# Mountain Goat Management Report and Plan, Game Management Unit 8:

Report Period 1 July 2013–30 June 2018, and

Plan Period 1 July 2018–30 June 2023

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Species Management Report and Plan ADF&G/DWC/SMR&P-2022-17

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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 Jeff Selinger, 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.

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

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## Purpose of this Report

This report provides a record of survey and inventory management activities for mountain goat in Unit 8 for the 5 regulatory years 2013–2017 and plans for survey and inventory management activities in the following 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 more efficiently report 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 3 years.

# I. RY13–RY17 Management Report

## Management Area

Unit 8 (5,097 $mi^2$, Fig. 1) is located in the Kodiak Archipelago in the Gulf of Alaska. It encompasses all islands southeast of the centerline of Shelikof Strait, including Kodiak, Afognak, Whale, Raspberry, Shuyak, Spruce, Marmot, Sitkalidak, Amook, Uganik, Chirikof, the Trinity Islands, the Semidi Islands, the Barren Islands, other adjacent islands, and all seaward waters and lands within 3 miles of these coastlines. The archipelago is approximately 177 miles long and 50 miles wide consisting of a rugged, fjord-carved landscape with elevations ranging from sea level to approximately 4,500 feet. The archipelago has a wet maritime climate with little seasonal temperature variation and abundant precipitation. Vegetation composition varies throughout the archipelago and is highly influenced by past glaciation.

There are 3 primary ecological regions comprising the archipelago: the Sitka spruce region, the central ecological region, and the southern ecological region (Fleming and Spencer 2004). The Sitka spruce region encompasses northeastern Kodiak Island and includes Afognak and Shuyak Islands. The lower elevations in this region are comprised primarily of Sitka spruce (*Picea stichensis*) with a dominant understory consisting of salmonberry (*Rubus spectabilis*), devil's club (*Echinopanax horridum*), cow parsnip (*Heracleum lanatum*), ferns (*Athyrium* spp.) and high-bush blueberry (*Vaccinium ovalifolium*) with dispersed pockets of elderberry (*Sambucus racemosa*). Other plant communities in this region include forb-grass meadows containing willow (*Salix* spp.), birch (*Betula kenaica*), and alder (*Alnus crispa sinuata*). Much of Kodiak Island is classified as the central ecological region and is dominated by rugged, mountainous topography with steep ravines, deep valleys, and fast-moving glacial streams and rivers. Bands of deciduous forests comprised of willow, birch, cottonwood, and alder can be found in lowland areas along rivers and streams. Similar to the Sitka spruce region, salmonberry, ferns, cow parsnip, blueberry, and fireweed (*Epilobium angustifolium*) cover much of the landscape, along with various grass and forb assemblages. At the higher elevations, plant communities include

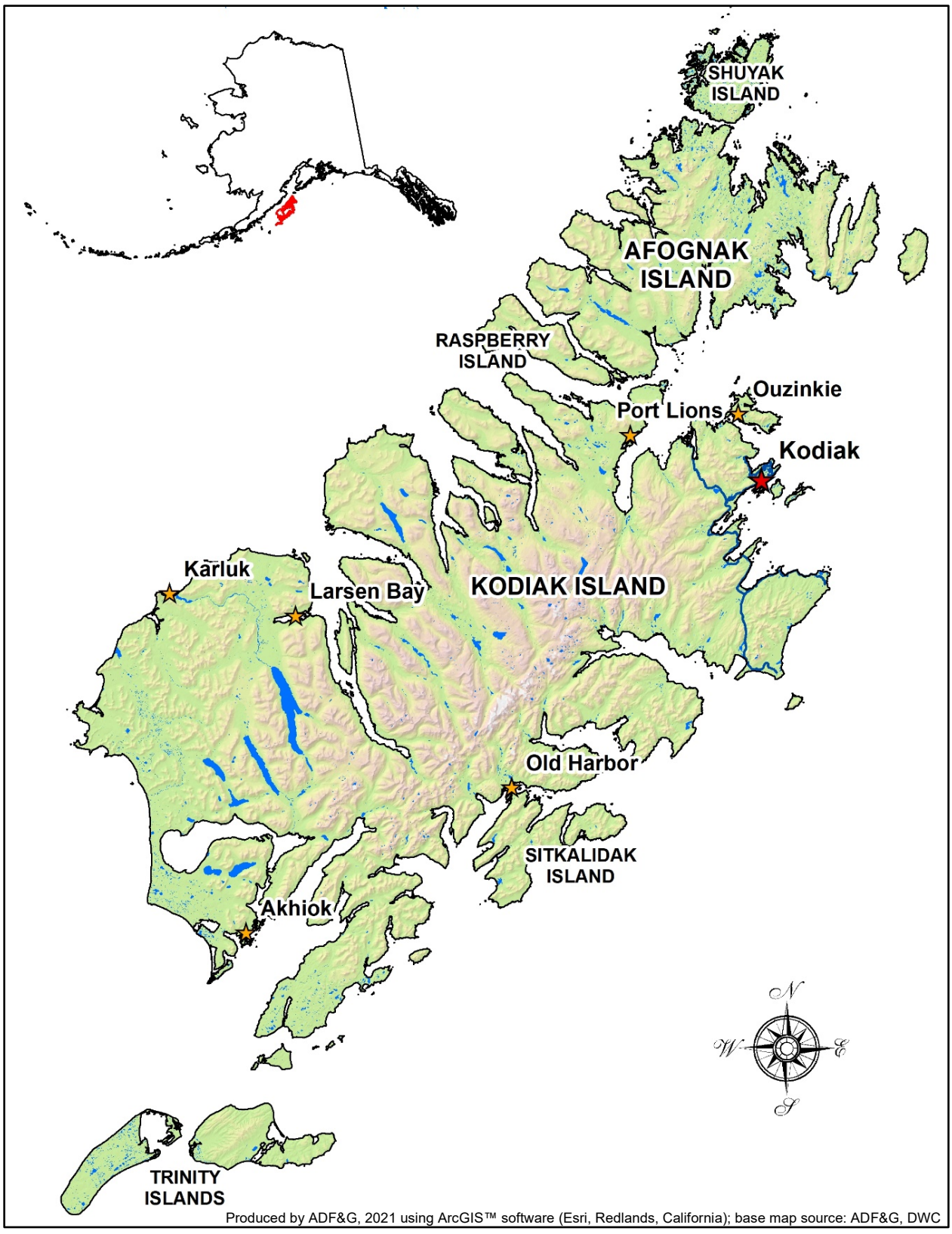


**Figure 1. A map showing Game Management Unit 8, Kodiak Archipelago, Alaska.**

alpine forb meadows and alpine tundra. Alpine forb meadows consist of sedges (*Carex* spp.), lupine (*Lupinus nootkatensis*), and Indian paint brush (*Castilleja unalaschensis*); while the alpine tundra is comprised of crowberry (*Empetrum nigrum*), partridgefoot (*Luetkea pectinata*), alpine blueberry (*Vaccinium uliginosum*), various lichens (*Cladina* spp., *Cetraria* spp.) and dwarf shrubs. The southern ecological region encompasses the glacial refugium and subarctic heath lands (Fleming and Spencer 2004) and consists of crowberry, dwarf willow (*Salix* spp.), fireweed, blueberry, cranberry (Vaccinium vitis-idaea), goldenrod (*Solidago lepida*), Labrador tea (*Ledum palustre*), kinnikinnick (*Arctostaphylos uva-ursi*), and various forbs and mosses (Fleming and Spencer 2004).

The Kodiak Road System Management Area is contained within Unit 8 and only includes portions of the main island comprising that portion of Kodiak Island north of a line from the head of Settlers Cove (including Peregrebni Point) to Crescent Lake (57°52′N, 152°08′W), east of a line from the outlet of Crescent Lake to Mount Ellison Peak, from Mount Ellison Peak to Pokati Point at Whale Passage, that portion of Kodiak Island east of a line from the mouth of Saltery Creek to the mouth of Elbow Creek, and adjacent small islands in Chiniak Bay.

## Summary of Status, Trend, Management Activities, and History of Mountain Goat in Unit 8

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). By 1968, when the first hunting season opened, 71 goats (57 adults, 14 kids) were observed (Hensel and Berns 1970). Mountain goat hunting permits have been issued annually since 1968. To promote population growth, goat permits were initially limited by a restricted draw hunt occurring within a limited area. As the population expanded, both the number of permits available each year and the areas that were opened to hunting fluctuated; managers adjusted harvest strategies to reflect management objectives, population trends, and goat movements. Since establishment, mountain goat numbers on Kodiak Island ranged from 4 goats observed in 1957 (Hensel and Berns 1966) to an estimated 3,500 in 2017 (ADF&G, unpublished data, 2017).

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 Van Daele (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 2002). 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 Regional Advisory Council [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 animals. 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. 2). 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 Kodiak National Wildlife 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.

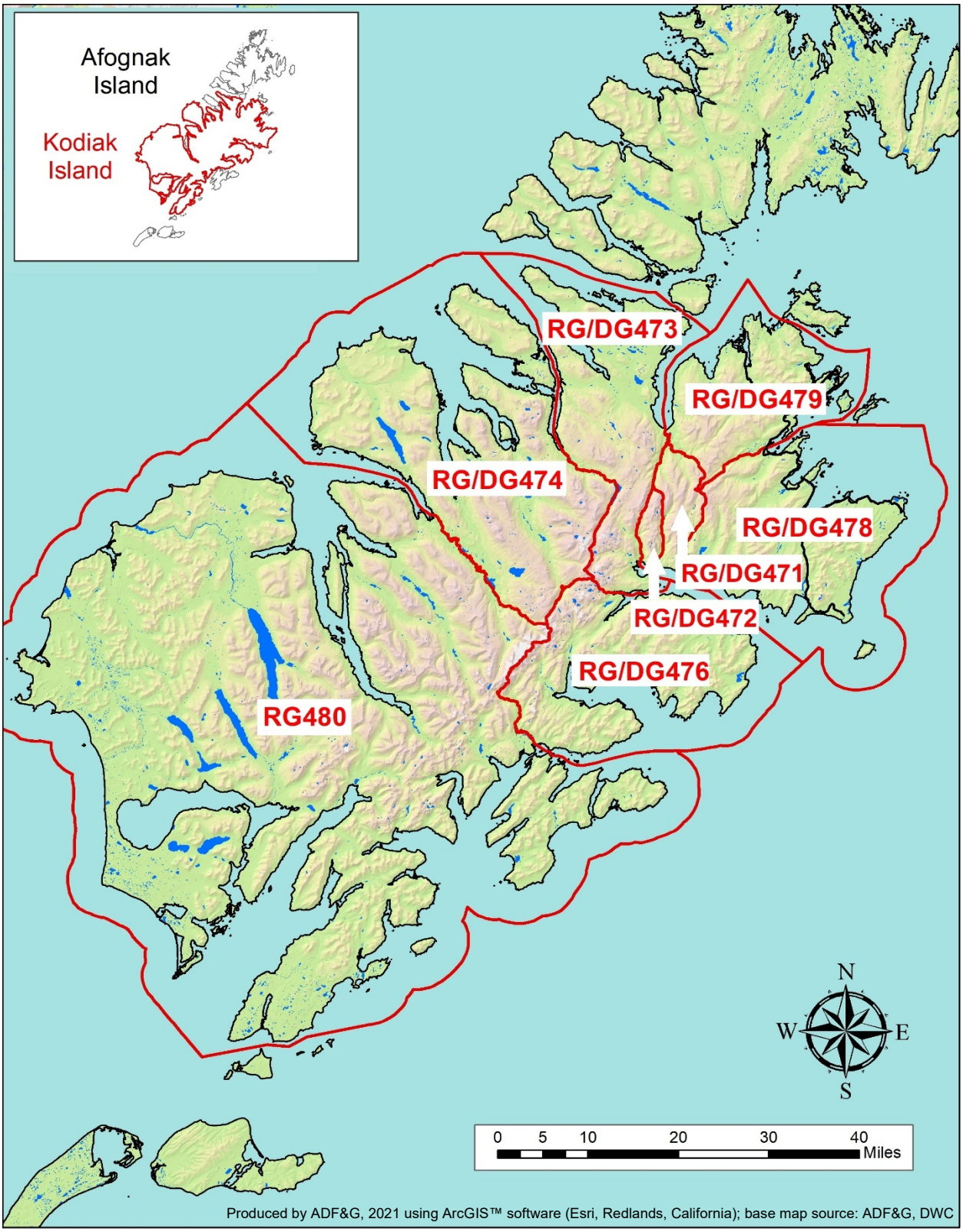


**Figure 2. Kodiak Island mountain goat (*Oreamnos americanus*) hunt areas, regulatory years 2013–2017, Alaska.**

Currently, 8 permit hunt areas are managed using drawing and registration permits (Fig. 2). 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. Goat populations on the southern portion of the island are gradually increasing and should be regularly 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 (GPS) radio collars. Both agencies worked collaboratively to conduct aerial surveys to determine goat herd composition, distribution, and abundance; however, unfortunately nearly all of the goat collars deployed in 2013 experienced some type of malfunction so very little useable data was collected. Future efforts to collar goats on Kodiak Island will be revisited as time and resources allow. Nonetheless, based on data from 2017–2018 comprehensive aerial surveys, we estimate the Kodiak goat population at an all-time high with an estimated 3,500 goats islandwide.

# Management Direction

## Existing Wildlife Management Plans

Guidelines for mountain goat management were first outlined in the Alaska Wildlife Management Plans – Southwestern Alaska (ADF&G 1976) and have been modified over time based on public comment, department recommendations, Alaska Board of Game action, the latest research, and survey-and-inventory estimates. A record of these changes can be located in our Division of Wildlife Conservation's species management report and plan series.

## Goals

- Provide sustained goat harvest opportunities for both residents and nonresidents.
- Maintain a robust islandwide goat population without compromising habitat quality.
- Provide opportunities for consumptive and nonconsumptive users to view, photograph, and enjoy mountain goats in aesthetically pleasing conditions.

## Codified Objectives

Amounts Reasonably Necessary for Subsistence Uses

There is a negative customary and traditional use determination for mountain goats in Unit 8; therefore, no predetermined number of goats are necessary for subsistence uses.

## Intensive Management

Mountain goats are not designated as intensive management species; therefore, no intensive management objectives have been determined.

## MANAGEMENT OBJECTIVES

Maintain a population of 3,500–4,000 goats islandwide, distributed in a manner that will provide sustained hunting opportunities and has minimal long-term impact on their habitat. Incrementally increase harvest opportunities to slow population growth while still allowing sustainable hunting opportunities for residents and nonresidents.

## MANAGEMENT ACTIVITIES

### 1. Population Status and Trend

ACTIVITY 1.1. Conduct annual aerial composition counts of each hunt area to estimate mountain goat abundance, distribution, and age ratios.

*Data Needs*

Annual composition surveys (i.e., minimum population counts) are necessary to determine the current population status and assess fluctuations in population trends and demographics. Maintaining consistent monitoring methods will ensure that management goals are being met and allow managers to set sustainable harvest goals.

*Methods*

In collaboration with the U.S. Fish and Wildlife Service, we conducted annual aerial survey composition counts with fixed-wing aircraft in July and August to estimate mountain goat abundance, distribution, and adult-to-kid ratios. Mountain goats in Unit 8 are ideally surveyed during late July thru mid-August when alpine snow cover has diminished resulting in increased sightability. Spring and/or fall surveys in most areas are not feasible due to increased snow accumulation which compromises our ability to identify goats on a snow-covered landscape. Surveys were conducted using fixed-wing aircraft with 2 observers (biologist and pilot). Survey efforts were focused on alpine habitats above shrub-line (approximately 300 meters or 328 yards 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. Counts and adult-to-kid ratios were compared between pilot and biologist observers to ensure consistency and accuracy. If discrepancies occurred, goat groups were circled and recounted until consensus was reached. Observers recorded a GPS waypoint when the aircraft was directly above a group or when a group was perpendicular to the aircraft's flight path. Estimated locations were documented accordingly. It is important to note that detection during summer can be compromised because goats will 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 with 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 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.

*Results and Discussion*

Aerial composition surveys indicate a growing trend in the Unit 8 mountain goat population during RY13–RY17 (Table 1). Minimum population counts this period range from a low of 1,013 goats observed in 2015 to a record high of 3,254 goats observed in 2017. This growth in the population can be attributed to relatively mild winters, combined with high-quality habitat, and increased kid-to-adult ratios.

Summer 2013 (RY13): Cooperative survey flights with USFWS covered approximately 60% of the goat range in Unit 8 (Table 1). No survey was conducted in hunt area 474, and only partial surveys were conducted in hunt areas 476 and 480 (Fig. 2). The estimated kid-to-adult ratio increased in 2013 compared to 2012.

Summer 2014 (RY14): In 2014, about 75% of the goat range was surveyed. No survey was conducted in hunt area 476 and only a partial survey was conducted in hunt area 480 (Fig. 2). The kid-to-adult ratio was similar in 2014 compared to 2013.

Summer 2015 (RY15): Approximately 50% of the goat range was surveyed in 2015. A lack of pilot availability prevented much of the survey area from being surveyed in 2015. No survey was conducted in hunt areas 474 or 476 and a partial survey was conducted in hunt area 480 (Fig. 2). The unitwide population estimate for 2015 was similar to the 2014 estimate (Table 1).

Summer 2016 (RY16): In 2016, about 90% of the goat range was surveyed. A partial survey was conducted in hunt area 473. The kid-to-adult ratio decreased in 2015 compared to 2016.

Despite successfully surveying nearly all of the known goat range, survey conditions in 2016 were poor. Elevated temperatures during the survey period combined with periodic low cloud cover likely resulted in many goats residing in cooler, shaded areas (e.g., crevices, caves, overhangs) or snow-covered fields, compromising identification and sightability.

Summer 2017 (RY17): In 2017, nearly the entire known occupied goat range was surveyed revealing the highest number of goats ever counted on Kodiak Island (Table 1).

**Table 1. Unit 8 summer mountain goat aerial survey composition counts and estimated population size within permit hunt areas, regulatory years 2007–2017, Alaska.**

| Hunt area | Regulatory year | No. adults | Percent adults | No. kids | Percent kids | Kids: 100 adults | Total goats observed | Estimated population size[b] |
|---|---|---|---|---|---|---|---|---|
| All permit hunt areas | 2007[a] | 1,390 | 83.0 | 284 | 17.0 | 20 | 1,674 | 1,910 |
| | 2008[a] | 1,607 | 81.4 | 368 | 18.6 | 23 | 1,975 | 2,145 |
| | 2009[a] | 814 | 79.2 | 214 | 20.8 | 26 | 1,028 | 2,371 |
| | 2010[a] | 804 | 84.6 | 146 | 15.4 | 18 | 950 | 2,320 |
| | 2011 | 1,963 | 83.0 | 401 | 17.0 | 20 | 2,364 | 2,426 |
| | 2012 | 1,041 | 82.3 | 224 | 17.7 | 22 | 1,265 | 2,390 |
| | 2013[a] | 1,544 | 78.3 | 429 | 21.7 | 28 | 1,973 | 2,588 |
| | 2014[a] | 1,956 | 77.8 | 557 | 22.2 | 28 | 2,513 | 2,732 |
| | 2015[a] | 777 | 76.7 | 236 | 23.3 | 30 | 1,013 | 2,732 |
| | 2016[a] | 924 | 82.8 | 192 | 17.2 | 21 | 1,116 | 3,000 |
| | 2017 | 2,595 | 79.7 | 659 | 20.3 | 25 | 3,254 | 3,500 |
| DG/RG 471 Wild Creek Center Mountain | 2007 | 137 | 88.4 | 18 | 11.6 | 13 | 155 | 175 |
| | 2008 | 72 | 83.7 | 14 | 16.3 | 19 | 86 | 110 |
| | 2009 | 114 | 72.2 | 44 | 27.8 | 39 | 158 | 160 |
| | 2010 | 102 | 81.6 | 23 | 18.4 | 23 | 125 | 125 |
| | 2011 | 103 | 83.7 | 20 | 16.3 | 19 | 123 | 130 |
| | 2012 | 108 | 83.7 | 21 | 16.3 | 19 | 129 | 130 |
| | 2013 | 28 | 93.3 | 2 | 6.7 | 7 | 30 | 80 |
| | 2014 | 75 | 74.3 | 26 | 25.7 | 35 | 101 | 101 |
| | 2015 | 90 | 76.3 | 28 | 23.7 | 31 | 118 | 118 |
| | 2016 | 114 | 83.8 | 22 | 16.2 | 19 | 136 | 136 |
| | 2017 | 111 | 79.9 | 28 | 20.1 | 25 | 139 | 139 |
| DG/RG 472 Crown Mountain | 2007 | – | – | – | – | – | – | 40 |
| | 2008 | 30 | 88.2 | 4 | 11.8 | 13 | 34 | 40 |
| | 2009 | 37 | 84.1 | 7 | 15.9 | 19 | 44 | 50 |
| | 2010 | – | – | – | – | – | – | 50 |
| | 2011 | 39 | 100.0 | 0 | 0.0 | 0 | 39 | 40 |
| | 2012 | 19 | 86.4 | 3 | 13.6 | 16 | 22 | 25 |
| | 2013 | 20 | 80.0 | 5 | 20.0 | 25 | 25 | 25 |
| | 2014 | 15 | 88.2 | 2 | 11.8 | 13 | 17 | 25 |
| | 2015 | 36 | 70.6 | 15 | 29.4 | 42 | 51 | 51 |
| | 2016 | 26 | 78.8 | 7 | 21.2 | 27 | 33 | 33 |
| | 2017 | 16 | 94.1 | 1 | 5.9 | 6 | 17 | 25 |

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**Table 1. Page 2 of 3.**

| Hunt area | Regulatory year | No. adults | Percent adults | No. kids | Percent kids | Kids: 100 adults | Total goats observed | Estimated population size[b] |
|---|---|---|---|---|---|---|---|---|
| DG/RG 473 Hidden Basin Terror Lake | 2007 | 45 | 91.8 | 4 | 8.2 | 9 | 49 | 60 |
| | 2008 | 51 | 86.4 | 8 | 13.6 | 16 | 59 | 60 |
| | 2009 | 49 | 81.7 | 11 | 18.3 | 22 | 60 | 75 |
| | 2010 | – | – | – | – | – | – | 75 |
| | 2011 | 57 | 86.4 | 9 | 13.6 | 16 | 66 | 70 |
| | 2012 | 48 | 87.3 | 7 | 12.7 | 15 | 55 | 60 |
| | 2013 | 39 | 81.3 | 9 | 18.8 | 23 | 48 | 50 |
| | 2014 | 49 | 80.3 | 12 | 19.7 | 24 | 61 | 61 |
| | 2015 | 22 | 81.5 | 5 | 18.5 | 23 | 27 | 40 |
| | 2016 | 37 | 84.1 | 7 | 15.9 | 19 | 44 | 44 |
| | 2017 | 60 | 87.0 | 9 | 13.0 | 15 | 69 | 69 |
| DG/RG 474 Uganik River | 2007 | 43 | 81.1 | 10 | 18.9 | 23 | 53 | 130 |
| | 2008 | 95 | 81.9 | 21 | 18.1 | 22 | 116 | 130 |
| | 2009 | 234 | 86.3 | 37 | 13.7 | 16 | 271 | 271 |
| | 2010 | – | – | – | – | – | – | 250 |
| | 2011 | 201 | 83.4 | 40 | 16.6 | 20 | 241 | 250 |
| | 2012 | 55 | 83.3 | 11 | 16.7 | 20 | 66 | 250 |
| | 2013 | – | – | – | – | – | – | 250 |
| | 2014 | 155 | 72.1 | 60 | 27.9 | 39 | 215 | 215 |
| | 2015 | – | – | – | – | – | – | 215 |
| | 2016 | 189 | 82.2 | 41 | 17.8 | 22 | 230 | 230 |
| | 2017 | 237 | 83.2 | 48 | 16.8 | 20 | 285 | 285 |
| DG/RG 476 Kiliuda Bay | 2007 | 95 | 84.1 | 18 | 15.9 | 19 | 113 | 130 |
| | 2008 | 82 | 86.3 | 13 | 13.7 | 16 | 95 | 140 |
| | 2009 | 89 | 85.6 | 15 | 14.4 | 17 | 104 | 125 |
| | 2010 | – | – | – | – | – | – | 125 |
| | 2011 | 99 | 92.5 | 8 | 7.5 | 8 | 107 | 125 |
| | 2012 | – | – | – | – | – | – | 125 |
| | 2013 | 65 | 77.4 | 19 | 22.6 | 29 | 84 | 125 |
| | 2014 | – | – | – | – | – | – | 125 |
| | 2015 | – | – | – | – | – | – | 125 |
| | 2016 | 156 | 86.2 | 25 | 13.8 | 16 | 181 | 181 |
| | 2017 | 188 | 85.1 | 33 | 14.9 | 18 | 221 | 221 |
| DG/RG 478 South Road system | 2007 | 117 | 80.1 | 29 | 19.9 | 25 | 146 | 175 |
| | 2008 | 156 | 75.7 | 50 | 24.3 | 32 | 206 | 230 |
| | 2009 | 179 | 72.8 | 67 | 27.2 | 37 | 246 | 250 |
| | 2010 | 168 | 81.2 | 39 | 18.8 | 23 | 207 | 220 |
| | 2011 | 163 | 79.1 | 43 | 20.9 | 26 | 206 | 220 |
| | 2012 | 165 | 81.7 | 37 | 18.3 | 22 | 202 | 220 |

-continued-

**Table 1. Page 3 of 3.**

| Hunt area | Regulatory year | No. adults | Percent adults | No. kids | Percent kids | Kids: 100 adults | Total goats observed | Estimated population size[b] |
|---|---|---|---|---|---|---|---|---|
| DG/RG 478 South Road system | 2013 | 223 | 73.8 | 79 | 26.2 | 35 | 302 | 302 |
| | 2014 | 246 | 73.4 | 89 | 26.6 | 36 | 335 | 335 |
| | 2015 | 183 | 77.5 | 53 | 22.5 | 29 | 236 | 236 |
| | 2016 | 258 | 81.6 | 58 | 18.4 | 22 | 316 | 316 |
| | 2017 | 278 | 75.1 | 92 | 24.9 | 33 | 370 | 370 |
| DG/RG 479 North Road system | 2007 | 130 | 83.9 | 25 | 16.1 | 19 | 155 | 170 |
| | 2008 | 92 | 78.0 | 26 | 22.0 | 28 | 118 | 145 |
| | 2009 | 112 | 77.2 | 33 | 22.8 | 29 | 145 | 150 |
| | 2010 | 126 | 80.8 | 30 | 19.2 | 24 | 156 | 165 |
| | 2011 | 97 | 80.2 | 24 | 19.8 | 25 | 121 | 130 |
| | 2012 | 126 | 82.4 | 27 | 17.6 | 21 | 153 | 150 |
| | 2013 | 154 | 74.8 | 52 | 25.2 | 34 | 206 | 206 |
| | 2014 | 174 | 79.5 | 45 | 20.5 | 26 | 219 | 219 |
| | 2015 | 81 | 77.9 | 23 | 22.1 | 28 | 104 | 104 |
| | 2016 | 144 | 81.8 | 32 | 18.2 | 22 | 176 | 176 |
| | 2017 | 161 | 79.3 | 42 | 20.7 | 26 | 203 | 203 |
| RG 480 Southern Kodiak | 2007 | 823 | 82.1 | 180 | 17.9 | 22 | 1,003 | 1,100 |
| | 2008 | 1,029 | 81.6 | 232 | 18.4 | 23 | 1,261 | 1,300 |
| | 2009 | – | – | – | – | – | – | 1,300 |
| | 2010 | 408 | 88.3 | 54 | 11.7 | 13 | 462 | 1,300 |
| | 2011 | 1,204 | 82.4 | 257 | 17.6 | 21 | 1,461 | 1,500 |
| | 2012 | 520 | 81.5 | 118 | 18.5 | 23 | 638 | 1,500 |
| | 2013 | 1,015 | 79.4 | 263 | 20.6 | 26 | 1,278 | 1,550 |
| | 2014 | 1,242 | 79.4 | 323 | 20.6 | 26 | 1,565 | 1,575 |
| | 2015 | 365 | 76.5 | 112 | 23.5 | 31 | 477 | 1,575 |
| | 2016 | 692 | 72.0 | 269 | 28.0 | 39 | 961 | 1,700 |
| | 2017 | 1,544 | 79.2 | 406 | 20.8 | 26 | 1,950 | 2,000 |

*Note*: En dashes represent years where surveys were not conducted.
[a] Indicates partial survey.
[b] Population estimates based on annual survey and historical knowledge of unsurveyed and partially surveyed areas.

*Recommendations for Activity 1.1*

Continue with modifications. Annual aerial composition counts should continue islandwide for all mountain goat hunt areas in Unit 8. Current population estimates are derived based on annual survey results combined with historical knowledge of partially surveyed or unsurveyed areas. Although this estimation approach has been applied for decades and is useful for detecting trends and major population fluctuations, more accurate and robust estimates are needed. The development and application of a sightability correction factor would improve this method by correcting for variable survey conditions and provide more accurate information to guide management decisions. Current methodology should be modified to include the application of a

sightability factor (White et al. 2016) to obtain more accurate population estimates and to account for seasonal and environmental variability.

## 2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2.1. Monitor annual mountain goat harvest and mortality through hunter harvest reports, field observations, and contact with hunters, guides, and transporters.

*Data Needs*

Collecting and analyzing harvest data is vital for the continued, sustainable harvest of mountain goats in Unit 8. The analysis of harvest data is necessary to inform management decisions and establish hunt conditions such as season length, number of permits, and methods of take.

*Methods*

Mountain goat harvest is monitored via hunt reports submitted to the department or through information collected by in-person reporting at the Kodiak office. Harvest reports are summarized by regulatory year (RY) and include such metrics as total harvest, hunter residency and success, transportation method, and harvest chronology.

*Season and Bag Limit*

Northern area[1]. Goat hunting season for resident and nonresident hunters was open 20 August–25 October by drawing permit in the northern part of Kodiak Island (Fig. 2); the bag limit was 1 goat of either sex. Following the drawing permit hunt, a registration hunt (1 November–15 December) in the northern hunt areas was initiated in RY03 for Alaska residents only. Registration permits were available during a limited time prior to the hunting season in the villages nearest the hunt area (RG471–RG474 Port Lions, RG476 Old Harbor); and floatplane access was restricted to saltwater.

Southern area. The southern part of Kodiak Island is a registration hunt area (RG480, Fig. 2) and permits are available to both residents and nonresidents. Nonresident hunters must hunt with a registered guide or with a resident relative within second degree of kindred. Hunters interested in hunting in RG480 were able to obtain a permit throughout the season from any ADF&G office or online at www.adfg.alaska.gov. Beginning in RY13 the bag limit for RG480 was increased from 1 goat (either sex) to 2 goats of either sex. Also, the season end date was extended from 15 December to 20 March; the season start remained on 20 August. Nannies with kids and kids cannot be legally harvested in any hunt areas.

[1] The northern area includes the area north and east of line from Spiridon Bay, along the Spiridon River to its headwaters, then southwest along the Kodiak spine across Koniag Peak to the headwaters of Midway Creek, then along Midway Creek to Midway Bay. This includes the following drawing hunts DG471, DG472, DG473, DG474, DG476, DG478, and DG479; and the following registration hunts RG471, RG472, RG473, RG474, RG476, RG478, and RG479 (Fig. 2).

*Results and Discussion*

There are 7 drawing hunts and 8 registration hunts for mountain goats in Unit 8 (Tables 2 and 3, Fig. 2).

Harvest by Hunters

Mean annual goat harvest for RY13–RY17 for drawing and registration hunts was 89 and 234 animals, respectively (Tables 2 and 3). Mean annual harvest for drawing hunts this period was similar to the RY08–RY12 average of 94 goats harvested annually (Table 2). In contrast, the mean annual harvest for registration hunts in RY13–RY17 increased considerably compared to the RY08–RY12 mean of 68 goats (Table 3). Increased harvest during the registration hunt is likely due to the significant increase in registration permits from an average of 458 issued during RY08–RY12 to an average of 1,502 issued during RY13–RY17 (Table 3). This increase may be in response to the bag limit increase from 1 to 2 goats that was implemented by the Board of Game prior to the 2013 season. Anecdotal information collected from guides and transporters suggests that the recent increased bag limit combined with a nearly 8-month goat season has increased hunter interest in goat hunting on Kodiak Island. Unit 8 has the longest goat season in Alaska and is the only hunt area where a 2-goat bag limit is permitted. On average, from RY13–RY17, 34 hunters harvested 2 goats annually in the registration hunt area, all other successful hunters harvested 1 goat. From RY13, when the 2-goat bag limit commenced, to RY17, 168 hunters harvested 2 goats in registration hunt area RG480.

Hunter Residency and Success

Mean hunter success was 44% during RY13–RY17 and was slightly greater than the RY08–RY12 mean of 40% (Table 4). There was an average of 738 hunters afield during RY13–RY17. The number of local resident hunters increased from a mean of 112 in RY08–RY12 to 184 in RY13–RY17. The mean number of nonlocal residents each year increased substantially from 175 in RY08–RY12 to 462 during RY13–RY17. Similarly, the average number of nonresident mountain goat hunters increased from 47 in RY08–RY12 to 92 in RY13–RY17.

**Table 2. Unit 8 mountain goat drawing hunt harvest data regulatory years 2007–2017, Kodiak, Alaska.**

| Hunt area | Regulatory year | Permits issued | Hunters afield | Successful | Percent successful | Males | Percent males | Females | Percent females | Total harvest[a,b] |
|---|---|---|---|---|---|---|---|---|---|---|
| All drawing hunts | 2007 | 500 | 262 | 131 | 50 | 89 | 68 | 41 | 31 | 131 |
| | 2008 | 499 | 268 | 126 | 47 | 80 | 63 | 46 | 37 | 129 |
| | 2009 | 500 | 226 | 144 | 64 | 92 | 64 | 51 | 35 | 145 |
| | 2010 | 237 | 121 | 53 | 44 | 33 | 62 | 20 | 38 | 53 |
| | 2011 | 239 | 143 | 79 | 55 | 58 | 73 | 21 | 27 | 79 |
| | 2012 | 254 | 129 | 62 | 48 | 43 | 69 | 18 | 29 | 62 |
| | 2013 | 255 | 124 | 64 | 52 | 39 | 61 | 25 | 39 | 64 |
| | 2014 | 284 | 152 | 94 | 62 | 63 | 67 | 31 | 33 | 94 |
| | 2015 | 294 | 166 | 104 | 63 | 70 | 67 | 34 | 33 | 104 |
| | 2016 | 249 | 140 | 89 | 64 | 58 | 65 | 31 | 35 | 90 |
| | 2017 | 249 | 146 | 95 | 65 | 70 | 74 | 25 | 26 | 96 |
| DG471 Wild Creek | 2007 | 39 | 28 | 10 | 36 | 4 | 40 | 6 | 60 | 10 |
| | 2008 | 40 | 22 | 6 | 27 | 5 | 83 | 1 | 17 | 6 |
| | 2009 | 40 | 17 | 6 | 35 | 5 | 83 | 1 | 17 | 6 |
| | 2010 | 30 | 16 | 3 | 19 | 1 | 33 | 2 | 67 | 3 |
| | 2011 | 30 | 14 | 4 | 29 | 4 | 100 | 0 | 0 | 4 |
| | 2012 | 35 | 10 | 4 | 40 | 2 | 50 | 2 | 50 | 4 |
| | 2013 | 35 | 13 | 4 | 31 | 2 | 50 | 2 | 50 | 4 |
| | 2014 | 35 | 16 | 11 | 69 | 8 | 73 | 3 | 27 | 11 |
| | 2015 | 35 | 13 | 5 | 38 | 4 | 80 | 1 | 20 | 5 |
| | 2016 | 35 | 20 | 9 | 45 | 6 | 67 | 3 | 33 | 9 |
| | 2017 | 35 | 12 | 8 | 67 | 4 | 50 | 4 | 50 | 8 |
| DG472 Crown Mountain | 2007 | 10 | 3 | 3 | 100 | 3 | 100 | 0 | 0 | 3 |
| | 2008 | 10 | 8 | 4 | 50 | 3 | 75 | 1 | 25 | 4 |
| | 2009 | 10 | 2 | 2 | 100 | 2 | 100 | 0 | 0 | 2 |
| | 2010 | 11 | 3 | 3 | 100 | 1 | 33 | 2 | 67 | 3 |
| | 2011 | 12 | 7 | 3 | 43 | 2 | 67 | 1 | 33 | 3 |
| | 2012 | 12 | 5 | 5 | 100 | 3 | 60 | 2 | 40 | 5 |
| | 2013 | 13 | 4 | 1 | 25 | 1 | 100 | 0 | 0 | 1 |

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**Table 2. Page 2 of 4.**

| Hunt area | Regulatory year | Permits issued | Hunters afield | Successful | Percent successful | Males | Percent males | Females | Percent females | Total harvest[a,b] |
|---|---|---|---|---|---|---|---|---|---|---|
| DG472 Crown Mountain | 2014 | 12 | 4 | 3 | 75 | 3 | 100 | 0 | 0 | 3 |
| | 2015 | 12 | 6 | 4 | 67 | 3 | 75 | 1 | 25 | 4 |
| | 2016 | 12 | 3 | 2 | 67 | 2 | 100 | 0 | 0 | 2 |
| | 2017 | 12 | 8 | 6 | 75 | 4 | 67 | 2 | 33 | 6 |
| DG473 Hidden Basin | 2007 | 10 | 6 | 5 | 83 | 4 | 80 | 1 | 20 | 5 |
| | 2008 | 10 | 6 | 3 | 50 | 1 | 33 | 2 | 67 | 3 |
| | 2009 | 10 | 4 | 2 | 50 | 2 | 100 | 0 | 0 | 2 |
| | 2010 | 12 | 3 | 1 | 33 | 1 | 100 | 0 | 0 | 1 |
| | 2011 | 12 | 7 | 3 | 43 | 2 | 67 | 1 | 33 | 3 |
| | 2012 | 12 | 6 | 4 | 67 | 3 | 75 | 1 | 25 | 4 |
| | 2013 | 12 | 4 | 1 | 25 | 1 | 100 | 0 | 0 | 1 |
| | 2014 | 12 | 6 | 5 | 83 | 4 | 80 | 1 | 20 | 5 |
| | 2015 | 12 | 8 | 6 | 75 | 4 | 67 | 2 | 33 | 6 |
| | 2016 | 12 | 9 | 6 | 67 | 5 | 83 | 1 | 17 | 6 |
| | 2017 | 12 | 10 | 7 | 70 | 4 | 57 | 3 | 43 | 7 |
| DG474 Uganik River | 2007 | 21 | 11 | 7 | 64 | 5 | 71 | 2 | 29 | 7 |
| | 2008 | 20 | 12 | 7 | 58 | 3 | 43 | 4 | 57 | 7 |
| | 2009 | 20 | 16 | 10 | 63 | 9 | 90 | 1 | 10 | 10 |
| | 2010 | 30 | 10 | 5 | 50 | 4 | 80 | 1 | 20 | 5 |
| | 2011 | 30 | 12 | 9 | 75 | 8 | 89 | 1 | 11 | 9 |
| | 2012 | 40 | 17 | 8 | 47 | 6 | 75 | 2 | 25 | 8 |
| | 2013 | 40 | 14 | 9 | 64 | 2 | 22 | 7 | 78 | 9 |
| | 2014 | 40 | 24 | 12 | 50 | 8 | 67 | 4 | 33 | 12 |
| | 2015 | 50 | 24 | 17 | 71 | 10 | 59 | 7 | 41 | 17 |
| | 2016 | 50 | 25 | 22 | 88 | 15 | 68 | 7 | 32 | 22 |
| | 2017 | 50 | 29 | 20 | 69 | 19 | 95 | 1 | 5 | 20 |

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**Table 2. Page 3 of 4.**

| Hunt area | Regulatory year | Permits issued | Hunters afield | Successful | Percent successful | Males | Percent males | Females | Percent females | Total harvest[a,b] |
|---|---|---|---|---|---|---|---|---|---|---|
| DG476 Kiliuda Bay | 2007 | 20 | 14 | 6 | 43 | 5 | 83 | 1 | 17 | 6 |
| | 2008 | 20 | 7 | 7 | 100 | 5 | 71 | 2 | 29 | 7 |
| | 2009 | 20 | 9 | 7 | 78 | 5 | 71 | 2 | 29 | 7 |
| | 2010 | 30 | 13 | 3 | 23 | 1 | 33 | 2 | 67 | 3 |
| | 2011 | 30 | 20 | 11 | 55 | 9 | 82 | 2 | 18 | 11 |
| | 2012 | 30 | 17 | 3 | 18 | 3 | 100 | 0 | 0 | 3 |
| | 2013 | 30 | 15 | 4 | 27 | 4 | 100 | 0 | 0 | 4 |
| | 2014 | 30 | 9 | 5 | 56 | 3 | 60 | 2 | 40 | 5 |
| | 2015 | 30 | 15 | 6 | 40 | 5 | 83 | 1 | 17 | 6 |
| | 2016 | 30 | 15 | 10 | 67 | 6 | 60 | 4 | 40 | 10 |
| | 2017 | 30 | 10 | 10 | 100 | 10 | 100 | 0 | 0 | 10 |
| DG478 South Road | 2007 | 60 | 40 | 23 | 58 | 14 | 61 | 9 | 39 | 23 |
| | 2008 | 59 | 44 | 22 | 50 | 13 | 59 | 9 | 41 | 23 |
| | 2009 | 60 | 37 | 26 | 70 | 18 | 69 | 7 | 27 | 26 |
| | 2010 | 75 | 42 | 25 | 60 | 15 | 60 | 10 | 40 | 25 |
| | 2011 | 75 | 49 | 28 | 57 | 17 | 61 | 11 | 39 | 28 |
| | 2012 | 75 | 47 | 26 | 55 | 20 | 77 | 6 | 23 | 26 |
| | 2013 | 75 | 44 | 28 | 64 | 16 | 57 | 12 | 43 | 28 |
| | 2014 | 90 | 56 | 32 | 57 | 16 | 50 | 16 | 50 | 32 |
| | 2015 | 90 | 59 | 37 | 63 | 25 | 68 | 12 | 32 | 37 |
| | 2016 | 75 | 45 | 27 | 60 | 19 | 70 | 8 | 30 | 27 |
| | 2017 | 75 | 53 | 32 | 60 | 21 | 66 | 11 | 34 | 32 |
| DG479 North Road | 2007 | 50 | 34 | 11 | 32 | 6 | 55 | 5 | 45 | 11 |
| | 2008 | 50 | 34 | 18 | 53 | 8 | 44 | 9 | 50 | 18 |
| | 2009 | 50 | 34 | 22 | 65 | 12 | 55 | 10 | 45 | 22 |
| | 2010 | 49 | 34 | 13 | 38 | 10 | 77 | 3 | 23 | 13 |
| | 2011 | 50 | 34 | 21 | 62 | 16 | 76 | 5 | 24 | 21 |
| | 2012 | 50 | 27 | 12 | 44 | 6 | 50 | 5 | 42 | 12 |

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**Table 2. Page 4 of 4.**

| Hunt area | Regulatory year | Permits issued | Hunters afield | Successful | Percent successful | Males | Percent males | Females | Percent females | Total harvest[a,b] |
|---|---|---|---|---|---|---|---|---|---|---|
| DG479 North Road | 2013 | 50 | 30 | 17 | 57 | 13 | 76 | 4 | 24 | 17 |
| | 2014 | 65 | 37 | 26 | 70 | 21 | 81 | 5 | 19 | 26 |
| | 2015 | 65 | 41 | 29 | 71 | 19 | 66 | 10 | 34 | 29 |
| | 2016 | 35 | 23 | 13 | 57 | 5 | 38 | 8 | 62 | 13 |
| | 2017 | 35 | 24 | 12 | 50 | 8 | 67 | 4 | 33 | 12 |

[a] Total harvest includes mountain goats shot illegally or goats that died of unknown causes.

[b] Total harvest may not equal the number of males plus the number of females harvested due to the sex of some harvested animals being unknown.

**Table 3. Unit 8 mountain goat registration hunt harvest data regulatory years 2007-2017, Kodiak, Alaska.**

| Hunt area | Regulatory year | Permits issued | Hunters afield | Successful | Percent successful | Males | Percent males | Females | Percent females | Total harvest[c] |
|---|---|---|---|---|---|---|---|---|---|---|
| All registration hunts | 2007 | 178 | 68 | 17 | 25 | 12 | 71 | 5 | 29 | 17 |
| | 2008 | 212 | 83 | 25 | 30 | 19 | 76 | 6 | 24 | 25 |
| | 2009 | 376 | 155 | 45 | 29 | 28 | 62 | 17 | 38 | 47 |
| | 2010 | 627 | 278 | 94 | 34 | 65 | 69 | 29 | 31 | 94 |
| | 2011 | 502 | 235 | 82 | 35 | 56 | 68 | 26 | 32 | 82 |
| | 2012 | 574 | 283 | 93 | 33 | 62 | 67 | 30 | 32 | 92 |
| | 2013 | 1,126 | 509 | 157 | 31 | 115 | 73 | 75 | 48 | 191 |
| | 2014 | 1,521 | 653 | 250 | 38 | 140 | 56 | 110 | 44 | 250 |
| | 2015 | 1,590 | 665 | 279 | 42 | 164 | 59 | 115 | 41 | 279 |
| | 2016 | 1,701 | 623 | 228 | 37 | 154 | 68 | 74 | 32 | 228 |
| | 2017 | 1,576 | 527 | 221 | 42 | 144 | 65 | 77 | 35 | 221 |
| RG471 Wild Creek | 2007 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2008 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2009 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2010 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2011 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2012 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2013[a] | – | – | – | – | – | – | – | – | – |
| | 2014[a] | – | – | – | – | – | – | – | – | – |
| | 2015 | 8 | 3 | 2 | 67 | 2 | 100 | 0 | 0 | 2 |
| | 2016 | 7 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2017 | 9 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RG472 Crown Mountain | 2007 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2008 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2009 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2010 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2011[a] | – | – | – | – | – | – | – | – | – |
| | 2012[a] | – | – | – | – | – | – | – | – | – |
| | 2013[a] | – | – | – | – | – | – | – | – | – |

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**Table 3. Page 2 of 4.**

| Hunt area | Regulatory year | Permits issued | Hunters afield | Successful | Percent successful | Males | Percent males | Females | Percent females | Total harvest[c] |
|---|---|---|---|---|---|---|---|---|---|---|
| RG472 Crown Mountain | 2014[a] | – | – | – | – | – | – | – | – | – |
| | 2015 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2016[a] | – | – | – | – | – | – | – | – | – |
| | 2017[a] | – | – | – | – | – | – | – | – | – |
| RG473 Hidden Basin | 2007 | 13 | 3 | 2 | 67 | 2 | 100 | 0 | 0 | 2 |
| | 2008 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2009 | 2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2010 | 11 | 2 | 1 | 50 | 1 | 100 | 0 | 0 | 1 |
| | 2011[a] | – | – | – | – | – | – | – | – | – |
| | 2012[a] | – | – | – | – | – | – | – | – | – |
| | 2013 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2014[a] | – | – | – | – | – | – | – | – | – |
| | 2015[b] | – | – | – | – | – | – | – | – | – |
| | 2016[a] | – | – | – | – | – | – | – | – | – |
| | 2017[a] | – | – | – | – | – | – | – | – | – |
| RG474 Uganik River | 2007 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2008 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2009 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2010 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2011 | 1 | 1 | 0 | 0 | 1 | 100 | 0 | 0 | 1 |
| | 2012[a] | – | – | – | – | – | – | – | – | – |
| | 2013[a] | – | – | – | – | – | – | – | – | – |
| | 2014[a] | – | – | – | – | – | – | – | – | – |
| | 2015 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2016[a] | – | – | – | – | – | – | – | – | – |
| | 2017 | 2 | 2 | 1 | 50 | 1 | 100 | 0 | 0 | 1 |

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**Table 3. Page 3 of 4.**

| Hunt area | Regulatory year | Permits issued | Hunters afield | Successful | Percent successful | Males | Percent males | Females | Percent females | Total harvest[c] |
|---|---|---|---|---|---|---|---|---|---|---|
| RG476 Kiliuda Bay | 2007 | 23 | 8 | 3 | 38 | 1 | 33 | 2 | 67 | 3 |
| | 2008 | 31 | 16 | 7 | 44 | 5 | 71 | 2 | 29 | 7 |
| | 2009 | 12 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2010 | 8 | 3 | 1 | 33 | 1 | 100 | 0 | 0 | 1 |
| | 2011[a] | – | – | – | – | – | – | – | – | – |
| | 2012 | 18 | 7 | 2 | 29 | 1 | 50 | 1 | 50 | 2 |
| | 2013 | 11 | 6 | 3 | 50 | 3 | 100 | 0 | 0 | 3 |
| | 2014 | 19 | 6 | 2 | 33 | 0 | 0 | 2 | 100 | 2 |
| | 2015 | 8 | 7 | 3 | 43 | 3 | 100 | 0 | 0 | 3 |
| | 2016 | 19 | 9 | 3 | 33 | 3 | 100 | 0 | 0 | 3 |
| | 2017 | 14 | 6 | 2 | 33 | 2 | 100 | 0 | 0 | 2 |
| RG478 South Road | 2007 | 44 | 19 | 2 | 11 | 0 | 0 | 2 | 100 | 2 |
| | 2008 | 47 | 16 | 3 | 19 | 2 | 67 | 1 | 33 | 3 |
| | 2009 | 54 | 25 | 8 | 32 | 5 | 63 | 3 | 38 | 9 |
| | 2010 | 60 | 23 | 6 | 26 | 3 | 50 | 3 | 50 | 6 |
| | 2011 | 59 | 27 | 3 | 11 | 2 | 67 | 1 | 33 | 3 |
| | 2012 | 70 | 31 | 4 | 13 | 4 | 100 | 0 | 0 | 4 |
| | 2013 | 69 | 27 | 5 | 19 | 4 | 80 | 1 | 20 | 5 |
| | 2014 | 82 | 28 | 6 | 21 | 4 | 67 | 2 | 33 | 6 |
| | 2015[b] | – | – | – | – | – | – | – | – | – |
| | 2016 | 71 | 20 | 4 | 20 | 1 | 25 | 3 | 75 | 4 |
| | 2017 | 67 | 24 | 9 | 38 | 6 | 67 | 3 | 33 | 9 |
| RG479 North Road | 2007 | 37 | 17 | 2 | 12 | 1 | 50 | 1 | 1 | 2 |
| | 2008 | 46 | 22 | 6 | 27 | 6 | 100 | 0 | 0 | 6 |
| | 2009 | 31 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2010 | 57 | 17 | 2 | 12 | 0 | 0 | 2 | 1 | 2 |
| | 2011[a] | – | – | – | – | – | – | – | – | – |
| | 2012 | 70 | 24 | 5 | 21 | 3 | 60 | 1 | 20 | 5 |

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**Table 3. Page 4 of 4.**

| Hunt area | Regulatory year | Permits issued | Hunters afield | Successful | Percent successful | Males | Percent males | Females | Percent females | Total harvest[c] |
|---|---|---|---|---|---|---|---|---|---|---|
| RG479 North Road | 2013 | 70 | 34 | 7 | 21 | 1 | 14 | 6 | 86 | 7 |
| | 2014 | 81 | 31 | 2 | 6 | 2 | 100 | 0 | 0 | 2 |
| | 2015[b] | – | – | – | – | – | – | – | – | – |
| | 2016 | 70 | 21 | 5 | 24 | 5 | 100 | 0 | 0 | 5 |
| | 2017 | 63 | 19 | 5 | 26 | 4 | 80 | 1 | 0 | 5 |
| RG480 | 2007 | – | – | – | – | – | – | – | – | – |
| | 2008 | – | – | – | – | – | – | – | – | – |
| | 2009 | 274 | 116 | 37 | 32 | 23 | 62 | 14 | 38 | 38 |
| | 2010 | 461 | 232 | 85 | 37 | 61 | 72 | 24 | 28 | 85 |
| | 2011 | 439 | 207 | 78 | 38 | 53 | 68 | 25 | 32 | 78 |
| | 2012 | 415 | 221 | 82 | 37 | 54 | 66 | 28 | 34 | 82 |
| | 2013 | 968 | 442 | 141 | 32 | 107 | 76 | 68 | 48 | 176 |
| | 2014 | 1,339 | 588 | 240 | 41 | 134 | 56 | 106 | 44 | 240 |
| | 2015 | 1,566 | 655 | 274 | 42 | 159 | 58 | 115 | 42 | 274 |
| | 2016 | 1,534 | 569 | 216 | 38 | 145 | 67 | 71 | 33 | 216 |
| | 2017 | 1,421 | 473 | 204 | 43 | 131 | 64 | 73 | 36 | 204 |

[a] Closed by emergency order prior to hunt.
[b] Closed by emergency order (27 October 2015 release date).
[c] Total harvest may not equal the number of males plus the number of females harvested due to the sex of some harvested animals being unknown.

**Table 4. Unit 8 mountain goat hunter residency and success for drawing and registration hunts, regulatory years 2007–2017, Kodiak, Alaska.**

| | Successful | | | | | Unsuccessful | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Regulatory year | Local resident[a] | Nonlocal resident | NR[b] | Total | % | Local resident[a] | Nonlocal resident | NR[b] | Total | % | Total hunters | Total local residents[a] | Total nonlocal residents | Total NR[b] |
| 2007 | 30 | 74 | 27 | 131 | 50 | 34 | 86 | 11 | 131 | 50 | 262[c] | 64 | 160 | 38 |
| 2008 | 25 | 67 | 34 | 126 | 48 | 60 | 65 | 13 | 138 | 52 | 264[c] | 85 | 132 | 47 |
| 2009 | 29 | 83 | 32 | 144 | 36 | 24 | 55 | 3 | 82 | 64 | 226[c] | 53 | 138 | 35 |
| 2010 | 67 | 46 | 35 | 148 | 37 | 97 | 136 | 17 | 250 | 63 | 398 | 164 | 182 | 52 |
| 2011 | 53 | 79 | 29 | 161 | 43 | 73 | 128 | 15 | 216 | 57 | 377 | 126 | 207 | 44 |
| 2012 | 46 | 76 | 33 | 155 | 38 | 84 | 142 | 25 | 251 | 62 | 406 | 130 | 218 | 58 |
| 2013 | 82 | 139 | 34 | 255 | 41 | 118 | 234 | 21 | 373 | 59 | 628 | 200 | 373 | 55 |
| 2014 | 72 | 204 | 68 | 344 | 43 | 113 | 321 | 29 | 463 | 57 | 807 | 185 | 525 | 97 |
| 2015 | 122 | 190 | 71 | 383 | 46 | 77 | 334 | 37 | 448 | 54 | 831 | 199 | 524 | 108 |
| 2016 | 65 | 182 | 69 | 316 | 42 | 110 | 304 | 26 | 440 | 58 | 756 | 175 | 486 | 95 |
| 2017 | 82 | 154 | 80 | 316 | 47 | 79 | 248 | 26 | 353 | 53 | 669 | 161 | 402 | 106 |

[a] A local resident is a resident that resides in Unit 8.

[b] NR stands for nonresident. This includes all hunters that are not residents of Alaska.

[c] Includes hunters from drawing hunts only (excludes registration hunts).

Harvest Chronology

October has consistently been the preferred month for Unit 8 goat hunters (Table 5). Weather patterns, which affect hunter success and influence when hunters go into the field, largely determine the chronology of harvest.

**Table 5. Percent of Unit 8 mountain goat harvest by month, regulatory years 2007–2017, Kodiak, Alaska.**

| Regulatory year | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Total[a] |
|---|---|---|---|---|---|---|---|---|---|
| 2007 | 13 | 34 | 41 | 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 | 59 | 11 | 3 | – | – | – | 152 |
| 2013 | 5 | 26 | 38 | 14 | 9 | 1 | 2 | 5 | 247 |
| 2014 | 7 | 26 | 43 | 15 | 1 | 2 | 1 | 5 | 343 |
| 2015 | 8 | 16 | 41 | 16 | 4 | 1 | 5 | 9 | 379 |
| 2016 | 9 | 22 | 43 | 13 | 4 | 0 | 2 | 7 | 315 |
| 2017 | 6 | 22 | 38 | 18 | 3 | 2 | 1 | 10 | 315 |

[a] Total harvest may differ slightly from actual harvest due to lack of information from hunters regarding date of harvest.

Transport Methods

Aircraft was the predominant transportation method used by mountain goat hunters during RY13–RY17 with 57% of hunters reporting aircraft as their primary method of transport (Table 6). This is a significant increase compared to RY08–RY12 when 47% of hunters reported using aircraft. 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). Interestingly, the number of hunters being transported by boat increased in RY13–RY17.

*Other Mortality*

Documenting mortality from sources other than hunting is difficult to gauge because of the remote, rugged, and inaccessible nature of goat habitat. Predation by brown bears and golden eagles undoubtedly occurs but is probably 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. Mortality due to wounding loss and illegal harvest are estimated at 10% of the reported harvest (Van Daele and Smith 1998).

**Table 6. Percentage of each transportation method used by Unit 8 mountain goat hunters and total number of hunters during regulatory years 2007–2017 in Kodiak, Alaska.**

| Regulatory year | Aircraft | Boat | 3- or 4-Wheeler | ORV[a] | Highway vehicle | Snow-machine | Unknown | Total |
|---|---|---|---|---|---|---|---|---|
| 2007 | 56 | 10 | 10 | <1 | 22 | 0 | 2 | 262 |
| 2008 | 53 | 13 | 5 | 1 | 26 | 0 | 2 | 264 |
| 2009 | 55 | 11 | 8 | <1 | 25 | 0 | 1 | 226 |
| 2010 | 43 | 26 | 6 | <1 | 23 | 0 | 2 | 398 |
| 2011 | 40 | 29 | 4 | <1 | 21 | <1 | 5 | 378 |
| 2012 | 42 | 24 | 6 | <1 | 21 | 0 | 7 | 406 |
| 2013 | 51 | 25 | 4 | <1 | 16 | 0 | 4 | 628 |
| 2014 | 59 | 20 | 4 | <1 | 14 | 0 | 3 | 807 |
| 2015 | 59 | 25 | 4 | <1 | 9 | 0 | 2 | 831 |
| 2016 | 60 | 23 | 6 | 1 | 11 | 0 | 2 | 756 |
| 2017 | 56 | 26 | 4 | 1 | 12 | 0 | 3 | 669 |

[a] Off-road vehicle.

*Alaska Board of Game Actions and Emergency Orders*

The Board of Game took no actions regarding mountain goat hunting in Unit 8 during RY13–RY17. However, during its March 2013 meeting, the Board of Game adopted a proposal extending the RG480 hunting season, which begins on 20 August, from 15 December to 20 March. Within the same proposal (RG480), the bag limit was increased from 1 to 2 goats. These changes were adopted during the March 2013 meeting and took effect July 2013.

*Recommendations for Activity 2.1*

Continue to monitor harvest and mortality of mountain goats in Unit 8.

## 3.1 Habitat Assessment-Enhancement

ADF&G is not currently conducting habitat enhancement or assessment projects at this time.

There has not been a detailed analysis regarding goat range or carrying capacity on Kodiak Island; however, survey data suggests the population is stabilizing in the north-central portion of the island, where goats first became established. This might indicate the population is approaching carrying capacity. In recently colonized areas of southern Kodiak Island the population is lower, but survey results indicate that population growth is ongoing. In 2013 and 2015, in cooperation with the Kodiak National Wildlife Refuge, ADF&G commenced a study to develop a survey sightability factor and to investigate mountain goat resource use on Kodiak Island with the hope of gaining a better understanding of goat habitat requirements and the potential impact goats may be having on the alpine habitat. Unfortunately, due to a substantial radiocollar failure the project ended in 2016 and minimal useable information was collected.

Winter severity is variable in maritime environments. Precipitation at lower elevations may occur as either rain or snow. Hjeljord (1973) observed goats on Kodiak Island 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 that 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.

Because there are no current or ongoing projects investigating habitat use and availability of mountain goat habitat in Unit 8, current efforts should be modified to include the investigation of seasonal and annual resource use. This information could provide managers valuable information on resources important to goats at different times of year. In addition, this could potentially provide insight into which areas may be vulnerable to habitat degradation if the goat population exceeds carrying capacity.

### NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

No nonregulatory management problems currently exist; however, there has been some concern expressed from the Kodiak National Wildlife Refuge regarding the potential negative impacts a robust goat population may have on sensitive alpine habitats in areas with increased goat numbers. Concerns regarding alpine habitat degradation are reasonable and should be further investigated.

#### Data Recording and Archiving

All data, survey memoranda, and forms are located at the Kodiak Fish and Game office. Data collected from field surveys and capture events is digitized and entered into various databases at the ADF&G office in Kodiak. All mountain goat harvest information is stored in a database at the Kodiak ADF&G office as well as in ADF&G's Wildlife Information Network (WinfoNet) database system.

#### Agreements

In April of 2002, a memorandum of agreement (MOA) 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. However, because this MOA is nearly 20 years old and many individuals in leadership positions have departed, it would be advantageous to consider revisiting this agreement.

#### Permitting

No permits were required for management of mountain goats in Unit 8 during RY13–RY17.

## Conclusions and Management Recommendations

Kodiak Island is currently the most popular goat hunting destination in Alaska, accounting for 45–50% of the harvest in Alaska during this reporting period (RY13–RY17). During RY13–RY17 the goat population on northern and central Kodiak Island was stable and increased slightly. On the southern end of the island the goat population increased. Based on aerial surveys conducted in Unit 8, we estimate the goat population to be approximately 3,500 animals at the

end of this reporting period. Goat harvest significantly increased during RY13–RY17, particularly for registration hunts. The increase in harvest is likely due to a combination of factors including the dramatic increase in the number of registration hunters, which may be in response to the implementation of the 2-goat bag limit. In addition, Kodiak has the longest (8-month) goat season in Alaska, and combined with the 2-goat bag limit, has resulted in a significant increase in the number of goat hunters on Kodiak Island. Conversations with hunters, transporters, guides, and other biologists also suggest that Kodiak has greater access to the goat population than many other goat hunting areas across the state. Hunter success for drawing permit holders increased nearly 10% during RY13–RY17, while hunter success for registration permit holders increased more than 6%.

With the increase in available hunt opportunities, there has been a demographic shift of goat hunters on Kodiak Island. During the last reporting period (RY08–RY12), local hunters composed approximately 33% of total hunters, compared to 25% during RY13–RY17. The number of resident nonlocal hunters increased during the same time frame from 52% to 63%, while the number of nonresident hunters decreased slightly from 14% in RY08–RY12 to 12% in RY13–RY17.

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 some areas. We have shifted our emphasis from facilitating range expansion and increased densities to limiting population growth to a level that will provide sustainable hunting opportunities while maintaining habitat quality. The implementation of the 2-goat bag limit has enhanced our ability to slow population growth and stabilize goat numbers, but we must continue to consider other possibilities if these measures are insufficient. We must continue to consider habitat quality, hunting opportunities, and goat-viewing interests along the Kodiak road system and develop socially and biologically acceptable ways of balancing these potentially conflicting factors.

# II. Project Review and RY18–RY22 Plan

## Review of Management Direction

### Management Direction

In RY18–RY22 there will be changes to our management strategy to reflect shifts in management objectives and direction. The emphasis will shift from facilitating range expansion and increasing densities to limiting population growth.

### Goals

- Provide sustained goat harvest opportunities for both residents and nonresidents.
- Maintain a robust islandwide goat population without compromising habitat quality.
- Provide opportunities for consumptive and nonconsumptive users to view, photograph, and enjoy mountain goats in aesthetically pleasing conditions.

## CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

There is a negative customary and traditional use determination for mountain goats in Unit 8; therefore, there is not a predetermined number of goats for subsistence uses.

Intensive Management

Mountain goats are not designated as intensive management species so no intensive management objectives have been determined.

## MANAGEMENT OBJECTIVES

Maintain a population of 3,500–4,000 goats islandwide, distributed in a manner that will provide sustained hunting opportunities and has minimal long-term impact on their habitat. Incrementally increase harvest opportunities or modify hunting stipulations to slow population growth while still allowing sustainable hunting opportunities for residents and nonresidents.

## REVIEW OF MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Continue to conduct annual aerial composition counts of each hunt area to estimate mountain goat abundance, distribution, and age ratios. Create and apply a sightability correction factor.

*Data Needs*

Although current methodology (aerial surveys) is valuable for providing an estimate on the minimum count of mountain goats in Unit 8, the development and implementation of a sightability correction factor would provide a more robust estimate that includes confidence parameters.

*Methods*

Collaborate with USFWS to conduct aerial survey composition counts with a fixed-wing aircraft in July and August of each year to estimate mountain goat abundance, distribution, and adult-to-kid ratios. Methodology will continue to be standardized between agencies to reduce variability and increase consistency. To reduce potential interference with hunters, surveys will be targeted for completion prior to the start of goat hunting season.

Surveys will be conducted with 2 observers (biologist and pilot). Goat groups will be circled if discrepancies occur. Observers will record a GPS waypoint when the aircraft is directly above a group or when a group is perpendicular to the aircraft's flight path. Estimated locations will be documented accordingly.

Continue to survey alpine habitats above shrub-line (approximately 300 meters or 328 yards above sea level) in all suitable mountain goat areas as funding allows including the previously surveyed established mountain goat hunt areas on Kodiak Island. Survey areas will be prioritized based on management and population concerns.

A more robust population estimate including confidence intervals should be developed using the methodology outlined by White et al. (2016) to create an apply a sightability correction factor for future surveys in Unit 8.

### 2. Mortality-Harvest Monitoring

ACTIVITY 2.1. Monitor annual mountain goat harvest and mortality through hunter harvest reports, field observations, and contact with hunters, guides, and transporters.

*Data Needs*

No change from RY13–RY17.

*Methods*

No change from RY13–RY17.

### 3. Habitat Assessment-Enhancement

Although there are no habitat assessment or enhancement projects planned for RY18–RY22 in Unit 8, efforts should be made to implement a project that investigates seasonal and annual resource use. This information would provide managers valuable information on resources important to goats at different times of year and provide insight into what areas may be vulnerable to habitat degradation if the goat population becomes excessive.

## NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

No change from RY13–RY17.

### Data Recording and Archiving

All data, survey memoranda, and forms will be located at the Kodiak Fish and Game office. In addition, all harvest information is entered into ADF&G's WinfoNet database.

### Agreements

None.

### Permitting

ADF&G collection permit.

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