not hunt in Subunit 13D. Three of 30 RG580 hunters (10%) indicated that they hunted in Subunit 13D in RY11, and 2 of 11 (18%) in RY12.

A total of 11 goats were harvested under all hunts in Subunit 13D during the period, 8 in RY11 and 3 in RY12, including 10 billies (91%), and 1 nanny (9%). Ten billies were harvested under the DG720 permit, 8 in RY11 and 2 in RY12, and 1 nanny in RY12.

In RY07, a portion of the Subunit 13D drawing hunt DG719 was added to an existing registration hunt area (RG580) by Board of Game action. The area, which includes the region of Subunit 13D south of the Tiekel River and east of a line beginning at the confluence of the Tiekel and Tsina rivers. No goats were harvested within Subunit 13D under the RG580 during this reporting period (full harvest information for the RG580 hunt can be found in the Unit 11 goat species management report).

Hunter Residency and Success. Nonresidents harvested 18% of the goats during this reporting period, and no goats were harvested by local residents (Table 3). Nonlocal resident hunters harvested 88% of the goats in the DG720 hunt in RY11, and 67% in RY12. Local residents harvested no goats in Subunit 13D during this reporting period.

Harvest Chronology. During RY11, 63% of the draw harvest occurred within the first 3 weeks of the season, and 67% in RY12. Harvest chronology is primarily influenced by the time periods for each individual hunt, as well as the number of permits allotted. Weather plays an important role in the timing of hunts, and field conditions often deteriorate rapidly during the last weeks of October. However, goats may be more accessible to hunters later in the season after moving to lower elevations. Season dates for hunting other big game species may also affect timing of goat hunts.

Transport Methods. During the reporting period in Subunit 13D, all successful draw hunters reporting used airplanes, boats, or highway vehicles (Table 4).

Other Mortality

While carnivore predation on goats undoubtedly occurs, it is suspected that the mountain goat populations in Unit 13 are regulated primarily by winter weather. Goat population declines have been documented in Unit 13 following deep snowfalls.

HABITAT

Assessment

The central Chugach Mountains are within the northernmost extension of mountain goat range in Alaska. Goat habitat is limited in Subunit 13D, and habitat quality and availability have not been assessed.

CONCLUSIONS AND RECOMMENDATIONS

An average of 6 goats were harvested annually during the period of this report, 91% of which were males. One dedicated goat survey was conducted in Subunit 13D during this reporting period, although goats were also counted incidental to sheep surveys. Ideal sheep survey conditions are bright sun and limited cloud cover, whereas goats prefer cool overcast weather. Survey methods, therefore, may account for variation in the number of goats observed in different years. We recommend dedicated, comprehensive surveys be conducted for goats within Subunit 13D. Information available suggests that the goat population in Subunit 13D remains stable. The harvests within the drawing hunt areas have been low and consistent over time. There are no concerns with sustainability of these hunts.

Observations of goat populations suggest that both sexes use low-elevation areas extensively during the critical winter period. Understanding seasonal habitat selection is important in developing wildlife management strategies and devising protocols that may limit the effect of human disturbance on mountain goats. Commercial heli-ski guides operate in the central Chugach Mountains out of Thompson Pass. Heli-ski activities may create disturbances in critical mountain goat wintering or kidding areas. We recommend identifying important seasonal mountain goat habitat to help mitigate any negative goat population effects. Additionally, we recommend that helicopters should not hover over, circle, or harass goats in any way. Pilots should use flight paths that avoid mountain goats and their habitat, and helicopters should not land within any area known to be goat wintering habitat.

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Robbins, W. F. 2014. Subunit 13D mountain goat management report. Pages 155–162 [*In*] P. Harper, editor. Mountain goat management report of survey and inventory activities 1 July 2011–30 June 2013, Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/SMR 2014-3, Juneau.

Table 1. Subunit 13D, Central Chugach aerial mountain goat composition counts, calendar years 2009 through 2013.

	Adults	(%)	Kids	(%)	Kids: 100 adults	Goats Observed
2009 [a]	69	(80)	17	(20)	25	86
2010 [b]	64	(82)	14	(18)	22	78
2011 [c]	85	(83)	17	(17)	20	102
2012 [d]	272	(85)	49	(15)	18	321
2013 [e]	15	(79)	4	(21)	27	19

[a] Partial surveys conducted incidental to sheep surveys (count areas 1–3, 5, and 16–17).
[b] Partial surveys conducted incidental to sheep surveys (count areas 1–3).
[c] Partial surveys conducted incidental to sheep surveys, (count areas 16–18).
[d] Partial surveys conducted incidental to sheep surveys (count areas1–3, 5, 9, 14, and 16-18), and Tiekel/Tasnuna goat survey area.
[e] Partial surveys conducted incidental to sheep surveys (count areas 1–2, 16–17).

Table 2. Subunit 13D, Central Chugach mountain goat harvest data, regulatory years 2006 through 2012.

Area	Regulatory Year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Males (%)	Females (%)	Total harvest
DG718	2006	10	40	83	17	2 (40)	3 (60)	5
Subunit 13D	2007	10	40	67	33	1 (50)	1 (50)	2
West	2008	10	90	100	0	0	0	0
	2009	10	50	20	80	4 (100)	0	4
	2010	10	90	0	100	1 (100)	0	1
DG719	2006	25	44	93	7	1 (100)	0	1
Subunit 13D	2007	25	44	69	31	3 (75)	1 (25)	4
East	2008	25	56	64	36	2 (50)	2 (50)	4
	2009	25	56	64	36	3 (75)	1 (25)	4
	2010	25	60	90	10	1 (100)	0	1
DG720	2011	35	60	43	57	8 (100)	0	8
Subunit 13D	2012	35	57	80	20	2 (67)	1 (33)	3
RG580	2008	n/a	n/a	50	50	3 (100)	0	3
Subunit 13D [a]	2009	n/a	n/a	67	33	3 (100)	0	3
	2010	n/a	n/a	42	58	7 (100)	0	7
	2011	n/a	n/a	100	0	0	0	0
	2012	n/a	n/a	100	0	0	0	0

[a] Permit numbers are for the entire hunt; harvest numbers; no information is available about how many hunters intended to but did not hunt in Subunit 13D; harvest data include only data from RG580 hunters who reported hunting in Subunit 13D.

Table 3. Subunit 13D, Central Chugach mountain goat hunter residency and success, regulatory years 2006 through 2012.

		Successful				Unsuccessful				
Area	Regulatory Year	Local Resident	Nonlocal Resident	Nonresident	Total (%)	Local resident	Nonlocal Resident	Nonresident	Total (%)	Total Hunters
DG718	2006	0	2	3	5 (83)	0	1	0	1 (17)	6
Subunit	2007	0	2	0	2 (33)	0	3	1	4 (67)	6
13D	2008	0	0	0	0	0	0	1	1 (100)	1
West	2009	0	1	3	4 (80)	0	1	0	1 (20)	5
	2010	0	0	1	1 (100)	0	0	0	0	1
DG719	2006	0	1	0	1 (7)	4	9	0	13 (93)	14
Subunit	2007	0	4	0	4 (31)	0	9	0	9 (69)	13
13D East	2008	0	1	3	4 (36)	0	7	0	7 (64)	11
	2009	0	4	0	4 (36)	0	7	0	7 (64)	11
	2010	0	0	1	1 (10)	1	8	0	9 (90)	10
DG720	2011	0	7	1	8 (57)	1	4	1	6 (43)	14
Subunit	2012	0	2	1	3 (20)	3	6	3	12 (80)	15
13D										
RG580	2008	0	0	3	3 (50)	1	2	0	3 (50)	6
Subunit	2009	0	1	2	3 (33)	0	6	0	6 67)	9
13D [a]	2010	0	2	5	7 (58)	0	5	0	5 (42)	12
	2011	0	0	0	0 (0)	0	3	0	3 (100)	3
	2012	0	0	0	0 (0)	1	1	0	2 (100)	2

[a] Includes data only from hunters who reported hunting in in the Subunit 13D portion of RG580; for additional data on hunt RG580, see the Unit 11 goat management report.

Table 4. Subunit 13D, Central Chugach successful mountain goat hunter transport methods, regulatory years 2006 through 2012.

Area	Regulatory year	Percent of harvest						
		Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle
	2006	100	0	0	0	0	0	0
DG718	2007	100	0	0	0	0	0	0
Subunit	2008	0	0	0	0	0	0	0
13D	2009	75	0	0	0	0	0	25
West	2010	100	0	0	0	0	0	0
DG719	2006	0	0	0	0	0	0	100
Subunit	2007	0	0	0	0	0	0	100
13D East	2008	50	0	0	0	0	0	50
	2009	25	0	0	0	0	0	75
	2010	100	0	0	0	0	0	0
DG720	2011	88	0	12	0	0	0	0
Subunit	2012	67	0	0	0	0	0	33
13D								
RG580	2008	0	0	67	0	0	0	33
Subunit	2009	0	0	67	0	0	0	33
13D [a]	2010	14	0	29	0	0	14	43
	2011	0	0	0	0	0	0	0
	2012	0	0	0	0	0	0	0

[a] Includes only hunter transportation reports for the Subunit 13D portion of RG580.

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 14A and 14B (4,713 mi^2)

GEOGRAPHIC DESCRIPTION: The western Talkeetna Mountains and the Subunit 14A portion of the western Chugach Mountains

BACKGROUND

Since the early 1990s, the goat population in the Chugach Mountain portion of Subunit 14A has increased from 111 goats observed in the 1992 survey to 220 goats observed in the 2010 survey. The goat population in the Talkeetna Mountain portion of Subunits 14A and 14B remains low, with an estimate of no more than 50 goats (Coltrane 2010).

Seasons and bag limits for goats in Unit 14 have varied since statehood. Regulations for Unit 14 were most liberal during the mid-1960s, with a 144-day hunting season (10 August–31 December) and a 2-goat bag limit, until regulatory year (RY) 1967 (RY67 = 1 July 1967 through 30 June 1968) when the bag limit for Unit 14 was lowered to 1 goat. In the 1970s the hunting season in Unit 14 began in early August or September and ran until 15 November. From RY84 to RY07 most of the goat hunting opportunity in Unit 14 required a registration permit. The harvest was limited to billies during RY87 and RY88, but was liberalized to either sex in RY89. Goat hunting has been closed in the Talkeetna Mountain portion of Subunit 14A since RY86, but remains open in the Chugach Mountain portion of Subunit 14A. Goat hunting in Subunit 14B (the remainder of the Talkeetna Mountains) has been closed since RY90.

In 2001, mountain goat hunting on the Kenai Peninsula became restricted by drawing permit. Beginning in RY02, participation in goat registration hunts in the Chugach Mountain portion of Unit 14 (Subunits 14A and 14C) increased dramatically. Many of the hunters participating in the registration hunts were guided residents who were taking goats on combination mountain goat/dall sheep hunts. By RY05, most registration hunts were closing within 2 weeks of opening due to harvest quotas being met at a rapid pace. Both mountain goat and Dall sheep hunting in the Chugach portion of 14A went to draw hunting permits in 2007. A draw hunt system was developed for implementation in RY08. As a result, harvest has decreased; the harvest was 10 goats in RY06, 8 goats in RY07, 3 goats in RY08, 2 goats in RY09, and 2 goats in RY10. (Albertson 2012).

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Subunit 14A (Chugach Mountains)

- Maintain a minimum observable population of 60 goats that will sustain an annual harvest of 7% of observable goats and at least 70% males.

Subunits 14A and 14B (Talkeetna Mountains)

- Allow the population to reach an observable minimum of 50 goats before allowing harvest, at which time annual harvest should not exceed 5% of observable goats and should comprise at least 60% males.

METHODS

We monitored age composition and population trends of goat populations through aerial minimum count surveys. We monitored harvests by requiring successful hunters to report harvests within 2 days of kill. In addition, all hunters were required to return hunt reports, whether they harvested a goat or not. Harvest data were reviewed for accuracy and updated if necessary.

Calculation of the number of permits that are issued each year is based on surveys of the goat population and the age composition of goats observed, using a 3-year 'rolling average' of the population. The number of permits is also adjusted following a review of harvest statistics from previous years. Points are assigned based on the sex of the harvested animal; a female is counted as 2 goats toward the allowable harvest guideline, while a male is counted as one. Goats can be susceptible to overharvest, especially when the female component of the harvest is high (Hamel et al. 2006). Hunters are encouraged to harvest only male goats.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Surveys in the Chugach Mountain portion of Subunit 14A were conducted in conjunction with sheep surveys in RY11 and RY12 (Table 1). The results of RY12 indicate a decrease in the goat population in the Chugach; however, survey results often can be quite variable and it would be premature to say at this time that there is a decreasing trend in the population. Limited sheep surveys were conducted in the Talkeetna Mountains with our best effort in years during the summer of 2012. However this was not a complete survey of the unit and we cannot draw any conclusions about the size of the goat population in the Talkeetna Mountains at this time.

Age Distribution

Goats observed were categorized as kids or adults. Kids made up 18–25 % of observed goats in Subunit 14A (Chugach Mountains) during this reporting period. This follows a general trend in the Chugach population over the past decade of about 20% kids (Table 1).

Distribution and Movements

Throughout the summer surveys, goats were seldom observed far from escape terrain, which includes broken, rocky, and steep areas. Goat distribution during summer has been documented from aerial surveys. During summer, goats were found feeding in early morning and late evening on open grassy slopes, often adjacent to glaciers or snowfields. During midday goats seek relief from the heat in dense shrub cover, on ice fields or glaciers, and under rocky outcrops. This undoubtedly affects on our ability to get an accurate count of the population.

Most of the mountain goat population in 14A can be found east of the ridge dividing Metal Creek and Grasshopper Creek in the southeast corner of the unit. Approximately 40% of the population can be found west of this dividing line.

MORTALITY

Harvest

Seasons and Bag Limits. The bag limit for Subunit 14A (Chugach Mountains) was 1 goat of either sex, with the taking of nannies accompanied by kids prohibited.

In the Chugach Mountain portion of Subunit 14A the RY11 hunting season for residents and nonresidents was 1 September–31 October by draw permit (DG866), or 10 October–30 October by registration permit (RG866). In RY12 the hunting season remained the same, but the hunt area was split between the eastern and western portion of the Chugach Range at the ridge dividing Metal and Grasshopper creeks. The harvest quota was split, with 60% of the quota designated for the western portion and 40% of the quota designated for the eastern portion. The bag limit for residents and nonresidents was 1 goat by draw permit (DG890 – western portion, DG891 – eastern portion) or by registration permit (RG890 – western portion, RG891 – eastern portion).

Board of Game Actions and Emergency Orders. During the spring 2011 Board of Game meeting the board passed a proposal to add a registration hunt to the draw hunt in the Chugach portion of GMU 14A to address the low goat harvest, and required that the department split the hunt area into 2 hunt areas to distribute the harvest. The registration hunt went into effect in RY11 and the splitting of the 2 areas began in RY12. The registration hunt was closed by emergency order in RY11 and the number of registration permits available was limited to 10 in the eastern portion and 5 in the western portion of the Chugach in order to reduce the potential for overharvest.

Permit Hunts. A total of 75 drawing and registration permits were issued in RY11 and 45 permits were issued in RY12 (Table 2). The number of registration permits issued is based on the harvest the previous year and number of goats observed during surveys.

Hunter Residency and Success. The number of hunters has decreased since drawing permits replaced registration permits in RY08. However, the number increased substantially during this reporting period (Table 3). Nonresidents are no longer responsible for a large percentage of the harvest. Between both the registration and the drawing permit hunts, 59 hunters reported hunting during this reporting period. During the previous period, when only the drawing hunt was available, a total of 15 hunters participated. The proportions of local resident, nonlocal resident and nonresident hunters have changed with the new hunting scenario. In RY11 98% of the

hunters were residents and in RY12 75% of the hunters were residents (Table 3). Part of the explanation for the change is that since the registration hunt begins after the drawing hunt and participants are not able to get a registration permit before October 1, the potential to reach the quota and thus not have a registration hunt at all increases. This increase makes planning for a hunt in 14A very difficult for nonresident hunters.

Harvest Chronology. Harvest chronology is primarily influenced by the time periods for each individual hunt, as well as the number of permits allotted. This is especially true as additional hunts are created and hunt periods are shortened. However, weather plays an important role in the timing of hunts, and field conditions often deteriorate rapidly during the last weeks of October. Regardless, the majority of goats are harvested within the first week of each hunt period. Season dates and suitable conditions for hunting other big game species also affect timing of goat hunts.

Transport Methods. Aircraft is the primary mode of transport for successful hunters in Subunit 14A, however all-terrain vehicles (ATV) are occasionally used (Table 4).

HABITAT ASSESSMENT

Summer habitat quality and availability have not been assessed in Subunits 14A and 14B. High productivity in the western Chugach goat population suggests goats may still be below carrying capacity in these areas. Winter weather, particularly deep snow and heavy icing, are believed to be the limiting factors in the western Chugach Mountains. No direct winter habitat assessments have been conducted.

CONCLUSIONS AND RECOMMENDATIONS

Population objectives in the Chugach portion of Subunit 14A were met; however, overall harvest rates were below the objective, and the percentage of females harvested exceeded the objective in at least one year (RY11, Table 2). The addition of the registration permits to the current drawing permits has resulted in an increase in harvest from the draw period, and has shifted the harvest back to residents. These are desirable results based upon testimony at the 2011 Board of Game meeting, but this method of management can be time-consuming, requiring close monitoring during the season.

The Talkeetna Mountains portion of Subunits 14A and 14B appears to be marginal goat habitat. Goat season should remain closed in the Talkeetna Mountains until mountain goats are firmly established in the units.

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Table 1. Subunit 14A, Chugach Mountains, aerial mountain goat composition counts, 2003–2012.

Regulatory year	Adults (%)		Kids (%)		Kids: 100 adults	Total goats observed	Goats /hour
2003[a]	-	-	-	-	-	-	-
2004	118	(75)	40	(25)	34	158	15.8
2005[a]	-	-	-	-	-	-	-
2006[b]	102	(78)	29	(22)	28	131	13.1
2007	118	(78)	33	(22)	28	151	7.5
2008	170	(79)	45	(21)	26	215	10.3
2009[c]	100	(80)	25	(20)	25	125	6.8
2010	173	(79)	47	(21)	27	220	9.6
2011	163	(75)	54	(25)	33	217	12.6
2012[b]	107	(82)	23	(18)	21	130	7.6

[a] No surveys conducted.
[b] Poor survey conditions.
[c] Incomplete survey conducted.

Table 2. Subunit 14A Chugach mountain goat harvest data by permit hunt, 2006 through 2012.

Area	Regulatory Year	Permits issued	Percent did not hunt	Percent Unsuccessful Hunters	Percent Successful Hunters	Males (%)		Females (%)		Total Harvest
RG866	2006	33	45	44	56	7	(70)	3	(30)	10
	2007	56	46	73	27	7	(87)	1	(13)	8
	2011	50	50	70	30	5	(71)	2	(19)	7
DG866[a]	2008	12	58	40	60	2	(67)	1	(33)	3
	2009[b]	20	55	75	25	2	(100)	0	(0)	2
	2010	20	65	71	29	1	(50)	1	(50)	2
	2011[c]	25	44	36	64	6	(67)	3	(33)	9
DG890 Eastern 14A	2012	10	80	20	0	0	(0)	0	(0)	0
DG891 Western 14A	2012	20	50	80	20	2	(100)	0	(0)	2
RG890 Eastern 14A	2012	5	0	60	40	2	(100)	0	(0)	2
RG891 Western 14A	2012	10	50	60	40	1	(50)	1	(50)	2

[a] Replaced RG866 with DG866 starting in RY08.
[b] Excludes an illegally harvested goat in Subunit 13D with a Subunit 14A DG866 permit.
[c] RG866 was added to the DG866 starting in RY11.

Table 3. Subunit 14A mountain goat hunter residency and success, regulatory years 2006 through 2012.

		Successful				Unsuccessful				
Area	Regulatory year	Local resident	Nonlocal resident	Nonresident	Total (%)	Local resident	Nonlocal resident	Nonresident	Total (%)	Total Hunters[a]
RG866	2006	1	2	7	10 (56)	2	5	1	8 (44)	18
Subunit 14A	2007	1	0	7	8 (21)	15	8	7	30 (79)	38
	2011	6	0	1	7 (30)	15	1	0	16 (70)	23
DG866[b]	2008	1	1	1	3 (60)	2	0	0	2 (40)	5
Subunit 14A	2009[c]	1	0	1	2 (25)	5	0	1	6 (75)	8
	2010	1	1	0	2 (29)	1	4	0	5 (71)	7
	2011[d]	8	1	0	9 (64)	5	0	0	5 (36)	14
DG 890 Eastern 14A	2012	0	0	0	0 (0)	1	0	1	2 (100)	2
DG 891 Western 14A	2012	0	0	2	2 (20)	6	1	1	8 (80)	10
RG 890 Eastern 14A	2012	1	0	1	2 (40)	3	0	0	3 (60)	5
RG 891 Western 14A	2012	1	1	0	2 (40)	2	0	1	3 (60)	5

[a] Includes hunters with unspecified residency or who failed to report.
[b] Replaced RG866 in starting in RY2008.
[c] Excludes an illegally harvested goat in Subunit 13D with a Subunit 14A DG866 permit.
[d] RG866 was added to the DG866 starting in RY11.

Table 4. Subunit 14A successful mountain goat hunter transport methods, regulatory years 2006 through 2012.

		Percent of harvest								
Area	Regulatory Year	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
RG866	2006	56	0	0	0	0	0	0	44	9
Subunit 14A	2007	0	0	0	0	0	0	0	100	8
	2011	67	0	0	33	0	0	0	0	6
DG866	2008	100	0	0	0	0	0	0	0	3
Subunit 14A	2009[a]	50	0	0	50	0	0	0	0	2
	2010	100	0	0	0	0	0	0	0	2
	2011	78	0	0	22	0	0	0	0	9
DG 890 Eastern 14A	2012	0	0	0	0	0	0	0	0	0
DG 891 Western 14A	2012	100	0	0	0	0	0	0	0	2
RG 890 Eastern 14A	2012	0	0	0	50	0	0	0	50	2
RG 891 Western 14A	2012	100	0	0	0	0	0	0	0	2

[a] Excludes an illegally harvested goat in Subunit 13D with a Subunit 14A DG866 permit.

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MOUNTAIN GOAT MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 14C (1,961 mi^2)

GEOGRAPHIC DESCRIPTION: Chugach Mountains

BACKGROUND

The goat population in the western Chugach Mountains has increased slightly in the last decade. In 1994, 619 goats were observed during a complete survey of Unit 14C, while in 2011, 764 goats were counted in the same area. Goats observed incidental to recent sheep surveys suggest a range expansion in parts of Unit 14C, and, overall, the population appears to be stable to increasing.

Seasons and bag limits for goats in Unit 14C have varied since statehood. Most of Unit14C was closed to goat hunting in the early 1960s, except for 1969–1972, when all of 14C was open to hunting. In 1973, the then recently created Chugach State Park, encompassing most of the mountains west of the Lake George and Twentymile River drainages, was closed to goat hunting. Historically, these closed areas have not included a substantial segment of the goat population in Unit 14C; however, more goats have been observed in the park in recent years, and drawing permit hunts have been established in drainages with a harvestable surplus of goats.

The Lake George Area is the most popular goat hunting area in Unit 14C and supports the largest numbers of goats in the unit. Most hunting in Lake George has been managed by registration permits; however, since 2002 there have been numerous changes to hunting regulations governing the Lake George area in attempts to reduce overharvest while maximizing hunting opportunity. Beginning in 2002, participation in goat registration hunts in Unit 14C, specifically the Lake George area, increased dramatically. This increase occurred a year after goat hunts on the Kenai Peninsula were moved to a later time frame, with drawing hunts 10 August–October 15 and a late season registration hunt 1–30 November. As a result, the only early season registration goat hunts available in the area were in Units 14A and 14C. Hunter participation, specifically by guided nonresident hunters, increased rapidly for these registration hunts. By 2005, most registration hunts in the Lake George Area closed within 2 weeks of opening due to harvest quotas being met at a rapid pace. In 2005 and 2006, harvest exceeded desired quotas in Unit 14C. As a result, in 2007 the Board of Game approved a department proposal to change the registration goat hunts in Unit 14C to drawing permit hunts, to be followed by late season registration permit hunts if quotas were not met. The new hunts began in the 2008–2009 season. Then, in 2009 the Board of Game changed the drawing permit hunts in the Lake George area to a

drawing hunt for nonresident hunters and a registration hunt for residents. In 2011, the board converted the nonresident drawing permit hunt to a registration permit hunt with a separate quota from the resident registration permit hunt. This new harvest regime began in the fall of 2012.

Winter recreation activities in the Chugach Mountains (Unit 14C) continue to increase. The Chugach National Forest receives more permit requests every year for motorized winter activities that have the potential to impact wintering goats. One of the most prevalent winter activities is heli-skiing. Currently, Chugach Powder Guides, operating out of Girdwood, has a permit to conduct commercial heli-ski activities in the Chugach National Forest. During 2000–2002, the Glacier Ranger District of the Chugach National Forest contracted the Alaska Department of Fish and Game to conduct winter surveys for goats in areas potentially affected by heli-ski operations. The purpose was to identify habitat repeatedly used by mountain goats during winter. The information gathered during these surveys enabled biologists to designate "no-fly zones" in winter use areas for mountain goats to help reduce potential impacts to the goat population.

Helicopter-assisted winter and summer recreational activities have also increased in the Lake George area. In summer 2010, a dogsled tour operation was permitted to maintain a helicopter-accessed dogsled camp from 1 May through 30 September on Colony Glacier. ADF&G biologists worked with the tour operator to establish a flight path that would reduce potential impacts of helicopter overflights on goats. However, in 2013 the dog sled operation was moved to Troublesome Glacier, where nanny groups concentrate to give birth and raise kids. This move was of particular concern due to dog team presence and helicopter activity near nanny-kid groups. In 2014, the operation will return to Colony Glacier. Continued expansion of sled dog tours as well as other summer activities may lead to significant impacts on goats in the area. In addition to the dogsled activity in the Lake George area, a heli-skiing company has been operating in the area since at least 2009. Unfortunately, because helicopter overflights and landings are considered general use on state land, there is no mechanism to control such operations. ADF&G biologists are currently working with Alaska Department of Natural Resources (DNR) staff to ascertain a way to regulate helicopter activity in the Lake George area, due to the sensitivity of goats to aircraft disturbance, especially during the winter and spring. Currently, no changes in access that will protect wintering goats have been made.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a population of at least 500 goats that will sustain an annual harvest of 25 goats, comprising at least 60% males.

METHODS

When possible, we monitored sex and age composition and population trends of goat populations through aerial surveys. We monitored harvests by requiring successful hunters to report harvests within 3 or 10 days of kill, depending on hunt location. In addition, all hunters were required to return hunt reports, whether they harvested a goat or not. Harvest data are organized by regulatory year. A regulatory year runs from 1 July to 30 June (e.g., RY11 = 1 July 2011–30 June 2012).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

During the reporting period, a complete mountain goat survey of Unit 14C was flown in July 2011 (Table 1). A total of 764 goats (83% adults and 17% kids) were observed, including 440 goats (17% kids) in the Lake George Area (Table 1). More recently, we surveyed goats in the Lake George area in July and August 2013.

Mountain goat surveys are typically flown in the evening when ambient temperatures are cooler and goats move to higher elevations to feed. However, unusually hot weather during June and July 2013 made evening survey conditions poor. Therefore, we decided to try flying in the morning before ambient temperatures reached 60°F. On 30 July 2013, we surveyed the entire Lake George Area for goats in the morning during 0600 – 1100 hours. A total of 224 goats, including 166 adults and 58 kids, were observed (53 goats per hour, Table 1). The number of goats observed was suspiciously low compared to the 440 goats observed in the same area in 2011 (Table 1). Therefore, we assumed that the warm temperatures (> 70° F by mid-morning) and time of day caused goats to remain at lower elevations and in thicker vegetation, which reduced their detectability.

In order to compare the efficacy of morning versus evening surveys, we recounted goats in the Lake George Area during the evenings of 1 and 12 August 2013. Viewing conditions were good throughout the survey with sparse to no snow cover and partly cloudy to sunny conditions. A total of 415 goats (308 adults and 107 kids) were counted in the Lake George Area (Table 1). Although viewing conditions were good, warmer air temperatures during the 1 August 2013 flight could have caused goats to occupy lower elevations dominated by alders, potentially reducing detections. Observation rate during the evening survey was 87 goats per hour. Based on our observations, evening counts are a more reliable manner in which to survey goat populations. Overall, we had not only a higher observation rate during the evening versus morning surveys, but we counted nearly twice as many goats during the evening.

In addition to survey numbers, goats observed during sheep surveys suggest that goats in Unit 14C may be expanding their range throughout Chugach State Park. Overall, the goat population in Unit 14C appears stable to increasing.

Age Distribution

Goats observed were categorized as kids or adults. Kids composed 17% of observed goats in Unit 14C in 2011 and 26% of observed goats in Lake George in 2013 (Table 1).

Distribution and Movements

Throughout the summer surveys, goats were seldom observed far from escape terrain, which includes broken, rocky, and steep areas. Goat distribution during summer has been documented from aerial surveys. During summer, goats were found feeding in early morning and late evening on open grassy slopes, often adjacent to glaciers or snowfields. During midday goats seek relief from the heat in dense shrub cover, on ice fields or glaciers, and under rocky outcrops.

No dedicated study has been conducted to assess goat movements or habitat use in Unit 14C.

MORTALITY

Harvest

Seasons and Bag Limits. Bag limit for Unit 14C was 1 goat of either sex, with the taking of kids and nannies accompanied by kids prohibited. Goat harvest in Unit 14C is managed by both registration and drawing permit hunts for residents and nonresidents. During regulatory years 2011 and 2012, there were 4 drawing hunts within Chugach State Park in Unit 14C: 1 in the East Fork of the Eklutna River drainage, 1 in the Glacier and Winner creek drainages, 1 in Bird Creek drainage, including Penguin Creek, and 1 in the upper Eagle River drainage, including Icicle Creek, but excluding Raven Creek drainage. These hunts were open from the day after Labor Day to 15 October. The Lake George and Twentymile drainage areas supported goat hunting by registration and drawing permits only from 15 August–15 October, and 1–15 November, with a bag limit of 1 goat.

Board of Game Actions and Emergency Orders. There were no Board of Game actions regarding mountain goats in Unit 14C during this reporting period.

Emergency orders were issued in 2011 and 2012 to close registration mountain goat hunts in the Lake George Area once harvest quotas were reached. In 2011 and 2012, RG869, a resident-only registration permit hunt for mountain goats in the Lake George Area, was closed on October 12 and October 13, respectively, by emergency orders. On 11 September 2012, RG882, a non-resident registration permit hunt for mountain goats in the Lake George Area was closed by emergency order.

Permit Hunts. The number of goat registration and drawing permits issued for Unit 14C ranged from 219 to 250 during this reporting period (Table 2). The number of drawing permits issued in Unit 14C is based on the number of goats observed during surveys. There were 6 drawing permit hunts in RY11 and 4 drawing permit hunts in RY12, with 34 and 18 total permits issued in those years, respectively. In addition, there were 5 registration permit hunts in RY11 and 6 in RY12.

Hunter Residency and Success. Most successful hunters in Unit 14C were local or nonlocal residents (Table 3).

Overall success rates during the reporting period ranged from 25% to 33%. Nonresidents typically experienced higher rates of success than did resident hunters (Table 3). Nonresidents are required to be accompanied by a registered guide or a resident relative to hunt goats in Alaska; guided hunters are typically more successful than unguided hunters.

Harvest Chronology. Harvest chronology is primarily influenced by the time periods for each individual hunt, as well as the number of permits allotted. This is especially true as additional hunts are created and hunt periods are shortened. However, weather plays an important role in the timing of hunts, and field conditions often deteriorate rapidly during the last weeks of October. Regardless, the majority of goats are harvested within the first week of each hunt period. Season dates and suitable conditions for hunting other big game species also affect timing of goat hunts.

Transport Methods. In the Lake George portion of Unit 14C, aircraft was the primary mode of transport for successful hunters (Table 4). In the Twentymile River drainage of Subunit 14C, the common modes of transport are airplanes, highway vehicles, and boats, except in years when boat access is difficult due to low water levels (Table 4).

HABITAT

ASSESSMENT

Summer habitat quality and availability have not been assessed in Unit 14C. High productivity in the western Chugach goat population suggests goats may still be below carrying capacity in these areas. Winter weather, particularly deep snow and heavy icing, is believed to be the limiting factor in the western Chugach Mountains.

Winter surveys have provided some insight on winter habitat and goat distribution in the survey areas in Unit 14C. However, data are limited. No direct winter habitat assessments have been conducted.

CONCLUSIONS AND RECOMMENDATIONS

All management objectives were met during this reporting period. At least 26 goats were harvested in Unit 14C annually, and goat harvests exceeded 67% males annually.

The goat population in Unit 14C appears to be stable to increasing; however, because of a relatively large harvest and increasing recreational activity in the winter through the kidding period in early summer, dedicated, comprehensive surveys should be conducted at least biennially. The maximum allowable harvest should not exceed 7% of the number of goats observed during surveys in the Chugach Mountains.

Increased unregulated helicopter-based recreational activity is occurring during winter and during the kidding period in the Lake George Area, which is one of the most popular goat hunting areas in the state. Aircraft overflights can alter both goat and sheep behavior and incite negative physiological responses, which may ultimately lead to reduced survivorship (MacArthur et al. 1979, 1982; Foster and Rahs 1983; Bleich et al. 1994; Côtê 1996; Krausman et al. 1998; Frid 2000a, b; Frid 2002; Goldstein et al. 2005).

Adult female mountain goats have heightened sensitivity to disturbances during kidding and post-kidding periods (Penner 1988). Compared to other ungulates, mountain goats have a low recruitment rate (Bailey 1991, Festa-Bianchet et al. 1994), and reproductive success and survivorship of goat populations is closely tied to the health of mountain goat nursery groups. Since females are highly sensitive to disturbance, the Northern Wild Sheep and Goat Council recommends that helicopter activities be prohibited in areas inhabited by nursery groups during spring and early summer (Hurley 2004).

There are no data to indicate that habituation of mountain goats or Dall sheep will occur over time with cumulative exposure to helicopter activity (Frid 2003, Hurley 2004, Côtê et al 2013). Contrarily, repeated exposure to adverse stimuli, such as helicopter overflights, may increase vigilance and flight-initiation distance and result in increased stress on mountain ungulates (Frid

and Dill 2002). Therefore, it is recommended that helicopter activity be no closer than 1,500 meters from any mountain goat locations (Hurley 2004).

In light of this information, we recommend that the Lake George Area be considered a Special Use Area in order to regulate commercial helicopter activity, especially during winter through early summer (November 1 – June 15). If such activity continues unregulated, it may have significant negative impacts on the goat population in the Lake George Area. We recommend dedicated winter surveys for goats in the Lake George Area to obtain better information on winter goat distribution. Such information could be useful in restricting aircraft activity in areas subject to high disturbance.

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Table 1. Unit 14C aerial mountain goat composition counts and estimated population size, regulatory years 2007–2013.

Regulatory Year	Adults (%)	Kids (%)	Kids: 100 adults	Total goats observed	Goats /hour
2007[a]	121 (79)	33 (21)	27	154	
2008[b]					
2009[b]					
2010[b]					
2011[c]	636 (83)	127 (17)	20	764	
2012[b]					
2013[d]	166 (74)	58 (26)	35	224	53
2013[e]	308 (74)	107 (26)	35	415	87

[a] Complete survey of Twentymile River (80 goats [26% kids]. Additional goats counted incidental to sheep surveys (74 goats [16% kids]).

[b] No surveys conducted.

[c] Complete survey of Unit 14C goat hunt areas (440 goats in Lake George [17% kids], 135 goats in Twentymile River [17% kids], and 189 goats counted incidental to sheep surveys [15% kids]).

[d] Complete survey of Lake George conducted between 0600 – 1100.

[e] Complete survey of Lake George conducted between 1830 – 2200.

Table 2. Unit 14C mountain goat harvest data by permit hunt, regulatory years 2007–2012.

Area	Regulatory Year	Permits Issued	Percent did not hunt[a]	Percent Unsuccessful Hunters	Percent Successful Hunters	Males (%)		Females (%)		Total Harvest[b]
	2007	3	33	50	50	1	(100)	0	(0)	1
DG852	2008	3	0	67	33	1	(100)	0	(0)	1
East Eklutna	2009	3	67	100	0	0	(0)	0	(0)	0
	2010	3	0	33	67	2	(100)	0	(0)	2
	2011	5	40	33	67	2	(100)	0	(0)	2
	2012	5	0	60	40	2	(100)	0	(0)	2
	2007	3	0	0	100	3	(100)	0	(0)	3
DG854	2008	3	0	0	100	3	(100)	0	(0)	3
Eagle River	2009	3	33	0	100	1	(50)	1	(50)	2
	2010	3	33	50	50	1	(100)	0	(0)	1
	2011	5	20	75	25	1	(100)	0	(0)	1
	2012	3	0	67	33	1	(100)	0	(0)	1
	2007	4	50	100	0	0	(0)	0	(0)	0
DG856	2008	4	0	100	0	0	(0)	0	(0)	0
Glacier Ck.	2009	3	33	100	0	0	(0)	0	(0)	0
	2010	3	67	100	0	0	(0)	0	(0)	0
	2011	5	40	100	0	0	(0)	0	(0)	0
	2012	5	20	100	0	0	(0)	0	(0)	0
	2007	3	0	67	33	0	(0)	1	(100)	1
DG858	2008	3	0	67	33	1	(100)	0	(0)	1
Bird Ck.	2009	3	0	67	33	0	(0)	1	(100)	1
	2010	0								
	2011	5	0	80	20	1	(100)	0	(0)	1
	2012	5	0	100	0	0	(0)	0	(0)	0

Area	Regulatory Year	Permits Issued	Percent did not hunt[a]	Percent Unsuccessful Hunters	Percent Successful Hunters	Males (%)		Females (%)		Total Harvest[b]
DG859[c]	2008	20	70	50	50	3	(100)	0	(0)	3
Lake	2009	20	60	63	37	3	(100)	0	(0)	3
George										
DG868[c,d]	2008	12	42	67	33	2	(100)	0	(0)	2
Twentymile	2009	20	35	69	31	3	(75)	1	(25)	4
River	2010[d]	2	100	0	0	0	(0)	0	(0)	0
	2011	2	100	0	0	0	(0)	0	(0)	0
DG869[d,e]	2008	20	50	50	50	5	(100)	0	(0)	5
Lake	2009	20	35	46	54	6	(86)	1	(14)	7
George	2010[d]	8	63	0	100	3	(100)	0	(0)	3
	2011	12	50	0	100	6	(100)	0	(0)	6
RG862[f]										
Twentymile	2011	30	63	100	0	0	(0)	0	(0)	0
River										
RG864[f]										
Lake	2010	28	75	57	43	3	(100)	0	(0)	3
George										
RG868[e]	2007	78	62	80	20	6	(100)	0	(0)	6
Twentymile	2008	60	62	100	0	0	(100)	0	(0)	0
River	2009	0								
	2010	78	64	75	25	4	(57)	3	(43)	7
	2011	110	59	96	4	2	(100)	0	(0)	2
	2012	88	65	84	16	2	(40)	3	(60)	5

Area	Regulatory Year	Permits Issued	Percent did not hunt[a]	Percent Unsuccessful Hunters	Percent Successful Hunters	Males (%)		Females (%)		Total Harvest[b]
RG869[e]	2007	76	51	46	54	15	(75)	5	(25)	20
Lake	2008	44	50	64	36	6	(75)	2	(25)	8
George	2009	117	70	74	26	4	(44)	5	(56)	9
	2010	79	71	57	43	9	(90)	1	(10)	10
	2011	68	51	58	42	10	(71)	4	(29)	14
	2012	88	63	58	42	11	(79)	3	(21)	14
	2007	4	100			0	(0)	0	(0)	0
RG878	2008	13	69	100	0	0	(0)	0	(0)	0
Twentymile	2009	7	43	75	25	1	(100)	0	(0)	1
River	2010	7	71	100	0	0	(0)	0	(0)	0
(archery)	2011	3	100	0	0	0	(0)	0	(0)	0
	2012	6	83	100	0	0	(0)	0	(0)	0
	2007	4	100			0	(0)	0	(0)	0
RG879	2008	10	80	50	50	1	(100)	0	(0)	1
Lake	2009	8	62	100	0	0	(0)	0	(0)	0
George	2010	2	100	0	0	0	(0)	0	(0)	0
(archery)	2011	5	40	33	67	2	(100)	0	(0)	2
	2012	5	80	100	0	0	(0)	0	(0)	0
RG881[g] Twentymile River	2012	3	33	50	50	1	(100)	0	(0)	1
RG882[g] Lake George	2012	11	18	0	100	9	(100)	0	(0)	9

[a] Includes permittees who did not report.
[b] Includes animals of unknown sex.
[c] New hunt, regulatory year 2008.
[d] Nonresident hunt only beginning regulatory year 2010.
[e] Resident hunt only beginning in regulatory year 2010.
[f] Resident hunt announced if quota is not reached.
[g] Nonresident hunt only beginning in regulatory year 2012.

Table 3. Unit 14C mountain goat hunter residency and success, regulatory years 2007–2012.

		Successful				Unsuccessful				
Area	Regulatory Year	Local resident	Nonlocal resident	Nonresident	Total (%)	Local resident	Nonlocal resident	Nonresident	Total (%)	Total Hunters[a]
DG852	2007	0	1	0	1 (50)	0	1	0	1 (50)	2
East Eklutna	2008	0	1	0	1 (33)	0	2	0	2 (67)	3
	2009	0	0	0	0 (0)	0	1	0	1 (100)	1
	2010	1	1	0	2 (67)	1	0	0	1 (33)	3
	2011	1	1	0	2 (67)	1	0	0	1 (33)	3
	2012	0	2	0	2 (40)	2	1	0	3 (60)	5
DG854	2007	1	1	1	3 (100)	0	0	0	0 (0)	3
Eagle River	2008	2	0	1	3 (100)	0	0	0	0 (0)	3
	2009	2	0	0	2 (100)	0	0	0	0 (0)	2
	2010	1	0	0	1 (50)	0	1	0	1 (50)	2
	2011	1	0	0	1 (25)	1	2	0	3 (75)	4
	2012	1	0	0	1 (33)	2	0	0	2 (67)	3
DG856	2007	0	0	0	0 (0)	2	0	0	2 (100)	2
Glacier Ck.	2008	0	0	0	0 (0)	3	1	0	4 (100)	4
	2009	0	0	0	0 (0)	1	1	0	2 (100)	2
	2010	0	0	0	0 (0)	1	0	0	1 (100)	1
	2011	0	0	0	0 (0)	3	0	0	3 (100)	3
	2012	0	0	0	0 (0)	4	0	0	4 (100)	4
DG858	2007	1	0	0	1 (33)	1	1	0	2 (67)	3
Bird Ck.	2008	0	0	1	1 (33)	2	0	0	2 (67)	3
	2009	1	0	0	1 (33)	0	2	0	2 (67)	3
	2010	0	0	0	0 (0)	0	0	0	0 (0)	0
	2011	1	0	0	1 (20)	3	1	0	4 (80)	5
	2012	0	0	0	0 (0)	4	1	0	5 (100)	5
DG859	2008	0	0	3	3 (50)	0	2	1	3 (50)	6
Lake George	2009	3	0	0	3 (38)	1	4	0	5 (62)	8

Area	Regulatory Year	Successful				Unsuccessful				Total Hunters[a]
		Local resident	Nonlocal resident	Nonresident	Total (%)	Local resident	Nonlocal resident	Nonresident	Total (%)	
DG868	2008	1	1	0	2 (29)	4	1	0	5 (71)	7
Twentymile	2009	2	2	0	4 (31)	8	1	0	9 (69)	13
River	2010	0	0	0	0 (0)	0	0	0	0 (0)	0
	2011	0	0	0	0 (0)	0	0	0	0 (0)	0
DG869	2008	2	1	2	5 (50)	2	3	0	5 (50)	10
Lake	2009	1	4	2	7 (54)	3	3	0	6 (46)	13
George	2010	0	0	3	3 (100)	0	0	0	0 (0)	3
	2011	0	0	6	6 (100)	0	0	0	0 (0)	6
RG862 Twentymile River	2011	0	0	0	0 (0)	4	7	0	11 (100)	11
RG864 Lake George	2010	0	2	1	3 (43)	0	4	0	4 (57)	7
RG868	2007	4	2	0	6 (20)	16	8	0	24 (80)	30
Twentymile	2008	0	0	0	0 (0)	17	6	0	23 (100)	23
River	2009									
	2010	7	0	0	7 (25)	14	7	0	21 (75)	28
	2011	2	0	0	2 (4)	31	11	1	43 (96)	45
	2012	3	2	0	5 (16)	18	8	0	26 (84)	31
RG869	2007	4	0	16	20 (54)	9	5	3	17 (460	37
Lake	2008	4	3	1	8 (36)	0	14	0	14 (64)	22
George	2009	6	2	1	9 (26)	10	16	0	26 (74)	35
	2010	3	7	0	10 (43)	10	3	0	13 (57)	23
	2011	9	5	0	14 (42)	7	11	1	19 (58)	33
	2012	5	8	1	14 (42)	4	11	4	19 (58)	33

Area	Regulatory Year	Successful				Unsuccessful				Total Hunters[a]
		Local resident	Nonlocal resident	Nonresident	Total (%)	Local resident	Nonlocal resident	Nonresident	Total (%)	
RG878	2007	0	0	0	0 (0)	0	0	0	0 (0)	0
Twentymile	2008	0	0	0	0 (0)	2	2	0	4 (100)	4
River	2009	0	0	1	1 (25)	2	1	0	3 (75)	4
(archery)	2010	0	0	0	0 (0)	2	0	0	2 (100)	2
	2011	0	0	0	0 (0)	0	0	0	0 (0)	0
	2012	0	0	0	0 (0)	1	0	0	1 (100)	1
RG879	2007	0	0	0	0 (0)	0	0	0	0 (0)	0
Lake	2008	0	0	1	1 (50)	0	1	0	1 (50)	2
George	2009	0	0	0	0 (0)	1	1	1	3 (100)	3
(archery)	2010	0	0	0	0 (0)	0	0	0	0 (0)	0
	2011	0	0	2	2 (67)	0	0	1	1 (33)	3
	2012	0	0	0	0 (0)	1	0	0	1 (100)	1
RG881 Twentymile River	2012	0	0	1	1 (50)	0	0	1	1 (50)	2
RG882 Lake George	2012	0	0	9	9 (100)	0	0	0	0 (0)	9
	2007	10	4	17	31 (40)	28	15	3	46 (60)	77
Totals	2008	9	6	9	24 (28)	30	32	1	63 (72)	87
for all	2009	15	8	4	27 (32)	26	30	1	57 (68)	84
Unit 14C	2010	12	10	4	26 (38)	28	15	0	43 (62)	69
	2011	14	6	8	28 (25)	50	32	3	85 (75)	113
	2012	9	12	11	32 (33)	36	21	4	61 (67)	93

[a] Includes hunters with unspecified residency or who failed to report.

Table 4. Unit 14C successful mountain goat hunter transport methods, regulatory years 2007–2012.

		Percent of harvest									
Area	Regulatory Year	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Foot	Unknown	n
DG852	2007	0	0	0	100	0	0	0	0	0	1
East Eklutna	2008	0	0	0	100	0	0	0	0	0	1
	2009	0	0	0	0	0	0	0	0	0	0
	2010	0	0	0	100	0	0	0	0	0	2
	2011	0	0	0	50	0	0	0	0	50	2
	2012	0	0	0	100	0	0	0	0	0	2
DG854	2007	0	0	0	0	0	0	67	0	33	3
Eagle River	2008	0	0	0	0	0	0	100	0	0	3
	2009	0	0	0	0	0	0	100	0	0	2
	2010	0	0	0	0	0	0	100	0	0	1
	2011	0	0	0	0	0	0	0	100	0	1
	2012	0	0	0	0	0	0	0	100	0	1
DG856	2007	0	0	0	0	0	0	0	0	0	0
Glacier Ck.	2008	0	0	0	0	0	0	0	0	0	0
	2009	0	0	0	0	0	0	0	0	0	0
	2010	0	0	0	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0
	2012	0	0	0	0	0	0	0	0	0	0
DG858	2007	0	0	0	100	0	0	0	0	0	1
Bird Ck.	2008	0	0	0	100	0	0	0	0	0	1
	2009	0	0	0	100	0	0	0	0	0	1
	2010	0	0	0	0	0	0	0	0	0	0
	2011	0	0	0	100	0	0	0	0	0	1
	2012	0	0	0	0	0	0	0	0	0	0
DG859	2008	67	0	33	0	0	0	0	0	0	3
Lake George	2009	100	0	0	0	0	0	0	0	0	3

Area	Regulatory Year	Percent of harvest: Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Foot	Unknown	n
DG868	2008	100	0	0	0	0	0	0	0	0	2
Twentymile	2009	25	0	0	0	0	0	75	0	0	4
River	2010	0	0	0	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0
DG869	2008	60	0	40	0	0	0	0	0	0	5
Lake	2009	100	0	0	0	0	0	0	0	0	7
George	2010	100	0	0	0	0	0	0	0	0	3
	2011	100	0	0	0	0	0	0	0	0	6
RG868 Twentymile River	2011	0	0	0	0	0	0	0	0	0	0
RG864 Lake George	2010	100	0	0	0	0	0	0	0	0	3
RG868	2007	0	0	17	0	0	0	83	0	0	6
Twentymile	2008	0	0	0	0	0	0	0	0	0	0
River	2009	0	0	0	0	0	0	0	0	0	0
	2010	29	0	0	0	0	0	57	0	14	7
	2011	0	0	50	0	0	0	50	0	0	2
	2012	0	0	20	0	0	0	60	20	0	5
RG869	2007	100	0	0	0	0	0	0	0	0	20
Lake	2008	100	0	0	0	0	0	0	0	0	8
George	2009	78	0	0	0	0	0	22	0	0	9
	2010	100	0	0	0	0	0	0	0	0	10
	2011	100	0	0	0	0	0	0	0	0	14
	2012	93	0	7	0	0	0	0	0	0	14

Area	Regulatory Year	Airplane	Percent of harvest								n
			Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Foot	Unknown	
RG878	2007	0	0	0	0	0	0	0	0	0	0
Twentymile	2008	0	0	0	0	0	0	0	0	0	0
River	2009	100	0	0	0	0	0	0	0	0	1
	2010	0	0	0	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0
	2012	0	0	0	0	0	0	0	0	0	0
RG879	2007	0	0	0	0	0	0	0	0	0	0
Lake	2008	100	0	0	0	0	0	0	0	0	1
George	2009	0	0	0	0	0	0	0	0	0	0
	2010	0	0	0	0	0	0	0	0	0	0
	2011	100	0	0	0	0	0	0	0	0	2
	2012	0	0	0	0	0	0	0	0	0	0
RG881 Twentymile River	2012	100	0	0	0	0	0	0	0	0	1
RG882 Lake George	2012	100	0	0	0	0	0	0	0	0	9

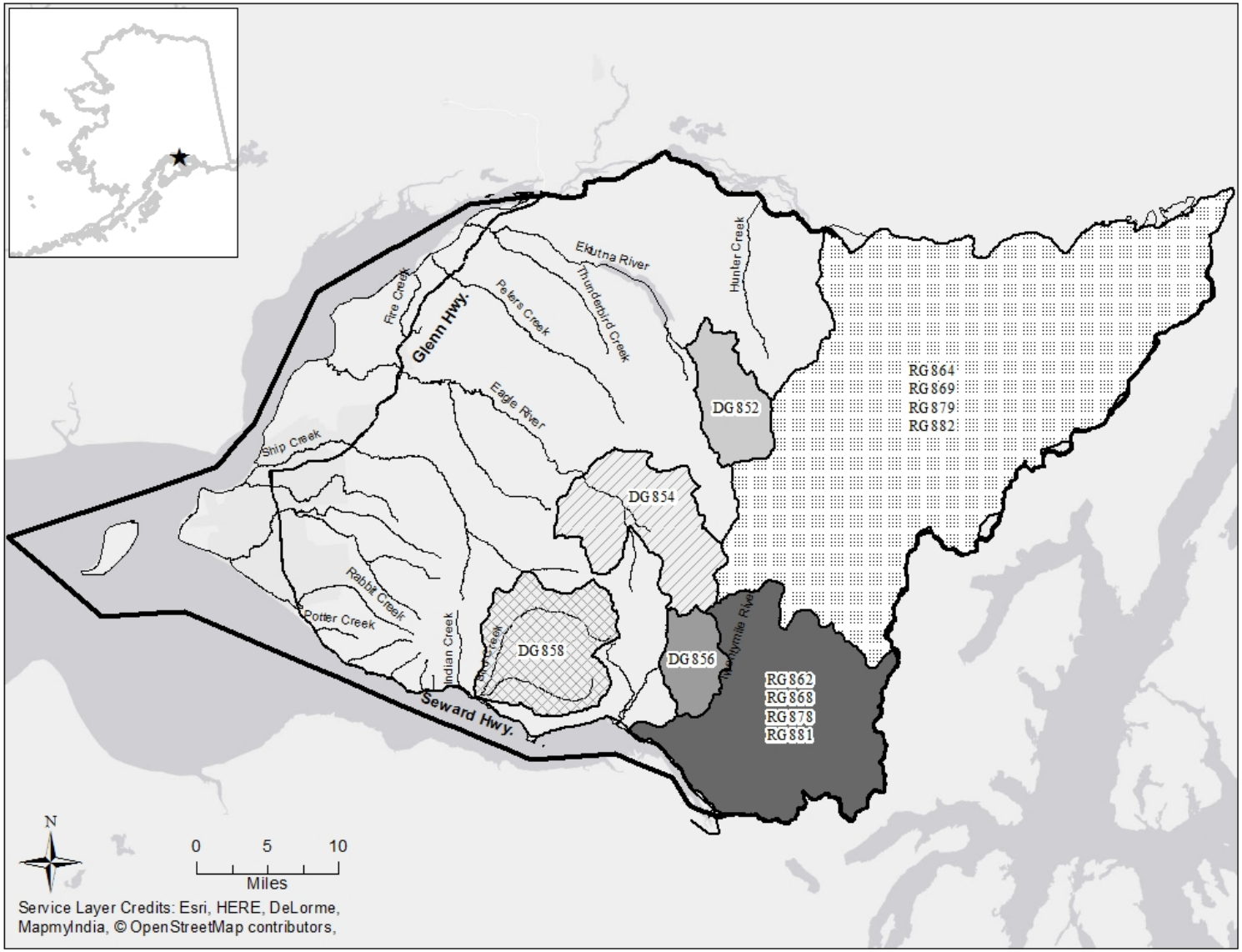

Figure 1. Unit 14C goat hunt areas. Drawing permit hunts have DG before the number, and registration permit hunts have RG before the number.


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