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FURBEARERS

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Sid O. Morgan, Publications Technician
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STATE OF ALASKA
Steve Cowper, Governor

DEPARTMENT OF FISH AND GAME
Don W. Collinsworth, Commissioner

DIVISION OF WILDLIFE CONSERVATION
W. Lewis Pamplin, Jr., Director
W. Bruce Dinneford, Acting Planning Chief

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Publications Technician
ADF&G, Wildlife Conservation
P.O. Box 3-2000
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(907) 465-4190

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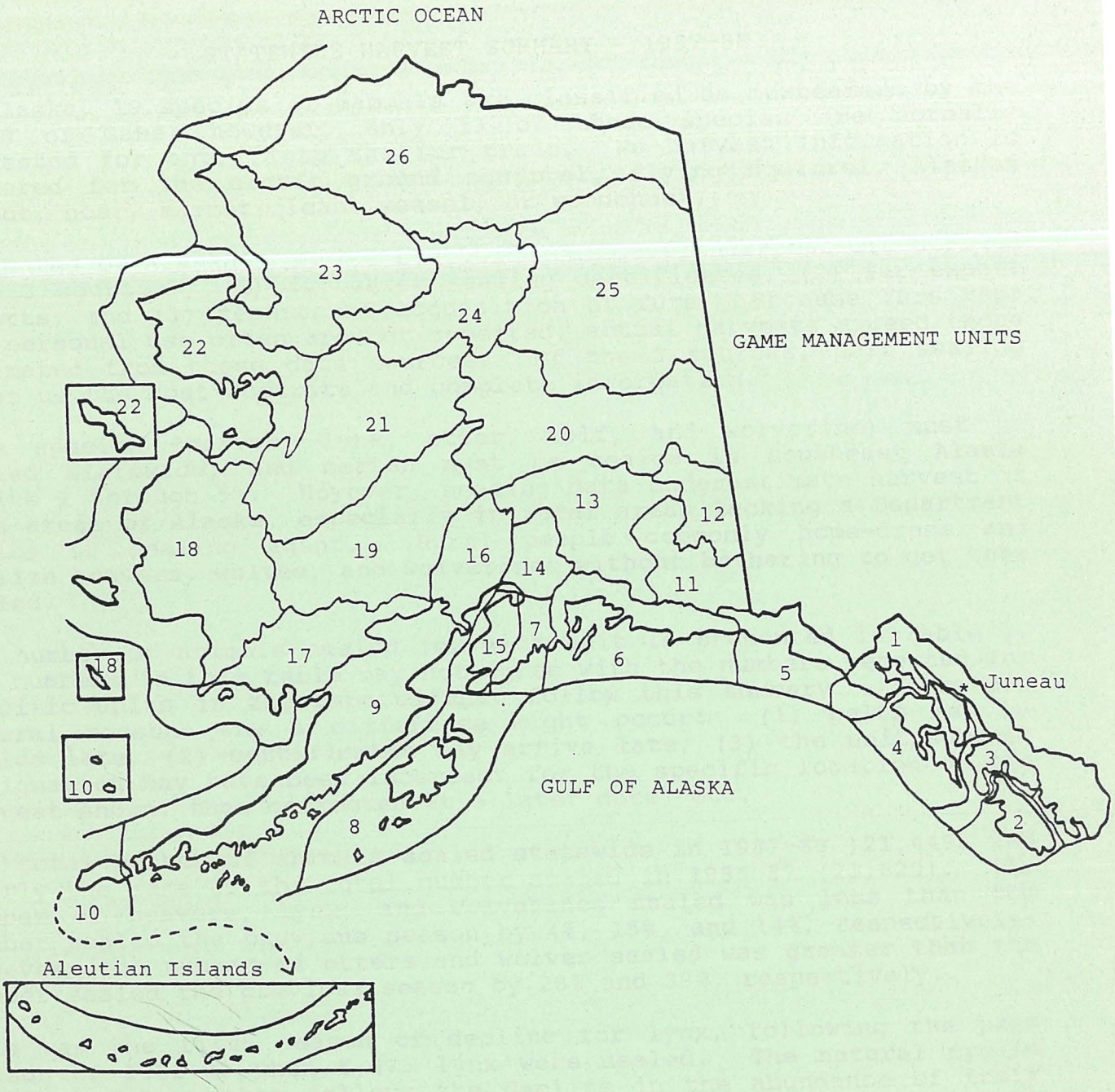
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STATEWIDE HARVEST SUMMARY - 1987-88

In Alaska, 19 species of mammals are classified as furbearers by the Board of Game; however, only 13 of these species are normally harvested for entry into the fur trade. No harvest information is gathered for the arctic ground squirrel, flying squirrel, Alaskan marmot, hoary marmot, least weasel, or woodchuck.

Estimates of Alaska's annual statewide furbearer harvests are derived from 3 sources: (1) furbearer sealing certificates, (2) fur export reports, and (3) reports of acquisition of furs. Because furs kept for personal use often are not reported, actual harvests exceed those estimated from these data sources. Of the 3 sources, pelt sealing gives us the most accurate and complete information.

Five species (beaver, lynx, otter, wolf, and wolverine) must be sealed statewide, and marten must be sealed in Southeast Alaska (Units 1 through 5). However, sealing data underestimate harvest in some areas of Alaska, especially in rural areas lacking a Department office or sealing agent. Rural people commonly home-dress and utilize beavers, wolves, and wolverines without bothering to get them sealed.

The number of animals sealed for each unit is presented in Table 1. The numbers in this table may not agree with the numbers reported for specific units in the reports that follow this summary. There are several reasons why a difference might occur: (1) pelts may be sealed late, (2) certificates may arrive late, (3) the unit/subunit designation may have been incorrect for the specific location of the harvest shown, then corrected at a later date, etc.

The total number of animals sealed statewide in 1987-88)21,449) was nearly the same as the total number sealed in 1986-87 (21,629). The number of beavers, lynx, and wolverines sealed was less than the number sealed the previous season by 4%, 15%, and 14%, respectively; however, the number of otters and wolves sealed was greater than the number sealed the previous season by 28% and 38%, respectively.

This was the fifth season of decline for lynx, following the peak season of 1982-83 when 5,673 lynx were sealed. The natural cyclic decline of lynx that follows the decline in the abundance of their principal prey, the snowshoe hare, as well as the shortened or closed seasons for lynx in some units account for the overall downward trend in the harvest since the 1982-83 season.

In the fall of 1987 the Department recommended and the Board of Game adopted a tracking harvest strategy for managing lynx in those areas of Alaska where trapping pressure is increasing. The new strategy will be initiated with the 1988-89 season. As the lynx population and it's recruitment increases in those areas of the state where this new management strategy is being applied, seasons currently closed to the trapping of lynx will be reopened. Similarly, seasons that were shortened during the decline in the lynx population will be lengthened.

During the reporting period the number of land otters sealed increased 28% over that of the previous one, reflecting the general increase in the number of beaver harvested during the past two seasons; otter are caught commonly in sets made for beavers. Analysis of beaver and land otter harvests in Alaska and Canada showed a statistically significant correlation between beaver and otter harvests over several decades (Saunders and Melchior 1984). This was true, even through the data sets included harvests from areas of Alaska (e.g., coastal portions of the Gulf of Alaska) where trappers make sets specifically for otters in locations where beavers do not occur. If data from these areas had been removed from the analysis, the correlation probably would have been stronger.

The 38% increase in the number of wolves sealed over that for the previous season can be explained by the better-than-average snow and flying conditions for land-and-shoot harvesting. For the previous reporting period (1986-87), 29% of the wolves harvested were taken by the land-and-shoot method, compared with 49% for this reporting period. Additional sealing data and analyses of wolf harvests have been presented in a separate wolf survey-inventory activities report (Morgan 1989).

Data from fur export and acquisition-of-furs reports are summarized in Table 2. The number of pelts bought by fur dealers from trappers in 1987-88 (47,408) was nearly the same as that for the previous season (47,478); however, the number of pelts exported by trappers in 1987-88 was 33% greater than those for the previous season. This increase in trapper exports accounts for the overall increase of 8.5% in harvest (Table 2, column 5) for 1987-88, compared with 1986-87.

During the previous reporting period (1986-87), total dealer exports exceeded total dealer purchases (Melchior 1988); this season (1987-88) the reverse was true (Table 2, columns 1 and 2). As a general rule, one could expect the ratio of dealer acquisitions to dealer exports to be approximately 1:1, provided dealers exported in the same season all the pelts they had purchased. If the ratio is greater than 1:1, this may indicate dealers are holding furs over to another season or that they have found intrastate markets. If the ratio is less than 1:1, it could indicate that dealers have been exporting pelts acquired during more than 1 season or have not been reporting all of their purchases. Without more information, it is not possible to distinguish among the alternative explanations.

Fur dealers are not the only ones who might hold over furs from one year to next before selling them; trappers often make that decision. For example, in the 1986-87 reporting period, total dealer purchases and trapper exports of beaver were 15,065, but the number of beaver sealed was 17,090, or 13% more than were sold to dealers or exported for sale or processing (Melchior 1988). During this reporting period, 17,912 beaver were sold or exported, but only 16,367 were sealed. Although we do not know for certain, it seems likely that some beaver pelts that had been harvested last season, were held over and sold or exported by trappers this year.

Statewide beaver populations continue to remain relatively high, even though the harvest has increased substantially. Some area wildlife biologists reported a continuing increase in beaver populations.

Lynx populations are generally low throughout most of the state, but increases in snowshoe hares and signs of kittens indicate the populations have the potential for increasing.

In Southeast Alaska, marten harvests as well as the number of marten taken per trapper increased substantially in several areas. Improved access because of new logging roads into areas previously not trapped could account for the increases. Land otter harvests increased also, but the reason for the increase in unknown.

In Southcentral Alaska, coyotes were reported as abundant or increasing in several units, including Units 6, 7, 11, 13, 14, and 15. Marten populations were reported high in Units 11 and 13, but they may be starting to decline. Lynx numbers were low. Muskrats seemed to be increasing in a few areas. Wolverine harvests show a declining trend in Southcentral Alaska, indicating a decline in population, a decline in trapper effort, or both. Because lynx populations are low, some trappers have reduced the number or temporarily eliminated the use of the cubby sets for large carnivores. An overall reduction in the number of these sets could result in lower harvests of species such as wolverine that are commonly caught in them; however, we lack the data necessary to evaluate this possibility.

In Interior Alaska, as elsewhere, beaver populations are high and still expanding in some areas. Their numbers seem to be down slightly, compared with survey results from the previous reporting period, but only in portions of the Yukon Flats National Wildlife Refuge where they are still abundant. Marten populations are reported to be at moderate-to-high levels. In one areas of Unit 20, catches of 10 marten per mile of trapline have been reported. Lynx numbers remained generally low, but their prey, snowshoe hares, are increasing in many areas.

In Southwestern and Western Alaska, beaver are abundant and harvests have increased. The mink harvest in the Yukon-Kuskokwim Delta was low this season, compared with the mean. Muskrat numbers are increasing in some areas. No marked changes appear to be taking place in populations of other species throughout the state.

Herbert R. Melchior
Statewide Furbearer Coordinator

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Table 1. Number of beavers, lynx, otters (land), and wolverines sealed statewide during the 1987-88 regulatory year.

	Species			
Unit	Beaver	Lynx	Otter	Wolverine
1	114	--	194	23
2	352	--	176	--
3	123	--	92	1
4	4	--	186	--
5	8	--	1	1
6	30	2	196	7
7	54	--	9	14
8	88	--	142	--
9	866	10	220	72
10	--	--	--	--
11	21	--	3	11
12	18	72	10	19
13	301	1	13	27
14	280	--	9	8
15	78	7	27	8
16	405	--	51	25
17	3,021	1	267	44
18	4,697	10	556	5
19	1,363	47	69	68
20	1,817	176	57	45
21	1,713	71	67	34
22	40	3	1	28
23	60	--	13	39
24	468	95	25	22
25	446	552	5	43
26	--	1	--	3
Unknown	--	1	--	--
Total	16,367	1,049	2,389	547

Table 2. Reported fur dealer acquisitions, dealer exports, trapper exports, and number sealed for 13 species of furbearers, 1987-88.

Species	(1) Dealer acquisitions	(2) Dealer exports	(3) Trapper exports	(4) Total exports	(5) Col. (1) + col. (3)	(6) Number sealed
Beaver	11,264	8,950	6,648	15,598	17,912	16,367
Coyote	80	202	46	248	126	
Lynx	689	392	196	588	885	1,049
Marten	16,843	18,870	9,265	28,135	26,108	
Mink	6,366	3,119	2,257	5,376	8,623	
Muskrat	6,631	4,187	955	5,142	7,586	
Otter (land)	840	993	649	1,642	1,489	2,389
Red fox[a]	3,280	3,215	1,311	4,526	4,591	
Red squirrel	563	307	149	456	712	
Weasel (Ermine)	164	232	235	467	399	
White (Arctic) fox[b]	449	482	128	610	577	
Wolf	104	404	131	535	235	1,097
Wolverine	135	370	102	472	237	547
Totals	47,408	41,723	22,072	63,795	69,480	21,449

[a] Includes cross and silver fox.

[b] Includes blue fox.

STUDY AREA

GAME MANAGEMENT UNITS: 1A and 2 (8,400 mi²)

GEOGRAPHICAL DESCRIPTION: Subunit 1A - Ketchikan area including mainland areas draining into Behm and Portland canals.
Subunit 2 - Prince of Wales Island and adjacent islands south of Sumner Strait and west of Kashevarof Passage.

BACKGROUND

Over the past 5 years furbearers have generally been at moderate-to-high levels. Trapping pressure has not been heavy, except for marten during the last 2 years. Fur prices appear to be the primary factor in changing trapping pressure and harvest.

Southeast Alaska has excellent otter habitat, and pelts from this area are of high quality. The high prices of the late 1970's have declined to low levels, resulting in low trapper interest. Otters are difficult to trap and handle, and prices must be high to affect harvest levels.

Beaver prices have been relatively stable at a fairly low level for many years, and trapper interest has been low, except for the roaded areas on Prince of Wales Island where easy access has led to large harvests by a few trappers that have taken advantage of the logging road system. In addition, clearcuts provide good beaver habitat; following initial cutting, populations increase for approximately 20 years. These factors have brought about a substantial increase in the beaver harvest on the northern half of Prince of Wales Island.

Marten have been the predominant species sought by trappers in Southeast for many years. They are easy to trap and care for, and the monetary return is typically greater than for any other furbearer. Generally, fur prices were steady until the winter of 1986-87, when the value of marten fur jumped; this factor is reflected in the large increase in harvest this year. Because of the ease of trapping marten, the current high pelt value and the extensive logging-road access to much of Prince of Wales Island, over harvesting could occur there. Moreover, extensive logging in Units 1A and 2 is removing the prime uneven-aged old-growth habitat required by marten. The capability of the area to support marten populations is declining.

Because prices have been stable at relatively low levels during the past 5 years, trapper interest has been at moderate-to-low levels. There are no sealing requirements for mink, and only estimates of the total annual harvest are possible.

The weasel population fluctuations occurring from year to year are independent of trapping. Their harvest is incidental to primarily marten trapping.

Very few muskrats are present in either Unit 1A or 2. Generally, those taken are incidental to beaver trapping.

Wolverines are found only on the mainland portion of GMU 1A, and very few are taken. Very little effort is directed at wolverines, and most of the harvest is probably incidental to wolf trapping.

There are no foxes or coyotes in either unit, and only an occasional lynx is taken from the mainland.

POPULATION OBJECTIVES

To maintain furbearer populations capable of sustaining harvest at the 1984-85 level as follows:

Species	GMU 1A	GMU 2
Beaver	39	224
Marten	203	1,039
Otter	65	192
Wolverine and Lynx	occasional	not present

To develop objectives by 1990 for those species sustaining harvest in these areas that are not sealed.

METHODS

Harvest data comes from mandatory sealing of marten, beaver, lynx, otter, and wolverine. The beaver sealing program commenced over 20 years ago. Wolverine were first sealed in 1971-72, and the river otter program started in 1978-79. Marten were first sealed in 1984-85. Harvest estimates for other species are derived from a fur export report that, while mandatory, does not account for all species taken, because not all are exported and many that are exported are not reported.

In Southeast there are no population surveys conducted on any furbearers, and only a few short-term research studies have been conducted on mink and otters.

RESULTS AND DISCUSSION

Population Status and Trend

Otter populations were low in the late 1970's when prices were high. Since that time, prices have dropped significantly and trapper interest is low. Populations have increased steadily since the early 1980's and have been at moderate to high levels for several years.

Marten populations in GMU 1A appear to have maintained a moderate level over the past 5 years, despite increasing harvest pressure. Difficult access to inland areas probably maintains reserve populations. In GMU 2, a combination of logging road access, heavy trapping pressure, and high prices will reduce marten populations. Consequently, harvests from this area will probably decline over the next several years.

Mink populations appear to be high and stable over most of GMU 1A and 2. This is unlikely to change significantly, unless pelt prices increase, attracting added trapper effort.

Although beaver populations are generally high over most of the area, they are probably low in easily accessible areas. Typically, local populations are reduced by trapping, the trapping subsides, the population increases for several years and the trapping begins again. In addition to the effects of trapping, habitat changes cause fairly large population fluctuations. Early stages of clearcuts support higher populations than old growth, but when the forest canopy closes (i.e., 20 years following cutting), beaver numbers drop dramatically to very low levels. Current pelt prices are not high enough to draw much trapper pressure, except in areas of good accessibility, so beaver populations remain at high levels over most of the area.

Mortality

Hunting Seasons and Bag Limits:

Mink, Marten, Otter, Weasel, Muskrat	No open season	
Beaver	No open season	
Wolverine	Nov. 10 - Feb. 15	One Wolverine

Trapping Seasons and Bag Limits:

Mink, Marten, Otter, Weasel, Muskrat	Dec. 1 - Feb. 15	No limit
Beaver	Dec. 1 - May 15	No limit
Wolverine	Nov. 10 - April 30	No limit

Human-induced Mortality:

Table 1 presents harvest figures for the major furbearers for Units 1A and 2 for the past 5 years. Table 2 displays more detailed harvest and trapper information for the 1987-88 season. The most significant change from 1986-87 was in the marten

harvest, resulting from the large increase in value of marten. Forecasts for continued high marten prices greatly increased the number of trappers and effort expended in 1987-88. In Unit 1A in 1986-87, 14 trappers averaged 9.1 marten, while in 1987-88, 15 trappers averaged of 20.9 marten each. In Unit 2 in 1986-87, 29 trappers averaged 9.7 marten compared with 63 trappers sealing an average of 18.2 marten in 1987-88. In Units 1A and 2, 100% and 94% of the marten were taken in old-growth habitat, respectively.

If prices remain high for marten, overharvesting will probably occur in Unit 2. Road access to the interior portions of the island have eliminated the refuge effect that beach trapping creates as well as the interior reserve of untrapped animals. In addition, the loss of old-growth forecasts because of logging will continue to reduce marten habitat over much of Unit 2.

Unless pelt values for the other furbearers rise significantly, it is unlikely trapping will cause overharvesting of those species.

Habitat

Clearcut logging of the uneven-aged old-growth forest in Units 1A and 2 is affecting most furbearers. It is particularly damaging to marten. The conversion to second-growth forest will eliminate large blocks of marten habitat, and populations will probably decline proportionately. In addition, the roads associated with logging create access to areas inland from the normal beach trapping zone and eliminate the refuge effect that exists without roads. This is particularly evident in Unit 2, but will become a problem in Unit 1A with expansion of the road system. Under current practices, these changes are virtually permanent.

Otter habitat is mostly confined to a narrow strip along the salt water beach and the larger stream and lake systems; however, natal dens may be up to one-half mile inland from beach areas. Old-growth forest is the preferred habitat, and little use is made of cut-over areas. Logging of these habitats will reduce otter populations.

Mink habitat appears to be similar in many respects to otter habitat, and while impacts of beach logging would seem to be less than those for otters, mink populations decline following logging of those areas.

Beavers benefit from logging. Early stages of clearcuts produce abundant food and often support more beaver than found in old-growth habitat; however, canopy closure will reduce populations below that in old-growth stands.

Wolverines are found only on the mainland portion of Unit 1A, and most of this area has been legislatively designated as wilderness

and protected from logging. Only the lower Cleveland Peninsula is scheduled for intensive logging and road building. These activities are expected to have an adverse impact on wolverine populations.

Game Board Actions and Emergency Orders

Essentially the same seasons and bag limits have been in effect for the past 5 years. Seasonal opening dates for most species are established on the basis of primeness of pelts and the species that could be taken in the same type of set; e.g., although marten are prime before 1 December, mink in late December, and otter and beaver by 1 December, 1 December was selected as the best compromise.

The only change in seasons during the past 5 years was a lengthening of the wolverine season to correspond with that for wolves, because both species are taken in wolf sets. Closing dates are based on loss of primeness and the desire for a uniform closing date for mink, marten and otter. Beaver seasons run late to allow trapping on the major mainland river systems after the ice goes out; however, very little trapping occurs during the last month of the season. Because prices have been low, these larger rivers are seldom trapped for beaver.

CONCLUSIONS AND RECOMMENDATIONS

With the exception of marten in Unit 2, all furbearers in this area appear relatively secure. Only a significant increase in pelt prices would raise trapping effort to a level that would impact other populations to a noticeable degree. Overtrapping of marten in Unit 2 is possibly occurring now, but the 1988-89 harvest and trapping pressure will clarify this. The extensive road system and widely distributed human population creates much greater trapping pressure than in Unit 1A, and along with high marten pelt prices, may lead to substantial overharvesting. Changes in seasons of a furbearer are difficult, because they affect trapping of other species; the most acceptable solution would probably be some type of road closure for purposes of trapping.

Studies should be conducted to document the impacts of logging on furbearer habitat, particularly for marten. Logging removes the uneven-aged old-growth forest for hundreds of years or more, replacing it with an even-aged, closed-canopy/open understory forest that does not meet the requirements of the major furbearers. A study should be implemented to delineate the impacts of this type of forest management (i.e., logging practices).

PREPARED BY:

Robert E. Wood
Wildlife Biologist III

SUBMITTED BY:

David M. Johnson
Regional Management Coordinator

Table 1. Furbearer harvests from 1983-84 to 1987-88 seasons in Subunit 1A and Unit 2.

GMU 1A

Season	Beaver	Marten[a]	Mink	Otter	Wolverine
1983-84	95	---	Unknown	50	1
1984-85	39	203	Unknown	65	0
1985-86	20	156	Unknown	70	0
1986-87	52	127	Unknown	63	2
1987-88	44	313	Unknown	88	1

GMU 2

Season	Beaver	Marten[a]	Marten[b]	Mink[c]	Otter
1983-84	215	-----	----	---	153
1984-85	234	1,039	----	---	192
1985-86	292	571	----	---	141
1986-87	411	301	----	---	62
1987-88	352	1,149	414	341	176

[a] Marten harvest from sealing records.
[b] Marten harvest from fur export reports.
[c] Mink harvest from fur export reports.

Table 2. Furbearer data from sealing certificates in Subunit 1A and Unit 2, 1987-1988.

Species		Otter		Beaver		Marten		Wolverine
Unit		1A	2	1A	2	1A	2	1A
# Sealed		88	176	44	352	313	1,149	1
% Male		61	60	-	-	69	60	0
%Trapped		89	90	100	100	100	100	100
% Taken by	Boat	81	76	27	14	84	51	100
	Road	5	22	48	82	16	49	0
	Air	4	0	0	0	0	0	0
	Unk.	11	1	25	3	0	0	0
# Trappers*		14	27	11	29	15	63	1
Avg/Trapper*		5.5	5.9	4.0	11.4	20.9	18.2	1.0
# Taken in	Dec.	42	36	16	90	61	643	100
	Jan.	40	103	0	87	74	338	0
	Feb.	6	34	0	34	7	44	0
	Mar.	0	1	11	73	-	-	0
	Apr.	0	0	1	45	-	-	0
	May	0	0	3	13	-	-	0
	Unk.	0	2	13	10	171	124	0

* Trappers under 16 years and over 60 and others without trapping license numbers (and their harvests) are not included in these figures for otter, beaver, and wolverine.

STUDY AREA

GAME MANAGEMENT UNIT: 1B and 3 (6,900 mi²)

GEOGRAPHICAL DESCRIPTION: Subunit 1B - Southeast mainland from Cape Fanshaw to Lemesurier Point

Unit 3 - Islands of the Petersburg, Kake, and Wrangell area

BACKGROUND

Beavers are locally abundant in both Unit 1B and 3. Trapper effort fluctuates greatly from season to season. Lynx are not found in GMU 3 or Subunit 1B. Marten occur naturally in Subunit 1B and Unit 3, and mandatory sealing has been required since the 1984-85 season; previously, the only information was from fur export reports, showing numbers of marten shipped by trappers. No data was collected about chronology or location of the harvest prior to the 1984-85 season. Mink are still an important furbearer, but little data is collected. Fur export reports show the number shipped by trappers living in Wrangell and Petersburg but do not indicate the specific area of trapping. Otters continue to be harvested by some trappers; the harvest has generally remained constant the past few years. Wolverines are found on Mitkof Island in Unit 3 and also in Subunit 1B. Some are caught incidentally in wolf sets, but a few trappers concentrate specifically on them.

POPULATION OBJECTIVES

To maintain furbearer populations capable of producing harvests at the 1984-85 levels as follows:

Species	GMU 1B	GMU 3
Beaver	4	52
Marten	185	250
Otter	15	141
Wolverine	4	3

To develop objectives by 1990 for those species presently harvested in these areas that are not sealed.

METHODS

The harvest of beavers, marten, otters, and wolverines was monitored through the mandatory pelt-sealing program. The harvest of mink was monitored through the mandatory fur buyer and fur export reporting program. Data routinely collected through the pelt-sealing requirement included the species, number, sex, and size of animals taken as well as the location and date. Method of transportation was also recorded. Habitat information is collected from marten trappers.

RESULTS AND DISCUSSION

Population Status and Trend

Data are insufficient to make a quantified determination of furbearer populations in Units 1B and 3. However, incidental observations by staff and observations by trappers, hunters, and other members of the public suggest a high and stable or increasing population of beaver; no known incidence of lynx; a moderate to high population of marten with decreasing numbers in localized, heavily trapped areas; moderate and stable populations of mink and otter; and a stable population of wolverine.

Population Composition:

Sex is determined for all furs sealed except beaver. A probable bias in the susceptibility to trapping between the sexes precludes using the sealing data to make reasonable population composition estimates.

Mortality

Trapping Seasons and Bag Limits:

Beaver (except Mitkof Island)	Dec 1 - May 15	No limit
Beaver (Mitkof Island)	Dec 1 - Apr 15	No limit
Lynx, Marten, Mink, Otter	Dec 1 - Feb 15	No limit
Wolverine	Nov 10 - Apr 10	No limit

Hunting Seasons and Bag Limits:

Lynx	Nov 1 - Mar 31	Two lynx
Wolverine	Nov 10 - Feb 15	One wolverine
Marten, Mink, Otter	No open season	

Human-induced Mortality:

In Subunit 1B marten trappers and the number of pelts/trapper increased from 11 to 16 and 14 to 17, respectively, from the 1986-87 to 1987-88 seasons. In Unit 3 32 trappers averaged 11 pelts each, compared with 14 trappers averaging 8 pelts each during the 1986-87 season. No trapper effort data were collected.

In Unit 1B otter harvests and number of successful trappers increased significantly from 9 and 2 in 1986-87 to 50 and 9 in 1987-88, respectively. The average number of pelts also rose from 5 to 6 per trapper, respectively, during the 2 reporting periods.

Trappers in Unit 3 and their average number of pelts increased from 9 to 13 and 5 to 7 otters, respectively.

Historic furbearer data including those for the current reporting period are detailed in Table 1. Although a few beaver are occasionally taken by special permit during the closed season, primarily to reduce damage to logging roads, none were taken during this reporting period.

Harvest Chronology: Table 2 details the harvest chronology for beavers, marten, otters and wolverines for the past 5 years.

Transport Methods: Marten trappers used boats and highway vehicles as transportation for 54% and 19% of the pelts taken, respectively. Walking, ORV's, and snow machines were also used. For the other furbearers, trappers used boats and highway vehicles as transportation for 75% and 15% of the harvest, respectively. Aircraft, walking, and snow machines accounted for the balance.

CONCLUSIONS AND RECOMMENDATIONS

Marten harvest have more than doubled since 1986-87. Continued high prices have encouraged more trapping effort and may be depleting the few populations that are easily accessible. Beaver harvest shifted from Subunit 1B to Unit 3, but the total catch was about the same. Otter harvest was up in both Subunit 1B and Unit 3, resulting from increased overall trapper effort. Although the wolverine take was down slightly, it was within the recent harvest range.

No changes are recommended at this time.

PREPARED BY:

Charles Land
Wildlife Biologist I

David James
Wildlife Biologist III

SUBMITTED BY:

David Johnson
Regional Management Coordinator

Table 1. Furbearer harvest in Subunit 1B, 1983-84 to 1987-88.

Year	Beaver	Marten	Mink	Otter	Wolverine
1983-84	0	256[a]	291[a]	15	3
1984-85	4	190	unknown	15	4
1985-86	37	83	unknown	8	4
1986-87	122	147	unknown	9	15
1987-88	21	270	264[b]	50	11

[a] Number of pelts exported by Petersburg and Wrangell residents according to fur export reports. These data are not comparable to other data in this column which were derived from sealing certificates.

[b] Total number of mink reported on fur export reports and fur acquisition reports for all of Unit 1. The proportion taken in Subunit 1B is unknown.

Table 2. Furbearer harvest in Unit 3, 1983-84 to 1987-88

Year	Beaver	Marten	Mink	Otter	Wolverine
1983-84	25	256[a]	291[a]	42	1
1984-85	52	241	unknown	141	3
1985-86	62	155	unknown	51	5
1986-87	67	90	unknown	45	2
1987-88	123	362	198	97	1

[a] Number of pelts exported by Petersburg and Wrangell residents according to fur export reports. These data are not comparable to other data shown in the table which were derived from sealing certificates.

Table 3. Harvest chronology of furbearers in Units 1B and 3, 1983-84 to 1987-88.

Beaver harvest by regulatory year and unit

	1983-84[a]		1984-85		1985-86		1986-87		1987-88	
	Units		Units		Units		Units		Units	
Month	1B	3	1B	3	1B	3	1B	3	1B	3
Dec				11	5	7	31	30	6	46
Jan			1	21		29	8	7	8	30
Feb				5	10	10	8	7		31
Mar			1	1	14	6	46	14	1	0
Apr			2	14	8	8	11	9	6	10
May					2	1	18			6
Totals	0	25	4	52	39	61	122	67	21	123

Marten harvest by regulatory year and unit

	1983-84[b]		1984-85		1985-86		1986-87		1987-88	
	Units		Units		Units		Units		Units	
Month	1B	3	1B	3	1B	3	1B	3	1B	3
Dec			133	135	51	42	110	71	109	219
Jan			37	69	18	21	37	27	141	133
Feb			15	46	14	4	2	2	20	10
Totals			185	250	83	67	149	100	270	36

(Continued)

Table 3. Harvest chronology of furbearers in Units 1B and 3, 1983-84 to 1987-88. (Continued)

Otter harvest by regulatory year

Month	1983-84 Units 1B	1983-84 Units 3	1984-85 Units 1B	1984-85 Units 3	1985-86 Units 1B	1985-86 Units 3	1986-87 Units 1B	1986-87 Units 3	1987-88 Units 1B	1987-88 Units 3
Dec	3	8	5	61	5	16	5	18	19	41
Jan	9	24	10	62	1	26	3	21	29	51
Feb	3	10	0	14	2	9	1	6	9	5
Totals	15	42	15	136	8	51	9	45	57	97

Wolverine harvest by regulatory year

Month	1983-84 Units 1B	1983-84 Units 3[c]	1984-85 Units 1B	1984-85 Units 3	1985-86 Units 1B	1985-86 Units 3	1986-87 Units 1B	1986-87 Units 3	1987-88 Units 1B	1987-88 Units 3
Nov					1	1				
Dec	2		2	2	2	1	4			1
Jan	1			1		3	4	1	7	
Feb			2		1	1	2		1	
Mar							2	1	2	
Apr							3		1	
Totals	3	1	4	3	4	6	15	2	11	1

[a] Information not available.

[b] No mandatory sealing, chronology not available.

[c] Chronology not available.

STUDY AREA

GAME MANAGEMENT UNIT: 1C (6,500 mi²)

GEOGRAPHICAL DESCRIPTION: The Southeast Alaska mainland and the islands of Lynn Canal and Stephan's Passage lying between Cape Fanshaw and the latitude of Eldred Rock, including Sullivan Island and the drainages of Berners Bay.

BACKGROUND

Marten, mink, otters, and beavers make up the majority of the harvest of furbearers in Subunit 1C. Smaller numbers of wolverines and weasels are also taken each year.

Beavers exist at moderate levels in most drainages along the coastal mainland where habitat is suitable. In contrast to other units in Southeast where clearcut logging may provide additional habitat for beaver colonization, limited natural or human-caused disturbances present successional stages conducive to expansion and growth of beaver populations in most of Subunit 1C. Berners Bay produces the largest harvest each year, but the Taku River, Herbert-Eagle River system, St. James Bay on the Chilkat Peninsula, and Shelter Island also contribute substantially to the total. Few beaver have been sighted on Douglas Island.

River otter are fairly common along the mainland coast and most larger islands in Subunit 1C. While little is known about otter populations, they are thought to be most abundant in sheltered waters provided by the many bays and inlets. River otter ecology in southern Southeast Alaska has recently been investigated by Larson (1983) and Woolington (1984).

Marten remain at moderate-to-high levels; the prices offered for furs and the relative ease of trapping marten keep harvest levels high. The sealing program for marten began in 1985, providing valuable harvest data for this economically important furbearer.

Little data is available for mink or wolverines; because mink are not sealed, most information is anecdotal. Although wolverines must be presented for sealing, the number harvested each year provides little insight into their distribution or abundance. Wolverines are generally found inland along the coastal mountains, although elevations from which they are harvested varies with winter weather conditions. While wolverines may be one of the more elusive and uncommon species trapped in the subunit, high pelt prices provide incentive for trappers.

POPULATION OBJECTIVES

To maintain a furbearer population capable of sustaining harvests at least as high as the 1984-85 levels as follows Beaver, 36; Lynx,

1; Marten, 245; Otter, 34; and Wolverine, 9.

METHODS

Mandatory sealing of marten, beavers, otters, wolverines, and lynx was the chief source of furbearer harvest data. For each species, method and month of take, transportation means, and trap location were recorded. Sex and pelt size were recorded for otters and lynx, while only pelt size was determined for beavers. The sex ratio of the marten harvest was also noted. Trapper interviews provided additional insights into perceived population status and trapping pressure.

RESULTS AND DISCUSSION

Population Status and Trend

Based on trapper reports and harvest data, populations of all furbearers in Subunit 1C appear to be stable. Lynx remain uncommon, while otters, mink, and marten are common or moderately abundant.

Beaver harvests remained higher than average for the second year in a row; however, the increment was likely a product of increased pressure by a few individuals, rather than an indication of population growth.

Mortality

Hunting Seasons and Bag Limits:

Marten, otter,	No Open Season	
mink, beaver lynx	Nov 1 - Mar 31	
Two Wolverine	Nov 10 - Feb 15	One

Trapping Seasons and Bag Limits:

Marten, otter,	Dec 1 - Feb 15	No limit
mink, lynx Beaver	Dec 1 - May 15	No limit
Wolverine	Nov 10 - Apr 30	No limit

Human-induced Mortality:

The number of beaver harvested this year was less than half of the 1986-87 harvest (Table 1); however, the 47 beaver harvested in 1987-88 was still well above the 1980-86 annual mean (i.e., 30. The record season of 1986-87 was the result, in part, of a single trapper who was responsible for 40% of the take. That trapper was inactive during the 1987-88 season. During this reporting period, 10 trappers reported taking 47 beaver, averaging 4.7 beaver/trapper. Two trappers, however, accounted for 53% of the harvest.

The number of otters taken in 1987-88 was the highest since 1980,

and at 55 animals, it was well above the previous 5-year mean of 34 (Table 1). Males accounted for 56% of the take. Fourteen trappers reported taking otters, an average of 3.9/trapper.

Eight wolverines were taken by 7 trappers during this reporting period. No lynx were taken in Subunit 1C.

The marten harvest was up substantially this year; 314 animals were taken (Table 1). This was the highest harvest recorded since the beginning of the sealing program in 1985. Males comprised 66% of this year's harvest.

Harvest Chronology: Trappers reported taking most of their beavers in April (55%) and January (29%). The remainder were taken in December and May. No beavers were harvested during February or March.

Most of the otter harvest was split between December (43%) and January (41%). The remaining 16% was taken during the first half of February.

January was the most productive month for wolverine trappers, and 5 animals (63%) were taken. One wolverine was taken in each of the following months: December, February, and March.

Table 2 depicts the chronology of the marten harvest. December continues to be the best time for trapping marten. During this reporting period, 173 marten, or 55% of the total harvest, were taken in that month. Seventy percent of the animals caught in December were males. As the season progressed, both numbers of marten trapped per month and percentage of males in the harvest declined. During the final 15 days of the season, only 13 marten were taken and the sex ratio dropped to 7 males:6 females.

Transport Methods: The majority of beaver and otter trappers (i.e., 77% and 76%, respectively) reported using boats as their primary means of transportation. Highway vehicles, skis or snowshoes, and airplanes were also used. Wolverine trappers primarily used highway vehicles (50%) and boats (25%). One wolverine trapper traveled by plane and one used snowshoes. Although marten trappers were not required to report transport methods, of those who reported, most travelled by boat and a smaller number used highway vehicles.

Habitat Assessment

Unlike most of Southeast, Subunit 1C has had only limited timber harvest in recent years, an activity that can have substantial impacts on furbearer habitat. In areas that have been heavily logged previously inaccessible drainages that have been roaded, symptoms of overharvesting have become apparent in the marten catch. Sex ratios close to 50:50 or even slightly skewed toward females, an indication of overharvesting, have been observed in areas that have many miles of new logging road (i.e., portions of

Unit 4). In contrast, males continue to dominate the harvest in Subunit 1C.

Berners Bay, a productive area for furbearers, is the next likely extension of the Juneau road system. Both timber harvest and mining activity are planned northwest of Echo Bay, the current terminus of the road. Additionally, a renewed effort has recently been mounted to gain public support for a road linking Juneau and Haines. In conjunction with disturbance from logging and mining, the opening of these areas to vehicle-borne trappers could negatively impact furbearers in those areas.

Game Board Actions

The Alaska Board of Game recently promulgated a regulation that closes many areas along the Juneau-Douglas road system to trapping. Until the 1987-88 season, only a 1/4-mile-wide strip along the mainland coast between the end of Thane Road and Eagle River and most of the Mendenhall Valley were off limits to trapping. The new regulation more than doubled the closed area by adding a 1/4-mile-wide strip along the length of the Douglas Highway, extending the mainland strip to the end of the road system at Echo Cove, and adding a 1/2-mile-wide strip centered on most winter-use trails in the borough.

CONCLUSIONS AND RECOMMENDATIONS

Harvests of marten and otters were up substantially in 1987-88. The beaver catch, although down from the previous year, was still above average. Harvest parameters (e.g., sex ratios of marten and pelt sizes of beavers) have not shown characteristic signs of overharvesting.

Prices paid for marten are likely to remain high enough to support continued heavy trapping pressure. Sex ratios of the harvest will continue to be monitored closely. Because most marten are taken early in the season, it is difficult to control harvest by adjusting the length of the season. Should control become necessary, bag limits may also be needed. Trappers have the opportunity with marten to practice self-regulated management. A marten harvest containing greater than 30% to 35% females should indicate to the trapper that (1) an inordinate proportion of the breeding stock is being lost and (2) pressure should be reduced to ensure continued production.

The size of beaver pelts presented for sealing have not decreased, an indication of a higher portion of juveniles and kits in the bag. We will monitor the early returns during the 1988-89 season, especially those from Berners Bay and Shelter Island, 2 areas that receive heavy trapping pressure. Unlike marten, it is possible to adjust the length of the season for beaver. As there are 2 peaks in the beaver harvest, one in December-January and the other late in the spring, an early closure of the season would probably eliminate the potential for overharvesting.

Population objectives identified for all species have been met and exceeded this year, with the exception of lynx. Lynx are known to occur on the mainland, and there are reported sightings and/or track observations each year. Nevertheless, they should be considered rare within the subunit. The harvest of lynx is almost always incidental to other trapping efforts, and the population objective (i.e., harvesting 1 lynx/year) is probably not realistic.

Population objectives previously identified for marten have failed to address the sex ratios of the harvest. For marten we should maintain a population capable of sustaining a harvest at least 250 animals; furthermore, the harvest be made up of no less than 65% males.

The recent regulatory change greatly increasing the area closed to trapping within the subunit will effect several trappers in the Juneau area. The area to be closed beginning in 1988-89 produced 22% of the otter and 13% of the beaver harvested in 1987-88. Trappers displaced by this closure may move into the few other easily accessible areas that already receive moderate to heavy use. Conflicts with other trappers and excessive harvests may occur in areas such as Berners Bay.

At present only limited opportunities for trapper education are available in Juneau through the local trappers association. Trapper education, which is mandatory in many states for inexperienced trappers, provides instruction in effective trapping techniques and equipment, furbearer management, and trapline management encouraging ethical and humane trapping methods. The need for increased participation by the Department in such educational programs in Juneau will be examined in the coming year. Advancement of furbearer management concepts and trapping ethics will benefit the trapping public and the Department's efforts to better manage the resource.

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PREPARED BY:

Tom M. McCarthy
Game Biologist II

SUBMITTED BY:

David M. Johnson
Regional Management Coordinator

Table 1. Furbearer harvest in Subunit 1C, 1983/84 - 1987/88.

Year	Beaver	Lynx	Marten	Otter	Wolverine
1983-84	96	1	193	41	5
1984-85	36	1	245	31	9
1985-86	22	0	128	38	8
1986-87	107	0	241	31	9
1987-88	47	0	314	55	8
Mean	62	1	224	39	8

Table 2. Chronology of marten harvest by sex in Subunit 1C, 1987-88.

	Males		Females	
Month	n	%	n	%
December	121	70	52	30
January	69	63	41	37
February	7	54	6	46
Unknown	11	61	7	39
Total	208	66	106	34

STUDY AREA

GAME MANAGEMENT UNIT: 1D (2,600 mi^2)

GEOGRAPHICAL DESCRIPTION: That portion of the Southeast Alaska mainland laying north of the latitude of Eldred Rock, excluding Sullivan Island and the drainages of Berners Bay.

BACKGROUND

Trapping in Subunit 1D may be limited by the relative scarcity of most furbearers. With relatively limited marine shoreline, little otter habitat is available, compared with most other Southeastern areas; hence, otter harvests are proportionately lower. Harvest data suggest lynx populations have been low for at least the last 4 years. Alternatively, the rugged mountainous terrain of the subunit provides extensive wolverine habitat. In recent years, more wolverines have been taken from this subunit than from any other in Southeast.

Because beaver remain scarce in the area, the season has not been open since 1975. Local people have expressed interest in having beavers transplanted into some of the drainages within the subunit. The feasibility of such a move is being examined by the Division. In addition to replenishment of beaver numbers, associated habitat alterations that may also benefit moose will be a factor in the site selected for such a reintroduction.

POPULATION OBJECTIVES

Measurable population objectives for all species presently harvested in the subunit should be developed by 1990. At a minimum, furbearers will be managed to maintain a population capable of sustaining harvests at levels equal to the 1983/84 through 1987/88 average for all species subject to sealing, excepting lynx. Lynx harvest levels should not be evaluated on an annual basis, because trends over decades are more pertinent. The suggested harvest levels for other sealed species are as follow: marten, 92; otter, 6; and wolverine, 9.

METHODS

The mandatory sealing records of marten, otters, wolverines, and lynx provided the best source of data on furbearer harvests. For each species, the method and month of take as well as transportation means were recorded. Habitat information for marten trap locations was also collected. Sex and pelt size were determined for otters and lynx. Sex ratio of the marten harvest was also noted. Trapper interviews provided additional insights into perceived population status and trapping pressure.

RESULTS AND DISCUSSION

Population Status and Trend

Based on harvest reports, marten populations appear to be stable. Division staff expected catch rates for this species to increase over the last several years because of increased trapping pressure brought on by elevated pelt prices; however, the sex ratios in this year's harvest suggest a strong population that is not showing signs of overharvest.

Wolverine harvests are far below average, but a review of sealing records suggests that some of the most productive wolverine trappers of the early 1980's (i.e., when harvests were high) have concentrated on other species or not been active during the past two years. The low catch rate for wolverines should not cause concern at this time because populations are either stable or slightly depressed.

Lynx are currently scarce in the subunit. River otter numbers are probably stable.

Mortality

Hunting Seasons and Bag Limits:

Marten, otter,	No Open Season	
mink Lynx	Nov 1 - Mar 31	Two
Wolverine	Nov 10 - Feb 15	One

Trapping Seasons and Bag Limits:

Marten, otter,	Dec 1 - Feb 15	No limit
mink, lynx Wolverine	Nov 10 - Apr 30	No limit

Human-induced Mortality: The single otter taken during the reporting period represented the smallest harvest in 5 years (Table 1). Lynx trappers were unsuccessful this year, culminating a 4-year slide from a high of 14 during 1983-84 season. Wolverines were taken in lesser numbers than average; 3 trappers accounted for 3 animals, which was well below the 5-year mean of 9. This low harvest could be due, in part, to the transfer of trapper effort from this species to marten.

Records for the marten harvest have only been kept since the 1984-85 season (Table 1). The 1987-88 catch of 108 animals was well short of the 166 marten taken in 1984-85 but above the 4-year average of 92. The percentage of males in the harvest remained strong throughout the season, suggesting a healthy population that does not appear to be overharvested.

Chronology of Harvest: The single otter harvested this season was taken in January. Of the 3 wolverines taken by trappers, two were taken in December and one in January.

The chronology of the marten harvest is provided in Figure 2. Few (6%) marten were taken during November, possibly because trappers do not consider the pelts to be prime. The remainder of the catch was spread fairly evenly from December through February. A large proportion of the catch (27%) was harvested sometime during that 3-month period; however, trappers were unable to specify the exact month. In those instances, the dates are listed as "unknown."

Because the chronology of the marten harvest is markedly dissimilar from that reported for the remainder of Southeast Alaska (i.e., where catch rates drop off sharply after December or early January) and the sex ratio is strongly skewed toward males throughout the season, the marten population in Subunit 1D may currently be underutilized. It therefore could sustain somewhat heavier harvests.

Transport Methods: Highway vehicles were used to transport 1 successful wolverine trapper and the only successful otter trapper. One wolverine trapper traveled by boat and one used snowshoes. Method of transportation for marten trappers is not collected.

Habitat Assessment

Some marten habitat may be lost where old-growth stands, particularly riparian areas, are converted to clearcuts. Many of the areas currently scheduled for harvest, such as those along the upper Chilakat and Klehini Rivers fall into this category. Most operable timber lands within the Haines State Forest support marten. While impacts to wildlife populations are considered in timber harvest plans, mitigation measures or habitat enhancement opportunities are limited and the old-growth forest characteristics, representing important marten habitat, may not be reproducible in second-growth forests.

CONCLUSIONS AND RECOMMENDATIONS

Marten populations appear strong, and no changes in seasons or bag limits are suggested. The mandatory sealing of marten should be continued. The program has allowed close monitoring of catch rates and sex ratios for shifts that may signify declining populations.

The depressed otter and wolverine harvests observed this season may be attributable to adjustment of trapping pressure to other species, particularly marten. Should this trend continue, however, more effort should be made to ascertain specific causes for the decline.

Anecdotal information gained from trappers during the sealing of furs can provide invaluable information regarding furbearer populations, particularly those species for which sealing is not required. While budgetary concerns forced the elimination of the Division's day-to-day presence in Haines, routine visits during the fur season should be continued so that contacts and dialogue with trappers and sportsman can be maintained.

PREPARED BY:

Thomas M. McCarthy
Game Biologist II

SUBMITTED BY:

David M. Johnson
Regional Management Coordinator

Table 1. Furbearer harvest in Subunit 1D, 1983/84 - 1987/88.

Year	Lynx	Marten	Otter	Wolverine
1983-84	14	--[a]	10	18
1984-85	1	166	4	14
1985-86	1	49	5	1
1986-87	1	45	9	9
1987-88	0	108	1	3
Mean	3	92	6	9

[a] Marten sealing program was begun in 1984

Table 2. Chronology of marten harvest by sex in Subunit 1D, 1987-88.

Month	Males		Females		Total
	n	%	n	%	
November	6	86	1	14	7
December	17	74	6	26	23
January	18	64	10	36	28
February	16	76	5	24	21
Unknown	19	66	10	34	29
Total	76	70	32	30	108

STUDY AREA

GAME MANAGEMENT UNIT: 4 (5,700 mi^2)

GEOGRAPHICAL DESCRIPTION: Admiralty, Baranof, Chichagof, and ajacent islands

BACKGROUND

Furbearer trapping is generally pursued as a part-time vocation or recreation by residents of Unit 4. Because the area is made up of 5 major islands (Admiralty, Baranof, Chichagof, Kruzof, and Yakobi) intersected by numerous bays and fjords, the bulk of furbearer trapping is conducted from boats. The intensity of the harvest effort is therefore regulated by the weather.

During periods of high winds (i.e., during winter months) trapping effort declines. The use of motorized land vehicles is increasing in areas where logging roads have been constructed.

Furbearers that occur in GMU 4 include marten, land otter, mink, short-tailed weasel, red squirrel, and beaver.

POPULATION OBJECTIVES

To maintain a furbearer population capable of sustaining harvests at the 1984-85 levels as follows: 14 beavers and 1,355 marten.

METHODS

Trappers are required to submit furs of certain species for examination and sealing. In addition to personnel of the Alaska Departments of Fish and Game and Public Safety who seal furs, there are appointed sealers located in Hoonah and Angoon who are paid $1.00 for each fur sealed.

Alaska regulation 5AAC 92.170 requires that marten, beavers, lynx, land otters, wolves, and wolverines be sealed. To comply with federal regulations required by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), wolf, otter, and lynx hides must be tagged with a dated, numbered CITES seal. Trappers are interviewed at the time of sealing about method of taking, transport means, and month and location of harvest. Sex is recorded for marten and otters, while pelt widths and lengths are recorded for otters and beavers.

Otter pelts are easily sexed by the presence of the preputial orifice found in males. Marten pelts are roughly sorted to sex by the larger size of the male (Strickland and Douglas 1987). After sizing, the presence of a preputial orifice and/or the direction of the growth of the underfur at the posterior end of the abdominal gland is used to verify sex; in females it grows in a posterior direction, while in males the fur grows in an anterior direction at the site of the penile opening (Lensink 1953).

RESULTS AND DISCUSSION

Population Status and Trend

It is difficult to determine marten populations without using expensive mark-recapture techniques. Strickland and Douglas (1987) observed that "regulated" trapping does not appear to limit populations, except in years of reproductive failure; however, they did not elaborate on their definition of "regulated." Marten populations appear to be controlled by environmental factors such as the abundance and availability of prey, which are reflected both in fecundity and mortality (Hawley and Newby 1957, Weckswerth and Hawley 1962). Based on sealing records, it is assumed that marten numbers are declining in Unit 4.

Mink and land otters occur throughout the islands of Unit 4. Populations of both species are probably stable. Beavers occur in small numbers on Baranof Island. Although the season was closed on Chichagof Island during the reporting period, permits to move beavers that were causing problems were issued to the U.S. Forest Service, suggesting that populations may be increasing. Admiralty Island populations are thought to be low and stable.

Population Composition:

Marten sealing records indicate that of the 1,205 marten furs submitted for sealing, 662 (55%) were males, 467 (39%) were females, and 76 (6%) were not specified. The sex ratio at birth is approximately 1:1 (Strickland and Douglas 1987). Male marten are more vulnerable to trapping (Soukkala 1983); normally, two to three times as many males as females are trapped. Yeager (1950) suggested that this is attributable to the larger foraging areas of males, increasing their chance of encountering traps. When food is abundant, more females survive and reproduction is high; however, females and young are more vulnerable to starvation because of high energy demands in years when food is scarce (Hawley and Newby 1957).

Of the 186 otters sealed, 105 (57%) were males, 79 (42%) were females, and two (1%) were not specified. A preponderance of males in the harvest has been attributed to increased male vulnerability because of larger home ranges than those of females (Melquist and Hornocker 1983). Data on the population composition of other species are unavailable.

Distribution and Movements

Marten are found on the major islands of Unit 4. The species was probably endemic to Admiralty Island, which is east of Chatham Strait, but did not naturally occur west of Chatham Strait on Baranof and Chichagof Islands. These 2 islands were the recipients of transplanted animals, when Alaska was still a territory (Burris and McKnight 1973). Seven marten were introduced to an unspecified

location on Baranof Island in 1934; they are assumed to be the source of the current populations on the island. Records indicate that a total of 21 marten were introduced to Chichagof Island: beginning with 6 marten (2 males, 4 females) in 1949, one in 1950, nine in 1951, and five in 1952. Burris and McKnight (1973) stated that the transplant was of questionable value because of little economic return from the transplanted animals. Prices for marten hides increased dramatically in the 1980's, and the species has provided recreation and supplemental income for many residents of Baranof and Chichagof Islands.

Land otters are endemic on the major islands in Unit 4. Otters readily take to salt water, and most of their food is of marine origin.

Beavers presently are known to occur on Admiralty, Baranof, and Chichagof Islands. Beaver distribution prior to statehood was not well documented. A transplant of 10 beavers to Goddard Hot Springs on Baranof Island occurred in 1927 (Burris and McKnight 1973), and beavers are still found in the area. There is no record of a transplant to Chichagof Island, although one had been planned. No records of such a transplant are available; however, beavers currently inhabit Chichagof Island. Admiralty Island beaver populations are probably endemic.

Mortality

Hunting Seasons and Bag Limits:

No open season

Trapping Seasons and Bag Limits:

Beaver, east of Chatham Strait	Dec 1-May 15	No limit
Beaver, west of Chatham Strait	No open season	
Land Otter	Dec 1-Feb 15	No limit
Marten	Dec 1-Feb 15	No limit
Mink	Dec 1-Feb 15	No limit

Human-induced Mortality:

Marten. A total of 1,279 marten were reported trapped during the 1987-88 season (Table 1). This represents an increase of 25% over the 1986-87 harvest, when 957 were taken. Fur export reports indicated that 465 marten (36%) were exported from the Unit 4 (H. Melchior, pers. commun.). Records indicate that 56% came from Chichagof, 27% from Baranof, 14% from Admiralty, and 3% from Kruzof Islands. Table 2 shows the marten catch by island for the last 4 seasons.

I attempted to analyze marten sealing records to determine the

number trapped on the Hoonah road system; however, I found that many records could not be included because information on trapping locations was not specific enough. The usable data showed that 318 marten, 44% of the Chichagof total, were taken on the Hoonah peninsula in 1987-88, compared with 142 (33%) in 1986-87, 199 (21%) in 1985-86, and 281 (33%) in 1984-85 (Table 3).

Otter. According to sealing records, 186 otters were taken in GMU 4 during the 1987-88 season (Table 1). This is the highest otter harvest recorded since the sealing requirement was initiated in the 1972-73 season. Analysis of otter sealing records showed that trappers on Baranof, Chichagof, Admiralty, and Kruzof Islands harvested 99 (53%), 49 (26%), 16 (9%), and 4 (2%) otters, respectively. Eighteen (10%) otters were taken by trappers who were uncertain as to whether Baranof or Chichagof Island was the location (Table 2); this confusion may be attributed to the fact that the 2 islands are separated in places by a very narrow channel. The data showed that no otters were taken on the Hoonah peninsula in 1987-88, compared with 10 in 1986-87, 13 in 1985-86, and 7 in 1984-85 (Table 3).

Mink. While trappers are not required to seal mink, fur export reports indicated that 417 mink pelts were shipped from Unit 4 in 1987-88 (H. Melchior pers. commun.). Assuming that the 36% report rate for marten exports is similar for mink, an estimated 1,157 mink were harvested in 1987-88.

Beavers. Four beavers were taken on Admiralty Island in 1987-88. The beaver season is closed west of Chatham Strait.

Trapper Residency and Success: Of the 70 marten trappers reporting for 1987-88, 50 (71%) were residents of Unit 4 (Table 4). Of the 27 otter trappers who reported catches in 1987-88, 18 (67%) were residents of the unit (Table 4).

Harvest Chronology: A total of 722 (64%) of the marten were taken in December, 278 (25%) in January, and 77 (6%) in February (Table 5). The harvest timing was not known in 202 instances (16%). Sealing records indicate that 84 (45%) of the otters were taken in December, 57 (31%) in January, and 45 (24%) in February (Table 5).

Transport Methods: An overwhelming majority of otter trappers used boats (Table 6); although the means of transport was not collected for other furbearer trappers, boats are the most common transportation means for trappers throughout Southeast Alaska.

CONCLUSIONS AND RECOMMENDATIONS

The beaver harvest remained low during the 1987-88 regulatory year. It is unlikely that the beaver harvest objective of 14 can be met unless the season is opened on Chichagof Island. Timber harvest in valley bottoms on portions of Chichagof Island produced an initial influx of deciduous plants and forbs that may be creating

acceptable beaver habitat (Johnson, in press). Scarcity of beavers in most areas may slow colonization of these sites. An aerial survey of Chichagof Island is needed to determine the current distribution of beaver populations. If populations are found to be at an appropriate level, a conservative season could be implemented. Management may include a bag limit to prevent overharvesting of the animals.

It is not possible to determine if the marten objective of maintaining a population capable of sustaining a harvest of 1,355 marten was met. To provide management guidance, a harvest objective of marten/unit area should be considered.

Nonpermanent marking with plastic cords was again used in sealing marten. According to Johnson (1988), removing temporary seals prior to sale allows Southeast marten to be graded without bias by fur graders. The deliberate downgrading of Southeast marten has not been proven. Although marten are graded according to fur length and color and sold by lots without regard to origin, temporary sealing should be continued because it encourages trapper cooperation.

Marten populations in local areas may decrease because of continued trapping pressure. Areas such as the Hoonah road system on Chichagof Island should be monitored to insure that populations are not overharvested. Johnson (in press) was concerned that logging road access and high fur prices could combine to reduce interior marten stocks that normally repopulate the heavily trapped coastal populations. Shortening the season may have little effect on the marten take; a season closure or bag limit would be a more effective means of limiting the harvest. Season closures would necessarily include mink and otter as well, since incidental catches of marten are high.

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PREPARED BY:

Elroy L. Young
Game Biologist III

SUBMITTED BY:

David M. Johnson
Regional Management Coordinator

Table 1. Marten and otter harvest data in Unit 4, 1983-1987 seasons.

Season	Reported Harvest M	F	U	Total
Marten[a]				
1983-84[b]	--	--	--	--
1984- 85	894	466	1	1,361
1985-86	680	532	110	1,322
1986-87	537	375	45	957
1987-88	700	503	76	1,279
Otter[c]				
1983-84	61	55	1	117
1984-85	89	73	5	167
1985-86	72	72	0	144
1986-87	82	79	0	161
1987-88	105	79	2	186

[a] Marten information in all tables will differ from previous reports because of late submission of certificates.

[b] The marten sealing program was initiated in the 1984-85 season.

[c] Otter data in all tables is subject to revision as additional historical information becomes available.

Table 2. Marten and otter harvest by island in Unit 4, 1983-1987 seasons.

Season	Islands							
	Admiralty	Baranof	Chichagof	Baranof or Chichagof[a]	Kruzof	Yakobi	Unknown	Total
Marten								
1983-84	--	--	--	--	--	--	--	--
1984-85	119	215	840	147	2	38	0	1,361
1985-86	55	177	937	139	14	0	0	1,322
1986-87	188	166	433	144	26	0	0	957
1987-88	173	339	721	0	46	0	0	1,279
Otter								
1983-84	24	42	15	32	0	0	4	117
1984-85	28	92	41	0	1	3	2	167
1985-86	31	28	84	0	1	0	0	144
1986-87	49	47	25	17	1	0	22	161
1987-88	16	99	49	18	4	0	0	186

[a] Location not specific.

Table 3. Marten and otter harvest on Hoonah Peninsula, Chichagof Island, 1983-1987 seasons.

Season	Marten			Otter			
	Males	Females	Total	Males	Females	Unknown	Total
1983-84	--	--	--	2	1	0	3
1984-85	162	119	281	3	2	2	7
1985-86	96	103	199	6	7	0	13
1986-87	84	58	142	6	4	0	10
1987-88	159	159	318	0	0	0	0

Table 4. Trapper residency and success in Unit 4, 1983-1987 seasons.

Season	Successful			Total
	Local residents[a]	Nonlocal residents	Nonresidents	
Marten				
1983-84	--	--	--	--
1984-85	48	20	0	68
1985-86	37	12	0	49
1986-87	39	18	0	57
1987-88	50	20	0	70
Otter				
1983-84	14	7	0	21
1984-85	26	10	0	36
1985-86	23	8	0	31
1986-87	19	10	0	29
1987-88	18	9	0	27

[a] A local resident is a resident of GMU 4.

Table 5. Marten and otter harvest chronology in Unit 4, 1983-87 seasons.

Season	December	January	February	Seasonwide	Total
Marten					
1983-84	--	--	--	--	--
1984-85	702	236	54	369	1,361
1985-86	470	64	6	782	1,322
1986-87	510	117	22	308	957
1987-88	722	278	77	202	1,279
Otter					
1983-84	27	37	0	53	117
1984-85	64	58	33	12	167
1985-86	26	13	14	91	144
1986-87	41	56	11	53	161
1987-88	84	57	45	0	186

Table 6. Successful trapper transport methods for otter in Unit 4, 1983-1987 seasons.[a]

Season	Airplane	Boat	Highway vehicle	Walked	Transport unknown	Total
Otter						
1983-84[a]	--	--	--	--	--	--
1984-85[a]	--	--	--	--	--	--
1985-86	2	118	2	3	19[b]	144
1986-87	3	150	2	6	0	161
1987-88	3	176	3	4	0	186

[a] Transport methods information for otter not required until 1985-86 season.

[b] Some sealers did not use revised forms when transport information requirement added.

STUDY AREA

GAME MANAGEMENT UNIT: 5 (6,235 mi^2)

GEOGRAPHICAL DESCRIPTION: Cape Fairweather to Icy Bay, eastern gulf coast

BACKGROUND

Furbearing species probably gained access to the Yakutat Forelands via the Alsek-Tatshenshini corridor (Klein 1965). Beavers, land otters, and mink are the common water-associated species. Muskrats are noticeably absent. Lynx are present in small numbers, while marten are found in fair abundance. Wolverines are sparsely distributed here, as is normal throughout their range. Trapping pressure has historically been relatively light throughout the Malaspina and Yakutat Forelands.

POPULATION OBJECTIVES

To maintain populations capable of sustaining harvest at the 1983 to 1987 average as follows: beaver, 3; lynx, 1; marten, 44; otter, 2; and wolverine, 2.

To develop objectives for unsealed species (i.e., coyote, mink, red fox, and weasel) by 1990.

METHODS

Alaska trapping regulations require that beaver, lynx, marten, land otter, wolf and wolverine hides be sealed by an authorized sealing officer. Harvest information recorded at that time includes the number of animals taken, location and date of harvest, and size information for some species. Hunters and trappers are also queried concerning furbearer observations made while in the field.

RESULTS AND DISCUSSION

Population Status and Trend

Incidental observations made while in the field suggest that beaver numbers may be increasing across the Yakutat Forelands. Both dams and lodges appear to be abundant, the harvest is the highest it has been in 5 years, and complaints of beaver dams blocking highway culverts have increased in recent years.

The abundance of lynx in Unit 5 is probably at its normally low level. No dramatic increase in the snowshoe hare population has been observed, suggesting that an attendant expansion in lynx numbers has not occurred.

The increased harvest of marten during the reporting period could

be indicative of increased population levels, but it is probably only a result of trapping pressure.

Land otters are more common in Subunit 5A than their harvest level indicates. The relatively low trapping effort in the unit probably accounts for the low incidence in harvest records.

Wolverines exist in Unit 5 in small numbers beyond Yakutat, the road system, and commercial fishing camps. The population trend is unknown.

Mortality

Hunting Seasons and Bag Limits:

Beaver	No open season	No limit
Coyote	Sep 1 - Apr 30	Two coyotes
Fox, Red	Nov 1 - Feb 15	Two foxes
Lynx	Nov 1 - Mar 31	Two lynx
Marten, Mink, Weasel, and Land Otter	No open season	
Wolverine	Nov 10 - Feb 15	One wolverine

Trapping Seasons and Bag Limits:

Beaver	Nov 10 - May 15	No limit
Coyote, Red Fox and Lynx	Dec 1 - Feb 15	No limit
Marten, Mink Weasel, and Land Otter	Nov 10 - Feb 15	No limit
Wolverine	Nov 10 - Apr 30	No limit

Human-induced Mortality: Table 1 shows the harvest of furbearers for the most recent 5-year period. The beaver harvest has remained relatively high over the past 3 years. The harvest of 111 marten is the highest recorded since the state sealing requirement went into effect. Weather in the Yakutat area was characterized by low snow levels early in the winter, when most of the harvest occurred (Table 2). An increasing number of logging roads in the area may have contributed to the harvest by improving access to previously unexploited habitat. The take of lynx, otters, and wolverines remained at low levels.

Trapper Residency and Success: The following number of trappers were successful in catching the following species: beavers, 2; otters, 1; marten, 4; and wolverines, 1. All successful trappers were residents of Yakutat, except for one beaver trapper who was a resident of Juneau.

Harvest Chronology: Two and 5 beavers were harvested in November and April, respectively; 74, 15, and 22 marten were harvested in November, December and January, respectively; and an unspecified

number of otters and wolverines were harvested in February and November, respectively.

Transport Methods: Beaver trappers travelled by highway vehicle and aircraft. The otter and wolverine trappers used a snow machine and an aircraft, respectively. Two marten trappers used boats, one used an aircraft, and one used a highway vehicle.

Habitat

No comprehensive assessment of marten habitat in the spruce-hemlock forest of the Yakutat or Malaspina Forelands has ever been undertaken; however, in Subunit 5A (Yakutat Forelands), clearcut logging is taking place at such a rate that it can be anticipated that some marten habitat is being lost.

CONCLUSIONS AND RECOMMENDATIONS

Harvest appears to be within acceptable limits, with the possible exception of marten because of the impact of logging and associated road construction occurring on the Yakutat Forelands. Should Forest Highway 10, which currently extends from Yakutat to the Dangerous River, be extended largely unexploited furbearer habitat will become very accessible. Any development of unexploited habitat should be evaluated for deleterious effects on furbearer habitat.

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PREPARED BY:

Bruce Dinneford
Wildlife Biologist III

SUBMITTED BY:

David M. Johnson
Regional Management Coordinator

Table 1. Furbearer harvest in Unit 5, 1983-84 - 1987-88.[a]

Year	Beaver	Lynx	Marten	Mink	Otter	Weasel	Wolverine
1983-84	4	3	75	50	4	0	2
1984-85	1	0	63	58	1	7	2
1985-86	6	2	0	NA	2	NA	0
1986-87	8	0	38	NA	2	NA	2
1987-88	7	0	111	NA	1	NA	1

[a] Data from sealing certificates, trapper interviews, trapper export reports, and Survey and Inventory Progress Reports. Data on non-sealed species should be considered low estimates.

Table 2. Marten harvest by sex and month in Unit 5, 1987-88.

Month	Males		Females		Unknown		Totals	
	N	%	N	%	N	%	N	%
November	47	(42)	23	(21)	4	(3)	74	(67)
December	9	(8)	6	(5)	0		15	(13)
January	17	(15)	5	(5)	0		22	(20)
Totals	73	(65)	34	(31)	4	(3)	111	(100)

STUDY AREA

GAME MANAGEMENT UNIT: 6 (14,300 mi^2)

GEOGRAPHICAL DESCRIPTION: Prince William Sound and North Gulf Coast

BACKGROUND

Beaver, coyote, land otter, lynx, marten, mink, muskrat, red fox and wolverine occur in Unit 6; however, only beaver, land otter, mink, and marten, are subject to significant but varying trapping pressure. Beaver density is high east of Cordova and appears to be increasing. The 1964 earthquake uplifted a intertidal marsh area near the mouth of the Copper River (Subunits 6B & 6C). These uplifted lands developed into very good beaver habitat; i.e., numerous ponds and old tidal guts surrounded by dense stands of alder, willow, and poplar. Land otters have also benefitted from the land uplift and are beginning to exploit habitat created by increased beaver activity. Coyotes are common to abundant. Coyotes on the Copper River Delta has been linked with declining production rates for dusky Canada geese. Muskrats were once abundant on the Copper River Delta prior to the 1964 earthquake.

The 1987-88 winter weather brought above-average precipitation that appeared to discourage trapping effort. Fur prices for this period were generally unattractive to trappers. Two exceptions were favorable prices for mink and marten that stimulated trapping activity for those species.

POPULATION OBJECTIVES

To develop measurable objectives for all furbearer species.

METHODS

All beaver and land otter harvested by hunters or trappers are measured and sealed. Trappers are asked their opions of local furbearer population trends and pelt quality at the time of sealing. Beaver cache surveys are flown on selected streams.

RESULTS AND DISCUSSION

Population Status and Trend

Data are insufficient to accurately determine the status and trends of furbearer populations in the Unit. Beavers are generally common to abundant in most freshwater habitat in Unit 6. The population in Subunit 6C is high and presently increasing. Cache count results for the reporting period

are nearly 2 caches per mi^2. Coyotes were common to abundant east of Valdez Arm. Land otter and mink appear to be common to abundant throughout the unit. Marten appear to be increasing and are repopulating heavily trapped areas of Unit 6. Lynx are uncommon. Red foxes are scarce. The distribution and abundance of muskrats has increased, but this species is still at low levels. Woverine harvest levels sugest that this species is either stable or increasing in Unit 6.

Mortality

Season and Bag Limit:

See trapping and hunting regulations No. 28.

Human-induced Mortality:

Trappers took 31 beaver in the Unit; 29 of these were from Subunit 6C. Beaver harvest and trapper effort in Unit 6 fluctuates with fur prices and weather conditions; it does not necessarily reflect beaver density. There was an apparent heavy trapping effort for land otter. One individual harvested over 100 from Subunit 6D. An additional 12 were livetrapped and translocated to Nebraska. Total otter harvest in the unit was less than 150.

One lynx was reported shot prior to an Emergency Closure made in November 1987. The purpose of the closure was to protect remnant lynx during the low period of the population cycle. Seven wolverine were harvested (6 males, 1 female); four were taken from Subunit 6A and 3 from Subunit 6D.

Management Recommendations

Retain the current seasons and regulations. Retain the closure on lynx.

PREPARED BY:

Herman Griese
Wildlife Biologist III

SUBMITTED BY:

John Trent
Management Coordinator

STUDY AREA

GAME MANAGEMENT UNIT: 7 and 15 (10,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Kenai Mountains

BACKGROUND

The Kenai Peninsula has a diverse complement of furbearers that includes all recognized Alaskan furbearers except Arctic fox. The distribution and density of red fox and marten are also limited. Red fox were abundant prior to 1930, according to long-time Kenai residents; however, they quickly disappeared as coyotes established and rapidly increased during the 1930's. Subunit 15C currently supports a small remnant population of red fox; occasionally other observations are reported from other areas of the Kenai Peninsula.

Marten are moderately abundant in Unit 7 but are rare in Unit 15. Since marten have never been common in Unit 15, it is suspected that habitat, rather than human-induced mortality, controls their distribution on the Kenai Peninsula. Beavers, land otters, wolverines, lynx, coyotes, mink and weasels are found throughout the Kenai Peninsula at varying densities, depending on habitat quality or prey abundance.

POPULATION OBJECTIVES

To maintain furbearer trapping seasons and bag limits consistent with population levels during periods of pelt primeness.

To maintain furbearer hunting seasons and bag limits consistent with population levels, but not necessarily limited to periods of pelt primeness.

METHODS

Monitor harvest through mandatory sealing program and reports from local trappers through questionnaires.

RESULTS AND DISCUSSION

Beaver:

Beavers are common in suitable habitat on the Kenai Peninsula; however, population densities and trends have not been measured and are poorly understood. Incidental observations and the trend in nuisance beaver complaints indicate that beaver populations in Subunit 15C peaked in 1984, and thereafter declining slightly. Midwinter flooding

is common in Subunit 15C and may be a significant source of mortality for beavers.

According to sealing certificates since 1983, the annual harvest (Table 1) has exceeded 200 beavers in 3 out of 5 years and, averaging 179 (range = 108-240). Harvest has steadily declined for the past 3 seasons because of reduced trapping effort. The order of magnitude of harvest by subunit and unit during the past 5 years has been: 15A > 7 > 15C > 15B. Recreational trappers are responsible for most of the beaver harvest; few trappers take more than 10 beavers annually.

Land Otter:

Land otters are fairly common in inland waters and sheltered coastal areas of the Kenai Peninsula. Little is known about the population dynamics of this species. Observations of animal sign and harvest information indicate that otters are most abundant in drainages that support large numbers of anadromous fish, large stream-connected lakes, and sheltered coastal waters such as the south shore of Kachemak Bay.

Otter harvests have shown little variation in recent years. The mean annual 5-year harvest (Table 2) has been 53 otters (range = 42-65). Males have consistently outnumbered females; the mean 5-year sex ratio in the harvest was 1.6:1.0.

Wolverine:

Wolverines are most commonly found in the Kenai Mountains, including the southern and eastern coastal areas, Caribou Hills, and the hilly terrain forming the headwaters of the Deep Creek and Anchor River drainages. Wolverines are seldom observed in the northern lowlands or the western coastal fringes of the peninsula. The historical distribution of wolverines on the Kenai Peninsula has not been documented; however, historical harvest records suggest a wider distribution during the late 1960's and early 1970's, when moose densities were highest and wolf densities low.

In the past 5 years the reported wolverine harvest has been relatively stable. The mean annual 5-year harvest (Table 3) was 19 wolverines (range = 12-22). Males have consistently predominated in the harvests; the mean, 5-year sex ratio was 2.2:1.0.

Lynx:

Lynx are cyclically abundant in the forest habitats of the Kenai Peninsula. Early seral, mixed deciduous-spruce forests in Subunits 15A and 15B appear to have a higher

carrying capacity for snowshoe hares; consequently, lynx numbers are usually higher in these areas than in the subclimax spruce forests of Subunit 15C and Unit 7. Lynx populations on the Kenai Peninsula increased noticeably during the early 1980's in response to an abundance of hares. According to harvests and reports from experienced trappers, the densities in Subunit 15A and 15B appeared to peak in either 1985 or 1986, compared with a 1987 peak in Subunit 15C.

Lynx harvests in Units 7 and 15 have steadily increased since 1984-85, in spite of trapping closures in Subunit 15A in 1985, 1986, and 1987 and reduced seasons in the remaining areas (Table 4). The reported harvest of 75 lynx (including 5 nonsport) in 1986-87 was the largest on record since mandatory sealing began in 1977. The proportion of kittens in the harvest remained stable from 1983-84 to 1984-85, declining sharply in 1985-86 following the crash of snowshoe hares in the northern portion of the Kenai lowlands in 1984-85. Since 1983 the sex ratio of harvested lynx has been 0.9 males:1.0 females.

Season and Bag Limit:

See trapping regulations No. 28.

CONCLUSIONS AND RECOMMENDATIONS

Current harvest levels for beaver do not seem excessive; conversely, beaver populations have been underutilized in remote portions of the Peninsula, particularly Subunit 15C. I recommend establishing beaver cache surveys along several representative drainages in Subunit 15C to monitor population trends and determine whether additional harvesting is warranted.

Land otter and wolverine harvests have been relatively stable over the past 5 years. However, a change in land otter and wolverine seasons in 1987-88 may result in a reduced harvest, compared with current levels.

Lynx management on the Kenai Peninsula, particularly on the Kenai National Wildlife Refuge, has been a controversial issue in recent years. The U.S. Fish and Wildlife Service believes that lynx have been overexploited on the refuge during the last decade, especially in accessible areas (Bailey et al. 1986). Recent trapping effort on the Kenai Peninsula during periods when lynx populations were high has not exceeded sustained-yield levels; however, as lynx numbers decline and enter the low population cycle, season reductions and trapping closures should be implemented to maintain optimum lynx numbers prior to entering the population rebuilding phase. Interagency and public discussion of lynx management on the Kenai Peninsula have

resulted in a number of decisions by the Department and Board of Game that have either closed (i.e., Subunit 15A, 1984-85 to 1986-87) or shortened (i.e., Unit 7 and Subunits 15B and 15C) trapping seasons.

During a lynx population decline in Alberta, Brand and Keith (1979) suggested that trapping mortality was additive to natural mortality. Using computer modeling, they showed that more lynx would be produced and greater long-term harvests achieved when trapping was curtailed for 3-4 years starting with the 2nd year after the peak in the lynx harvest. This harvest strategy should be implemented on the Kenai Peninsula. Hare and lynx cycles in Subunits 15A and 15C are not synchronous; however, to avoid displacement of trappers, closures should be consistent in Units 7 and 15. A closure for hunting and trapping is recommended for the 1988-89 season.

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PREPARED BY:

Ted H. Spraker
Game Biologist III

SUBMITTED BY:

Donald G. Calkins
Survey-Inventory Coordinator

Table 1. Summary of annual beaver harvests on the Kenai Peninsula by game management unit, 1983-88.

Regulatory year	Game Management Units					Total
	7	15A	15B	15C	All 15	
1983-84	31	56	5	16	77	108
1984-85	36	92	16	64	172	208
1985-86	56	111	7	66	184	240
1986-87	79	48[a]	12	75	135	214
1987-88	49	45	8	25	78	127
$\bar{X}$	50	70	10	49	129	179

[a] Two nonsport harvests included.

Table 2. Summary of land otter harvests on the Kenai Peninsula by game management unit, 1983-88.

Regulatory year	Unit/ Subunit	Sex				Total
		Male	(%)	Female	Unk.	
1983-84	7	5		2	-	7
	15A	9		5	-	14
	15B	-		2	-	2
	15C	19		9	1	29
	Subtotal	33	(65)	18	1	52
1984-85	7	9		8	-	17
	15A	10		11	-	21
	15B	2		-	-	2
	15C	11		11	-	22
	Subtotal	32	(52)	30	-	62
1985-86	7	8		2	1	11
	15A	12		4	-	16
	15B	6		5	-	11
	15C	17		8	2	27
	Subtotal	43	(69)	19	3	65
1986-87	7	6		1	-	7
	15A	8		7	1	16
	15B	3		1	-	4
	15C	9		5	1	15
	Subtotal	26	(65)	14	2	42
1987-88	7	3		5	1	9
	15A	7		2	1	10
	15B	5		2	-	7
	15C	6		10	-	16
	Subtotal	21	(53)	19	2	42
Totals		155	(61)	100	8	263
$\bar{X}$		31		20	1.6	53

Table 3. Summary of wolverine harvests on the Kenai Peninsula by game management unit, 1983-88.

Regulatory year	Unit/ Subunit	Sex Male	(%)	Female	Unk.	Total
1983-84	7	7		1	2	10
	15A	1		1	-	2
	15B	-		-	1	1
	15C	3		3	-	6
	Subtotal	11	(69)	5	3	19
1984-85	7	9		8	-	17
	15A	1		-	1	2
	15B	-		-	-	-
	15C	1		2	-	3
	Subtotal	11	(52)	10	1	22
1985-86	7	6		1	-	7
	15A	-		-	-	-
	15B	-		1	-	1
	15C	2		2	-	4
	Subtotal	8	(67)	4	-	12
1986-87	7	9		2	-	11
	15A	-		-	-	-
	15B	3		-	-	3
	15C	4		3	-	7
	Subtotal	16	(76)	5	-	21
1987-88	7	12		2	-	14
	15A	1		-	-	1
	15B	2		1	-	3
	15C	2		2	-	4
	Subtotal	17	(77)	5	-	22
Totals		63		29	4	96
$\bar{x}$		17		6	.8	19

Table 4. Summary of lynx harvests on the Kenai Peninsula by game management units, 1983-88.

Regulatory year	Unit/ Subunit	Adults			Kittens			%	Unclass	Total
		M	F	Unk.	M	F	Unk.			
1983-84	7	1	1	-	-	-	-		-	2
	15A	6	3	-	1	2	-		-	12[a]
	15B	3	8	-	4	4	-		2	21
	15C	1	2	-	-	1	-		-	4
	Subtotal	11	14	-	5	7	-	30.7	2	39
1984-85	7	1	1	-	-	-	-		-	2
	15A	-	-	-	-	-	-		-	-
	15B	8	7	-	5	4	-		-	24
	15C	-	3	-	-	-	-		-	3
	Subtotal	9	11	-	5	4	-	31.0	-	29
1985-86	7	6	8	-	2	1	-		1	18
	15A	-	2	-	-	-	-		-	2
	15B	9	6	4	2	2	1		-	24
	15C	5	11	-	1	3	-		-	20
	Subtotal	20	27	4	5	6	1	18.7	1	64
1986-87	7	13	7	-	1	2	-		-	23
	15A	1	1	-	1	1	-		-	4[b]
	15B	10	13	-	3	2	-		3	31[c]
	15C	5	7	-	2	3	-		-	17
	Subtotal	29	28	-	7	8	-	20.6	3	75
1987-88[d]	7	-	-	-	-	-	-		-	-
	15A	1	1	-	-	-	-		-	2
	15B	5	-	-	1	-	-		-	6
	15C	-	-	-	-	-	-		-	-
	Subtotal	6	1	-	1	-	-	13.0	-	8
Total		75	81	4	23	25	1		6	215

[a] Includes 1 nonsport.
[b] Includes 3 nonsport.
[c] Includes 2 nonsport.
[d] Nonsport mortality, no open season.

STUDY AREA

GAME MANAGEMENT UNIT: 8 (8,750 mi^2)

GEOGRAPHICAL DESCRIPTION: Kodiak Archipelago

BACKGROUND

Furbearer species native to the Kodiak area include red foxes, land otters and short-tailed weasels. Beavers and muskrats were introduced in 1925, and mink, marten, and red squirrels were introduced in 1952 (Burris and McKnight 1973). Raccoons were brought into the area sometime prior to 1934 and non-Native red and arctic foxes may have escaped or were released from fox farms in the early part of the century.

Beavers, land otters, red foxes and short-tailed weasels are the most abundant furbearers. Muskrats and red squirrels are common in some areas but are not widespread. Marten are restricted to the forested areas of Afognak Island. Mink, raccoons, and Arctic foxes are extremely rare or nonexistent.

POPULATION OBJECTIVES

To develop measurable objectives for all furbearer species.

METHODS

All beavers and land otters harvested by hunters or trappers were measured and sealed. Trappers were asked their opinions of local furbearer population trends and pelt quality at the time of sealing. No data on other species were collected.

RESULTS AND DISCUSSION

Population Status and Trend

Data are insufficient to accurately determine the status and trends of furbearer populations in the unit. Beaver, otter and fox populations appear to be stable. Except on the Kodiak road system and in a few local areas, furbearer populations are regulated more by natural mechanisms than by trapping.

Mortality

Hunting Seasons and Bag Limits:

Beaver	No open season	
Red Fox	Nov. 1 - Feb. 15	2 foxes
Marten	No open season	
Mink & Weasel	No open season	
Muskrat	No open season	
Land otter	No open season	
Red squirrel	No closed season	No Limit

Trapping Seasons and Bag Limits:

Beaver	Nov 10 - Apr 30	No Limit
Red Fox	Nov 10 - Mar 31	No Limit
Marten	Nov 10 - Jan 31	No Limit
Mink & Weasel	Nov 10 - Feb 28	No Limit
Muskrat	Nov 10 - Jun 10	No Limit
Land Otter	Nov 10 - Jan 31	No Limit
Red squirrel	No closed season	No Limit

Human-induced Mortality:

Eighteen trappers harvested 88 beavers during the 1987-88 season. This is the lowest reported beaver harvest in the past 4 years (Table 1). The mean catch per trapper was 4.9 bears, and the largest individual catch was 19 beaver. Most (75%) were taken from the Kodiak Island area.

Twenty-four trappers harvested 142 land otters in Unit 8 during the reporting period. This harvest level is higher than that reported for last year, but below 1984-85 and 1985-86 levels (Table 2). The percentage of males in the harvest (56%) was comparable to that reported in previous years. The mean catch per trapper was 5.9, and the largest individual catch was 19 otters. Most (64%) were taken from the Kodiak Island area.

CONCLUSIONS AND RECOMMENDATIONS

Trapping pressure remained relatively low in Unit 8; 18 and 24 trappers sealed beavers and land otters, respectively. The land otter harvest remained well below the 1980-81 peak of 409. The beaver harvest was relatively low; few drainages received any trapping pressure. No data were collected on red foxes, the furbearer that is most intensively trapped in the unit. Furbearer populations in Unit 8 are well below sustained yield. No changes in season or bag limit are recommended.

LITERATURE CITED

Burris, O.E. and D.E. McKnight. 1973. Game Transplants in Alaska. Wildlife Technical Bulletin 4. Alaska Dept. Fish and Game. Juneau. Fed. Aid Wildl. Rest. Project W-17-R. 57pp.

PREPARED BY:

Lawrence J. Van Daele
Wildlife Biologist II

SUBMITTED BY:

John N. Trent
Management Coordinator

Table 1. Beaver Harvest in GMU 8 for 1984-85, 1985-86 and 1986-87.

	1984-84 No. beaver	1985-86 No.beaver	1986-87 No. beaver	1987-8 No. beaver
Afognak, Raspberry Shuyak Islands	24	7	15	22
Kodiak and Adjacent islands	69	234	130	66
Unknown location	5	0	2	0
Total	98	241	147	88
No trappers	14	17	20	18
Mean catch/trapper	7.4	14.2	7.0	4.9
Largest individual catch	19	57	43	19

Table 2. Land otter harvest in GMU 8 for 1984-85 through 1987-88 (percent in parentheses)

	1984-85			1985-86				1986-87			1987-88		
	Male	Female	Total	Male	Female	Unk	Total	Male	Female	Total	Male	Female	Total
Afognak, Raspberry, Shuyak	56(58)	41(42)	97	29(44)	37(56)	2	68	33(66)	17(34)	50	32(64)	19(36)	51
Kodiak and adjacent islands	48(57)	36(43)	84	103(59)	72(41)	7	182	29(48)	32(52)	61	46(52)	42(48)	91
Unknown location in GMU 8	4(67)	2(33)	6	0 --	0 --	0	0	0 --	0 --	0	0 --	0 --	0
TOTAL	108(58)	79(42)	187	132(55)	109(45)	9	250	62(56)	49(44)	111	78(56)	60(43)	142
No. Trappers													
Mean catch/trapper													
Largest individual catch													

STUDY AREA

GAME MANAGEMENT UNITS: 9 (45,522 mi^2) and 10 (15,798 mi^2)

GEOGRAPHICAL DESCRIPTION: Alaska Peninsula mainland offshore islands, Aleutian and Pribilof Islands

BACKGROUND

The species of furbearers addressed in this study include beavers, coyotes, red foxes, Arctic foxes, lynx, marten, mink, muskrats, land otters, and wolverines. All of them, except the Arctic foxes, are found on the Alaska Peninsula. There is considerably less diversity of furbearers present on the islands offshore of the Alaska Peninsula and Aleutian and Pribilof Islands. On some offshore islands furbearers are present as a result of past introductions for fur farming or efforts to establish harvestable wild populations.

Beavers are found on the mainland portion of the Alaska Peninsula north of Port Moller. The most productive beaver habitat is characterized by a dependable water supply with little fluctuation in stream flow and abundant and easily accessible willow, aspen, cottonwood, or birch vegetation. Beavers are found from sea level to elevations of 4,000 feet.

Coyotes apparently first arrived in Alaska about 1915, and rapid population expansion occurred. Coyotes are restricted to the mainland portion of Unit 9. Relatively few coyotes are trapped, usually incidentally to trapping foxes, lynx, and wolves. A few coyotes are taken by sport hunters.

Red foxes occur on the mainland portion of the Alaska Peninsula, on some of the offshore islands and on the larger islands of the eastern Aleutians. Red fox introductions to these islands go back to the Russian period, continuing through 1932. Some of these earlier introductions were later exterminated to facilitate introduction of the Arctic fox. Periodically, rabies, mange, and distemper epidemics occur in fox populations, resulting in widespread mortality.

Arctic foxes occur in a narrow band along marine coasts, open tundra, rocky beaches, and sea ice many miles from shore. Its natural distribution extends to the northwestern shore of Bristol Bay. Arctic fox of the blue-color phase were introduced on some of the offshore islands of the Alaska Peninsula, the Aleutian Islands, and the Pribilof Islands during the Russian period. Arctic foxes are noted for their extreme fluctuations in population levels; periodic peaks in populations occur approximately every 4 years and are tied to cyclic fluctuations in small rodent populations. Foxes frequent beaches in search of carrion; they are also efficient predator of nesting birds. The

U.S. Fish and Wildlife Service is attempting to eliminate Arctic foxes from many of the islands.

Lynx occur on the mainland portion of the Alaska Peninsula north of Port Heiden. They primarily inhabit the northern boreal forest, where they feed largely on showshoe hares. Occasionally lynx occur on the tundra beyond treeline, and in starvation years they venture onto the tundra in search of Arctic hares, lemmings and ptarmigan. Lynx populations fluctuate in response to the abundance of their primary prey. The lynx-hare cycle is well known, and population highs can sometimes be predicted, usually every 8 to 10 years. However, Unit 9 is on the fringe of the range for both lynx and showshoe hare, and the fluctuations for both these species are less consistent than elsewhere in Alaska.

Marten occur only in the northern portion of Subunit 9B. The distribution of marten is limited primarily to climax spruce forests from sea level to timberline.

Mink occur on the mainland portion of the Alaska Peninsula and on Unimak Island. Microtine rodent populations typically fluctuate drastically and are a primary factor affecting mink abundance. An abundance of mice or hares in upland areas will sometimes prompt mink populations to expand inland in search of prey. In some areas spring flooding may reduce populations by drowning young mink in dens.

Land otters occur on the mainland portion of the Alaska Peninsula, the eastern offshore islands, and Unimak Island. Otter populations are relatively stable. Coastal areas provide abundant marine food. Parasites and disease are not normally important mortality factors. Flooding in the spring sometimes drowns young otters in their dens.

Wolverines occur on the mainland portion of the Alaska Peninsula and Unimak Island. Wolverines never attain high densities because of their large territorial requirements and low reproductive rate.

POPULATIONS OBJECTIVES

To develop measurable objectives for all furbearer species.

METHODS

Current efforts to monitor furbearer population trends have been targeted on harvest enumeration and information obtained from trappers through our annual "Trapper Questionnaire." During this reporting period no surveys were conducted. All field observations of furbearers were incidentally made during moose, caribou, and brown bear surveys.

The recorded annual furbearer harvests are derived from 2 sources: (1) sealing certificates, and (2) combined total of fur

trapper export plus dealer acquisition reports. Since furs kept for personal use sometimes are not reported, actual harvests exceed those obtained from these data sources. Pelt sealing gives us the most accurate and complete information. Four species (beaver, lynx, land otter, and wolverines) must be sealed. The number of lynx sealed is very close to the actual number harvested because of its high commercial value.

For unsealed furbearers (coyote, red fox, arctic fox, martin, mink, and muskrat) the recorded harvest is the combined total of fur trapper export and dealer acquisition reports. This recorded harvest is unquestionably lower than the actual harvest.

An estimate for actual harvest for unsealed furbearers can be obtained by assuming that 35% of actual harvest is represented by the combined trapper export and dealer acquisition reports (Table 1). This technique is based on the following assumptions: (1) all harvested beavers, lynx, river otters, and wolverines are sealed, (2) for these four species, a constant percentage (35%) of the total harvest is also reflected in combined trapper export and dealer acquisition reports, and (3) this percentage can also be applied to unsealed furbearer species tallied on export and acquisition reports. These assumptions have not been tested, and the estimates derived for unsealed species should be viewed as rough approximations. For example, from 1977 to 1988 the Unit 9 harvests (i.e., combined trapper export and dealer acquisition reports) of beavers, lynx, and land otters ranged between 9% and 92% of the total pelts sealed (Table 1).

RESULTS AND DISCUSSION

Mortality

Hunting Seasons and Bag Limits:

Coyote	Units 9 & 10	Sep 1-Apr 30	2 per season
Red Fox	Units 9 & 10	Nov 1-Feb 15	2 per season
Arctic Fox	Unit 9	Dec 1-Mar 15	No limit
	Unit 10	No closed season	No limit
Lynx	Units 9 & 10	Nov 1-Mar 31	2 per season
Wolverine	Units 9 & 10	Nov 10-Feb 15	One per season

Trapping Seasons and Bag Limits:

Beaver	Unit 9A	Feb 1-Apr 30	40 per season
	Unit 9B	Feb 1-Mar 31	40 per season

	Unit 9E, that portion south of and including the drainages of the Meshik and Aniakchak Rivers	Jan 1-Mar 31	40 per season
	Unit 9C and remainder of 9E	Feb 1-Mar 31	40 per season
	Unit 9D	Feb 1-Mar 15	20 per season
	Unit 10	No open season	
Coyote	Units 9 & 10	Nov 10-Mar 31	No limit
Red Fox	Units 9 & 10 Unimak Island only	Nov 10-Feb 15	No limit
	Unit 10, except Unimak Island	No closed season	No limit
Arctic Fox	Unit 9	Nov 10-Feb 15	No limit
	Unit 10	No closed season	No limit
Lynx	Unit 9	Nov 10-Mar 31	No limit
Marten	Unit 9	Nov 10-Feb 28	No limit
	Unit 10	Nov 10-Jan 31	No limit
Mink	Units 9 & 10	Nov 10-Jan 31	No limit
Muskrat	Units 9 & 10	Nov 10-Jun 10	No limit
Otter	Units 9 & 10	Nov 10-Mar 31	No limit
Wolverine	Units 9 & 10	Nov 10-Mar 31	No limit

Population Status and Trend

Beaver:

A total of 865 beavers were sealed in Unit 9 (Table 2), representing the largest harvest in the past 14 years. Subunits 9B, 9C and 9E produced 70%, 16%, and 13% of the harvest, respectively. Kits made up 17.8% of the harvest, similar to the average for the previous 5 years.

No beaver cache surveys were conducted in 1987. General observations during other survey flights, comments from trappers, and complaints from the public indicate that beaver populations remained high north of Subunit 9D. From information obtained from the Trapper Questionnaire, abundance is high. Therefore, next year's harvest may exceed that for 1986-87 (Table 3).

Coyote:

From dealer acquisition and trapper export reports there were 8 coyotes harvested during 1987-88 in Unit 9, compared with none for 1986-87.

From information obtained from the Trapper Questionnaire coyote abundance was low during the 1987-88 trapping season, but representing a slight increase over coyotes available during the 1986-87 trapping season (Table 3).

Red Fox:

The 1987-88 reported harvest of 89 and 20 red foxes in Units 9 and 10, respectively, (Table 4) is vastly smaller than the actual take. Recent highs of 543 in 1984-85 and 426 in 1976-77 were harvested in Units 9 and 10, respectively.

Trappers reported red fox abundance was moderate to high in Unit 9 during the 1987-88 trapping season, representing an increase over that of the previous year (Table 3).

Arctic Fox:

There were zero and 35 Arctic fox harvested during the 1987-88 trapping season in Units 9 and 10, respectively (Table 4). Recent highs of 30 in 1980-81 and 319 in 1977-78 were harvested in Units 9 and 10, respectively.

Lynx:

A total of 7 and 3 lynx were sealed in Subunits 9B and 9E, respectively (Table 5), representing the smallest harvest in 11 years. A fool proof method of determining sex of lynx from pelt examination has not been established, but often trappers will report the sex of the lynx at the time the pelt is sealed. A noticeable trend towards a decrease in males in the harvest since 1983 poses the question of whether the percentage of males in the harvest represents an indicator of population trend.

From information obtained from the Trapper Questionnaire, lynx abundance was extremely low during the 1987-88 trapping season, representing a considerable decrease over the number of lynx available during the 1986-87 trapping season in Unit 9 (Table 3); however, the abundance of lynx's primary prey species, the snowshoe hare, was moderate to high during the 1987-88 trapping season, representing a considerable increase in abundance over that for the 1986-87 trapping season. Hopefully, lynx populations will accordingly increase.

Marten:

There were 7 marten recorded as harvested during the 1987-88 trapping season in Unit 9 (Table 4). A harvest high of 70 marten was taken in the 1982-83 trapping season in Unit 9.

From information obtained from the trapper questionnaire trappers believed marten abundance to be low during the 1987-88 trapping season and similar to what was available in the 1986-87 trapping season in Unit 9 (Table 3).

Mink:

The reported harvests of 18 and 4 mink in Units 9 and 10, respectively, (Table 4) are substantially lower than the actual take. A recent high of 225 mink was harvested in the 1984-85 trapping season in Unit 9. There has never been a significant harvest of mink in Unit 10.

From information obtained from the Trapper Questionnaire, mink abundance was moderate during the 1987-88 trapping season, similar to that for the 1986-87 trapping season in Unit 9 (Table 3).

Muskrats:

There was no reported harvest for muskrats during the 1987-88 trapping season in Unit 9 (Table 4). A recent high of 161 muskrats were harvested in the 1976-77 trapping season in Unit 9.

From information obtained from the Trapper Questionnaire, muskrat abundance in Unit 9 was low during the 1987-88 trapping season, similar to that during the 1986-87 trapping season (Table 3).

Otter:

A total of 220 otter were sealed in Unit 9, representing the largest harvest in 11 years (Table 6). A recent harvest low of 64 and harvest high of 205 otters were taken in the 1985-86 and 1982-83 trapping seasons, respectively. No harvests have been reported from Unit 10 since 1980.

From information obtained from the Trapper Questionnaire, otter abundance was moderate to high during the 1987-88 trapping season (Table 3).

Wolverine:

A total of 72 wolverines were sealed in Unit 9, representing a typical harvest for the past 11 years (Tables 7). No wolverine harvests have been reported from Unit 10 since 1980.

From information obtained from the Trapper Questionnaire, wolverine abundance was low to moderate during the 1987-88 trapping season (Table 3).

Game Board Actions and Emergency Orders

Lynx hunting and trapping seasons were shortened or closed in much of Interior and Southcentral Alaska to speed the recovery phase of the population cycle. The open season in Unit 9 was reduced by 1 month. In addition, several refugia exist within National Parks and in other inaccessible areas. Because of concerns over increased trapping pressure brought about by high

lynx and beaver pelt prices and the closure of lynx seasons elsewhere Southcentral Alaska, the lynx trapping season was closed on 28 February by Emergency Order. During the past 5 years an average of 14% of the harvest occurred during March.

Mink populations appear to be relatively stable at moderate densities throughout Unit 9. In an effort to standardize seasons for several species to prevent incidental catch of nontarget species as well as enforcement problems, the mink season in Units 9 and 10 were extended by 1 month. This regulatory change is not expected to have much impact on the harvest.

Wolverine populations were relatively stable at low densities throughout Unit 9. Nevertheless, because wolverine numbers have continued to decline throughout most of Southcentral Alaska, the Board adopted a standardized, shortened wolverine trapping season (10 Nov - 28 Feb) for the 1988-89 season.

CONCLUSIONS AND RECOMMENDATIONS

Currently, sufficient furbearer harvest information is available for management purposes.

To evaluate population size and trend, we need adequate field observations to augment the Trapper Questionnaires. Beaver cache surveys should be conducted in areas where considerable harvest occurs. Red fox surveys should be incorporated with current moose composition surveys to tally the number of foxes observed per hour. Lynx population surveys should be standardized, funded and implemented for each Unit. Wolverine represents a problem for establishing population trends through field surveys because they occur only at low densities. Development of techniques for obtaining the population size or trend for other furbearing species should become a priority.

In Units 9 and 10 the indicated furbearer harvests are low. Despite the lack of information on population sizes, I believe we are harvesting furbearers below their sustainable yields.

Prepared By:

David A. Johnson
Game Biologist II

Submitted By:

Larry Van Daele
Survey-Inventory Coordinator

STUDY AREA

GAME MANAGEMENT UNIT: 11 (13,257 mi^2)
13 (22,857 mi^2)

GEOGRAPHICAL DESCRIPTION: Nelchina and Upper Susitna Rivers and Wrangell Mountains

BACKGROUND

Historic harvest data are not available for furbearers in Units 11 or 13 prior to the initiation of sealing requirements. Wolverine and beaver sealing became mandatory in 1971, followed by lynx and river otter in 1977. Little research on furbearer populations has been conducted in either unit until recently, and as a result, data pertaining to population densities, movements, and distribution of furbearers are limited. Indirect indices, such as reports by hunters and trappers and field observations of Department personnel, are the only historic source of information, other than harvest records concerning furbearer abundance.

POPULATION OBJECTIVES

To develop measurable objectives for management of furbearer populations.

METHODS

Aerial and ground transects were randomly distributed within favorable lynx habitat in both units and surveyed to monitor trends in lynx track abundance. Each aerial transect was approximately 2 miles long and 0.25 miles wild. In addition, approximately 90 miles of trap and seismic lines were surveyed by snowmachine. Density estimates for wolverine were obtained in a portion of Subunit 13D in conjunction with the field testing of a new density technique designed to utilize aerial surveys; this technique involved mapping all wolverine tracks encountered while flying predetermined transects through the study area immediately after a fresh snow. All observed tracks were followed until either the wolverine was sighted or the tracks had gone beyond the census boundary. Beaver, lynx, river otter, and wolverine pelts were sealed; trappers were interviewed at the time of sealing. Trapper Questionnaires were sent out to obtain harvest and population information. Data collected from surveys, sealing documents, and questionnaires were analyzed.

RESULTS AND DISCUSSION

Population Status and Trend

Beavers are relatively abundant in Units 11 and 13. Although aerial beaver cache surveys have not been conducted, frequent field observations of beaver ponds and food caches mad during aerial surveys for other game species suggest beaver numbers are high. Trappers responding to the Trapper Questionnaire considered beavers to be abundant.

River otters occur in both units but are not considered abundant in either one. Trappers reported river otters to be scarce to common.

Lynx numbers which are currently very low in Units 11 and 13, are considered to be at the bottom of an approximate 10-year cycle. Responding to the Trapper Questionnaire, all but 1 trapper listed lynx as scarce or absent; however, 78% indicated they believed lynx numbers were stable or increasing slightly. To better assess the status of lynx and monitor changes in abundance, 26 aerial transects (19 in Unit 13 and 7 in Unit 11) were conducted. Fifteen transects were surveyed from 7 to 14 days after snowfall, and an average of 0.9 sets of lynx tracks were observed. Two transects had the same family group of four; 2 transects each held a pair, 5 transects had 1 set of tracks; and 6 transects had no tracks. The remaining 11 transects were surveyed 48 hours after a snowfall, and only one set of tracks was observed. No lynx tracks were found on snowmachine surveys. Because of both the complete lack of sign on the ground transects and the fact that 1-2 weeks was needed after a snowfall before lynx tracks were evident on the aerial transects, I have concluded lynx are present in low densities. Additional surveys are necessary to determine trends.

Wolverine numbers vary considerably in portions of both units. Wolverine are considered abundant in the more remote, mountainous regions but relatively scarce in the forested basin. Of the trappers responding to the Trapper Questionnaire, 65% considered wolverine scarce while the remainder believed they are common. Trapper reports and comments suggest wolverine numbers have declined in Units 11 and 13 over the past 20 years.

The marten populations in Units 11 and 13 are considered to be at historically high levels. Trappers with lines located in favorable marten habitats reported them to be common; however, 35% of the trappers indicated fewer marten on their lines this year. I expect a decline in marten numbers wills occur.

Coyotes are abundant, and their numbers have increased in Units 11 and 13. Prior to 1980 coyotes were located primarily along the larger rivers (e.g., Copper and Chitina Rivers); they are not numerous along most waterways. Fox numbers declined during the mid 1980's as coyotes increased. Foxes are still common over much of the forested lowlands and are considered abundant in subalpine and tundra habitats. Fox numbers are considered to be much higher in Unit 13 than in Unit 11.

Muskrat numbers are currently very low throughout both units. Muskrats were abundant during the early 1980's, but their numbers declined dramatically during the mid 1980's. Observations of muskrat dens increased this past year, but not enough to state with certainty that overall numbers are increasing. Mink were considered to be scarce this year by trappers in both units.

Population Size:

Unitwide population estimates are not available for furbearers in either unit. A density estimate for wolverine was obtained during 1988 (Becker and Van Daele 1988) in a 720-mi^2 portion of Subunit 13D: 10 wolverine (1 wolverine/72 mi^2), 80% CI of 7-14 wolverines (1 wolverine/51-97 mi^2). This is comparable to a density estimate of 1 wolverine/29-55 mi^2 (Gardner and Ballard 1982) in the Upper Susitna River area of Subunits 13A and 13E that was based on radio-collared wolverines relocated over a period of time rather than on a census.

Distribution and Movements:

Beavers and river otters are found throughout both units wherever favorable aquatic habitat occurs. Unit 13 has substantially more riparian habitat than Unit 11, and it generally supports higher numbers of aquatic furbearers.

Lynx distribution follows that of the spruce forest habitat in both units. Lynx numbers are higher in the southern portions of Unit 11, especially in the Chitina Valley, and in Subunits 13D, eastern 13A, and southern 13C. Movement of lynx between the two units occurs, because favorable habitat types are continuous between the units. One incident of a long-distance dispersal of a lynx into Unit 13 has also been documented; during December 1987 an adult male lynx was trapped near Chitina in Subunit 13D. It had previously been radio-collared and ear-tagged on the Kenai Peninsula by the U.S. Fish and Wildlife Service and had been last observed in April 1987 on the Kenai National Wildlife Refuge. This represents a straight-line movement of at least 250 miles within a 7-month period, including crossing a major mountain range.

Wolverines are most abundant in mountainous habitats of the Chugach, Talkeetna, and Alaska Ranges in Unit 13 and the Wrangell Mountains in Unit 11. Prior to the late 1970's wolverines were more numerous near settlements and on the Lake Louise flats than is the case today. Movement patterns for radio-collared wolverine in Unit 13 were reported by Gardner (1985). He observed that movements declined during the fall but increased again in February with the dispersal of juveniles into vacant habitat. A long-distance dispersal of a subadult out of the unit was also reported.

Mortality

Hunting Seasons and Bag Limits:

Coyote	1 Sep - 30 Apr	2 coyotes
Red Fox	1 Nov - 15 Feb	2 foxes
Lynx	1-30 Nov	2 lynx
Wolverine	1 Sep - 31 March	1 wolverine

Trapping Seasons and Bag Limits:

Beaver (Unit 11)	10 Nov - 15 Apr	No limit
Beaver (Unit 13)	10 Nov - 15 Apr	20 per season
Coyote	10 Nov - 31 Mar	No limit
Red fox, marten, wolverine	10 Nov - 28 Feb	No limit
Mink, weasel	10 Nov - 31 Jan	No limit
Lynx	No open season	

Human-induced Mortality:

Beaver harvests reported for Unit 11 have fluctuated yearly, but overall the harvest level has increased in recent years. Although the 1987-88 harvest of 21 beavers is substantially less than the average of 34 reported for 1983-1987 (Table), it is much higher than the average annual take of 9 animals (range = 0-22) reported between 1971 and 1982. The percentage of kits in the 1987 harvest averaged 19%, slightly higher than the 4-year average of 16%.

Beaver harvests in Unit 13 increased sharply beginning in 1985 (Table 2). The 1987-88 reported harvest of 300 beaver is the second-largest catch ever reported in the unit; the highest was 333 in 1986-87. Current harvests are well above the 81-beaver average (range = 33-176) reported for the period between 1972 and 1982. The percentage of kits in the 1987 harvest was 16%, compared with the average of 19% for the previous 4 years.

River otter harvests in Unit 11 have averaged 4 animals per year since 1983. Harvest levels have changed little; the average take has been 6 otters per year (range = 1-11) from 1977 to 1982. In Unit 13 the 1987-88 harvest of 16 otters

was lower than that for the previous year (36). Otter harvests fluctuate from year to year, but the 1983-88 yearly average of 34 is higher than the average (i.e., 24, range = 10-40) from 1977-82. Yearly fluctuations in otter harvests reflect both abundance and overall trapping pressure.

The lynx hunting and trapping seasons were closed in Units 11 and 13 by Emergency Order for the 1987-88 season. Lynx harvests were extremely low during the previous year (1986-87); only 16 were harvested in Units 11 and 13, respectively. During the period from 1984 to 1987 when lynx were declining, the average yearly catches were 38 and 27 lynx in Units 11 and 13, respectively. In contrast, during the previous cyclic low (1978-80), the average harvests were 57 and 49 lynx in Units 11 and 13, respectively. The reported harvest for the last cyclic high (1982-83) was 137 lynx in Unit 11 and 290 in Unit 13. The percentage of kittens in the harvest during the 1986-87 season was only 13% in Unit 11 and 5% in Unit 13.

Wolverine harvests in Units 11 and 13 since 1983 are presented in Tables 1 and 2. In Unit 11, the wolverine harvests have generally declined since the early 1970's, except for 1982-84. Between 1971 and 1982 the average annual harvest was 27 wolverine, but it has averaged only 18 since 1982. The high harvests reported in 1983 and 1984 probably reflected increased trapping activity associated with the recent peak of the lynx cycle. Harvest levels over the past 3 years have been the lowest ever reported in Unit 11. Males have composed 65% of the harvest over the past 5 years (range = 56-78%).

Wolverine harvests have also declined in Unit 13. Between 1971 and 1982, the average annual harvest was 81 wolverines, compared with 42 since 1983. The current take of 27 wolverines is the lowest number of animals ever sealed since initiation of sealing in 1971. Males have composed 64% (range = 53-74%) of the harvest in Unit 13 over the last 5 years. Most of the harvest occurred in mountainous areas of the unit, especially the Alaska and Talkeetna Ranges in Subunit 13E and the Chugach Range in Subunit 13D.

Hunter and Trapper Success. During the 1987-88 season, 7 trappers reported taking beavers in Unit 11. Since 1984 an average of 9 trappers have taken beavers, averaging four per trapper. The number of successful beaver trappers in Unit 13 increased from 15 in 1984 to a high of 55 in 1986, declining to 40 in 1987. The catch per trapper in Unit 13 has been fairly consistent, ranging from 5.8 to 7.5 beavers. Trapping and snaring were the were the most successful harvest methods, accounting for 96% and 100% of the takes in Units 13 and 11, respectively. In Unit 13, 8 problem beavers were shot and included in the harvest figures.

In Units 11 and 13, 2 and 9 trappers harvested averages of 1.5 and 1.8 otters, respectively, during the 1987-88 season. These figures are similar to the 5-year-average annual catch per trapper; i.e., 1.5 and 1.9 otters in Units 11 and 13, respectively. All otters harvested in Unit 11 and 81% of those harvested in Unit 13 were taken in traps.

Prior to the emergency closure on lynx, during the 1986-87 season, 13 trappers took an average of 1.2 lynx in Unit 11. The trapper success rate in Unit 11 represented a substantial decline from that for 1982-83, when 32 trappers reported taking an average of 4.0 lynx. The success rate during the 1986-87 season in Unit 13 also declined, because only 7 trappers reported taking lynx that year, compared with 71 during 1982-83. The average harvest per trapper dropped from 4.1 lynx during the peak of the cycle to 1.3 at the low. During the 1986-87 season trapping and snaring were the most popular harvest methods, accounting for all but one of the lynx taken in both units. In Unit 13 one lynx was shot by a sport hunter.

In Unit 11, 10 wolverine trappers reported taking an average of 1.1 wolverines during 1987-88, a figure similar to the 5-year average of 11 trappers reporting 1.7 wolverines each. During 1987-88, 21 trappers took an average of 1.3 wolverines each in Unit 13, down slightly from the 5-year-average annual harvest of 1.5 wolverines per trapper by 28 trappers.

The most successful method of harvesting wolverines in Unit 11 during the past 5 years (1983-87) has been trapping (90%), followed by landing-and-shooting (5%), and snaring (4%). In Unit 13 over the past 5 years, trapping has accounted for 80% of the wolverine harvest, while the land-and-shoot method has accounted for only 59% of the harvest, while the percentage taken by the land-and-shoot method increased to 30%. The number of wolverine taken by the land-and-shoot method increased this year, because it was the last year trappers could legally use the method.

During the reporting period, a Trapper Questionnaire was extensively employed in both units for the first time, in an attempt to evaluate furbearer harvests and population trends. The response rate was 57% (i.e., 32 of 56 trappers). Unit 11 trappers reported an average of 9.5 years on their lines, averaging 61 miles in length. Unit 13 trappers averaged 11.5 years trapping in the unit, but the length of their lines averaged only 28 miles. All Unit 11 trappers reported that trapping provided an important source of personal income, while 33% of the Unit 13 trappers listed recreation as the primary motivating factor. Trapping pressure declined during 1987-88; 63% and 46% of Units 11 and 13, respectively. With lynx seasons closed, survey results indicated marten as the most important furbearer in

terms of the number taken and availability. In Unit 13 the second-most-important furbearer was the red fox. According to responses to the Trapper Questionnaire, hares were scarce. Since hares are the main prey species for lynx, their populations must substantially increase before lynx can begin recovering.

Twenty of the 32 trappers responding to the Trapper Questionnaire reported harvesting marten in 1987-88; Unit 11 trappers averaged 30 (range = 7-87) and Unit 13 trappers, 16 marten (range = 3-91). Trappers in Unit 11 also averaged harvests of 5 coyotes, 3 mink, and 2 red foxes last year. In Unit 13 red foxes were much more important commercially as trappers averaged 9 foxes (range = 1-41), while coyote and mink catches were similar to those reported in Unit 11, averaging 3 of each species per trapper.

Harvest Chronology. Beaver harvests tended to be larger at the beginning and end of the season in both units. In Unit 11, 33% of the 1987-88 harvest occurred in November and December and 52% in March, while in Unit 13 45% were taken during November and December and 31% in March. The early part of the season is popular because the ice is thinner and beaver meat is sought for trap bait. High harvests in March reflected increased trapper activity associated with longer days, moderate temperatures, and higher pelt prices.

The harvest chronology for otters in Unit 11 has shown no particular pattern over the past 3 years, probably because of the small number taken. The Unit 13 harvest chronology also has fluctuated, but it appears that more otters have been taken in the first 3 months of the season than later on, a pattern that generally reflects overall trapping pressure.

During the last open season (1986-87), 63% of the lynx harvest in Unit 13 occurred in November and December. The lynx harvest in Unit 11 was more evenly distributed throughout the season. These lynx harvest chronologies generally reflect the different trapping patterns in the two units. In Unit 13 where there are more trappers and intense competition, the emphasis in on getting furs early. Unit 11 trappers are fewer, have more traditional trapping areas, and less competition; thus weather and snow conditions often dictate when trapping pressure is the heaviest.

In both units more wolverines are taken later in the season. Before the season was shortened (i.e., ending February 28) in 1985, almost half of the total wolverine harvest occurred during February an March. Since 1971, 26% of the harvest in both units has occurred in February, with January and December following in importance.

Transportation Methods. The transportation methods most used by successful trappers for beavers, river otters, and lynx in Units 11 and 13 and wolverines in Unit 11 were snowmachines, dog sleds, snow shoes, or skis (Table 3). Wolverine trappers in Unit 13, however, reported using aircraft as the principal transportation method.

Game Board Actions and Emergency Orders

The Board of Game, during its November 1987 meeting, made land-and-shoot trapping of wolverines and foxes illegal in Units 11 and 13 beginning with the 1988-89 season. During this same meeting, marten seasons were shortened to 28 days for the 1988-89 season. Lynx trapping was closed by the Board beginning with the 1988-89 season and by Emergency Order for the 1987-88 season.

CONCLUSIONS AND RECOMMENDATIONS

Track survey transects are important management tools for monitoring the furbearer population status and trend. Special emphasis should be given to determining the best time interval after a snowfall to conduct surveys. The effects of changes in densities and movement patterns on survey results must be examined and the techniques modified to compensate for these changes.

Specific survey recommendations for lynx include expanding ground transects by adding additional lines and surveying all transects surveyed previously. Additional wolverine surveys should also be completed in Subunits 13A and 13E, so density estimates can be derived and compared with estimates obtained in the early 1980's. A portion of the forested areas in Subunit 13A should also be stratified.

Beaver harvests over the past few years have been some of t he highest ever reported. Liberalization of trapping seasons by as much as 82 days accounts for much of the increase as well as recent increases in pelt prices. In spite of the increased harvests, the percentage of kits in the harvest remained around 19%, below the 25% level that would suggest overharvesting (Buckley and Libby 1955). Monitoring of harvests should continue; however, harvest statistics provide an indication of localized conditions only. Trappers have concentrated on accessible colonies, whereas remote populations have been virtually untrapped. Management guidelines will eventually need to be developed to address overharvesting in accessible areas to that beaver populations next to the road system are not substantially reduced. Management should promote trapping of more remote populations.

Lynx are currently at the bottom of their population cycle, and it appears that lynx numbers are lower than they were at

the same stage of the previous cycle. Until the season was closed, lynx harvests during the current cycle. Until the season was closed, lynx harvests during the current cycle have been lower than those reported in past cycles. Reduced lynx numbers may be a result of overharvesting, especially during low points in the cycle. Lynx prices were especially high over the last cycle, and trapping pressure did not decline when lynx became less abundant. Higher prices for pelts offset the reduced catches, and trappers still made money. Because of the lack of recruitment during cyclic lows, it appears that trapping mortality is additive and lynx become vulnerable to overharvesting. To reverse this trend, closed seasons should be maintained for a 3-4 year period coinciding with cyclic lows. The season should be opened when there is evidence of kitten production and survival and an increase in the number of tracks observed along transects.

During initial periods of population increase, I recommend only a 30-day season and a bag limit of 1 or 2 lynx to facilitate rapid population growth and allow trappers to keep those harvested incidentally in traps set for other species. During the cyclic highs, seasons should not exceed 60 days and the opening should coincide with those for other furbearers. Close monitoring of the lynx cycle will require information on recruitment so that seasons can be reduced or closed when production declines. The best indicator of recruitment is the percentage of kittens in the harvest. Pelts should continue to be measured at the time of sealing to obtain this composition data.

A decline in the number of wolverines sealed, a low density estimate on a recent survey, and reports of low numbers on the Trapper Questionnaire tend to support the hypothesis that wolverine numbers have declined in portions of both units. Factors contributing to this decline include a reduction in ungulate numbers during the 1970's that resulted in less food available for wolverines, overharvesting, and increased human settlement in formerly remote areas. To allow wolverine numbers to increase in areas of low density, I recommend that the wolverine season be closed on 31 January. An earlier closure should reduce the harvest by 25%. Protection of dispersing animals may allow individuals to find and inhabit territories now vacant. Since moose and caribou have increased substantially in Unit 13 in recent years, a reduction in the harvest may allow wolverines to increase there.

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PREPARED BY:

Robert W. Tobey
Game Biologist III

SUBMITTED BY:

Gregory N. Bos
Management Coordinator

Table 1. Unit 11 furbearer harvests from sealing data, 1983-87.

	1983-84	1984-85	1985-86	1986-87	1987-88
Beaver	29	20	56	46	21
Land Otter	5	3	4	5	3
Lynx	111	76	22	16	0
Wolverine	27	32	10	9	11

Table 2. Unit 13 furbearer harvests from sealing data, 1983-87.

	1983-84	1984-85	1985-86	1986-87	1987-88
Beaver	113	90	201	333	300
Land Otter	68	19	29	36	16
Lynx	153	48	23	9	1
Wolverine	50	56	33	42	27

Table 3. Units 11 and 13 successful trapper transportation methods reported from furbearer sealing data, 1987-88.

Species	Unit	Method of Transport [a]							
		1	2	3	4	5	6	7	Unknown
Beaver	11	19%	28%	0%	0%	48%	0%	5%	0%
Beaver	13	6%	34%	0%	0%	41%	0%	18%	1%
Otter	11	0%	33%	0%	0%	33%	0%	0%	33%
Otter	13	0%	25%	0%	0%	69%	0%	6%	0%
Lynx	11[b]	0%	38%	0%	0%	56%	0%	0%	6%
Lynx	13[b]	11%	44%	0%	0%	44%	0%	0%	0%
Wolverine	11	9%	27%	0%	0%	64%	0%	0%	0%
Wolverine	13	33%	26%	0%	0%	22%	19%	0%	0%

a Method of transport:
1. Air
2. Dog sled, skis, snowshoes
3. Boat
4. 3/4-wheeler
5. Snowmachine
6. ORV
7. Highway vehicle

b 1986-87 data. Season closed by EO in 1987-88.

STUDY AREA

GAME MANAGEMENT UNIT: 12 (10,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Upper Tanana and White River drainages

BACKGROUND

Trapping of furbearers has long been a seasonally important part of the economy in eastern Interior Alaska. Following World War II and the construction of the Alaska Highway, trapping augmented summer incomes derived largely from road maintenance and services to travelers. Even today, the economy of the upper Tanana drainage is largely seasonal and dependant upon subsistence, construction work, and services to travelers of the Alaska Highway and the Tok Cutoff. Trapping continues to provide income and opportunity for productive winter work for many local residents.

In economic terms, muskrats, marten, and lynx are the most important furbearers sought in Unit 12. The Northway-Tetlin Flats continues to be one of the most productive trapping areas for muskrats in Alaska, particularly in the vicinity of the villages of Northway and Tetlin. "Ratting" is traditionally a springtime activity, and muskrats are taken with traps in pushups before breakup and with .22-caliber rifles after breakup. Muskrat populations have fluctuated in this area; recent highs occurred in the mid-1970's and mid-1980's. Populations are currently low but increasing.

Marten and lynx are also important to local trappers. Lynx are cyclic, and the population is currently expanding in response to increasing snowshoe hare numbers. Conversely, marten numbers are expected to decline from current, historically high levels. During the past few years marten distribution has expanded virtually throughout all suitable habitats in Unit 12, even in valley bottoms. As hare and hare predator numbers continue to increase, I expect marten numbers to decline as a result of predation by predators that normally prefer hares; e.g., great-horned owls, goshawks, red foxes, and lynx.

Little intentional trapping effort is expended on coyotes, red foxes, mink, land otters, beavers, ermine, red squirrels, or wolverines because of their low pelt values, low abundance, or difficulty and expense of trapping these species. The production of high-quality pelts by fox and mink fur farmers has lowered demand and pelt values of wild foxes and mink. Beavers are abundant, but pelt prices are not high enough to stimulate much interest in trapping them, given the physical difficulties of trapping through thick ice. Wolverines and otters are uncommon, contributing little to the overall value of the Unit 12 harvest. Similarly, coyotes, ermine, and red squirrels are of little interest to Unit 12 trappers.

Overall, trapping pressure has increased in recent years because of increased marten abundance and pelt value--a fortuitous combination for area trappers. Trappers using ski-equipped aircraft for access have distributed trapping pressure more widely; however, they have caused conflicts with trappers using snowmachines in some instances. I expect the eventual declines in marten distribution and abundance will reduce overall trapping effort and conflicts.

POPULATION OBJECTIVES

To provide for an optimum harvest of furbearers.

To provide the greatest opportunity to participate in hunting and trapping furbearers.

METHODS

Furbearer management is based largely upon annual harvest estimates. Sealing of pelts is mandatory for wolves, wolverines, lynx, land otters, and beavers. During the course of sealing, information is obtained on specific location and date of take, sex of the animals, and estimates of age (young-of-the-year or adult). Additionally, pelts of all furbearers exported from Alaska must be enumerated, attributed to a specific game management unit, and reported on the "Raw Fur Skin Export Report" form. Unit-specific furbearer harvest estimates based upon the mandatory sealing program is deemed more accurate than harvest estimates derived from export reports.

Subjective assessments of species abundance and trapping effort are made through informal discussions with local fur buyers and trappers working throughout Unit 12. Documentation of similar responses is carried out by regional staff through the annual "Trapper Questionnaire", but the number of respondents to this voluntary program is low.

An aerial survey technique for estimating abundance of lynx has been developed (Stephenson 1986), but it has not been used in Unit 12. However, areas of lynx concentration and individual lynx tracks were mapped during March 1988, in the course of approximately 100 hours of extensive aerial wolf surveys. The absence, presence, and relative abundance of tracks of other furbearer species are also noted, but not recorded, during annual aerial surveys of other wildlife species from October through March.

RESULTS AND DISCUSSION

Population Status and Trend

Lynx:

Lynx attained an unspectacular population peak in 1982-83 and subsequently reached a cyclic low 1985 through 1987. Based upon an increasing hare population and an increasing percentage of kits in the harvest (29% based upon pelt lengths $\leq$35 inches), the lynx population is poised to increase during the next few years. In addition to reproduction of lynx within Unit 12, I expect lynx to move into this area from the adjacent Yukon Territory and Unit 25 as populations increase in those areas.

Wolverine:

Numbers of wolverine are currently lower in Unit 12 than they were in the 1960's and 1970's. The distribution of wolverines has been reduced to mountainous habitat, where high densities of Dall sheep, ground squirrels, and marmots provide an adequate prey base. I suspect that a severe reduction in moose and wolf populations during the 1970's and subsequent reduction in the availability of carrion may be partly responsible for the wolverine population's decline. The density of trappers in accessible lowland areas and the susceptibility of wolverines to trapping may also have been responsible. The reduction of the wolverine trapping season by 1 month may allow recovery of wolverine numbers in Unit 12.

Marten:

Marten have attained historically high numbers and extent of distribution during the past 3 years. Based upon interviews, catches of up to 3 marten per mile of trapline have been recorded in northern Unit 12. Additionally, marten have become abundant throughout lowland areas in the upper Tanana Valley, where they were only incidental or virtually absent in the past. According to trapper reports, marten numbers reached extremely low levels in the early 1970's, coinciding with a spectacular cyclic high of snowshoe hares. If the hypothesis is true that predators of hares actually can control marten numbers when predators are abundant, I expect a decline in marten abundance as snowshoe hare numbers continue to increase in Unit 12.

Muskrat:

Muskrat numbers peaked in 1976 and again in the mid-1980's in the Scottie Creek and Northway-Tetlin Flats areas. Muskrats are currently at low levels, except in restricted areas where muskrat trapping effort is normally great; e.g., in the immediate vicinity of the villages of Northway and Tetlin. Muskrat population cycles or fluctuations in untrapped or lightly trapped

marshes are attributed to periodic "eat-outs" of aquatic food sources and subsequent die-offs.

Red Fox:

Red fox numbers increased to high levels by 1987 in open lowland habitats in the upper Tanana Valley, Scottie Creek Flats, and Northway-Tetlin Flats. Increased numbers of snowshoe hares are believed to be responsible for high densities of red foxes. Fox abundance is expected to increase even further.

Coyote:

Coyotes are present in Unit 12, but the status and trend of the population is not known.

Beaver:

Beavers are moderately abundant in Unit 12 in suitable, lowland habitat, but the population trend is unknown.

Otter:

Otters are relatively scarce in Unit 12, and the population trend is unknown.

Mink and Ermine:

Status and trend are unknown.

Red Squirrel:

Red squirrels are currently at low levels compared with their abundance in the late 1970's.

Mortality

Hunting Seasons and Bag Limits:

Coyote	Two coyotes	Sept. 1-April 30
Red Fox	Two foxes	Nov. 1-Feb. 15
Lynx	Two lynx	Nov. 1- March 15
Squirrel	No limit	No closed season
Wolverine	One wolverine	Nov. 10-Feb. 15

Trapping Seasons and Bag Limits:

Beaver	15 per season	Nov. 1-April 15
Coyote	No limit	Nov. 1-March 31
Red Fox	No limit	Nov. 1-Feb. 28
Lynx	No limit	Dec. 1-Jan. 31
Marten	No limit	Nov. 1-Feb. 28
Mink/Weasel	No limit	Nov. 1-Feb. 28
Muskrat	No limit	Sept. 20-June 10

Land Otter	No limit	Nov. 1-April 15
Squirrel/Marmot	No limit	No closed season
Wolverine	No limit	Nov. 1-March 31

Human-induced Mortality:

Harvests of most furbearer species in Unit 12 have been relatively stable and are not believed to be having significant effects on the species population dynamics with a few exceptions (Tables 1 and 2). Harvests of lynx and wolverine may have depressed their populations.

Lynx numbers were still low, even though snowshoe hare numbers have been increasing. Although lynx numbers and distribution appeared to be increasing, recent lynx harvests may have retarded their population growth.

While the wolverine population in Unit 12 was smaller than the historic one, the effects of annual harvests and lowered availability of ungulates are difficult to assess. Wolverine abundance would probably be greater, if annual harvests had been lower in the past.

The impact of current harvest levels on the Unit 12 marten population is also unclear. Most of the increased marten harvest has occurred in lowland areas that have not supported meaningful numbers of marten until recently. Typical marten habitat exists in upland areas of Unit 12.

Habitat

Assessment:

Unit 12 is characterized by rolling, timbered hills on the north, rugged, steep mountains on the south, and the broad, lowland Tanana Valley running southeast-northwest in the middle. Over 30 years of successful wildfire suppression has resulted in an older, less diverse habitat than would have existed today had not most fires been successfully suppressed.

Enhancement:

The "Alaska Interagency Fire Management Plan" went into effect in 1984. While a great deal of the northern portion of Unit 12 was afforded full and modified protection status, nearly all of the Wrangell-St. Elias National Park and Preserve, the Tetlin National Wildlife Refuge, and state lands in southern Unit 12 received limited suppression status; i.e., a near-natural wildfire regime.

Commercial logging and mechanical disturbance of decadent riparian willow stands have resulted in younger, more diverse habitats along the Tok Cutoff. Sizable wildfires have burned in the Tetlin NWR (43,000 acres) and in the Porcupine Creek drainage

(14,000 acres) since 1982. The U.S. Fish and Wildlife Service has conducted prescribed fires covering about 2,000 acres in recent years, and ADF&G has prepared a 500-acre site for burning in the Tok River drainage and proposed burning several thousand acres in Unit 12. While habitat enhancement has been justified on the basis of fuel reductions or moose browse enhancement, some furbearer species will benefit from increases in microtine rodent and hare populations.

Game Board Actions and Emergency Orders

The Alaska Board of Game shortened the lynx trapping season from 4.5 to 2.0 months effective during the 1985-86 season to reduce harvests during the low of the lynx population cycle.

The Board decided to track the lynx harvest because of the susceptibility to trapping, subsequently approving a 1-month extension for the 1988-89 season providing the percentage of kits in the harvest remained high and harvest increased during the 1987-88 season. Because the harvest failed to increase, an Emergency Order was issued to retain the 2-month season for the 1988-89 season. The Board also took action during their spring 1988 meeting to end land-and-shoot taking of furbearers for the 1988-89 season.

CONCLUSIONS AND RECOMMENDATIONS

Lynx, red fox, and coyote populations are expected to increase in response to increasing hare numbers. Harvests of lynx and foxes are expected to increase, unless continued low fox pelt prices serve to deter trapping effort. Marten numbers and harvests are expected to decline as numbers of hares and their predators increase through the late 1980's. The harvest of wolverines is expected to decline as a result of the shortened 1988-89 trapping season. Muskrat harvests are expected to increase, following recent lows in abundance and subsequent population recovery. Harvests of beavers, otters, coyotes, weasels, and squirrels are expected to remain low because of low pelt values for these species.

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PREPARED BY:

David G. Kelleyhouse
Wildlife Biologist III

SUBMITTED BY:

Wayne E. Heimer
Survey-Inventory Coordinator

REVIEWED BY:

Randall L. Zarnke
Wildlife Biologist II

Table 1. Furbearer harvests in Unit 12 determined by sealing certificates, 1983-87.

Species	1983	1984	1985	1986	1987	$\bar{x}$
Wolverine	21	19	23	30	19	22
Otter	4	1	2	4	10	4
Beaver	41	44	6	55	18	33
Lynx	150	82	73	80	74	92

Table 2. Furbearers exported from Alaska and reported taken in Unit 12, 1987-88 season.

Species	Number taken
Beaver	1
Coyote	5
Fox	62
Lynx	5
Marten	300
Mink	9
Muskrat	221
Otter	0
Squirrel	21
Weasel	3
Wolf	3
Wolverine	6

STUDY AREA

GAME MANAGEMENT UNIT: 14A and 14B (4,780 mi^2)

GEOGRAPHICAL DESCRIPTION: Northeastern Upper Cook Inlet and Western Talkeetna Mountains

BACKGROUND

Beavers now occur at moderate-to-high densities throughout most of Subunits 14A and 14B. Every major drainage and most of the minor tributaries have large numbers of beavers. In the 1950's and early 1960's, beaver densities were reduced in a few scattered locations, especially where road access was good. However, trapping effort significantly declined in the 1970's and early 1980's, and beaver populations recovered to former numbers. A slight resurgence in beaver trapping has occurred in the past 5 years, but it has had little impact on beaver numbers. Beaver are still very abundant; densities are so high in some drainages, they have become regular nuisances. Every year the Department receives frequent complaints of beavers damming culverts, feeder streams, lake outlets, and other waterways. In some places beavers have become so numerous, people consider them pests.

Reports from long-time residents living in Unit 14 indicate that coyotes were not present in the 1940's and 1950's. Apparently, coyotes began colonizing the area sometime in the 1960's or 1970's. Today coyotes are abundant throughout Subunit 14A and the southern portion of Subunit 14B. Coyote numbers appear to be increasing, and this increase appears to be moving in a northward direction up the Susitna Valley and the Parks Highway. According to responses from the Trapper Questionnaire sent to those individuals sealing furs in Subunits 14A and 14B, five said coyotes were abundant in their area, six said they were common, and five said the animals were scarce.

Land otters occur throughout Subunits 14A and 14B in low-to-medium densities. The history of the population has not been well documented, but no major changes in population status have occurred in the past 10 to 20 years. According to responses from the Trapper Questionnaire, Unit 14 trappers indicated land otters were scarce in their area and seven indicated they were common.

In the 1940's to late 1950's lynx were relatively common throughout Subunits 14A and 14B. From the mid-1960's to mid-1980's lynx densities declined, and densities during the cyclic highs and lows decreased with each succeeding high and low cycle. Currently, the lynx density throughout the area is very low, even though prey species in some areas are high. Heavy trapping pressure in the early 1980's depressed

lynx populations, and continued trapping effort has kept numbers low.

The history of the muskrat population in Unit 14 is not well documented, but changes in population status during the last 10 to 15 years have been relatively minor. Muskrats occur in almost all marsh habitat throughout the area; however, the greatest numbers are found in the Palmer Hayflats State Game Refuge and portions of the Knik and Little Susitna River drainages. The population has experienced a small decline in recent years, perhaps because of increased trapping effort and/or a gradual change in habitat availability resulting from the 1964 earthquake. Responses to the Trapper Questionnaire indicate muskrat are common to abundant in Unit 14.

Red fox densities are very low throughout most of Subunit 14A and the southern half of Subunit 14B. Red foxes were once very abundant and widespread; even in years when the fox population experienced "cyclic" lows, densities were high than today's "cyclic" highs. The reason for this decline is unknown, but most trappers attribute it to increased competition from colonizing coyotes; i.e., coyotes displace red foxes when their distribution overlaps. Of responses to a Trapper Questionnaire sent to Unit 14 trappers, nine said red foxes were common, seven said they were scarce, and one trapper said they were absent in their area.

The history of the wolverine population in Unit 14 is not well documented, but wolverines are believed to have been relatively common prior to 1950. As the Matanuska-Susitna Valley became more developed during the 1970's and 1980's, wolverine density began to slowly decline. Today density is very low. The majority of animals are found in remote mountain areas. Few wolverines are found near areas with good road access. According to responses from the Trapper Questionnaire sent to Unit 14 trappers, 13 said wolverines were scarce in their area, two said they were not present, and only one said wolverines were common.

POPULATION OBJECTIVES

To develop population objectives for furbearer populations in Unit 14.

METHODS

Relative numbers and distribution of furbearers were determined by (1) noting tracks and other sign while conducting aerial surveys for big game species, (2) tabulating sightings and other reports from the public and conducting interviews of long-time residents of the area, (3) sending a questionnaire to trappers who sealed

furbearers taken in Subunits 14A and 14B during 1987-88, and (4) analyzing harvest returns from sealing records and fur export permits. Harvests of beavers, land otters, lynx, and wolverines were determined from sealing records.

RESULTS AND DISCUSSION

Mortality

Hunting Seasons and Bag Limits:

Beaver	No open season	
Coyote	1 Sep - 30 Apr	2 coyotes
Land otter	No open season	
Lynx	1 Nov - 31 Mar*	2 lynx
Muskrat	No open season	
Red Fox	1 Nov - 15 Feb	2 foxes
Wolverine	10 Nov - 15 Feb	1 wolverine

*Closed Nov. 30, 1987 by Emergency Order

Trapping Seasons and Bag Limits:

Beaver	1 Feb - 30 Apr	40 per season
Coyote	10 Nov - 31 Mar	No limit
Land Otter	10 Nov - 31 Mar	No limit
Lynx	1 Dec - 31 Jan*	No limit
Muskrat	10 Nov - 10 Jun	No limit
Red Fox	10 Nov - 15 Feb	No limit
Wolverine	10 Nov - 31 Mar	No limit

*Closed Nov. 30, 1987 by Emergency Order

Human-induced Mortality:

Beaver. During the 1987-88 trapping season, the reported harvest was 267 beavers: 98 and 169 in Subunits 14A and 14B, respectively. This harvest is close to the 5-year-mean annual harvest of 299 beavers (Table 1). The highest annual harvest in the past 5 years was 453 beavers (1985-86), but it may have been an anomaly because the harvest in Subunit 14B (314) was roughly 2 times that of other years (Table 1). Trapper success was nearly twice as high in Subunit 14B (11.9 beaver/trapper), compared with Subunit 14A (5.2 beaver/trapper).

Land otter. The reported harvest was only 8 land otters; i.e., two in Subunit 14A and six in Subunit 14B; this represents a significant decline from the 5-year mean of 31 and the record harvest of 46 in 1984-85 (Table 2). The reason for the decline is unknown, but it may have been related to poor trapping conditions and reduced trapping effort. The winter of 1987-88 began with relatively cold temperatures and above normal snowfall. Many of the lakes and streams were frozen and/or covered by snow early in the trapping season. Under these conditions otters may have

been difficult to catch. Reported trapping success was 1.2 otters per trapper (6 otters among 5 trappers).

Lynx. The hunting and trapping seasons in Unit 14 were closed by Emergency Order because of low lynx numbers in Southcentral Alaska. In 1987-88 no lynx were trapped because the effective date of the Emergency Closure occurred before the opening of the trapping season, and no lynx were taken by hunters. Lynx harvests from 1983 to the present are reported in Table 3.

Wolverine. The reported harvest during the hunting and trapping seasons was eight wolverines; i.e., three in Subunit 14A and five in Subunit 14B. This harvest is down slightly from the 5-year mean of 10 wolverines, but one higher than the previous year's harvest of seven (Table 4). Despite low wolverine density in Unit 14, some experienced trappers seem to consistently catch one or more wolverines. Trapping success was 1.2 wolverines per successful trapper (7 wolverines among 6 trappers).

CONCLUSIONS AND RECOMMENDATIONS

Populations of beaver, coyote, and muskrat are abundant in most areas of suitable habitat, and for Subunits 14A and 14B overall harvests appear to be below sustained yield for these species.

The harvest of land otters has declined recently, but there is no indication that the smaller harvest occurred because of a decline in the population. Otter habitat occurs throughout the unit, and during the winter otter sign was frequently seen on most of the major drainages and tributaries. Trapping pressure in the past year has been low, and it is not likely that recent harvests exceeded sustained yield, except perhaps in some localized areas.

Red fox populations have declined markedly during the past 3 decades, but this decline may be related to competition from coyotes rather than overharvesting or loss of habitat. Trappers and hunters probably kept red fox populations at low numbers near human settlements, but it is not likely that hunting or trapping have significantly impacted red fox populations in remote areas.

Wolverine density is low throughout Unit 14, especially near areas with high human use. Wolverine numbers are probably lower today than they were 30 years ago; however, this decline occurred gradually over a period of many years. The harvest in most years since 1977 has been near the 11-year mean of 13 wolverines (ranging from a high of 26 in 1977-78 to a low of seven in 1986-87), suggesting that the population has been relatively stable during this period. A significant change in the number of trappers or in trapping

success has not occurred. Even though densities are low, the wolverine population appears to be resilient, especially in remote areas; therefore, changes to the season and bag limit are not recommended at this time.

Lynx densities in Unit 14, as well as most of Southcentral Alaska, are very low. In some locations in Unit 14 densities of snowshoe hares and ptarmigan are increasing, but lynx numbers have not significantly increased because of more abundant prey. Past trapping and hunting efforts are partly responsible. Even though lynx numbers are low, trappers have continued to make some effort to catch lynx because of the high value of their pelts. A few lynx have been caught each year because of the large number of trappers in the field. The hunting and trapping seasons should remain closed until the lynx population has begun to recover.

PREPARED BY:

Carl A. Grauvogel
Wildlife Biologist III

SUBMITTED BY:

Gregory N. Bos
Management Coordinator

STUDY AREA

GAME MANAGEMENT UNIT: 14C (2,091 mi^2)

GEOGRAPHICAL DESCRIPTION: Anchorage area

BACKGROUND

Beavers are found throughout the Subunit 14C lowlands and within several upland river valleys between elevations of 500 and 2000 feet. They are most abundant in the Twentymile River drainage, Girdwood Valley, and the Ship Creek drainage above Fort Richardson.

Beaver trapping is the best documented trapping activity in the Anchorage area; sealing records have been available since 1971. All of Subunit 14C northwest of Girdwood (Glacier Creek), including Chugach State Park, is closed to beaver trapping.

In Subunit 14C land otters are most abundant in the Twentymile River drainage. They also sparcely inhabit the undeveloped portions of the Anchorage area military reservations and the southern portion of Chugach State Park. Otter trapping is closed within Chugach State Park, the Anchorage Management Area, and the Anchorage Coastal Wildlife Refuge.

Wolverine are found in low numbers throughout the undeveloped portions of Subunit 14C. Trapping occurs in the Lake George and Twentymile River drainages. Chugach State Park is closed to wolverine trapping.

Lynx are found in low numbers throughout Subunit 14C at or below timberline. They are presently near the low point in their cycle. Trapping and hunting is presently closed throughout the subunit.

Information on furbearers that are not sealed is gained from trappers, park rangers, and general observations. Coyotes and weasels are abundant throughout Subunit 14C in brushy an second-growth areas below timberline. Mink are common in wooded, riverine habitat. Red foxes are very uncommon, although they are occasionally seen in the area from the Eagle River drainage north to the Knik River. Marten are uncommon from Ship Creek south to the Twentymile River and scarce to absent in drainages to the north. Muskrats are common throughout lowland marshy areas. Muskrat numbers fluctuate substantially, because periodic cold winters with little snow cover cause die-offs.

Early settlers trapped throughout the area, beginning with the establishment of Anchorage in 1915. Native Alaskans undoubtedly obtained furs from the area for centuries prior

to Caucasian settlement. Persons associated with trapping and fur-buying over the past 40 years believe that the area never supported large numbers of furbearers, mainly because much of it is unsuitable habitat. The mountainous nature of the area and the lack of extensive lake and riverine habitat precluded large numbers of riparian species such as otters, beavers, and mink.

POPULATION OBJECTIVES

To develop measurable population objectives for all furbearer species.

RESULTS AND DISCUSSION

Low-to-moderate numbers of furbearers, motorized access restrictions, and extensive closed areas combined to bring about a low annual furbearer harvest. Over the past decade a mean of 16 beavers were harvested annually (Table 1). The average animal take of otters, wolverines and lynx over the past decade has been 1, 1 and 2, respectively (Tables 2, 3, 4). Coyotes are trapped in low numbers on Fort Richardson and in the Twentymile River drainage. A large expanse of excellent coyote habitat in the Anchorage and Eagle River areas is closed to trapping. Moderate muskrat harvests occur southeast of Glacier Creek and from Fort Richardson north to the Knik River. Some red foxes may be taken along the Knik River, although closed areas and low numbers of foxes preclude significant harvests. Low numbers of marten are taken from Ship Creek south to the Twentymile River, excluding the Anchorage management area which is closed to all trapping.

Hunting Seasons and Bag Limits:

Beaver	No open season	
Land otter	No open season	
Lynx	1 Nov - 31 Mar*	2 lynx
Wolverine	1 Sep - 31 Mar	1 wolverine
Coyote	1 Sep - 20 April	2 coyote
Red fox	1 Nov - 15 Feb	2 foxes
Marten	No open season	
Mink	No open season	
Weasel	No open season	
Muskrat	No open season	

*Closed Nov. 30, 1987 by Emergency Order

Trapping Seasons and Bag Limits:

Beaver	1 Feb - 31 Mar	20 per season
Land otter	10 Nov - 31 Mar	No limit
Lynx	1 Dec - 31 Jan*	No limit
Wolverine	10 Nov - 31 Mar	No limit
Coyote	10 Nov - 31 Mar	No limit

Red Fox	10 Nov - 15 Feb	No limit
Marten	10 Nov - 28 Feb	No limit
Mink	10 Nov - 31 Jan	No limit
Weasel	10 Nov - 31 Jan	No limit
Muskrat	10 Nov - 10 Jun	No limit

*Closed Nov. 30, 1987 by Emergency Order

CONCLUSIONS AND RECOMMENDATIONS

Beaver harvests in Subunit 14C have varied according to fur prices, conditions affecting access, and fluctuations in beaver populations. Within the previous 10 years, harvests have ranged between zero and 45. The recommended management objective for the population is to maintain a population that will sustain a five-year mean harvest of 20 beaver per year, consisting of less than 25% kits.

Opportunities to trap otter are limited because large portions of the area are closed to trapping and otter densities are low outside the Twentymile drainage. The management objective for the population is to maintain a population that will sustain a 5-year-mean harvest of 2 otters per year.

The wolverine harvest has declined over the past 5 years, indicating a decline in wolverine numbers. The best wolverine habitat in the subunit is closed to trapping; however, since wolverine range over considerable distances, they probably move between closed and open areas. The recommended management objective for the population is to maintain a population that will sustain a harvest of 1-2 wolverines per year.

Lynx densities are presently low and lynx trapping and hunting are currently prohibited. The management objective is to increase lynx densities by reducing or eliminating harvest during periods of low abundance and by allowing harvests after verification that lynx numbers and recruitment have increased.

Coyotes have adapted well to the mixed timber and brushy habitat throughout both the lightly developed and undeveloped portions of Subunit 14C. Harvest levels are unknown, but thought to be low. The management objective is to avoid harvesting beyond sustainable levels.

Mink are possibly the most sought-after furbearer. Significant numbers of mink are taken from riverine habitats, particularly during years of light snow accumulation; however, harvest figures are unknown. The management objective is to maintain a population that will sustain historical harvest levels.

Weasels are abundant throughout large areas of Subunit 14C where trapping is permitted. Harvest levels are unknown. The management objective is to maintain a population that will sustain historical harvest levels.

Muskrats are relatively common within the freshwater wetlands at elevations below 500 feet. Closures in the Anchorage Management Area and the Anchorage Coastal Wildlife Refuge precluded trapping where muskrats are most abundant. The management objective is to maintain a population that will sustain historical harvest levels.

Red fox numbers in a given area declined as coyotes became more numerous; Subunit 14C supports far more coyotes than foxes. The fox harvest is unknown; it is probably very low. The management objective is to maintain a population that will sustain historical harvest levels.

Subunit 14C supports a small population of marten that, because of the value of the fur, could be subject to overexploitation by trappers. Harvest levels are unknown. Some method of determining harvest should be devised. That management objective is to maintain a population that will sustain historical harvest levels.

PREPARED BY:

David Harkness
Game Biologist III

SUBMITTED BY:

Gregory N. Bos
Management Coordinator

Table 1. Unit 14(C) beaver harvest, 1971-1988.

Year	Glacier Creek	Twentymile River	Total
1971-72	0	11	11
1972-73	0	1	1
1973-74	0	14 (5)[a]	14 (5)
1974-75	0	3 (3)	3 (3)
1975-76	0	21 (7)	21 (7)
1976-77	0	3 (1)	3 (1)
1977-78	0	3 (2)	3 (2)
1978-79	0	13 (0)	13 (0)
1979-80	0	27 (7)	27 (7)
1980-81	9 (1)	36 (5)	45 (6)
1981-82	0	4 (2)	4 (2)
1982-83	0	0 (0)	0 (0)
1983-84	0	0 (0)	0 (0)
1984-85	4 (0)	6 (2)	10 (2)
1985-86	2 (0)	16 (2)	18 (2)
1986-87	10 (1)	28 (9)	38 (10)
1987-88	4 (1)	5 (0)	9 (1)

[a] Kit harvest in parentheses.

Table 2. Unit 14(C) land otter harvest, 1978-1988.

Year	Male	Female	Unknown	Total
1978-79	0	0	0	0
1979-80	0	0	0	0
1980-81[a]	-	-	-	-
1981-82[a]	-	-	-	-
1982-83	0	0	0	0
1983-84	0	1	2	3
1984-85	1	0	0	1
1985-86	2	0	1	3
1986-87	0	0	0	0
1987-88	0	0	1	1

[a] No harvest data available.

Table 3. Unit 14(C) wolverine harvest, 1972-1988.

Year	Male	Female	Unknown	Total
1972-73	6	8	0	14
1973-74[a]	-	-	-	-
1974-75[a]	-	-	-	-
1975-76	0	2	0	2
1976-77	0	0	1	1
1977-78	2	1	0	3
1978-79[a]	-	-	-	-
1979-80	0	1	0	1
1980-81	0	0	0	0
1981-82	3	3	0	6
1982-83	0	1	0	1
1983-84	0	0	0	0
1984-85	0	0	0	0
1985-86	0	2	0	2
1986-87	0	0	0	0
1987-88	0	0	0	0

[a] No harvest data available.

Table 4. Unit 14(C) lynx harvest, 1978–1988.

Year	Male	Female	Unknown	Total
1978-79	0	0	0	0
1979-80	0	0	2	2
1980-81	0	0	0	0
1981-82	0	0	0	0
1982-83	4	2	0	6
1983-84	1	0	0	1
1984-85	2	3	0	5
1985-86	1	4	0	5
1986-87	0	0	0	0
1987-88	0	0	0	0

STUDY AREA

GAME MANAGEMENT UNIT: 17 (20,351 mi^2)

GEOGRAPHICAL DESCRIPTION: Northern Bristol Bay

BACKGROUND

Historically, beaver has been the most important furbearer species in the northern Bristol Bay area, and they are abundant throughout most portions of Unit 17. Intensive trapping and adverse weather conditions in late fall and winter exert the most influence on this species. Season closures in portions of the unit have been imposed on several occasions since 1900 to allow populations to recover. Aerial cache surveys have been conducted since 1968 to provide an index of abundance in the more heavily trapped portions of the unit. Harvest data and trapper interviews during the sealing process are also used to manage this species.

Red foxes are second in popularity among Unit 17 trappers. Populations have fluctuated widely during the past 10 years, peaking in 1979-80 and declining sharply the following year because of an outbreak of rabies. Increases have been noted in recent years, and present populations appear to be high.

Land otters have increased steadily during the 1980's. They are common in Subunit 17A and are abundant in Subunits 17B and 17C. Otters are most commonly trapped in February during the open beaver trapping season.

Lynx are generally rare to uncommon in Subunits 17A and 17C. The population fluctuates in Subunit 17B, depending upon hare abundance; however, they are generally found in low-to-moderate densities during their peak.

Wolverines occur throughout Unit 17 but are most common in Subunit 17B. This population appears to be fairly stable, and harvest levels have remained relatively constant since 1976.

Marten were uncommon in most of Unit 17 prior to 1970. Most of their habitat occurs along the Wood-Tikchik Lake system. Marten trapping was popular during the 1930's and 1940's in the lake area, but since then it has been nearly nonexistent until prices peaked. The population is presently low, but high pelt prices are maintaining trapping interest in this species.

Long-term residents of Dillingham report that muskrats were common along the Lower Nushagak River and on the Nushagak Peninsula in the 1920's and 1930's, but they are presently scarce throughout Unit 17.

POPULATION OBJECTIVES

To develop measurable objectives for all furbearer species.

METHODS

Harvest data were collected during the sealing process for all beavers, wolverines, lynx, and otters presented for sealing. Fur acquisition reports provided additional harvest data for those species not required to be sealed. A Trapper Questionnaire designed to provide an index of population status of various furbearer species was sent to 26 trappers throughout the unit. Beaver cache surveys were flown on 6 streams and rivers to provide an index of population status. Two surveys were flown during the beaver trapping season to determine trapping pressure and trapper distribution.

RESULTS AND DISCUSSION

Population Status and Trend

Most furbearer populations appear to be stable at moderate-to-high densities; however, harvest information and trapper questionnaires indicate that lynx and marten are at low densities and beaver in Subunit 17A are at lower-than-normal levels. Red foxes and snowshoe hares are both increasing throughout Unit 17.

Aerial beaver cache surveys were conducted on 6 streams in Unit 17 (Table 1); an average of 1.6 caches per mile of stream was observed, equaling the peak recorded in 1980. Streams surveyed were those that generally have had the highest densities; however, the overall density in Unit 17 was less than that for 1980.

Mortality

Harvest data for species sealed are presented in Table 2. Trapping conditions were excellent during this reporting period, and harvest levels of most species reflected this factor. The beaver harvest was the highest recorded since 1968; it may have been excessive in Subunit 17A, where nearly 28% of the harvest were kits. Otter harvests have remained relatively stable, although the 1987-88 harvest (i.e., 267 otters) is the highest ever recorded for Unit 17. The wolverine harvest level was similar to previous years, but an increase was expected as a result of the intense pressure on other species during the season. Only 1 lynx was taken, representing the lowest recorded harvest for this unit. Fur acquisition reports indicate that 510 red fox and 268 marten were taken by trappers from Unit 17. This is the highest recorded harvest of marten in this unit.

Game Board Actions and Emergency Orders

In April 1988, the Game Board prohibited the taking or assisting in taking Arctic fox, red fox, or wolverine on the same day as airborne. The beaver season in Subunits 17B and 17C was changed to 1 Jan-28 Feb. Arctic and red fox seasons were changed to 10 Nov-28 Feb. The lynx season was reduced; i.e., from 10 Nov-31 March to 10 Nov-28 Feb. Mink and weasel seasons were extended from 10 Nov-31 Jan to 10 Nov-28 Feb. The wolverine season was reduced; i.e., from 10 Nov-31 March to 10 Nov-28 Feb.

CONCLUSIONS AND RECOMMENDATIONS

Trappers took advantage of excellent trapping conditions throughout Unit 17 to take record high numbers of many furbearer species during this reporting period. While most furbearer populations have remained at levels capable of sustaining high harvests, lynx and marten have not. Seasons for both species were shortened by the Board of Game for the 1988-89 trapping season.

Measurable population objectives need to be established for furbearer populations in this unit. I recommend the following objectives for each species: (1) Beaver, to maintain a beaver population capable of sustaining a harvest of 2500 beavers annually; (2) Otter, to maintain an otter population capable of sustaining a harvest of 150 otters annually; (3) Wolverine, to maintain a wolverine population capable of sustaining a harvest of 40 wolverines annually; (4) Lynx, to maintain a lynx population capable of sustaining a ten year average harvest 20 lynx; (5) Marten, to maintain a marten population capable of sustaining a ten year average harvest of 85 marten; and (6) Red Fox, to maintain a red fox population capable of sustaining a ten year average harvest of 350 fox.

PREPARED BY:

Kenton P. Taylor
Game Biologist III

SUBMITTED BY:

Larry VanDaele
Survey-Inventory Coordinator

Table 1. Results of beaver cache surveys flown in Unit 17, 1980 to 1988.

River	Miles	Caches per mile 1987	1986	1985	1984	1983	1982	1981	1980
Klutuk	47	--	--	--	--	1.3	--	1.4	1.4
Kokwok	30	2.0	2.3	1.8	2.0	2.4	1.2	2.4	2.5
Iowithla	62	1.0	1.6	1.0	1.0	1.2	1.0	1.5	1.6
Sunshine	12	2.7	3.3	2.5	1.7	2.7	1.8	2.3	2.9
Togiak	60	--	1.0	.7	.6	1.0	1.2	1.5	1.6
Ongivinuk	32	1.6	1.9	1.3	1.1	1.5	1.7	2.0	1.7
Harris	29	1.9	1.4	1.1	1.8	1.1	--	1.7	1.2
Mosquito	29	--	1.7	--	2.0	--	--	--	2.8
Stuyahok	40	--	1.6	1.0	1.3	--	--	2.2	1.9
King Sal.	72	--	1.1	--	--	1.0	--	--	1.6
Mulchatna	65	--	--	--	--	--	--	--	2.5
Tikchik	70	--	1.1	--	--	--	--	--	--
Total caches		261	633	303	372	445	176	549	905
Total survey miles		165	436	265	294	344	136	369	555
Unit 17 average caches per mile		1.6	1.5	1.1	1.3	1.3	1.3	1.5	1.6

Table 2. Reported harvest of furbearers in Unit 17 from sealing records, 1970 to 1988.

Year	Beaver		Otter				Lynx			Wolverine			
	% Kits	Total	M	F	Unk	Total	Kits	Ad	Total	M	F	U	Total
1970	22.6	1,190											
1971	27.5	824											
1972	20.5	762											
1973	23.9	1,849								10	5	6	21
1974	23.9	1,681								27	18	0	45
1975	15.8	929*								14	7	1	22
1976	22.2	637*								50	25	3	78
1977	17.7	766*								37	12	2	51
1978	23.5	802*	52	49	7	108	4	32	36	32	14	3	49
1979	20.5	959	70	54	9	133	8	22	30	26	14	3	43
1980	27.7	1,478	68	62	9	140	8	17	25	28	19	0	47
1981	20.0	1,673	82	80	0	160	15	25	40	30	10	0	40
1982	20.9	1,693	94	83	1	179	2	15	17	28	10	0	38
1983	12.8	1,824	100	72	31	204	3	22	25	34	17	1	52
1984	18.7	1,360	94	63	3	165	1	11	12	10	4	0	14
1985	22.9	1,661	105	94	20	219	8	21	29	39	16	2	57
1986	15.9	1,452	49	46	6	101	1	7	8	13	8	2	23
1987	20.1	2,817	87	91	0	178	3	11	14	36	10	0	46
1988	21.8	3,021	133	133	0	226	0	1	1	22	20	2	44

[a] Beaver trapping season closed in Subunits 17A and 17C.

STUDY AREA

GAME MANAGEMENT UNIT: 18 (42,000 mi²)

GEOGRAPHICAL DESCRIPTION: Yukon-Kuskokwim Delta

BACKGROUND

Furbearers were abundant in all areas of suitable habitat in Unit 18. In recent years, one-third of all furbearers sealed in Alaska were harvested from Unit 18. During 1987-88, Unit 18 accounted for the highest number of sealed beaver pelts statewide for the 2nd consecutive year. In addition, the number of river otters sealed in the unit was the highest reported since 1983-84. The harvest of unsealed furbearers such as mink, muskrat, and fox was also very high, although remaining well below historical levels of the 1930's.

POPULATION OBJECTIVES

To provide maximum harvest opportunity within sustained-yield limits.

METHODS

Information concerning furbearer distribution and population status in Unit 18 was collected through interviews with local residents, trappers, furbuyers, and agency biologists. Harvest data were obtained from Fur Acquisition reports submitted by furbuyers and from sealing-certificate informa tion. Incidental observations of the staff were compiled during field work directed at other species. Aerial beaver cache counts have been conducted in previous years but were not flown in 1987-88 because of changing budget and personnel priorities.

RESULTS AND DISCUSSION

Population Status and Trend

Muskrats:

Muskrats in Unit 18 are typically subject to dramatic fluctuations in density. Muskrat distribution extends across the entire unit from eastern riparian habitats to coastal marshes. Muskrat populations in 1987-88 were rapidly recovering from a population decline initially observed in 1982. Dispersing muskrats were frequently observed during the fall of 1987. Muskrat "push-ups" are now commonly observed in Unit 18.

Beaver:

Beaver densities remained high throughout Unit 18. Densities are highest in the areas southeast of the Kuskokwim River in the

Kilbuck Mountains and in the Johnson River south and west of Bethel. Densities were reportedly increasing even in the treeless expanse of the Delta lowland adjacent to the Bering Sea. Nelson Island has reportedly been heavily colonized by beaver in recent years, particularly in streams draining the southeastern portion of the island. Local furbuyers reported increasing incidences of bite scars on beaver pelts purchased during the last several years, suggesting increased intra specific strife within the beaver population. Such strife tends to become more frequent as population density increases.

Mink:

Mink populations were reportedly stable in Unit 18. Because trapping success is determined primarily by weather and snow conditions during November and December, the size of the harvest usually does not accurately reflect population size.

River Otters:

Otters were reportedly abundant throughout Unit 18, particularly in the Delta lowland north and west of the Kuskokwim River.

Marten:

Marten are a species of the boreal forest; therefore, their habitat is limited to the eastern and northern portion of Unit 18. Marten populations in the Yukon and Kuskokwim drainages have reportedly been increasing for several years. Marten numbers in adjacent Unit 19 were reported by local trappers as low in 1987 and but high in 1988. The increase in number is probably related to an increasing abundance of snowshoe hares and microtines.

Red Fox:

Red foxes are currently abundant throughout Unit 18, including the coastal regions and Nunivak Island. Red foxes are apparently at or near the peak of their population cycle. The red fox population has clearly recovered from the 1981-82 rabies epizootic, which led to a population decline. Foxes were again frequently observed during fall 1986. Microtine, hare and ptarmigan prey populations are currently abundant throughout the Unit.

Arctic Fox:

Arctic or white foxes are found in coastal and tundra habitats in Unit 18. Arctic foxes are most abundant from Nunivak Island northward to the Yukon Delta. However, their distribution extends to the periphery of the boreal and riparian habitats along the Kuskokwim River, where their niche is largely replaced by red foxes. In general, arctic foxes have a narrower ecological niche than red foxes and are not as common as red foxes in Unit 18. Trappers only occasionally catch arctic foxes near Bethel. Arctic foxes are subject to large annual fluctuations in population size,

and in some years, they may not breed at all. Although arctic foxes were also involved in the 1981 rabies epizootic, no incidence of the disease in the unit was reported for this species in 1988. When common, arctic foxes are significant predators on coastal-nesting geese species.

Lynx:

Lynx numbers reportedly have increased in 1987-88 in Unit 18, presumably in response to increasing hare numbers. The snowshoe hare population has progressed about 6 years into their 10-year population cycle. Unit 18 normally supports few lynx, because habitat is limited to mixed coniferous-deciduous habitats along the Yukon, Kuskokwim, and tributary rivers and isolated outcroppings such as Kusilvak Mountain between Mountain Village and Scammon Bay. The highest densities and harvests have been reported from revegetating mine tailings along the upper Tuluksak River. Lynx are expected to continue to increase in Unit 18 through the remainder of the hare population cycle.

Wolverine:

Wolverine populations were reported as stable in the mountainous regions of northern and eastern Unit 18.

Mortality

Hunting Seasons and Bag Limits:

Arctic Fox	Sept. 1-Apr. 30	2 foxes
Red Fox	Nov. 1-Feb. 15	2 foxes
Lynx	Nov. 1-Mar. 31	2 lynx
Wolverine	Sept. 1-Mar. 31	1 wolverine

Trapping Seasons and Bag Limits:

Beaver	Nov. 1 -June 10	No limit
Arctic Fox	Nov. 10-Mar. 31	No limit
Red Fox	Nov. 10-Mar. 31	No limit
Lynx	Nov. 10-Mar. 31	No limit
Marten	Nov. 10-Mar. 31	No limit
Mink	Nov. 10-Jan. 31	No limit
Weasel	Nov. 10-Jan. 31	No limit
Muskrat	Nov. 10-June 10	No limit
River Otter	Nov. 10-Mar. 31	No limit
Wolverine	Nov. 10-Mar. 31	No limit

Human-induced Mortality:

Muskrat. Furbuyer purchases of muskrats have increased rapidly in the last several years in Unit 18, reflecting recovery from the population decline occurring in 1982.

Beaver. Beaver prices remained relatively good during 1987-88 for high-quality pelts, particularly for large "super-blanket" beaver. Trapper effort on beaver has been substantial. A total of 4,686 beaver were sealed in Unit 18 in 1987-88, the 2nd consecutive year a record harvest has been reported. The sealed harvest from the Yukon drainage was slightly higher (1,614 pelts) than from the Kuskokwim drainage (1,419 pelts) in 1987-88. The lower Johnson, Kisaralik, and Kwethluk drainages produced the most sealed beaver in the Kuskokwim drainage. The Black River south of Mountain Village produced the most sealed beaver in the Yukon drainage.

Beaver pelts were frequently used domestically in the unit, particularly the smaller pelts. Consequently, many of these pelts were not sealed. The smaller pelts have been subject to downward price pressure in recent years, because tanning costs are proportionally higher than for larger pelts. Economically, this facilitates the domestic use of small beaver pelts for hats and trim on garments, and thus most of the smaller pelts are not sealed and sold. Because the domestic use of beaver can be substantial, the actual harvest is probably much higher than the reported harvest.

Mink. Kuskokwim mink have a world-class reputation for excellent fur quality. Although prices and demand for Kuskokwim mink have remained high, annual harvests have been relatively low since 1984, averaging 6,000 pelts. Harvest success has been hindered by poor weather and trapping condi tions during November and December. Recent harvests are well below the long-term annual harvest of 16,000 mink and substan tially lower than the record annual harvests of 30,000 mink observed during the 1930's.

River Otter. As with mink, the river otter harvest is influenced by late-fall weather, travel access, and trapping conditions. On occasion, both mink and otter are caught in the same "fyke" or "taluyak" trap. The 1987-88 harvest in Unit 18 was 566 otters, which is above average. A harvest of approximately 750 otters was reported in 1983-84, because of an early freeze-up and moderate snow cover, but the number of otters sealed declined to 587 in 1984-85 and to 190 in 1985-86. Most of the otter harvest occurs during November through January, a period frequently characterized by freeze-thaw conditions and variable snowfall. Otter catches were facilitated by cold weather during November and December 1987. The lower Johnson River was the most productive drainage for otter, accounting for 85 otters sealed in 1987-88, approximately 15% of the reported harvest.

Marten. Trappers reported that their marten catches have approximately doubled since 1987. Although marten prices have fallen substantially over the last year, particularly for lower-grade pelts and damaged furs, demand has remained stable for top-quality skins.

Red Fox. Fur Acquisition data indicate that over 2,500 red foxes were purchased from Unit 18 in 1987-88, and approximately 200 of

these were taken from within the Bethel city limits. Prices and demand for red foxes, however, were very poor, and international markets appear flooded by red fox pelts; no immediate improvement is forecasted. The color variety known as the "cross" fox is present in approximately 2% of the harvest in Unit 18. These pelts are highly prized as parka trim and infrequently appear in the commercial trade.

Arctic Fox. Arctic fox prices are currently very low, and trapper effort was minimal. Local furbuyers purchased many arctic fox pelts at low prices and tanned them for resale locally.

Lynx. Lynx pelt prices have fallen substantially during 1987- 88; however, lynx prices were still high, relative to other species. Most lynx taken in Unit 18 were sold and not used domestically; therefore, I believe the sealed harvest accurately reflects the actual harvest. The documented take of lynx in 1987-88 in Unit 18 was only 10 animals; 4 of these came from the vicinity of Kusilvak Mountain south of Mountain Village.

Wolverine. The annual harvest of wolverine in Unit 18 was low, exhibiting little annual variation in magnitude from previous harvests. Six wolverines were sealed in Unit 18 in 1987-88; four came from the Yukon drainage and two were taken near Marshall in the hills north of the Yukon River. The annual harvest in Unit 18 usually averages 8 wolverines. Wolverine pelt prices have also been relatively stable; however, its fur is highly prized as parka trim, and most of the harvest was probably utilized domestically.

Transport Methods:

Nearly the entire furbearer harvest in Unit 18 was conducted using snow machines as transportation.

Natural Mortality:

The abundance and distribution of furbearers in Unit 18 appear to be related to weather, habitat, and disease factors, rather than to mortality caused by trapping. Muskrat and beaver populations are particularly subject to heavy overwinter mortality caused by occasional consecutive winters charac terized by thick ice, cold temperatures, and little snow. Otter and mink are more mobile and less subject to "freeze-outs". Fox, muskrat, and lynx populations in Unit 18 appear to fluctuate greatly in number and are subject to mortality caused by weather, disease, and declines in prey abundance. Fox populations in Unit 18 are subject to epizootics of rabies, mange, and distemper, causing major population declines. The large fox population in Unit 18 was supported in 1987-88 by abundant prey species; however, it appears primed for a "crash", because the incidences of rabies, distemper, and mange are reportedly increasing.

Habitat

Unit 18 contains vast acreage of lowland tundra and wetlands, and it is largely within the boundaries of the Yukon Delta National Wildlife Refuge. Consequently, the habitat favors production of aquatic furbearer species such as mink, otter, beaver, and muskrat. Conversely, boreal forest and montane habitat is limited, and species such as marten, lynx and wolverine are relatively uncommon. All habitats are rela tively natural and undisturbed, with the exception of revege tating dredge tailings in the upper Tuluksak drainage; there, the brushy habitat, which is created in successional stages, is productive for snowshoe hares and lynx. No major habitat changes or enhancement effort are planned for Unit 18.

Game Board Actions and Emergency Orders

The Board of Game eliminated the bag limit (i.e., 40 beavers) for Unit 18 north of the Yukon River in 1984. In 1987 the Board enacted regulations prohibiting the practice of using aircraft for harvesting wolves, wolverines and foxes with firearms on the same day. However, this regulatory change does not prohibit trappers from using firearms to dispatch trapped animals. Because furbearers are rarely harvested in Unit 18 using aircraft as transportation, I do not anticipate any significant change in harvest patterns. There have been no other regulatory changes for furbearers in Unit 18 in the last 5 years.

CONCLUSIONS AND RECOMMENDATIONS

Furbearers are abundant in all areas of suitable habitat in Unit 18. Production of aquatic species such as mink, beaver, otter, and muskrat is immense, and it is supported by vast amounts of lowland tundra and wetland habitat. Red foxes are abundant, and their numbers may be peaking. Forested, boreal habitat is limited, and far fewer lynx, marten, wolf and wolverine are taken in Unit 18. All habitats are relatively undisturbed. Trapping pressure appears to affect furbearer populations only in the vicinity of communities. Furbearer populations appear to fluctuate in response to weather, disease, and changes in densities of prey species, rather than to human harvest.

No changes are recommended in seasons or bag limits at this time.

PREPARED BY:

Samuel M. Patten, Jr.
Game Biologist III

SUBMITTED BY:

Steven Machida
Survey-Inventory Coordinator

STUDY AREA

GAME MANAGEMENT UNIT: 19 (36,850 mi^2)

GEOGRAPHICAL DESCRIPTION: All drainages of the Kuskokwim River upstream of the village of Lower Kalskag.

BACKGROUND

Furbearers have historically played an important role in the history of Unit 19. Several species were essential to the welfare of native groups in the area. The first Euro-American influences in the area resulted from early Russian exploration and the developing furtrade. Furbearers are still linked to the lifestyle of most area residents; in addition to domestic uses for garments, food, and craft items, considerable monetary benefits are realized. During the 1987-88 fur-trapping season, I've estimated that well over one-half million dollars were grossed by area trappers for heir catches.

MANAGEMENT OBJECTIVES

To provide annual harvestable surpluses of all species.

To encourage continued commercial activities.

To develop final furbearer population management objectives by 1990.

METHODS

Harvest statistics for beavers, land otters, lynx, and wolverines were gathered from sealing documents. During the course of sealing, information was obtained on specific location and date of harvest, sex of the animals, and approximate age. Rough harvest trends of 7 additional furbearer species were gathered from "Fur Acquisition and Fur Export Reports."

In addition to the annual "Trapper Questionnaire" distributed through the statewide furbearer management program, an additional 117 trappers who operated in Unit's 19 and 21(A) and (E) were sent questionnaires. Names of trappers were obtained from sealing documents. Questionnaires were distributed in May 1988, and 69 trappers responded (59% response). Trappers were asked how many animals of each species they had harvested, along with a check-mark system regarding population trend (i.e., Trend Index [TI] reflecting increasing, decreasing, or stable) and current population levels (i.e., Abundance Index [AI] refelcting high, moderate, or low) for each species. Species listed as increasing, stable, or decreasing were assigned values of 9, 5, and 1, respectively. The same indexing system was used for current population levels. All responses were lumped, and a mean was calculated for each species. In analyzing the TI, mean

values between 4.51 and 5.50 were assumed to represent stable trends, ≤4.50 declining, and >5.50 increasing. Likewise, for AI, values ≤4.50 were assumed to represent low populations, 4.51 to 5.50 were moderate, and >5.50 represented relatively high population levels.

Because of previous and current concerns over declining marten populations in Unit 19 and portions of Unit 21, marten carcass collections were initiated. A total of 252 marten carcasses were donated by 8 local trappers; they were necropsied.

Sex and approximate age estimates of the harvested segment of the marten population were gathered. A gross examination of digestive tracts was conducted to determine incidence of macro parasites. Skulls were collected and transferred to Fairbanks for research into marten aging techniques. Bacula and femurs were also collected for age determinations.

Limited beaver cache counts were conducted by boat along the Takotna and Nixon Fork Rivers near McGrath. In addition, incidental aerial observations of active colonies along lower Big River and its tributaries were noted.

External parasites were collected from 1 marten and 1 short-tailed weasel during 1987-88. Parasite identification was completed by Dr. Nixon Wilson, University of Northern Iowa.

RESULTS AND DISCUSSION

Population Status and Trend

Beaver:

Beaver populations appear to be increasing throughout Unit 19, particularly where favorable habitat exists. In Subunits 19B and 19C (i.e., more restricted habitat), beaver colonies appear to inhabit virtually all suitable habitat. In Subunits 19A and 19D (i.e., favorable habitat) populations appear to be high and healthy.

Based on sealing documents, harvests during the reporting period totaled 1,402 beavers, substantially higher than the previous 10-year annual average of 1,135. The sealing certificate tallies represents a close approximation of actual harvests in Unit 19. When "Fur Acquisition Reports" and "Fur Export Reports" were combined, a total of 1,013 beavers were represented. A relatively accurate harvest level can be estimated by computing a conversion factor between these two figures. For the 1987-88 season, a value of 1.38 (1402/1013) is indicated.

Subunits 19A and 19D provided the majority (91%) of the harvest (Table 1). This distribution reflects optimum habitat and access. The relatively high harvest during this reporting period was probably due to high beaver population numbers and moderate

pelt prices (Table 2), providing additional incentives for trappers.

One hundred forty-four trappers reported taking 1402 beavers for; i.e., averaging 9.7 beavers/trapper. During the 1984-85 season, 75 trappers harvested 700 beavers (mean = 9.3 beavers/trapper). Ninety-two percent of the 1402 beavers harvested during the 1987-88 season were taken by residents of the unit; the remaining 8% harvested by other Alaska residents. Snow machines were the most common mode of transportation used by beaver trappers (75%), and snaring was the most common method of capture (91%). Of 1,384 beaver pelt measurements recorded on sealing documents, 117 (8.5%) were judged to be kits ($\leq$52 inches) and 694 (50.1%) were large adults ($\geq$65 inches). The month of harvest was also available for 1,343 beavers; November, 28 (2.1%); December, 149 (11.1%); January, 103 (7.7%); February, 224 (16.7%); March, 651 (48.5%); and April, 188 (14.0%).

Limited beaver cache counts were conducted during the 1987-88 reporting period. On 26 September 1987, the Takotna River was surveyed by boat. Eleven active colonies were recorded on 16 miles of river, yielding 0.7 active colonies/mile. Six miles of the Nixon Fork River were also surveyed on the same day; 7 active colonies were recorded, yielding 1.17 colonies/mile. These two areas receive high harvest pressure, yet beaver densities remain relatively high. Incidental aerial observations of caches in the lower Big River also indicate a relatively high incidence of beavers, certainly higher than 1 colony per mile of river.

Respondents to the 1987-88 "Trapper Questionnaire" indicated that beaver abundance was high (AI = 7.47; $\underline{n}$ = 43) and has continued to increase over last years' levels (TI = 6.07; $\underline{n}$ = 30). Of all furbearer species, beaver received the highest overall index numbers, both for current abundance and for trends.

Because of moderate pelt prices and continually expanding beaver populations, harvest regulations were further liberalized during this reporting period. Beginning with the 1988-89 trapping season, trappers will be allowed to take 50, rather than 40, beavers per year. Because only 3 trappers were known to have harvested their respective limits during 1987-88, the increase in the bag limit should not substantially affect the total annual harvest.

River Otter:

The harvest of river otter in Unit 19 largely incidental to other targeted species. Average pelt prices remain relatively low (Table 2), providing little incentive for trappers to specifically seek otters. The 1987-88 harvest of 80 otters was not statistically different from the 10-year mean annual harvest of 71 (range = 55-105). Harvest chronology was distributed fairly evenly from November through April. Consistent with most previous years, Subunit 19A provided 44% of the unitwide harvest;

i.e., 35 of 80 (Table 1). During 1987-88, the method of take was equally distributed between trapping and snaring. Transportation methods were as follows: 65% snowmachines; 30% dogsled, skis, or snowshoes; and 5% airplanes.

Five of the 80 otters harvested (6%) were considered to be pups (combination of length and width <39 in). Mean pelt size for all harvested otter was 44.9 inches. Thirty-seven trappers harvested otters, yielding an average take of 2.2 otters per successful trapper. Almost 90% of the harvest was made by residents of the unit; the remainder taken by other Alaska residents.

The Trapper Questionnaire indicated that trappers considered river otter populations moderate (AIx = 4.71). The trend of the population was thought to be stable (TI = 5.41).

Lynx:

Eighteen trappers took a total of 37 lynx during the 1987-88 season (i.e., 2.1 lynx/successful lynx trapper). This represents a slight increase in the harvest from that for 1986-87, indicating an upswing in the population cycle. A more noticeable increase in the harvest should occur during the 1988-89 season.

There is a strong statistical relationship between pelt size and future harvests, sealing documents have included pelt lengths since the 1977-78 season. When the total current harvest is correlated with the percentage of pelts $\leq$ 33 inches long (i.e., nose to base of tail) from the harvest 2 years before, a relatively consistent pattern develops. The correlation coefficient for this regression is 0.806, enabling predictive capabilities of what the lynx catches will be. Assuming relative consistency in lynx pelt prices, number of trappers, and access (environmental) conditions, I predict the 1988-89 unitwide lynx catch at 160 $\pm$ 23 ($\underline{P}$ = 0.10, 8 d.f.) based on the 12.0% pelts $\leq$ 33 inches in the 1986-87 catch. The highest catch during the reporting periods 1977-78 through 1986-87 was 283 lynx recorded in the 1981-82 season.

The lynx catch by subunit was distributed as follows: 19A, 5; 19B, 1; 19C, 23; 19D, 8 (Table 1). Residents of Unit 19 harvested 32 of the 37 lynx taken; the remaining 5 were taken by other Alaska residents. Of 37 sealed pelts where month of harvest was known, 18 (49%) were taken in January, 6 each in December and March (32%), 4 (11%) in February, and 3 (8%) in November. Of 27 harvested lynx whose sex had been recorded, 16 (59%) were males. The majority of lynx were harvested with traps (27 of 37, 73%); the most prevalent means of transportation were airplanes (19 of 37, 51%) and snowmachines (11 of 37, 30%).

Based on the Trapper Questionnaire, active trappers listed current lynx populations as low (AI = 2.45). The overall trend in the population was thought to be stable (TI = 5.0). In addition, the questionnaire asked trappers to give relative

abundance and trend of snowshoe hare populations in their respective areas. Overall abundance was listed as moderate (AI = 5.05), with an increasing trend over last years levels (TI = 6.35). Because population density of lynx appears to be highly dependent on population density of snowshoe hare, I suspect the increasing trend in hare numbers also lends support to the prediction of increased lynx catches during the 1988-89 season.

Wolverine:

As with most other furbearer species in Alaska, few data are available concerning population status and trends of wolverines. However, mandatory sealing of pelts has provided an account of harvests since 1971-72. These data, in the absence of other more quantifiable information, provide some indication of the population's trend. Although numerous other factors undoubtedly affect the harvest (i.e., access conditions related to weather and land ownership, pelt prices, abundance, and value of alternate species, etc.), trends in the harvest may provide some insights into population trends.

In Unit 19, wolverine harvests have remained relatively stable since mandatory sealing was initiated. The 1987-88 harvest of 68 is slightly above the previous 10-year-annual mean of 59. Wolverine harvest locations are evenly distributed throughout Unit 19 (19A = 16, 19B = 22, 19C = 20, 19D = 10). Thirty-five trappers were responsible for the harvest of the 68 wolverines, yielding a mean catch of 1.9 wolverines/trapper. Fifty-one wolverines were taken by Unit 19 residents (75%), and an additional 17 wolverines were taken by trappers residing elsewhere in Alaska. Consistent with previous years, the harvest was weighted toward males (58%). Shooting accounted for the greatest single capture method (n = 29, 43% of total); trapping (n = 23, 34%) and snaring (n = 16, 24%) accounted for the remainder. Most wolverines were harvested in March (27 of 68, 40%) and February (14 of 68, 21%). Only 1 wolverine was reported to be taken by a big game hunter during the fall.

The 1987-88 Trapper Questionnaire respondents indicated that current wolverine abundance and trend were moderate (AI = 4.5, n = 30), and slightly increasing (TI = 5.8, n = 45), respectively.

Marten:

Because there were concerns over low marten abundance and an apparent downward trend, I discussed the status of marten populations with many trappers during the reporting period. Approximately 4,300 and 3,879 marten were harvested during the 1986-87 and 1987-88 seasons, respectively. Because pelt prices have been relatively low until 4 or 5 years ago, the trapping pressure has been modest; however, $100 pelts have stimulated interests in trapping marten.

The 1986-87 Trapper Questionnaire indicated a population decline, compared with 1985-86 (TI = 3.86). Trappers in 1987-88 also indicated a decline in the population (AI = 3.87, n = 62), compared with that for the previous year (TI = 2.84, n = 50). In addition to these indices, one of the larger-volume furbuyers in Alaska wrote a short article in the Alaska Trapper, expressing his concerns over the marten decline throughout western Alaska, (i.e., specifically Units 19 and 21). Potential causes of the perceived declines were examined.

Parasites. Most of 270 marten carcasses that were donated by area trappers were subjected to a cursory examination of gastrointestinal tracts for parasites. Tapeworms (Taenia sp.) and roundworms (Soboliphyme baturini) were found in a small percentage of the carcasses. Four ectoparasites were identified from a single host (i.e., 2 fleas: Orchopeas caedens durus and Chaetopsylla floridensis; 2 sucking lice: Hoplopleura sciuricola and Neohaematopinus semifasciatus). In no instances were these parasites thought to be debilitating to individual marten.

Food. Lack of available food resources is another logical factor that may influence marten natality and/or mortality. In performing the necropsies of trapped marten, I noted an abundance of inguinal and internal fat reserves, although, marten rarely develop extensive adipose deposits, even under ideal conditions (Buskirk 1983, Strickland and Douglas 1988). Fat levels of the donated carcasses were normal. Responses to the Trapper Questionnaire suggest that marten food items were adequate. Mice, including voles and shrews were relatively abundant (AI = 6.41). Grouse populations were moderate (AI = 5.31), and ptarmigan and red squirrel populations were abundant (AI = 5.98) and (AI = 7.08), respectively. Snowshoe hare populations were moderately abundant (AI = 4.97). Overall trends of these prey species indicated increasing populations; thus it appears unlikely that marten were food-stressed.

Natural Cycles. In reviewing the historical statewide marten harvest data from 1910-11 to 1987-88, there were apparent cycles in marten catches; they were particularly evident from 1911 to 1920, 1920 to 1928, and 1928 to 1936. Harvests fluctuated erratically from 1936 to 1959, affected by season closures and World War II, which lessened trapping efforts. From 1959 to 1979 there was a general increase in the numbers of marten exported; i.e., from a low of 2,368 in 1959 to a high of 29,483 in 1979. It appears that another population decline may have occurred in 1984; harvests have been increased since then.

In virtually all documented cases of cyclicity, they are driven by relative food abundance or predation. However, as discussed above, food appears to be abundant and is therefore not suspected to be the driving force behind the present downturn in the marten population.

Predation. High abundance of predators, relative to their primary prey species, may cause predation to be shifted toward alternate prey. As typical prey species become abundant, predators also become more abundant. As typical prey species begin to decline, the predators redirect their predation efforts toward alternate prey. Predators (i.e., great-horned and great gray owls, foxes, lynx, and coyotes) certainly increase in response to their primary prey abundance. Although D. Kelleyhouse, ADF&G (pers. commun.) suggested that those predators redirect predation toward marten as their primary prey become scarce, I don't feel that is the case for Unit 19. First, abundance of primary prey, is relatively high. Second, trappers who responded to the questionnaire rated the lynx and coyote populations as low (AI's of 2.31 and 1.42, respectively) and fox and hawk/owl populations as moderate (AI's of 4.88 and 4.56, respectively).

Overharvesting. With the price of marten at an all-time high, trapping pressure was intense. Marten are an easy animal to trap, skin, and stretch; therefore, many trappers tend to focus efforts on them. In the early 1900's trappers were very hard on local marten populations; however, their effects were limited by where they could travel by dogsled or snowshoes. Extensive areas were not trapped, simply because it was too far for trappers to go. These untrapped areas provided refugia for marten that overflowed into the well-trapped areas. With modern means of transportation (i.e., snowmachines and airplanes), these refugia are being trapped more extensively, thus providing less marten for the heavily trapped areas.

Many trappers operate a trap line for a year or two and then let it lay idle for a year or two, which is a good management practice. However, with the high prices for marten pelts, other trappers may move in and operate these areas.

In an attempt to involve local citizens in the decision-making process, I presented results of the Trapper Questionnaire and necropsies Fish and Game Advisory Committees for McGrath and Central Kuskokwim areas. They agreed that there was no single, readily apparent cause for the long-term decline in marten populations. Six possible management strategies were proposed and considered by members of these committees: (1) gather another year's data and formulate a recommendation, (2) register trapping areas so people could "farm" them, (3) impose individual annual limits on the number of marten allowed per trapper, (4) institute a system of complete closures in certain drainages, opening them on alternate years, (5) initiate 1-year season closure, and (6) reduce the length of the season.

Strategy No. 1 was generally discounted, because people were concerned that another season of intense harvest pressure in the face of declining populations could depress marten populations to the point that it may take several years for populations to rebound. Strategy No. 2 was discussed, and although it was

appealing to many of the established trappers, it did not appear politically possible. Strategy No. 3 was discounted because most advisory committee members thought it would be completely ineffective, requiring a costly sealing of their furs before selling. Strategy No. 4 was also discounted, because it would redistribute trapping pressure to open areas and place extreme pressure on the open drainages. Strategy No. 5 was not considered an acceptable alternative. Strategy No. 6 was considered the most viable alternative. Carcass analyses indicated a relatively low percentage of young marten in the harvest (i.e., 17-22%) and the sex ratio was nearly equal (106 males:100 females).

Following discussions with the advisory committees, I reviewed several details of the season reduction. An article was published in newspapers in Bethel (Tundra Drums) and McGrath (Kusko Courier), letters were sent to advisory committee members soliciting ideas and a radio discussion was aired from McGrath (Station KSKO).

Recent work published by Strickland and Douglas (1988) suggests that age (i.e., number of juveniles per adult female) and sex ratios can be used to evaluate the intensity of the harvest. They reported that ratios of more than 3 juveniles:1 adult female represents an acceptable harvest level. Several authors (Yeager 1950, Quick 1953, Soukkala 1983, Archibald and Jessup 1984) that sex ratios in the harvest reflect trapping pressure and equal ones probably indicate overharvesting. In the Unit 19 harvested sample of 270 marten, juvenile/adult female ratios were approximately 0.5:1, 6 times lower than the 3:1 ratio recommended by Strickland and Douglas (1988). Sex ratios in the harvest was nearly equal (i.e., 53.8% males, 1.1:1), a further indication of overharvesting.

Marten hides are generally prime in Unit 19 by the beginning of the season on 1 November, and most pelts remain prime until the end of the season on 28 February; however, there are a few that are beginning to show signs of declining fur quality in February. The proportion of females in the harvest also increases as the season progresses, effectively reducing the breeding stock. Therefore, the shortening of the season at the end was thought to be the best strategy. In order to allow reasonable opportunities for harvesting marten while yet reducing the annual take, I issued an Emergency Order, shortening the marten season by 44 days (37%); i.e., the 1988-89 season is from 1 November to 15 January.

I will continue to document population status and trends through the Trapper Questionnaire. Additionally, carcass collections will continue to enable the documentation of sex and age ratios in the harvest.

Mink:

Relatively low market demand for wild-caught mink has resulted in moderate pelt prices (Table 2), leading to minimal trapper effort. When results from the "Fur Export Report" and "Dealer Acquisition Report" were combined, a total of 64 mink were harvested. When responses from the Trapper Questionnaire (47 mink taken by 20 trappers) were compared with the total reported catch, 16 mink were represented on both data bases. Thus, 2.94 (47/16) mink had been caught for every one reported through the acquisition-export system. Multiplying the reported harvest (64) by this factor resulted in an estimated total of 188 mink during the 1987-88 season.

Responses to the Trapper Questionnaire revealed that a total of 47 mink were captured by 20 trappers, a mean of 2.35 mink/successful mink trapper. The AI was 3.55, indicating a relatively low population; the TI was 4.30, signaling a slight decline in the perceived trend of mink populations. The 1986-87 TI was 4.47, indicating a slight decline. The low reported harvest and relatively low number of mink per trapper probably reflects a lack of mink trapping effort as well as moderate-to-low population status.

Muskrat:

The muskrat harvest remained low. According to data in the "Fur Acquisition Report" and "Fur Export Report", 43 muskrats were harvested; however, only about 50% of the actual harvest was represented in these reports. Therefore, 86 muskrats were taken in Unit 19 during the 1987-88 trapping season. Only 4 muskrats were reported harvested, according to respondents to the Trapper Questionnaire, indicating little interest in the species.

Results of the Trapper Questionnaire indicate a slight upward trend in muskrat populations; i.e., TI of 5.84. Even with this increasing trend, however, most trappers still consider muskrat populations to be extremely low (AI = 2.73, $\underline{n}$ = 30).

Coyote:

Viable coyote populations are largely restricted to areas in or near the Alaska Range. Apparently, coyotes are invading Unit 19 from areas south of the range, where they are well established. One coyote was on the Kuskokwim River near Stony River Village, indicating a possible expansion northward and westward. A guide operating in the Alaska Range near Big River reported seeing coyotes in that area for the first time in 15 years.

The estimated harvest remained extremely low, reflecting the low population density and relatively low pelt prices. Only about 12 coyotes were harvested during 1987-88. Results of the Trapper Questionnaire show an AI of 1.73, and a stable TI of 5.25. I

suspect that coyote numbers will continue to increase over the next several years.

Red Fox:

Although red fox populations appear to be well established in all areas there is apparently little trapper interest in harvesting them. Identical to last year, 75 foxes were reported taken by 19 trappers who responded to the Trapper Questionnaire (3.9 foxes/successful trapper). Because of low market demand, I suspect that few trappers specifically targeted foxes; most were incidentally caught in sets made for other species.

Indices were highly variable among areas, but the mean unitwide AI was 4.96, depicting a moderate fox population. The indicated TI was relatively stable at 5.48. I suspect that fox populations will continue to show modest density increases in response to low harvest pressure and relatively abundant supplies of primary prey species.

Weasel:

Short-tailed weasels are often incidentally caught in sets made for other species, notably marten. Little or no trapper effort is directly targeted toward weasels because of low market demands. No information is available on trends or relative abundance of weasels in Unit 19.

Seasons and Bag Limits

See Trapping and Hunting Regulations No. 28.

CONCLUSIONS AND RECOMMENDATIONS

Beaver populations appear to be high and increasing, and harvests will probably vary in response to market demands. An increase in the individual limits per trapper (i.e., from 40 to 50) may result in slightly higher catches. The land otter harvest is incidental to the beaver harvest, and little effort is directed specifically toward otter. No changes in seasons or bag limits are recommended.

The lynx harvest was low, but with the apparent increase in hare populations, lynx populations should increase. A shortened season or methods-and-means restrictions should be considered if lynx populations (as reflected in the harvest) do not rebound.

Wolverine populations appear to be stable throughout Unit 19. At this time, no changes in season length, bag limits, or methods and means are recommended.

Mink populations were moderate and stable, but harvest remained low because of weak market demand. No changes are recommended. With the high prices for marten pelts, the intense trapper effort

for this species should continue to document population trends. Carcass analyses to document sex and age ratios in the harvest should continue. The Emergency Order, designed to reduce the proportion of female martren taken should be reevaluated annually.

Weasels and red foxes are additional furbearers that appear widespread and stable. Coyote populations will probably continue to expand, and trapping regulations should remain liberal to allow harvests. Because of low market value, muskrat populations are presently affected lightly by current seasons and harvest levels; therefore no changes are recommended.

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PREPARED BY:
Jackson S. Whitman
Game Biologist III

SUBMITTED BY:
Wayne E. Heimer
Survey-Inventory Coordinator

REVIEWED BY:
Randall L. Zarnke
Wildlife Biologist II

Table 1. Estimated numbers of furbearers harvested, in Unit 19 during the 1987-88 trapping season.

Species	Subunit					19 Total
	19A	19B	19C	19D	19 Unk	
Beaver	613	101	23	665	0	1,402
Land otter	35	20	7	18	0	80
Lynx	5	1	23	8	0	37
Wolverine	16	22	20	10	0	68
Wolf	60	50	13	15	5	143
Marten	-	-	-	-	-	3,879
Mink	-	-	-	-	-	188
Muskrat	-	-	-	-	-	86
Red fox	-	-	-	-	-	144
Coyote	-	-	-	-	-	12
Weasel	-	-	-	-	-	Unk
Red squirrel	-	-	-	-	-	Unk
Total						5,896

Table 2. Estimated total catch and value of all furbearers captured in Unit 19 during the 1987-88 season.

Species	Est.Total Take[a]	Est.Mean $/Pelt[b]	Total Value
Beaver	1,402	40.86	57,286
Land otter	80	40.51	3,241
Lynx	37	314.05	11,620
Wolverine	68	210.00	14,280
Wolf	143	222.00	31,746
Marten	3,879	104.33	404,696
Mink	188	48.18	9,058
Muskrat	86	3.39	292
Red fox	144	26.95	3,881
Coyote	12	49.75	597
Red squirrel	Unk	.67	Unk
Weasel	Unk	2.16	Unk
Total	-	-	$536,697

[a] Estimated catch was obtained from sealing documents for beaver, otter, lynx, wolf, and wolverine. For the remaining species, an estimate was obtained by comparing questionnaire results and Fur Acquisition and Export Reports.

[b] Estimated mean price per pelt was determined from Canadian fur sales results from 1987-88.

STUDY AREA

GAME MANAGEMENT SUBUNITS: 20A, 20B, 20C, 20F, and 25C (39,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Central Tanana Valley, Middle Yukon River drainage

BACKGROUND

The demand for better information on furbearer populations and the effects of harvest has recently increased. Historically, trapping was largely self-regulating; when a species was scarce, trapping intensity was reduced. Overharvesting was not a concern, because the productivity of a trapline was dependent, in part, on the conservation and management by the trapper. However, concern for effects of trapping on lynx populations increased when extremely high pelt prices (i.e., $600/pelt in 1986) coincided with the low phase of the lynx population cycle. The inclusion of lynx and land otter on Appendix IIB of the Convention on International Trade of Endangered Species (CITES) since 1977 requires that the Department monitor and justify harvests. This requirement has been an additional catalyst to increasing our knowledge of these furbearers.

Although the fur trade is one of Alaska's oldest industries, the population dynamics of many furbearers are still not well understood. In general, most furbearers are difficult to study because of their secretive nature. Instead, information on furbearers has come principally from harvest data. Additionally, the Trapper Questionnaire, issued annually since 1965, queries Interior trappers about changes in furbearer abundance and encourages communication between trappers and biologists.

The few furbearer studies in the last 20 years in Interior Alaska included lynx population dynamics (Nava 1970, Berrie 1973, O'Connor 1984, Stephenson 1988), beaver population ecology (Boyce 1974), and the effects of fire on furbearers (Stephenson 1984, Magoun and Vernam 1986). In response to the recent demand for basic survey and inventory information, other studies have focused on developing techniques to survey furbearer populations by track counts (Golden 1987, Schwartz et al. 1988, Stephenson 1988).

POPULATION OBJECTIVES

Fur beaver in Fairbanks vicinity of Subunit 20B (the Chena River downstream from its confluence with the Little Chena River, and Badger (Piledriver) Slough downstream from Plack Road:

To manage for a population density of <0.8 colonies/mi.

To mitigate problems arising from beaver activities.

To promote opportunities for the public to view/photograph beaver.

For beaver outside Subunit 20B closed area and other furbearers in Subunits 20A, 20B, 20C, 20F, and 25C:

To provide for continued subsistence use of furbearers by rural Alaskan residents who have customarily and traditionally used the population.

To provide the greatest sustained opportunity to participate in trapping and hunting furbearers.

To provide for commercial use of furbearers.

To measure and interpret changes in the status of furbearer populations and their habitat.

Beaver in Subunits 20A, the remainder of 20B, 20C, 20F, and 25C:

To manage for an annual subunit harvest that includes <20% kits.

For other furbearers under the following schedule:

To summarize data from the most recent 5 years by FY89.

To establish management objectives for lynx by FY90.

To establish management objectives for marten, wolverine, and otter by FY91.

METHODS

Beaver populations in the portion of Subunit 20B closed to trapping were estimated with cache surveys conducted by boat on 21 October 1987. Population status and trend for all furbearers was assessed with responses to Trapper Questionnaires. Harvests estimates for beaver, lynx, otter, and wolverine were based on data from sealing documents; however, some pelts are used domestically and are not reported. The proportions of kits in the harvest for beaver and lynx were based on pelt measurements from the sealing certificates. Although overlapping occurs between pelt lengths of kits and yearlings, beaver pelts <53 inches (length plus width) (Buckley and Libby 1953) and lynx pelts <35 inches long (Stephenson 1988) were considered to be kits. Other harvest data were available from the Fur Export Reports and Fur Acquisition Reports. Average pelt prices were estimated by a local furdealer (J. Mattie, pers. commun.).

RESULTS AND DISCUSSION

Environmental Conditions Affecting Trapping

Winter temperatures in 1987-88 were 2-6°F above normal in this area, and snow depths were 15-30% below normal (National Weather Service, pers. commun.). Most trappers responding to a Trapper Questionnaire concurred with these observations. Trapping conditions were generally good while those in higher elevations and earlier in the season poorer.

Seasons and Bag Limits

See Tables 1a. and 1b.

Population Status and Trend

Beaver:

Beaver density in the portion of Subunit 20B that is closed to trapping currently exceeds our management objective of 0.8 colonies/mile. During cache surveys in October 1987, density was estimated at 1.0 colony/mile; 25% higher than the 0.8 colonies/mile (0.5 colonies/km) that Boyce (1981) believed was a saturation density for a stream in Interior Alaska. Using a mean of 5 beavers/colony (Boyce 1974), the population in the closed area was estimated at 200-250 beavers. During the summer of 1988, we recorded at least 15 complaints of property damage by beavers within this area. Conflicts were resolved by landowners fencing trees or property when possible. Beavers were removed if necessary. In 1988, 18 beavers were harvested under 4 permits issued to trappers to remove nuisance beaver within the closed area. In addition, 11 beavers were harvested under 8 nuisance permits issued for problems outside the closed area. In 1988-89, the closed area will be open to beaver trapping by registration permit (see Game Board Actions) to help reduce the population to our management objective of 0.8 colonies/mile. Because of a city ordinance prohibiting the setting of traps or snares within the city limitsof Fairbanks, issuance of permits must be approved by the city manager.

According to Trapper Questionnaire, beavers in the Tanana basin were common and populations were at about the same level as that for 1986-87. The reported 1987-88 harvest was 1,724 beavers, similar to harvests during the previous 2 years but much higher than the 1983-84 and 1984-85 harvests (Table 2, Figure 1). Most beavers were taken in Subunit 20B. The distribution of harvest in the most heavily harvested drainages is listed in Table 3. Forty-six percent of the beavers harvested were taken in March. Pelt prices averaged $35-45 and provided some incentive for trappers to trap beavers.

Our management objective for maintaining an annual harvest of beavers that includes <20% kits in each subunit is currently

being met. In 1987-88, the percentage of kits in the harvest was 9% (20A), 10% (20B), 3% (20C), and 15% (20F). However, local areas within some subunits may have sustained heavier trapping pressure and may have had more than 20% kits in their harvests. For example, 33% of the 75 beavers harvested from the Fairbanks vicinity (Subunit 20B Uniform Code Units 212, 301, 401, and 501) were kits. The average number of beavers per trapper ranged from six in Subunit 20A to 10 in Subunit 20C. No beavers were harvested in Subunit 25C this year.

Lynx:

Responses from the Trapper Questionnaire indicated that lynx populations throughout the Tanana basin remained low and snowshoe hares were common but increasing in numbers. This year's harvest of 179 lynx (Table 2, Fig. 1) was low, compared with those from previous years; however, harvest trends should be interpreted with caution because season lengths changed several times in recent years and trappers have been encouraged not to catch lynx during this low phase of the cycle. During 1987-88, 78 lynx were harvested in December and 68 were harvested in January. Subunit 20B has had the highest lynx harvest of the 5 subunits during 4 of the last 5 years.

The proportion of kittens in the harvest should provide us with an index to recruitment. During the last 3 years, lynx kittens (pelts <35 in) have made up 19-22% of the harvest, which is significantly more than the 8% and 11% kittens in the 1983-84 and 1984-85 harvests, respectively ($\underline{X}^2 = 20.7$, $\underline{P} < 0.001$) (Table 4). In a study of 3,130 lynx carcasses collected in Alaska during an 11-year period, the highest proportions of kittens were collected in the 1 to 4 years prior to peak lynx populations (O'Connor 1984), not 2 years after a lynx peak as noted in Alberta (Brand and Keith 1979). If this relationship holds during the current cycle, the lynx population is expected to peak in the next few years, as hares swing up out of the low phase of their cycle. Average pelt price for lynx was still very high ($400) in 1987-88. The price is expected to be lower next year, but it will probably be high enough to provide considerable incentive for lynx trappers.

Land Otter:

Land otter populations in the Interior seem to be stable at moderately low densities. According to responses from the Trapper Questionnaire, otters were moderately scarce in 1987-88 and populations were the same as those for 1986-87. However, McNay (1989) noted that otter tracks were commonly seen in Subunits 20A, 20B, and 20C during moose surveys in November 1986 and 1987. More investigation is necessary to interpret this apparent discrepancy.

Fifty-four otters were reported harvested in 1987-88, which is similar to recent annual harvests (Table 2, Figure 2). Sex

ratios were nearly even (51 males:49 females). Although otters were taken throughout the 5.5-month season, 46% of the 1987-88 harvest occurred in March, perhaps because otter are often harvested incidentally by beaver trappers. Trapping pressure on otter will probably continue to be relatively low because of low pelt prices (i.e., average about $30/pelt).

Wolverine:

Wolverines were rated as scarce by 27 of 32 trappers responding to the Trapper Questionnaire, and most (22 of 27) said the size of the population was similar to that in 1986-87. Harvests were relatively stable during the previous 4 years (range = 39-48 wolverines/year) (Table 2, Figure 2). The 1987-88 reported harvest of 38 wolverines was at the lower end of this trend, perhaps because the season was 1 month shorter (see Game Board Actions). Seventy-four percent of the wolverines were taken in December and January. None were reported harvested by big game hunters in the fall.

The preponderance of males (73%) in this year's harvest is consistent with a population that is not overharvested. Male wolverines have larger home ranges than females (Magoun 1985, Gardner 1985) and are thought to be more susceptible to trapping. Although correlations between sex ratio and overharvesting have not been firmly established, I will consider actions to reduce the harvest if the proportion of males in the harvest consistently falls below 60%.

In all studies of wolverines' food habits that Magoun (1985) reviewed, large ungulates have been the primary food resource, at least in winter. Most of the ungulates are probably obtained as carrion. Ungulate populations in this area are currently stable or increasing, which should result in stable or slightly increasing wolverine populations. Pelt prices remained at about $200-250, and trapping pressure will probably remain fairly stable.

Magoun (1985) stated that factors probably responsible for long-term population declines include (1) widespread declines in food resources, particularly the demise or range shift of large ungulate populations, (2) widespread habitat destruction, or (3) heavy harvests over large areas. At this time, none of these factors appear to be jeopardizing wolverine populations in the area covered by this report.

Marten:

Most trappers responding to the Trapper Questionnaire rated marten as common but with lower populations than in 1986-87. Trapping intensity has increased in recent years because of high pelt prices (average $90/pelt in 1987-88). Because marten pelts are not sealed, the harvest is estimated from fur dealer reports and export data. During this reporting period, 4,570 marten

pelts from Unit 20 were sold to fur dealers and 1,368 were exported from Alaska (Table 5).

The impact of different harvest rates on marten populations is unknown. Strickland and Douglas (1987) used a low ratio of juveniles to adult females (<3 juveniles:1 adult female) as an indicator to possible overharvesting, but this relationship needs more investigation. A field technique for sexing and aging marten developed by Magoun et. al (1988) could be used to collect baseline data for marten populations in areas of interest.

Other Furbearers:

Responses from trapper questionnaires indicated that populations of coyotes and muskrats were scarce; mink were scarce-to-common; red fox, hares, grouse, ptarmigan, and mice were common; and squirrels were abundant. Responses also suggested that compared with 1986-87, hare and ptarmigan populations had increased and population levels of these other species had not changed.

Economic Use

According to data from Fur Acquisition reports, fur dealers purchased Unit 20 furs from approximately 500 people in 1987-88. A comparison of data from these reports and sealing documents revealed that the purchases represented 67% of the beaver, 73% of the lynx, 44% of the otter, and 53% of the wolverine pelts that were sealed (Table 5). The proportion of pelts from this area that were sealed and exported from Alaska was very low (9-16%), but compliance with reporting requirements has historically been very low.

Method of Take and Transportation

Snares were the most common method of beavers (93%), traps were most common for lynx (75%) and wolverines (87%), and otters were taken with either snares (48%) or traps (52%) (Table 6). Snowmachines were the most commonly used method of transportation (88%) for harvesting these 4 species.

Game Board Actions and Emergency Orders

The Board of Game discussed furbearer regulations in November 1987. Effective 1 July 1988, beaver trapping in the Chena River downstream from the confluence with the Little Chena and Badger Slough downstream from Plack Road (i.e., previously the closed area) will be allowed by permit only; the Department will stipulate permit conditions. This opening is an attempt to reduce the beaver population to help minimize human-beaver conflicts and prevent beaver from overutilizing their habitat; however, the setting of traps and snares is prohibited within the Fairbanks city limits, and beaver in that area can only be removed through use of a nuisance beaver permit from the

Department given to a trapper with prior approval from the city manager.

The Board raised the bag limit for beavers in Subunit 20F (as well as Units 21, 24, and 25 (except 25C)) from 25 to 50 beaver. Beaver populations throughout the Yukon drainage are high, and although harvests have been increasing, the percentage of kittens in the harvest has been low, the total harvest falling below sustainable yield. Raising the bag limit will allow trappers to increase use of this resource.

The Board endorsed a "tracking strategy" for lynx regulations for areas where trapping intensity is highest; seasons and bag limits will be most liberal when lynx are abundant and more restrictive when lynx are scarce. Because lynx are currently scarce, the lynx trapping season in Unit 20 (except 20E) and Subunit 25C was reduced from 2 months (1 Dec-31 Jan) to 1 month (15 Dec-15 Jan) to further reduce the harvest in areas accessible to large numbers of trappers along the road system. Because this change by the Board would not be effective until 1 July 1988, the Department issued an Emergency Order effective 30 November 1987, reducing the lynx trapping and hunting seasons for 1987-88 (Tables 1a, 1b).

The wolverine trapping season in Units 12, 20, and 25C was shortened from 5 months (1 Nov-31 Mar) to 4 months (1 Nov-28 Feb). This action was taken primarily to reduce the potential for incidental catch of lynx during the period of closed lynx seasons. Other goals were to reduce wolverine harvest slightly and to align the end of the wolverine season with most other fur seasons. In addition, landing and shooting wolverines in this area (excluding Subunit 25C) will be prohibited. Those changes may not significantly reduce the wolverine harvest, because in 1987-88 most wolverines (74%) were harvested in December and January and only 2 wolverines were harvested by landing and shooting.

CONCLUSIONS AND RECOMMENDATIONS

The beaver population in the closed portion of Subunit 20B is currently higher than our management objective of 0.8 colonies/mile. Although ample viewing opportunities exist, human-beaver conflicts are frequent. A registration permit trapping season will be implemented in 1988-89 to reduce this population; however, nuisance beaver complaints will probably continue. Beaver harvests in each subunit met our management objective of <20% kits in the harvest.

Lynx populations are expected to increase in the next few years; however, I recommend retaining the conservative short season through 1988-89. Much of the 1988-89 furbearer S&I activities will include collecting and more thoroughly examining lynx data, in preparation for making recommendations for changes in lynx hunting and trapping regulations to the Board of Game in November

1989. There are no indications of population declines or management problems for other species in this area. No changes in regulations, other than those listed under Game Board Actions, are recommended at this time.

The high demand for furbearer resources and trapping opportunities is expected to continue. Furbearers provide an important source of income and livelihood for many trappers, especially in remote areas where alternative sources of income are limited. Trapping also provides an important source of recreation, especially for "weekend trappers" in the more accessible, road-connected areas. Furthermore, the importance of nonconsumptive use of furbearers should not be overlooked. Many people enjoy watching furbearers or seeing their sign, recognizing the importance of furbearers to the ecosystem.

To adequately manage furbearers in light of these demands, there is clearly a need for a better understanding of furbearer populations and the effects of harvest. Little is known about factors limiting furbearer populations, including the importance of changes in habitat (i.e., through fire, development of roads, mineral exploration). Successful management of some species, such as wolverines, is directly related to successful management of moose and caribou. We should continue to develop reliable methods to determine the status and distribution of furbearers and their prey. Increased effort for furbearer research could include support for graduate studies and interagency cooperative projects.

Trappers will continue to be an important source of information regarding furbearer populations. Even when adequate survey techniques are available, the Department will probably have the resources to survey only small portions of Alaska. Communication with the trappers should be improved by expanding the Trapper Questionnaire (i.e., send to more trappers or send reminder letters to increase response), visiting traplines, writing articles about furbearer research projects for the Alaska Trapper's Association magazine, soliciting input regarding management issues, and trying to keep trappers informed about issues affecting them.

To direct our information needs, furbearer management objectives will be established during the next few years. To prepare for developing these objectives, this report summarized the last 5 years of data on furbearers in this area. The Board of Game will discuss furbearer regulations in spring 1991, and management objectives should be established by then.

Although it would be useful to have baseline data for all furbearer species, limited time and budgets require us to prioritize our furbearer data needs. Currently, the highest demand is for data on lynx. I recommend establishing long-term studies of lynx and snowshoe hares to monitor population indices and to develop methods to anticipate changes in the magnitude and

timing of cycles. The effectiveness of our harvest tracking strategy depends on this information.

Achieving our management goals for furbearers depends on wise use of this renewable resource, proper management, and a sensitivity to various public concerns regarding furbearers. A good working relationship among Department staff, the trappers, and the nonconsumptive users should help ensure continued use of the wild fur resources available to us.

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PREPARED BY:

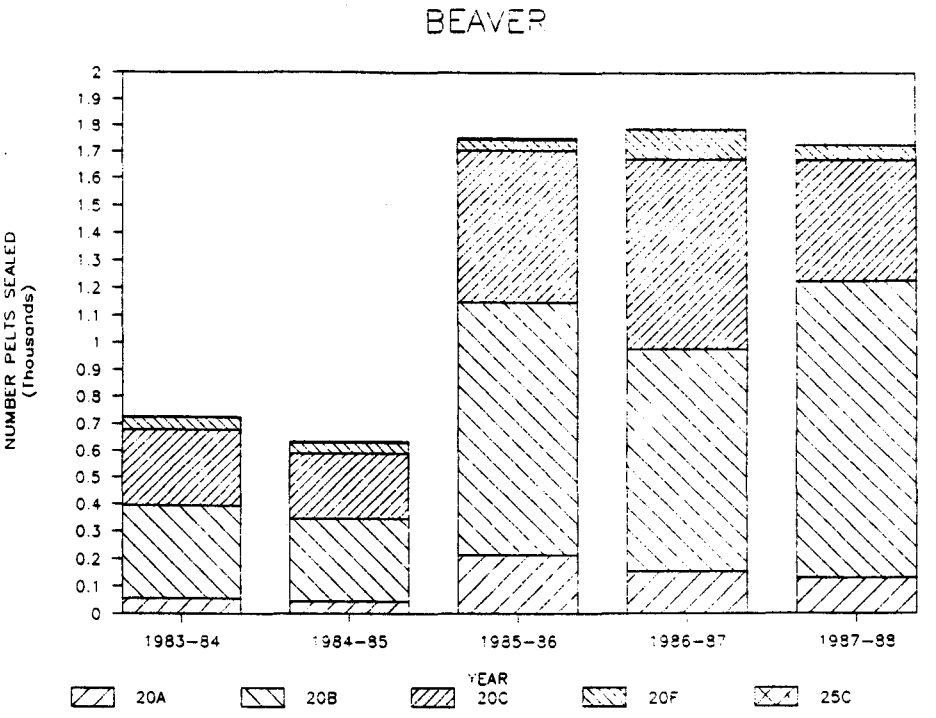
Robin M. Beasley
Wildlife Biologist I

SUBMITTED BY:

Wayne E. Heimer
Survey-Inventory Coordinator

REVIEWED BY:

Randall L. Zarnke
Wildlife Biologist II



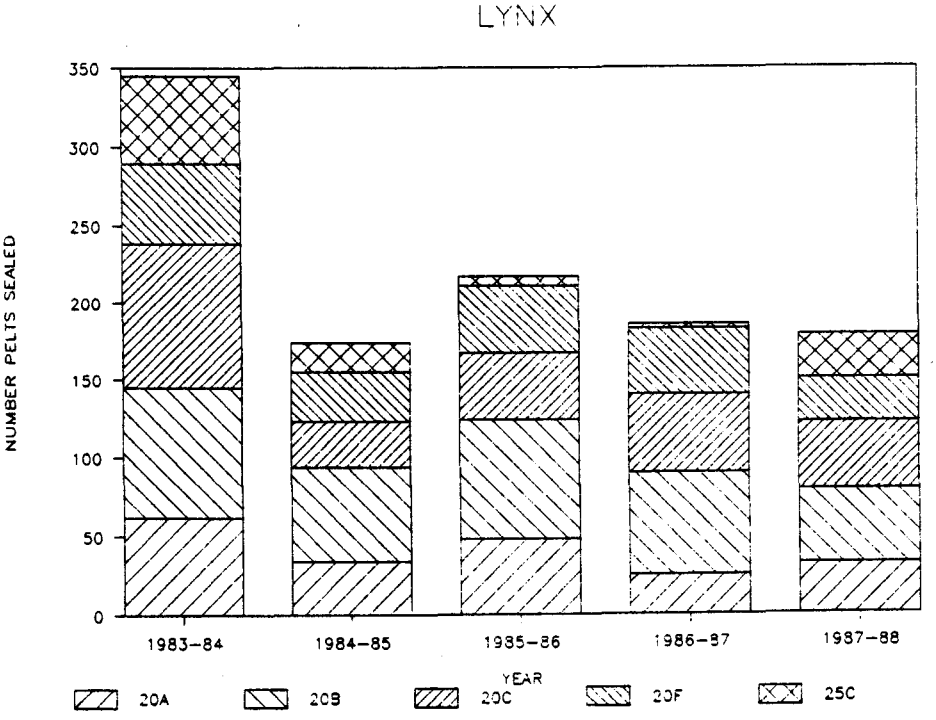


Figure 1. Distribution of beaver and lynx pelts sealed in portions of Unit 20 and Subunit 25C, 1983-84 to 1987-88 (See Table 1 for season changes during this period).

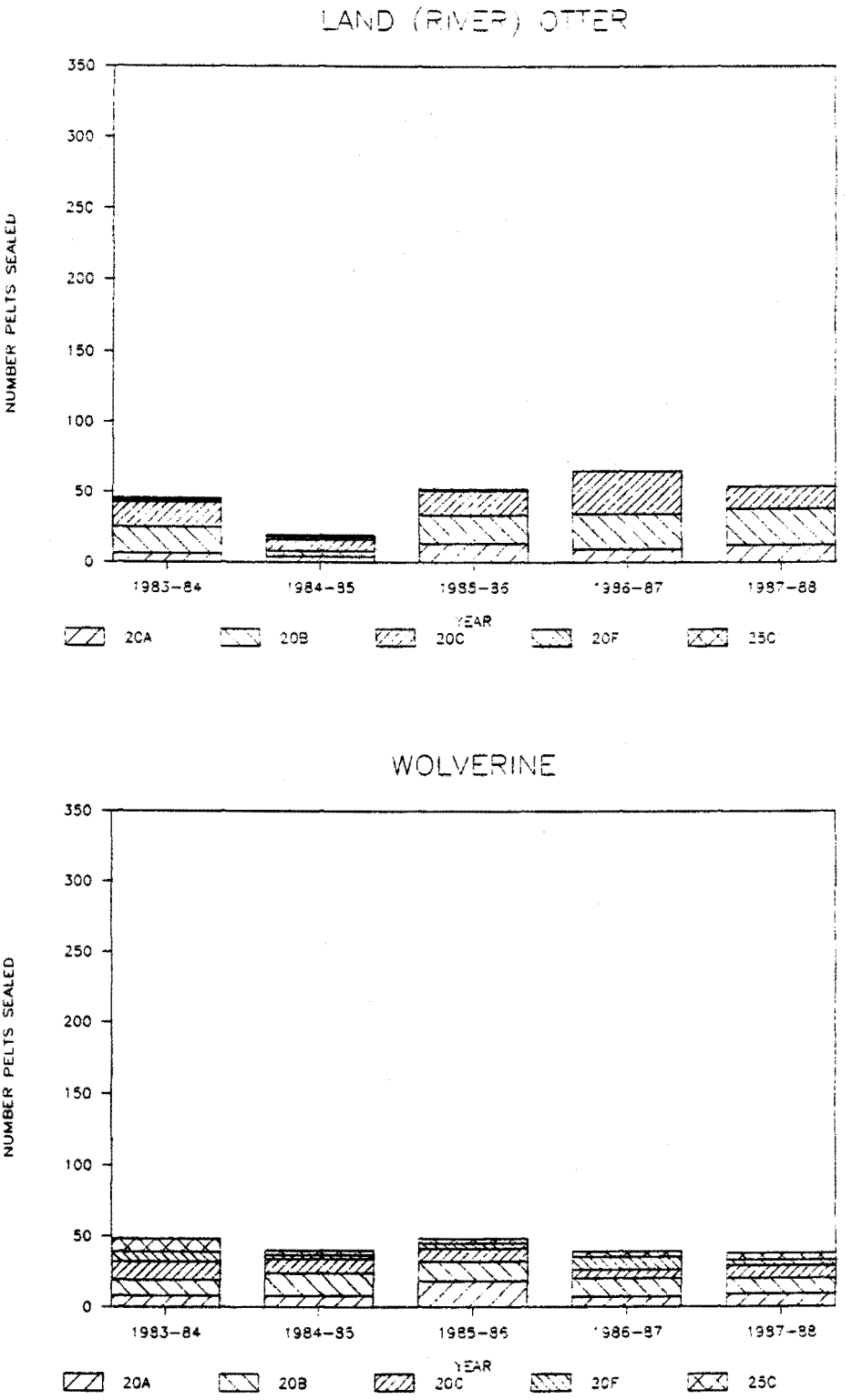


Figure 2. Distribution of otter and wolverine pelts sealed in portions of Unit 20 and Subunit 25C, 1983-84 to 1987-88 (See Table 1 for season changes during this period).

Table 1a. Trapping seasons and bag limits for selected furbearers in portions of Units 20 and 25, 1983-84 to 1987-88.

Species (Bag limit)	Area	Seasons 1983-84/1984-85	1985-86/1986-87	1987-88 [b]
Beaver (25)	20A	Feb 1 - Apr 15	Feb 1 - Apr 15	Feb 1 - Apr 15
	20B [a]	Feb 1 - Apr 15	Nov 1 - Apr 15	Nov 1 - Apr 15
	20C,F,25C	Nov 1 - Apr 15	Nov 1 - Apr 15	Nov 1 - Apr 15
Lynx (No limit)	20A,B,C,F 25C	Nov 1 - Mar 15	Dec 1 - Jan 31	20A: Dec 1-31 20B,C,F Dec 1 - Jan 15 25C Dec 1 - Jan 15
Land Otter (No limit)	20 25	Nov 1 - Apr 15	Nov 1 - Apr 15	Nov 1 - Apr 15
Wolverine (No limit)	20 25	Nov 1 - Mar 31	Nov 1 - Mar 31	Nov 1 - Feb 28
Coyote (No limit)	20 25	Nov 1 - Mar 31	Nov 1 - Mar 31	Nov 1 - Mar 31
Marten, Mink, Weasel, Fox (No limit)	20 25	Nov 1 - Feb 28	Nov 1 - Feb 28	Nov 1 - Feb 28
Muskrat (No limit)	20 25	Nov 1 - Jun 10	Nov 1 - Jun 10	Nov 1 - Jun 10

[a] Excluding the portion of Subunit 20B closed to trapping.
[b] These changes for lynx in Units 20A,B,C,F and 25C were effective 30 November 1987 by Emergency Order.

Table 1b. General hunting seasons and bag limits for fur animals and wolverines in Subunits 20A, 20B, 20C, 20F, and 25C, 1983-84 to 1987-88.

Species (bag limit)	1983-84 to 1986-87	1987-88[a]
Lynx (2)	1 Nov-31 Mar	1 Nov-31 Dec (20A) 1 Dec-15 Jan (20B, 20C, 20F, 25C)
Wolverine (1)	1 Sept-31 Mar	10 Nov-15 Feb
Red Fox (2)	1 Nov-15 Feb	
Coyote (2)	1 Sept-30 April	
Squirrel (no limit)	no closed season	

[a] Season changed by emergency order effective 30 November 87.

Table 2. Number of pelts sealed[a] from selected furbearers in portions of Unit 20 and Subunit 25C, 1983-84 to 1987-88[b].

Species	Subunit	1983-84	1984-85	1985-86	1986-87	1987-88
Beaver	20A	55	44	214	153	129
	20B	341	303	935	823	1095
	20C	281	244	557	697	445
	20F	47	39	42	113	55
	25C	1	3	4	0	0
Total		725	633	1,752	1,786	1,724
Lynx	20A	62	34	48	25	32
	20B	83	60	76	65	47
	20C	94	29	43	50	43
	20F	51	32	44	43	28
	25C	55	19	6	3	29
Total		345	174	217	186	179
Land Otter	20A	6	4	13	9	12
	20B	18	4	20	25	26
	20C	18	8	18	31	16
	20F	2	2	1	0	0
	25C	1	1	0	0	0
Total		45	19	52	65	54
Wolverine	20A	8	8	18	7	9
	20B	11	16	14	13	11
	20C	13	10	9	6	9
	20F	7	3	4	9	4
	25C	9	3	3	4	5
Total		48	40	48	39	38

[a] Except for 1987-88, data from S&I reports.
[b] See Tables 1 and 1b.

Table 3. Distribution of 1987-88 beaver harvest by drainage.

Area	Uniform Coding Units	No. beaver harvested
Greater Minto Flats	20B-200, 201, 205, 210	369
Chatanika River, Washington Cr.	20B-207, 208, 209	103
Chena River (espec. 20B-0402)	20B-400, 401, 402, 403, 404, 405, 486	377
Salcha River	20B-601, 602, 604	98
Manley to Tanana	20B-101, 20F-601	52
Lower Kantishna-Tanana to Kantishna	20C-501, 104	156
Toklat River	20C-502	45
Minchumina-Foraker	20C-504, 505	118
Tozitna River	20F-100, 101	37
Nenana River	20A-100, 101, 102 20C-601, 605	82
Other		287
Total		1,724

Table 4. Percentage of lynx kittens[a] in the harvest from Subunits 20A, 20B, 20C, and 20F, 1983-84 to 1987-88.

Year	Subunit	No. pelts measured	No. kittens	Percent
1983-84	20A	59	0	0
	20B	72	15	21
	20C	88	5	6
	20F	52	2	4
	Total	271	22	8
1984-85	20A	30	2	7
	20B	59	10	17
	20C	25	3	12
	20F	30	1	3
	Total	144	16	11
1985-86	20A	48	11	23
	20B	76	14	18
	20C	43	8	19
	20F	44	7	16
	Total	211	40	19
1986-87	20A	25	1	4
	20B	59	16	27
	20C	50	15	30
	20F	42	6	14
	Total	176	38	22
1987-88	20A	30	6	20
	20B	48	6	12
	20C	43	10	23
	20F	28	7	25
	Total	149	29	19

[a] Pelt length <35 inches.

Table 5. Number of furs from Unit 20 reported sold to fur dealers[a] or exported[b] from Alaska in 1987-88.

Species	No. pelts sealed	No. pelts sold to fur dealers	(%)	No. pelts exported	(%)
Beaver	1,817	1,220	(67%)	162	(9%)
Coyote		31		4	
Cross fox		48		27	
Red fox		175		58	
Silver fox		5		2	
Lynx	176	129	(73%)	15	(9%)
Marten		4,570		1,368	
Mink		273		44	
Muskrat		180		71	
Otter	57	25	(44%)	9	(16%)
Red squirrel		426		1	
Weasel		39		22	
Wolf	84	24	(29%)	18	
Wolverine	45	24	(53%)	7	(16%)
Total		7,169		1,808	

[a] From fur acquisition forms.

[b] From fur export reports.

Table 6. Method of take and transportation used to harvest furbearers from Subunits 20A, 20B, 20C, and 20F, 1987-88.

Species	Method of take				Method of transportation			
	Ground shooting	Trapping	Snaring	Other/Unk	Airplane	Dog sled/ snowshoe/skiis	Snow machine	Other/Unk
Beaver	0	122	1,567	35	29	125	1,299	44
Land otter	0	27	25	2	2	10	37	5
Lynx	0	135	44	0	5	35	129	10
Wolverine	2	33	3	0	0	5	33	0

STUDY AREA

GAME MANAGEMENT SUB UNIT: 20E (10,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Fortymile, Ladue, and Charley River drainages

BACKGROUND

Since the early 1900's the Fortymile area has been an important placer mining area. Placer mining is a seasonal endeavor, and many people engaged in mining during the summer have also trapped during the winter. The human population of Subunit 20E during the winter months has probably been less than 250 for the last 10 years. A number of trappers from Tok in Unit 12 also trap in Subunit 20E.

Marten and lynx are the most important species sought by trappers in this area; red foxes, wolverines, and wolves are less important because of low pelt values, scarcity, or difficulty of trapping. The number of wolverines are lower than they were in the 1960's, when numbers of moose and caribou were much greater. Marten have been widely distributed and abundant for the past 15 years; however, prices have been noticeably higher during the past 5 years. Lynx abundance is closely tied to the cyclic fluctuations in snowshoe hare population.

POPULATION OBJECTIVES

To provide for an optimum harvest of furbearers.

To provide the greatest opportunity to participate in hunting and trapping furbearers.

METHODS

Furbearer management in Subunit 20E is based largely upon annual harvest estimates. Sealing of pelts is mandatory for wolves, wolverines, lynx, land otters, and beavers. During the course of pelt sealing process, information is obtained on the location and date of harvest, i.e., method, sex of the animals, and estimates of age (young-of-the-year or adult). Additionally, pelts of all furbearers exported from Alaska must be enumerated, attributed to a specific game management unit, and reported to ADF&G on the Raw Fur Skin Export Report. Unit-specific estimates of harvests based upon the mandatory sealing data are considered to be more accurate than estimates based upon the fur export reports for a number of reasons.

Informal discussions with trappers and furbuyers familiar with Subunit 20E serve as a subjective assessment of furbearer abundance in the area. Documentation of similar responses by regional staff

through the annual Trapper Questionnaire also serves as a subjective assessment of furbearer abundance.

An aerial survey technique for estimating lynx abundance has been developed for Interior Alaska (Stephenson 1986), but it has not been used in Subunit 20E. Lynx tracks and areas of concentration were mapped during approximately 55 hours of aerial wolf surveys in the area during the winter of 1987-88.

RESULTS AND DISCUSSION

Population Status and Trend

Lynx:

Lynx numbers reached an unspectacular high in 1982-83 in Subunit 20E, subsequently reaching a cyclic low from 1985 to 1987. During the current reporting period, lynx began to increase slightly; a few lynx were reported in the Eagle, Chicken, and Mosquito Flats-Kechumstuk, areas where snowshoe hare numbers are increasing. An increasing percentage of lynx kittens in the harvest (33%) also indicates that further population increase is imminent. Subunit 20E appears to be an area inhabited by moderate numbers of lynx only when cyclic highs develop; it does not seem to be a significant reservoir of adult lynx during cyclic lows.

Wolverine:

Wolverine numbers in Subunit 20E are noticeably lower now than they were in the 1960's, when ungulate biomass in the area was greater. At this time, the wolverine population may be characterized best as moderately low and stale. Numbers of both caribou and moose are currently increasing in the area, and recent restrictions on wolverine trapping may provide for increased numbers of wolverines in the future.

Marten:

Marten reach high densities throughout most of Subunit 20E during this reporting period. Catches of up to 10 marten per mile of trapline were reported in the southern Mosquito Flat. The Subunit 20E marten population may best be characterized as extremely high, having peaked during the winter of 1987-88; declines are expected during the next few years as populations of snowshoe hare predators continue to increase.

Marten populations fluctuated inversely to snowshoe hare populations, because of the complement of hare predators that increase in response to increased hare abundance. I believe that predation on marten outweighs other marten welfare factors such as food availability, and it largely determines marten population status and trend Marten numbers were reportedly very low during the early 1970's, when hare populations reached a cyclic high.

Red Fox:

Red fox numbers are moderately high and increasing in Subunit 20E, presumably because of increasing numbers of hares. Red fox densities are greatest in open habitats and are quite low in homogenous expanses of closed canopy black-spruce forest typical of much of the area.

Beaver:

Although of little interest to Subunit 20E trappers, beaver numbers apparently increased significantly in the early 1980's coinciding with the wolf control program; however, the increase occurred only in that same area. Beaver numbers are believed to be moderate and stable or slowly decreasing.

Otter, mink, weasel:

The status and trend of these populations are largely unknown. Otters appear to be uncommon, mink status and trend are unknown; and weasels fluctuate from year to year but are considered to be common overall.

Coyote:

Coyotes are uncommon in Subunit 20E, but are still expanding their range into this area.

Mortality

Hunting Seasons and Bag Limits:

Coyote	Two coyotes	Sept. 1-April 30
Red Fox	Two foxes	Nov. 1-Feb. 15
Lynx	Two lynx	Nov. 1-Mar. 31
Squirrel	No limit	No closed season
Wolverine	One wolverine	Nov. 10-Feb. 15

Trapping Seasons and Bag Limits:

Beaver	25 per season	Nov. 1-April 15
Coyote	No limit	Nov. 1-March 31
Red Fox	No limit	Nov. 1-Feb. 28
Lynx	No limit	Dec. 1-Jan 31
Marten	No limit	Nov. 1-Feb. 28
Mink/Weasel	No limit	Nov. 1-Feb. 28
Muskrat	No limit	Sept. 20-June 10
Land Otter	No limit	Nov. 1-April 15
Squirrel/Marmot	No limit	No closed season
Wolverine	No limit	Nov. 1-March 31

Human-induced Mortality:

It is obvious that lynx harvests have declined steadily in Subunit 20E in recent years (Table 1), reflecting the natural decline in lynx numbers since the early 1980's. Shortened seasons and decreased opportunity may also have been factors. Harvests are expected to increase throughout the late 1980's and early 1990's as the lynx population again approaches a cyclic high.

While there has been no apparent trend in wolverine harvests in recent years, long-time trappers familiar with Subunit 20E maintain that wolverine numbers now are far lower than in the 1960's and early 1970's. As ungulate biomass continues to increase in this area, wolverine density is also expected to increase. If and when such a wolverine population response occurs, it should be reflected in increased harvests.

Marten harvests have been extremely high in Subunit 20E in recent years, and trapper reports indicate that the 1987-88 harvest may be one of the highest. Higher marten pelt prices and increased harvest effort undoubtedly have contributed to the high Subunit 20E take, but individual trappers also have reported a great abundance of marten in most areas. An increase in the marten population while trapping pressure has concurrently increased, that trapping may not be having a significant effort on population dynamics, except in localized areas such as the Taylor Highway corridor.

Habitat

Assessment:

Virtually all of Unit 20E from the 6,500-foot elevation of Mount Harper to the lowlands of the Mosquito Flats constitutes habitat for some species of furbearers. While subalpine habitat is extensive in the northern and western portions of the area, wetland habitat is limited. Spruce forest is the most extensive habitat, punctuated by seral stages resulting from wildfires. The 1966 Chicken Fire (225,000 acres) and the 1969 Ladue Fire (125,000 acres) are noteworthy areas of early to mid-seral habitat types, as are burned areas on the south side of the Yukon River downstream from Eagle. Over 30 years of successful wildfire suppression has resulted in an older, less diverse, less productive habitat mosaic than would have existed under a natural fire regime.

Enhancement:

The "Alaska Interagency Fire Management Plan: Fortymile Area" went into effect in 1984, replacing the "1979 Fortymile Interim Fire Management Plan." Most of Subunit 20E was afforded limited suppression status, which should result in the restoration of a more near-natural fire regime and eventual improvement of habitat heterogeneity. Ultimately, development of the area will warrant higher levels of fire suppression to the detriment of furbearer populations.

Game Board Actions and Emergency Orders

The Alaska Board of Game shortened the lynx trapping season from 4.5 to 2.0 months effective during the 1985-86 season to reduce lynx harvests during the low of the lynx population cycle. This represented a decision to implement a tracking harvest strategy for lynx in Alaska, because of the susceptibility of this species to trapping. The Board subsequently approved a 1-month extension effective for the 1988-89 season, providing harvest levels and percentage of kittens increase during the 1987-88 season; however, the Department issued an Emergency Order to retain the 2-month season because of the low harvest of 9 lynx during this reporting this reporting period.

The Board took action in the spring of 1988 to end land-and-shoot harvesting of furbearers in Subunit 20E beginning with the 1988-89 season. The Board also reduced the wolverine trapping season by 1 month, effective for the 1988-89 trapping season, occurring currently with the prohibition against land-and-shoot taking of wolverines. These actions will probably help efforts to increase desirable wolverine abundance in Subunit 20E.

CONCLUSION AND RECOMMENDATIONS

Lynx, red fox, and coyote populations are expected to increase in response to increasing numbers and distribution of snowshoe hares. Harvests of lynx are also expected to increase, but currently low pelt values for foxes and coyotes are expected to keep trapping effort for these 2 species low.

Marten numbers are expected to decline in response to increasing numbers of predators that normally focus on snowshoe hares; however, they may switch to marten as hare numbers decline. Trapping effort on marten is expected to remain high because of currently high pelt values (i.e., $100/pelt average during 1987-88). Eventually, low numbers of marten are expected to result in an overall decline in trapping effort in Subunit 20E that has been geared primarily toward marten for the past 15 years.

Management goals and objectives are being met for all furbearer species in Subunit 20E; however, I foresee some difficulties in implementing a truly responsive, harvest-tracking strategy for lynx. For this reason, I recommend that the Board establish a 4- or 5-month lynx season for all areas subject to change by the Department through the use of Emergency Orders. In this manner, timely Board action wold not be required to tailor appropriate season lengths to what can be rapid changes in lynx populations. Such management latitude will be important to prevent overutilization or underutilization of lynx populations because of a bureaucratic lag time in adopting appropriate seasons for lynx trapping.

LITERATURE CITED

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PREPARED BY:

David G. Kelleyhouse

Wildlife Biologist III

SUBMITTED BY:

Wayne E. Heimer

Survey-Inventory Coordinator

REVIEWED BY:

Randall L. Zarnke

Wildllife Biologist II

Table 1. Furbearer harvests as determined by sealing certificates, Subunit 20E, 1983-87.

Species	1983	1984	1985	1986	1987
Wolverine	9	7	8	10	7
Otter	0	0	0	0	0
Beaver	0	0	6	5	3
Lynx	23	20	18	11	9

STUDY AREA

GAME MANAGEMENT UNIT: 21 (43,823 mi^2)

GEOGRAPHICAL DESCRIPTION: Yukon River drainage above Paimiut to Tozitna River, including Koyukuk River up to Dulbi Slough

BACKGROUND

Furbearers have traditionally been an important resource within Unit 21, supplying food, clothing, and trade items. Although furbearer populations have always been sufficient to meet local demand, they have been subject to cycles of abundance. The species found in the Unit 21, in order of their economic importance, are marten, beavers, lynx, red foxes, wolverines, wolves, mink, river otters, and muskrats. Coyotes occasionally occur but are rare, and weasels are common but are not targeted.

POPULATION OBJECTIVES

To manage a furbearer population that will sustain population levels high enough to provide maximum consumptive and non-consumptive use.

METHODS

Harvests were monitored through sealing records, fur export and acquisition reports, and personal interviews. A mail questionnaire was implemented in Subunits 21A and 21E and responses were analyzed. Throughout the remainder of Unit 21, furbearer abundance was determined from interviews with trappers, and incidental data were gathered during surveys of other species. Small mammal abundance was measured using snap and pitfall traps on annual census lines.

RESULTS AND DISCUSSION

Population Status, Distribution, and Trend

Beavers and river otters are found where suitable habitat occurs; their populations are high and increasing. Muskrats are on a long-term decline in the area loss of habitat to pond succession. Where they occur, they are numerous. Lynx are in the low part of their cycle but are expected to begin increasing in the next few years. Red foxes are numerous throughout in all habitats and appear to be on the increase.

Marten populations are moderate throughout most of the northern half of the unit; the trend appears stable. During the trapping season most trappers reported periods when marten had been absent. These temporary absences were caused by local migrations or very restricted movements lessening the amount of tracks. In Subunits 21A and 21E, responses to the Trapper Questionnaire indicated marten populations were low and continuing to decline.

Trapping Conditions and Prey Species

The weather was mild for most of the trapping season. Heavy snowfall during December limited some trappers by covering up sets and producing overflowing conditions in rivers and streams. Red-backed vole numbers were higher in open black spruce habitats but they were lower in riparian balsam poplar and open grassland meadow habitats (Table 1). Hare populations began increasing throughout the unit. Responses from the Trapper Survey also revealed an increase in snowshoe hare numbers. Willow ptarmigan and grouse populations were high in most of the unit.

Mortality

Trapping Seasons and Bag Limits:

Beaver	Nov. 1- April 15	40	beaver
Coyote	Nov. 1- March 31	No	limit
Red fox	Nov. 1- Feb. 28	No	limit
Marten	Nov. 1- Feb. 28	No	limit
Mink & weasel	Nov. 1- Feb. 28	No	limit
Muskrat	Nov. 1- June 10	No	limit
River otter	Nov. 1- April 15	No	limit
Wolverine	Nov. 1- March 31	No limit	

Human-induced Mortality:

Beaver. A total of 1,717 beavers were sealed during the reporting period (Table 2). Subunit 21D had the highest harvest (920); only 310 furbearers were trapped in the Kaiyuh Flats. The harvest on the Kaiyuh Flats continues to be mainly older animals; only 3% were kits (Fig. 1). The low kit harvest is mainly due to the trapping techniques employed. They use snares with large diameter openings, placing their sets on the outside of the food cache away from the lodge. The harvest in Subunit 21E was down slightly to 328 animals, despite a liberalized season. The overall harvest continues to be only a fraction of the perceived harvestable population.

Lynx. Harvest data indicate that lynx populations throughout the unit (Tables 2 and 3) have reached their lowest point of the 10-year cycle and are expected to remain stable or slowly increase for the next 2 years. Based upon interviews and Trapper Questionnaire responses, extremely high fur prices caused trappers to increase their effort and move into willow-birch refugia areas. The upper drainages of the Nulato, Gisasa, and Kateel Rivers are not normally trapped. All were subject to increased pressure from Unit 22-based trappers and some trappers from Unit 21.

Otter. Although otter are abundant harvests remain relatively low and stable (Table 2). With low prices for Interior otter, trapping efforts were minor. Otter werer often incidentally harvested in beaver sets.

Wolverine. Trapper harvests were below normal (Table 2), despite the good aerial hunting conditions. During aerial wolf surveys in late March, numerous wolverine tracks were seen, indicating that the harvests, not population levels, were down.

Marten. Marten, the mainstay of the trappers' catch, were in moderate numbers in the northern part of the unit. Trappers reported good catches at the start of the season; however, very cold weather (-40C) caused a decrease in marten activity. Most trappers were convinced that the marten had left the country. Around mid-December the weather became moderate again and catches increased.

Prices for marten started out high but had decreased by 33% by the end of the season. Harvests were about average, despite higher prices. Based on fur acquisition and export reports, 2,031 marten were sold.

Other Species. Foxes continue to flourish; however, low prices have caused little trapper interest, and only 60 were sold. Coyotes are still common around the Galena area, and a few are caught each year. There is a resident group immediately north of the Galena airfield. However, because of an abundance of wolves within the unit, coyotes are generally scarce. Mink continue to be a minor furbearer in the unit; few trappers actively set for them. The price for wild- caught Interior mink is very low.

Game Board Actions and Emergency Orders

Prior to the spring of 1981 the unit was divided into 2 subunits. During the past 10 years trapping seasons and bag limits have remained the same for marten, coyotes, foxes, mink, muskrats, otters, and wolverines. In 1985 the Board of Game adopted a recommendation from the Middle Yukon Fish and Game Advisory Committee to shorten the lynx season by 2 weeks, because lynx in early March had singed fur and were not in prime condition.

The bag limit for beavers has been increased by the Board 3 times, in response to proposals submitted by the Department. The limits had not uniform throughout the unit and for the most part was without biological basis. The changes from 1979 to 1988 are presented in Table 3.

During 1987, the Grayling/Anvik/Shageluk/Holy Cross Fish and Game Advisory Committee submitted a proposal to the Board to shorten the open marten trapping period. The Board took no action on the proposal, but it asked the Department to monitor the situation.

CONCLUSIONS AND RECOMMENDATIONS

Furbearer populations throughout the unit are in good condition. There are no areas with excessive harvests. I recommend continuation of the present seasons and bag limits, except for

beaver which should have no bag limit. Beaver are an abundant resource with prices and trapping techniques limiting harvest more than regulations. Based on Trapper Questionnaire results, discussions with local Fish and Game Advisory Committees, and incidental trapper interviews, marten seasons should be reviewed annually and perhaps adjusted according to local population fluctuations.

PREPARED BY:
Timothy O.Osborne
Wildlife Biologist III

Jackson S. Whitman
Wildlife Biologist III

SUBMITTED BY:
Wayne E. Heimer
Survey-Inventory Coordinator

REVIEWED BY:

Randall L. Zarnke
Wildlife Biologist II

Table 1. Number of small mammals caught in 3 habitats during August 1984-88, Subunit 21D. Results from 90 trap-nights/habitat/year.

Species	Open black spruce				Balsam poplar				Grass meadow			
	1984	1985	1987	1988	1984	1985	1987	1988	1984	1985	1987	1988
Yellow-checked Vole	0	0	0	0	0	2	0	0	11	0	0	3
Meadow Vole	0	1	0	3	0	0	0	1	1	19	38	16
Northern Red-backed Vole	7	21	3	41	35	33	18	12	3	0	2	1
Northern Bog Lemming	0	0	0	0	0	0	0	0	1	0	0	0
Northern Jumping Mouse	0	0	1	0	0	0	0	0	0	0	0	0
Shrew	22	6	12	31	28	5	7	9	20	6	7	17
Total	29	28	16	75	63	40	20	22	36	25	47	37

Table 2. Furbearer harvests in Unit 21, 1982-88.

	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Beaver	882	984	700	1,802	1,838	1,717
Lynx	364	121	123	162	62	71
Otter	32	103	68	52	62	67
Wolverine	78	32	57	55	30	34

Table 3. Lynx harvest by Subunit in Unit 21, 1982-88

	1982-83[a]	1983-84[a]	1984-85	1985-86	1986-87	1987-88
21A	16	2	2	20	6	5
21B	49	5	13	31	4	7
21C	13	0	1	4	4	7
21D	236	86	82	86	41	40
21E	43	21	25	21	7	12

[a] Hand count of certificates in Galena.

Table 4. Regulatory changes to Unit 21 beaver bag limits, 1979-88.

Year	21A	21B	21C	21D	21E
1979-80[a]	15	15	15	15	15
1980-81[a]	15	15	15	15	15
1981-82	40	30	30	20	20
1982-83	40	30	30	20	20
1983-84	40	40	40	40	20
1984-85	40	40	40	40	20
1985-86	40	40	40	40	40
1986-87	40	40	40	40	40
1987-88	40	40	40	40	40
1988-89	50	50	50	50	50

[a] Unit was only divided into 2 subunits.

STUDY AREA

GAME MANAGEMENT UNIT: 22 (23,000 mi²)

GEOGRAPHICAL DESCRIPTION: Seward Peninsula and that portion of the Nulato Hills draining into Norton Sound.

BACKGROUND

Within Unit 22 furbearers are most abundant in Subunits 22A and 22B, where spruce and riparian willow vegetation are common. Records indicate that furbearer densities and harvests have fluctuated in past years. Because data are lacking or are inaccurate, it is not known with certainty whether these fluctuations were caused by hunting mortality or natural factors. Although human harvest has at times noticeably reduced furbearer numbers in areas adjacent to villages in Unit 22, major fluctuations in furbearer numbers probably have been caused by natural factors.

POPULATION OBJECTIVES

To protect, maintain, rehabilitate, enhance, and develop the furbearer resources and their habitats.

To provide for the optimum sustained use, both consumptive and nonconsumptive, of the furbearer resource consistent with the social, cultural, aesthetic, environ mental, and economic needs of the public.

To maintain and/or increase viable furbearer populations consistent with environmental conditions, legal mandates, and public desires.

To minimize adverse interactions of furbearers with the public.

METHODS

Research studies designed specifically to evaluate the population status of furbearers in Unit 22 have never been conducted. Limited information on furbearer distribution and densities continued to be gathered from field observations of the staff, general conversation with unit residents, and results of an annual Trapper Questionnaire. Harvest informa tion was obtained from sealing records, responses to the Trapper Questionnaire, and fur acquisition records submitted by furbuyers (Tables 1 and 2). When interpreting the fur acquisition data, care should to be taken, because these records only indicate the total number of pelts sold and not the time at which they were taken. Trappers awaiting more competitive sale prices often stockpile their catch over several years before selling them.

In an attempt to expand distribution of the Trapper Questionnaire, all residents of Subunits 22A and 22B were sent a letter requesting a response if they harvested any furbearers during the past year. This year 30 questionnaires were mailed to individuals who responded to my letter and to those who had furs sealed but did not respond. Sixteen individuals (15%) returned their questionnaires. Reminder letters were not sent. A summary of questionnaire results was mailed back to all respondents. Also, a letter of response was sent to some individuals who had expressed a concern or had questions dealing with current regulations.

RESULTS AND DISCUSSION

Population Status and Trend

Reported observations and results of the Trapper Questionnaire indicate that beaver, otter, wolverine, mink, marten, and red fox numbers are increasing or at least remaining stable in Unit 22. Lynx, arctic fox, and muskrat numbers, although still low, are increasing slightly in some portions of the unit.

Mortality

Hunting Season and Bag Limit:

Fox, Arctic	Sept. 1-Apr. 30	2 foxes
Fox, Red	Nov. 1-Feb. 15	2 foxes
Lynx	Nov. 1-Mar. 31	2 lynx
Wolverine	Sept. 1-Mar. 31	1 wolverine

Trapping Season and Bag Limit:

Beaver		
(22A,22B)	Nov. 1-June 10	No limit
(Remainder of Unit)	Nov. 1-Apr. 15	50 per season
Fox, Arctic	Nov. 1-Apr. 15	No limit
Fox, Red	Nov. 1-Apr. 15	No limit
Lynx	Nov. 1-Apr. 15	No limit
Marten	Nov. 1-Apr. 15	No limit
Mink	Nov. 1-Jan. 31	No limit
Muskrat	Nov. 1-June 10	No limit
River Otter	Nov. 1-Apr. 15	No limit
Weasel	Nov. 1-Jan. 31	No limit
Wolverine	Nov. 1-Apr. 15	No limit

Harvest

Human-induced Mortality:

Beaver. Forty-two beavers (4 males, 2 females, and 36 unspecified) were reported harvested from Unit 22 during the reporting period: 40 beavers were taken by trappers, and two

that were damming a road culvert were taken by Alaska Department of Transportation personnel.

Arctic Fox. Based on information obtained from the Trapper Questionnaire, a minimum of 2 arctic foxes were taken during the 1987-88 season.

Red/Cross Fox. Fur acquisition data submitted by furbuyers indicate that 158 red/cross fox were sold in the Unit during the reporting period. The Trapper Questionnaire results showed a minimum of 107 foxes were harvested.

Lynx. Sealing records indicate that 3 lynx (2 males, 1 female) were taken from the unit during the 1987-88 trapping season, representing a record low harvest of lynx for Unit 22 (Table 3). Results of the Trapper Questionnaire indicate that 4 lynx were taken during the same time period. Fur acquisi tion data indicate that 10 lynx were sold during the year.

Marten. Fur acquisition data indicate that 93 marten were sold from Unit 22 last year. Information obtained from the Trapper Questionnaire indicate that a minimum of 9 marten were harvested during the same time period.

Muskrat. According to the Trapper Questionnaire, 3 muskrats were taken during the reporting period.

River Otter. One male otter was sealed during the reporting period, representing a record low otter harvest reported for Unit 22 (Table 4).

Wolverine. Sealing certificates indicate that 28 wolverines (13 males, 14 females and 1 sex unspecified) were taken from Unit 22 during the 1987-88 season (Table 5). The current reported harvest is nearly identical to the unit's 5-year-mean harvest of 30 wolverines annually. Wolverines are clearly the most valued furbearer taken in Unit 22, because they are used extensively in the local manufacture of winter garments. It is common knowledge that many of the wolverines harvested in Unit 22 are used locally for making garments and are not sealed. I estimate the annual harvest of wolverines in Unit 22 was greater than 28 but probably less than 40 animals.

Hunter Residency and Success:

With few exceptions, the hunters and trappers of furbearers in Unit 22 are local residents. Harvest success in the Unit is difficult to measure accurately, because most furbearers are taken on an oppor-tunistic basis.

Harvest Chronology:

Lynx and otter were taken primarily during April. The current

wolverine harvest took place during November through April, and the highest reported harvest occurred during January (Tables 3, 4, and 5).

Transport Methods:

The snowmobile was used almost exclusively by hunters and trappers seeking furbearers in Unit 22. Data obtained from sealing certificates indicate that, with the exception of 1 wolverine, all access to furbearers sealed during the reporting period was by snowmobile.

Game Board Actions and Emergency Orders

During the reporting period, the Board of Game at the request of the Department changed several regulations pertaining to beaver in Unit 22: the trapping season was extended in Subunits 22A and 22B to June 10 and the bag limit for those Subunits was eliminated; firearms were also legalized as a method of taking beaver in Unit 22.

CONCLUSIONS AND RECOMMENDATIONS

Furbearer harvesting activity in Unit 22 is usually related to densities of furbearers. When furbearer numbers are high, the numbers of hunters and trappers are also high. There are very few residents whose sole winter occupation is trapping. Most individuals harvesting furs are doing it either recreationally or opportunistically.

Little is known of the impact hunters and trappers have had on furbearer populations in Unit 22. Current regulations may cause impacts on species within close proximity of some villages; however, it is doubtful that these impacts affect populations unitwide.

The accuracy of furbearer harvest data remains one of the more pressing management problems in Unit 22. Although fur sealing agents are available in all Unit 22 villages, a significant portion of the furbearer harvest is not sealed and sold commercially, rather that portion remains unsealed for use in the manufacturing of garments and handicrafts. It is presently unclear to many village residents why furs need to be sealed, particularly if they are utilized domestically within the village. Continued public contact by biologists and enforcement personnel is needed to explain the importance of sealing requirements.

No changes in the Unit 22 furbearer regulations are recommended at this time.

PREPARED BY:

Robert R. Nelson
Game Biologist III

SUBMITTED BY:

Steven Machida
Survey-Inventory Coordinator

Table 1. Furbearer harvest information in Unit 22 obtained from fur acquisition reports submitted by furbuyers, 1987-88.

Species	Number sold	Number of sellers
Beaver	6	4
Arctic Fox	0	0
Cross/Red Fox	158	41
Lynx	10	4
Marten	93	33
Mink	4	4
Muskrat	0	0
Otter	1	1
Wolverine	1	1

Table 2. Harvest of furbearers in Unit 22 as indicated by the Trapper Questionnaire, 1987-88.

Species	Number caught	Number of trappers
Beaver	10	3
Arctic Fox	2	2
Cross/Red Fox	107	9
Lynx	4	2
Marten	9	2
Mink	0	0
Muskrat	3	3
Otter	0	0
Wolverine	15	7

Table 3. Historical reported lynx harvest[a] within Unit 22 from 1977-78 through 1987-88.

Year	Sex				Harvest Chronology								Subunit					
	M	F	Unk	Total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	A	B	C	D	E	Unk
1977-78	70	70	28	168	0	7	21	34	35	65	0	6	9	144	0	4	0	11
1978-79	100	100	38	238	0	24	36	41	61	76	0	0	39	199	0	0	0	0
1979-80	110	114	36	260	0	10	42	57	57	67	8	19	29	220	0	0	0	11
1980-81	43	28	15	86	0	6	8	13	13	31	13	2	2	78	0	0	0	6
1981-82	245	215	19	479	0	17	45	90	119	163	29	16	168	311	0	0	0	0
1982-83	426	323	71	820	0	45	190	161	178	197	59	0	377	442	0	0	1	0
1983-84	255	134	54	443	0	27	79	130	109	73	25	0	311	132	0	0	0	0
1984-85	62	70	24	156	1	20	28	40	30	22	9	6	101	47	0	2	6	0
1985-86	9	12	2	23	1	0	1	7	8	6	0	0	12	7	0	4	0	0
1986-87	10	7	1	18	0	1	4	3	6	3	1	0	9	8	0	1	0	0
1987-88	2	1	0	3	0	0	0	0	0	0	3	0	0	3	0	0	0	0

[a] Data based on information obtained from sealing certificates.

Table 4. Historical recorded otter harvest[a] within Unit 22 from 1971 through 1988.

Year	Sex				Harvest Chronology								Subunit					Method of take[b]				
	M	F	Unk	Total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	A	B	C	D	E	1	2	3	4	5
1977-78	8	4	4	16	0	3	5	3	2	3	0	0	7	7	2	0	0	2	13	0	0	1
1978-79	2	1	3	6	0	0	2	2	0	2	0	0	6	0	0	0	0	0	6	0	0	0
1979-80	9	2	2	13	0	3	1	1	2	6	0	0	6	7	0	0	0	2	10	0	0	1
1980-81	5	0	0	5	0	0	3	0	0	2	0	0	2	3	0	0	0	1	4	0	0	0
1981-82	5	1	2	8	0	5	1	1	1	0	0	0	8	0	0	0	0	1	7	0	0	0
1982-83	1	1	0	2	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0
1983-84	5	1	2	8	0	0	1	1	1	1	4	0	8	0	0	0	0	0	7	1	0	0
1984-85	3	3	0	6	0	2	4	0	0	0	0	0	2	3	1	0	0	1	2	0	0	3
1985-86	6	4	0	10	0	0	0	4	1	5	0	0	2	5	0	3	0	2	3	5	0	0
1986-87	0	2	3	5	0	2	0	0	1	2	0	0	4	1	0	0	0	0	5	0	0	0
1987-88	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0

[a] Data based on information obtained from sealing certificates.

[b] 1 = Ground shot
2 = Trapped
3 = Snared
4 = Shot using aircraft
5 = Unknown

Table 5. Historical recorded wolverine harvest [a] within Unit 22 from 1978 through 1988.

Year	Sex				Harvest Chronology								Subunit					Method of take [b]				
	M	F	Unk	Total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	A	B	C	D	E	1	2	3	4	5
1978-79	10	6	2	18	0	0	2	7	3	6	0	0	5	11	1	1	0	6	12	0	0	0
1979-80	9	8	1	18	0	0	2	7	4	4	1	0	10	7	1	0	0	2	14	1	0	1
1980-81	11	2	1	14	0	3	1	1	2	6	1	0	2	6	2	4	0	7	6	0	0	1
1981-82	6	4	0	10	0	2	1	2	1	4	0	0	1	7	1	1	0	2	7	1	0	0
1982-83	11	3	0	14	1	1	2	1	2	7	0	0	3	7	2	2	0	4	9	0	0	1
1983-84	19	12	4	35	2	0	7	6	7	6	7	0	16	16	1	2	0	4	31	0	0	0
1984-85	11	9	1	21	1	4	4	2	5	3	2	0	8	8	3	1	1	8	12	0	1	0
1985-86	20	16	4	40	1	3	6	13	10	7	0	0	11	14	11	4	0	6	27	4	0	3
1986-87	16	10	1	27	0	1	3	3	9	6	5	0	19	6	1	0	1	8	19	0	0	0
1987-88	13	14	1	28	0	5	4	8	4	6	1	0	9	17	2	0	0	10	15	3	0	0

[a] Data based on information obtained from sealing certificates.

[b]
1 = Ground shot
2 = Trapped
3 = Snared
4 = Shot using aircraft
5 = Unknown

STUDY AREA

GAME MANAGEMENT UNIT: 23 (43,000 mi^2)

GEOGRAPHIC DESCRIPTION: Kotzebue Sound and western Brooks Range

BACKGROUND

Before a cash economy was introduced in the early 1900's, the Inuit traditionally harvested furbearers for subsistence in northwest Alaska. Many Native and non-Native trappers have since supported themselves seasonally by trapping. Today, furbearers are harvested in Unit 23 by subsistence and recrea tional users, as well as by professional trappers to generate monetary income and provide materials for fur garments sewn locally. Many furbearers are harvested opportunistically by local residents engaged in other activities.

POPULATION OBJECTIVES

To maintain healthy, viable furbearer populations throughout the Unit.

METHODS

Harvest information for lynx, wolverine, river otter, and beaver were gathered primarily from fur sealing certificates. Although sealing data can provide information on the relative abundance and distribution of furbearers in Unit 23, many furs used locally are not sealed. Therefore, sealing data only provides a minimum estimate of harvest. Also, the geographic distribution of the harvest determined from sealing data is not always a good indicator of the spatial abundance of furbearers in Unit 23, because differences exist in the willingness and ability of individual trappers to have furs sealed. In past years, aerial track surveys for wolverines and lynx were infrequently flown when snow conditions were favorable. None were conducted during the 1987-88 winter; however, opportunistic sightings of foxes, otters, wolverines, and lynx were recorded during big game and beaver cache surveys.

Beaver cache surveys have been flown annually since 1985 in a 139-mi^2 (356 km^2) trend count area that extends south from the confluences of the Selawik, Kugarak, and Tagagawik Rivers. Surveys were flown in early October, soon after freeze-up but before too much snow had accumulated. A Piper PA-18 aircraft with 1 observer was used for the surveys. Total numbers of active and inactive lodges, discerned by the presence of a feed cache near the lodge, were recorded, and their locations were noted on U.S. Geological Survey 1:63,360 series topographic maps. Although some evidence suggests that the number of active caches in an area is not always a good indicator of population size

(Payne 1981, Swenson et al. 1983), we believe this technique provides adequate information on population trend in this count area. Two hundred and four questionnaires were sent to trappers residing in Unit 23; each questionnaire solicited input regarding the size and status of local furbearer populations, as well as comments on regulations that apply to furbearers. Of the 56 trappers (27%) who returned completed questionnaires, 20 indicated they had trapped during the 1987-88 season.

RESULTS AND DISCUSSION

Population Status and Trend

Wolverine:

No track counts for wolverines were conducted in Unit 23 during 1987-88. There was concern among some local residents that wolverine numbers are low in the area surrounding Kotzebue, and some trappers reported that this area of low density may extend at least to the Kivalina and Wulik River drainages. In the remainder of the unit, trappers indicated that wolverine populations were moderately abundant.

Beaver:

Most trappers indicated that beavers continued to increase in number and distribution throughout the unit. These reports and observations of beaver sign along the northeast side of Hotham Inlet (Kobuk Lake) suggest that beavers may be colonizing new areas within Unit 23. Two trappers reported that beavers were present in the Noatak River drainage, an area in which beavers were thought to be absent. Aerial cache survey data also indicate that beaver numbers are increasing at least in the Selawik flats (Table 1). In an area outside the trend count area, we observed new dams in extremely small tundra streams with little riparian willow biomass present. Beaver densities in optimal habitat may be at or near satura tion levels in this portion of Unit 23, and dispersal is apparently occurring onto marginal quality habitat.

Lynx:

Reports from trappers and observations by Department personnel indicated that lynx numbers remained extremely low during 1987-88. Snowshoe hare numbers are increasing in portions of the unit, and we anticipate a corresponding increase in lynx numbers during the next few years.

Mink and Marten:

As in 1986-87, most trappers reported that mink and marten populations were low in Unit 23 during 1987-88.

Red fox:

Trappers reported medium-to-low numbers of red fox in that portion of Unit 23 north of and including the Kobuk River. Red fox were reported at medium-to-high levels in the Selawik River drainage. There was no consensus regarding population level on the northern Seward Peninsula. Opportunistic obser vations of red fox by Department personnel indicate that they are continuing to increase throughout the unit (Table 2).

Arctic fox:

All responses to the Trapper Questionnaire indicated low-to-medium numbers of arctic fox in Unit 23. Low numbers of arctic fox have prevailed in this unit during the past several years.

Muskrat:

Trappers reported that muskrat populations were high in the Noatak and Selawik River drainages in 1987-88. In the remainder of the unit, muskrat numbers were thought to be at medium-to-low levels.

Mortality

Hunting Seasons and Bag Limits:

Wolverine	Sept. 1-Mar. 31		1 wolverine
Red fox	Nov. 1-Feb. 15		2 foxes
Arctic fox	Sept. 1-Apr. 30		2 foxes
Lynx	Nov. 1-Mar. 31		2 lynx

Trapping Seasons and Bag Limits:

Wolverine	Nov. 1-Apr. 15		No limit
Red fox	Nov. 1-Apr. 15		No limit
Arctic fox	Nov. 1-Apr. 15		No limit
Lynx	Dec. 1-Jan. 15		3 lynx per season
Marten	Nov. 1-Apr. 15		No limit
Mink	Nov. 1-Jan. 31		No limit
Muskrat	Nov. 1-Jun. 10		No limit
River otter	Nov. 1-Apr. 15		No limit
Beaver	Nov. 1-Jun. 10		30 beaver per season*

*50 beaver per season may be taken from the Kobuk and Selawik River drainages.

Human Induced Mortality:

Beaver. Seventy-six beavers were sealed in Unit 23 during 1987-88. The current harvest represents a substantial

increase from the 56 and 28 beavers sealed in 1986-87 and 1985-86, respectively. Of the 76 beavers sealed, 16 were taken from the Selawik River drainage, 22 from the upper Kobuk River area, and 38 from the Pah River drainage.

Lynx. No lynx from Unit 23 were sealed during 1987-88.

River otter. Thirteen otters were sealed from the Unit during 1987-88. This is nearly identical to the number sealed in 1986-87 (i.e., 12 otters).

Wolverine. Forty wolverines (28 males, 11 females and 1 unspecified sex) were sealed during 1987-88. Although the harvest for 1987-88 is considerably lower than the record 64 wolverines sealed during 1986-87, it is within the range of annual harvests reported since 1977-78 (Table 3). Residents of Unit 23 accounted for 32 (80%) of the wolverines sealed, and nonresidents and Alaska residents residing in other units accounted for 1 (2%) and 7 (18%) wolverines, respectively. Trappers harvested the same number of wolverines in 1987-88 as they did in 1986-87 (i.e., 28); however, hunters using snow machines took less than half as many wolverines in 1987-88 as they did the previous season (Table 3).

Game Board Actions and Emergency Orders

Concern expressed by local trappers and results of track surveys conducted by Department personnel in 1987 indicated that lynx numbers were extremely low throughout Unit 23. The Board of Game subsequently passed a proposal submitted by the Department shortening the trapping season from 1 November-15 April to 1 December-15 January and reducing the bag limit from no limit to 3 lynx per season. The Board also passed a proposal submitted by the Department that increased the bag limit on beaver in the Selawik and Kobuk River drainages from 30 to 50 beaver per season.

CONCLUSIONS AND RECOMMENDATIONS

The Department should attempt to develop a quantitative technique for estimating wolverine population size and assessing population trend. Because of concerns expressed by the public and the staff, the size and status of the wolverine population near Kotzebue, in particular, needs to be evaluated. As with other furbearers, sealing data alone is inadequate for managing wolverine populations. Some local trappers have suggested that the wolverine trapping season be closed at the end of March, because pelts are not considered to be prime during April. In addition, some trappers have suggested that wolverines are especially vulnerable to over harvesting in April, because mating begins by mid-April. If wolverine numbers near Kotzebue are indeed low, the Department may want to consider proposing that the season close before 15 April. Public input will be solicited before any formal recommendations are made.

The Department should continue to solicit input from local hunters and trappers regarding lynx population status through village visits and the annual Trapper Questionnaire. Department personnel should also conduct track surveys annually to monitor lynx population levels, when numbers are extremely low or very high. Department staff should also consider establishing 1 or more trend count areas for lynx track surveys to allow annual comparisons of abundance.

At present, there is no biological need for a bag limit on beaver in the Selawik and Kobuk River drainages. In 1986-87, 4 individuals accounted for all of the beavers sealed in these drainages (i.e., 16, 22, 25, and 13 beavers). Although none of these trappers approached the bag limit of 50, an unneces sarily restrictive limit on beaver may discourage serious trappers from increasing their effort in these drainages when the population could sustain greater harvest. If beaver populations remain high, the Department should consider eliminating the limit on beaver in the Kobuk and Selawik River drainages.

No changes in seasons or bag limits are recommended at this time.

LITERATURE CITED

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Swenson, J. E., S. J. Knapp, P. R. Martin and T. C. Hinz. 1983. Reliability of aerial cache surveys to monitor beaver population trends on prairie rivers in Montana. J. Wildl. Manage. 47:697-703.

PREPARED BY:

Jim Dau
Game Biologist II

SUBMITTED BY:

Steve Machida
Survey-Inventory Coordinator

Table 1. Results of aerial beaver cache surveys in a 139 mi^2 trend count area, Selawik River drainage, 1981-88.

Year	Survey time (min.)	Active caches	Inactive caches	Density of active caches (cache/mi^2)
1981	--	52	25	0.37
1982	75	37	41	0.27
1985	195	73	42	0.53
1986	238	72	41	0.52
1987	239	84	72	0.60
1988	226	120	53	0.86

Table 2. Red fox observations during Unit 23 fall and spring moose surveys and recorded cases of fox rabies, 1976-88.

Report period	Survey time (hrs)	Foxes observed	Foxes/hr	Reported cases of rabies in red foxes
1976-77	32.9	14	0.4	3
1977-78	28.7	12	0.4	1
1978-79	26.7	34	1.3	0
1979-80	37.0	29	0.8	11
1980-81	21.7	22	1.0	0
1981-82	40.8	61	1.5	2
1982-83	47.1	4	0.1	0
1983-84	62.5	19	0.3	1
1984-85	62.5	42	0.7	0
1985-86	46.5	12	0.3	0
1986-87	39.7	13	0.3	0
1987-88[a]	37.3	11	0.3	0

[a] Excludes one 3.8-hour survey flown in the Inmachuk River drainage where 15 foxes were observed in the vicinity of a reindeer slaughter site.

Table 3. Reported harvest of lynx, otter, and wolverine from Unit 23, 1977-88.

Species	Total take	% male	Method of take				Chronology						Area[a]				
			Shot	Trapped	Snared	Unk.	Nov	Dec	Jan	Feb	Mar	Apr	1	2	3	4	5
Lynx																	
1977–78	230	55	0	223	5	2	11	28	60	67	61	0	0	31	166	27	6
1978–79	385	53	2	341	3	39	12	48	81	117	127	0	0	117	147	120	1
1979–80	407	54	14	378	3	12	19	53	96	110	110	13	1	128	139	136	3
1980–81	306	60	3	254	1	41	30	45	62	72	80	17	1	17	128	143	14
1981–82	483	54	7	444	0	32	23	68	77	145	148	19	1	77	133	238	34
1982–83	277	--	6	265	1	5	24	36	39	69	70	34	4	5	34	149	83
1983–84	98	--	3	93	0	2	9	23	25	25	10	5	0	10	14	27	42
1984–85	26	61	3	23	0	0	3	8	2	4	7	2	1	8	8	4	5
1985–86	45	51	7	37	0	1	4	5	12	12	9	3	2	4	18	12	9
1986–87	16	62	2	13	1	0	0	7	3	2	4	0	0	2	4	7	3
1987–88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Otter																	
1977–78	12	--	1	11	0	0	0	4	5	1	2	0	0	1	4	3	4
1978–79	15	--	2	13	0	0	0	12	2	0	1	0	0	5	1	8	1
1979–80	19	--	10	9	0	0	5	9	2	1	2	0	0	4	2	13	0
1980–81	29	--	0	27	2	0	21	4	2	0	0	2	0	3	6	20	0
1981–82	9	--	0	9	0	0	5	0	1	3	0	0	0	0	4	4	1
1982–83	7	--	1	5	0	1	4	1	1	0	1	0	0	2	2	2	0
1983–84	8	--	1	7	0	0	3	3	2	0	0	0	0	1	5	1	0
1984–85	5	--	0	5	0	0	2	2	1	0	0	0	1	1	1	1	1
1985–86	5	--	1	4	0	0	1	1	1	2	0	0	0	0	3	0	2
1986–87	12	--	0	12	0	0	4	2	2	0	2	2	0	1	9	0	2
1987–88	13	--	1	12	0	0	5	3	0	1	2	2	0	1	12	0	0

Table 3. (Continued).

Species	Total take	% male	Method of take				Chronology						Area[a]				
			Shot	Trapped	Snared	Unk	Nov	Dec	Jan	Feb	Mar	Apr	1	2	3	4	5
Wolverine																	
1977-78	75	67	26	49	0	0	9	8	29	17	12	0	4	10	40	15	6
1978-79	45	73	9	34	0	0	4	4	13	7	17	0	2	8	18	2	6
1979-80	26	63	12	14	0	0	2	4	4	6	9	1	2	8	10	4	2
1980-81	18	76	11	7	0	0	3	6	1	1	5	2	0	10	5	3	0
1981-82	48	75	13	35	0	0	2	3	8	7	23	5	1	28	14	5	0
1982-83	37	67	16	20	1	0	3	2	3	13	12	4	2	21	6	3	5
1983-84	46	59	17	27	1	1	2	8	17	7	5	3	0	23	9	6	7
1984-85	37	61	19	15	2	2	1	5	7	3	13	7	0	15	11	5	6
1985-86	35	77	7	27	1	0	0	4	10	5	12	4	0	15	14	1	5
1986-87	64	56	28	28	1	7	4	8	4	9	28	8	8	35	16	3	2
1987-88	40	72	11	28	1	0	1	5	9	13	7	5	4	14	14	5	3

[a] 1 = Pt.Hope-Kivalina (drainages west of Noatak R. drainage), 2 = Noatak R. drainages, 3 = Kobuk R. drainages, 4 = Selawik R. drainages, 5 = Buckland R. drainages and northern Seward Peninsula drainages.

STUDY AREA

GAME MANAGEMENT UNIT: 24 (24,150 mi^2)

GEOGRAPHICAL DESCRIPTION: Koyukuk River drainage above Dulbi River

BACKGROUND

Fur populations have generally been sufficiently abundant to meet local demand; however, they have been subject to cycles of abundance. The local species in order of their economic importance are marten, beaver, lynx, red fox, wolverine, wolf, mink, river otter, and muskrat. Coyotes rarely occur in Unit 24 and weasels are common but are not often used.

MANAGEMENT OBJECTIVES

To manage furbearer populations at high enough levels to provide for maximum consumptive and nonconsumptive use.

METHODS

Harvests were monitored through sealing records, fur export and fur acquisition reports, and personal interviews. Distribution and abundance surveys were conducted by the National Park Service within the Gates of the Arctic National Park and Preserve (GAAR) (Golden 1988). No other surveys were conducted, but some trappers were interviewed regarding furbearer abundance. Incidental data were also gathered during surveys of other species.

RESULTS AND DISCUSSION

Population Status and Trend

Populations in GAAR are moderately high and increasing for marten and red foxes (Golden 1988). Wolverines are low but stable. Beavers and river otters are increasing in the southern portion of the unit and are high and increasing within GAAR. Muskrats are still on a long-term decline; the reason for the decline is unknown. Large areas of former habitat have dried up because of natural succession, and the decline may be a result of habitat loss. Lynx are in the low part of their cycle, but they are expected to increase in the next few years. Lynx populations are low in GAAR but moderate in a few pockets in the eastern portion of the unit (Golden 1988).

Distribution:

Most species are found throughout the unit; however, some species reach the northern limits of their ranges in the upper areas of the southern Brooks Range. Marten, mink, river otters, beavers, and muskrats occur only on the slopes of the Brooks Range.

Trapping Conditions and Prey Species

The weather was mild during most of the trapping season; however, heavy snowfall during December limited some trappers. The vole populations in the southern part of the Unit were higher than those of the previous 2 years. Hare populations were low throughout the unit, except for a few isolated willow communities along the major rivers. The hare population is increasing, based on increases in the density of tracks. Golden (1988) found that hares were highest around Norutak Lake, the Jack White Range, and in a few drainages of the Dietrich River, but low elsewhere. Golden (1988) also thought that grouse and ptarmigan were at low-to-moderate densities and increasing within GAAR.

Mortality

Trapping Seasons and Bag Limits:

Beaver	1 November-15	April	40	beaver
Coyote	1 November-31	March	no	limit
Red fox	1 November-28	February	no	limit
Marten	1 November-28	February	no	limit
Mink & weasel	1 November-28	February	no	limit
Muskrat	1 November-10	June	no	limit
River otter	1 November-15	April	no	limit
Wolverine	1 November-31	March	no limit	

Harvest and Species Accounts

Beaver. Four hundred sixty-eight beavers from 43 trappers were sealed within the unit (Table 1). This harvest level reflected a liberal bag limit of 40 beaver for each trapper; however, price have always regulated harvests more than the bag limits. Half of the harvest (i.e., 219) was taken in the southern part of the unit around Huslia.

The harvest was down by 50% from that of the previous year, it was composed mainly of adults, and only 8% kits taken. The low harvest of kits is mainly due to the techniques employed by local trappers. They typically use snares with large-diameter openings and place their sets on the outside of the food cache away from the lodge. One hundred twenty-eight beavers were taken in the Koyukuk River drainage above the confluence of the Alatna River, the area in which Golden (1988) found beavers to be abundant.

Lynx. Harvest data indicate that lynx (Table 1) have reached the low point in the 10-year cycle and are expected to remain stable or to slowly increase over the next 2 years. Golden (1988) examined carcasses and found a relatively low proportion of juveniles, indicating a low level of productivity.

Otter. Although otters are abundant in the unit, the harvest was relatively low, compared with past years (Table 1). With prices

low for Interior otters, trapping effort was minor. Otters are occasionally incidentally taken in beaver sets.

Wolverine. The reported wolverine harvest was low (Table 1). The actual harvest may be higher, because furs that are used for subsistence purposes are seldom sealed. Golden (1988) found only 1 set of wolverine tracks during his surveys. I saw a wolverine on a freshly killed Dall sheep on the Tinayguk River in October 1987 and observed tracks often enough to consider the population to have a low-to-moderate density.

Other Species. Fox populations remain high, but low prices elicited little trapper interest. Only 75 foxes were reported from the unit. Marten were in moderate numbers in the southern part of the unit. Based upon track density, Golden (1988) estimated their numbers to be highest around the Jack White Range and moderate within the southern preserve. Based on fur acquisition and export reports, 2,156 marten were sold.

Game Board Actions and Emergency Orders

During the past 10 years trapping seasons and bag limits have remained the same for marten, coyotes, foxes, mink, muskrats, otters and wolverines. In 1987 the Board of Game adopted a recommendation from the Koyukuk River Fish and Game Advisory Committee to shorten the lynx season by 2 weeks. They were concerned that lynx in early March had poor fur and were not in prime condition.

The bag limit for beaver has been increased by the Board 3 times after proposals submitted by ADF&G. The by limit from 1981 to 1985 was 25; it was 40 from 1985 to 1988.

CONCLUSIONS AND RECOMMENDATIONS

Furbearer populations were in good condition throughout the unit. Golden's (1988) conclusion for his GAAR study can be expanded for the entire unit: "It was apparent from interviews with trappers that they were very aware of furbearer population changes and that they responded accordingly to prevent overharvest of any particular species. The current known distribution of trappers in and near GAAR seems to be compatible with the ability of populations to withstand the pressure. This situation is not likely to change significantly given the density of trappers, their conscientious efforts, and their access to suitable areas."

The main recommendation is to continue the present seasons and bag limits, with the exception of liberalized beaver limits. There should be no limit for beavers in the unit. Beavers are an abundant resource, and prices and trapping techniques limit harvest more than regulations. When prices were relatively high during the spring of 1987 the harvest of 554 beaver in the Huslia area contained only 4% kits because of selective trapping.

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PREPARED BY:

Timothy O. Osborne
Wildlife Biologist III

SUBMITTED BY:

Wayne E. Heimer
Survey-Inventory Coordinator

REVIEWED BY:

Randall L. Zarnke
Wildlife Biologist II

Table 1. Furbearer harvest Unit 24, 1982-88.

Species	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Beaver	383	508	236	595	904	468
Lynx	698	430	162	203	127	89
Otter	13	28	19	13	22	25
Wolverine	45	36	19	38	20	22

STUDY AREA

GAME MANAGEMENT UNITS: 25A, 25B, 25D and 26B, 26C (75,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Eastern Interior, Eastern Brooks Range, and Central and Eastern Arctic Slope

BACKGROUND

In the eastern Interior centered around the Yukon Flats lynx, marten, and beaver are the most important species to trappers, and there are good populations of each. A significant part of the local economy depends on trapping. In contrast, the eastern Brooks Range and Arctic Slope have relatively few furbearer species densities are also low. Wolves, wolverines, and foxes are the most important species to trappers. Most information on furbearers comes from pelt-sealing records for beavers, lynx, land otters, and wolverines, fur acquisition and export reports, and from trapper questionnaires. Beaver populations have been surveyed annually in the Yukon Flats National Wildlife Refuge (YFNWR) (McLean 1986). Furbearers have been also surveyed in the YFNWR (Golden 1987). These latter efforts provided the only sources of furbearer population survey data.

MANAGEMENT OBJECTIVES

To determine the relative abundance of lynx, marten, and beavers by 1991.

To determine age and sex ratios of harvested lynx and marten by 1991.

To develop accurate estimates of furbearer harvest by 1991.

To identify trapper use patterns by 1991.

To determine marten habitat and dispersal by 1992.

To determine lynx habitat use, movements, and density in and near burned areas of different successional stages from 1991 through the lynx population peak.

METHODS

Counts of beaver lodges and food caches in the YFNWR by U.S. Fish and Wildlife Service (USFWS) biologists were the only population surveys conducted during the reporting period. Harvest data were analyzed from sealing certificates, fur acquisition and export reports. Incidental observations by trappers were also evaluated.

RESULTS AND DISCUSSION

Population Status and Trend

Beaver, marten, and red fox numbers have been consistently high in the Yukon Flats for the past several years. The beaver populations that increased markedly between 1983 and 1987 have begun to stabilize. Marten, which were uncommon on the Flats in the 1950's, are now abundant. Red foxes have increased to a high level across the Flats. Other furbearer species, including mink, land otters and wolverines, were typically common but not abundant in Subunits 25A, 25B, and 25D. Red and Arctic fox populations seemed to be increasing in Subunits 26B and 26C. Wolverines occur at low densities throughout the study area.

Aerial surveys of beaver lodges and food caches in 5 areas of the YFNWR during 1987 indicated that populations were stable or declining. The number of active lodges, as indicated by food caches, was lower in all 5 survey areas than those for previous years; however, beavers remain abundant in the refuge.

Aerial track counts were used as indices of furbearer abundance in the YFNWR in 1985 and 1986 (Golden 1987). Tracks/km ranged from 0.0 to 1.96 for red foxes, 0.0 to 3.78 for marten, and 0.0 to 0.64 for lynx. Track densities were highest for red foxes in the central lake flats. Marten densities were highest in mature coniferous forests, mixed coniferous-deciduous forests, and in a 7- to 9-year-old burn. Track densities for lynx were highest in mid-successional forests with diverse habitat and plentiful snowshoe hare tracks.

Mortality

Hunting Seasons and Bag Limits:

Coyote	2	Sept. 1- Apr. 30
Arctic Fox	2	Sept. 1- Apr. 30
Red Fox	2	Nov. 1-Feb. 15
Lynx	2	Nov. 1-Mar.31
Wolverine	1	Nov. 10-Feb. 15

Trapping Seasons and Bag Limits:

Beaver	25	Nov. 1-Apr. 15	No open season
Coyote	No limit	Nov. 1-Mar. 31	Nov. 1-Apr. 15
Arctic Fox	No limit	No season	Nov. 1-Apr. 15
Red Fox	No limit	Nov. 1-Feb. 28	Nov. 1-Apr. 15
Lynx	No limit	Dec. 1-Jan. 31	Nov. 1-Apr. 15
Marten	No limit	Nov. 1-Feb. 28	Nov. 1-Apr. 15
Mink & Weasels	No limit	Nov. 1-Feb. 28	Nov. 1-Jan. 3
Muskrat	No limit	Nov. 1-June 10	Nov. 1-June 10
Land Otter	No limit	Nov. 1-Apr. 15	Nov. 1-Apr. 15
Wolverine	No limit	Nov. 1-Mar. 31	Nov. 1-Apr.15

Human-induced Mortality:

Beaver. Trappers harvested fewer beavers in Unit 25 in 1987-88 than in 1986-87 (Table 1). This has been the first downward trend in beaver harvest in 5 years. This trend roughly correlated with food cache and lodge counts.

The percentage of kits in the 1987-88 harvest was not substantially different throughout Unit 25 (Table 2). The percentages of kits in Unit 25 were generally higher than those reported for other areas of North America (Novak 1987). Beaver were taken most frequently in the Coleen River and Hodzana River drainages in Subunit 25A; in the Little Black River and Black River drainages in Subunit 25B; and in the Chandalar River, Christian River, Birch Creek, and Black River drainages in Subunit 25D.

Lynx. Fifty-one more lynx were taken in 1987-88 than in 1986-87. Harvests in Subunits 25B and 25D were nearly the same as those for last season, but the harvest in Subunit 25A increased by about 50% (Table 1). Lynx populations were at their 10-year low between 1984 and 1986 and appear to have begun increasing.

The percentage of kittens in the harvest has increased since 1985-86 in all Subunits of Unit 25 (Table 3). Subunit 25A had the highest percentage of kittens in this study area in 1987-88 and in most previous years as well.

Lynx were taken most frequently in the East Fork Chandalar and Christian River drainages in Subunit 25A, in the Little Black River, Black River, and Salmon Fork drainages in Subunit 25B; and in the Chandalar River, Christian River, Porcupine River, Chandalar Creek, and Sheenjek River drainages in Subunit 25D. Over 75% of the kittens harvested in Unit 25 were taken in the Chandalar River, Christian River, and Salmon Fork drainages.

Land Otter and Wolverine. The 1987-88 otter harvest was lower than those for the previous 4 years (Table 1). No otters were taken in Subunit 25D in 1987-88. Wolverine harvest was typically low in the study area (Table 1). Only 1 wolverine was taken in each of Subunits 26B and 26C.

Unsealed Species. Reported harvests of furbearers that are not sealed decreased during 1986-87, except for white or arctic fox and red squirrel (Table 4). Trappers harvested more marten than any other furbearer in Unit 25. Pelt prices averaging $92 per marten with reports of up to $195 per pelt provided great incentives. Marten populations seemed to be moderate to high in most areas of Unit 25 in 1987-88. Although red foxes, were fairly abundant, they received little effort from trappers because of their low pelt prices. Trappers took few mink, probably because of their low abundance in the Yukon Flats. Several years ago, muskrats were very abundant in the Yukon Flats and were trapped heavily. Their numbers and harvest have since

declined substantially, perhaps because of the gradual drying of water bodies in the area.

Trapper Success. The number of furbearers/trapper was higher for beavers than for lynx, land otters, or wolverines (Table 5). Trappers in Subunit 25B had above average success with beavers and lynx. The incentive for trappers to take lynx was high, because pelt prices averaged $342; top pelts were valued at $800. The number of otters and wolverines taken per trapper was consistently low in the area.

Harvest Chronology. Fifty percent of the beavers were harvested in March, and about 35% were caught in January, February, and April 1988 (Table 6). Nearly all lynx were harvested during the December-January, season but several were taken either before and after the season, despite the closure. December and January were also the months when most otters and wolverines were harvested, reflecting trapper activity associated with the lynx season.

Harvest and Transport Methods. Beavers were snared more often than they were trapped; whereas, lynx, otters, and wolverines were trapped or snared with equal frequency (Table 7). Method of transportation for most trappers was snow machine; less commonly used means were aircraft, dog sled, skis, and snowshoes (Table 7).

Game Board Actions and Emergency Orders
At the Department's request, the Board of Game shortened the lynx season in Unit 25, from 4.0 months in 1986-87 (1 Nov.-15 Mar.) to 2.0 months in 1987-88 (1 Dec.-31 Jan.). This action was in response to low lynx populations in some parts of Alaska and a desire by the Department to adopt a "tracking strategy" for lynx management that would restrict harvest during cyclic population lows.

CONCLUSIONS AND RECOMMENDATIONS

Progress was made toward improving harvest estimates in the area. The scope of work should be expanded to meet the management objectives for other furbearers, particularly lynx and marten. In this way we can hopefully begin basing management decisions on sources of population data other than harvest statistics. I recommend the Department allocate more money for aerial surveys to determine relative abundance of lynx and marten. I also recommend the Department establish cooperative projects with the USFWS, the National Park Service, and the Bureau of Land Management to conduct aerial surveys food caches for beavers and to determine the movements and habitat uses of lynx and marten. Lynx carcasses and marten skulls collected from trappers could be used to assess age sex ratios and reproductive success.

I support the recommendation made by Nowlin (1988) to lengthen the lynx season that has been shortened (i.e., from 4.5 to 2.0 months). The reduced season probably was unnecessary for

Subunits 25A, 25B, 25D, 26B, and 26C. Trapping pressure in this area has been relatively light, and lynx populations have typically been the most numerous in the state. Based on the size of the area and the density of trappers, I believe the lynx harvest can be more self-regulated. A longer season (e.g., 1 November-28 February) probably would have no adverse effects on the lynx populations.

I also recommend that marten and land otter seasons be eliminated in Subunits 26B and 26C, because these subunits are north of either species' usual range. Animals that occur there are probably transients or in the process of establishing new territory. This change would be consistent with the elimination of the beaver season in Subunits 26B and 26C.

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PREPARED BY:

Howard N. Golden
Wildlife Biologist III

SUBMITTED BY:

Wayne E. Heimer
Survey-Inventory Coordinator

REVIEWED BY:

Randy Zarnke
Wildlife Biologist II

Table 1. Furbearer harvest by Subunit, 1983-88.

Species/Year	Subunit 25A	25B	25D	26B	26C	Unk	Total
Beaver							
1983-84	8	126	65			32	231
1984-85	8	130	193			0	331
1985-86	7	166	302			0	475
1986-87	24	171	333			0	528
1987-88	23	136	287			0	446
Lynx							
1983-84	62	446	456			0	964
1984-85	73	203	322			0	598
1985-86	57	104	346			0	507
1986-87	77	124	282			0	483
1987-88	117	127	278			0	522
Land Otter							
1983-84	1	5	0			8	14
1984-85	0	7	3			0	10
1985-86	4	4	7			0	15
1986-87	3	1	6			0	10
1987-88	3	0	2			0	5
Wolverine							
1983-84	13	11	22	0	0	0	46
1984-85	8	28	23	0	1	0	60
1985-86	15	13	14	0	0	0	42
1986-87	16	19	19	0	0	0	54
1987-88	13	11	14	1	1	0	40

Table 2. Beaver harvest by pelt size category[a], 1983-88.

Subunit/Year	0-52	53-59	60-64	≥65	Unk	%Kit	%Adult
25A							
1983-84	2	2	3	1		25	75
1984-85	1	3	3	1	0	13	87
1985-86	0	1	4	2	0	0	100
1986-87	3	4	9	5	3	13	75
1987-88	1	7	9	6	0	4	96
25B							
1983-84	30	26	33	37		24	76
1984-85	17	19	40	54	0	13	87
1985-86	38	16	49	65	0	23	77
1986-87	29	21	51	69	1	17	82
1987-88	24	18	36	58	0	18	82
25D							
1983-84	3	11	26	25		5	95
1984-85	49	28	57	59	0	25	75
1985-86	46	41	88	112	15	15	80
1986-87	47	64	63	123	37	14	75
1987-88	41	46	95	100	5	14	84
Totals							
1983-84	35	39	62	63	32	15	71
1984-85	67	50	100	114	0	20	80
1985-86	84	58	141	179	15	18	79
1986-87	79	89	123	197	41	15	77
1987-88	66	71	140	164	5	15	84

[a] Pelt size (length and width) in inches; kit <53", adult ≥53".

Table 3. Percentage of kittens and adult lynx in harvest (N), 1983-88.

Year	Subunit/Age											
	25A			25B			25D			Total		
	K	Ad	N	K	Ad	N	K	Ad	N	K	Ad	N
1983-84	11.3	88.7	62	8.3	91.7	446	6.1	93.9	456	7.5	92.5	964
1984-85	15.1	84.9	73	4.4	95.6	203	6.2	93.8	322	6.7	93.3	598
1985-86	10.5	89.5	57	3.8	96.2	104	10.7	89.3	346	9.3	90.7	507
1986-87	26.0	74.0	77	9.7	90.3	124	24.1	75.9	282	20.7	79.3	483
1987-88	33.0	67.0	117	12.6	87.4	127	20.5	79.5	278	21.5	78.5	522

Table 4. Harvest of unsealed furbearer species, 1984-88, based on fur acquisition and fur export reports to ADF&G for Unit 25.

Report/Year	Coyote	White Fox	Red Fox				Marten	Mink	Weasel	Muskrat	Red Squirrel
			Red	Silver	Cross	Total					
Acquisition											
1984-85	0	1	203	19	121	343	2584	63	64	53	52
1985-86	0	0	163	21	143	327	3279	98	44	969	0
1986-87	0	0	241	13	187	441	5228	207	56	1843	5
1987-88	0	2	112	20	84	216	3857	53	18	874	22
Export											
1986-87	0	0	11	5	7	23	479	4	4	517	1
1987-88	0	0	32	11	27	70	1229	27	37	267	9
Total											
1986-87	0	0	252	18	194	464	5707	211	60	2360	6
1987-88	0	2	144	31	111	286	5086	80	55	1141	31

Table 5. Trapper success (number animals/trapper) in furbearer harvest, 1987-88.

Species	Subunit					Total
	25A	25B	25D	26B	26C	
Beaver	7.7	10.5	6.6	0.0	0.0	7.7
Lynx	5.5	5.8	3.7	0.0	0.0	4.4
Land Otter	1.0	0.0	1.0	0.0	0.0	1.0
Wolverine	1.2	1.4	2.2	1.0	1.0	1.4

Table 6. Chronology of furbearer harvest, 1983-88.

Species/Year	Month						
	Nov	Dec	Jan	Feb	Mar	Apr	Unk
Beaver							
1983-84							
1984-85	51	34	57	77	72	8	35
1985-86	15	11	27	86	313	25	2
1986-87	44	37	51	84	286	13	13
1987-88	32	23	50	55	234	52	0
Lynx							
1983-84	197	384	191	172	80	0	3
1984-85	116	195	151	86	66	1	2
1985-86	0	295	208	1	2	0	7
1986-87	1	273	196	2	1	0	14
1987-88	1	267	247	2	2	0	3
Land Otter							
1983-84	0	2	1	3	1	0	0
1984-85	5	5	0	1	0	0	0
1985-86	3	3	3	1	5	0	0
1986-87	0	6	3	1	1	0	2
1987-88	1	1	3	0	0	0	0
Wolverine							
1983-84	9	17	12	12	5	0	0
1984-85	7	17	14	15	9	0	0
1985-86	6	12	15	5	7	0	0
1986-87	4	16	20	5	9	0	4
1987-88	2	14	15	5	3	1	0

Table 7. Method of harvest and transportation of furbearers, 1983-88.

Species/Year	Method of Take[a]				Method of Transportation[b]							
	1	2	3	4	1	2	3	4	5	6	7	8
Beaver												
1983-84												
1984-85	0	64	222	48								
1985-86	0	52	427	0	111	36	0	0	300	0	0	32
1986-87	0	59	461	8	3	40	0	0	475	0	0	10
1987-88	0	35	409	2	26	16	0	0	400	0	0	4
Lynx												
1983-84	1	662	312	52								
1984-85	0	456	152	9								
1985-86	0	280	231	2	9	32	0	0	288	0	0	184
1986-87	1	241	243	2	14	38	0	0	423	0	0	12
1987-88	2	279	231	10	18	51	0	0	439	0	0	9
Land Otter												
1983-84	0	6	1	0								
1984-85	0	6	5	0								
1985-86	0	5	10	0	1	1	0	0	9	0	0	4
1986-87	0	10	2	1	0	1	0	0	10	0	0	2
1987-88	0	3	2	0	0	1	0	0	4	0	0	0

(Cont'd) Table 7. Method of harvest and transportation of furbearers, 1983-88.

Species/Year	Method of Take[a]				Method of Transportation[b]							
	1	2	3	4	1	2	3	4	5	6	7	8
Wolverine												
1983-84	1	43	8	3								
1984-85	5	47	13	0								
1985-86	5	27	12	1	7	6	0	0	25	0	0	7
1986-87	1	32	20	5	7	9	0	0	40	0	0	2
1987-88	4	20	16	0	4	7	0	0	27	0	1	1

[a] Method of take: 1) ground shooting, 2) trapping, 3) snaring, 4) other.

[b] Method of transportation: 1) airplane; 2) dog sleds, skis, or snowshoes; 3) boat; 4) 3- or 4-wheeler; 5) snowmachine; 6) other ORV; 7) highway vehicle; 8) unknown.

STUDY AREA

GAME MANAGEMENT UNIT: 26A (53,000 mi²)

GEOGRAPHIC DESCRIPTION: Western North Slope

BACKGROUND

The only furbearers common to Subunit 26A are red and arctic foxes and wolverines. Because lynx are primarily a boreal forest species, they are found only in limited numbers in the southern portion of the subunit. Prior to the introduction of a cash economy in the early 1900's, furbearers were harvested by Inupiat people for use in the domestic manufacture of garments. Currently, hunters and trappers harvest furbearers not only for domestic use but for commercial sale as well. Although the magnitude of the harvest of furbearers from Subunit 26A is considerably smaller than reported for other areas of Alaska, the furbearer resources, particularly wolverines, are highly valued by local residents.

POPULATION OBJECTIVES

To maintain productive, viable populations.

To allow maximum harvest opportunity within sustained yield limits.

METHODS

Surveys for gathering population information on furbearers were not conducted during the reporting period; however, observations of furbearer activity were recorded during surveys conducted for wolves, moose, and other big game species. Harvest data for wolverines and lynx were summarized from sealing certificate records.

RESULTS AND DISCUSSION

Population Status and Trend

Arctic Fox:

No population or harvest information are available for arctic foxes in Subunit 26A. Informal reports from local residents indicate that the abundance of arctic foxes has not changed significantly since the last reporting period.

Red Fox:

No population or harvest information are available for red foxes in Subunit 26A.

Lynx:

No population information are available for lynx in Subunit 26A. Because the northern range limit for lynx in Alaska occurs near the southern border of the subunit, lynx densities have never been reported as high. Lynx numbers were reported to be very low in adjacent Units 23 and 24 and were probably very low in Subunit 26A as well.

Wolverine:

Magoun (1984) estimated a minimum fall population of 821 wolverines in Subunit 26A. This estimate was based on a density of 1 wolverine/48 km^2 (1/19 mi^2) in the foothills and 1 wolverine/139 km^2 (1/54 mi^2) for the entire subunit. Because reliable population and harvest data are lacking, the current population status of wolverines is not known with certainty. Because wolverines inhabiting open tundra habitats are highly vulnerable to hunters using snow machines, Trent (1988) indicated that overharvesting of the wolverine population could occur in Subunit 26A. If a long-term trend of overharvesting were currently occurring, a declining population trend is certainly probable.

Mortality

Hunting Seasons and Bag Limits:

Red Fox	Nov. 1-Feb. 15	2 foxes
Arctic Fox	Sept.1-Apr. 30	2 foxes
Lynx	Nov. 1-Mar. 31	2 lynx
Wolverine	Sept. 1-Mar. 31	1 wolverine

Trapping Seasons and Bag Limits:

Red Fox	Nov. 1-Apr. 15	No limit
Arctic Fox	Nov. 1-Apr. 15	No limit
Lynx	Nov. 1-Apr. 15	No limit
Wolverine	Nov. 1-Apr. 15	No limit

Human-induced Harvest:

Lynx. Only 1 lynx was reported harvested in Subunit 26A. Because lynx were found in significant numbers only in the southern portion of Subunit 26A and the size of the population was probably quite low, harvest opportunity for local residents was limited. Only residents of Anaktuvuk Pass who reside in the northern portion of Unit 24 have much opportunity to harvest lynx in Subunit 26A.

Wolverine. Sealing records indicate that 18 wolverines were harvested by hunters and trappers during 1987-88. All of the harvest was reportedly taken by nonlocal residents from other areas of Alaska. The actual size of the harvest is certainly

much larger, although its size is conjectural. Magoun (1984) estimated that, in some years, less than 10% of the wolverines harvested in Subunit 26A were sealed and only rarely were more than 50% sealed. Because sealing agents have not been established in most Subunit 26A communities, the size of the harvest attributable to local subunit residents is unknown. Trent (1988) believed that 100 wolverines were taken by local residents, assuming an annual harvest of 15-20 wolverines for each of the communities located in the subunit. A model developed by Magoun (1984) indicated that the population could, under certain circumstances, sustain an annual harvest of nearly 300 wolverines. This high harvest rate would be sustainable only if no more than 90 females were harvested and the reproductive rate observed in the Driftwood Creek study area of 0.60 kits/female/year was valid throughout the subunit. If Magoun's population estimate and assumptions are still valid, overharvesting is probably not occurring in the subunit. Because wolverines are especially vulnerable to hunters using aircraft and snow machines, the potential for overharvesting certainly exists.

Game Board Actions and Emergency Orders

During 1987, the Board of Game enacted statewide regulations prohibiting the use of aircraft for taking wolverines and foxes with firearms on the same day; however, these regulatory changes do not prohibit a trapper employing an aircraft as transportation from using a firearm to dispatch a trapped animal. Because most nonlocal hunters use aircraft for transportation in Subunit 26A, their harvest opportunities, particularly for wolverine hunting, will be adversely impacted. Most local hunters, however, use snow machines for transportation and their harvest opportunities will not be significantly affected.

CONCLUSIONS AND RECOMMENDATIONS

A management problem of immediate concern in Subunit 26A is obtaining accurate harvest information. Trent (1984, 1985) discussed problems and proposed the following solutions for dealing with the short-comings in furbearer harvest reporting: assigning either part-time Department representatives living in each community or an assistant area biologist the task of improving furbearer harvest reporting.

Because wolverines are especially vulnerable to harvest, their population status needs to be closely monitored. A lack of reliable harvest information serves to magnify the problem. The applicability of using track count techniques for lynx and wolves is currently being evaluated in other portions of Alaska. If such techniques prove feasible, their applicability to wolverine populations in Subunit 26A should be investigated.

No changes in seasons or bag limits are recommended at this time.

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PREPARED BY:

Steven Machida
Game Biologist III

SUBMITTED BY:

Steven Machida
Survey-Inventory Coordinator

Table 1. Beaver harvest in Subunits 14A and 14B as determined from sealing documents, 1983-87.

Year	Subunit 14A	Subunit 14B	Total
1983-84	130	63	193
1984-85	147	130	277
1985-86	139	314	453
1986-87	160	143	303
1987-88	98	169	267
Mean	135	164	299

Table 2. Land otter harvest in Subunits 14A and 14B as determined from sealing documents, 1983-87.

Year	Subunit 14A	Subunit 14B	Total
1983-84	20	9	29
1984-85	24	22	46
1985-86	17	18	35
1986-87	22	14	36
1987-88	2	6	8
Mean	17	14	31

Table 3. Lynx harvest in Subunits 14A and 14B as determined from sealing documents, 1983-87.

Year	Subunit 14A	Subunit 14B	Total
1984-84	4	1	5
1984-85	8	2	10
1985-86	3	0	3
1986-87	6	0	6
1987-88[a]	0	0	0
Mean	4	1	5

[a] Hunting and trapping seasons were closed

Table 4. Wolverine harvest in Subunits 14A and 14B as determined from sealing documents, 1983-87.

Year	Subunit		Total
	14A	14B	
1983-84	5	7	12
1984-85	4	6	10
1985-86	8	6	14
1986-87	1	6	7
1987-88	3	5	8
Mean	4	6	10

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