

FURBEARER HARVEST PROJECT

1991-92 Progress Report

GAAR-92-003
November 16, 1992

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Abstract: Red fox (Vulpes vulpes), wolverine (Gulo gulo), and lynx (Lynx canadensis) carcasses and marten (Martes americana) were purchased from trappers operating in and near Gates of the Arctic National Park and Preserve during the 1991-92 trapping season to collect information on furbearer populations. Sex ratios for harvested marten and wolverine were biased towards males. Juvenile animals composed over 60% of the red fox and wolverine harvests. Over 30% of the juvenile red fox and lynx females were reproductively active. Based on the sex and age structure, reproductive information, and body condition, furbearer populations in the park and preserve vicinity appear to be healthy and able to sustain current harvest levels.

INTRODUCTION

Gates of the Arctic National Park and Preserve has purchased furbearer carcasses [arctic fox (Alopex lagopus), coyote (Canis latrans), lynx, marten, red fox, and wolverine] from trappers working in and near the park and preserve since 1987. Carcass data has been used to monitor the harvest levels in the park and preserve area and to examine the health of the furbearer populations as reflected by the sex and age distribution, reproductive information, and physical condition. Furbearer harvest information from 1987-88 was presented by Golden (1988) and furbearer data from 1988-1991 was summarized and discussed by Swanson (1991). This report summarizes data collected during the 1991-92 trapping season.

STUDY AREA

Gates of the Arctic National Park and Preserve is located above the Arctic Circle in the central Brooks Range, Alaska (Fig. 1). The 33,182 km² park and preserve unit spans 2 climate zones: the subarctic zone at low altitudes south of the Brooks Range and the arctic zone to the north. Precipitation is low within the park and preserve, ranging from 30 - 46 cm in the west to 13 - 25 cm in the north. Snow falls average 152 - 203 cm in the south and 89 - 127 cm in the north. Temperatures in the south fluctuate from average July maximums of 18 - 21° C (65 - 70° F) to average January minimums of -29 - -34° C (-20 - -30° F). Temperatures in the north fluctuate from average July maximums of 13 - 18° C (55 - 65° F) to average February minimums of -21 - -23° C (-5 - -10° F) (National Park Service 1986).

Boreal forest, tundra, and shrub thickets are the major vegetation communities in the park/preserve (National Park Service 1986). The dense boreal forest south of the mountains, composed of black spruce (Picea mariana), white spruce (P. glauca), paper birch (Betula papyrifera), aspen (Populus tremuloides), and balsam poplar (Populus balsamifera), extends into the southern flanks and valleys of the Brooks Range. Boreal forest is replaced at treeline by shrub birch (Betula spp.), willow (Salix spp.), and alder (Alnus spp.) thickets. Dense willow/alder thickets occur along stream channels and gravel bars at lower elevations. Alpine tundra is found at higher altitudes and on dry ridges and contains low-growing willow, Dryas spp., Saxifraga spp., and lichens. Moist tundra, composed primarily of cotton sedge (Eriophorum spp.), forms in moderate to poorly drained soils in the foothills, mountainsides, and river valleys.

METHODS

Letters notifying trappers of the furbearer carcass project and carcass purchase program were sent to trappers in October 1991. Prices paid for carcasses were: fox (arctic or red)--\$5.00, lynx--\$10.00, wolverine--\$10.00, and marten heads--\$3.00 for the first

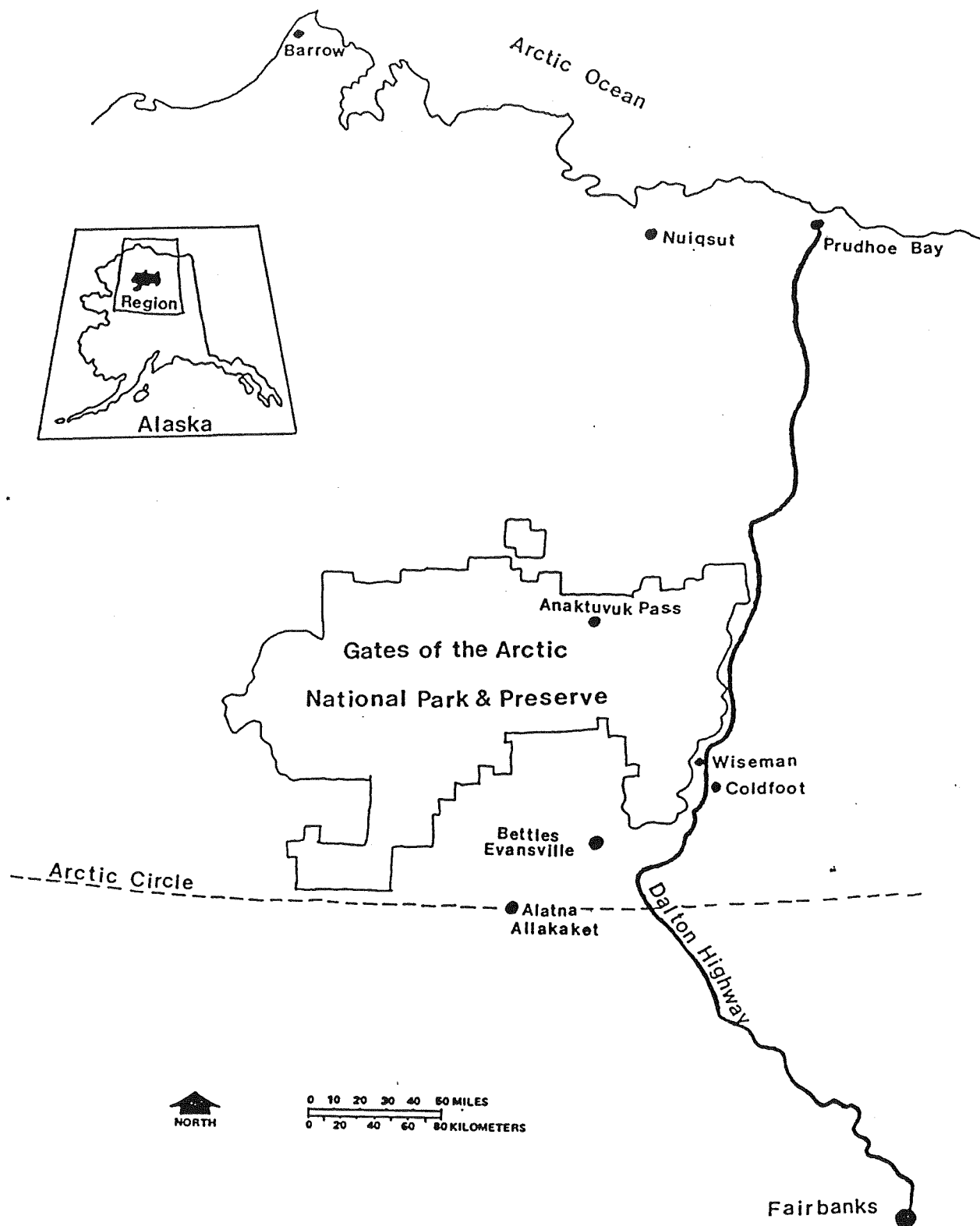


Fig. 1. Location of Gates of the Arctic National Park and Preserve, Brooks Range, Alaska.

50, \$2.00 for the next 20, and \$1.00 for any above 70. Carcasses were collected in Wiseman, Nolan, Anaktuvuk Pass, and Bettles in mid-March, and necropsy work was conducted 16 - 20 March and 30 March - 3 April, 1992.

The following data was recorded from each carcass: 1.) sex; 2.) body, skull, and upper canine length; 3.) heart girth; 4.) rump, sternum, flank, and xiphoid fat depths; 5.) visceral fat estimation (none, scarce, moderate, or abundant); 6.) gastrointestinal contents; 7.) parasites; and 8.) infirmities. Placental scars were counted from uterine tracts to assess previous reproductive effort. Canine teeth were collected from all species except marten for age determination. Juveniles were defined as animals <2 years old, based on tooth cementum annuli. Tongues from 44 lynx were collected for Randy Zarnke [Alaska Department of Fish and Game (ADF&G)] and will be examined for evidence of trichinosis.

Skull length and temporal muscle closure were used to determine marten juveniles from adults and males from females (Magoun et al. 1991). A subsample of marten jaws ($n = 202$) was collected to test an aging technique using x-rays of the canine tooth and examining the size and condition of the root pulp cavity. Brad Shults [National Park Service (NPS)] will be processing and x-raying these teeth, and results will be compared with sex and age information for the same animals based on skull characteristics.

Carcasses and harvest records for Anaktuvuk Pass were collected by Bob Ahgook (NPS). Bob Stephenson (ADF&G) and Layne Adams (NPS) interviewed trappers in Anaktuvuk Pass about the furbearer harvest, particularly that of wolves. Fifty-two wolves were harvested in Anaktuvuk Pass as of 15 April 1992 and information from these animals was summarized by Bob Stephenson (ADF&G, unpubl. data).

RESULTS

Thirteen trappers from Wiseman, Bettles, Anaktuvuk Pass, Nolan, and other outlying areas around the park contributed carcasses to the project during 1991-92. One hundred three furbearer carcasses (1 arctic fox, 44 lynx, 41 red fox, and 17 wolverine) were necropsied, and 390 marten heads were measured for sex and age determination. Skulls from 2 beavers, 42 marten, 1 otter, and 3 wolves from the Kobuk River area of the park and preserve were donated to the project.

Sex and Age Information

Roughly equal numbers of male and female red fox were captured during the 1991-92 trapping season (Table 1). Juvenile animals composed >60% of the red fox harvest (Fig. 2), and more juveniles were captured than adults or adult females (Table 2).

Table 1. Percentage of males (M):females (F) for furbearer carcasses (n) purchased from trappers in and near Gates of the Arctic National Park and Preserve, Alaska, 1991-1992.

Red Fox M:F (<u>n</u>)	Marten M:F (<u>n</u>)	Wolverine M:F (<u>n</u>)	Lynx M:F (<u>n</u>)
61:39 (54) ^a	56:44 ^b (390)	84:16 ^b (19) ^a	39:61 (44)

^aNumbers include carcasses sexed by ADF&G personnel in Anaktuvuk Pass following work completed by NPS.

^bThe number of males is significantly different from the number of females (Binomial Probability, $p < 0.05$).

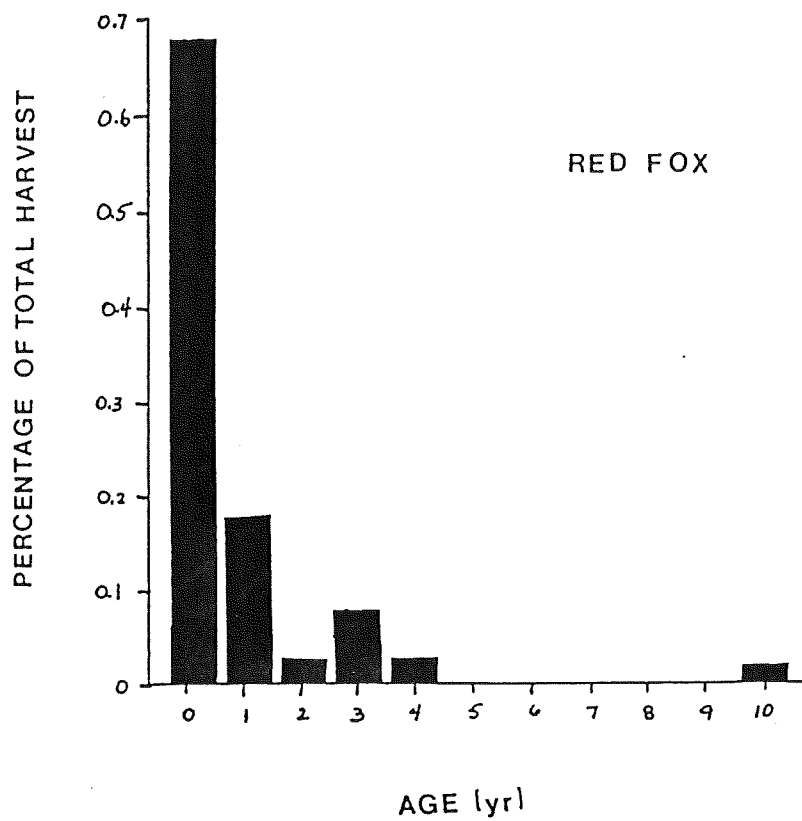


Fig. 2. Age composition of the red fox harvest taken in and near Gates of the Arctic National Park and Preserve, Brooks Range, Alaska, 1991-1992. Age was determined by counting tooth cementum annuli in canine teeth of red fox carcasses purchased from trappers.

Table 2. Percentage of juveniles^a (J):adults (A) and juveniles (J): adult females (AF) of furbearer carcasses (n) purchased from trappers in and near Gates of the Arctic National Park and Preserve, Alaska, 1991-1992.

Red Fox		Marten		Wolverine		Lynx	
J:A	J:AF	J:A	J:AF	J:A	J:AF	J:A	J:AF
(<u>n</u>)	(<u>n</u>)	(<u>n</u>)	(<u>n</u>)	(<u>n</u>)	(<u>n</u>)	(<u>n</u>)	(<u>n</u>)
85:15 ^b	90:10 ^b	43:57 ^b	63:37 ^b	87:13 ^b	87:13 ^b	43:57	51:49
(41)	(39)	(390)	(265)	(16)	(16)	(44)	(37)

^aJuveniles are animals <2 years old as determined by tooth cementum aging or skull characteristics.

^bThe number of juveniles is significantly different from the number of adults or adult females (Binomial Probability, $p < 0.05$).

More male wolverines were captured during the 1991-92 trapping season than females of this species (Table 1). Greater than 60% of the wolverine harvest was composed of juvenile animals (Fig. 3), and more juveniles were captured than adults or adult females (Table 2).

The number of male lynx harvested was not statistically different from the number of female lynx harvested (Table 1). Equal numbers of juvenile and adult lynx were harvested (Table 2), but most of the lynx classified as adults were in the 2-year-old class (Fig. 4). The mean age of harvested lynx was 2 years ($\bar{n} = 42$). Six kittens (age = <1 year) were taken.

More male marten were captured during the 1991-92 trapping season than female marten (Table 1). Adult males composed a high percentage of the marten harvest, and more juvenile than adult female marten were taken (Table 2). Overall, adult males composed a high percentage of the marten harvest, but in 2 areas, the southwestern part of the park and preserve and an area around the South Fork Koyukuk River, the number of male martens was not statistically different from the number of females harvested (Binomial Probability, $p < 0.05$). Adult females accounted for 35% of the harvest ($\bar{n} = 78$) from the South Fork area and were nearly equal to the number of males harvested (37%).

Reproductive Information

Based on placental scars, 47% of the female red fox were reproductively active during 1991 ($\bar{n} = 17$) and produced an average litter size of 6 kits. Thirty-one percent of the juvenile female red fox produced young ($\bar{n} = 13$).

A 2-year-old female wolverine taken near Anaktuvuk Pass had 3 well-developed fetuses in utero and was the only reproductively active female wolverine examined ($\bar{n} = 3$). The fetuses were nearly full-term and would have been born in late March or early April. No placental scars were observed on a 5-year-old female.

Reproductively active female lynx ranged in age from 1 - 11 years. Seventy percent of the female lynx bore placental scars ($\bar{n} = 27$), and an average of 4 placental scars per reproductively active female was obtained. Placental scars were observed on 38% of the juvenile female lynx ($\bar{n} = 8$).

Body Condition

Mean rump, sternum, flank, and xiphoid fat deposit measurements for all species were in the lower 50% of their respective ranges (Table 3); ranges were determined using the low and high fat measurements from the carcasses examined. Red fox and wolverine fat measurements were comparable to those obtained during previous years of the project (Swanson 1992), but fat levels in lynx were lower. Lower mean fat levels in lynx taken during 1991-92 may have been a reflection of the young age structure of

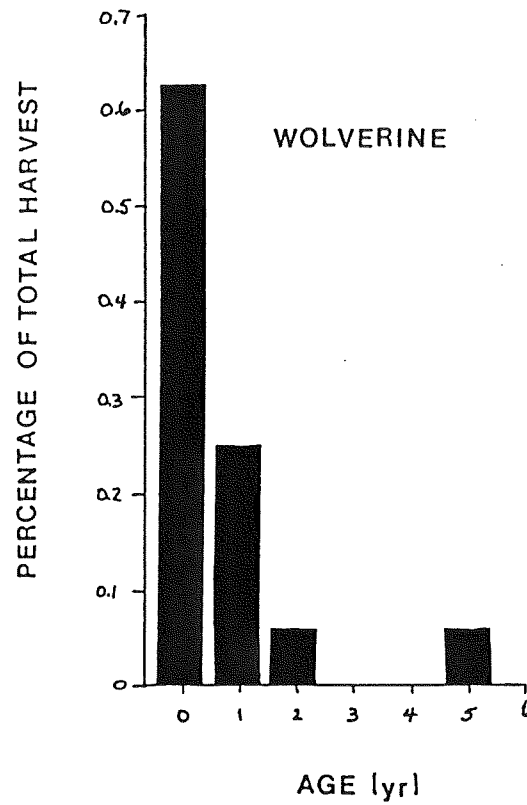


Fig. 3. Age composition of the wolverine harvest taken in and near Gates of the Arctic National Park and Preserve, Brooks Range, Alaska, 1991-1992. Age was determined by counting tooth cementum annuli in canine teeth of wolverine carcasses purchased from trappers.

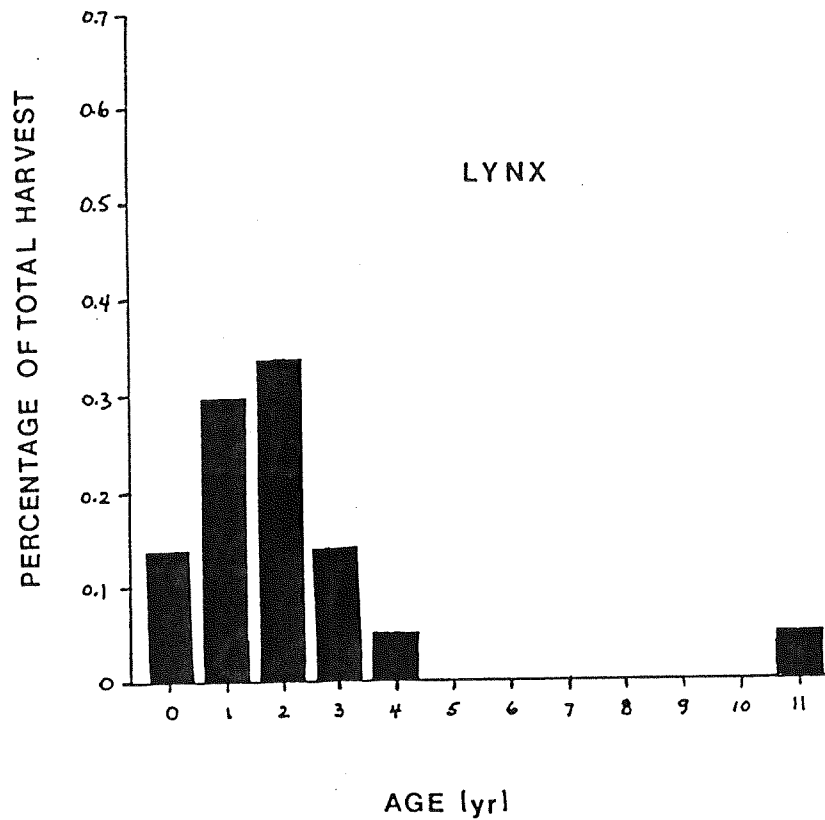


Fig. 4. Age composition of the lynx harvest taken in and near Gates of the Arctic National Park and Preserve, Brooks Range, Alaska, 1991-1992. Age was determined by counting tooth cementum annuli in canine teeth of lynx carcasses purchased from trappers.

Table 3. Mean fat deposit measurements for red fox, wolverine and lynx trapped in and near Gates of the Arctic National Park and Preserve, Alaska, 1991-1992.

Species	Rump Fat (mm) (<u>n</u>)	Sternum Fat (mm) (<u>n</u>)	Flank Fat (mm) (<u>n</u>)	Xiphoid Fat (mm) (<u>n</u>)
Red Fox	0.4 (41)	0.4 (41)	1.1 (32)	3.0 (36)
Range (mm)	0 - 3.0	0 - 3.3	0 - 2.2	0 - 7.0
Wolverine	1.7 (17)	1.5 (16)	3.1 (16)	7.5 (16)
Range (mm)	0 - 5.8	0 - 9.6	0 - 10.2	0 - 25.5
Lynx	0.6 (42)	1.1 (42)	1.1 (36)	8.2 (39)
Range (mm)	0 - 1.6	0 - 4.2	0 - 6.6	0 - 21.0

the population sample. Visceral fat rankings also were higher in 1991-92 than in the earlier years of the study (Table 4).

Parasites were found in 25% of the wolverine carcasses ($n = 16$), 29% of the red fox ($n = 41$), and 39% of the lynx ($n = 44$). Free-roaming nematodes were found in all 3 species, though they had not been observed in lynx during the previous years of this project (Swanson 1992). Nematode cysts of Cylicospirura spp. were found in 13 lynx stomachs and tapeworms were found in the small intestines of 2 lynx. Nematodes in 1 wolverine were identified by Dr. Eric Hoberg (Atlantic Veterinary College) as Soboliphyme baturini and Baylisascaris devosi, both common in wolverines in the northern hemisphere.

Gastro-intestinal contents for red fox were most diverse and included blueberries, snowshoe hares, microtines, lemmings, beaver fur, feathers, fish bones, ungulate hair, and strips of dog collar leather. One red fox had been eating lemmings with stomachs full of blueberries. Lynx stomachs were often empty or contained bits of trap debris (soil, sticks, and other vegetation), but snowshoe hare, ptarmigan or grouse feathers, and ungulate hair also were observed. Snowshoe hare and ungulate hair was identified in several wolverine stomachs, but trap debris was frequently the only content. It was not determined if stomach contents from these furbearer carcasses represented natural food items or trap bait.

DISCUSSION

Male-dominated sex ratios, such as those found for marten and wolverine in this study, are indications of good trapline management and healthy populations. Maintaining a high percentage of resident females in the population increases the reproductive potential of the population and leads to population stability and growth. Sex ratios are influenced by many variables including food abundance, habitat conditions, and trapping pressure (Strickland and Douglas 1987). The sex ratio also may be affected by trap type. Trappers maintain that male marten are captured more frequently in pole sets than females. Since pole sets are the most common trap set for marten, this may increase the number of male marten harvested.

The higher number of female marten coming from the southwestern part of the park and preserve may reflect trapping technique, wildfire activity in the Kobuk River area, or the portion of the total harvest which we examined. We will continue to examine the harvest sex ratio in this area and discuss our findings with trappers working there. Marten harvest in the South Fork Koyukuk River area should be monitored by Kanuti National Wildlife Refuge staff to examine what effects high adult female harvest may have on the population. If females taken in these areas were dispersing or transient animals rather than residents, little effect on the local population should be observed.

Table 4. Mean visceral fat rankings for red fox, wolverine, and lynx trapped in and near Gates of the Arctic National Park and Preserve, Alaska, 1991-1992. Visceral fat levels were ranked on the following scale: 0 = none, 1 = scarce, 2 = moderate, and 3 = abundant.

Species	Mean Rank	Range	Sample Size <u>n</u>
Red Fox	3.0	1-4	36
Wolverine	3.5	2-4	38
Lynx	3.4	2-4	38

Red fox numbers and, consequently, red fox harvest has been high over much of the state in recent years. Higher percentages of reproductively active females and juvenile females were harvested during 1991-92 than during 1988-1991 (Swanson 1992). The high incidence of reproductively active juveniles and the high percentage of juvenile animals in the harvest indicates a healthy red fox population.

Twice as many lynx carcasses were purchased in 1991-92 as in the other 3 years of the project combined, even though one trapper had disposed of several lynx carcasses before learning we were purchasing them. Increased harvest numbers may be attributable to increased trapper effort during the 1991-92 season which was the predicted peak of the lynx cycle (Osborne 1984, 1990). Lynx prices averaged \$75.00 in 1991-92 (Alaska Raw Fur Company, Fairbanks, Alaska, pers. commun.), so fur prices probably did not account for the increased harvest. Some trappers obtained better prices for lynx pelts by selling locally rather than to fur buyers. Higher prices also were obtained for lynx pelts with claws left on to be used as taxidermy mounts or wall hangings.

The lynx harvest was composed largely of juveniles and young adults; and the bimodal age structure noted by Swanson (1992) for lynx harvested from 1988-91 was not observed. A higher percentage of female lynx had placental scars in 1991-92 than in other years of the study and this, combined with the low mean age of the harvested population, indicates a healthy population. Few kittens were observed during 1990-91 (Swanson 1992), so the presence of kittens in this year's harvest indicates successful reproduction during 1991 and suggests improved population health.

NPS will continue to study furbearer populations through harvest and carcass information during the 1992-93 trapping season, but several changes will be made in the project methods. First, carcasses will no longer be purchased in Anaktuvuk Pass due to the poor documentation they provide for the actual harvest in that area. Second, the program will be expanded to support resident biological technicians in Anaktuvuk Pass and Wiseman Village to document furbearer harvest in these high harvest areas. Third, heart, liver, and kidney tissues from lynx and wolverine will be frozen and submitted to UAF for future genetic and environmental pollutant work. Additionally, Kanuti National Wildlife Refuge may begin a similar furbearer carcass study south of the park, allowing furbearer harvest over a large continuous area to be monitored.

ACKNOWLEDGEMENTS

This project was funded through the Resource Management Division of Gates of the Arctic National Park and Preserve. The following individuals provided valuable assistance with fieldwork and data collection: Ed Forner, Susan Holly, Dave Schmitz, and Ron Sutton. The project could not have been completed without the cooperation of trappers in Bettles, Anaktuvuk Pass, Wiseman, Nolan, and Kobuk.

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