KENAI NATIONAL WILDLIFE REFUGE

REFUGE
FURBEARER CONSERVATION
AND
TRAPPING PLAN

D R A F T

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I. THE U.S. FISH AND WILDLIFE SERVICE AND TRAPPING

1. Introduction

This document outlines the policies and states general objectives of the U.S. Fish and Wildlife Service (FWS) regarding trapping on the National Wildlife Refuge System, outlines authorities of refuge managers regarding refuge trapping programs, and provides specific background information for conserving furbearers and managing trappers on the Kenai National Wildlife Refuge, Alaska.

Of significance to this document are general and Alaskan public attitudes toward wildlife and critical wildlife and natural habitat issues. Perhaps the best studies of these attitudes are those reported by Kellert (1979, 1980,). In regards to furbearers and trapping, his studies revealed the general public indicated moderate, but significant, opposition to the harvesting of furbearers with over 70% of informed and uninformed respondents indicating disapproval of the steel leg-hold trap (Kellert 1979:108). In contrast, nearly all respondents that trapped (96%) saw nothing wrong with the use of leghold traps. Alaskans, in contrast to the general public, had exceptional animal knowledge, ecological appreciation, interest in wildlife, and were less utilization-oriented (Kellert 1979:97). Only persons with graduate degrees ranked higher than Alaskans. For example, Alaskan respondents reported the most positive attitude toward predators, especially the wolf, of all those surveyed (Kellert 1980).

In view of these general public and Alaskan attitudes toward

furbearers, predators, and the use of leg-hold traps, it is imperative that the objectives of the National Wildlife Refuge System (USFWS 1976) be reflected in its refuge management programs, especially trapping programs. Because the general public is characterized by a pervasive lack of biological or management knowledge (Kellert 1980) effort must be made to support biologically sound programs acceptable to the public.

2. Service Policy

- The Service permits the trapping of furbearing animals on national wildlife refuges where it may contribute to, or be compatible with, the management objectives of the refuge.

- Service trapping policy is based on the premise that, given habitat conditions capable of supporting healthy wildlife populations, harvestable surplusses are usually produced and constitute a renewable natural resource. Regulated consumptive harvesting has been shown to have no adverse effect, and may have beneficial effects, on the long-term stability and health of wildlife populations and their habitats.

- The Service recognizes trapping as an effective tool of wildlife population management and a legitimate recreational and economic activity.

° Specific - Alaska. Each refuge manager in Alaska has the authority to develop and implement a trapping program in conformance with applicable State and Federal regulations and subject to the concurrence of the regional director. Provisions of the overall trapping policy should be considered and incorporated where possible.

3. Objectives

Specific objectives of trapping furbearing animals on national wildlife refuges may include but are not limited to the following:

° To maintain furbearer populations at levels compatible with refuge and surrounding habitat and with refuge objectives which may involve habiata manipulation.

° To contribute to the attainment of national migratory bird, mammal and non-migratory bird, and endangered species objectives or goals.

° To minimize furbearer damage to physical facilities (e.g., dikes and water control structures).

° To minimize competition with or interaction among wildlife populations and species which conflict with refuge objectives.

° To minimize the occurrence of high population densities which have the potential to transmit contagious diseases humans, among furbearer populations, other wildlife species, or

domestic animals.

° To provide authorized individuals with quality wildlife-oriented recreational experiences, educational opportunities, and opportunities to utilize a renewable natural resource.

4. Authorities

The following Federal legislative and administrative authorities apply to trapping on National Wildlife Refuges:

1. The National Wildlife Refuge System Administration Act
2. Title 43 CFR 24.3 (provides for trapping
3. The Refuge Recreation Act
4. Title 50 CFR 31.2 (permit requirements)
5. The Refuge Revenue Sharing Act
6. Title 50 CFR 29.1 (public economic use)
7. The Fish and Wildlife Act

For example, among other authorities, the refuge manager has the authority to:

1. Charge a fee for trapping permits issued on a refuge.
2. Specify the following conditions as long as they are not more liberal than existing State trapping regulations.
   a. Species and numbers to be taken

b. Seasons and hours

c. Areas where trapping is permitted and prohibited

d. Methods of trapping (sizes, types, sets, baits, scents, and locations

e. Methods of dispatching furbearers

f. Methods of carcass disposal

g. Report submission procedures

h. Provisions governing the use of refuge vegetation

i. Provisions governing trap and equipment removal

3. Provide for patrols and spot checking of the refuge trapping operation to assure compliance with permit provisions

4. Disqualify individuals applying for trapping permits because of experience, equipment, training, or other appropriate factors

5. Immediately revoke trapping permits for non-compliance with any of the conditions on the permit

6. Refuse to issue future trapping permits or any other permits for use or privileges on the refuge for non-compliance with any conditions on the permit

It is the responsibility of the refuge manager to encourage: 1) selective, 2) humane, and 3) effective trapping techniques; minimize the taking of non-target species, and encourage the use of quick-kill and drowning sets and frequent checking of traps for humane purposes.

5. Conflict of Interest

It is policy that Service personnel may trap on refuges only when it is necessary for management and/or education or research as part of their official duties.

II. THE KENAI NATIONAL WILDLIFE REFUGE AND TRAPPING

1. Introduction

The Kenai National Wildlife Refuge was established on December 2, 1980 under provisions of the Alaska National Interest Lands Conservation Act (ANILCA). Prior to 1980, the refuge was known as the Kenai National Moose Range. The Kenai National Moose Range was established in 1941 by executive order of President Franklin Roosevelt, primarily to protect the breeding and feeding grounds of the giant Kenai moose. In addition to changing the name of the refuge, the ANILCA enlarged the size of the refuge, traded surface and subsurface rights with Native villages and corporations, and broadened the purpose of the refuge to include the conservation of all species of wildlife and specifically mentioned wolves and other furbearers.

Prior to 1967, the refuge was divided into extensive trapping units which were allocated to trappers. During this period, the human population was relatively low on the Kenai Peninsula and an average of 23 permits were issued per year (16-33). During the 1967-68 season, trappers were allowed to trap without permits on refuges and during the 1968-69 season, and unlimited number of free-use permits were issued. The justification for changing trapping regulations at that time included (Kenai NWR 196:37):

1. "The economic aspect of trapping has been eliminated due to high paying winter jobs and low fur prices."
2. ". . . trapping has become a recreational pursuit."
3. ". . . there has been little demand for furbearers and trapping permits, . . ."

A recreational trapping program appeared to be the most equitable method of providing trapping opportunity and a plan was prepared in 1968 to provide for the maximum number of people. Although another plan was submitted in 1975, no changes were recommended other than the refuge "should provide for the trapping of wolves only in a portion of the [moose] Range." (Kenai NWR 1975:12)

2. Physical Description

The Kenai Peninsula is located between Prince William Sound and Cook Inlet in southcentral Alaska (lat. 60°N, long, 150°W), and lies just south of Anchorage (Fig 1A). Although 26,000 km^2 in area, the peninsula is connected to mainland Alaska by a narrow neck of land and ice only 16 km wide. Two major landform characterize the peninsula: the rugged Kenai mountains rising to 1,500 m (with major icefields) dominate the eastern half and the Kenai lowlands, a rolling plateau ranging from sea level to about 500 m, form the western half. Numerous bedrock fault-lines cross the landscape, the most notable separating the Kenai lowlands from the mountains, Patterns of uplift and subsidence are pronounced, with the lowlands generally rising and the mountains settling into the sea.

Of the 26,000 km^2 that make up the Kenai Peninsula, 14,600 km^2

are included in the following federal land units: Kenai National Wildlife Refuge (7,972 km^2), Chugach National Forest (4,340 km^2), and recently established Kenai Fjords National Monument (2,268 km^2). The refuge is divided into 2 ADF&G game management units, GMU7 and 15. GMU 15 is further divided into 15A, 15B, and 15C. The Kenai NWR encompasses the Kenai lowlands and adjacent mountains. Most of the area was burned by wildfires during the last 100 years (Spencer and Hakala 1964, Davis and Franzmann 1979). Much of the 700 km^2 "benchland" between Skilak and Tustumena Lakes burned between 1885 and 1890. Large fires in 1947 and 1969 were accidentally started by humans. The 1947 fire burned 1,250 km^2 in the northern lowlands and the 1969 fire covered an additional 352 km^2 of mature forest just northeast of the town of Kenai.

Forest vegetation includes white and black spruce (Picea glauca and P. mariana), white birch (Betula papyrifera), aspen (Populus tremuloides), and willow (Salix spp.), with black cottonwood (Populus trichocarpa) in stream bottoms and Sitka spruce (Picea sitchensis) in coastal areas. The altitudinal limit of trees in the mountains is approximately 500 m.

3. Furbearer Population, Habitats, and Harvest

A. Terrestrial Furbearers

Marten - Marten are probably the rarest furbearer on the Kenai NWR. Only 4 marten have been reported taken on the refuge by

was noticed by Culver (1923), who suggested that they be "re-introduced". Attempts to protect marten on the Kenai Peninsula became apparent as early as 1916, when marten seasons were closed throughout Alaska for 5 years.

During the 44-year period between 1916 and 1960, marten seasons were closed on the western Kenai Peninsula at least 21 years, the most recent ones from 1948-52 and during the 1954-55 season. After statehood (1960), marten season on the western Kenai Peninsula was held between November 10 and January 31 (93 days) with no bag limit. The same regulation is in effect on the Kenai NWR today.

There may be at least two reasons why marten are rare on the refuge today: 1) they were exterpated by man in the early 1900's and have failed to recolonize the refuge despite closed seasons in the past, or 2) the current refuge habitat is incapable of supporting marten. Since marten still occur on the western Kenai Peninsula off the refuge and probably in the refuge Russian River drainage, and since marten were apparently once more widespread on the Peninsula than they are today, it appears that the refuge is capable of supporting marten. It is possible that marten were exterpated on the refuge portion of the Kenai Peninsula at approximately the same time that wolves (Peterson and Woolington 1982) and caribou (Davis and Franzmann 1979) were exterpated in the early 1900's. But, unlike the

highly mobile wolf which naturally recolonized the Peninsula after 50 years and the caribou which were reintroduced by man in the 1960's. The marten were unable to expand from small isolated packets into available habitat.

Perhaps on factor limiting dispersal is that marten are reluctant to cross wide, open habitats. For example, Buskirk (1983) reported marten were never observed to have crossed open bodies of water and rivers and creeks presented barriers to travel during summer and formed home range boundaries throughout the year. Hawley and Newby (1957) reported marten home range boundaries coincided with large, open meadows, burns, and streams, and Pullianinen (1981) reported female marten avoided clearings such as fens. Soutierre (1979) also reported that although male marten travelled in clear cut areas, females appeared to avoid them. Only 1 of 12 marten he captured in a clear-cut was a female.

The Skilak Glacier Flats may present a physical barrier to dispersing female marten which are known to occur in the Upper Russian drainage. The fast flowing river and the barren, snow-cover flats averaging a mile in width in the winter may prevent female dispersed into surrounding habitat to the north, the Kenai River may be an effective barrier because it often remains unfrozen throughout the winter and frozen Skilak Lake may be also be too wide and open for females to cross.

Habitats used by marten elsewhere and small mammal densities on the refuge indicate there should be ample habitat and prey for

marten, especially in the Tustumena Benchlands, south of Tustumena Lake, the Mystery Creek Wilderness Unit and the Big Indian Creek drainage. Although it was once generally believed that marten required undisturbed, mature forest habitats (Marshall 1951a, de Vos 1952, Miller et al 1955, Ingran 1983), more recent work by Koehler and Hornocker (1977), Soutierre (1979) and Douglass et al (1983) suggest marten and natural wildfires are compatible, marten continue to use timber-harvested areas but occur at lower relative densities depending on cutting technique, and habitat use may be a function of prey abundance rather than habitat structure.

Voles appear to be the main prey of marten in Alaska, Canada, and the northwestern United States (Lensik et al 1955, Quick 1955, Cowan and Mackay 1950, Weckworth and Lawley 1962). Since red-backed vole densities on the Kenai NWR (Table) appear just as high, often higher, than those ????? in prime marten habitat (Koehler an Hornocker 1977, Soutierre 1979).

History has demonstrated that marten are easily overtrapped. This has led to overharvest if not near exterpation in many settled or readily accessible areas (Strickland et al 1982) Strickland et al (1982) also summarized problems managing marten. Noting that marten are easily trapped and can be overharvested even in a short early season, they recommended establishing quotas in heavy trapped areas, use of registered

traplines and discussed the value of established or natural sanctuaries from which marten could disperse into trapped areas. Reintroductions and restocking have been successfully used to re-establish marten into areas of their former range.

Status Summary Marten are extremely rare on the Kenai NWR despite an apparent abundance of habitat and prey, particularly red-backed voles. The only currently known population of marten on the refuge is an apparently small population in a wilderness areas between the Skilak and Russian Rivers. Although marten have periodically been seen in other areas, it is not known whether these are members of a viable population or merely dispersing individuals. Intensive trapping in the past (early 1900's) and poisoning may have exterpated marten over large accessible areas of the refuge. With increasing trapping pressure and access on the Kenai NWR, the probability is high, that the remaining isolated populations may be eliminated and other areas will never be colonized naturally unless reintroductions occur.

Red Fox Red fox also appear to be extremely rare on the Kenai NWR. Trapper harvest reports indicate only 12 foxes have been reported taken on the refuge over the past 23 years. Refuge furbearer harvest reports indicate the following harvests: 1978-79=1; 1975-76=2; 1972-73=3; 1969-70=6. A survey of 88 trappers in 1980, some who had trapped over 20 years of the Kenai Peninsula revealed only 31 (35%) had seen fox or their tracks on th Peninsula. Only 1 reported catching a fox. Areas where more than one sighting took place included the Swanson River/Swan Lake Roads (5), Skilak Lake (4), 1969 Burn (3), Caribou Hills (3), and Tustumena Lake (2).

No obvious trends are apparent in these data other than foxes

have been reported throughout the refuge and the data are biased with the areas of most intensive public use having the most reported foxes. Eleven of the 21 reports (52%) on the refuge have been near large lakes (7) or in alpine areas (7), but this may merely be a result of increased visibility rather than habitat selection.

Red foxes were apparently common on the Kenai Peninsula because the Tanana regularly trapped them took them in deadfalls, and occasionally ate them noting they were especially good in the winter (Osgood 1937). By the early 1920's fox were apparently becoming scarce. Culver (1923) noted that before propagation of foxes was undertaken, "there was a good supply of wild stock on Kenai Peninsula and the trappers were able to secure a fairly good catch each winter." To secure live foxes, propagatos "scoured the hills during the late spring and early summer, raiding every fox den they could locate." He attributed the catching of live foxes to the decline and stated "today (1923) there are very few wild foxes to be found any place on the Peninsula."

In was about this same time that wolves were eliminated on the Peninsula (Peterson and Woolington 1982) and coyotes were becoming numerous (_____). Whether coyote-fox interactions have kept the fox population depressed remains

unknown. Robinson (1961) felt that once coyote populations were reduced in North Dakota, red fox expanded their range excessively. However, in the Flint Hills of Kansas, coyotes, red foxes and gray foxes exist together with no evidence of agonistic behavior between them, and in Colorado, New Mexico, and Oklahoma, swift foxes and coyotes occur in the same area with no apparent conflicts (Gier 1975). Red foxes appear to benefit from wolves by scavenging from their kills (Bjarvall and Isokson 1982). Although foxes and sometimes chased by wolves they usually easily outrun them and have thrived alongside wolves on Isle Royale (Peterson 1977).

JWM 1983 47(3):852. Recent studies in Souther Ontario strongly suggest red fox avoid areas regularly used by coyotes (Voigt and Earle 1983). Separation of fox and coyote was greatest in the spring and summer and least in the winter. Apparently because red fox avoid raising pups in areas where coyote traditionally travel and raise pups. However, because foxes have a broader ecological niche, they can persist in areas where coyotes cannot.

Circumstancial evidence suggests that man, then coyotes, have contributed to the extremely low number of red fox on the Kenai NWR. In the early 1900's, fox appeared to be abundant on the refuge. With the unregulated digging of fox dens and poisoning, fox populations drastically declined by the 1920's. In the 1920's and 1930's, coyotes became established after wolves were exterpated, and increased greatly in numbers and distribution. Because fox populations were already low, they

were unable to occupy their former habitat once given protection because coyotes now occupied their former range. Today, red fox persist only in areas that coyotes do not continuously occupy, but occasional dispersing fox are seen travelling through coyote-occupied areas in the winter. These key areas supporting red fox dens appear to be limited to alpine areas especially those in the Caribou Hills where traditional red fox dens still exist and between Skilak and Tustumena Lakes.

Because fox populations are low and denning areas may be restricted to alpine areas on the refuge it is essential that the few remaining individuals be given adequate protection on the refuge. For example, one area on the refuge where fox have been periodically reported over at least 20 years is the Caribou Hills. It is also the only known area where fox dens occur. Perhaps supporting less than 3-4 pairs of fox, they could easily be overtrapped.

Status Summary Red fox once common are extremely rare on the Kenai NWR, probably because of intensive exploitation by man in the early 1900's and subsequent occupying of their former habitat by coyotes. Now, red fox appear restricted to areas not permanently occupied by coyotes. Alpine areas, especially the Caribou Hills areas, appear to provide denning and rearing areas for an unknown but apparently small number of fox. With increasing trapping pressure and access on the Kenai NWR, there is a high probability

that all remaining isolated populations of red fox, may be eliminated. As long as the coyote population persists on the refuge, it is unlikely that red fox will significantly increase in the near future.

Wolverine Wolverine are uncommon on the Kenai NWR and appear to be restricted to the rugged subalpine and alpine habitats in the mountainous eastern region of the refuge. Although wolverine are periodically observed in the lowlands less than 5 reports have been received from the lowlands in the past 7 years. Since all wolverine reported captured by trappers, have been taken in remote or mountainous habitats to the east, it is highly likely that those periodically seen on the lowlands are dispersing individuals or adult males whose huge home ranges may seasonally include a portion of the lowlands.

Because of their extensive movements and scavenging habits, wolverines are especially vulnerable to trapping (Hornocker and Hash). Intensive trapping and perhaps poisoning probably were responsible for the elimination of wolverine throughout much of their former ranges in the continental United States ( ). They are extremely rare in northern Europe primarily because of the confluence of man (Krott 1958, Mypberget 1970.

Trappers have reported taking wolverine/year on the refuge with a 23 year average of wolverine/year. It is unknown what proportion of the refuge population this represents. Our best estimate is that there is 1,007 km^2 of prime wolverine habitat on the refuge (Table). It is likely

that the density of adult wolverines on the Kenai NWR, in prime wolverine habitats, is similar to that in the Nelchina Basin, or 1 wolverine per 136-248 km^2 (Gardner and Ballard 198). Thus, the refuge may support a resident population of between 4-7 adult wolverine in prime habitat. If we assume wolverine avoid clear-cut and recent burns (Hornocker and Hash) there is 4,500 km^2 of marginal mainly lowland habitat where densities are probably at best 50-70% lower (table). This increases the estimated total refuge population to a maximum of 23 adults wolverine.

If we assume an equal adult sex ratio, and the approximately 12 adult females, would produce an average of 3.5 young (Rausch and Pearson 1982) per year there would be a maximum of 65 wolverine prior to the trapping season. A minimum population of 9 adults would result in about 27 wolverines prior to trapping. If the actual population is somewhere between thee two extremes, or about 46 prior to the trapping season. The 1 to 14 wolverine ????/year thus represents about 2-30% of the estimated pre-trapping refuge population of wolverine.

Status Summary Observations, harvest by trappers, and densities and favored habitats reported in the literature suggest an extremely low population of wolverine inhabits the refuge. Most of the wolverine appear limited to rugged, remote wilderness areas. Assuming densities are similar to those reported elsewhere , less than 50 wolverine perhaps as few as 23 adults

probably inhabitat the entire 2000 mi^2 refuge. Because of their extensive movements, low population density, attraction to baits and large home ranges, wolverine are especially susceptible to trapping. Because females are nursery young during the latter part of the current 4 month trapping season, capturing females late in the year as such a small population could significantly influence annual recruitment. It is believed that the increase in hunting and trapping and easy access be seriously ?????????

Lynx Lynx have been fairly abundant on the refuge because of the abundance of habitat permanently or periodically favorable to snowshoe hares, their main prey. For example, during the last peak of snowshoe abundance, nearly 250 lynx were taken from the refuge (table). Reports of lynx in the annual refuge narratives and harvest data indicate lynx were particularly abundant in early successional forest and the mountainous zones at timberline.

A dramatic increase (700%) in the value of lynx pelts in the mid-1970's coincided with increased natural mortality on lynx pelts in the mid-1970's coincided with increased natural mortality on lynx and declining productivity because of the decline in snowshoe hare population. This, and the increasing human population on the Kenai lead to an increased harvest of lynx. When snowshoe hare population began increased harvest of lynx. When snowshoe hare population began increasing to the late 1970's and early 1980's, lynx populations, especially in GMU 15A where trapping pressure was most intense, did not respond. Concern over the lack of lynx lead to a refuge proposal to shorten the lynx season during the 1980-81 season.

No action was taken on the proposal. In order to supplement harvest data with other, population-related data and prey data, a refuge study on lynx and snowshoe hares was initiated in 1982 to obtain baseline data.

Results of the study as of 1 May 1984 and comparing lynx population levels now to comparable levels in the 1970's strong suggest that 1) lynx population levels on the refuge and 2) extremely low relative to an abundant snowshoe hare population (up to 2,700 hares/mi^2) 3) lowest in GMU 15A at the northern part of the refuge 4) only a small fraction of potential population levels inhabitat GMU 15A, 5) lynx are especially vulnerable to trapping and 6) released lynx or their offspring comprised a significant proportion (46%) of the lynx harvest in GMU 15A during the 1983-84 season.

Other studies 1) demonstrated high mortality rate among lynx due to trapping (Brand and Kuth 1979, Mech 1980, Parker et al. 1980) 2) strongly suggested trapping mortality is additive to natural mortality 3) revealed lynx are especially vulnerable to trapping (Mech 1980, Parker et al. 1983). During periods of low snowshoe hare abundance few young are recruited into the population for up to at least 4 yeas because of high litter mortality (Brand and Kuth 1979, Parker et al. 1983), few yearling females ovulate (O'Connor 1983) and/or procedure small litters (Brand and Kuth 1979, Parker et al

1983) and natural adult mortality is approximately 10-20%/year and probably related to starvation (D. Britell, pres. comm.)

Because of their low productivity, high mortality rates and vulnerability to trapping especially during low-prey years several investigations (Brand and Kuth 1979, Parker et al 1983, Bailey and Bangs 1983) have recommended that no trapping should occur for at least 3-4 years during low-prey years, that a quota system be implemented to prevent overharvest, that seasons be shortened and held late in the year to increase orphaned young survival and natural refugia closed to harvest be maintained to protect case populations and to provide for breeding and dispersing individuals.

Status Summary - Although lynx habitat is widespread and snowshoe hares are presently extremely abundant of the Kenai NWR, the refuge lynx population, especially north of the Kenai River appears to be unnaturally low. Data from radiotracking marked lynx on the refuge also suggest low population levels and high mortality rates due to trapping. Because lynx pelt value are still high and most of the refuge is accessible to an increasing number of trappers, trapping pressure on lynx, under current management practices, will remain high and continue to suppress the refuge lynx population well below the habitat's potential. The magnitude of this impact will also increase dramatically after the snowshoe population crashes.

Wolf - The history, current status and response of wolves to h harvest on the Kenai NWR has recently been summarized by Peterson et al. 1984: "Wolves (canis lupus) recolonized Alaska's Kenai Peninsula in the 1960's following a 50-year

absence. During 1976-81 wolf ecology and population dynamics were studied in 3-7 contiguous wolf packs on the Kenai National Wildlife Refuge. Sixty-four wolves were captured and radio-collared 87 times; they were located 3,600 times from aircraft. Wolf density ranged from 11 to 20 wolves/1,000 km^2

Typically 1 litter of wolf pups was born annually to the dominant female in each pack. Pups born to a socially subordinate female were growth-retarded and apparently died. One-third of the radio-collared volves dispersed from their original packs. Extraterritorial movements were most commonly undertaken by subordinate adult wolves during the February breeding season. Survival of dispersing wolves was only half that of nondispersers; most dispersers were killed before they could reproduce successfully. Dispersing individuals comprised 27% of wolves taken by hunters and trappers on the study area after open seasons were reinstated in 1974. Mortality was largely human-caused, averaging 33% annually. Harvest increased rapidly, reducing pack size and causing declines in pack territory size. Additional packs developed in vacated areas, and total wolf density was maintained until annual kill exceeded 30-40% of the early winter population. At the close of the study, wolf density on the study area appeared regulated by harvest."

Wolf harvest on the Kenai NWR increased steadily between the first trophy hunting season in 1974/75 and the 1979/80 hunting and trapping season. Although "land-and-shoot" harvest of wolves has sporadically been high on the Kenai NWR, the principal method used appears to be snaring. The proportion of radio-collared wolves harvested on a study area on the northern half of the Kenai NWR increased between 1976 and 1981; 39% of those available were killed in 1980/81. During the 1981-82, 1982-83 and 1983-84 seasons at least 46, 38, and 41 wolves respectively were reported taken from the refuge. Assuming a refuge-wide population of 82 (Peterson et al 1984).

This harvest represents 56%, 46%, and 50% of the refuge wolf population. If the density of wolves in the northern part of the refuge (2,740 km^2) was about 14 wolves (1000 km^2) (Peterson et al 1984) where hunting pressure is high, than about 73% (28), 89% (34) and 60% (23) of the refuge's wolf population was harvested annually in the northern part of the refuge during the 1981-82, 1982-83 and 1983-84 season, repeatedly. If the wolf density in the northern refuge during this period (1981-84) was the highest ever recorded on the Kenai, or 20 wolves (1000 km^2 (Peterson et al 1984), the above reported harvest represents 51%, 62%, and 42% of the that areas wolf population, during the 1981-82, 1982-83, and 1983-84 seasons, respectively. Either method of estimating impact of harvest in the northern refuge indicates current harvest is or has the potential to cause that area's wolf population to decline because Keith (1983), Gasaway et al 1983, Peterson et al (1984) reported harvest in excess of 30% to 40% reduced wolf

numbers. Since natural mortality rates among wolves generally exceed 10%/year (Van Ballenberghe et al 1975; Nueh 1977, Ballard et al 1981), overall mortality rates on Kenai NWR wolves probably exceed 50% and may approach 70% in the northern part of the refuge under current harvest conditions.

(Insert pages (2) on harvest of specific peaks here) (Pgs 6,7)

Because the refuge is surrounded by developed land on the event and because of the 4 mile wide Sterling corridor which projects deeply into the refuge, contact between wolves and domestic dogs are probably frequently. Mortality among at least 2 wolves from distemper following an outbreak in domestic dogs in the North Kenai area (Peterson et al 1984) and the discovery of the dog louse Trichodectes canis among wolves in 1981 strongly suggest that dog-wolf contacts has also had a negative impact on refuge wolves.

The high harvest rate of wolves on the Kenai NWR, especially on the northern refuge, is also having a significant impact on wolf population composition and distribution. Heavy harvest has resulted more but in smaller packs, increased proportions of pups in the population, and smaller pack areas (Peterson et al 1984). Unusual, extraterritorial movements followed the shooting of 7 wolves and disappearance of 3 other of the Swanson River pack in 1978-79.

Most of the remaining wolves were apparently pups. If socially-dominant, or alpha, wolves are removed from packs the overall impact on the remaining wolves appears to be much more severe, including the possible inability to capture large prey (Ballard et al 1981) than if pups are removed. With the reduced pack size (6) of the northern Kenai, and average number of surviving pups in the fall (4), many packs are probably comprised of only the alpha male and female and the current years pups. Loss of one or both of the alpha members could have significant impacts on the remainder of the pack.

Moose wolf ratios on the refuge are well above those where wolves are believed to significantly influence moose numbers. Even if one assumes a refuge-wide wolf population of 82 but only 5,000 moose - the population estimated for only the northern two-thirds of the Kenai Peninsula including the Kenai NWR in - the ratio is over 60 moose/wolf. Even during the year of the lowest moose population estimate (1978=3500) the ratio was 42 moose/wolf. Gasaway et al (1983) believed at less than 20 moose/wolf wolf predation could cause a decline in moose numbers, at 20-30 moose/wolf wolf predation could be controlling factor effecting moose number, and at over 30 moose wolf wolf predation should not stop moose numbers from increasing if they were below ecological carrying capacity and other forms of mortality are not exceptionally great. The current Kenai NWR moose:wolf ratios this suggest wolves are probably not the dominant mortality factor influencing refuge moose numbers.

Harvest of specific pacts

Trapping pressure on various refuge wolf packs has increased since the season was opened in 1974. Packs near the Sterling Highway, Swanson River and Swan Lake Roads, Pipeline Road received the greatest loss to trapping while packs in remote, inaccessible areas received less trapping pressure. Numbers of wolves reported taken - annually by trappers in known pack areas indicate the following ranking order of greatest to least proportion of wolves removed: Point Possession (n=3,k=51%), Bear Lake (n=6,x=39%), Skilak Lake (n=8,34%), Killey River (n=6,x=34%), Swanson River (n=8,x=32%), Elephant Lake (n=3,x=28%), Mystery Creek II (n=4,x=26%), Big Indian (n=3,x=19%), and Mystery Creek I (n=2,x=18%). Some pack areas (Skilak Lake, Bear Lake) have had as many wolves reported taken as known available prior to the trapping season. This suggests some of the harvest is probably wolves not associated with or from an adjacent pack. However, visual observation indicated that in at least one situation (Skilak Lake), the pack was reduced by trapping to only a breeding pair. High individual pack harvest rate, especially if it involves the alpha wolves, is expected to induce social disruption of the pack. Alpha females, the most important member of a wolf pack are sometimes taken in the harvest (Swanson River, Skilak Lake, Elephant Lake packs).

Status Summary Although wolves were once exterminated on the Kenai Peninsula by man, they now are occupying or have the potential to occupy all available refuge wolf habitat. Increasing wolf harvest on the refuge since the first season in 1974 has caused pack size to decrease, increased the proportion of pups in the population and now appears to be annually taking 50% or more of the early winter wolf population with perhaps levels exceeding 50% in the northern refuge. Empirical evidence suggests wolves cannot sustain harvest level exceeding 30-40% without experiencing a population decline. Contracting of diseases and parasites from domestic dogs is also another factor detrimentally effecting the refuge wolf population. Maintenance of a healthy moose population is a prerequisite to maintaining a viable wolf population on the refuge or current moose/wolf ratios suggests wolf predation is not the dominant mortality factor on the refuge moose population.

Coyote Coyotes apparently colonized the Kenai Peninsula in the early 1900's, after wolves were exterpated, and today inhabit all available habitat on the Kenai NWR. Coyotes on the refuge probably naturally fluctuate in numbers with the snowshoe hare cycle with peak coyote numbers occurring during periods of high hare abundance. Refuge harvest of coyotes has fluctuated between a reported take of 5-80 per year (Table) with peak harvest occurring in 1973-74 (58) and 1982-83 (80) and 1983-84 (74+). Assuming there are 4,680 km^2 of coyote habitat on the refuge, 1,217 km^2 of which are early to mid-successional stage forest, the estimated refuge winter coyote population is probably at least 230 (0.05 coyote/km^2), perhaps 460 0.1 coyotes/km^2 (Nellis and Keith) . Highest coyote densities are expected in the 1,217 km^2 successional stage forest.

populations can apparently withstand mortality rates to

age 1 year of 62-67%/annually and maintain stable populations (Knowlton 1972, Nellis and Keith 1976). A refuge harvest of 80 coyotes probably represents an over???? maximum harvest mortality of 17-35%. This approaches the average annual mortality rate (36-42%) for coyotes marked in Alberta (Nellis and Keith 1976). Since these mortality rates appear within those which coyotes can sustain, it is likely that trapping mortality, is not influencing the refuge-wide coyote population, at least when prey is abundant. Continued high trapping mortality when recruitment is low during periods of low food (snowshoe hare) abundance could, however, impact coyote numbers. Given the adaptability of coyote and their ability to increase despite human development, serious overharvest of coyotes on the refuge is unlikely to occur under current harvest levels. Many coyotes are captured in snares and scent post sets appear to be the most successful method of trapping coyote in foot traps on the refuge.

Status Summary Coyotes colonized the Kenai Peninsula in the early 1900's and are widespread and numerous on the Kenai NWR. Coyote numbers apparently fluctuate with the snowshoe hare population and are probably the highest in early successional stage forest. Because of their adaptability and productivity, it is unlikely that harvest is having any significant impacts on the refuge coyote population under current conditions.

Weasel The only data available on Mustela erminea on the refuge is reported harvest which annually varies between 2-149 (Table) with maximum numbers trapped during years of peak snowshoe abundance (1973-74). Nothing is known about weasel densities on the refuge although it is expected that weasel population densities fluctuate considerably with annual changes in small mammal abundance and different habitats.

Since most weasels are probably trapped incidentally in traps set for larger carnivores, other pelt value is relatively low, and their densities are probably relatively high compared to the larger carnivores, trapping is believed to have little significant impact on the refuge-wide population. Since it appears most weasels on the refuge are captured in foot traps set in cubbies or at exposed baits, any trapping changed regarding these trapping technique should influence weasel harvest.

Status Summary Although little is known about weasel populations on the refuge, most weasels are incidentally captured in set made for other furbeareres. Because of their presumed, relative high densities and the fact that few, if any, trappers specifically trap for weasels, the impacts of trapping on the refuge weasel population is presumed to be insignificant.

Otter Because otters are extremely difficult to census, little is known about the otter population on the Kenai NWR. Most reported studies of otter have been in marine, highly productive lake, or stream habitats. Since most of the lakes on the refuge are generally of low productivity, attempts to

extrapolate otters densities from other areas may not be meaningful unless data is available on the otters diet and composition of refuge prey population. Frequency of otters sign in the snow on the refuge suggests the best refuge otter habitat occurs along streams and several large lakes connected to the streams especially the Swanson River, Moose River, Chickaloon River and smaller streams such as Miller, Seven Egg, Swan and Pincher Creeks. Densities of otter along streams in Sweden averaged 1 otter/5km of stream (Erlinge 1968), and in Idaho Melquest and Hornocker (1979) estimated similar densities (1 otter/2-3 straight-line stream distance) but only 1 adult male/20-30km of stream. If otter densities are similar on the refuge and streams are the prime otter habitat on the refuge then the 469 km of prime stream habitat should support approximately 100 otter. If we increase this estimate another 30% to include land-locked lakes or lower quality, then the refuge should support about 130 otter.

Northern otter populations are susceptible to overharvest because of the fact that they travel extensively, up to 16 km overnight (Erlinge 1967), and in the restricted avenues provided by watercourses. The impact of even a single knowledgeable trapper may severely effect local populations (Toweill and Tabor 1982). Because of this, these authors recommended conservative management policies to assure the maintenance of healthy and viable populations. Since many

otter are trapped in beaver sets or trapped incidental to beaver regulations affected beaver harvest should indirectly influence otter harvest.

Although the impact of harvest on refuge otter populations are unknown, an annual harvest of 3-32 otters suggests this may represent 2-25% of the population. Like most furbearer harvest, the highest otter harvest occurs in the readily accessible northern part of the refuge particularly in the Swanson and Moose River and several smaller drainages, otters may be periodically overharvested on the refuge, but have been able to recolonize those areas from adjacent, less-intensively trapped areas. Should trapping pressure on otter increase, it is probable that these lightly-trapped areas could also be depleted of otter. These impacts would then be felt over a much larger area.

Status Summary Because otter are different to census little is known about their population status on the refuge. Comparisons to other areas suggests refuge stream habitat assumed to be the prime otter habitat on the refuge, should support about 100 otter, or the entire refuge about 130 otter. Because otter are susceptible to overharvest because of their extensive movements are restricted travel corridors, a conversative harvest policy appears appropriate.

Table . Reported harvest of otter on the Kenai NWR, 1977-84.

Location	Year						
	1983-84	1982-83	1981-82	1980-81	1979-80	1978-79	1977-78
Northern Refuge							
Kenai River		4		1	2	1	2
Beaver Creek				4			
Moose River		4	5	1	3		
Killey River		3			1	1	
Swanson River		3	9	10	6	1	4
Chickaloon River			3	3		1	
Others[1]		4	3	9	1		
Central Refuge							
Kasilof/Tustumena			4	2	2		3
Unknown			2	1	2	4	
TOTAL		18	26	31	17	8	9

[1] Otter Creek, Miller Creek, Seven Egg Creek, Bishop Creek, Pincher Creek

Little is known about mink populations or their ecology on the Kenai NWR. Mink harvest has fluctuated between _____ - _____ over the past 20 years, with a general increase in harvest, from 25 to 204 between 1978-79 and 1982-83. Since mink do not appear to suffer significant mortality due to predators others than man (Linscombe et al. 1982), trapping is assumed to be the dominant form of mortality of mink on the refuge. However, the extent to which trapping mortality influences population levels is unknown (Linscombe et al. 1982).

In northern areas where mink densities are relatively low compared to more southern latitudes, mink populations could be overharvested if some sort of quota system is not used. Because of this many wildlife managers in Canada have concluded that an imposed quota on registered traplines maintains are more stable annual mink production. Without this quota, overtrapping may cause lowered annual production (Linscombe et al. 1982).

Several harvest trends are apparent on the refuge. First, the number of mink taken from the refuge is increasing with an 8-fold increase between 1978-79 and 1982-83. Second, most of the increased harvest is coming from the Kenai River, Swanson River, and Kasilof River drainages. Since refuge mink population densities are unknown and the general impacts of trapping mortality on mink population (evils are unknown, a conservative management approach appears to be appropriate in those areas on the refuge where mink are now being intensively trapped. The Canadian management strategy for mink would also

appear appropriate for the Kenai NWR.

Status Summary Little is known about mink population densities or ecology on the Kenai NWR. Harvest data indicate nearly a 8 fold increase in number of mink taken between 1978-79 and 1982-83 when 204 were trapped. Most of the increased take is occurring along the Kenai and Swanson Rivers. Many Canadian managers recommend a quota system on registered traplines to prevent overharvest and to maintain a stable annual production. A similar strategy appears appropriate for the Kenai NWR.

Muskrat Because of the general low productivity of many of the lakes and ponds on the refuge, it does not appear to support high muskrat populations densities reported in the more southern latitudes (Errington 1948). Although certain shallow lakes with irregular chorelines appear to support high densities of muskrats. Other lakes appear to support very few, if any, of these furbearers. Perhaps the most productive muskrat area is the Upper Swanson River drainage where up to 115. or 50% of the total refuge harvest occurs. Thus, most of the refuge harvest is concentrated in a relatively small area in one drainage of the refuge. The second-most productive area on the refuge is the Moose River drainage where up to nearly 100 have been reported taken per year.

presumably released) each year on the refuge, and over the past 5 years, between 2-5 incidents of bald eagle injured in traps per year have been reported. Similarly, at least 206 incidents of moose being captured in snares occur each year and in the past 2-3 years, 1-3 instances of dogs being captured in snare on or adjacent to the refuge have been reported. Although it is difficult to prevent squirrels and hares from becoming trapped, many states have prohibited the use of exposed bait sets or have established minimum distances between traps and exposed baits to reduce the number of non-target birds being captured especially raptors including the golden and bald eagles. Although attempts have been made to educate trappers in regards to setting snares on the refuge, the number of moose accidentally captured in snares does not appear to be declining.

Furbearer Conservation and Trapper Management Issues

Furbearer conservation and trapper management issues on the Kenai NWR may be grouped under three major categories; 1) biological 2) humane and sportsmanship and 3) administrative issues. The biological issues focus on the maintenance of required habitat for furbearers and viable populations. Habitat requirements are generally addressed in the Kenai Comprehensive Conservation Plan and may be summarized as follows: maintenance of existing water quantity and quality on the refuge should insure adequate key habitat for aquatic furbearer; provision of early-forest succession stage should

provide required habitat and prey populations for beaver, lynx, coyote, weasel, and wolves; maintenance of mature, especially coniferous forest should provide habitat for marten, and maintenance of undisturbed alpine and subalpine habitat should provide habitat for wolverine and red fox. These habitat requirements have either already been addressed in the (KCCP) (aquatic, mature forest, and alpine) or will be addressed in the habitat-moose-wolf management plan.

Issues regarding viable populations and harvestable surpluses of furbearers on the refuge may be summarized from Section II as follows:

1. The refuge does not currently support large, healthy (viable) population of marten or red fox capable of producing harvestable surpluses.

2. The harvestable surplus of wolverines is probably negligible or at best extremely low on the refuge because of their low population density and habitat selection

3. Human-caused mortality on lynx on the refuge appears to have exceeded annual recruitment into the population since the last snowshoe hare population peak in the mid-1970's. Current refuge lynx populations are depressed below the habitats' and prey bases' potential, especially north of the Kenai River.

4. Human-caused mortality on wolves is usually at, and periodically exceeds, levels which would cause a reduction in

wolf numbers. Intensive harvest has reduced pack sizes and apparently disrupted the social structure of various packs. Harvest is most intense in accessible packs use the northern refuge and on the south side of Skilak Lake.

5. Beaver densities appear relatively low on the refuge, perhaps because of habitat quality. Refuge-wide harvest may be periodically exceeding annual recruitment, localized harvest may be reducing populations in some areas, and there appear to be a number of roadside lakes or lakes in the canoe systems which have in the past supported, or could support, beaver colonies.

6. Although little is known about otter densities on the refuge, their numbers are probably relatively low. During same years harvest may be exceeding annual recruitment and certain areas are trapped more intensively for beaver and/or otter than others.

7. Populations and ecological data is lacking for the majority of furbearer species on the refuge and on the impact of trapping on their numbers.

8. An unknown number of non-target species are captured in traps and snares on the refuge each year. The biggest impact

may be on raptors especially bald eagles, which are attracted to exposed baits. Moose and dogs are periodically captured in snares.

Several humane and sportsmanship issues are relevant on the refuge:

1. Because of the remoteness of some traplines and/or distances between trappers and traplines, some traplines can be checked only once weekly.

2. Instance have recorded where traps and snares have been left set in the field after seasons have closed. Wolves, coyotes, and black bears have been found dead or their remains in snares.

3. While all big game species are protected from shooting the same day airborne on the refuge, furbearers, especially wolves which occur at densities much lower than the big game species may still be shot the same day airborne.

4. Conflicts between trappers and non-trappers and competition for trapping areas between trappers is increasing as the numbers of free-use trapping permits increase. Complaints about disturbance on traplines such as checking and setting off of traps and snares, setting traps close to another trappers traps, and the stealing or traps, snares, and furbearers is increasing.

An administrative/law enforcement issue relative to trapping on

the refuge is:

1. Accountability is lacking on the refuge in regards to who traps certain areas and whether traps and snares are set, attended and collected in accordance with state and refuge regulations.

4. Trapping on the Refuge

Relatively few trapping permits, between, 16-30, were issued to trappers prior to 1967-68 because of the low human population density and difficult access (Table) at that time the refuge was subdivided into trapping units which were allocated to trappers. Because of the lack of demand for trapping on the refuge and the changing economic situation on the Kenai Peninsula, this system was abandoned in favor of a free permit, trapping system, in 1967-68. Currently there is no limit to the number of trappers, traps or snares on the refuge nor is there any attempt to distribute trappers to minimize their impacts on furbearers, each other, or other refuge users.

With the increasing human growth on the Peninsula since the 1970's, and the increasing use of aircraft, snowmobiles and dog-teams to trap once-remote areas, trappers began to have greater impacts on refuge furbearer populations. Today, the average number of trapping

permits issued is 5 times greater, usually over 100/year, than when the free-permit system was first initiated. The number of trapping permits issued generally parallels borough population growth (Bailey 1981a) with the majority of trappers from the Soldotna-Sterling and Kenai areas. Usually less than 10% of the trapping permit holders are from Anchorage. Most trappers (67%) in a 1977 survey indicated they trapped for the outdoor experience and for personal enjoyment (Bailey 1981b). Less than 10% claimed that trapping furbearers was the sole source of income.

Because of its relatively easy access by road, snowmobile and aircraft, the majority of trappers ( ) trap in the northern part of the refuge in Game Management Unit 15A. In some areas along the Swanson River and Skilak Loop Road, for example, up to 15 trappers desire to trap in the same region. This has led to increased number of sets and competition between trappers for locations to set traps. Furthermore, with the increase in other refuge users such as snowmobilers, winter hikers, cross-country skiers, ice fishermen, and small game hunters, there has been an increase in the number of people coming into contact with the increasing numbers of traps. This has resulted in a gradual but steady increase in the number of complaints by trappers having their traplines disturbed, traps stolen, or furbearer stolen. The 1977 survey (Bailey 1981b) indicated that 40% of the trappers had their sets visited by other people and 27% had their traps stolen. Conflicts between trappers however appear to be lower, about 6% of those interviewed, than conflicts between trappers and non-trappers. Finally, those trappers over 10 years of experience and fewer traps and furbearers stolen (37%) than trappers with 5-10

years of experience.

The distribution and intensity of trapping on the refuge, if any, where individual, widely-ranging furbearers such as wolverine, wolves, lynx and otter are not crossing 1-10 traplines. Minimum trapping effort based on an incomplete response on refuge furbearer harvest reports indicate an increase in the number of trap nights from about 78,000 in 1980-81 to 213,500 in 1982-83. During the 1982-83 season, the average trapper had 31 sets out for 57 days.

The leghold trap is the most popular type of trap used by refuge trappers (89%) for land furbearers followed by snares (38%) and killer-type traps (29%). The most common land sets made are bait sets (82%), trail or blend sets (47%) and scent sets (40%). Trappers use leghold traps (68%) and killer-types (57%) about equally often for aquatic furbearers and catch most aquatic furbearers in trail (60%) or bait (57%) sets. The majority (68%) of trappers trap under the ice for aquatic furbearers. The type of trap and sets used by trappers on the refuge varying with their experience. Trappers with more than 10 years of Alaskan experience trapping used snares, made sets for land furbearers in trails, and made baits sets for aquatic furbearers under the ice more often than trappers with less Alaskan experience (Bailey 1981b).

Another technique used primarily to take wolves on the refuge is to locate them by aircraft, land nearby or intercept them, and shoot when the wolves are in range - no traps are involved. This "land-and-shout form of trapping can be highly efficient if snow tracking conditions are good (i.e. frequent snowfall) and if the hunter/observers are skilled in aerial tracking. Locating and tracking wolves in the northern refuge is enhanced by thousands of open frozen lakes and bogs. The success of this technique has varied with snowtracking conditions and persons using the technique. During winters of low or infrequent snowfall, few, if any, wolves are taken by land-and-shoot trapping. During one"optimum" winter (1978-79), 2 permit holders took 13 of 32 (41%) wolves from the refuge. Most of these wolves (6-9) were taken from 1 packs. After the shooting, the pack social structure was disrupted and the remaining pack members (4) travelled about erratically into adjacent pack territories (Peterson et al 1984). Although this technique can apparently be highly efficient on wolves, most wolves on the refuge are taken in shares (Peterson et al. 1982).

The principal modes of access by trappers on the refuge between 1977-78 and 1981-82 have been snowmobile (35%), wheeled vehicle (32%), aircraft (26%), walking (4%), and dog teams (2%). During this period, trends indicated the use of snowmobiles, increasing; vehicles; stable; aircraft, decreasing; waling and dog teams; stable. Trappers using aircraft usually take a high proportion of beaver, because lodges are readily visible from the air, and a high proportion of otter. Trappers using snowmobile take most of the coyotes, wolverine, lynx and muskrat and those using vehicles most

of the mink and weasel. Wolves were taken about equally after (25%) by trappers using aircraft, snowmobiles and vehicles (Bailey 1981a).

The attitudes of trappers using the refuge in 1977 was summarized by Bailey (1981b).

The results of this survey suggest that trapping may be considered by many to be an attractive aspect of Alaskan adventure or the Alaskan life style. The apparent high turnover rate of trappers each year as measured by the number of persons obtaining permits for th lst time and by previous permit holders failing to renew permits indicate that many people have little success trapping on the refuge. The fact that nearly 1/4 of all trappers had no previous trapping experience and that 34 percent had not trapped previously on the refuge suggests that many people trap for the lst time on the refuge. Unsuccessful and nonrepeating trappers appear to be replaced annually by newcomers. An estimated 1 of every 340 persons on the Kenai Peninsula obtained a refuge trapping permit during the 1977 - 78 season.

The wolf apparently plays a significant role in influencing the attitudes of refuge trappers. One-half of the trappers on the refuge considered the wolf the most difficult species to trap and some believed wolves were too abundant. This attitude probably stems from an ongoing controversy regarding wolves on the refuge and

their influence on the refuge moose population that was once larger (because of other ecological factors in addition to predation). It appears that it is a challenge to many trappers to capture a wolf and to do so (in their opinion) enhances their prowess as outdoorsmen. Others may feel that they are improving the moose-wolf relationship by reducing the number of wolves.

The contrast between groups of trappers based on their years of Alaska trapping experience was informative. The majority of trappers with the most trapping experience believed furbearer populations were in balance with the food supply, favored additional regulations (if needed) to protect furbearers, felt trapping pressure may have been excessive on some species (especially lynx) and as a group were most likely to accept changes in trapping procedures. Trappers with 5-10 yr of Alaska trapping experience generally had quite different attitudes than the more experienced trappers. They were the least likely to believe furbearer populations were balanced with the food supply, did not as a majority favor additional regulations to protect furbearers, did not feel trapping of certain species was excessive, and were the least satisfied with the current trapping conditions. As a group, they believed wolves were too numerous, perhaps because they could remember when wolves were less numerous and still recolonizing their habitat on the Peninsula.

Trappers with less than 5 yr experience were more likely to believe in balanced furbearer populations, favored protection of furbearers (if needed), were more satisfied with the current trapping conditions, but did not believe trapping pressure was excessive on

long-haired furbearers. Less experienced trappers were more apt to use killer-type traps for aquatic furbearers and favored blind or trail sets for aquatic furbearers. More experienced trappers favored leghold traps but used snares more often than less experienced trappers.

In summary, it appeared that trapping is an important part of Alaskan lifestyle and most trappers on the refuge were concerned about the status of most furbearers on the refuge and favored steps to protect species from the potential adverse impacts of trapping if they could be convinced of such a need. The wolf appeared to be an exception, probably because of its perceived role as a predator on moose which are still a significant source of food for some trappers. The wolf was apparently viewed as a predator competing with man rather than as a traditional furbearer. Although most trappers identified various problems which in their opinion interfered with the enjoyment of trapping on the refuge, the majority did not favor any change in trapping procedures which might reduce their opportunity to experience that enjoyment.

WHERE'S NUMBER III? ISSUES AND PROBLEMS

IV. GOALS, OBJECTIVES AND STRATEGIES

The purpose of this plan is to have and maintain a furbearer program on the refuge which meets refuge objectives, is based on scientific

principles of wildlife management, protects refuge furbearer populations, is humane as much as practical, and reduces conflicts between trappers and between trappers and non-trappers on the refuge. This plan is designed to meet the following goals:

Goal 1. To conserve refuge furbearer[1] populations and their habitats in their natural diversity.

Goal 2. To provide opportunities for public use[2] of refuge furbearers in a manner consistent with Goal 1.

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[1]Marten, red fox, wolverine, lynx, wolves, coyotes, short-tailed weasels (ermine), beaver, otter, mink, and muskrat.

[2]Trapping, viewing, listening, interpretation, tracking, photography, and environmental education.

Specific objectives of this include to:

1. Maintain and re-establish, if necessary, viable populations of furbearers on the refuge.

   1a. Allow furbearers in refuge wilderness areas to develop natural social structures where natural mortality and dispersal are the dominant forms of mortality and mode of regulating furbearers numbers.

   1a(1) Insure that mortality from trapping is less than or

equal to natural mortality rates and that trapping is not removing a greater proportion of the population than can be replaced annually under natural reproduction.

1a(2) Maintain habitat and prey populations for furbearers by habitat management practice which duplicate natural fire regimes and which are in accordance with accepted practices for wilderness management.

2b. Monitor and adjust furbearer and prey numbers and habitat to achieve desired predator:prey ratios and/or habitat conditions in non-wilderness areas of the refuge.

1b(1) Maintain a wolf:moose ratio of at least 1 wolf per 30 moose, during the late winter, in intensively managed zones on the refuge.

1b(2) Reduce wolf numbers in intensively managed zone when annual monitoring over a 2 year period indicates the area's wolf population is exceeding the above desired ratio.

1b(3) Regulate harvest of moose and other prey to insure sufficient surplus for wolf and other furbearer population needs.

1b(4) Provide for early and mid-successional stage, forest habitat conditions to insure that those furbearers dependent on small mammals, snowshoe hares, and moose have an adequate food supply. Fire will be emphasized as the principle method of habitat manipulation in non-wilderness zone of the refuge.

1c. Allow furbearers in the Special Management Area to fluctuate naturally in numbers and distribution while enhancing their habitat conditions if needed or desired for wildlife viewing opportunities.

1c(1) Minimize man-caused mortality of furbearers by closing area to hunting and trapping.

1c(2) Provide an adequate prey base for furbearers by closing area to hunting and trapping.

1d. Provide increased furbearer viewing opportunities on other intensively used public use areas of the refuge.

1d(1) Manage beaver and other aquatic furbearers for maximum viewing opportunities in selected lakes, ponds and/or streams immediately adjacent to the Swanson River and Swan Lake Roads.

1d(2) Manage beaver and other aquatic furbearers for maximum viewing opportunities in selected, intensively-used and popular National Recreational Trails in the Swanson River and Swanson Lake Canoe Routes.

1e. Protect marten and red fox by minimizing man-caused mortality

on remnant populations on the refuge until their status and abundance on the refuge is known or until healthy populations are re-established on the refuge.

1e(1) Minimize the intentional and incidental catch of marten and red fox to protect existing populations and to provide possible sources for re-introduction.

1e(2) Re-establish marten in suitable refuge habitat and protect and maintain adequate marten habitat.

1e(3) Re-open refuge to marten trapping in accordance with objectives 1a or 1b once marten population are viable and producing harvestable surplusses.

4. Obtain accurate information on furbearer numbers, distribution, population trends, prey requirements and limiting factors on the refuge with priorities on status-uncertain species (marten and red fox) and low-density, vulnerable species (lynx, beaver, wolverine, wolf and otter).

3. Provide for a furbearer public use program consistent with those under objectives 1 and 2.

2 Provide for a refuge trapping program consistent with objectives 1,2 and 3.

TRAPPING PROGRAM DESCRIPTION (Objective 1,2,3)

In conformance with the general conditions applicable to trapping on National Wildlife Refuge Lands the following conditions will also be applicable on the Kenai National Wildlife Refuge:

1. State and Federal requirements. Trapping will be done in compliance with State game laws and regulations, and may be further restricted by general and special conditions of the refuge Special Use Trapping Permit. Permittees shall also comply with all other regulations and conditions affecting access and use of the National Wildlife Refuge.

2. Trapping permits. Any person exercising the priviledge of trapping furbearing animals with National Wildlife Refuge boundaries shall be in possession of a valid trapping license issued by the State in which trapping is done and must possess a Special Use Trapping Permit issued by the refuge manager. Trappers shall carry such State trapping license and refuge trapping permit while trapping, and when requested to do so shall exhibit them to any Federal or State agent authorized to enforce the game and fish laws of the State and of the United States. Permits are not transferable.

   The refuge manager may at any time, before or during the trapping season, half or limit trapping on the refuge or any portion thereof. Conditions of the permit may be modified as needed. Any changes will be made by an addendum (signed by both the issuing officer and the permittee) which should be attached to, and becomes a part of, the permit.

3. Approved types; trap inspection and removal. Fur animals authorized

to be taken on the refuge may be taken only by methods approved by the refuge manager.

Trap types, sizes, sets, baits, scents and locations will be selected to minimize the taking of non-target species.

Use of steel leghold traps having teeth or spiked jaws is prohibited.

Snares set on land must be equipped with effective locking devices. Slide locks are required for all leghold traps and snares used as water or shore drowning sets.

No person shall place, set, or maintain a trap or snare within 30 feet of sight exposed bait. "Sight exposed bait" means any portion of bait which is visible to the human eye at a minimum distance of 30 feet from any angle. "Bait" includes flesh, fur, hide, entrails, or feathers. Persons using bait may be held responsible should the bait become exposed for any reason.

The possession or use within the boundaries of the refuge of any trap or device by which furbearers may be taken that does not comply with State and refuge requirements is prohibited. Any such illegal traps or devices found on the refuge may be seized and retained by the refuge manager.

Identification tags (showing at least the name of the permittee) must be attached to each trap and snare used on a refuge.

Permittees are required to visit and inspect each trap set at least once every 72 hours, unless specifically waived by the refuge manager.

4. Use of vegetation. The permittee may cut on the refuge for use in trap sets only such species and amounts of brush or timber as the refuge manager shall designate.

5. Tending another person's traps. No person may attend another person's traps or trapline unless specifically authorized by the refuge manager.

6. Non-target species. Every effort will be made to prevent the capture of nontarget species. However, if birds and mammals other than those authorized are found alive and in satisfactory condition in the traps, they shall be immediately released or in the case of bald eagles turned in alive to the refuge manager. Birds and mammals found dead or seriously injured in the traps shall be disposed of as designated by the refuge manager.

7. Reports. Permittees shall submit a report (or reports) of traptake, of both target and non-target species, as required by refuge special conditions. The capture of all non-target species, regardless of condition, will be reported. Trappers should also promptly report the presence of diseased animals to the refuge manager.

8. Penalties. Failure of a permittee to comply with any of the

trapping provisions or with any applicable Federal or State law or regulation may be sufficient cause for refusal of future permits to trap on the refuge or for refusal of any other use or privilege on the refuge for which a permit may be required.

The permit may be revoked or suspended by the issuing officer for just cause, such as violation, non-compliance with permit conditions, or non-use (Title 50 CFR 25.43).

Permittees who wish to appeal adverse decisions should follow the appeals procedures designated in Title 50 CFR section 25.44 as amended (42 FR64120, December 22, 1977).

9. Damages. The United States shall not be responsible for any loss or damage to property including, but not limited to, animals and equipment; for injury to the permittee, partner or assistant; or for damages or interference caused by wildlife or employees or representatives of the government carrying out their official responsibilities.

In addition to the above general condition, the following conditions shall be specific to the Kenai National Wildlife Refuge.

1. Hand-and-shoot - trapping of furbearers is prohibited.

2. The use of any electronic device by a permittee to locate furbearers is prohibited.

3. Permittees shall report and return to the Kenai National Wildlife Refuge, within 48 hours, any marking devices (ear tags and radio collars) found on trapped furbearers.

4. Trapping is authorized on the Kenai National Wildlife Refuge only in those areas designated by the refuge manager.

5. Permittees are not authorized to trap marten or red fox on the refuge.

6. Beaver and otter may not be taken or leghold traps larger than No. 1 1/2, killer traps larger than or snares be used in lakes along the Swan Lake and Swanson River National Recreational Trail System, lakes connected by public trails to and within 1/2 mile of the Swanson River and Swan Lake Road, and on lakes with established public use or tent camp, (excluding Skilak and Tustumena Lakes) unless specifically authorized by the refuge manager.

7. Permittees are not authorized to trap lynx nor make cubby sits on any portion of the refuge north of the Kenai River unless specifically authorized by the refuge manager.

Other objectives of the trapping program will be accomplished by the following actions:

River Road and south of the Swanson River (Zone A-Fig. __) and the Swanson River upstream from the Swanson River Campground to McClain Lake Creek Inlet (Zone B), the refuge will be divided into designated trapping areas. These exceptions will be open trapping areas.

2. The refuge will issue an unlimited number of permits to trappers in Area A during regular trapping seasons.

3. The refuge will issue an unlimited number of permits to take muskrats only in Zone 5 between March 15 and June 10.

4. Each designated trapping area will have the following quotas:

a)

Species	Numbers	All Designated Areas
Beaver	1/active col/year	Dependent on beaver population
Otter	1/area/year	30
Wolverine	1/mountainous area/year	15
Wolf	2/area/year	60
Lynx	5/area/year[1]	150
Coyote	none	
Weasel	none	
Mink	none	
Muskrat	none	

[1] Only during year of high snowshoe hare abundance

b) Once a quota has been reached for a selected species in an area, trappers will be expected to alter or eliminate, for that particular season, the type of sit commonly used to capture the target species (Example: A trapper uses snares in trails to capture wolves; once two wolves are taken, trail sits will no longer be used, or a trapper uses cubby sets to capture lynx; once 5 lynx are taken, cubby sets are

no longer used that particular year).

c) Incidental catches exceeding the quotas will be changed against the next season's quotas for that area regardless of who traps the area.

5. Each designated trapping area will be allocated to a trapper who may or may not select one trapping partner or apprentice trapper to trap the area with him or her.

6. Allocation of designated trapping areas will be accomplished in the following manner.

a. Trappers may apply for k area only by filing an application at the Kenai NWR headquarters.

b. Each trapper applying for an area will be given up to 10 points, 2 for each year they actually and previous trapped primarily in the same unit. Each "point" will coincide with a "chance" to draw his or her name. Past trapping areas will be based on areas previously indicated or refuge permits.

c. The final date for application shall be 10 Oct 84.

d. Trappers will be selected by a random drawing on 15 Oct 84

e. Areas will be re-allocated every 3 years.

OR

a. Trapping areas will be allocated to the highest bidder.

b. A trapper may bid on one area only.

c. Bids must be received by 10 Oct 84.

d. The highest bidder will be allocated the specific trapping area on 15 Oct 84.

e. Areas will be re-allocated every 3 years.

7. Each trapper allocated a trapping area:

a. Must notify the refuge manager if he or she chooses to select a trapping partner within 5 days. Name and address of trapping partners will be provided to the refuge manager.

b. Will be solely responsible for conforming with and

insuring his or her partner conforms with the stipulations of the trapping permit.

c. Will report the capture ????? wolverine, lynx, otter and wolves to the refuge manager within 72 hours of capture unless specifically waived by the refuge manager.

d. Will be unable to apply for another designated trapping area for 3 years following any year he or she fails to abide by the conditions of the refuge trapping permits and will immediately lose all trapping priviledge on the refuge until the following trapping season.

8. Open and designated trapping areas are shown in Figure __ .

9. Trappers in open areas who fail to abide by the stipulations of the refuge trapping permit will immediately lose all trapping priviledge on the refuge for one year and be unable to apply for a designated area for 3 years.

10. Should a trapper desire to give up his designated trapping area or if he or she or their partner fails to abide by the stipulations of a designated area trapping permit, the area will be allocated to another trapper for the remainder of the 3 year period.

I. FURBEARER INFORMATION GATHERING PROGRAM

1. Information will be gathered on the following furbearers in the following priorities.

   1) Population distribution, status, densities and movement of lynx on the refuge.

   2) Population distribution, status, densities, and movements of marten on the refuge.

   3) Population distribution, status, densities, and movements of red fox on the refuge.

   4) Population distribution, status, densities, and movements of wolverine on the refuge.

   5) Population distribution, status, densities, and movements of otter on the refuge.

2. In addition, routine monitoring of wolf numbers, pack size and pack distribution will be accomplished by radio telemetry on the refuge an active beaver colonies will be censused every 1-3 years.

VII. FURBEARER RE-INTRODUCTION PROGRAM

Marten will be introduced into suitable refuge habitats if further studies indicate the habitat is suitable and marten are absent.