

**KENAI PENINSULA
CARIBOU MANAGEMENT PLAN**

ALASKA DEPARTMENT OF FISH AND GAME

U.S. FOREST SERVICE

U.S. FISH AND WILDLIFE SERVICE

FINAL

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EXECUTIVE SUMMARY

Caribou were extirpated from the Kenai Peninsula by 1912 and reintroduced via transplants from the Nelchina Herd in the mid 1960's and again in the mid 1980's. The relocation efforts resulted in the establishment of four herds: the Kenai Mountain Herd (Game Management Unit 7), Kenai Lowland Herd (Game Management Subunits 15A and 15B), Killey River Herd (Game Management Subunit 15B), and Fox River Herd (Game Management Subunit 15C). Populations are increasing or stable for all but the Fox River Herd.

This cooperative management plan identifies the following goals and actions for meeting those goals. These are only guidelines, if consistently unmet then management action will be needed.

GOAL 1: *Manage to maintain caribou populations at levels commensurate with long-term habitat protection.*

“Manage” is defined by the following measurable parameters:

- a. a maximum density of 2 caribou/km² where appropriate to allow for Goal 2
- b. a minimum fall recruitment of 20-25 calves:100 cows
- c. a minimum post-hunting season bull:cow ratio of 30-40:100
- d. monitor calf weights in fall/spring to compare with other herds in the state as another indicator of herd health
- e. monitor habitat changes (protocols to be developed in the work plan)

The Kenai Mountain Herd has a current density of approximately 0.4 caribou/km². A total of 378 caribou were counted on March 31, 2001. The last composition survey was completed on March 14, 1996 and the herd had a bull:cow ratio of 41:100, with a fall recruitment of 29 calves:100 cows. There is some concern that the carrying capacity of this herd may be around 400 animals as there is a decline in calf to cow ratios at that population level.

The Kenai Lowland Herd has a very low density (0.1 caribou/km²). This herd has the largest range (1,386 km²) with distinct seasonal use. Useable habitat for this herd remains unknown. The density of the Killey River and Fox River herds exceeded the maximum density of 0.8-1.0 caribou/km² during 2000 but have both since declined. The Killey River Herd had a minimum of 143 animals killed by an avalanche near Alpine Lake during the winter of 2001/2002. The Kenai Mountain and Kenai Lowland herds are well below this figure. All but the Kenai Lowland Herd have met the minimum fall recruitment of 20-25calves:100cows over the past several years. The bull:cow ratio is also being met by all the herds.

Protecting the habitat from overgrazing is a concern for all the herds, especially with densities above 1/km². Without expanding into new areas, the Killey River and Fox River herds could begin negatively impacting their respective habitats. It is critical for the refuge to begin monitoring vegetation on these two ranges.

GOAL 2: *Provide the opportunity for herds to expand into suitable but unoccupied range.*

The Caribou Hills is the last reported location of caribou prior to extirpation. During 1986, 16 caribou were released at Caribou Lake just south of the Caribou Hills. All of the animals dispersed from the area moving to both the Killey River and Fox River areas. Heavy snowmachine use in the Caribou Hills may significantly reduce the potential for this area to support a herd on other than a seasonal basis.

GOAL 3: *Provide for multiple use of caribou herds.*

The Kenai Mountains, Killey River and Fox River herds are currently the only hunted herds on the Peninsula. Due to the small size of the Kenai Lowland Herd there has been very limited hunting opportunity between 1981 and 1994. The limited permit hunt was closed beginning in 1994 and remains closed. The Kenai Lowland Herd provides the greatest viewing opportunity as it frequents areas adjacent to roads between Kenai, Kasilof, Soldotna, and Sterling during the spring, summer, and fall.

GOAL 4: *Provide for scientific research on introduced caribou herds.*

Specific graduate or Wildlife Cooperative Unit studies relating to caribou and/or their habitat may be developed and initiated in the future. Stacy Prosser (graduate student-University of Alaska Anchorage) is presently conducting caribou research on the Kenai Mountain Herd. Current agency budgets are committed to conducting composition counts and census; monitoring radio-collared caribou to determine home range, seasonal movements, herd interchange; and capture operations to maintain a sample of radio-collared animals in each herd.

INTRODUCTION

Historically, caribou (*Rangifer tarandus*) were found on the Kenai Peninsula (Porter 1893; Seton-Karr 1887; and Schiefner 1874 cited in Lutz 1960; Palmer 1938). Although reports indicate that their distribution was widespread, estimates of population size were not given. Because suitable caribou habitat is limited on the Peninsula, caribou were probably never numerous. According to Alaska Department of Fish and Game (ADF&G) and U.S. Fish and Wildlife Service (USF&WS) records, caribou antlers originating from the early 1900s have been found in only two areas on the Kenai Peninsula during the past two decades: 1) Caribou Hills and 2) Skilak-Tustumena Benchlands.

Caribou were extirpated from the Kenai Peninsula by 1912 (Palmer 1938). Davis and Franzmann (1979) concluded that caribou on the Kenai Peninsula were probably exterminated by over-hunting and further stated: "Although fires may have decreased the theoretical carrying capacity of caribou ranges on the Kenai, we are confident that sufficient habitat was always available for remnant populations". Market hunters hunted caribou for mining camps during the early 1900's and may have killed most of the remaining original population.

The USF&WS first considered reintroducing caribou in 1951 (1952 Narrative Report, Kenai National Wildlife Refuge). However, a reintroduction was not attempted until the mid 1960's when a decision was made by ADF&G to reintroduce caribou to the Peninsula with the objective of establishing viable herds for the purpose of hunting.

The Nelchina Herd, in Game Management Unit (GMU) 13 near Glennallen, was selected as the donor herd for the reintroduction. Fifteen caribou (3 males and 12 females) were released at an airstrip near Chickaloon River (N 60°42.0', W 150°11.0') in 1965. This release site was selected as a result of studies conducted in the early 1950's, which suggested that the northern portion of the Kenai Mountains could support caribou. A second release of 29 caribou (3 males and 26 females) was conducted at Watson Lake near Sterling, in 1966. The second release was scheduled for the Caribou Hills; however, a mechanical failure of the transport vehicle and deteriorating condition of the animals made farther travel impossible. These two reintroductions resulted in the establishment of two caribou herds, the Kenai Mountain Herd and the Kenai Lowland Herd, which in 2002 numbered approximately 400 and 130 animals, respectively.

Despite these successful reintroductions in 1965/66, historical caribou range in central and southern portions of the Peninsula remained unoccupied. In 1985 and 1986, ADF&G and USF&WS initiated a cooperative program to reintroduce caribou on Kenai National Wildlife Refuge (NWR) within this unoccupied range. Eighty animals from the Nelchina Herd were released at four sites. Caribou from the Nelchina Herd were selected for the donor population for two reasons: 1) caribou previously relocated on the Kenai Peninsula originated from this herd; and 2) a segment of the herd wintered near Glenn Highway along Lake Louise road, thus reducing capture and transportation costs. These reintroductions resulted in establishment of three new herds on the Kenai Peninsula,

designated as Twin Lakes Herd, Killey River Herd and Fox River Herd. These herds totaled 67, 643, and 66 caribou, respectively, on October 19, 2001.

MANAGEMENT OBJECTIVES

This Management Plan is a cooperative effort between USF&WS, U.S. Forest Service (USFS), and ADF&G. While the mandates of these agencies differ to some degree, the guiding principles are essentially the same: to protect the habitats on which wildlife populations depend; to maintain viable, healthy populations of wildlife; and to provide consumptive and non-consumptive recreation. A Caribou Working Group (composed of members from each cooperating agency) established the following objectives for management of caribou herds on the Kenai Peninsula.

1. Manage to maintain caribou populations at levels commensurate with long-term habitat protection.

“Manage” is defined by the following measurable parameters:

- a. a maximum density of 2 caribou/km² where appropriate to allow for Goal 2
- b. a minimum fall recruitment of 20-25 calves:100 cows
- c. a minimum post-hunting season bull:cow ratio of 30-40:100
- d. monitor calf weights in fall/spring to compare with other herds in the state as another indicator of herd health
- e. monitor habitat changes (protocols to be developed in work plan)

To achieve the first objective, population size estimates will be obtained and compared with current range use. Fall population size estimates for all herds (except Kenai Lowlands Herd which is counted in June) have been determined and will be continued in the future. Telemetry will be used to locate groups of animals to census and to determine distribution for density calculations. Herd sex and age composition data will be collected during fall to obtain calf recruitment, calf to cow ratios, and bull to cow ratios. Surveys will be conducted using a helicopter and experienced observers.

Predation can be a limiting factor on caribou herds. The extent of predation limiting Kenai Peninsula caribou herds is not well documented at this time. *Predation by domestic dogs has been documented for the Kenai Lowland herd. Low recruitment of calves in the Fox River herd may also be due to predation by wolves and bears. Future work plans will address impacts of predation on Kenai Peninsula caribou.*

Monitoring to assure habitat protection will require the following:

- a. Identify key habitat condition indicators.
- b. Identify the costs involved (personnel, transportation, and equipment).
- c. Plan a strategy for monitoring habitat changes.

Range monitoring is critical for these herds. Since caribou herds on the Kenai Peninsula occupy relatively small home ranges, all potential caribou range will be evaluated. Additionally, a program of habitat evaluation will be developed in the annual work plans.

2. Provide the opportunity for herds to expand into suitable but unoccupied range.

Radio/GPS telemetry will provide a means to document natural movement into new areas. Density figures will be adjusted as each herd expands its range. Presently the alpine area south of Fox River is one suitable, but unoccupied area for caribou. While we support the natural expansion of herds into surrounding habitat, major expansions of herds into range occupied by established herds complicates management options.

3. Provide for multiple use of caribou herds.

Caribou from the Kenai Lowland Herd are presently available for roadside viewing along Bridge Access Road, Kalifornsky Beach Road, Kenai Spur Highway and Beaver Loop Road as well as neighborhoods between Kenai, Soldotna, Sterling and Kasilof. The other herds are not found in developed areas and viewing requires backcountry travel. Hunting permits are currently issued for the Kenai Mountain, Killely River and the Fox River herds.

4. Provide for scientific research on introduced caribou herds.

Specific graduate or Wildlife Cooperative Unit studies relating to caribou and/or their habitat may be developed and initiated in the future. Current USF&WS and ADF&G budgets are committed to capture operations and monitoring radio-collared caribou to meet the first management objective.

A Caribou Working Group (with representatives from each agency) will meet to develop annual Work Plans. The Work Plan will contain specific information on surveys, captures, census, and research (including university graduate projects) to be conducted each year. Summaries of Work Plan accomplishments will be submitted to each agency.

This Management Plan will be reviewed annually by the Caribou Working Group. All parties can make changes to the plan at that time upon mutual agreement. This Management Plan will remain in effect until terminated by the cooperating agencies.

Kenai Mountain Herd

Range

The Kenai Mountain Herd occupies that portion of Game Management Unit (GMU) 7 north of the Sterling Highway and west of the Seward Highway. Land ownership is primarily USFS and USF&WS. The herd ranges between elevations of approximately 2,000 to 4,500 feet. Critical winter range includes the windblown ridges of that portion of the Kenai Mountains bordered by the Chickaloon River, Swan Lake and Juneau Creek on the south, Little Indian Creek on the north, the lowlands on the west, and Resurrection Creek and Pass Creek on the east. Caribou expand their range in summer to areas east and south of Resurrection Creek to the Seward and Sterling highways. The calving ground for the Kenai Mountain Herd extends from American Pass to the headwaters of Big Indian Creek, including the headwaters of American, Hungry and Moose creeks. Summer and winter range are shown in Figure 1. There is no known post-calving aggregation area.

Population

The Kenai Mountain Herd has had three documented population peaks in its 37-year history (Figure 2). The original introduction of 15 animals in 1965 grew to a minimum pre-hunting season population of 339 animals by 1975. The population declined sharply to 193 by 1977, primarily due to over harvest. The herd increased to another pre-hunting season peak of 434 in 1985, through more conservative hunting regulations. Herd size has fluctuated downward since that time to 305 in 1988, but increased again when 452 animals were counted in spring 1997. The 1996 composition was 29 calves and 41 bulls: 100 cows; calves accounted for 17 percent of the total (403) observed (Table 1).

The estimated population size shown in Table 1 was determined by adding the reported harvest to the fall survey count. Calf recruitment averaged 44 calves per 100 cows between 1980 and 1983, with a range of 38 to 51 calves per 100 cows. From 1985 to 1996 composition was determined during 7 years resulting in a mean of 25 calves per 100 cows, with a range of 20 to 34. The mean percentage of calves in the herd between 1987 and 1996 was 15. The ratio of bulls to cows has remained relatively stable from 1987 to 1996 with a mean of 41:100, and ranged between 37 and 44 per 100 cows.

Habitat

There are approximately 848km² (328 mi²) within the known range of the Kenai Mountain Herd (Figure 1). Winter range is approximately 391 km² (151 mi²) of the total identified range. Pitcher (ADF&G, personal comm.) suggested that caribou densities in Alaska should not exceed 1 caribou/km² to maintain range quality. The non-migratory nature of the Kenai Mountain Herd may cause it to vary significantly downward from this figure. Although habitat components of this herd have not been thoroughly investigated, concerns for habitat limitations have been discussed since the mid 1980s when the herd's performance started to decline. During the period 1980-83, when the herd increased from

248 to 305 animals, the calf to cow ratio remained steady at 43:100; however, it dropped to 25:100 when the herd peaked at 434 in 1985. Human caused mortality probably became additive as far back as 1985, accelerating the decline. The point at which calf to cow ratios declined may be an indication of carrying capacity for this herd.

Harvest

Hunting the Kenai Mountain Herd began in 1972/73, and harvest has varied from 6 to 87 animals taken per year. With the exception of three years (1974/75 to 1976/77) hunting has been by limited permit drawing. The number of permits issued has ranged from 20 to 250, with 250 issued since 1997. Table 2 lists harvest and hunting effort from 1972 to 2002.

Population Monitoring

Radio telemetry and summer/fall aerial surveys will continue to be used to assess population trends, composition, winter productivity, mortality, and habitat use patterns for the Kenai Mountain Herd. A minimum of 10 radio-collared adult female caribou should be maintained each year to facilitate location of the herd (currently there are 16 active VHF collars and 2 GPS collars, Appendix A). The mountainous terrain where this herd lives makes it extremely difficult to locate animals on a dependable basis. Traditionally, the Kenai Mountain Herd has been located by snow tracking in late October. The use of radio telemetry should reduce monitoring flight times and increase the number of caribou found per flight. Fall surveys conducted in late October will provide herd composition and size. Spring surveys will provide data pertaining to select calving areas and time of calving. Results of a survey conducted in the spring of 1988 suggest that calving occurs after the first of June; however, since calving time is believed to correlate with habitat quality, a more accurate assessment is needed.

Kenai Lowland Herd

Range

Most caribou in the Kenai Lowland Herd summer in bogs north of the Kenai airport and south and east of Kalifornsky Beach Road. This area is comprised of state, city, borough, and private lands. Caribou are also located in the Swan Lake Canoe System, Moose River valley and near Beaver Lake. Although some animals have been observed in winter south and east of Kalifornsky Beach Road, most of the herd migrates east to winter on the Kenai NWR along the Moose River to the outlet of Skilak Lake and even Funny River. The total range of this herd is approximately 1,386 km² (535 mi²) (Figure 3). Unlike ranges for other herds on the Peninsula, summer and winter range are separate for the Kenai Lowland Herd in most winters. The summer range is 341 km² (132 mi²) compared to 752 km² (291 mi²) for the winter range. Calving occurs in the wetlands north of the Kenai airport, along the Kenai River flats, and the wetlands south and east of Kalifornsky Beach Road in the Kenai gas fields. Highways and the Kenai River bisect the calving areas.

Population

The Kenai Lowland Herd has been surveyed only during spring due to the heavily timbered characteristics of the area utilized during fall breeding aggregation. Data collected from 1988 to 2001 indicate mean June calf survival to be 20 percent of the herd, with a range of 9 to 29 percent (Table 3). Peak calving occurs during the third week of May. The Kenai Lowland Herd reached its largest size in spring of 1999, when 140 caribou were observed. The number of animals counted declined slightly over the next couple years to 128 in June 2001 but the percentage of calves in the herd remained stable. Although moderately high percentages of calves are found during the June counts, low recruitment has plagued the herd. In addition to low recruitment, there is a second reason for concern that this herd may not reach its carrying capacity potential. The Kenai Lowland Herd slowly increased in numbers throughout the 1990s, but annual recruitment was not high enough to offset the aging trend in the population. In 1991 and 1992, for example, 13 randomly captured adult cow caribou were comprised of six (46%) 10+, five (39%) 6 to 9 and two (15%) 3 to 5 year old animals. If the assumptions are correct that this herd is comprised of mostly aged adults, and that recruitment will remain low, then the probability of even moderate growth without assistance is low.

Thirteen animals have been killed in highway accidents in the past three years. Highway kills need to be well documented to compare trends with an expected increase in traffic and speed for the Kenai-Soldotna-Sterling area. Further economic and population growth of the area will mean continued building and development on lands presently utilized by caribou.

Habitat

The area occupied by the Kenai Lowland Herd during winter is primarily spruce forest and open muskeg along the Moose River drainage. Bog-muskeg and open wetlands near the mouth of the Kenai River are utilized during summer. Total summer and winter range is approximately 1386 km² (535 mi²), and the herd appears to be expanding its range. Questions have arisen concerning a declining herd expanding its range with the implication that poor quality habitat is the reason for the herd's decline and range expansion. Although range evaluations have not been conducted, the range occupied by this herd is not considered atypical habitat for caribou. Harassment by dogs and human disturbances may be pushing these animals into new areas. A thorough evaluation of habitat types and vegetation utilized by the herd is needed, as well as a look at the continued human development occurring within its summer range.

Harvest

The Kenai Lowland Herd was hunted (bulls only) during the years 1981, and 1988 through 1994 (Table 4). There has not been an open season since 1994 due to a change in management direction for this herd. The current management objective will allow the herd to increase until 150 animals are counted before a hunting season is re-established. Five permits were issued in 1981 and three in each subsequent year that the season was open. Four bulls were taken in 1981, two bulls and one cow in 1988, two bulls annually from 1989-1991 and one bull in 1992. The open season for both resident and non-resident hunters has been September 1-20.

Population Monitoring

The herd has been monitored using aerial surveys in late June during the post-calving aggregation. These surveys provide calf percentage of the herd and a minimum bull to cow ratio using antler development to determine bulls. Attempts have been made in the past to conduct sex and age compositions surveys on this herd in the fall but due to the heavily timbered habitat they occupy, results have been generally unacceptable.

In November 27, 2000 two adult females were captured and fitted with store-on-board, GPS transmitters to determine seasonal use of range. Transmitters were programmed to record each animal's location every 13 hours, resulting in approximately 995 locations. Transmitters were removed on April 7, 2002 and replaced with conventional collars. On March 26, 2003 two GPS collars were deployed. There are currently 4 active VHF collars and 2 GPS collars on this herd, Appendix B). These caribou will be monitored to facilitate location of the herd during spring surveys.

Killey River Herd

Range

During the Caribou Working Group meeting on January 17, 2002, the Twin Lakes Herd was combined with the Killey River Herd. Both herds intermingled throughout the year, during calving, and were not distinct. Future reference to the Killey River Herd will include the Twin Lakes animals. The Killey River Herd now comprises the largest group of caribou resulting from the 1985-86 reintroductions. These animals utilize alpine and subalpine habitat at elevations between 2,000 and 4,500 feet on the benchlands and foothills between Skilak Lake and Tustumena Glacier (Figure 4). Presently, animals of the Killey River Herd have restricted their use to above tree line habitat. They winter on windblown ridges of the Kenai Mountains at elevations from 2,500 to 4,500 feet on the Skilak-Tustumena benchlands. There is no distinct seasonal range for this herd. Its range is year round. Calving occurs on higher mountain ridges (above 4,000 feet) north and south of Indian Glacier and near Twin Lakes. During May of 2000 and each May since, caribou cows were venturing out onto the nunataks of the Harding Icefield to calve on these isolated mountains. May 2000 was the first documented case of caribou in the Kenai Fjords National Park. This is likely a predator avoidance behavior. Peak calving occurs between May 16 and May 26.

Population

A post-hunting survey conducted on November 1, 2000 revealed 697 caribou in the Killey River Herd, including caribou in the Twin Lakes area. Thirteen caribou were harvested during the fall 2000 season resulting in a minimum early August population size of 710 animals.

On October 19, 2001 a similar aerial survey of the Killey River Herd revealed 710 caribou. The addition of the 54 animals killed during the fall hunting season indicates a minimum of 764 caribou were in the herd in early August (Table 5). This was the highest population ever for the Killey River Herd. Sometime during the winter of 2001/02 an avalanche near Alpine Lake killed at least 143 caribou, 23 bulls, 10 calves, and 110 cows. Of that total nine had radio collars. During the fall 2002 hunt 47 caribou were harvested. The population currently is estimated around 550.

Habitat

The range of the Killey River Herd includes approximately 764 km² (295 mi²) of Kenai NWR wilderness in GMS15B as well as a small area of Kenai Fjords National Park in GMU7. Excluding portions of the Harding Icefield reduces the amount to 576 km² (222 mi²) of potential habitat for caribou. The benchlands are primarily vegetated with alpine shrub-lichen tundra, which is very sensitive to physical disturbance. Willow (*Salix sp.*) covers lower and wetter sites, while dwarf birch (*Betula nana*) occurs on upland and drier sites. Tussocks, covered with willow and cranberry (*Vaccinium vitis-idea*), are common over most of the area. There are numerous areas of bare rock, and shrub subalpine habitat.

Harvest

Hunting by limited drawing permit began in 1994 when 25 permits were issued and 11 caribou were reported. The number of permits increased to 50 in 1997. In 1999, an aggressive effort to control the herd's growth included a reduction in number of permits for either gender animals but added 40 permits to kill female caribou. Each permit allowed the hunter to harvest two cows. This limited permit program was continued in 2000. In 2001, the 25 drawing permits were increased to allow the hunter to harvest one caribou of either gender and two females. The 40 drawing permits for females were replaced with an open registration hunt allowing each hunter to harvest up to 3 females. Beginning in 2002, the hunt area was expanded to include the range of the former Twin Lakes herd to the north of the Killey River, the registration hunt continued and the number of drawing permits increased to 75 (Table 6). The bag limit will be retained for the limited permit drawing hunt. The season will remain the same, Aug. 10 to Sept. 20.

Hunters used two primary methods to access their hunting areas: boat across Tustumena Lake and walk to the hunting area or boat across the lake and use horses to pack into the hunt area. With the expanded hunt area in 2002, hunters now have access via float plane to Twin Lakes and Iceberg Lake.

Population Monitoring

In April 1994 ADF&G and USF&WS collared 7 adult female caribou. At that time there were still two functioning radio collars deployed in 1991. Six additional adult cows were collared in 1996 and again in 1997. During 2001 5 adult cows were collared with GPS collars and 12 calves were collared with VHF collars. On March 26, 2003 four of the GPS collars were retrieved and replaced with VHF collars. One GPS collar was not located. Three new cows were also collared with VHF transmitters. Maintaining collars on adult females will provide additional data on calving areas, calf production and

survival. Monitoring should be conducted on a weekly basis from May 10 to June 15 (calving period). This herd should be closely monitored as its density is the highest for any of the Peninsula's caribou herds. There are currently 10 VHF and 1 GPS collars deployed in the Killey River Herd (Appendix C).

FOX RIVER HERD

Range

The Fox River Herd occupies alpine and subalpine habitats between Tustumena Glacier and the Fox River (Figure 6). This area lies within GMS 15C on Kenai NWR lands. The area contains approximately 126 km² (49 mi²) of potential caribou habitat. There is no separate winter or summer range. The area is used year round though that portion east of Truuli Creek seems to be utilized more in summer. The Fox River Herd originated from a release of 16 caribou near Caribou Lake, located south of the Caribou Hills, in April 1986. The animals abandoned the release area by October 1986 and moved into the Kenai Mountains. The Fox River Herd utilizes elevations of the Truuli Creek drainage between 2,000 and 5,000 feet. Telemetry flights in May and June documented calving along the high mountain ridge (near 5,000 feet) between Truuli and Chernof glaciers and the ridge north of Truuli Glacier.

Population

By 1987, the Fox River Herd numbered at least 22 caribou. The herd increased at a rate of 19 percent annually from 1987-1993, excluding one year of zero growth. Fall 1993 survey resulted in a herd of 58 caribou (Table 7). The population peaked at around 100 animals in March 1998 but has since declined. The latest count was 66 caribou in October 2001. Current density is 0.5 caribou/km². Productivity and calf survival in the herd was moderately high in the early 1990's, ranging from 44 percent in 1990 to 30 in 1992. Fall surveys in 1990, 1992, and 1993 revealed that the herd was comprised of 27, 20, and 12 percent calves, respectively. The number of calves the past two years has been few judging by efforts to get calf weights in the fall and spring.

Habitat

Truuli Creek Plateau is primarily alpine shrub-lichen tundra. Areas between 1,000 and 2,000 feet contain lowland subalpine shrub habitat and elevations below 1,000 feet contain mature spruce forest, much of which is dead from bark beetles. Vegetation is sparse above 4,000 feet and the east end of the plateau extends to the Harding Icefield. Common plants on the plateau include: crowberry (*Empetrum nigrum*), dwarf birch, willow, and dryas (*Dryas octopetala*) (Paez 1991). Lichen component is chiefly *Stereocaulon* spp., *Cladonia* spp., and *Cetraria* spp. Visits to the area with Dave Swanson, reindeer/caribou range expert with the Natural Resources Conservation Service, found a lack of lichens and much of the area trampled. The area east of Truuli Creek was in better shape than the area west of Truuli Creek.

There is approximately 50km² of additional suitable habitat on the benchlands south of Fox River, as well as 70km² in the Caribou Hills to the west of Truuli Creek Plateau. Both areas are currently unoccupied by caribou.

Harvest

Hunting was first allowed on the Fox River Herd in 1995 when 15 drawing permits were issued. The number of permits was decreased to 10 in 1996 and remains there today. Hunter success has averaged 20% since 1996. In each of the last two seasons only one bull was taken. Only two cows have ever been harvested, one in 1998 and one in 1999. Table 8 contains harvest information through 2002/2003 regulatory year.

Population Monitoring

Radio telemetry will continue to be used for monitoring the Fox River Herd population. A capture operation in October 2000 deployed 1 GPS collar on an adult cow and a VHF collar on a female calf. The cow died within the month and the GPS collar was retrieved. The calf also died shortly after deployment. Another capture was done on March 26, 2003. Two VHF collars and one GPS collar were deployed on cows. Unfortunately one cow died within a week. There are currently only 2 radio-collared cows, one VHF and one GPS collar. We should maintain a minimum of 4 collared animals for collecting information on population trends, composition, productivity, and seasonal distribution as well as identification of specific calving areas and time of calving.

SUMMARY

This plan establishes criteria to maintain viable and healthy herds of caribou on the Kenai Peninsula. Four management goals are presented. Caribou herds will be managed based on the following criteria: a maximum density of 2 caribou/km², a minimum fall count of 20-25 calves:100 cows, and a minimum post hunting season bull:cow ratio of 30-40:100. Caribou calf weights will be collected in fall and spring as an indicator of herd health for the Killey River and Kenai Mountain herds.

Caribou range expansion into suitable but unoccupied habitats in the Caribou Hills and alpine tundra south of Fox River is desirable. Due to the expense of introducing animals, we favor natural expansion of existing herds into new areas to achieve this objective. We have modified the maximum density to 2 caribou /km² from the previous plan parameters of 1 caribou/km² to allow for possible expansion. Haber and Walters (1980) suggest that competition for food when herds approach a density of 2 caribou /km² will cause caribou to disperse.

Protection of habitat is a primary responsibility for land managers - USF&WS and USFS. Monitoring habitat on the Kenai Mountain, Killey River and Fox River caribou ranges is needed. Some intensive work has been done (Paez 1991) but repeatability of past monitoring needs to be simplified and standardized, as funding may be difficult to obtain. The Caribou Working Group will meet to propose research for developing a habitat monitoring program in the annual Work Plan.

Radio telemetry will continue to be used to locate animals to document seasonal distribution; estimate population size, productivity, and survival rates; and delineate calving grounds. Tracking radio-collared caribou should be done frequently during calving to assess calf survival and at least monthly during the rest of the year to maintain contact with the herd's activities. Documenting peak calving period and recruitment may provide insight into overall health of the herds. It will be critical to maintain a sufficient number of radio-collars on each herd to achieve this objective.

USF&WS is using the forms in the Appendices to record data from telemetry flights. Refuge aircraft are equipped with Global Positioning Systems for collecting latitude/longitude coordinates in WGS84 datum. These coordinates are entered directly into an ACCESS file and mapped using ESRI's ArcGIS software.

The Caribou Working Group will meet to prepare the annual Work Plan and discuss future research and management information needs.

SIGNATURES

By their signatures below, the undersigned hereby certify their participation in and agreement with the Kenai Peninsula Caribou Management Plan.

The Alaska Department of Fish and Game acknowledges its participation in the development of the Plan, and agrees that all aspects of the Plan are consistent with management of the Kenai Peninsula's caribou herds under the sustained yield principle.

Kimi Lute for Matt Rebus *5/22/04*

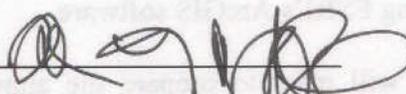
Director, Division of Wildlife Conservation Date

The U.S. Fish and Wildlife Service acknowledges its participation in the development of the Plan, and agrees that all aspects of the Plan are consistent with Service policies and purposes of the Kenai National Wildlife Refuge to "... conserve fish and wildlife populations and habitats in their natural diversity..."

Bob L. West *4-20-04*

Refuge Manager, U.S. Fish and Wildlife Service Date

The U.S.D.A. Forest Service acknowledges its participation in the development of the Plan, and agrees that all aspects of the Plan are consistent with Service policies and purposes of the Chugach National Forest.

 *6/10/04*
Forest Supervisor, U.S.D.A. Forest Service Date

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APPENDICES

CARIBOU TELEMETRY FORM

Flight#: _____ Date: __/__/__ Herd: **Kenai Mountain** Aircraft: _____ Pilot: _____ Observer: _____
 Start time: _____ Stop: _____ Wind Speed: _____ Wind Direction: _____ Precipitation: none rain snow
 Precip Intensity: light medium heavy Cloud Cover: clear scattered broken overcast
 Light Type: bright flat Light Intensity: high medium low Snow Age: fresh moderate old
 Snow Condition: complete partial bare Temperature: ____°F Turbulence: none light moderate
 Remarks: _____

M-mortality, G-GPS/SOB

150.298M **150.359** 150.450M **150.490** **150.650G** **150.930** **151.020** **151.100** **151.499** 151.519M
 151.530M **151.729** **151.739** 151.005M **151.800** **150.985** 151.015M 151.325M **151.846** **150.925**
 150.975M 151.600M **150.070** 150.945M **151.845** **150.270** **150.971** **150.820G** **150.890G**

#	Radio Freq	Total	C o m p o s i t i o n					Habitat	Location (WGS84)		Remarks
			Bull	Cow	Calf	Yrlg	Unkn		Latitude	Longitude	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
Totals											

JUN 2003

CARIBOU TELEMETRY FORM

Flight#: _____ Date: __/__/__ Herd: Kenai Lowland Aircraft: _____ Pilot: _____ Observer: _____
 Start time: _____ Stop: _____ Wind Speed: _____ Wind Direction: _____ Precipitation: none rain snow
 Precip Intensity: light medium heavy Cloud Cover: clear scattered broken overcast
 Light Type: bright flat Light Intensity: high medium low Snow Age: fresh moderate old
 Snow Condition: complete partial bare Temperature: ____°F Turbulence: none light moderate

Remarks: _____

M-mortality, G-GPS/SOB

150.590GM **150.780** 150.848M **150.920** **151.250** **150.880G** **150.830**

#	Radio Freq	Total	C o m p o s i t i o n					Habitat	Location (WGS84)		Remarks
			Bull	Cow	Calf	Yrlg	Unkn		Latitude	Longitude	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
Totals											

Mar 2004

CARIBOU TELEMETRY FORM

Flight#: _____ Date: __/__/__ Herd: Killey River Aircraft: _____ Pilot: _____ Observer: _____
 Start time: _____ Stop: _____ Wind Speed: _____ Wind Direction: _____ Precipitation: none rain snow
 Precip Intensity: light medium heavy Cloud Cover: clear scattered broken overcast
 Light Type: bright flat Light Intensity: high medium low Snow Age: fresh moderate old
 Snow Condition: complete partial bare Temperature: _____ °F Turbulence: none light moderate

Remarks: _____

M-mortality, G-GPS/SOB

167.080 167.120M 167.140M 167.190M **167.240** 167.270M **167.340** 167.350M **167.450G** **167.380**
167.160 **167.060** **167.040** **167.010** **167.030**

#	Radio Freq	Total	C o m p o s i t i o n					Habitat	Location (WGS84)		Remarks
			Bull	Cow	Calf	Yrlg	Unkn		Latitude	Longitude	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
Totals											

MAR 2004

CARIBOU TELEMETRY FORM

Flight#: _____ Date: __/__/__ Herd: Fox River Aircraft: _____ Pilot: ERNST Observer: _____
 Start time: _____ Stop: _____ Wind Speed: _____ Wind Direction: _____ Precipitation: none rain snow
 Precip Intensity: light medium heavy Cloud Cover: clear scattered broken overcast
 Light Type: bright flat Light Intensity: high medium low Snow Age: fresh moderate old
 Snow Condition: complete partial bare Temperature: _____°F Turbulence: none light moderate

Remarks: _____

M-mortality, G-GPS/SOB
 167.230M 167.260M 167.420GM

#	Radio Freq	Total	C o m p o s i t i o n					Habitat	Location (WGS84)		Remarks
			Bull	Cow	Calf	Yrlg	Unkn		Latitude	Longitude	
1											
2											
3											
4											
5											
6											
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19											
20											
Totals											

TABLES

Table 1. Composition Counts and Estimated Pre-hunt Population Size,1965-2002.

KENAI MOUNTAIN CARIBOU HERD									
Regulatory Year	Survey Date	Bulls/100 cows	Calves/100 cows	Percent Calves	Sample Size	Est. Herd Size	Cows	Bulls	Calves
1964/65	2-May-65				15		12	3	0
1965/66	15-Oct-65			12	25				3
1970/71	2-Dec-70				119	119			
1971/72	22-Oct-71				162	162			
1972/73	21-Dec-72				214	220			
1972/73	7-Jun-73			31	116	258			36
1973/74	10-Mar-74				246				
1973/74	22-May-74	42	46	24			24	10	11
1974/75	19-Nov-74	73	44	18	292	336	82	60	36
1974/75	17-Mar-75				136				
1975/76	25-Feb-76				252	339			
1976/77	8-Dec-76				249	298			
1976/77	8-Mar-77				148	193			
1978/79	28-Oct-78			15	178	208			26
1978/79	22-Jun-79			23	125				29
1979/80	5-Nov-79	44	24	15	172	234			35
1980/81	31-Oct-80	36	35	20	227	248	133	48	50
1980/81	15-Feb-81	21	38	24	122		77	16	29
1981/82	19-Oct-81	30	47	27	256	277	145	43	75
1982/83	27-Oct-82	27	51	29	266	294	150	40	85
1983/84	3-Nov-83	39	40	23	276	305	154	60	70
1984/85	19-Feb-85				343	395			
1985/86	29-Oct-85	44	25	15	401	434	238	104	59
1986/87									
1987/88	13-Dec-87	44	20	12	273		167	73	33
1987/88	20-Mar-88	44	20	12	303	347			
1988/89	21-Oct-88	37	23	15	282	305	177	41	64
1989/90									
1990/91	31-Oct-90	39	34	20	286	308	165	65	56
1991/92									
1992/93	11-Nov-92	43	24	14	390	405	234	101	55
1993/94									
1994/95									
1995/96	14-Mar-96	41	29	17	403	450	237	97	69
1996/97	14-Mar-97				452	500			
1997/98	27-Feb-98				419	475			
1998/99	7-Jan-99				380	425			
1999/00	5-Mar-00				290	325			
2000/01	31-Mar-01				378	400			
2001/02									

Table 2. Harvest Summary, 1972-2003.				
KENAI MOUNTAIN CARIBOU HERD				
Regulatory Year	Permits Issued	Harvest Bulls	Harvest Cows	Total Harvest
1972/73	20	6	0	6
1973/74	100	10	1	11
1974/75	registration	30	14	44
1975/76	registration	38	49	87
1976/77	registration	22	27	49
1977/78	100	11	15	26
1978/79	100	19	11	30
1979/80	100	17	16	33
1980/81	100	13	8	21
1981/82	100	12	9	21
1982/83	150	15	12	27
1983/84	150	19	10	29
1984/85	200	34	17	52
1985/86	200	21	12	33
1986/87	250	36	14	50
1987/88	250	21	23	44
1988/89	150	15	10	25
1989/90	150	12	2	14
1990/91	50	7	0	7
1991/92	100	9	7	16
1992/93	100	11	4	15
1993/94	200	26	7	33
1994/95	200	17	11	28
1995/96	200	10	8	18
1996/97	250	10	13	23
1997/98	250	12	14	27
1998/99	250	17	8	25
1999/00	250	11	13	24
2000/01	250	15	7	22
2001/02	250	13	6	19
2002/03	250	11	8	19

Table 3. Summer composition counts and estimated population size, 1987-2001.

KENAI LOWLAND CARIBOU HERD						
Regulatory Year	Survey Date	Bulls/100 cows	Calves/100 cows	Percent Calves	Sample Size	Est. Herd Size
1987/88	17-Jun-88			11	115	130
1988/89	19-Jun-89			9	117	130
1989/90	13-Jun-90			17	117	130
1990/91	25-Jun-91			12	98	110
1991/92	5-Jun-92			24	74	80
1992/93	8-Jun-93			24	66	75
1993/94	20-Jun-94			28	86	90
1994/95	21-Jun-95			22	86	96
1995/96	6-Jun-96			29	96	100
1996/97	8-Jun-97			17	98	105
1997/98	20-Jun-98			19	124	135
1998/99	22-Jun-99			21	140	150
1999/00	20-Jun-00			19	131	140
2000/01	19-Jun-01			23	128	138
2001/02						

Table 4. Harvest Summary, 1981-2001.

KENAI LOWLAND CARIBOU HERD				
Regulatory Year	Permits Issued	Harvest Bulls	Harvest Cows	Total Harvest
1981/82	5	4	0	4
1982/83	no season			
1983/84	no season			
1984/85	no season			
1985/86	no season			
1986/87	no season			
1987/88	no season			
1988/89	3	2	1	3
1989/90	3	2	0	2
1990/91	3	2	0	2
1991/92	3	2	0	2
1992/93	3	1	0	1
1993/94	no season			
1994/95	no season			
1995/96	no season			
1996/97	no season			
1997/98	no season			
1998/99	no season			
1999/00	no season			
2000/01	no season			
2001/02	no season			

Table 5. Composition Counts and Estimated Fall Population Size, 1988-2001.

KILLEY RIVER CARIBOU HERD						
Regulatory Year	Survey Date	Bulls/100 cows	Calves/100 cows	Percent Calves	Number Observed	Est. Herd Size
1987/88					70	70
1988/89	27-Jun-89			19		91
1989/90	18-Jun-90			25		132
1990/91	2-Nov-90	82	55	23	154	154
1991/92	11-Nov-91					197
1992/93	11-Nov-92	67	43	20	222	222
1993/94	15-Nov-93	56	44	22	281	281
1994/95a	31-Oct-94				259	288
1995/96	11-Nov-95				261	290
1996/97	11-Jun-97				376	418
1997/98	13-Jan-98				340	378
1998/99	23-Jun-99	36	25	16	546	607
1999/00						
2000/01	11-Nov-00	42	24	14	632	695
2001/02	19-Oct-01				710	764

a. Beginning in 1994/95 the number observed was assumed to be 90% of the population size.

Table 6. Harvest Summary, 1994-2002.

KILLEY RIVER CARIBOU HERD				
Regulatory Year	Permits Issued (Drawing)	Males Killed	Females Killed	Total Harvest
1994/95	25	10	1	11
1995/96	25	8	0	8
1996/97	25	12	0	12
1997/98	50	23	0	23
1998/99	50	26	0	26
1999/00	25 (40)	15	5	20
2000/01	25 (40)	13	0	13
2001/02	25a	10	4	14
2001/02	158b	0	40	40
2002/03	225a	16	6	22
2002/03	87b	0	25	25

a. Each drawing permit allowed harvest one caribou of either sex and two females.

b. Each registration permit allowed harvest of three females.

Table 7. Composition Counts and Estimated Fall Population Size, 1987-2002.

FOX RIVER CARIBOU HERD						
Regulatory Year	Survey Date	Bulls/100 cows	Calves/100 cows	Percent Calves	Sample Size	Est. Herd Size
1987/88						22
1988/89	27-Jun-89	64	64	28	32	32
1989/90	18-Jun-90			44	23	37
1990/91	2-Nov-90			27		37
1991/92	11-Nov-91					40
1992/93	23-Jun-92			30	61	61
1992/93	11-Nov-92	74	44	20	50	50
1993/94	15-Nov-93	61	23	12	57	58
1994/95	31-Oct-94				83	83
1995/96	11-Nov-95				83	83
1995/96	9-Apr-96				89	90
1996/97	3-Jun-97			19	81	85
1997/98	11-Mar-98				96	100
1998/99	28-Nov-98				67	70
1999/00	20-Jun-00					70
2000/01	19-Oct-01				66	66
2001/02						
2002/03						

Table 8. Harvest Summary, 1995-2002.

FOX RIVER CARIBOU HERD				
Regulatory Year	Permits Issued (Drawing)	Males Killed	Females Killed	Total Harvest
1995/96	15	5		5
1996/97	10	2		2
1997/98	10	2		2
1998/99	10	3	1	4
1999/00	10	1	1	2
2000/01	10	3		3
2001/02	10	1		1
2002/03	10	1		1

FIGURES

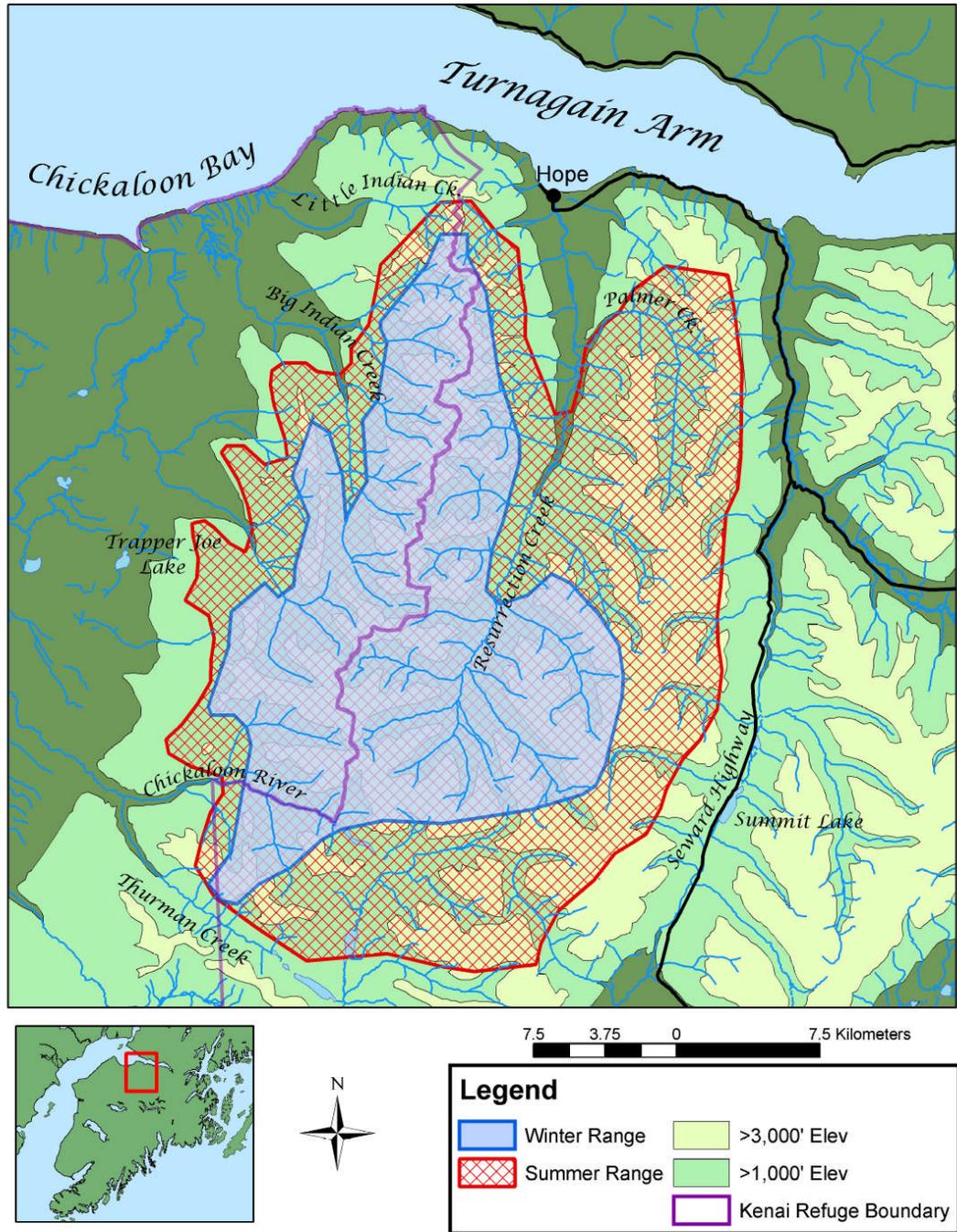


Figure 1. Kenai Mountain Herd summer and winter range.

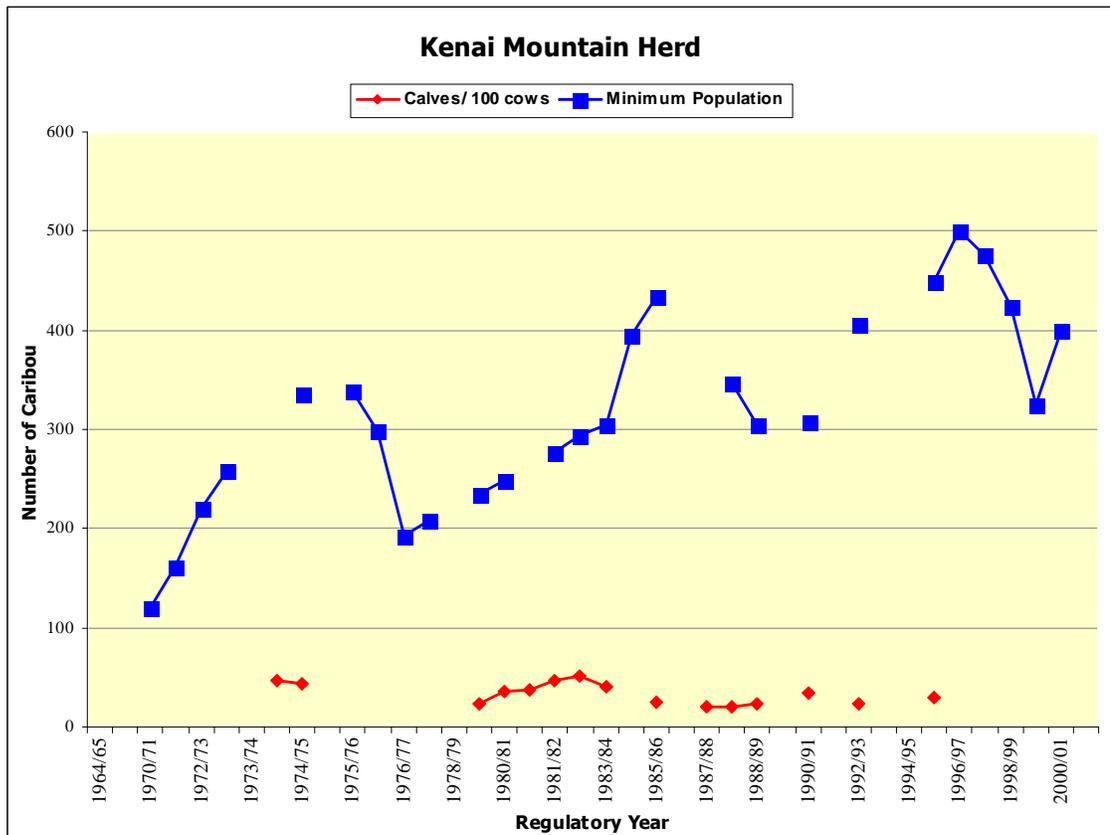


Figure 2. Kenai Mountain Herd population estimates and calf/cow

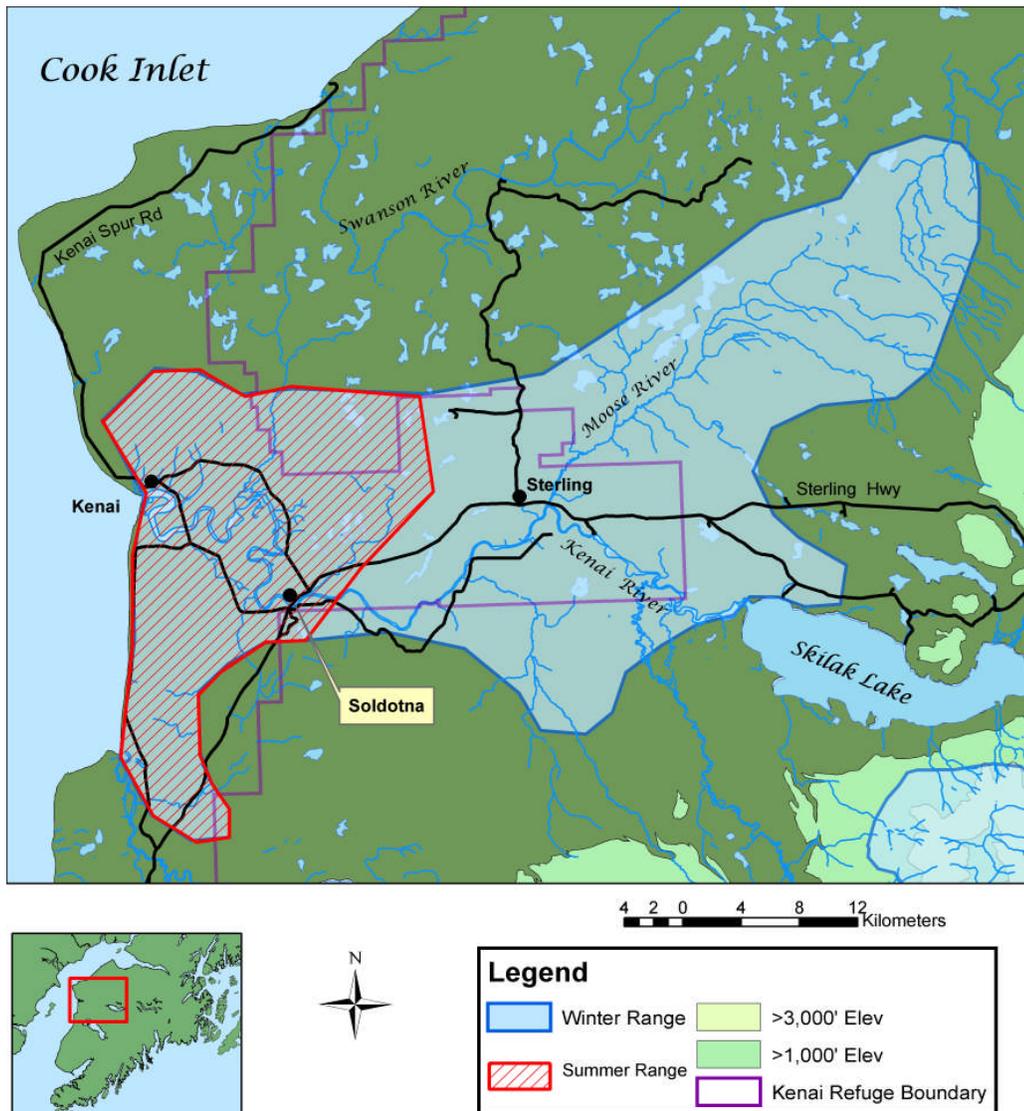


Figure 3. Kenai Lowland Herd summer and winter range.

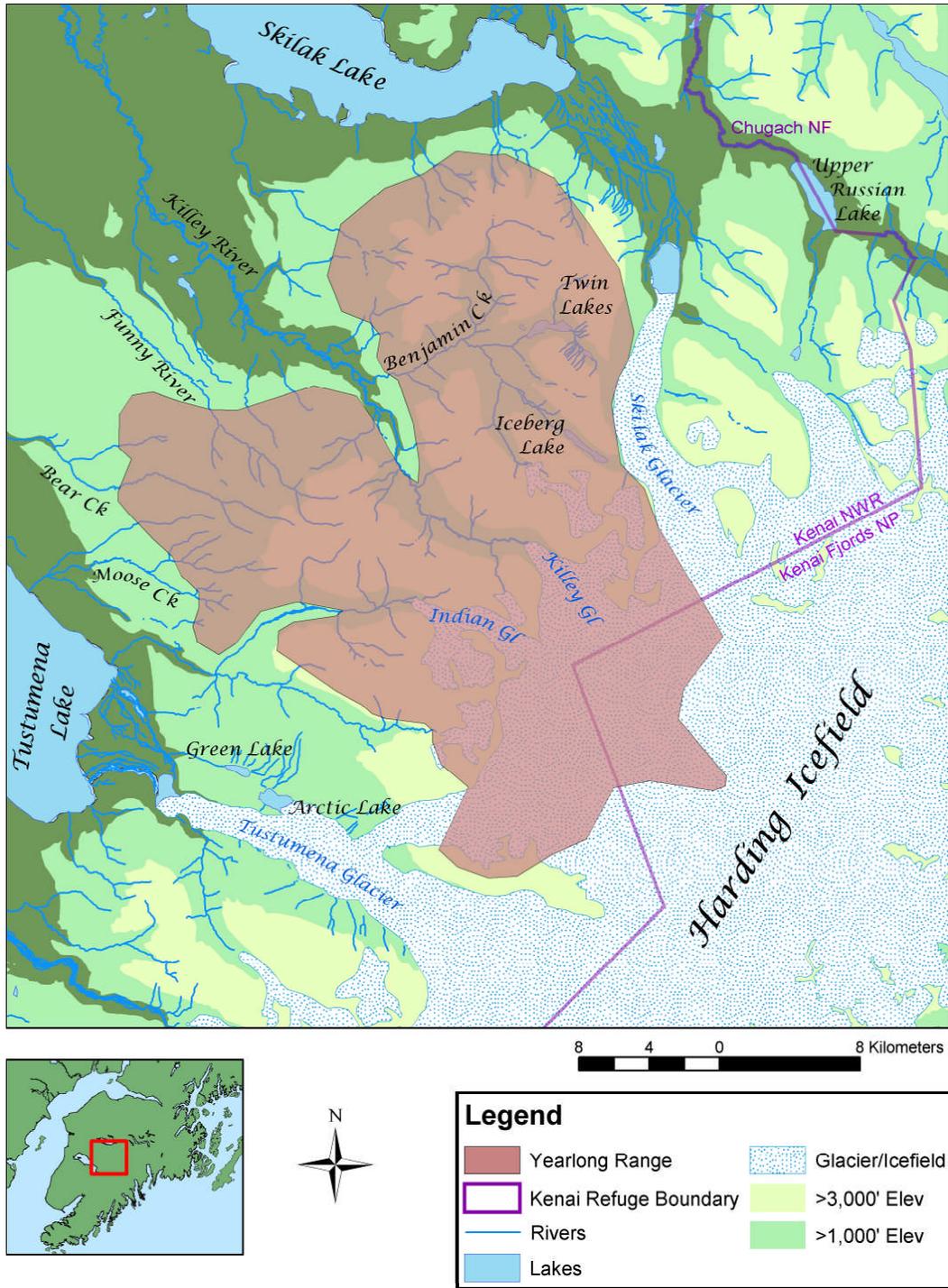


Figure 4. Killey River Herd yearlong range.

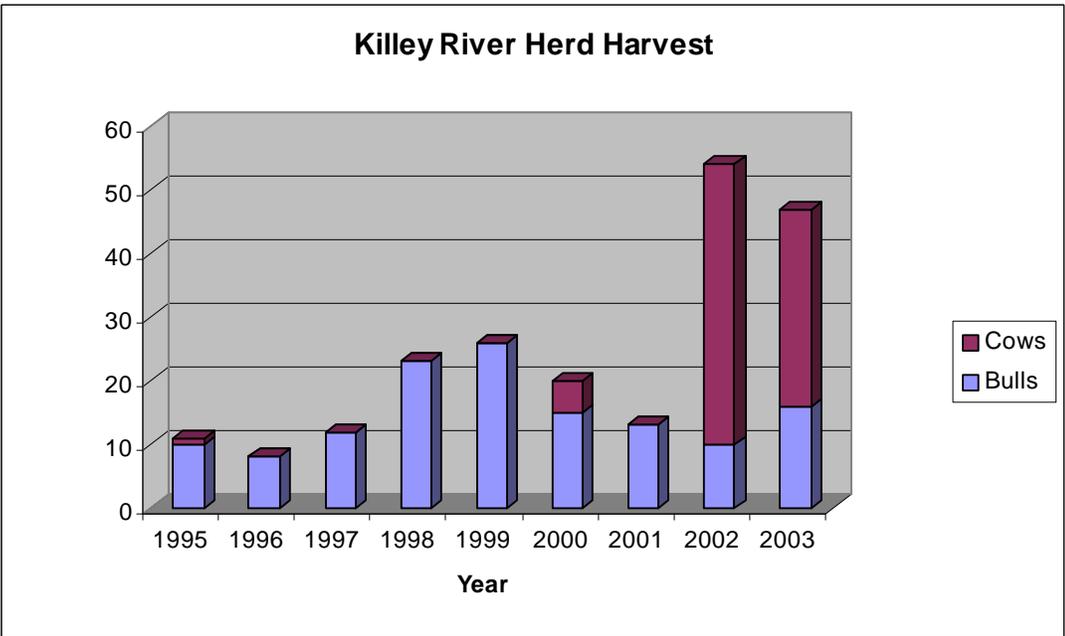


Figure 5. Harvest for the Killey River Herd.

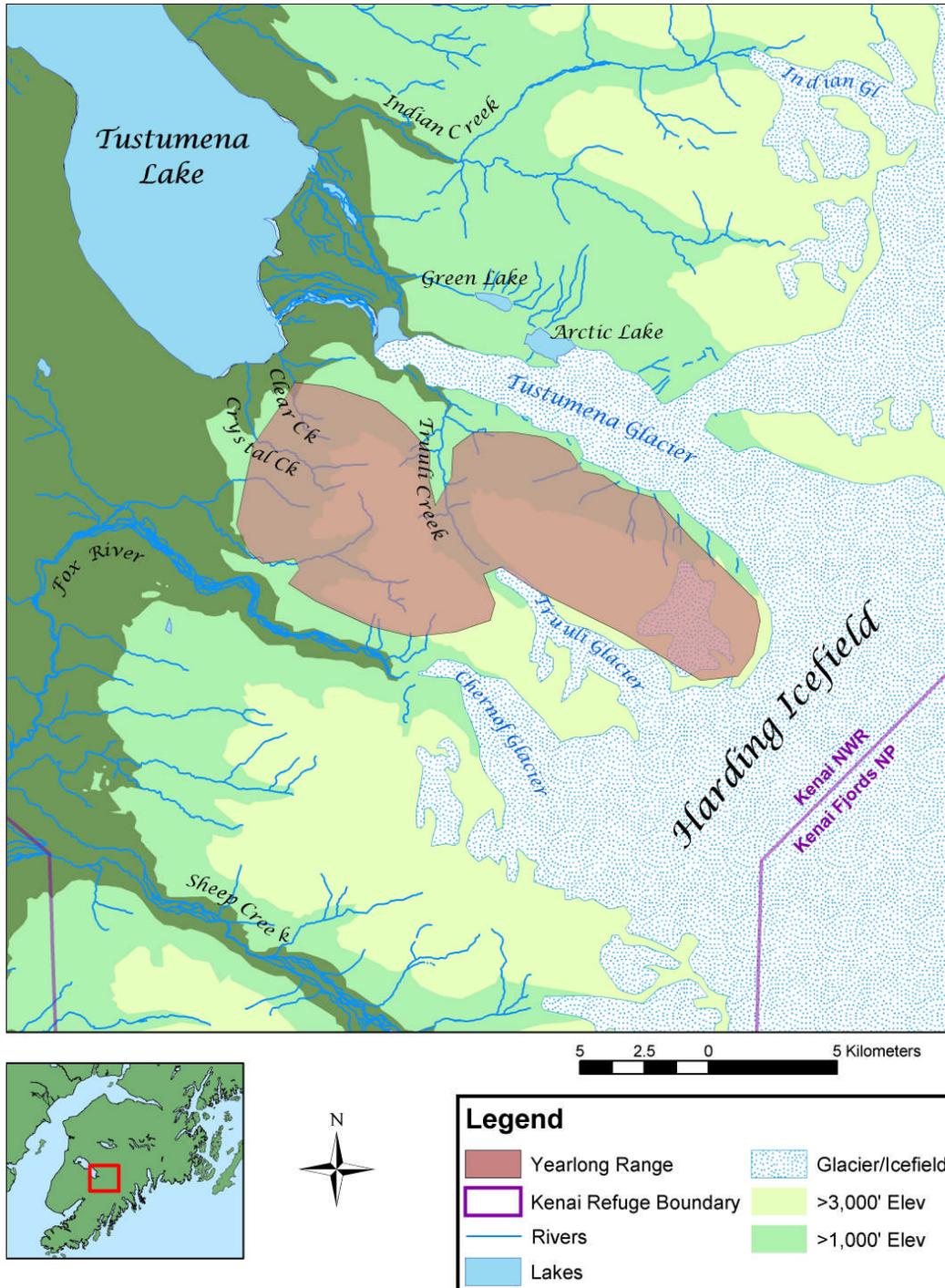


Figure 6. Fox River Herd yearlong range.