Species Management Report and Plan ADF&G/DWC/SMR&P–2025–44

Mountain Goat Management Report and Plan, Game Management Unit 4:

Report Period 1 July 2018–30 June 2023, and

Plan Period 1 July 2023–30 June 2028

Stephen Bethune

2025

Alaska Department of Fish and Game Division of Wildlife Conservation

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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 Roy Churchwell, Management Coordinator for Region I for the Division of Wildlife Conservation.

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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.

Cover Photo: Two mature male mountain goats observed during a February 2025 telemetry flight. Mountain goat research on Baranof Island has been instrumental in shaping current management strategies. ©2025 ADF&G. Photo by Stephen Bethune.

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Purpose of this Report

This report provides a record of survey and inventory management activities for mountain goats (*Oreamnos americanus*) in Game Management Unit 4 for the 5 regulatory years 2018–2022 and plans for survey and inventory management activities in the next 5 regulatory years, 2023–2027. A regulatory year (RY) begins 1 July and ends 30 June (e.g., RY22 = 1 July 2022–30 June 2023). 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. RY18–RY22 Management Report

Management Area

Unit 4 encompasses Admiralty, Baranof, Chichagof, and adjacent islands (Fig. 1). It consists of approximately 5,820 square miles of land and over 5,000 miles of shoreline. Roughly 90% of the unit is Tongass National Forest lands. Unit 4 is part of the larger Southeast Alaska Alexander Archipelago. The archipelago consists of more than 2,000 islands and contains the largest expanse of remaining temperate old-growth forests in the world. The region is known for its endemic mammal species and is a model of island conservation and biogeography (MacDonald and Cook 1996; Cook and MacDonald 2001; Dawson et al. 2007). Research indicates that portions of the archipelago acted as refugia during the last glacial maximum (Cook et al. 2006; Shafer et al. 2010), which potentially has important implications regarding the history of mountain goats on Baranof Island. Sitka, located on the island, is the largest community in the unit with about 8,500 residents. Other communities include Hoonah, Pelican, Elfin Cove, and Tenakee Springs on Chichagof Island, and Angoon on Admiralty Island. Baranof Island (approximately 1,865 mi^2) is the only island in Unit 4 inhabited by mountain goats.

The South Baranof Wilderness, within the Tongass National Forest, is 319,568 acres and encompasses much of the southern half of Baranof Island. This wilderness area was designated by Congress in 1980 as part of the Alaska National Interest Lands Conservation Act. Some of the protections afforded this wilderness area include prohibitions on commercial enterprises (except guides and outfitters), building new roads, timber harvest, the use of motorized land vehicles (except snowmachines), and the landing of helicopters.

Like most of Southeast Alaska, Unit 4 has a maritime climate with moderate summer and winter temperatures and high precipitation (Harris et al. 1974). Temperatures (Fahrenheit) range from the mid-30s in the winter to mid-50s in the summer. Rainfall in Sitka averages approximately 87 inches per year, but totals are highly variable from year to year and within the unit. For example, Little Port Walter on the southeast coast of Baranof Island, one of the rainiest places in North America, recorded 216 inches of rain in 2019 (NOAA [n.d.]). Sitka averages 33 inches of snow annually, but again, annual snowfall is highly variable across the unit and from year to year. In

some years deep and persistent snow can accumulate at sea level in the northern and eastern portions of the unit.

Unit 4's landscape is characterized by steep and rugged terrain with mountains, fjords, wetlands, estuaries, and short, swift rivers. Elevation within the unit ranges from sea level to 5,328 feet. Predominant vegetative communities occurring at low-moderate elevations (<1,500 feet) are dominated by western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*), with western red cedar (*Thuja plicata*) and Alaska yellow cedar (*Callitropsis nootkatensis*) old-growth, coniferous forests. Mixed-conifer muskeg and deciduous riparian forests are also common. Forests dominated by mountain hemlock (*Tsuga mertensiana*) make up a subalpine timberline band between 1,500 and 2,500 feet in elevation. Because of the high rainfall, natural disturbance to the forest occurs via landslides and wind-throw events rather than fire.

Unit 4 is relatively isolated from the mainland of Southeast Alaska and supports a limited diversity of land mammals. Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) and brown bears (*Ursus arctos*) are the only large native land mammals.

Summary of Status, Trend, Management Activities, and History of Mountain Goats in Unit 4

It was accepted for nearly a century that mountain goats on Baranof Island all descended from animals that had been transplanted. However, cooperative research the department began in 2006 with geneticist Aaron Shafer of the University of Alberta using tissue samples of hunter-harvested mountain goats indicates 2 distinct genetic lineages, one tracing directly to the Tracy Arm area, and another representing a refugial lineage that is believed to have occurred on Baranof Island since the last glacial maximum. Researchers continue to explore this finding. Comprehending population genetic structure has future management and conservation implications (Shafer et al. 2011a, Shafer et al. 2011b, and Shafer et al. 2012).

In the early 1900s it was thought no mountain goats existed in Unit 4 and efforts were made to introduce them. Mountain goats from the Tracy Arm area on the Southeast Alaska mainland were transplanted in 1923 to Baranof Island (Paul 2009). Additional transplants were attempted on Chichagof Island between 1952 and 1956. (Paul 2009). The last documented observation of mountain goats on Chichagof was in 1978; however, ADF&G biologists (Johnson 1981) were unable to confirm the report. It is accepted that goats no longer persist on Chichagof Island, but the Baranof Island population has grown.

The 1923 transplant to Baranof Island was recognized as successful when the Alaska Game Commission observed 41 mountain goats in 1937. The first aerial census was conducted in 1954, and biologists counted 263 goats and estimated the population at 400. The population has grown and expanded since then, with Mooney (2006) reporting that a survey analysis in 2004 yielded a population estimate of more than 1,500 goats. The population reached a new all-time high in 2019, with an estimate of 1,882 (Bethune 2021).

The first regular open hunting season for Baranof mountain goats occurred in 1949. The season has always been 1 August–31 December. Initially, the annual bag limit was 2 goats. The

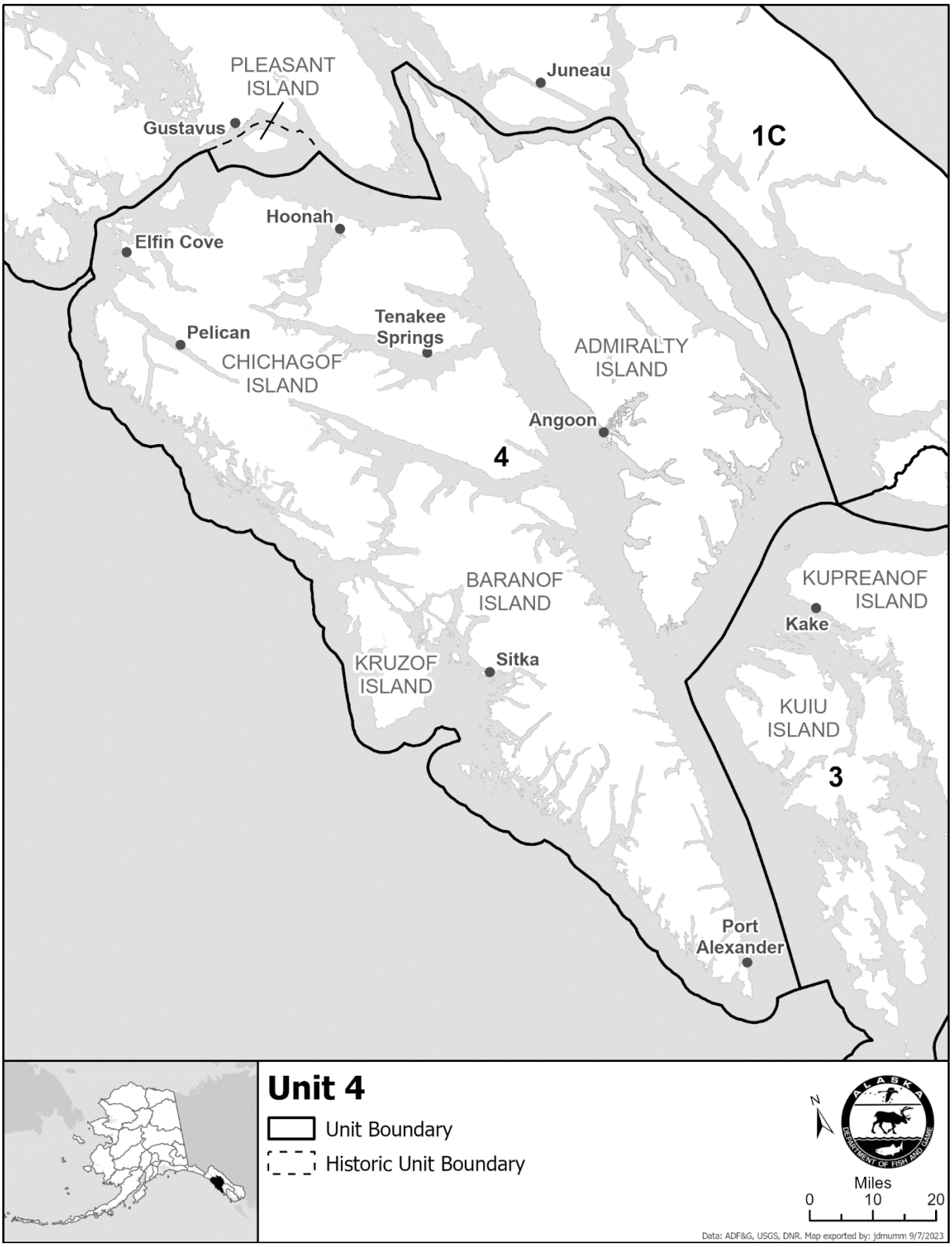


Figure 1. Map of Unit 4, Southeast Alaska.

Note: The Alaska Board of Game decided the unit boundary would exclude Pleasant Island starting in RY22 because the island is ecologically closer to the Gustavus forelands.

bag limit was reduced to 1 goat in 1975. Annual harvests had averaged 20–30 goats until then. In 1976, the RG150 registration hunt was established, and between 1976 and 2005, annual harvests ranged between 28 and 75 goats with an average of 53. Females composed up to 50% of the harvest (refer to harvest information presented in the Mortality-Harvest Monitoring section below). In 2006 the department instituted a harvest point system to encourage a lower percentage of females (nannies) in the harvest. Under the points system, a male (billy) counts as 1 point, and a nanny counts as 2. In 2006, the harvest quota for RG150 was 78 points. This was reduced to 56 points or 18 nannies in 2010 (Mooney 2014).

During the winters of 2006–2007, 2007–2008, and 2008–2009, the Sitka area, as well as much of Southeast and Southcentral Alaska, had record-breaking snowfall. The snowpack, along with 3 consecutive late and cold springs, resulted in reductions to the mountain goat population. Mortality was likely exacerbated by high female harvests preceding these bad winters. The islandwide estimate of more than 1,500 animals in 2004 (Mooney 2006) dropped to 700–850 goats in 2009 (Mooney 2014). Biologists were particularly concerned about goat populations in core areas such as the Blue Lake, Nakwasina, Katlian, and Glacial River watersheds.

A regionwide effort was launched in 2008 to better educate hunters on the management implications of female harvest and on how to select billies over nannies. A brochure was developed with field photos of mountain goats and descriptions of the characteristics used to identify sex. An online quiz was added and became a requirement for obtaining a registration permit; however, taking the quiz is on the honor system. Despite the department's efforts to educate hunters, the point system was not sufficient to reduce female harvest. As a result, new management strategies were developed for the 2011 season.

The department's current research and monitoring program (2011–present) was initiated due to concerns about apparent harvest-mediated declines in areas of close proximity to Sitka (i.e., high female harvest) prior to 2011. In order to understand the extent to which the areas have been historically harvested, annual harvest during RY07–RY11 was summarized (male = 1 point, female = 2 points) for each area and cross-referenced with aerial survey minimum counts. The number of harvest points taken per mountain goat survey was compared to a 0.06 points-per-goat (or 6 points per 100 goats seen) guideline to assess whether guideline harvests were exceeded in given areas. Overall, guideline harvests were exceeded in many areas. In some exceptional instances, harvest rates were 5–8 times higher than guideline harvest recommendations. Such localized overharvest occurred because the entire island was largely managed as one unit and did not explicitly consider mountain goat distribution and movement patterns.

Since 2011, hunt management strategies have been used and refined that subdivide the island into many different geographically discrete units to ensure that harvest spatially mimics mountain goat distribution across the island, thereby increasing the likelihood that mountain goat harvest opportunities will be consistent and sustainable in localized areas over the long term. It is particularly important to carefully manage areas with good access to ensure that those opportunities persist over time. For details on these strategies, see the Management Strategy section below.

Management Direction

Existing Wildlife Management Plans

- Southeast Alaska mountain goat management plan in the 1976 Alaska wildlife management plans (ADF&G 1976).

While the overall goals of the original plan are important, the management objectives and harvest management strategies have changed since the plan was written based on public comment, staff recommendations, and Alaska Board of Game (board, BOG) actions. These periodic changes in management planning have been reported in the division's previous Unit 4 mountain goat management reports.

Goals

1. To provide for a sustainable harvest of mountain goats in Unit 4.
2. To provide the greatest opportunity to participate in hunting of mountain goats in Unit 4 while maintaining aesthetically pleasing hunt conditions.
3. Provide an opportunity for nonconsumptive uses (viewing and photographing) of mountain goats in Unit 4.
4. Discourage land-use practices that adversely affect mountain goat habitat.

Codified Objectives

Amounts Reasonably Necessary for Subsistence Uses

The board made a negative finding for customary and traditional use of mountain goats in Unit 4 during its November 2006 Southeast regional meeting (5 AAC 99.025(7)).

Intensive Management

Not applicable.

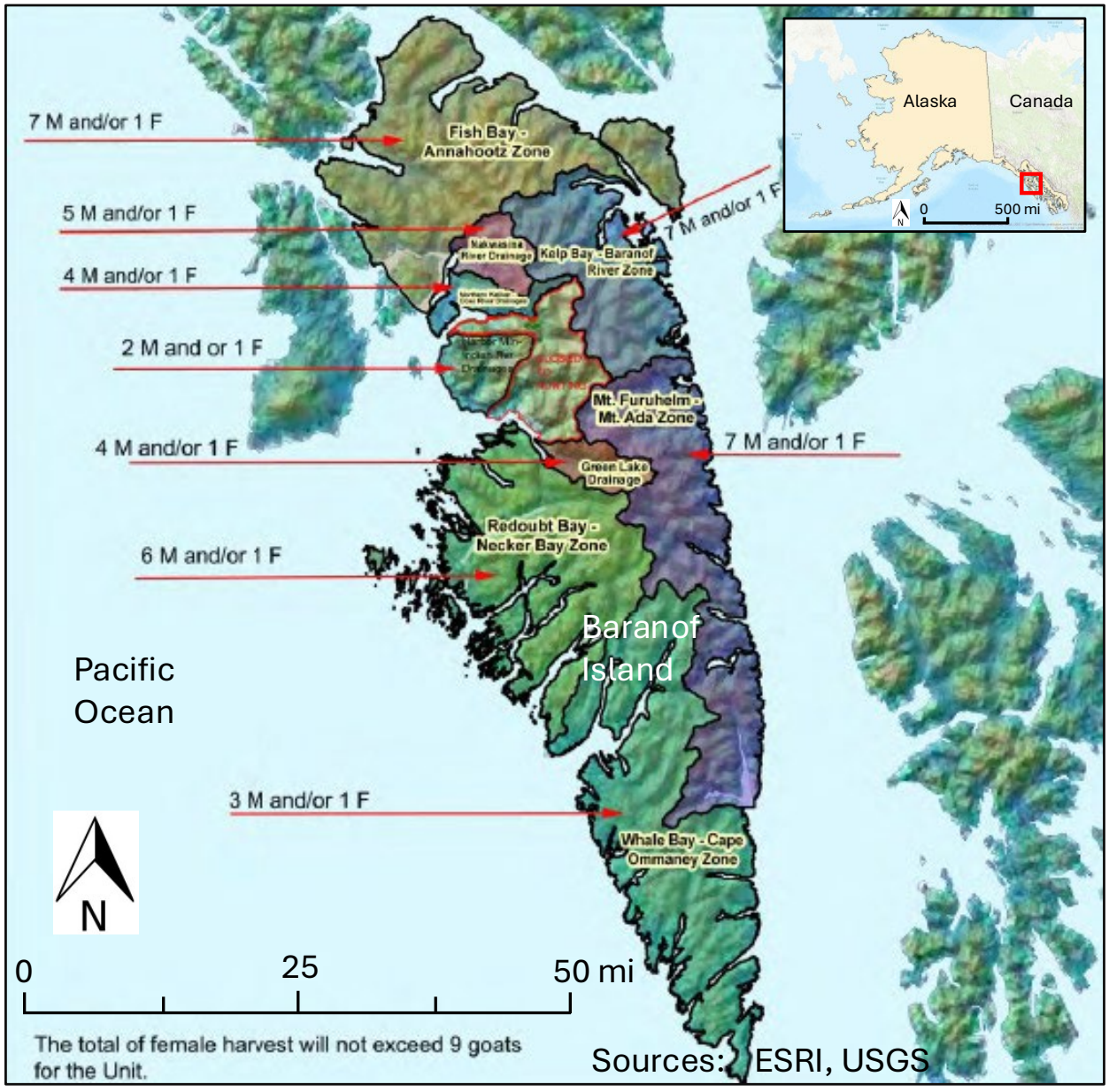
Management Objectives

1. Maintain an islandwide population in excess of 1,500 mountain goats.
2. Monitor sex composition of the harvest and maintain female component at <15% of the islandwide harvest or <1% of the estimated islandwide population.
3. Maintain overall harvest rate at ≤4% of the islandwide population.

Management Strategy

As described in the summary section above, ADF&G biologists began managing the Unit 4 mountain goat harvest using an islandwide point system in 2006. Beginning with the RY11 season, Baranof Island was divided into 9 zones (Fig. 2). Each zone was assigned a quota for

billies and a “one and done” concept was instituted for female harvest, meaning the harvest of 1 nanny would result in automatic closure of that zone to additional harvest by emergency order (EO).



ADF&G map.

Figure 2. Baranof Island mountain goat hunt zones and associated quotas for registration hunt RG150, regulatory years 2011–2016, Unit 4, Southeast Alaska.

Note: The text on each arrow line represents the quota of mountain goat males and females for that hunt zone. For example, the quota for the Fish Bay-Annahootz zone at the top of Baranof Island is 7 males and/or 1 female. For the unreadable text, starting with the first arrow line from the top that is labeled 4 males and/or 1 female, that arrow points to the Mountain Katlian zone; the other nearby zones, clockwise, are labeled Closed to Hunting, and the Harbor Mountain-Indian River drainage zone.

Beginning in RY17, hunt managers and researchers deemed the population adequately recovered to begin expanding hunt opportunities and reopening some areas that were closed in 2011. For RY17, a revised strategy was put in place for RG150. Baranof Island was divided into 34 new hunt zones (Fig. 3) with the goal of better distributing hunter effort and harvest. Each zone is assigned a quota based on the most recent population surveys. The "one and done" concept has been retained. These hunt zones allow biologists to manage at the subpopulation level, which affords hunters more opportunity, and reduces the possibility of localized overharvest. Under the previous management strategy, quotas were based on larger geographical areas, which meant the quota for a zone could be reached after several mountain goats were taken from a small area around a localized access point. This resulted in the entire large geographical area being closed by EO when additional harvest opportunity remained in more remote portions of that larger zone. This new strategy provides more opportunity for hunters by allowing more remote zones to stay open after zones with easier access close.

Hunt zones were determined considering a variety of factors: 1) Global Positioning System (GPS) collar data were used to identify subpopulations and general home ranges, 2) historical aerial survey zones were incorporated to provide continuity with previous survey data, 3) harvest records were used to identify primary access locations, 4) geographical features prohibiting mountain goat movements such as large valley bottoms were used as boundaries when possible, 5) distinctive geographical features to help hunters identify boundaries in the field were considered, and 6) local knowledge from experienced Baranof Island mountain goat hunters was considered.

Mountain goat research efforts, initially associated with the expansion of the existing Blue Lake hydroelectric project and potential Takatz Lake project, have contributed greatly to the department's understanding of mountain goat ecology on Baranof Island and have helped shape new management strategies that went into effect for the RY17 season. This research, although no longer tied to the hydroelectric projects, is ongoing and involves the capture and radiocollaring of mountain goats. In addition to determining potential impacts of development projects (White and Gregovich 2016, White et al. 2013), researchers have studied habitat selection, seasonal movement patterns, home range size, and survival, have monitored reproductive success, and have used collared animals to obtain sightability correction factors to better enumerate the island's population (White et al. 2016).

Despite the current robust population, there are areas of apparently suitable mountain goat habitat that are largely uninhabited, suggesting that there is potential for the population to move spatially. Therefore, managers may choose in some cases to close zones to hunting in hopes of increasing the population through no harvest in an effort to encourage range expansion, potentially creating new opportunities in the future. Since there are so few animals in some of these zones, retaining some closed areas has minimal effect on hunting opportunity (K. White, former ADF&G research biologist, personal communication, 2016 and 2017)

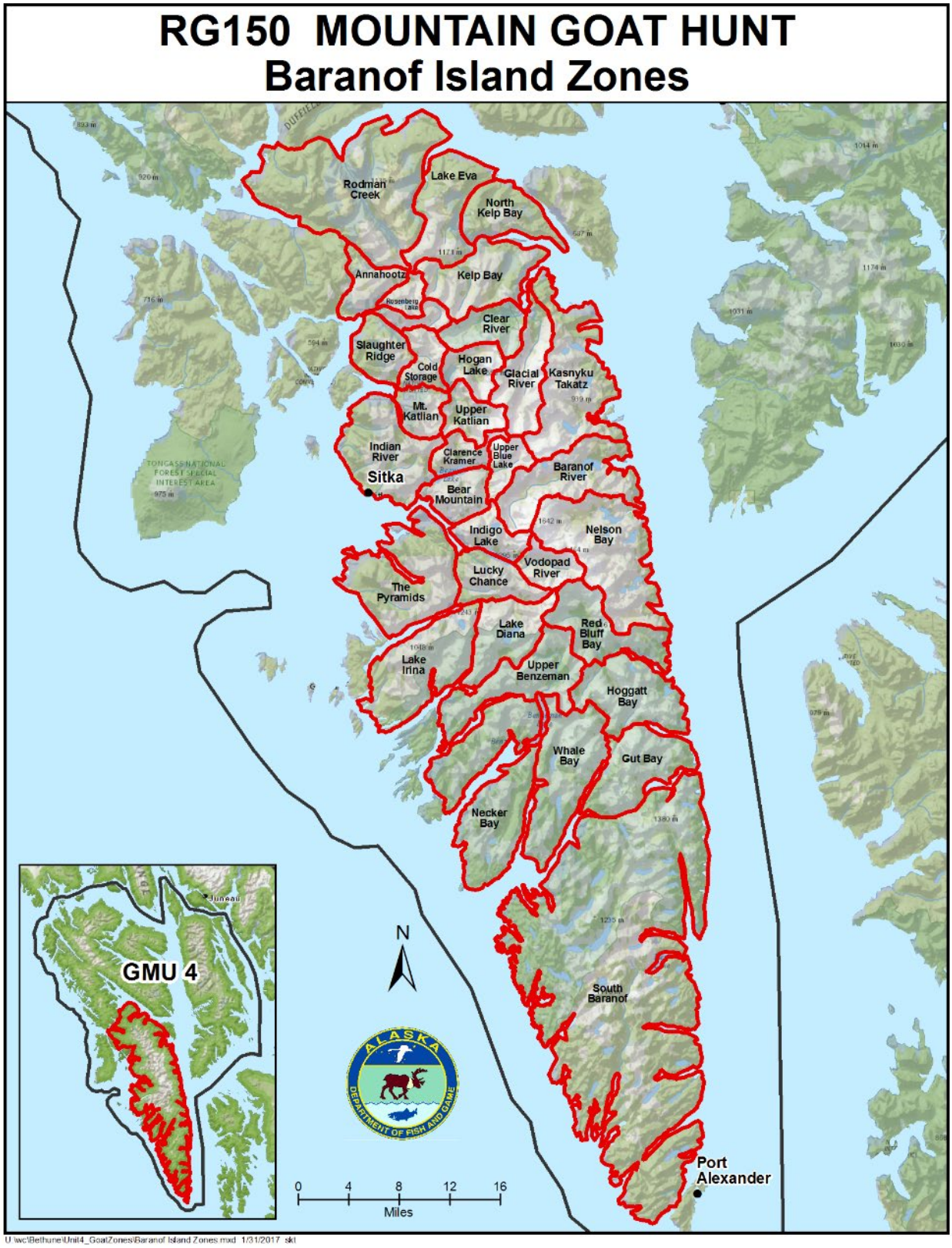


Figure 3. Baranof Island hunt zones implemented for registration hunt RG150 beginning in regulatory year 2017, mountain goat, Unit 4, Southeast Alaska.

Quotas in the individual zones are based loosely on ADF&G's general mountain goat management strategy of 6 goat "points" per 100 animals. Under this system, billies count as 1 point and nannies as 2 points. However, managers are using an adaptive approach, and in some cases, zones with lower numbers of goats have been opened by combining them with adjacent zones or because they have historically low or no harvest. In some cases, multiple years of survey data are averaged to help adjust for anomalies in survey data. An example of how the RG150 hunt is managed differently from other areas of the state is that typically the 6 points per 100 goats refers to observed goats. On Baranof, mountain goat population estimates for the purpose of setting quotas are adjusted for sightability.

MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Monitor the mountain goat population in Unit 4.

Data Needs

Current management strategies for mountain goats in Unit 4 rely on annual population monitoring. Managers collect information on total population, population per hunt zone, adult-to-kid ratios, sightability, survival, and fecundity.

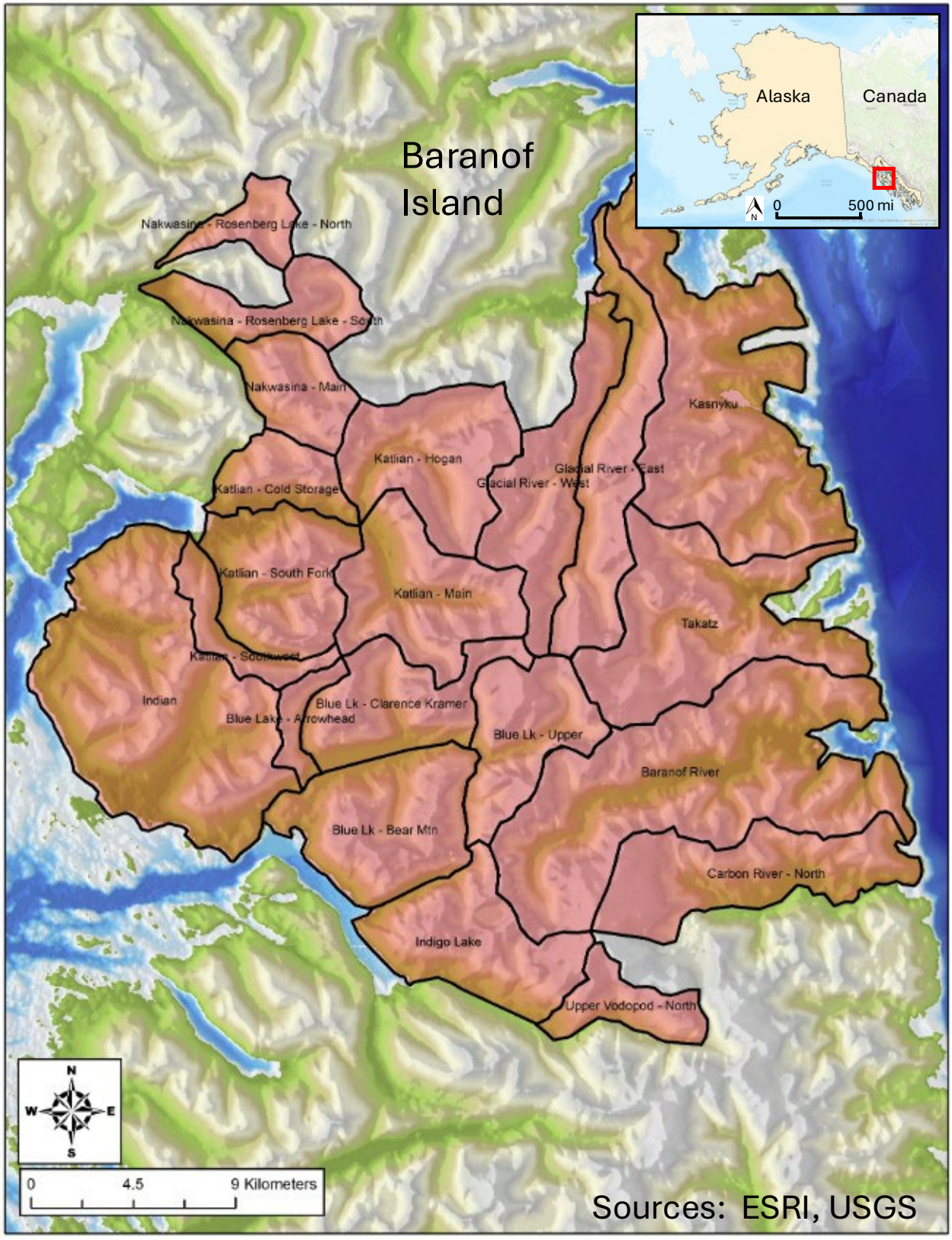
Methods

Traditional aerial mountain goat surveys are conducted annually if weather conditions allow. Surveys are generally flown in the fall (September or October) prior to the first snowfall of the season. The department attempts to survey the entire island, but at a minimum the consistently surveyed core area is flown (Fig. 4). Survey data is run through a sightability model to produce a population estimate (White, et al. 2016).

Results and Discussion

During RY18–RY22, the mountain goat population on Baranof Island reached record high levels in 2019 and appears to be on a slight downward trend but is still at high levels.

It is important to note that surveys are not always comparable year to year due to variances in areas surveyed. Therefore, managers rely on data from the consistently surveyed core area for reliable apples-to-apples comparisons. Over time, the area that constitutes the core area has shrunk. This occurs when an area is missed on an annual survey. The result is that core area estimates from earlier survey memos may be slightly different from later estimates. The estimate for the consistently surveyed core area peaked in 2019 at 836 with a 95% confidence interval (CI) range of 711–961. The 2020 estimate for the consistently surveyed core area was nearly the same at 805 (95% CI = 674–936). Surveys in 2022 and 2023 declined to 648 and 431, respectively. The core area estimate of 431 represents a 33% decrease from the 2022 estimate of 648. However, 2023 survey conditions were not ideal. Total survey time for 2023 was 30% less than 2022. Also, freezing temperatures in the mountains resulted in icing that made distinguishing goats from ice difficult at times. Severe wind and turbulence led to observer fatigue and inadequate coverage of terrain. (Table 1).



ADF&G map.

Figure 4. The consistently surveyed core areas on Baranof Island during 2011–2022 in Unit 4, Southeast Alaska.

Table 1. Aerial survey results summary conducted on Baranof Island, mountain goat, years 2011-2022, Unit 4, Southeast Alaska.

Year	Adults	Kids	Percent kids	Total	Number of groups	Sightability value[a]	Estimate	Confidence interval[b]
2011	325	77	19.2	402	180	0.71	625	87
2012	229	28	10.9	257	129	0.5	530	104
2013	319	82	20.4	401	181	0.73	574	68
2014	321	86	21.1	407	173	0.72	615	70
2015	365	87	19.2	452	218	0.76	637	70
2016	352	91	20.5	443	203	0.69	638	76
2017	409	102	20.0	511	216	0.9	568	33
2018	451	99	18.0	550	268	0.72	750	79
2019	474	116	19.7	590	275	0.69	836	125
2020	342	60	14.9	402	267	0.48	805	131
2022	371	63	17.0	434	190	0.67	648	69

Note: This table only includes areas that were surveyed consistently each year.
[a] The 2011–2020 sightability values based on mark-recapture of marked animals. The 2022 sightability value is based on a sightability model (White, et al. 2016).
[b] A 95% confidence interval.

During RY18–RY22, department staff were able to conduct islandwide surveys in 2018, 2019, and 2022. Based on available survey data, islandwide population estimates with a 95% confidence interval were 1,717 (range = 1,358–2,076) in 2018, 1,882 (range = 1,329–2,435) in 2019, and 1,652 (range = 1,298–2,006) in 2022 (Fig. 5).

Recommendations for Activity 1.1

Continue.

2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2.1. Monitor mountain goat harvest through mandatory sealing

Data Needs

Unit 4 mountain goats are managed in season via quotas per hunt zone based on recent population estimates. Therefore, timely reporting of harvest is crucial meeting harvest objectives in each zone, particularly in regard to female harvest. Anecdotal information is also collected on hunt conditions and populations.

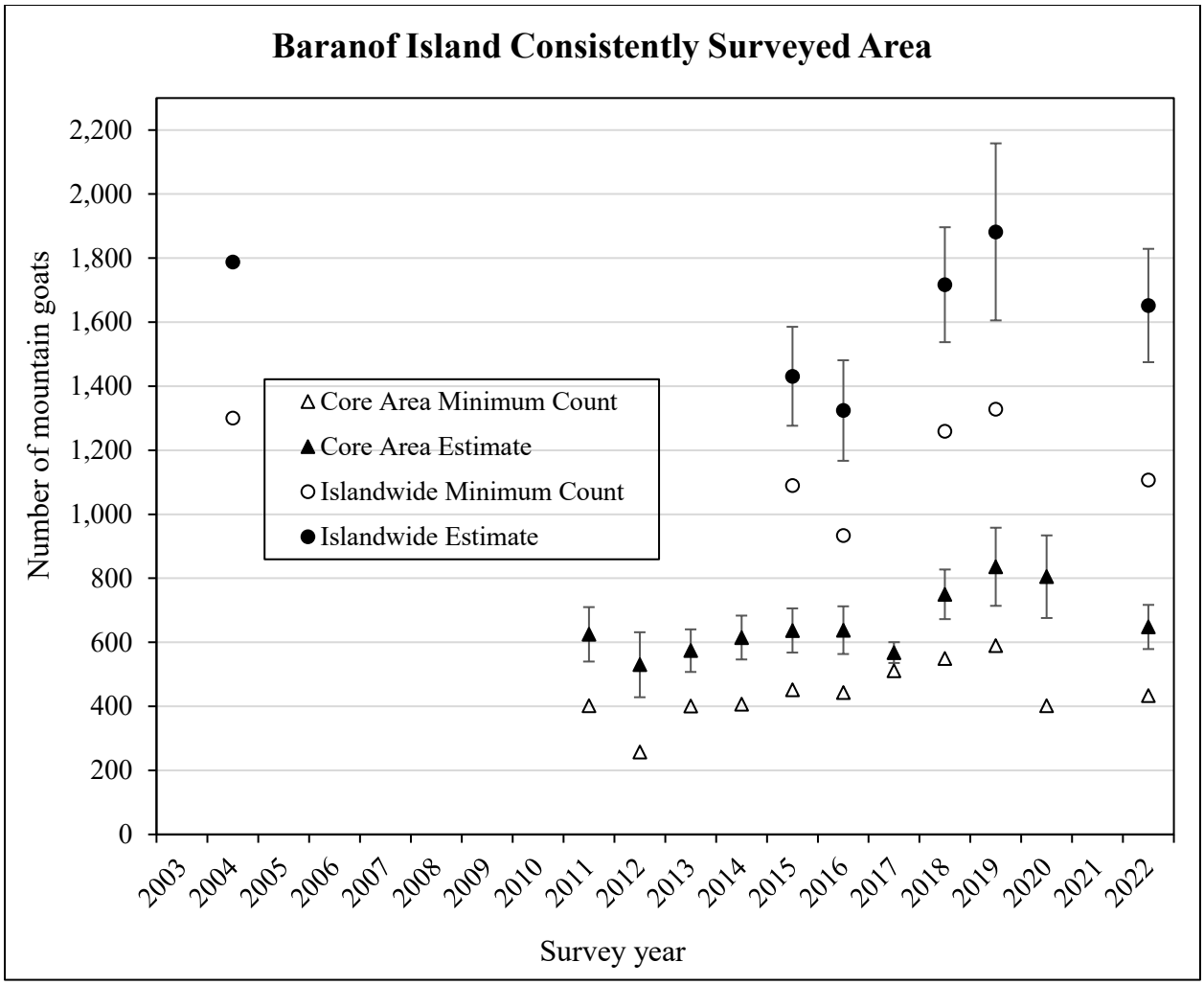


Figure 5. Aerial surveys with minimum counts and population estimates with 95% confidence intervals for both islandwide and consistently surveyed core areas, mountain goats, 2003–2022, Unit 4, Southeast Alaska.

Methods

ADF&G staff collected harvest data by sealing mountain goats harvested by hunters. Location and date of harvest, method of take, mode of transportation, horn measurements (total length, basal circumference, inter horn width and annuli increments) were recorded, and sex was verified. Sealing must occur by ADF&G staff within 5 days of harvest. These data are entered into a department database, the Wildlife Information Network (WinfoNet). Harvest data were summarized by regulatory year.

Season and Bag Limit

Season	Hunter	Bag limit
1 August– 31 December	Resident and nonresident	One goat; nannies with kids prohibited.

Results and Discussion

Harvest by Hunters

Harvest reached a low of 18 mountain goats in RY11 (Fig. 6). In the 15 seasons prior to RY11, female harvest averaged 41%. Since the "one and done" policy began in RY11, female harvest has declined to 18% of the total harvest. During RY18–RY22, hunters averaged 33 goats per year and 22% female harvest. During RY13–RY17, hunters averaged 22 goats per year and less than 10% female harvest. Although the percentage of female harvest has more than doubled since RY15–RY17, this represents only 5 more females annually and is likely not a conservation concern. If the nanny harvest continues to increase, managers may look into restrictions during December since 43% of all female harvest during RY13–RY22 occurred during December, the last month of the season when mountain goats were in more accessible locations and hunters were less concerned with zone quotas because the season was almost over.

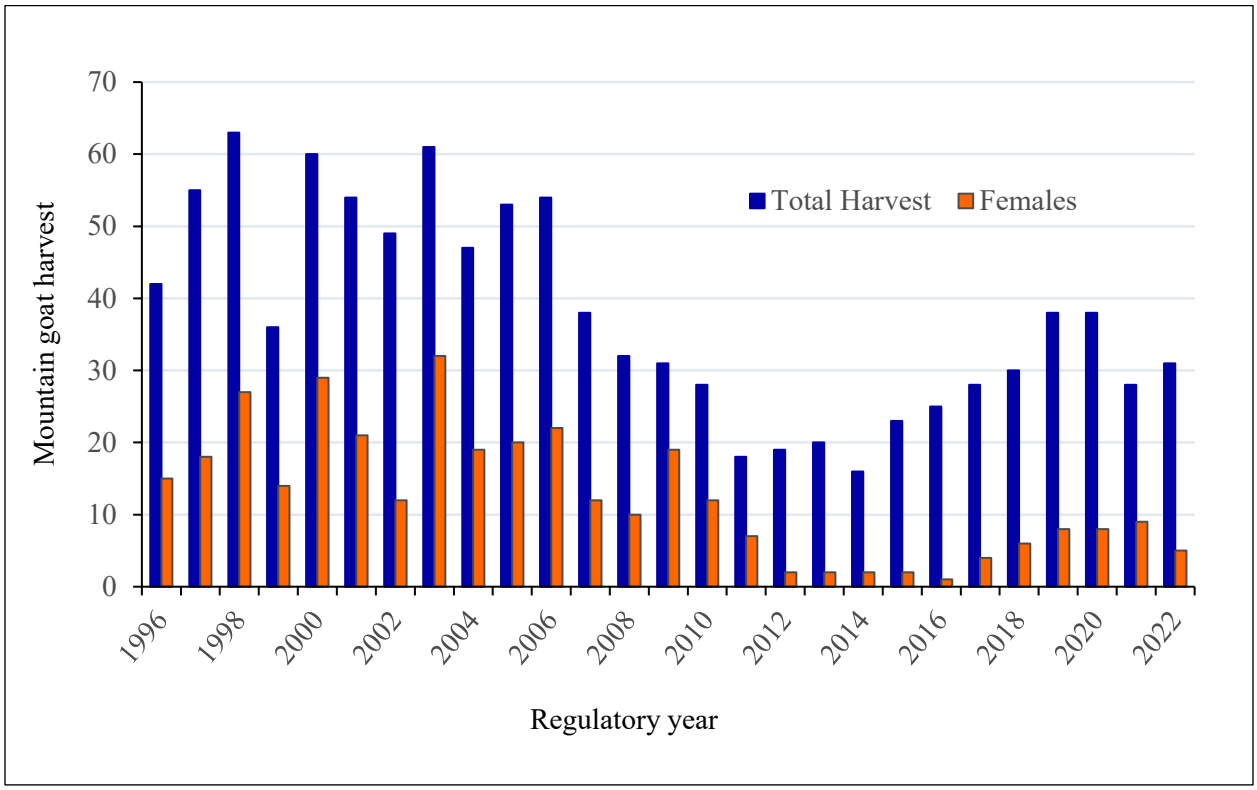


Figure 6. Baranof Island harvest, mountain goat, regulatory years 1996–2022, Unit 4, Southeast Alaska.

Permit Hunts

All mountain goat hunting in Unit 4 is by registration permit only. During RY18–RY22, an average of 205 permits were issued annually (range = 166–235). Of those permits, 60% of permit holders reported that they did not hunt mountain goats. Hunters who did participate reported an average 40% success rate (Table 2).

Table 2. Harvest data for RG150, mountain goat, regulatory years 2018–2022, Unit 4, Southeast Alaska.

Regulatory year	Number permits issued	Permit holders		Number of hunters		Number of mountain goats				
		Did not report	Did not hunt	Unsuccessful	Successful	Males	Females	Sex unknown	Illegal hunt	Total harvest
2018	166	0	94	42	30	24	6	0	0	30
2019	201	2	131	30	38	30	8	0	0	38
2020	235	0	128	69	38	30	8	0	0	38
2021	210	0	137	45	28	19	9	0	0	28
2022	215	1	122	61	31	26	5	0	0	31
Average	205	1	122	49	33	26	7	0	0	33

Note: All mountain goat hunting is Unit 4 is by registration permit only.

Table 3. Hunter residency and success for RG 150, mountain goat, regulatory years 2018–2022, Unit 4, Southeast Alaska.

Regulatory year	Successful				Unsuccessful				Grand total hunters
	Local resident[a]	Nonlocal resident[b]	Nonresident	Total	Local resident[a]	Nonlocal resident[b]	Nonresident	Total	
2018	26	3	1	30	32	3	7	42	72
2019	34	0	4	38	28	1	1	30	68
2020	31	2	5	38	54	3	12	69	107
2021	20	1	7	28	37	1	7	45	73
2022	24	2	5	31	42	9	10	61	92
Average	27	2	4	33	39	3	7	49	82

[a] Residents of Baranof Island.
[b] Alaska residents who do not live on Baranof Island.

Hunter Residency and Success

Mountain goat hunters in Unit 4 are mostly local residents (i.e., they live on Baranof Island). During RY18–RY22 approximately 81% of hunters were local. Nonlocals (i.e., Alaskans residing outside Baranof Island) made up about 6% of the hunters, and nonresidents accounted for 13% of the hunters. Those percentages mirror closely the residency of successful hunters as well (Table 3).

Harvest Chronology

August is the most popular month to hunt mountain goats. Approximately one-third of the harvest occurs the first month of the season. Long daylight hours, more predictable weather—and the likely chance of bagging an alpine buck if goat hunting proves unfruitful—make August appealing. Harvest declines every month after August with waning weather conditions and daylight hours. The exception being a slight uptick in December when winter snow conditions can push goats to lower elevations, making them more accessible to hunters. Also, near the end of the season, hunters are less picky about selecting for billies and often take whatever goat is available to them (Table 4).

Table 4. Harvest chronology for RG150, mountain goat, regulatory years 2018–2022, Unit 4, Southeast Alaska.

Regulatory year	August	September	October	November	December	Total
2018	7	16	2	0	5	30
2019	18	5	6	3	6	38
2020	6	12	10	4	6	38
2021	11	2	5	4	6	28
2022	14	3	9	3	2	31
Average	11.2	7.6	6.4	2.8	5.0	33

Transport Methods

During RY18–RY22, boats were by far the most used transport method for successful hunters at 60%. (Table 5). During RY13–RY17, boats and small planes were used nearly equally. The use of airplanes is highly variable. The availability of even one commercial transporter can swing percentages heavily. The use of planes was expected to decline during RY18–RY22 because of recent air services going out of business (Bellows Air and Harris Air). There is currently one transporter operating out of Port Alexander and one out of Sitka. Otherwise, plane access is limited to those with access to private planes. As far as walk-in access, an average of 3 goats a year were taken during RY18–RY22. The hunters were usually hatchery workers on the east side of Baranof Island who have good access to goat habitat directly from their residence.

Table 5. Harvest by transport method used by successful hunters for hunt RG150, mountain goat, regulatory years 2018–2022, Unit 4, Southeast Alaska.

Regulatory year	Airplane	Boat	Snow-machine	Off-road vehicle	Vehicle	Walking	Total
2018	5	19	0	4	1	1	30
2019	5	19	0	5	4	5	38
2020	4	23	0	3	4	4	38
2021	5	18	0	2	0	2	28[a]
2022	8	20	0	0	0	3	31
Average	5.4	19.8	0	2.8	1.8	3	33

[a] Includes one unknown.

Alaska Board of Game Actions and Emergency Orders

The board met twice during RY18–RY22, once in January 2019 and again in January 2023. No proposals for Unit 4 goat hunting were submitted. The last time the board heard a Unit 4 goat proposal was at its 2015 meeting.

Emergency orders (EOs) are used extensively as a management strategy for mountain goat hunting in Unit 4. Typically, an EO is issued prior to the start of the season closing some hunt zones to harvest and then additional EOs are issued in season, closing areas as quotas are reached (Table 6). Occasionally, an area will be opened by EO or a quota increased if a recent aerial survey indicates the goat population can sustain additional hunting opportunity (i.e., there are more goats than managers anticipated at the start of the season).

Recommendations for Activity 2.1

Continue.

ACTIVITY 2.2. Measure mountain goat horns to understand trends in growth and size.

Data Needs

Age and horn growth data give ADF&G biologists information on age classes being harvested and information to track horn size over time. Age class of mountain goats harvested helps indicate hunter preference and is an index to the age structure of the goats being harvested. Horn measurements help managers understand harvest trends and the overall health of the herd through the measurement of annuli.

Methods

When hunters harvest a mountain goat, they are required to present the horns at an ADF&G office for measurements within 5 days of kill. Managers record days hunted, method of transportation, date of kill, location, age of goat by annuli, sex, horn length and basal circumference, length of annuli on the longest horn, whether each horn was broken, and the width between horns.

Table 6. Hunt zone closures by emergency order, mountain goat, regulatory years 2018–2022, Unit 4, Southeast Alaska.

Regulatory year	EO number	EO issued date	Zone(s) closed	Reason
2018	01-01-18	31 Jul	Multiple, including: The Pyramids, Slaughter Ridge (Lisa Creek), Indian River, Rosenberg Lake, Lake Irina, Indigo Lake, Necker Bay, Lucky Chance, North Kelp, and South Baranof.	Preseason closures.
	01-03-18	9 Aug	Bear Mountain	Maximum harvest quota anticipated.
	01-06-18	19 Sep	Upper Benzeman	Maximum harvest quota met.
	01-07-18	19 Sep	Red Bluff Bay	Closure because of female harvest.
	01-09-18	26 Sep	Rodman Creek	Closure because of female harvest.
	01-12-18	3 Oct	Upper Blue Lake	Closure because of female harvest.
	01-18-18	1 Nov	Clarence Kramer	Maximum harvest quota met.
2019	01-02-19	31 Jul	South Baranof and Necker Bay	Preseason closure.
	01-13-19	7 Aug	Clarence Kramer	Closure because of female harvest.
	01-04-19	7 Aug	Slaughter Ridge (Lisa Creek)	Maximum harvest quota met.
	01-06-19	15 Aug	Bear Mountain	Maximum harvest quota met.
	01-07-19	5 Sep	Rosenberg Lake	Closure because of female harvest.
	01-08-19	19 Sep	Indian River	Maximum harvest quota met.
	01-14-19	10 Oct	Upper Blue Lake	Maximum harvest quota met.
	01-15-19	17 Oct	Indigo Lake and Vodopad River	Maximum harvest quota met.
	01-20-19	25 Nov	Whale Bay	Maximum harvest quota met.
2020	01-03-20	31 Jul	South Baranof and Lisa Creek	Preseason closure.
	01-05-20	10 Sep	Bear Mountain	Maximum harvest quota exceeded.
	01-06-20	10 Sep	Cold Storage	Closure because of female harvest.
	01-08-20	19 Sep	Rosenberg Lake	Maximum harvest quota met.

– Continued –

Table 6. Page 2 of 2.

Regulatory year	EO number	EO issued date	Zone(s) closed	Reason
2020 Cont.	01-09-20	19 Sep	Indian River	Maximum harvest quota met.
	01-12-20	4 Oct	Clarence Kramer	Closure because of female harvest.
	01-18-20	11 Oct	Upper Blue Lake	Maximum harvest quota exceeded.
	01-25-20	17 Dec	Katlian Mountain	Closure because of female harvest.
2021	01-02-21	31 Jul	South Baranof	Preseason closure.
	01-05-21	5 Aug	Lisa Creek	Maximum harvest quota exceeded.
	01-07-21	9 Sep	Rosenberg Lake	Maximum harvest quota met.
	01-08-21	10 Sep	Bear Mountain	Maximum harvest quota met.
	01-25-21	28 Dec	Clarence Kramer	Maximum harvest quota exceeded.
	01-26-21	29 Dec	Cold Storage	Maximum harvest quota exceeded.
2022	01-02-22	31 Jul	South Baranof	Preseason closure.
	01-05-22	19 Aug	Lisa Creek	Closure because of female harvest.
	01-06-22	25 Aug	Bear Mountain	Maximum harvest quota met.
	01-07-22	25 Aug	Rosenberg Lake	Maximum harvest quota met.
	01-13-22	14 Oct	Upper Blue Lake	Maximum harvest quota met.
	01-15-22	19 Oct	Clarence Kramer	Maximum harvest quota met.
	01-18-22	26 Oct	Indian River	Maximum harvest quota met.
	01-20-22	25 Nov	Whale Bay and Necker Lake	Maximum harvest quota exceeded.
	01-21-22	23 Dec	Hogan Lake	Maximum harvest quota exceeded.

Results and Discussion

Average age of harvested goats was 4.7 years old during RY18–RY22 (Table 7). Horn length averaged 8.3 inches long with a basal circumference of 4.7 inches. This is nearly identical to RY13–RY17 (Table 8), when harvested goats averaged 4.5 years old, 8.3-inch horns, and a 4.9-inch basal circumference. Mountain goats on Baranof Island are not known for producing trophy quality horns; goat horns from Baranof rarely exceed 9 inches and rarely qualify for record book entry. Average age and horn size were consistent throughout RY18–RY22. This suggests stability in harvest from the current management strategy.

Recommendations for Activity 2.2

Continue measuring horns in RY23–RY27 as part of Activity 2.1.

Table 7. Average and range of horn measurements and ages from harvested mountain goats in hunt RG150, regulatory years 2018–2022, Unit 4, Southeast Alaska.

Regulatory year	Age in years (range)		Length[a] of longest horn (range)		Basal circumference[a] of largest horn (range)	
2018	4.1	(1.5–8.5)	8.1	(5.8–9.8)	4.7	(3.8–5.5)
2019	4.0	(0.5–10.5)	8.1	(0.0–9.5)	4.6	(2.3–5.4)
2020	4.6	(2.5–10.5)	8.4	(6.9–9.7)	4.8	(3.9–5.4)
2021	5.8	(1.5–11.5)	8.5	(6.4–9.7)	4.9	(3.6–5.4)
2022	5.1	(1.5–8.5)	8.3	(6.0–10.0)	4.7	(3.8–5.4)
Average	4.7	–	8.3	–	4.7	–

Note: En dashes (–) indicate cells intentionally left blank.
[a] In inches.

Table 8. Average and range of horn measurements and ages from harvested mountain goats in hunt RG150, regulatory years 2013–2017, Unit 4, Southeast Alaska.

Regulatory year	Age in years (range)		Length[a] of longest horn (range)		Basal circumference[a] of largest horn (range)	
2013	5.4	(1.5–10.5)	8.6	(5.3–10.6)	5.0	(2.0–5.9)
2014	4.3	(1.5–10.5)	7.9	(6.1–8.9)	4.8	(3.9–5.4)
2015	4.4	(1.5–11.5)	8.2	(6.6–9.8)	4.9	(4.0–5.4)
2016	3.9	(1.5–9.5)	8.1	(7.0–9.6)	4.9	(3.6–5.4)
2017	4.8	(1.5–12.5)	8.6	(6.7–9.9)	4.9	(3.9–5.4)
Average	4.5	–	8.3	–	4.9	–

Note: En dashes (–) indicate cells intentionally left blank.
[a] In inches.

3. Habitat Assessment-Enhancement

ACTIVITY 3.1. Conduct mountain goat summer habitat field surveys

Data Needs

Characterize mountain goat diets and assess the relative quality of the food items goats are consuming and how or if quality varies spatially. A goal of this research is to address how forage quality varies across the island, to help explain and predict population variability across the island.

Methods

No habitat surveys were conducted during RY18–RY22.

Results and Discussion

None.

Recommendations for Activity 3.1

Discontinue.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Data Recording and Archiving

AERIAL SURVEYS

All records and data analysis related to mountain goat aerial surveys are archived on network servers in the Region I office in Douglas. Hard copy files are located in the ADF&G Sitka office.

HUNT REPORTS

All data derived from mountain goat hunt reports are archived electronically in WinfoNet. Horn sealing data are stored in the Sitka area biologist's computer and backed up to network servers.

Agreements

ADF&G, and the U.S. Fish & Wildlife Service, Office of Subsistence Management, have agreed to manage both the state and federal mountain goat hunt in Unit 4 using the State of Alaska's RG150 permit hunt and following the state's permit hunt conditions. Season dates are concurrent and the U.S. Forest Service issues emergency orders in conjunction with ADF&G. Bag limits are the same; however, federally qualified hunters can hunt mountain goats for other federally qualified rural residents under the federal designated hunter program (see Federal Subsistence Management Regulations for the harvest of wildlife on federal public lands in Alaska at www.doi.gov/subsistence).

Permitting

None.

Conclusions and Management Recommendations

Mountain goat harvests between RY76 and RY05 ranged between 28 and 75 goats with an average of 53. Females composed up to 50% of the harvest (Fig. 6). Severe winters with heavy snowfall between RY06 and RY09 may have reduced the islandwide population by up to 50% from estimates of over 1,500 animals to 700–850. Harvests decreased annually between 2007 and RY11, reaching a low of 18 goats harvested in 2011. The average annual harvest during that 5-year period (RY07–RY11) was 29 goats and female harvest remained high at 41%. High female harvest in conjunction with severe weather likely exacerbated the population decline. The department began an aggressive educational effort in RY08 to attempt to reduce the take of female goats but these efforts had minimal effect on reducing female harvest.

In RY11, the mountain goat management strategy was revised. The island was divided into 9 hunt zones, quotas for each zone were established, female harvest was limited with the "one and done" strategy, and many core areas were closed to the taking of mountain goats. These efforts in conjunction with several consecutive mild winters kickstarted the recovery of the Baranof Island mountain goat population. Harvests have been steadily increasing beginning in RY12 and female harvest was reduced to a low of 11% of the harvest during RY12–RY18.

In response to findings from research initiated in 2011 and the apparent recovery of the mountain goat population, a new harvest strategy was implemented for the RY17 season. This strategy aims to expand harvest opportunities for billies, spread harvest spatially, and continue to reinforce keeping female harvest to a minimum. To date, this new strategy appears to be successful and has received considerable support from the local hunting community. Anecdotally, it appears there has been a "culture shift" within the mountain goat hunting community where it is now considered socially unacceptable to purposefully harvest a nanny.

This new strategy requires a much higher level of active inseason management than has occurred historically. However, the workload appears sustainable, and the strategy has enough adaptability to respond to changing conditions to allow managers to increase or decrease harvest opportunity and maintain sustainability.

Management objectives were mostly met during RY18–RY22. Islandwide surveys indicate a population exceeding 1,500 mountain goats and total harvest was below 4% of the total population. The percentage of females in the harvest was slightly above management objectives at 22%; however, the total female harvest still fell below 1% of the entire population.

For department wildlife managers, the current Baranof Island strategy strikes a good balance between conservatism and providing optimum opportunity while providing the flexibility to adjust hunt management based on changes in the population. Smith (1984) summarized goat management well when he stated that goat harvest philosophy should be entirely different than for other ungulates, recognizing that goats might not be as resilient as other ungulates and there may be times when goat populations can withstand additive mortality and times when they

cannot. Traditional sustained yield principles (Caughley 1977) may be inappropriate. In reality, the number of hunters on Baranof Island physically capable of successfully hunting mountain goats is limited. Goat hunting on Baranof Island is extremely difficult. There are no alpine landing areas and few alpine lakes suitable for float planes. Hunters must climb 3,000–4,000 feet from salt water through spruce forests and alder slides and may have to traverse 3–5 miles to reach goats. Most of Baranof goat habitat is extremely steep and rugged. Successful hunters are rewarded with a trek back to their boat with up to 85 pounds of meat, plus hide, horns, and camping gear. Goats on Baranof do not produce Boone-and-Crockett-sized trophy horns, so it is unlikely Baranof will ever become a highly sought destination for nonresident and nonlocal hunters. If female harvest rates remain low, the difficulty of hunting goats on Baranof Island means that sport hunting will likely be a minimal factor in regulating goat numbers (ADF&G 1976).

It is worth commenting on the "one and done" policy. This policy was initially implemented for the RY11 season and has been the most effective strategy for reducing female mountain goat harvest ever implemented in Alaska. At that time there were many areas of population concern, and any additional female harvest was likely to have negative impacts. Female harvest rates the previous several years were approaching 50%. The strategy was a way to allow some areas to remain open to hunting despite justification to close other areas. Because the strategy has been so effective in reducing female harvest in contrast to other strategies, such as a 5-year prohibition on goat hunting on the Kenai Peninsula (McDonough and Selinger 2006), the strategy has been retained even for areas where harvest of one female no longer represents a significant population concern. Baranof Island mountain goat hunters have largely responded positively to this strategy and maintaining the policy helps encourage a culture of selecting for billies. This "culture shift" could be critical in the future if populations return to low levels again and there is increased biological justification for limited nanny take.

In summary, the "one and done" policy has been retained not necessarily because there are current population concerns but because it is an effective tool to reduce female harvest and maintain high harvest opportunities for males. It helps keep hunters focused on avoiding female harvest. Maintaining high male harvest opportunities is desirable in areas that have good access as it allows more people to participate in a hunt that is otherwise very difficult to access over a vast majority of its range. However, in remote areas of the island with large subpopulations and historically low harvest, managers are exploring options to relax the "one and done" policy. In these cases, it might be excessively restrictive to close an area where there is no biological justification to do so.

II. Project Review and RY23–RY27 Plan

Review of Management Direction

MANAGEMENT DIRECTION

The existing management direction and goals appropriately direct the management of mountain goats in Unit 4. The management direction for Unit 4 ensures that mountain goats will persist as part of the natural ecosystem and ensures continued hunting and viewing opportunities. There is

no indication that the long-term sustainability of the mountain goat population or that goals for human uses cannot be met. Therefore, the RY23–RY27 plan will be to continue management practices outlined in the RY18–RY22 management direction.

GOALS

1. To provide for a sustainable harvest of mountain goats in Unit 4.
2. To provide the greatest opportunity to participate in hunting of mountain goats in Unit 4 while maintaining aesthetically pleasing hunt conditions.
3. Provide an opportunity for nonconsumptive uses (viewing and photographing) of mountain goats in Unit 4.
4. Discourage land-use practices that adversely affect mountain goat habitat.

CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

The Board of Game made a negative finding for customary and traditional use of mountain goats in Unit 4 during the November 2006 Southeast regional meeting (5 AAC 99.025(7)).

Intensive Management

Not applicable.

MANAGEMENT OBJECTIVES

1. Maintain an islandwide population in excess of 1,500 goats.
2. Monitor sex composition of the harvest and maintain the female component at <15% of the harvest or <1% of the estimated islandwide population.
3. Maintain the overall harvest rate at ≤4% of the islandwide population.

REVIEW OF MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Monitor the mountain goat population in Unit 4.

Data Needs

Current management strategies for mountain goats in Unit 4 rely on annual population monitoring. ADF&G staff will continue to collect information on total population, population per hunt zone, adult to kid ratios, sightability, survival, and fecundity.

Methods

Traditional aerial mountain goat surveys will be conducted annually. Biologists will attempt to survey the entire island but at a minimum will survey the core area, also referred to as areas consistently surveyed each year.

2. Mortality-Harvest Monitoring

ACTIVITY 2.1. Monitor mountain goat harvests through mandatory sealing.

Data Needs

Unit 4 mountain goats are managed in-season via quotas per hunt zone based on recent population estimates. Therefore, timely hunter reporting of harvest is crucial for not going over harvest objectives in each zone, particularly in regard to female harvest. Anecdotal information about hunt conditions and populations is collected from hunters as well.

Methods

ADF&G staff will continue to collect harvest data by sealing mountain goats harvested by hunters. Managers will record location and date of harvest, method of take, mode of transportation, measure horns (total length, basal circumference, inter horn width and annuli increments), and verify sex. Sealing must occur by ADF&G within 5 days of harvest. These data will be entered into the department's WinfoNet database. Harvest data will be summarized by regulatory year.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Data Recording and Archiving

AERIAL SURVEYS

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federally qualified rural residents under the federal designated hunter program (See Federal Subsistence Management regulations for the harvest of wildlife on federal public lands in Alaska at www.doi.gov/subsistence).

Permitting

None.

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