Species Management Report and Plan ADF&G/DWC/SMR&P–2022–6

Mountain Goat Management Report and Plan, Game Management Unit 14C:

Report Period 1 July 2013–30 June 2018, and

Plan Period 1 July 2018–30 June 2023

Cory Stantorf

2022

Alaska Department of Fish and Game Division of Wildlife Conservation

Species Management Report and Plan ADF&G/DWC/SMR&P-2022-6

Mountain Goat Management Report and Plan, Game Management Unit 14C:

Report Period 1 July 2013–30 June 2018, and

Plan Period 1 July 2018–30 June 2023

PREPARED BY:

Cory Stantorf
Assistant Area Wildlife Biologist

APPROVED BY:

Jeff Selinger
Management Coordinator

PUBLISHED BY:

Sky M. Guritz
Technical Reports Editor

Alaska Department of Fish and Game
Division of Wildlife Conservation
PO Box 115526
Juneau, AK 99811-5526

Hunters are important founders of the modern wildlife conservation movement. They, along with trappers and sport shooters, provided funding for this publication through payment of federal taxes on firearms, ammunition, and archery equipment, and pay state hunting license and tag fees. These taxes and fees fund the federal Wildlife Restoration Program and the State of Alaska's Fish and Game Fund, which provided funding for the work reported on in this publication.

Species management reports and plans provide information about species that are hunted or trapped and management actions, goals, recommendations for those species, and plans for data collection. Detailed information is prepared for each species every 5 years by the area management biologist for game management units in their areas, who also develops a plan for data collection and species management for the next 5 years. This type of report is not produced for species that are not managed for hunting or trapping or for areas where there is no current or anticipated activity. Unit reports are reviewed and approved for publication by regional management coordinators and are available to the public via the Alaska Department of Fish and Game's public website.

This species management report and plan was reviewed and approved for publication by Mountain goat, Management Coordinator for the Division of Wildlife Conservation.

Species management reports and plans are available via the Alaska Department of Fish and Game's public website (www.adfg.alaska.gov) or by contacting Alaska Department of Fish and Game's Division of Wildlife Conservation, PO Box 115526, Juneau, AK 99811-5526; phone: (907) 465-4190; email: dfg.dwc.publications@alaska.gov. The report may also be accessed through most libraries, via interlibrary loan from the Alaska State Library or the Alaska Resources Library and Information Services (www.arlis.org). To subscribe to email announcements regarding new technical publications from the Alaska Department of Fish and Game, Division of Wildlife Conservation please use the following link: http://list.state.ak.us/mailman/listinfo/adfgwildlifereport.

This document, published in PDF format only, should be cited as:

Stantorf, C. 2022. Mountain goat management report and plan, Game Management Unit 14C: Report period 1 July 2013–30 June 2018, and plan period 1 July 2018–30 June 2023. Alaska Department of Fish and Game, Species Management Report and Plan ADF&G/DWC/SMR&P-2022-6, Juneau.

Please contact the authors or the Division of Wildlife Conservation at (907) 465-4190 if you have questions about the content of this report.

Contents

List of Tables

Purpose of this Report

This report provides a record of survey and inventory management activities for mountain goat (*Oreamnos americanus*) in Game Management Unit 14C for the 5 regulatory years 2013–2017 and plans for survey and inventory management activities in the next 5 regulatory years, 2018–2022. A regulatory year (RY) begins 1 July and ends 30 June (e.g., RY14 = 1 July 2014–30 June 2015). This report is produced primarily to provide agency staff with data and analysis to help guide and record agency efforts but is also provided to the public to inform it of wildlife management activities. In 2016 the Alaska Department of Fish and Game's (ADF&G, the department) Division of Wildlife Conservation (DWC) launched this 5-year report to report more efficiently on trends and to describe potential changes in data collection activities over the next 5 years. It replaces the mountain goat management report of survey and inventory activities that was previously produced every 2 years.

I. RY13–RY17 Management Report

Management Area

Unit 14C is approximately 1,912 mi^2 of Southcentral Alaska and largely consists of the Municipality of Anchorage (MOA). MOA is a mosaic of wildlife habitat and human development. Most of MOA is characterized by large tracts of natural lands, including Chugach State Park, Chugach National Forest, Anchorage Coastal Wildlife Refuge, and Joint Base Elmendorf-Richardson (an 84,000-acre military base). Even the highly developed portions of MOA support wildlife habitat in vegetated greenbelts, stream corridors, and large municipal parks.

Summary of Status, Trend, Management Activities, and History of Mountain Goat in Unit 14C

The goat population in the western Chugach Mountains has increased slightly in the last decade. In 2011, 764 goats were observed during a survey of Unit 14C, while in 2015, 877 goats were counted in a complete survey covering the same areas counted in 2011. 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 Unit 14C 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. 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 the Units 14A and 14C 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 harvest regime began in the fall of 2012. Since 2012 the harvest in Lake George continued to exceed desired quotas and as a result ADF&G proposed a change to the hunt structure. In 2016, the BOG created a drawing hunt for nonresidents only which was implemented in the fall of 2017.

Management Direction

Existing Wildlife Management Plans

Direction for the management of Unit 14C mountain goat was outlined in Alaska Wildlife Management Plans: A Public Proposal For The Management Of Alaska's Wildlife: Southcentral Alaska (ADF&G 1976) and has been reviewed and modified through public comments, staff recommendations, and Board of Game actions over the years. A record of these changes can be found in the division’s management report series. The plan portion of this report contains the current management plan for mountain goat in Unit 14C.

Codified Objectives

Amounts Reasonably Necessary for Subsistence Uses

None.

Intensive Management

None.

Management Objectives

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

MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Conduct annual late summer minimum counts in Twentymile and Lake George hunt areas. Additionally, when funding is available conduct minimum counts in all goat hunt areas in Unit 14C.

Data Needs

Goat hunting in Unit 14C is popular, particularly in the Twentymile and Lake George hunt areas. Minimum population counts in these areas are needed to allow managers to set permit numbers to ensure populations are not overharvested.

Methods

Every July through early August DWC biologists attempt to conduct minimum population counts via fixed-winged aircraft. The Twentymile and Lake George registration hunt areas are counted every year, as the majority of the 14C goat harvest comes from these 2 hunt areas. Additionally, when there are available pilots, available funding, and weather we attempt to fly the Glacier Creek, Bird Creek, Eagle River, and East Eklutna goat hunt areas.

Results and Discussion

RY13

A mountain goat survey was conducted for the Lake George hunt area using a fixed-wing Super Cub piloted by Billy Wiederkehr, Wiederkehr Air. Goats were counted on 30 July, 1 August, and 12 August 2013. Two complete surveys (1 in the morning and 1 in the evening) were completed in this area to help evaluate the effect of flight time on observable goats.

For all flights a single pass transect was flown midway between the tree line and the top of each ridgeline. Additional passes were made if necessary to cover all potential goat habitat. The aircraft followed this contour throughout all drainages within the Lake George area. A global positioning system (GPS) track line was obtained to compare the area surveyed among years. Once goats were observed, the aircraft made multiple passes so the observer could enumerate the number of individual goats within a group, classify them as adults or kids, and obtain a GPS waypoint.

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 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 from 0600–1100 hours. A total of 224 goats, including 166 adults and 58 kids were observed (53 goats per hour). The number of goats observed was suspiciously low compared to the 440 goats observed in the same area in 2011. Therefore, we assumed that the warm temperatures (>70° F by midmorning) 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 11 and 12 August 2013. Viewing conditions were good throughout the survey with sparse to no snow cover and partly cloudy to sunny conditions. Winds were light with temperatures ranging from 59–70°F. Surveys were flown between 1830 and 2200 hours with a total survey time of 4 hours and 45 minutes. 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. A goat survey was not conducted in Twentymile in RY13.

Table 1. Unit 14C, Alaska, 2013 aerial mountain goat composition count.

Survey area	Adults	Kids	Percent kids	Total
Lake George	308	107	26	415

RY14

No goat surveys were conducted.

RY15

Anchorage wildlife staff completed the 2015 mountain goat surveys on 3 August. Surveys were completed using a fixed-wing Super Cub airplane with Billy Wiederkehr and Ernie Finch as the pilots. Bird Creek, Eagle River, Eklutna, Glacier Creek, Lake George, and Twentymile hunt areas were surveyed from 19 July to 3 Aug 3. All survey counts were conducted during the evening hours (after 1800 hours) to maximize goat observations. Survey conditions were generally good with 1 survey cut short by turbulence, and 1 reporting high light intensity. However, neither of these counts changed significantly from previous years. A total of 852 goats (22% kids) were counted in these 6 areas (Table 2).

Table 2. Unit 14C, Alaska, 2015 aerial mountain goat composition count.

Area	Adults	Kids	Total	Percent kids
Bird Creek	38	11	49	22
Eagle River	89	28	117	24
East Eklutna	40	9	49	18
Glacier Creek	22	9	31	29
Lake George	371	100	471	21
Twentymile	102	33	135	24

RY16

Anchorage wildlife staff flew the Lake George mountain goat survey area on 20 July 2016. Due to poor weather conditions following this survey, no other mountain goat surveys were conducted. Surveys were completed using PA-18 Super Cub airplanes with Billy Wiederkehr

and Ernie Finch as the pilots. Given the size of the survey area, we divided the area into 2 smaller areas for each pilot/observer pair to fly. Lake George Glacier was chosen as the break point. All survey counts were conducted during the evening (after 1800 hours) in order to maximize goat observations. Survey conditions were fair at the beginning of the survey for both pilot/observer pairs, however, as the evening progressed, survey conditions deteriorated from fair to poor due to an increase in turbulence intensity and warm temperatures that continued into the evening.

Goat numbers in the Lake George area showed a drop in the minimum count compared to previous years (315 in this survey, compared to 471 in 2015). However, we suspect that this is due to the poor conditions experienced toward the end of the survey, particularly around Knik Glacier. We planned to survey the area again but did not get favorable conditions before goat seasons opened. The reduction in numbers occurred almost entirely in the portion of the survey area between Lake George Glacier and Knik Glacier, and this is the section where some small drainages were not flown due to turbulence. Goat numbers west of Lake George Glacier were similar to the number of goats counted in that portion of the survey area in 2015. A total of 315 goats, consisting of 250 adults and 65 kids (21% of the total) were counted in the Lake George survey area (Table 3). We were unable to survey the Twentymile River hunt area due to poor survey conditions.

Table 3. Unit 14C, Alaska, 2016 aerial mountain goat composition count.

Survey Area	Adults	Kids	Percent kids	Total
Lake George	250	65	21	315

RY17

Anchorage wildlife staff flew the Lake George mountain goat survey area on 12 July 2017, and the Twentymile survey on 22 July 2017. Twentymile was subsequently reflown on 4 August 2017. Surveys were completed using fixed-wing Super Cub airplanes with Billy Wiederkehr and Ernie Finch as the pilots. Given the size of the Lake George survey area, we split it into 2 smaller areas for each pilot/observer pair to fly. Lake George Glacier was chosen as the split point, identical to 2016. The Twentymile survey area is small enough to fly with a single pilot/observer pair. All survey counts were conducted during the evening hours (after 1800 hours) to maximize goat observations. Survey conditions in both areas surveyed were good with only mild turbulence during the 22 July Twentymile goat survey flight. There was some concern that temperatures would be too warm, possibly reducing detections. However, the average flying temperature was cool at 55 degrees Fahrenheit.

The survey numbers in the Lake George survey area did increase from last year. However, the previous year's survey was hampered due to poor flying conditions encountered halfway through the survey. We believe the current number is a more accurate representation of the number of goats in Lake George. A total of 348 (20% kids) goats were counted in the Lake George survey area (Table 4).

Twentymile was flown twice, once in July and again in August. The area was reflown due to the especially low number counted during the July survey. While no goats were observed below tree line, it is often difficult to see goats in the trees. Some may have been missed below tree line or

on snow patches above tree line. Additionally, mild turbulence kept the aircraft from getting close to the mountain during transects. The subsequent survey again saw no goats below tree line but counted multiple groups on large, hard packed snow patches. A total of 77 (19% kids) goats were counted in the Twentymile survey area (Table 4).

Table 4. Unit 14C, Alaska, 2017 aerial mountain goat composition count.

Survey area	Adults	Kids	Percent kids	Total
Lake George	278	70	20	348
Twentymile	62	15	19	77

Recommendations for Activity 1.1.

Continue.

2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2.1. Monitor mortality and harvest in Unit 14C annually.

Data Needs

Monitoring harvest data is vital in order to determine if management objectives are being met.

Methods

DWC monitors hunter harvest via harvest reports, sealing, and inperson reporting.

Season and Bag Limit

Table 5. Season dates and hunt areas for all Unit 14C, Alaska, mountain goat hunts for regulatory years 2013–2017.

Hunt number	Hunt area	Season date
DG852	East Eklutna	Day after Labor Day–15 Oct
DG854	Eagle River	Day after Labor Day–15 Oct
DG856	Glacier Creek	Day after Labor Day–15 Oct
DG858	Bird Creek	Day after Labor Day–15 Oct
RG878[a]	Twentymile	16 Aug–31 Aug
RG868/RG881	Twentymile	1 Sep–15 Oct
RG862	Twentymile	1 Nov–15 Nov
RG879/DG888[a]	Lake George	16 Aug–31 Aug
RG882/RG869/DG889	Lake George	1 Sep–15 Oct
RG865	Lake George	1 Nov–15 Nov

[a] Archery only.

Results and Discussion

From RY13–RY16, Unit 14C had 4 drawing and 8 registration hunts for mountain goat (Table 6). In RY17, the nonresident archery and non-weapons-restricted registration hunts for goats in Lake George were converted to drawing hunts DG888 and DG889, respectively.

Table 6. Harvest and hunter participation for regulatory years 2013–2017 for drawing and registration goat hunts in Unit 14C, Alaska.

Area/hunt no.	Regulatory year	Permits/tags issued	No. hunters	Percent successful	Males harvested	Percent males harvested	Total goats harvested
DG852 East Eklutna	2013	5	3	33	0	0	1
	2014	5	4	50	2	100	2
	2015	5	2	50	0	0	1
	2016	4	4	50	1	50	2
	2017	4	4	75	3	100	3
DG854 Eagle River	2013	3	1	0	0	0	0
	2014	3	2	0	0	0	0
	2015	5	2	50	1	100	1
	2016	10	7	43	3	100	3
	2017	10	6	83	4	80	5
DG856 Glacier Creek	2013	5	3	67	1	50	2
	2014	5	2	0	0	0	0
	2015	6	4	0	0	0	0
	2016	5	5	60	2	67	3
	2017	5	5	0	0	0	0
DG858 Bird Creek	2013	5	4	50	2	100	2
	2014	5	3	67	1	50	2
	2015	5	4	75	1	33	3
	2016	5	4	0	0	0	0
	2017	5	5	20	0	0	1
RG862	2013	77	42	12	3	60	5
	2014	–	–	–	–	–	–
	2015	39	9	11	0	0	1
	2016	–	–	–	–	–	–
	2017	–	–	–	–	–	–
RG868 Twentymile residents only	2013	65	27	7	2	100	2
	2014	57	15	33	4	80	5
	2015	81	30	7	2	100	2
	2016	69	22	27	5	83	6
	2017	90	28	14	3	75	4
RG878 Twentymile archery only	2013	2	0	0	0	0	0
	2014	7	3	0	0	0	0
	2015	4	3	0	0	0	0
	2016	6	2	0	0	0	0
	2017	7	1	0	0	0	0

-continued-

Table 6. Page 2 of 2.

Area/hunt no.	Regulatory year	Permits/tags issued	No. hunters	Percent successful	Males harvested	Percent males harvested	Total goats harvested
RG881 Twentymile nonresidents	2013	0	0	0	0	0	0
	2014	2	1	0	0	0	0
	2015	0	0	0	0	0	0
	2016	1	1	0	0	0	0
	2017	0	0	0	0	0	0
RG879 Lake George archery only	2013	6	3	67	2	100	2
	2014	4	2	100	2	100	2
	2015	5	2	0	0	0	0
	2016	6	1	100	1	100	1
	2017[a]	7	3	0	0	0	0
DG888 Lake George Nonresidents archery only	2013	–	–	–	–	–	–
	2014	–	–	–	–	–	–
	2015	–	–	–	–	–	–
	2016	–	–	–	–	–	–
	2017	1	0	0	0	0	0
RG882 Lake George nonresidents	2013	12	11	73	6	75	8
	2014	17	16	69	10	91	11
	2015	8	8	63	4	80	5
	2016	7	7	86	6	100	6
	2017[b]	–	–	–	–	–	–
RG869 Lake George residents only	2013	67	18	44	5	62	8
	2014	66	22	45	7	70	10
	2015	93	37	19	5	71	7
	2016	111	41	34	12	86	14
	2017	78	21	52	8	73	11
DG889 Lake George nonresidents	2013	–	–	–	–	–	–
	2014	–	–	–	–	–	–
	2015	–	–	–	–	–	–
	2016	–	–	–	–	–	–
	2017	5	4	100	4	100	4

Note: En dashes represent no data available.

[a] Residents only, nonresident archery converted to DG888.

[b] Hunt converted to DG889.

Harvest by Hunters

During RY13–RY17 hunters averaged 30 goats harvested per year with males comprising 77% of the harvest. Annually, we exceeded our objective for the percentage of males in the harvest and met our total harvest objective of at least 25 goats for 3 out of the 5 years during RY13–RY17. While we have not achieved our management objective every year, we have not seen any significant changes in overall goat populations in these hunt areas.

Hunter Residency and Success

During RY13–RY17, resident hunters comprised most of the goat harvest seen in Unit 14C. However, nonresidents had a higher success rate. In RY17 for example, every nonresident hunter harvested a goat (Table 7).

Table 7. Unit 14C, Alaska, goat hunter success by residency for regulatory years 2013–2017.

Regulatory year	Successful			Unsuccessful		
	Residents	Nonresidents	Total	Residents	Nonresidents	Total
2013	21	8	29	78	4	82
2014	21	11	32	32	6	38
2015	15	5	20	76	3	79
2016	27	8	35	56	2	58
2017	23	5	28	49	0	49

Transport Methods

Given the lack of all-terrain vehicle (ATV) trails into the goat country of Unit 14C, accessing the Unit continues to be primarily by aircraft, boat, and highway vehicle.

Other Mortality

Wounding loss occurs on occasion. Each season, between 1 and 2 goats are reported to management staff by hunters as wounded or killed and unrecovered.

Alaska Board of Game (BOG) Actions and Emergency Orders

RY13: No BOG action.

RY14: No BOG action.

RY15: No BOG action.

In RY16, the Lake George registration hunt for nonresidents (both archery and unrestricted firearms) was converted into drawing hunts to curb the overharvest by nonresidents. Change is slated to take place for the RY17 hunts.

RY17: No BOG action.

Recommendations for Activity 2.1.

Continue.

3. Habitat Assessment-Enhancement

No habitat assessment or enhancement was undertaken during RY13–RY17.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Helicopter-assisted winter and summer recreational activities have 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. The Troublesome Creek drainage is too narrow for aircraft to stay the recommended 1,500 meters from goats. It is also not possible to keep this distance from where nanny groups concentrate to give birth and raise kids. In 2014 the operation returned to Colony Glacier and will be returning to Troublesome Glacier later in 2018. 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 goats have been made.

Data Recording and Archiving

- All hardcopy goat survey datasheets are stored in the Region II ADF&G office in Anchorage, office number 2006.
- Electronic copies of goat survey datasheets are stored on ADF&G servers at O:\DWC\common\Anch_Wildlife_Management\BGDIF\Goat\Surveys.
- Goat harvest reports for all Unit 14C hunts are stored in ADF&G's Wildlife Information Network (WinfoNet) database.

Agreements

None.

Permitting

ADF&G collection permit.

Conclusions and Management Recommendations

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, 2000b; Frid 2002; Goldstein et al. 2005).

Adult female mountain goats have heightened sensitivity to disturbances during kidding and postkidding 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). 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 response to this information and the lack of basic knowledge on Unit 14C goats, we recommend that all goats, and in particular the Lake George population, continue to be monitored. Additionally, we would like to see research begin on determining basic life history characteristics (survival, reproduction, recruitment rates, home range, and habitat use) for goats in Unit 14C. To date, no research has been conducted on this species in this unit. The data gathered would allow managers to better assess these populations and protect vital kidding areas within the unit.

II. Project Review and RY18–RY22 Plan

Review of Management Direction

MANAGEMENT DIRECTION

No change from the RY13–RY17 reporting period.

CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

None.

Intensive Management

None.

MANAGEMENT OBJECTIVES

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

REVIEW OF MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Conduct annual late summer minimum counts in Twentymile and lake George Lake hunt areas and when funding is available. Conduct minimum counts in all goat hunt areas.

Data Needs

No change from the RY13–RY17 reporting period.

Methods

No change from the RY13–RY17 reporting period.

2. Mortality-Harvest Monitoring

ACTIVITY 2.1. Monitor mortality and harvest in Unit 14C annually.

Data Needs

No change from the RY13–RY17 reporting period.

Methods

No change from the RY13–RY17 reporting period.

3. Habitat Assessment-Enhancement

No habitat assessment or enhancement activities are planned for RY18–RY22.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Data Recording and Archiving

- All hardcopy goat survey datasheets are stored in the Region II ADF&G office in Anchorage, office number 2006.
- Electronic copies of goat survey datasheets are stored on ADF&G servers at O:\DWC\common\Anch_Wildlife_Management\BGDIF\Goat\Surveys.
- Goat harvest reports for all 14C hunts are stored in the WinfoNet database.

Agreements

None.

Permitting

ADF&G collection permit.

References Cited

Alaska Department of Fish and Game. 1976. Alaska wildlife management plans: A public proposal for the management of Alaska's wildlife: Southcentral Alaska. Draft proposal subsequently approved by the Alaska Board of Game. Division of Game, Federal Aid in Wildlife Restoration Project W-17-R, Juneau.

Bailey, J. A. 1991. Reproductive success in female mountain goats. Canadian Journal of Zoology 69:2956–2961.

Bleich, V. C., R. T. Bowyer, A. M. Pauli, M. C. Nicholson, and R. W. Anthes. 1994. Mountain sheep *Ovis canadensis* and helicopter surveys: ramifications for the conservation of large mammals. Biological Conservation 70:1–7.

Côtê, S. D. 1996. Mountain goat responses to helicopter disturbance. Wildlife Society Bulletin 24:681–685.

Côtê, S. D., S. Hamel, A. St-Louis, and J. Mainguy. 2013. Do mountain goats habituate to helicopter disturbance? Journal of Wildlife Management 77(6):1244–1248.

Festa-Bianchet, M., M. Urquhart, and K. G. Smith, 1994. Mountain goat recruitment: kid production and survival to breeding age. Canadian Journal of Zoology 72:22–27.

Frid, A. 2000a. Behavioral responses by Dall's sheep to overflights by fixed-wing aircraft. Biennial Symposium Northern Wild Sheep and Goat Council 12:170–185.

Frid, A. 2000b. Fleeing decisions by Dall's sheep exposed to helicopter overflights. Biennial Symposium Northern Wild Sheep and Goat Council 12:153–169.

Frid, A. 2002. Dall's sheep responses to overflights by helicopter and fixed-wing aircraft. Biological Conservation 110:387–399.

Frid, A. 2003. Dall's sheep responses to overflights by helicopter and fixed-wing aircraft. Biological Conservation 110:387–399.

Frid, A. and L. M. Dill 2002. Human-caused disturbance stimuli as a form of predation risk. Conservation Ecology 6:11.

Foster, B. R., and E. Y. Rahs. 1983. Mountain goat response to hydroelectric exploration in northwestern British Columbia. Environmental Management 7(2):189–197.

Goldstein, M. I.; A. J. Poe, E. Cooper, D. Youkey, B. A. Brown, and T. L. McDonald. 2005. Mountain goat response to helicopter overflights in Alaska. Wildlife Society Bulletin. 33(2):688–699.

Hurley, K. 2004. Northern Wild Sheep and Goat Council position statement on helicopter supported recreation and mountain goats, July 2004. Biennial Symposium of the Northern Wild Sheep and Goat Council 14:131–136.

Krausman, P. R., M. C. Wallace, C. L. Hayes, and D. W. DeYoung. 1998. Effects of jet aircraft on mountain sheep. Journal of Wildlife Management 62:1246–1254.

MacArthur, R. A., V. Geist, and R. H. Johnston. 1982. Cardiac and behavioral responses of mountain sheep to human disturbance. Journal of Wildlife Management 46:351–358.

MacArthur, R. A., R. H. Johnston, and V. Geist. 1979. Factors influencing heart rate in free ranging bighorn sheep: a physiological approach to the study of wildlife harassment. Canadian Journal of Zoology 57:2010–2021.

Penner, D. F. 1988. Behavioral response and habituation of mountain goats in relation to petroleum exploration at Pinto Creek, Alberta. Proceedings of the Biennial Symposium, North American Wild Sheep and Goat Council 6:141–158.


ALASKA
DEPARTMENT OF FISH AND GAME