

THE SUCCESS OF MOUNTAIN GOAT MANAGEMENT ON THE KENAI PENINSULA IN ALASKA

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Abstract. Innovative management strategies are sometimes necessary when budgets and manpower are limited and the demand for a resource is high. Mountain goat (*Oreamnos americanus*) management on the Kenai Peninsula in Alaska has evolved under these limitations from a liberal general season to a quota-based dual permit system. We utilized a limited drawing permit hunt based on a predetermined harvest quota followed by an unlimited registration permit hunt. Drawing permit hunters were allowed 52 days (10 August-30 September) and registration permit hunters were allowed a maximum season length of 47 days (15 October- 30 November). Twenty-nine survey areas were open to hunting in 1994 from a total of 35 areas. Each hunt area was surveyed on 1-5 year intervals and harvest quotas have increased from 5% to 7% of the number of goats observed. Individual hunt areas reopened for a registration hunt if the quota had not been harvested during the drawing permit season and the risk of overharvest was considered low. Hunt areas were closed as harvest objectives were met. We evaluated this system based on three major criteria: mountain goat population status, hunter opportunity, and control of harvest levels. This harvest-tracking strategy allowed for gradual increases in population size, maintained productivity, and controlled harvest where access is variable while maximizing hunter opportunity and maintaining a sustained and distributed harvest of goats.

Mountain goats occur along the entire length of the Kenai Mountains in Alaska (Fig. 1) which represents the western-most natural extension of the species' continental range. Goat populations are most abundant in the coastal mountains and least abundant along the drier western slopes and interior portions of the Kenai mountain range, where they coexist with Dall sheep (*Ovis dalli*).

Goats within Kenai Fjords National Park (KFNP) were unavailable to hunting after the park was established in 1980. In addition to the 2,268 km² KFNP, most goat habitat on the Kenai Peninsula lies within the Kenai National Wildlife Refuge (7,839 km²), Chugach National Forest (ca. 5120 km²), or Kachemak Bay State Park system (1,500 km²), and remains virtually unaffected by human development.

The most significant factor affecting goat populations on the Kenai (Hjeljord, 1973) and near Ketchikan (Smith 1984) was believed to be winter weather. Severe winters have pronounced effects on natality rates and mortality of older aged animals and juveniles (Smith 1986). Coupled with hunter harvest on prime aged animals, goat populations could decline. Since hunter harvest is primarily

additive (Hebert and Turnbull 1977, Kuck 1977, Smith 1986), restrictions on or elimination of human caused mortality is necessary following back to back or multiple severe winters. Surveys following suspected severe winters would help managers identify population declines and make difficult decisions regarding permit reductions or season closures.

The Kenai Peninsula has been a popular mountain goat hunting area since statehood because of its proximity to Anchorage and relatively accessible goat populations. By the late 1970s, Alaska Department of Fish and Game (ADF&G) wildlife managers recognized that moderate to severe winters, combined with liberal seasons and bag limits of up to 2 goats, resulted in local population declines. For example, the number of goats surveyed in area 342 declined from 84 in 1968 to 22 by 1980. Consequently, a registration permit hunt system was implemented in 1978 to reduce harvest and distribute hunting pressure. In 1980, drawing permits were issued by lottery followed by unlimited registration permits for areas where harvestable quotas remained. In addition, subsistence permits were allowed in designated

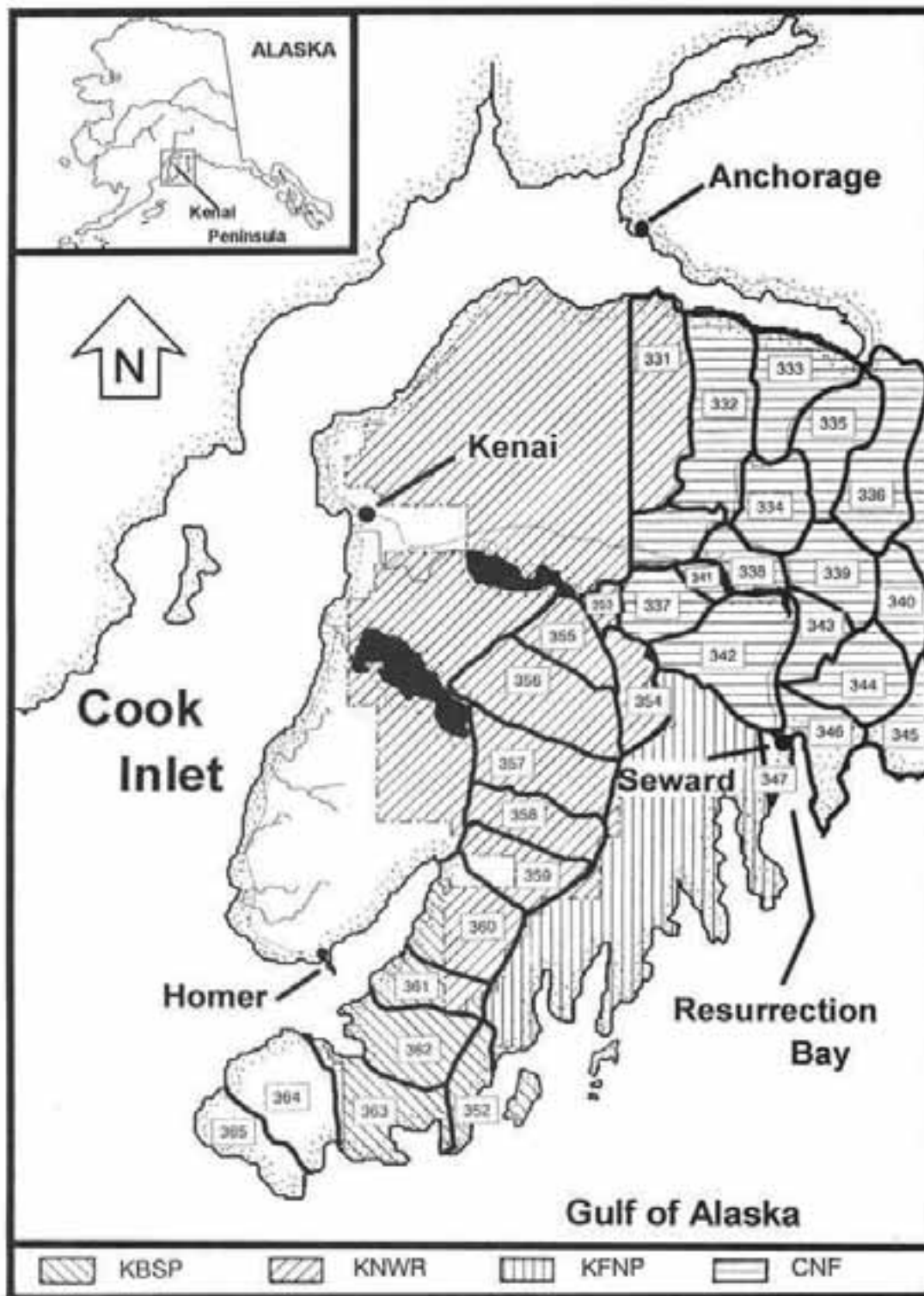


Figure 1. Kenai Peninsula and the associated mountain goat hunt areas. Most habitat lies within Kachemak Bay State Park (KBSP), Kenai National Wildlife Refuge (KNWR), Kenai Fjords National Park (KFNP) and Chugach National Forest (CNF) as indicated by cross hatching.

subsistence use areas only.

ADF&G management objective is to maintain a population of 4,000 to 4,500 mountain goats on the Kenai with a harvest of predominantly (66% minimum) males. The Department utilizes a harvest-tracking system (Caughley 1977) based on survey results of individual hunt areas.

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STUDY AREA AND METHODS

The Kenai Peninsula (21,831 km²) is located south of Anchorage, Alaska (Fig. 1) between 59° and 61° N. latitude and 149° and 152° W. longitude. Cook Inlet bounds the Kenai on the West, the Gulf of Alaska on the south, and Prince William Sound on the east. The Kenai Mountains and the associated mountain goat range lie on the eastern side of the Peninsula.

Climate on the Kenai varies from coastal maritime along the Gulf of Alaska to drier interior portions of the peninsula. Snowfall data available from the USDA Soil Conservation Service (1994) indicate that snow pack levels peak in late April or early May. Mean snow depth in 1961-1990 in selected sites near goat habitat ranged from 76.2 cm (30 in) at Summit Creek to 248.9 cm (98 in) at Nuka Glacier and Turnagan Pass. Annual variations in snowpack were caused by maritime influence, surrounding topographic features (Paez 1991), and prevailing storm direction.

The Kenai Peninsula mountain goat range is divided into 35 survey areas, which correspond to individual hunt areas. Twenty-nine areas were open to mountain goat hunting in 1994. Of the 6 areas not opened, 4 were located within KNFP and the other 2 contained small herds (less than 20 goats).

Since the early 1970s, the department has monitored goat populations using aerial survey techniques described by Lentfer (1955). Surveys were flown using a Piper PA-18 Super Cub with an observer during early morning and evening in July and August (prior to hunting season). Surveys generally were flown along drainage contours beginning at the subalpine zone progressing upward into the alpine zone by 150-200 m

increments. We counted and classified goats as either kids (< 4 months) or adults and recorded data on standardized forms. Harvest quotas were calculated based on the number of observable goats in each hunt area.

Three goat population trend areas, each consisting of 2 or 3 contiguous count areas, were established in separate geographic regions of the Kenai (Del Frate 1992a). These areas became the primary sampling units for monitoring trends in goat production and abundance for the regions they represented. Insufficient annual budgets restricted us from surveying all areas annually. Trend areas and other high priority areas were surveyed every 1-3 years, while low priority areas were surveyed at least every 5 years.

The Kenai Peninsula mountain goat population size was estimated by summing the most recent aerial survey results for all count areas and correcting for sightability. In doing so there was an unavoidable lag in the magnitude and direction of increase or decline of estimated population size. Additionally, since 1980 we assumed the population was increasing in all areas. The composite estimate was expressed as a range by assuming that 70% to 90% of the goats present during aerial surveys were observed (Nichols 1980a). Recent accurate estimates of mountain goats in KNFP were not available but were assumed between 800-1,000 animals.

Drawing permits were allocated based on the number of goats observed, degree of accessibility, and historical success rates for individual hunt areas. ADF&G is authorized through the Board of Game to issue up to 500 permits. Currently, 29 hunt areas are open and the number of permits differs from 2-40 per individual hunt area. The drawing permit season opened 10 August and closed 30 September. Hunters were required to report to a local department office within 10 days of harvesting a goat with the horns for aging and verification of sex. Unsuccessful hunters were required to report within 15 days of the end of the season by returning the harvest report portion of their permit.

Since success rates differed annually and because we suspected that additional drawing permits could result in overharvest in some areas, we included a registration permit system in 1982 for 7 days and quantities were unlimited. Only selected areas were opened (where harvest quotas were not met and chances for overharvest were minimal). Hunters were required to apply in person at an ADF&G office. Successful hunters were required to

present the horns within 5 days for measuring and aging. A short 5-day reporting period was necessary to facilitate in-season management.

The registration hunting season opened 15 October and closed 30 November unless areas were closed by Emergency Order (EO). In recent years most areas were closed by EO because individual area quotas were filled within 1-2 weeks of the registration season. Emergency orders issued locally allowed for closure of an area in one or two days, thus, reducing the risk of overharvest. Hunters who had not yet gone afield were advised of the EO closure by phone.

In Alaska, special provisions provide a priority for subsistence uses of wildlife. Where resources were not plentiful enough to provide for the subsistence needs for all residents (Tier I), resources were allocated to qualified individuals through lottery (Tier II). Hunter qualifications

were based on need, proximity to the resource, history of use, and sources of alternative foods. Subsistence mountain goat hunters were regulated utilizing the harvest-tracking strategy. Currently, 4 areas have been designated for Tier II subsistence hunts on the Kenai Peninsula. The Tier II season began 1 August instead of 10 August and closed 30 September. A follow up registration hunt was allowed if harvest quotas had not been met. These registration hunts were limited to residents of Alaska who qualified for subsistence.

RESULTS

In annual population estimates using the most recent aerial surveys, the mountain goat population remained relatively stable from 1968 to 1981 and then steadily increased through 1992 (Fig. 2). This

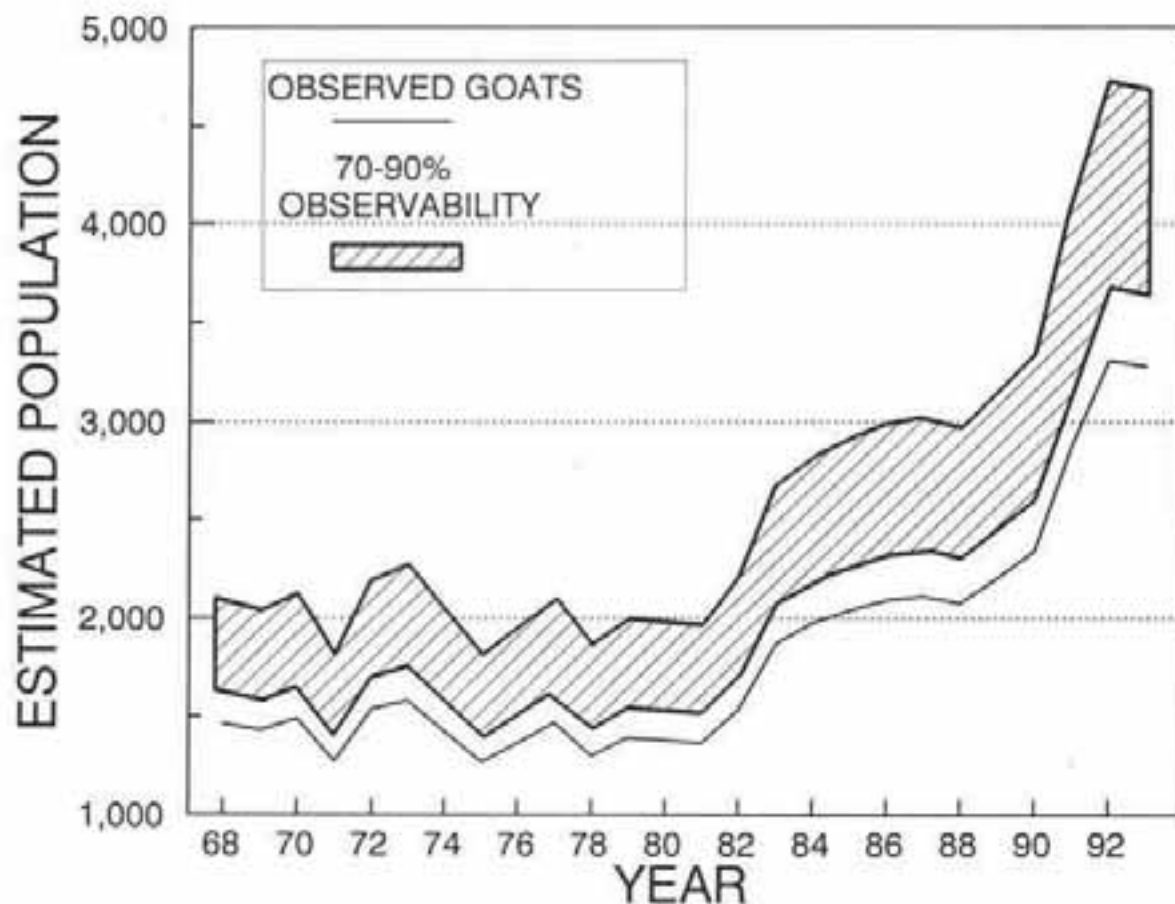


Figure 2. Kenai Peninsula mountain goat population, 1968-1993.

technique has been used to identify long term population trends as was noted with almost a three fold increase in the Kenai goat population. However, some limitations were noted: depending on the number of annual surveys completed, there may be a lag in recognizing population changes; localized increases and declines were not readily evident since all survey information was combined.

As the mountain goat population size increased under our management system, population objectives were revised upward in 1989 (Holdermann 1990) and again in 1993 (Del Frate 1992b). The current population estimate is 4,500 to 5,800 goats.

Trend area survey results during the period 1968-1987 indicated kids:100 older goats and percent kids observed ranged from 20:100 to 44:100 and 17 to 31%, respectively. Kid percentage during annual surveys in the West Slope and Blying Sound regions declined gradually in 2 of 3 trend areas during the last decade (Del Frate 1992b).

Harvest rates for individual count areas were increased from 5% to 7% of total countable goats to try to stabilize goat numbers within management objectives. Additional increases in quotas may be necessary if the harvest rate of 7% is inadequate.

DISCUSSION

The original permit system was instituted to disperse hunting pressure, limit harvests in highly accessible areas, and maintain hunter opportunity (Spraker 1981, 1983). After the 1984 season, Spraker (1986) recommended "adjusting" the permit allocation to meet the increasing population. Smith (1984) suggested that a population tracking strategy (Caughley 1977) was advantageous for mountain goat management. Since then, harvest has been based on predetermined population objectives and adjusted for long term environmental trends. Parameters such as sex ratio in the harvest and mountain goat distribution have been included (Holdermann 1986).

The drawing permit system was initiated in 1982 when we realized the registration permit system failed to provide the necessary safeguards to control hunting effort and to prevent overharvest. Localized overharvest problems generally occurred in areas with good access. Using drawing permits, hunt areas with as few as 30 goats could be opened. In addition, hunters could be distributed more evenly across the Peninsula and the "gold

rush" style of hunting would be eliminated.

Success rates for drawing permit hunters differed substantially between years. For example, hunt area 339 harvests have varied from 1-8 goats annually with success rates of 10% to 100%. Registration hunts were allowed only when harvest numbers were below quotas. By combining both drawing and registration permit systems we can maximize hunter opportunity and achieve harvest objectives while protecting smaller subpopulations of goats. Where there are small populations of goats or good access we can only issue drawing permits since the possibility of overharvest is high. Annual adjustments in the number of permits issued often were necessary to adjust for the desired harvest. By comparison, areas with moderate to difficult access have been managed well using registration permits. If an area had a high probability of overharvest, a registration season was not authorized regardless of surplus goats.

Weather also is a factor that affects in-season management by affecting hunter success rates. Extended periods of poor weather prevent hunters from traveling to hunt areas or reaching goats in difficult terrain. Drawing permit systems generally cannot be adjusted for unpredictable and variable harvest rates. The addition of the registration permit system allows in-season adjustments to enable the Department to achieve harvest objectives.

Several conditions of the permits allow personal contact between the Department and hunters. Information on animal condition, age, and sex, as well as methods of transportation, and success rates allowed us to gain insight concerning the results of our management program. We provided a handout to hunters describing the life history of goats, how to identify billies in the field and specific maps showing the description of hunt areas.

CONCLUSIONS AND MANAGEMENT IMPLICATIONS

There are several benefits associated with the current mountain goat management system on the Kenai Peninsula. Each type of permit allows for specific objectives to be met while still maintaining hunter opportunity and protecting wildlife resources. However, manpower for data entry and analysis increases with in-season management. In areas where unlimited participation hunts are no longer viable, a dual permit system may be applicable.

Since the beginning of the harvest tracking

strategy on the Kenai Peninsula the mountain goat population has experienced continuous growth. The decline in the proportion of kids may be an indication that the Kenai Peninsula goat population is nearing carrying capacity. Declining habitat conditions may reduce the productivity of female goats (Adams and Bailey 1982) or perhaps density dependant reductions may be occurring (Swenson 1985). Both theories need further investigation on the Kenai.

Weather patterns generally have been moderate to mild with only a few exceptions. Poor winter conditions have been reported 3 times since 1978 (Nichols 1980b, Del Frate and Spraker 1991, Del Frate 1992c). If the Department suspects high overwinter mortality, allocation of permits can be adjusted to account for winter severity. Late July surveys may confirm suspicions and we can further adjust registration permit allocations.

The addition of a registration permit hunt system that follows the drawing system is not without its faults. This type of in-season management is labor intensive. Personnel need to be available to issue permits on demand as well as check hunters in and out of hunts. Since the number of registration permits are unlimited, access becomes critical to whether or not an area should be opened. Areas with good access stimulate interest in some hunters who would otherwise not attempt to hunt goats. In some areas on the Kenai well over 100 permits have been issued in less than 5 days.

Smith (1984) suggested that mountain goat populations followed "boom or bust" cycles based on extended periods of moderate or severe winters. Mountain goat management on the Kenai Peninsula recognizes the potential for these cycles. We can take advantage of the "booms" by increasing hunter participation and harvesting additional animals. In the event of a "bust" we can protect the remaining animals through conservative allocation of permits. If necessary, individual hunt areas can be closed until populations sufficiently recover. The keys to the success of this program are the manager's working knowledge of mountain goat biology and hunter demographics.

This system of mountain goat harvest management developed on the Kenai Peninsula may have application elsewhere. Advantages are: (1) effective dispersal of hunting effort by allocation of permits by hunt areas; (2) reduction in the risk of localized overharvest in areas with easy access; (3) specific hunt area objectives; and (4) long term use of trend areas facilitates assessment of hunting

and environmental effects on mountain goats.

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