Alaska Department of Fish and Game
Division of Wildlife Conservation

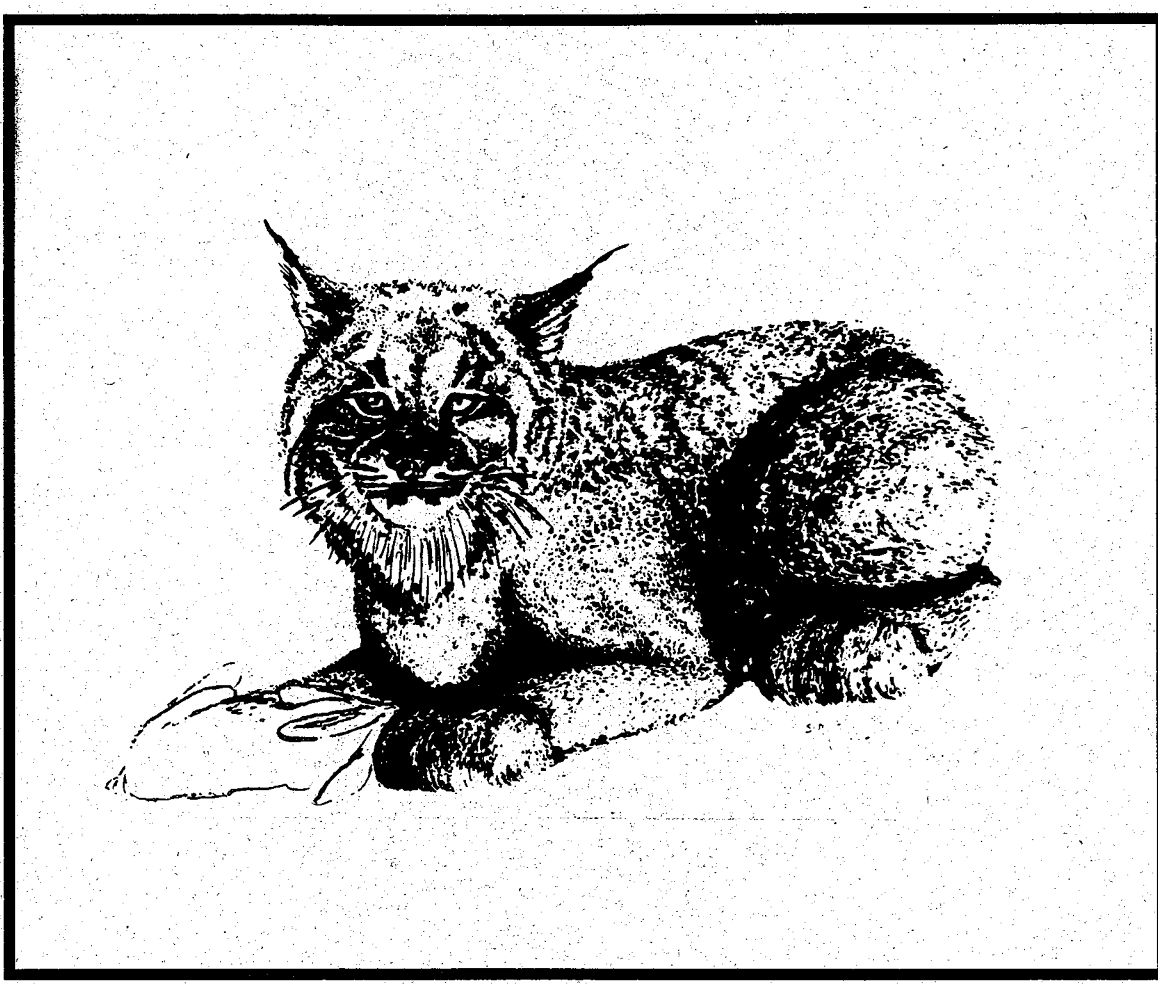
Federal Aid in Wildlife Restoration

Survey-Inventory Management Report

1 July 1989 - 30 June 1991

FURBEARERS

Susan M. Abbott, Editor



Project W-23-3, W-23-4, Study 7.0
February 1993

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LOCATION

Game Management Units: Subunit 1A (5,300 mi^2) and Unit 2 (3,600 mi^2)

Geographical Description: Subunit 1A - Unit 1 south of Lemesurier Point, including all areas draining into Behm and Portland Canals, and excluding areas draining into Ernest Sound

Unit 2 - Prince of Wales and all adjacent islands bounded by a line drawn from Dixon Entrance in the center of Clarence Strait, Kashevarof Passage and Sumner Strait to and including Warren Island

BACKGROUND

Furbearer numbers have remained moderate to high in Subunit 1A and Unit 2 during the past six years. Trapping pressure and harvest fluctuates annually, primarily because of trapping conditions and changes in fur prices.

Southeast Alaska provides excellent habitat for river otters, and fur buyers consider the area's pelts to be of high quality. High prices of the late 1970s have declined recently causing trapper interest to decline. Because otters are difficult to trap and pelt preparation is time consuming, prices must be high to influence harvest levels substantially.

Beaver prices have stabilized at low levels for several years. Trapper effort has been low except along roaded portions of Prince of Wales Island where easy access has accommodated high harvests by a few trappers. Beaver harvests can fluctuate dramatically from year to year depending on efforts of just a few trappers.

Trappers in Southeast Alaska have been mostly interested in marten for many years. Besides being easy to trap, marten are easy to care for, and combined income made from marten is often greater than for other furbearer species in Subunit 1A and Unit 2. Marten fur prices were low for many years. However, during winter 1986-87, a substantial increase in the value of marten fur precipitated a large increase in harvest. Extensive and expanding logging road access on Prince of Wales Island could result in future escalated harvests in Unit 2. Extensive logging in Subunit 1A and Unit 2 is removing prime uneven-aged old growth habitat required by marten. As a result, the area's capacity to support marten populations is declining.

For at least the past seven years mink fur prices have remained low and stable, which keeps trapper interest at moderate to low levels. Mink harvest data were collected for the first time during 1990-91.

Weasel populations fluctuate from year to year, independent of trapping. Harvest tends to be limited to incidental take from trapping other furbearers, primarily marten. Very few muskrats exist in Subunit 1A or Unit 2 but a few are taken from the area each year. Muskrat harvest is incidental to beaver trapping.

Wolverines occur only on the mainland portion of Subunit 1A and very few are taken. Little trapping effort targets wolverines and most of the harvest is probably incidental to wolf trapping. No foxes or coyotes exist in Subunit 1A and Unit 2, and only an occasional lynx is taken from the mainland. Cougar sightings on Revillagigedo Island were reported this year. Although unsubstantiated, the fact that a cougar was shot and killed north of Ketchikan in Unit 3 during 1989 makes the report plausible.

MANAGEMENT DIRECTION

Management Objectives

Population objectives for this area are to maintain furbearer populations capable of sustaining harvests at 1984-85 levels. These are as follows:

Species	Subunit 1A	Unit 2
Beaver	39	224
Marten	203	1,039
Otter	65	192
Wolverine and Lynx	Occasional	Not present

Data obtained through a recently initiated regionwide trapper survey should be used to determine possible trends of furbearer species which are not currently sealed. We should evaluate surveys annually and make changes where appropriate.

METHODS

Harvest data comes from mandatory sealing of marten, beaver, lynx, otter, and wolverine. Mink harvests, once determined incompletely through fur export reports, are now obtained from trappers who seal marten. Although incomplete, we believe this reporting system accounts for most mink trapped each season.

The beaver sealing program began over 20 years ago. Wolverine were first sealed in 1971-72 and the river otter sealing program began in 1978-79. The current marten sealing requirement began in 1984-85. However, from 1925 to 1948 marten were intermittently sealed by federal agents (B. Dinneford, pers. commun.).

Fur export reports are sometimes referenced when estimating harvests of furbearers that do not require sealing. Although mandatory, these reports do not account for all animals taken because not all harvested animals are exported, many that are exported are not reported, and some fur exported from these units may have been taken in other units.

We do not conduct population surveys on furbearers in Southeast Alaska. Some ecological information is available for mink and river otters from short-term research studies conducted in Southeast (Harbo 1958, Home 1977, Larsen 1983, Woolington 1984, Johnson 1985). A study of marten ecology is now under way on northeast Chichagof Island (Flynn 1992).

RESULTS AND DISCUSSION

Population Status and Trend

Otter populations were low in the late 1970s when prices were high. Since that time prices have dropped significantly and trapper interest has declined. Populations have steadily increased since the early 1980s and currently remain at moderate to high levels.

Marten in Subunit 1A apparently maintained high numbers over the past six years despite increased trapping pressure. Difficult access to inland areas probably maintains reservoir populations. In Unit 2, access to insular habitats provided by logging roads, along with heavy trapping pressure when prices are high, may reduce marten populations in these areas. Harvests from roaded areas may decline over the next several years. Discussions with trappers suggest that marten are concentrating in old growth stands and away from clearcuts, which increases trapper catch per unit effort.

Mink populations appear high and stable throughout most of Subunit 1A and Unit 2. This probably will not change significantly unless pelt prices increase.

Beaver populations remain high throughout most of Subunit 1A and Unit 2, but are probably somewhat lower in more easily accessed areas. Trapping reduces local populations and when trapping effort decreases, beaver numbers increase for several years until they are trapped again.

Habitat changes cause fairly large population fluctuations. Early successional second-growth habitat supports higher populations of beavers than does old-growth habitat; however, when the canopy closes approximately 20 years after cutting, beaver numbers drop to low levels. Current pelt prices are not high enough to invite much trapping pressure except in easily accessed areas.

Mortality

Seasons and Bag Limits:

Hunting		
Mink, Marten, Otter,		
Weasel, Muskrat	No open season	
Beaver	No open season	
Wolverine	10 Nov. - 15 Feb.	1 wolverine
Trapping		
Mink, Marten, Otter,		
Weasel, Muskrat	1 Dec. - 15 Feb.	No limit
Beaver	1 Dec. - 15 May	No limit
Wolverine	10 Nov. - 20 Apr.	No limit

Harvest. The reported beaver harvest from Subunit 1A during the past two seasons was the lowest recorded in recent history (Table 1). In Unit 2, the harvest was high during 1989-90 and dropped during 1990-91 (Table 2). We believe the low harvests are because of a lack of trapping interest rather than a reflection of population status. For the first time in six seasons a beaver was reported shot (Table 2). Trappers used road vehicles and boats to access beaver habitat in Subunit 1A (Table 3), while road vehicles prevailed in Unit 2 (Table 3). The average number of beavers caught per trapper in Unit 2 far surpassed the average in Subunit 1A (Table 4).

The Subunit 1A marten harvest remained basically the same the past two seasons (Table 1). The Unit 2 marten harvest dropped to its lowest level in four seasons during 1990-91 (Table 2). Marten trappers used boats as the main transport method in Subunit 1A, while road vehicles were the main method of choice in Unit 2 (Table 3).

The average number of marten caught per trapper remained relatively constant during the past two seasons (Table 4). Marten harvest continued to come mainly from old growth habitat during 1989-90 (Table 4). No effort was made to ascertain habitats in which marten were caught during 1990-91. Unit 2 may sustain a higher marten harvest than previously believed, but the long-range outlook for trapping in Unit 2 is not good. Road access to the interior portions of the island has eliminated the refugia that beach trapping provided, thus eliminating the interior reservoir of untrapped animals (Wood 1990). Loss of old growth habitat from logging will continue to reduce marten habitat over much of Subunit 1A and Unit 2.

Harvest data obtained on mink during 1990-91 represent the first such data collected on mink (Tables 1 and 2). Boats were used by most trappers who took mink (Table 3). Mink trappers averaged 10 and 12 mink each in Subunit 1A and Unit 2, respectively (Table 4).

Otter harvests in Subunit 1A were high the past two seasons (Table 1) though in Unit 2, the otter harvest fell to a 7-year low (Table 2). Trapping was the main method of take. Most otter trappers used boats for transportation. An otter was found drowned in a crab pot near Thorne Bay on 3 August 1990. The pot was set in 30-60 feet of water (A. Matthews, pers. commun.). Another otter was inadvertently caught and drowned in a USFS fyke net in Margaret Lake on 24 August 1990 (R. Wood, pers. commun.).

A single male wolverine was trapped in Burroughs Bay during 1989-90, and 7 were taken near Hyder during 1990-91 (Table 1). Snowmachines were the primary transport means used by trappers taking wolverines during 1990-91 (Table 3). Past wolverine harvests have come from a variety of locations within Subunit 1A, including Marten Arm, Anchor Pass, and Walker Cove.

Habitat

Clearcut logging of the uneven-aged old growth forest in Subunit 1A and Unit 2 is affecting most furbearers; it particularly damages marten. Conversion of old growth to second growth will eliminate large portions of marten habitat and populations will decline accordingly. Roads eliminate the refuge effect which is particularly evident in Unit 2. This will probably become a problem in Subunit 1A with road system expansion. Under current roading/logging practices, these changes are permanent.

River otter habitat is primarily confined to a 20-30 meter strip of old growth forest along the saltwater coast and adjacent to the larger stream and lake systems (Larsen 1983, Woolington 1984). Woolington (1984) found natal dens up to a half mile inland from beach areas. Old growth forest is preferred otter habitat and little use is made of cutover areas. Logging these habitats may reduce otter populations.

Mink habitat appears similar to otter habitat in many respects. While impacts of beach logging would seem less detrimental to mink than to otter, it is still believed that mink populations may decline after logging beach habitat (Johnson 1985).

Beaver seem to benefit from logging in the short-term. Early stages of clear-cuts produce abundant food and often support more beaver than does old growth. Canopy closure eventually reduces populations to levels below those supported in old growth stands.

Wolverines are found only on the mainland portion of Subunit 1A where most of the area has been legislatively designated as wilderness and thereby protected from logging. However, the lower Cleveland Peninsula is scheduled for intensive logging and road building. These activities are expected to adversely impact wolverine populations.

Board of Game Actions and Emergency Orders. The same seasons and bag limits have been in effect for the past six years. Season opening dates for most species were established using a combination of pelt primeness and standardized dates for species that could be taken in the same types of trap sets. Marten are apparently prime before 1 December while mink are not prime until late December, and otter and beaver are prime by 1 December. Therefore, 1 December was selected as the best compromise as an opening date for these species.

The only change in season dates in the past six years was a lengthening of the wolverine season to correspond with the wolf season. Wolverine harvests are so small that this is not expected to effect population levels detrimentally. Closing dates are based on time of declining pelt quality and the desire to have a uniform closing date for mink, marten, and otter. Beaver seasons run late to allow trapping on major mainland river systems after the ice has gone out. Despite this, very little beaver trapping occurs during the last month of the season along these larger river systems because pelt prices have remained low. These larger rivers are seldom trapped for beaver.

CONCLUSIONS AND RECOMMENDATIONS

All furbearer populations in Subunit 1A and Unit 2 appear healthy and stable at this time. A significant increase in pelt prices would be necessary to raise trapping effort to a level that would adversely impact populations. The extensive road system and widely distributed human population in Unit 2 creates much greater trapping pressure than in Subunit 1A. This along with high pelt prices, could lead to an overharvest of marten. Changes made to marten seasons are difficult to implement because they affect the trapping of other species. The most acceptable solution would be to implement access restriction for marten trapping.

Logging permanently removes the uneven-aged old growth forest, replacing it with an even-aged, closed canopy, open understory monoculture type forest that does not meet the requirements of several furbearers. Impacts of this forest management technique should be identified and publicized to point out the trade-offs between logging and furbearer populations. New information gathered from ongoing marten research on Chichagof Island should be made available to area management staff for use in evaluating population requirements and managing this species.

LITERATURE CITED

Flynn, R. 1992. Ecology of martens in southeast Alaska. Fed. Aid Wildl. Rest. Prog. Rep. Proj. W-23-5, Study 7.16. Juneau. 48pp.

Harbo, S. 1958. An investigation of mink in interior and southeastern Alaska. M.S. Thesis, Univ. of Alaska, Fairbanks. 108pp.

Home, W.S. 1977. Otter. Pages 48-57 in Dixon Harbor biological survey: Final report on winter mammal and bird studies. Natl. Park serv., Juneau, Alaska.

Johnson, C. B. 1985. Use of coastal habitat by mink on Prince of Wales Island, Alaska. M.S. Thesis, Univ. of Alaska, Fairbanks. 179pp.

Larsen, D. N. 1983. Habitats, movements and foods of river otters in coastal southeastern Alaska. M.S. Thesis, Univ. of Alaska, Fairbanks. 149pp.

Wood, R.E. 1990. Annual report of survey-inventory activities. Furbearers. Pages 1-7 in S.O. Morgan, ed. Fed. Aid Wild. Rest. Proj. W-23-1, Study 7.0. Juneau.

Woolington, J.D. 1984. Habitat use and movements of river otters at Kelp Bay, Baranof Island, Alaska. M.S. Thesis, Univ. of Alaska, Fairbanks. 147pp.

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Table 1. Subunit 1A, reported harvest of beaver, marten, mink, otter, and wolverine, 1984-1991.

Species/ Year	Total take	% male	Method of take (%) Shot	Trapped or snared	Unk	Harvest chronology Dec	Jan	Feb	Mar	Apr	May	Unk
Beaver												
1984-85	39	--	0	100	0	1	11	8	5	11	3	0
1985-86	20	--	0	100	0	0	1	11	6	2	0	0
1986-87	52	--	0	100	0	15	8	12	9	4	4	0
1987-88	44	--	0	100	0	16	0	0	11	1	3	13
1988-89	24	--	0	100	0	12	4	0	8	0	0	0
1989-90	10	--	0	100	0	3	2	1	0	4	0	0
1990-91	7	--	0	100	0	0	0	4	3	0	0	0
Marten												
1984-85	203	69	0	100	0	118	68	17	0	0	0	0
1985-86	156	63	0	100	0	107	5	2	0	0	0	42
1986-87	127	66	0	100	0	49	65	13	0	0	0	0
1987-88	313	69	0	100	0	61	74	7	0	0	0	171
1988-89	490	59	0	100	0	95	43	2	0	0	0	350
1989-90	246	70	0	100	0	73	80	75	0	0	0	18
1990-91	261	65	0	100	0	115	43	10	1	0	0	92
Mink												
1990-91	144	--	0	100	0	27	34	4	0	0	0	79
Otter												
1984-85	65	63	1	99	0	24	37	2	0	0	0	2
1985-86	70	71	7	93	0	27	30	13	0	0	0	0
1986-87	63	62	11	89	0	29	26	8	0	0	0	0
1987-88	88	61	9	91	0	42	40	6	0	0	0	0

Table 1. (Continued)

Species/ Year	Total take	% male	Method of take (%) Shot	Trapped or snared	Unk	Harvest chronology Dec	Jan	Feb	Mar	Apr	May	Unk
Otter												
1988-89	45	78	40	60	0	8	20	17	0	0	0	0
1989-90	81	72	18	82	0	19	40	22	0	0	0	0
1990-91	80	59	10	90	0	36	34	10	0	0	0	0
Wolverine												
1984-85	1[a]	100	100	0	0	1	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	2	100	0	100	0	0	2	0	0	0	0	0
1987-88	1	0	0	100	0	1	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	1	100	0	100	0	0	0	0	0	1	0	0
1990-91	7	71	14	86	0	1	5	0	1	0	0	0

[a] Mistakenly reported as 0 in past S & I reports.

Table 2. Unit 2, reported harvest of beaver, marten, mink[a], and otter, 1984-1991.

Species/ Year	Total take	% male	Method of take (%) Shot	Trapped or snared	Unk	Harvest chronology Dec	Jan	Feb	Mar	Apr	May	Unk
Beaver												
1984-85	234	--	0	100[b]	0	52	54	38	40	32	18	0
1985-86	364[c]	--	0	99	0	66	96	66	95	34	7	0
1986-87	411	--	0	100	0	120	66	96	74	26	29	0
1987-88	352	--	0	99	0	90	87	34	73	45	13	10
1988-89	103	--	0	100	0	31	4	7	2	48	11	0
1989-90	397	--	0[d]	100	0	199	79	6	76	26	9	2
1990-91	172	--	0	100	0	18	56	59	17	17	5	0
Marten												
1984-85	1,039	57	0	100	0	675	275	89	0	0	0	0
1985-86	571	56	0	100	0	300	175	27	0	0	0	69
1986-87	301	58	0	100	0	217	57	27	0	0	0	0
1987-88	1,149[e]	60	0	100	0	643	338	44	0	0	0	124
1988-89	908	54	0	100	0	519	63	29	0	0	0	297
1989-90	907	58	0	100	0	613	258	33	0	0	0	3
1990-91	501	44	0	100	0	257	157	58	0	0	0	29
Mink												
1990-91	168	--	0	100	0	69	24	14	0	0	0	61
Otter												
1984-85	192	50	8	85	7	55	93	44	0	0	0	0
1985-86	141	59	2	97	1	43	82	16	0	0	0	0
1986-87	62	70	3	82	15	35	23	4	0	0	0	0
1987-88	176	56	8	90	2	36	103	34	1	0	0	2
1988-89	92	61	2	98	0	60	21	11	0	0	0	0
1989-90	154	56	10	90	0	60	66	28	0	0	0	0
1990-91	40	53	20	78	2	6	19	12	0	0	0	3

[a] According to fur export reports, 341 mink were harvested from GMU 2 during 1987-88.
[b] One beaver was hit and killed by a car.
[c] Includes 72 beaver not previously reported.
[d] One beaver was shot.
[e] According to fur export reports, 414 marten were harvested from GMU during 1987-88.

Table 3. Subunit 1A and Unit 2, transportation methods used by trappers, 1984-1991.

Species/	Unit 1A Transportation used (%)					Unit 2 Transportation used (%)				
Year	Boat	Road	Air	Unk	Other[a]	Boat	Road	Air	Unk	Other[a]
Beaver										
1984-85	--	--	--	100	--	--	--	--	100	--
1985-86	95	5	0	0	0	37	63	0	0	0
1986-87	45	55	0	0	0	33	67	0	0	0
1987-88	27	48	0	25	0	14	82	0	4	0
1988-89	33	67	0	0	0	5	90	1	4	0
1989-90	60	40	0	0	0	12	88	0	0	0
1990-91	29	29	0	0	42	9	85	0	3	3
Marten										
1984-85	--	--	--	100	--	--	--	--	100	--
1985-86	--	--	--	100	--	--	--	--	100	0
1986-87	94	6	0	0	0	63	37	0	0	0
1987-88	84	16	0	0	0	51	49	0	0	0
1988-89	84	16	0	0	0	44	56	0	0	0
1989-90	89	11	0	0	0	34	54	0	12	0
1990-91	71	15	1	0	13	21	63	0	5	11
Mink										
1990-91	93	3	0	0	4	69	13	2	0	16
Otter										
1984-85	--	--	--	100	0	--	--	--	100	--
1985-86	63	0	0	37	0	62	10	0	28	0
1986-87	91	5	4	0	0	74	26	0	0	0
1987-88	81	5	4	10	0	76	22	0	2	0
1988-89	71	11	0	18	0	91	9	0	0	0
1989-90	90	10	0	0	0	85	15	0	0	0
1990-91	98	2	0	0	0	68	22	0	0	10

Table 3. (Continued)

Species/ Year	Unit 1A Transportation used (%)					Unit 2 Transportation used (%)				
	Boat	Road	Air	Unk	Other[a]	Boat	Road	Air	Unk	Other[a]
Wolverine										
1984-85	100	0	0	0	0	--	--	--	--	--
1985-86	0	0	0	0	0	--	--	--	--	--
1986-87	100	0	0	0	0	--	--	--	--	--
1987-88	100	0	0	0	0	--	--	--	--	--
1988-89	0	0	0	0	0	--	--	--	--	--
1989-90	100	0	0	0	0	--	--	--	--	--
1990-91	29	0	0	0	71[b]	--	--	--	--	--

[a] Includes trappers who hike or use snowmachines.
[b] Five of seven wolverines taken using snowmachines.

Table 4. Subunit 1A and Unit 2, average furbearer take per trapper, and percent of marten harvest occurring in old growth habitat, 1986-1991.

Species/ Year	Number of trappers 1A	2	Average catch/trapper 1A	2	Percent of harvest occurring in old growth 1A	2
Beaver						
1986-87	11	21	5	20	--	--
1987-88	11	29	4	12	--	--
1988-89	5	16	5	6	--	--
1989-90	5	22	2	18	--	--
1990-91	5	17	1	10	--	--
Marten						
1986-87	14	29	9	10	93	94
1987-88	15	63	21	18	100	94
1988-89	21	49	23	18	100	98
1989-90	16	53	15	17	93	92
1990-91	17	30	15	17	--	--
Mink						
1990-91	14	14	10	12	--	--
Otter						
1986-87	13	19	5	3	--	--
1987-88	14	27	6	6	--	--
1988-89	12	17	4	5	--	--
1989-90	12	29	7	5	--	--
1990-91	14	14	6	3	--	--
Wolverine						
1986-87	1	--	2	--	--	--
1987-88	1	--	1	--	--	--
1988-89	0	--	0	--	--	--
1989-90	1	--	1	--	--	--
1990-91	3	--	2	--	--	--

LOCATION

Game Management Units: Subunit 1B (3,300 mi^2)
Unit 3 (3,000 mi^2)

Geographical Description: Southeast Alaska mainland from Cape Fanshaw to Lemesurier Point and islands of Petersburg, Wrangell, and Kake areas

BACKGROUND

Beaver are abundant in both Subunit 1B and Unit 3. Trapper effort fluctuates greatly from season to season. Lynx are not found in Unit 3. No verified reports of lynx have occurred in Subunit 1B in recent years.

Marten occur naturally in Subunits 1B and Unit 3. A mandatory sealing requirement started with the 1984-85 season. Before that only fur export reports provided information and this showed numbers of marten shipped by resident trappers. No data was collected about chronology of harvest or location of kill before the 1984-85 season.

Mink are taken intentionally by some trappers and incidentally by others but little data is collected. Fur export reports show the number shipped by trappers living in Wrangell and Petersburg but not the specific area where mink were trapped.

Otter are targeted by some trappers, mostly in Unit 3, and the harvest has fluctuated the past few years. Wolverine are found in Subunit 1B and also on Mitkof Island in Unit 3. Some are caught incidentally in wolf sets but a few trappers target on wolverine.

MANAGEMENT DIRECTION

Management Goals

Management goals have not been established for furbearers.

Management Objectives

The following interim objective is used as a guideline for Subunit 1B and Unit 3 until we determine formal furbearer goals and objectives: 1) monitor the harvest and level of trapper effort insofar as can be ascertained with trapper interviews and questionnaires.

Population Objectives

The interim population objective is to maintain furbearer populations capable of producing harvests at the 1984-85 levels as follows:

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

METHODS

We monitored harvest of beaver, marten, otter, and wolverine through the mandatory pelt-sealing program. We monitored the mink harvest through the mandatory fur buyer and fur export report program. This data has limited value as only the trapper's residence is recorded, not the location of the take. Trappers are asked to volunteer information about mink when they report on marten, but this data collection scheme has not been in place long enough to furnish meaningful information. Data collected through the pelt-sealing requirement included number of animals taken, location, date taken, sex, and size (for age-class estimation). We also recorded methods of transportation and take.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Data are insufficient to quantify furbearer populations in Subunit 1B and Unit 3. However, observations by staff, trappers, hunters, and other members of the public suggest a high and stable or increasing beaver population; no known incidence of lynx; a moderate to high marten population with decreasing numbers in heavily trapped areas; moderate and stable populations of mink and otter; and a stable wolverine population. All harvest data have been reconciled with the latest reports. Some numbers may have changed from previous reports as we received late sealing documents.

Population Composition: Sex is determined for all furs sealed except beaver. For some species there may be a sex bias in trapability. This precludes using sealing data to make useful population composition estimates.

Mortality

Harvest:

Season and Bag Limit.

Beaver		
Unit 1B and 3 (except Mitkof Is.)	Dec. 1 - May 15	No limit
Unit 3, Mitkof Is.	Dec. 1 - Apr. 15	No limit
Lynx, Marten, Mink, Otter		
Unit 1B and 3	Dec. 1 - Feb. 15	No limit
Wolverine		
Unit 1B and 3	Nov. 10 - Apr. 30	No limit

Board of Game Board Actions and Emergency Orders. No Board of Game actions or emergency orders were issued during this report period.

Trapper Harvest. Historic furbearer take including this report year is detailed in Tables 1-8. Beaver harvest (Tables 1 and 2) fluctuates greatly, seemingly influenced more by market conditions than by population levels. New trappers seem to target beaver more than more experienced trappers. A few beaver are occasionally taken by special permit outside the open season, primarily to reduce flooding of roads.

Marten harvest has shown no discernable trend over the past 5 years (Tables 3 and 4). The number of successful trappers varies more in Unit 3 than in Subunit 1B but in both areas trappers are usually people with other income. Few, if any, trappers in the area rely upon trapping income. Trappers report fewer marten in areas accessible by road systems, but marten numbers are about the same as in previous years in roadless areas.

During 1989-90 trappers increased their catch from 56 to 90 otters but the catch declined to 67 in 1990-91 (Tables 5 and 6). The same trappers usually target otter, but individual trapper effort varies. Otter prices have remained low for several years so that few trappers target otter.

Only a few trappers try to catch wolverine and the harvest remains stable (Tables 7 and 8). Most of the kill is in Subunit 1B. Some sets are made especially for wolverine but a few are taken from wolf sets each year.

Harvest Chronology. Tables 9-16 report the harvest chronology of beaver, marten, otter and wolverine for the past 5 years. There are no apparent changes in the harvest patterns.

Transport Methods. Except for a few individuals seeking marten, trappers in Subunit 1B and Unit 3 rely on skiffs. Some trappers in Unit 3 use road vehicles in addition to skiffs. Very few trappers use airplanes, ORVs, or snow machines.

CONCLUSIONS AND RECOMMENDATIONS

Fur harvest during this report period was within the range of recent years for all species except beaver. As discussed previously beaver prices have been low for several years and few trappers take beaver. Trapping interest for beaver was so low that special permits are issued to remove problem beavers. I recommend no regulation changes at this time.

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Table 1. Subunit 1B beaver harvest, 1986-91.

Regulatory year	Reported harvest	Method of take Trap/snare	Successful / Total trappers
1986/87	122	122	7
1987/88	21	21	5
1988/89	21	21	2
1989/90	83	83	7
1990/91	2	2	1

Table 2. Unit 3 beaver harvest, 1986-91.

Regulatory year	Reported harvest	Method of take Trap/snare	Successful / Total trappers
1986/87	67	67	12
1987/88	123	123	15
1988/89	36	36	9
1989/90	49	41	10
1990/91	25	25	7

Table 3. Subunit 1B marten harvest, 1986-91.

Regulatory	Reported harvest						Successful
year	M	(%)	F	(%)	Unk.	Total	Total Trappers
1986/87	88	60	59	40	0	147	12
1987/88	193	71	77	29	0	270	16
1988/89	142	66	74	34	0	216	14
1989/90	174	78	50	22	0	224	14
1990/91	121	75	41	25	0	162	8

Table 4. Unit 3 marten harvest, 1986-91.

Regulatory	Reported harvest						Successful
year	M	(%)	F	(%)	Unk.	Total	Total Trappers
1986/87	59	66	31	33	0	90	14
1987/88	217	60	145	40	0	362	33
1988/89	81	53	50	33	22	153	15
1989/90	174	63	96	35	82	78	22
1990/91	72	71	29	29	0	101	11

Table 5. Subunit 1B otter harvest, 1986-91.

Regulatory year	Reported harvest M	(%)	F	(%)	Unk.	Total	Method of take Trap/snare	(%)	Shot	(%)	Successful Total Trappers
1986/87	6	67	3	33	0	9	7	78	2	22	5
1987/88	30	53	26	46	1	57	44	77	13	23	11
1988/89	7	70	1	10	2	10	10	100	0	0	5
1989/90	14	70	6	30	0	20	15	75	5	25	7
1990/91	15	71	6	29	0	21	16	76	1	5	5

Table 6. Unit 3 otter harvest, 1986-91.

Regulatory year	Reported harvest M	(%)	F	(%)	Unk.	Total	Method of take Trap/snare	(%)	Shot	(%)	Successful Total Trappers
1986/87	25	62	20	38	0	45	44	98	1	2	15
1987/88	49	51	48	49	0	97	80	82	17	18	18
1988/89	25	47	25	47	3	53	40	75	13	25	12
1989/90	33	47	37	53	0	70	58	83	12	17	11
1990/91	20	43	23	50	3	46	40	87	6	13	12

Table 7. Subunit 1B wolverine harvest, 1986-91.

Regulatory	Reported harvest						Method of take				Successful
year	M	(%)	F	(%)	Unk.	Total	Trap/snare	(%)	Shot	(%)	Total Trappers
1986/87	10	67	5	33	0	15	15	100	0	0	8
1987/88	6	55	5	45	0	11	11	100	0	0	6
1988/89	9	75	3	25	0	12	10	83	0	0	4
1989/90	10	67	5	33	0	15	15	100	0	0	10
1990/91	5	50	4	40	1	10	8	80	2	20	7

Table 8. Unit 3 wolverine harvest, 1986-91.

Regulatory	Reported harvest						Method of take				Successful
year	M	(%)	F	(%)	Unk.	Total	Trap/snare	(%)	Shot	(%)	Total Trappers
1986/87	0	0	2	100	0	2	2	100	0	0	2
1987/88	1	100	0	0	0	1	1	100	0	0	1
1988/89	0	0	0	0	0	0	0	0	0	0	0
1989/90	0	0	0	0	0	0	0	0	0	0	0
1990/91	1	50	1	50	0	2	2	100	0	0	2

Table 9. Subunit 1B beaver harvest chronology percent by month, 1986-91.

Regulatory year	Harvest periods: November	December	January	February	March	April	May	n
1986/87	0	31	8	8	46	11	18	122
1987/88	0	6	8	0	1	6	0	21
1988/89	0	6	0	0	0	15	0	21
1989/90	0	14	1	1	0	46	21	83
1990/91	0	0	0	0	0	2	0	2

Table 10. Unit 3 beaver harvest chronology percent by month, 1986-91.

Regulatory year	Harvest periods: November	December	January	February	March	April	May	n
1986/87	0	30	7	7	14	9	0	67
1987/88	0	46	30	31	0	10	6	123
1988/89	10	17	2	0	2	3	0	34
1989/90	0	30	1	2	11	2	2	48
1990/91	2	15	4	0	0	3	1	25

Table 11. Subunit 1B marten harvest chronology percent by month, 1986-91.

Regulatory year	Harvest periods			n
	December	January	February	
1986/87	110	35	2	147
1987/88	109	141	20	270
1988/89	110	96	10	216
1989/90	155	56	13	224
1990/91	39	121	2	162

Table 12. Unit 3 marten harvest chronology percent by month, 1986-91.

Regulatory year	Harvest periods			n
	December	January	February	
1986/87	61	28	1	90
1987/88	219	133	10	362
1988/89	95	36	22	153
1989/90	183	76	19	278
1990/91	85	16	0	101

Table 13. Subunit 1B otter harvest chronology percent by month, 1986-91.

Regulatory year	Harvest periods December	January	February	n
1986/87	5	3	1	9
1987/88	19	29	9	47
1988/89	4	3	3	10
1989/90	9	7	4	20
1990/91	5	10	6	21

Table 14. Unit 3 otter harvest chronology percent by month, 1986-91.

Regulatory year	Harvest periods December	January	February	n
1986/87	18	21	6	45
1987/88	41	51	5	97
1988/89	34	9	10	53
1989/90	29	32	9	70
1990/91	21	20	5	46

Table 15. Subunit 1B wolverine harvest chronology percent by month, 1986-91.

Regulatory year	Harvest periods						
	November	December	January	February	March	April	n
1986/87	0	4	4	2	2	3	15
1987/88	0	0	7	1	2	1	11
1988/89	0	3	2	5	1	1	12
1989/90	0	3	4	5	2	1	15
1990/91	1	1	7	0	0	0	9

Table 16. Unit 3 wolverine harvest chronology percent by month, 1986-91.

Regulatory year	Harvest periods						
	November	December	January	February	March	April	n
1986/87	0	0	1	0	0	1	2
1987/88	0	1	0	0	0	0	1
1988/89	0	0	0	0	0	0	0
1989/90	0	0	0	0	0	0	0
1990/91	0	1	1	0	0	0	2

LOCATION

Game Management Subunit: 1C (6,500 mi^2)

Geographical Description: Southeast Alaska mainland from Cape Fanshaw to the latitude of Eldred Rock, including Sullivan Island and the drainages of Berners Bay.

BACKGROUND

Marten, mink, otter, and beaver make up most of the furbearer harvest in Subunit 1C. Smaller numbers of wolverine and weasels are taken each year. Beaver exist at moderate levels in most drainages along coastal mainland areas with suitable habitat. In contrast to other units in Southeast Alaska, where clearcut logging may provide additional beaver habitat, there is limited natural or human-caused disturbance creating habitat changes beneficial to beaver in Subunit 1C. Berners Bay produces the largest harvest each year, with the Taku River, Herbert-Eagle River system, St. James Bay, and Shelter Island contributing to the total. Few beaver have been sighted on Douglas Island.

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

Marten remain at moderate levels. The price offered for marten pelts and the relative ease of trapping this species combine to keep trapping effort and harvest levels high. Little information exists for wolverine and mink. Mink are not sealed, and most harvest information is anecdotal. Wolverine occur in small numbers, and the sealing information provides little insight into population status or distribution. While wolverine are one of the subunit's more uncommon species, high pelt prices encourage trappers to target them.

MANAGEMENT DIRECTION

Management objectives for Subunit 16C are to maintain a furbearer population capable of sustaining harvests at least as high as the 1984-85 levels: beaver, 36; lynx, 1; marten, 245; otter, 34; and wolverine, 9. At least 60% of the marten harvest should be males.

METHODS

Furbearer harvest data came chiefly from interviews during mandatory sealing of marten, beaver, otter, wolverine, and lynx. For each species, we recorded method and month of take, transportation means, and trap location. We determined sex and pelt size for each beaver. We also noted the sex ratio of the marten harvest. Trapper interviews provided additional insight into perceived population status and trapping pressure.

RESULTS AND DISCUSSION

Population Status and Trend

Furbearer populations in Subunit 1C appear stable, based on trapper interviews and harvest data. Lynx remain uncommon, while otter, mink, and marten are common or moderately abundant. Beaver harvest declined from preceding years, and only 11 were taken in the subunit during 1990. However, this probably reflects low pelt prices, and is not a good indicator of population status.

Mortality

Harvest:

Hunting Seasons and Bag Limits.

Marten, otter, mink, beaver	No open season	
Lynx	Dec. 1 - Feb. 15	2
Wolverine	Nov. 10 - Feb. 15	1

Trapping Seasons and Bag Limits.

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

Hunter Harvest: The number of beaver harvested in regulatory year 1989 was nearly identical to the management objective (35 compared to 36). In 1990, the harvest dropped to 15. Seven trappers harvested beaver in 1989, for an average of 5 beaver per trapper. During 1990 the 5 participating trappers averaged only 3 beaver. However, 3 trappers who took 71% of the 1989 harvest, were not represented in the 1990 beaver harvest records.

The river otter harvest in 1989 equaled the management objective of 31, and in 1990 it was 36 animals. Ten trappers averaged 3.1 otter during 1989, while 12 trappers averaged 3 each during 1990. Males comprised 48% of the harvest in 1989 and 47% in 1990. Seven wolverine were taken by 5 trappers in 1989 and 5 animals were sealed by 4 trappers in 1990. No lynx were taken in Subunit 1C in either year. The marten harvest was 256 in 1989 and 240 in 1990 (Table 1), above the previous 5-year average of 224. Males comprised 67% of the harvest in 1989 and 60% in 1990.

Harvest Chronology: During 1989, January produced the greatest beaver harvest (15). December was the second most productive month, with 11 beaver taken. One beaver was taken in February. Seven beaver were sealed that were taken on unknown dates. Otter trappers did best in the 1989 season in December (19), followed by January (11). One otter was taken in February 1990. Wolverine trapping during the 1989 season was best during January (4), followed by December (2), and March (1).

During 1990, beaver trappers were most successful in April and May (8 beaver), with December being the next best month (4). One animal was trapped in January, 2 in February. Otter trappers also did best late in the season, with 18 otter taken in February 1991. December had 15 otter reported in the harvest. Four otter were taken in January. December was the best month for wolverine trappers during the 1989 season, with 6 being taken. One wolverine per month was trapped in January and April.

Chronology of the marten harvest is shown in Table 2. December was the best time to trap this species. During 1989, 71% of the season's marten were taken in December, and 63% of the 1990 harvest was trapped in that month. Most of the December harvest were males (67% in 1989; 57% in 1990). In 1989, no marten were taken after January, and the harvest sex ratio remained weighted toward males. Even in 1990, when harvest continued later into the season, no decline in the proportion of males in the harvest was evident.

Transport Method: Boat travel continues as the main transport means for trappers in Subunit 1C. To a minor extent, highway vehicles are used along the road system around Juneau to reach trapping areas accessible by foot.

CONCLUSIONS AND RECOMMENDATIONS

Harvests of beaver, marten, and otter rebounded substantially after the low harvests of 1988, and appear similar to those preceding 1988. While the number of wolverine sealed decreased, they are taken in such low numbers in the subunit that there is probably little real difference between years. Some of the increase in harvest may be the result of trappers adjusting to the roadside trapping closures which probably negatively affected the 1988 harvest (McCarthy, 1990).

Harvests for most fur species during the report period fell at, or near, levels established as management guidelines. Because choosing a single year's harvest level as a management goal is arbitrary and since fluctuations in harvest are produced by factors other than population status, it is difficult to judge population trends. Based on the status of habitat in the subunit and the relatively low number of trappers, I feel that the population bases that will support harvest of these species continue to exist.

Prices paid for marten pelts will continue to drive fairly heavy trapping effort. We will continue to monitor the sex ratio of the harvest for indications of overharvest. Based on previous management reports, a sex ratio of 60% males has been incorporated into the management guidelines for marten in this subunit.

Lynx will continue to be rare in the subunit, and since their presence probably depends more on population levels in neighboring Canadian jurisdictions than on management action here, using a harvest level as a management objective for this species is unrealistic. Lynx should continue to be harvested in Subunit 1D at low levels, with occasional increases stemming from animals moving to the area from high populations to the north and east.

Beaver trapping in the subunit has fallen off from levels seen before 1988. Anecdotal evidence from trappers and trapper questionnaires suggest that low prices affect trapper motivation to pursue beaver.

LITERATURE CITED

Larsen, D. 1983. Habitat use, movements, and foods of river otter in coastal southeastern Alaska. M.S. Thesis. Univ. of Alaska, Fairbanks. 149pp.

McCarthy, T. 1990. Game management unit 1C furbearer survey-inventory management report. Pages 14-20 *in* S.O. Morgan, ed. Annual report of survey-inventory activities. Part XIV. Furbearers. Vol. XX. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Juneau. 238pp.

Woolington, J. 1984. Habitat use and movements of river otter at Kelp Bay, Baranof Island, Alaska. M.S. Thesis. Univ. of Alaska, Fairbanks. 147 pp.

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Table 1. Furbearer harvest in Subunit 1C, 1986-1990.

Year	Beaver	Lynx	Marten	Otter	Wolverine
1986	107	0	241	31	9
1987	47	0	314	55	8
1988	5	0	209	19	10
1989	35	0	256	31	7
1990	15	0	240	36	5

Table 2. Chronology of marten harvest by sex in Subunit 1C, 1989.

	Males		Females	
Month	n	%	n	%
December	121	67	64	33
January	53	72	21	28
February	0	--	0	--
Unknown	0	--	0	--
Total	174	67	85	33

Table 3. Chronology of marten harvest by sex in Subunit 1C, 1990.

	Males		Females	
Month	n	%	n	%
December	86	57	66	43
January	28	76	9	24
February	23	68	11	32
Unknown	8	47	9	53
Total	145	60	95	40

LOCATION

Game Management Subunit: 1D (2,600 mi^2)

Geographical Description: Southeast Alaska mainland 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 limited marine shoreline compared to other Southeast Alaska units, little otter habitat is available and otter harvests have been small. Lynx harvests were low in recent years and probably depend upon population levels in Canada. Mountainous terrain in the subunit provides extensive wolverine habitat, and harvests were good in recent years. Beaver remain uncommon in the subunit, and the season has been closed since 1976.

MANAGEMENT DIRECTION

Management objectives for Subunit 1D are to maintain furbearer populations capable of sustaining harvests at levels equal to those recommended in the previous management report: 100 marten, 5 otter, and 7 wolverine. Objectives for otter and wolverine represent the average harvest for the previous 5-year period.

METHODS

Mandatory sealing of marten, otters, wolverine, and lynx has provided the best source of data on furbearer harvests. For each species, we recorded method and month of take and transportation means. We noted sex composition of the marten harvest. Sex and pelt size were determined for otters and lynx. Trapper interviews provided additional insight into perceived population status and trapping pressure.

RESULTS AND DISCUSSION

Population Status and Trend

Marten harvests during the report period were smaller than in 1988, although still over the management objective of 100. Continued high pelt prices have led to consistent high levels of effort for marten. Sex ratios indicate no signs of overharvesting.

Wolverine harvest levels have fallen below established management objectives. While the reason for the decline is unknown, trappers may be concentrating on marten because of the high pelt prices and ease of trapping and preparation. Trapping effort in 1990 was probably affected by extreme snow depths in much of the subunit. The wolverine population is probably stable.

Lynx are rare in the subunit. As populations in the Yukon Territory continue to grow towards the apex of the cycle, more lynx should be found in Subunit 1D. Otter harvests diminished during the report period. No known problem with the otter population exists; probably the effort for marten has diverted trappers from otter trapping.

Beaver numbers in the subunit are extremely low; trapping season has been closed for beaver for many years. Division of Wildlife Conservation staff are preparing to translocate beaver from other locations in northern Southeast Alaska to stimulate an increase in local numbers. The primary aim of this effort is to improve moose habitat in the Chilkat River valley, but a secondary benefit could be to resume beaver trapping in Subunit 1D.

Mortality

Harvest:

Hunting Seasons and Bag Limits.

Marten, otter, mink,	No Open Season	
Lynx	Nov. 1 - Mar. 31	2
Wolverine	Nov. 10 - Feb. 15	1

Trapping Seasons and Bag Limits.

Marten, otter	Dec. 1 - Feb. 15	No limit
Mink, lynx, wolverine	Nov. 10 - April 30	No limit

Trapper Harvest: One otter and 2 wolverine were taken during the 1989 season. In 1990-91 one otter and 3 wolverine were trapped. No lynx were taken during the report period.

During 1989, trappers harvested 114 marten in the area, and during 1990 the number decreased to 104. The percentage of males in the harvest remained high (82% and 73% in 1989 and 1990, respectively), suggesting a healthy population.

Harvest Chronology: During the 1989-90 season, 1 wolverine was taken in February and 1 in March. One otter was trapped in December. During 1990-91, 2 wolverine were taken in January and 1 in February. The single otter was harvested in January. Tables 2 and 3 contain the chronology of the marten harvest. December is still the prime month to harvest marten.

Transport Method: During 1989-90 all wolverine and otter trappers used highway vehicles to access trapping areas. The following year all wolverine trappers used snowmobiles, while the otter was taken by a trapper using a highway vehicle. No information on transport method was collected from marten trappers.

Habitat Assessment

Some marten habitat may be lost as old-growth forests, particularly riparian areas, are clearcut. Many areas scheduled for harvesting, such as those along the upper Chilkat and Klehini rivers, are in this category. Most operable timber lands within the Haines State Forest support marten. While impacts to wildlife populations are considered in timber harvest plans, habitat mitigation or enhancement for marten is limited.

CONCLUSIONS AND RECOMMENDATIONS

Marten harvests bracketed the management objective levels. With males continuing to comprise most of the harvest, no changes in season or bag limit are needed. We should continue to monitor sex ratios in the marten harvest. Harvests of other species are lower than specified in the management objectives. The combined effects of high prices for marten and severe winter weather probably diverted trapping effort from these species. Trapper interviews and questionnaires should be used to track the perceived levels of these animals in the future.

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Table 1. Subunit 1D furbearer harvest, 1986-1990.

Year	Lynx	Marten	Otter	Wolverine
1986	1	45	9	9
1987	0	108	1	3
1988	0	179	7	6
1989	0	114	1	2
1990	0	104	1	3

Table 2. Subunit 1D, chronology of marten harvest by sex, 1989.

			Males	Females
Month	n	%	n	%
November	0	--	0	--
December	53	80	13	20
January	15	54	13	46
February	0	--	1	100
Unknown	14	74	5	26
Total	82	72	32	28

Table 3. Subunit 1D chronology of marten harvest by sex, 1990.

			Males	Females
Month	n	%	n	%
November	0	--	0	--
December	68	70	29	30
January	5	71	2	29
February	0	--	0	--
Unknown	0	--	0	--
Total	73	70	31	30

LOCATION

Game Management Unit: 4 (>5,700 mi^2)

Geographical Description: Admiralty, Baranof, Chichagof, and adjacent islands

BACKGROUND

Furbearer trapping in Unit 4 is pursued vocationally and recreationally by residents and nonresidents alike. The area is made up of 5 major islands (Admiralty, Baranof, Chichagof, Kruzof, and Yakobi) which are intersected by numerous bays and fjords. Furbearers occurring in Unit 4 include marten, land otter, mink, short-tailed weasel, red squirrel, and beaver. The intensity of harvest effort is regulated by the weather. During periods of high winds, common during winter in the Alexander Archipelago, trapping effort declines. Most trappers travel by boat but motorized land vehicle use is increasing where logging roads have been constructed.

Seasons have remained the same for many years. Federal subsistence regulations supersede state regulations on federal lands under terms of the Alaska National Interest Lands Claim Act (ANILCA). Sea otters also occur in Unit 4, but harvest is regulated by Federal statute under the Marine Mammal Protection Act (MMPA).

MANAGEMENT DIRECTION

Management Goals

The management goal for furbearers in Unit 4 is to provide a sustainable population of furbearers to meet the needs of trappers.

Management Objectives

The current objective is to maintain a furbearer population capable of sustaining harvests at the 1984-85 levels. Objectives of 14 beaver and 1,355 marten were used. Long-term objectives will be developed and approved by the Board of Game.

METHODS

Trappers are required to submit the hides of some species to authorized personnel for examination and sealing (otter, beaver, and marten). Wolves, wolverine and lynx must be sealed, but are not commonly trapped in Unit 4. 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 are tagged with a dated, numbered CITES seal which also meets the state sealing requirement (5AAC 92.170).

We interviewed trappers at the time of sealing about method of take (trap, snare, or firearm); transport means; month of catch; and location. The 20 most active trappers were provided with waterproof record books to help document capture dates and locations.

Sex was recorded for marten and otters, while pelt width and length were recorded for otters and beavers. Otter pelts were sexed by the presence of the preputial orifice found in males. Marten pelts were roughly sorted by sex identifiable through the larger size male pelt (Strickland and Douglas 1987). After sorting, the presence of a preputial orifice and/or the direction of the growth of the underfur at the posterior end of the abdominal gland was used to verify sex: in females it grows in a posterior direction, while in males the fur grows in an anterior direction at the penile opening (Lensink 1953 ibid.).

RESULTS AND DISCUSSION

Population Status and Trend

Population Size:

Marten. Marten population data were not collected. 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." Researchers have stated that marten populations appear to be controlled by environmental factors such as prey abundance and availability, which are reflected both in fecundity and mortality. Overtrapping of marten on road systems and near popular boat anchorages may be a problem in Southeast Alaska.

Mink. Mink occur throughout the islands of Unit 4. Populations are considered stable. No census techniques were used.

Land Otter. Land otters occur throughout the islands of Unit 4. No census data is available, but populations are considered stable.

Beaver. Beavers are probably endemic to Admiralty Island. Admiralty Island beaver populations are considered stable although trapping effort is low.

Beavers were introduced to the Goddard Hot Springs area of Baranof Island in 1927 (Burris and McKnight 1973). Beavers occur in low numbers on Baranof Island but recently expanded their range to include areas near the drainage used as the Sitka municipal water supply. Beavers may be a problem there because of their propensity to transmit water-borne disease organisms.

Beaver trapping season is closed on Chichagof Island. Beavers often cause road flooding problems for the U.S. Forest Service, indicating that populations may be increasing. Beavers may have been transplanted to Chichagof Island before statehood, but there is no record in Burris and McKnight (1973).

Population Composition

Of the 653 marten furs submitted for sealing in 1989-90, 427 were males, 217 (34%) were females, and 9 were of unknown sex. In 1990-91, 708 marten furs were examined. Of these, 469 were males, 235 (35%) were females, and 4 were undetermined. Table 1 shows marten sex ratios from 1986-1991.

The male:female sex ratio of marten at birth is close to 50:50 (Strickland and Douglas 1987). Trappers usually take 2 to 3 times as many males as females (Soukkala 1983). Yeager (1950) attributes this higher male vulnerability to larger foraging areas for males, which increases the chance of encountering traps. When food is abundant, more females survive and reproduction is high, but females and young are more susceptible to starvation because of high energy demands. Buskirk and Lindstedt (1989) suggested that contributing causes of increased male vulnerability might be sexual differences in territory packing or in the way the sexes respond to traps that they perceive.

Of the 149 otters sealed in 1989-90, 80 were males, and 68 were females, and 1 was of unknown sex. In 1990-91, there were 29 males, 35 females, and 7 unknowns for a total of 65. Despite the preponderance of males in trappers' bags harvest techniques in Southeast Alaska, i.e., shooting otters from boats, may tend to kill the sexes more evenly.

Mortality

Harvest:

Season and Bag Limit.

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

Board of Game Action and Emergency Orders. The marten, mink, and weasel season on northeast Chichagof Island was closed by emergency order in 1990. There was no open season in that portion of Unit 4 on Chichagof Island east of Port Frederick and north of Tenakee Inlet. The Board of Game took no action affecting Unit 4.

Trapper Harvest. A total of 653 marten were reported trapped during the 1989-90 season (Table 1), a 30% decrease from the 1988-89 harvest. During 1990-91, 708 were marten trapped, a slight increase. Johnson (1988) speculated that low snowfall during trapping season may cause a decline in trapping success, but both winters had significant snow accumulations. According to sealing records, 149 otters were taken in Unit 4 during the 1989-90 season and 65 were trapped in 1990-91 (Table 2). Trappers took 8 beavers in 1989-90 and 4 in 1990-91. Beaver trapping was prohibited west of Chatham Strait.

Trapper Residency and Success. During the 1989-90 season, 40 trappers reported catching marten and 28 were unit residents. During 1990-91, 35 marten trappers reported and 21 listed residency in Unit 4. Of the 23 otter trappers, 18 were Unit 4 residents in 1989-90. During 1990-91, 19 otter trappers reported catching otters and 9 listed were Unit 4 residents.

Harvest Chronology. December was the most effective month to trap marten. A total of 415 (64%) of the 1989-90 marten were taken in December. In 1990-91, 356 (50%) of the catch occurred in December (Table 3). Sealing records indicate that in 1989-90, 63 (56%) of the otters were taken in December and 49 (38%) in January (Table 4).

Transport Methods. Over 90% of otter trappers used boats; transport methods data were not collected for other furbearer trappers.

Habitat Assessment

Habitat capability is decreasing in many areas in Unit 4 because of clear-cutting of the mature old-growth timber preferred by marten in Southeast Alaska.

Nonregulatory Management Problems/Needs

Clear-cut logging of old-growth timber in Southeast Alaska is detrimental to marten populations. Marten are found in greatest numbers in mature coniferous forests (Northcott 1977). While in dryer climes marten use logging slash as feeding areas in winter, the high moisture content of snow in Southeast Alaska may inhibit use of logging debris for this purpose. Northcott (1977) suggested that some logging practices in Canada, e.g. small clearcuts, may be compatible with marten habitat needs, but no evidence of this exists in Unit 4. Bissonette, et al. (1989) found habitat fragmentation to be a problem.

CONCLUSIONS AND RECOMMENDATIONS

Beaver harvest was low during the report period. The harvest objective of 14 beaver probably cannot be consistently 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 which may be creating acceptable beaver habitat.

Although current funding does not allow, we need a survey of Chichagof Island to determine the extent of beaver populations. If we found populations at an appropriate level, a conservative season could be implemented. Management may include a bag limit to prevent overharvest 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 was met. I recommend that measurable harvest objectives be developed regionwide to provide management guidance.

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 ensure that populations are not overharvested. Logging road access and high fur prices could combine to eliminate natural refugia and reduce interior marten stocks which normally repopulate heavily trapped coastal populations.

A recommendation to shorten the season on northeast Chichagof Island has been drafted for the Board of Game. Season restrictions for marten would include mink and otter as well as incidental catches of marten by mink and otter trappers are common. A marten management plan for northeast Chichagof Island was drafted and is currently being evaluated (Young and Schenck 1991).

LITERATURE CITED

Bissonette, J.A., R.J. Fredrickson and B.J. Tucker. 1989. American marten: a case for landscape-level management. Trans. 54th N. A. Wildl. & Nat. Res. Conf. pp. 89-101.

Buskirk, S.W. and S.L. Lindstedt. 1989. Sex biases in trapped samples of mustelidae. J. Mamm. 70(1):88-97.

Burris, O.E. and D.E. McKnight. 1973. Game transplants in Alaska. Alaska Dep. of Fish and Game. Tech. Bull. No. 4. 57pp.

Johnson, L.J. 1988. Unit 4 furbearer survey-inventory progress report. *In* S. Morgan, ed. Annual report of survey-inventory activities. Part XVII. Furbearers. Vol. XIV. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Juneau. 109pp.

Lensink, C.J. 1953. An investigation of the marten in interior Alaska. M.S. Thesis. Univ. Alaska, Fairbanks. 89pp

Northcott, T.H. 1977. Marten. Hinterland who's who. Canadian Wildl. Serv. Ministry of Fisheries and the Environment. Ottawa. 3pp.

Strickland, M.A. and C.W. Douglas. 1987. Marten. In Wild Furbearer Management and Conservation in North America. M. Novak, J.A. Baker, M.E. Obbard and B. Malloch, eds. pp.531-546. Ontario Ministry of Nat. Resources. Toronto.

Soukkala, A.M. 1983. The effects of trapping on marten populations in Maine. M.S. Thesis. Univ. Maine, Orono. 31pp in Strickland, M.A. and C.W. Douglas. 1987. Marten. In Wild Furbearer Management and Conservation in North America. M. Novak, J.A. Baker, M.E. Obbard and B. Malloch, eds. pp.531-546. Ontario Ministry of Nat. Resources. Toronto.

Yeager, L.E. 1950. Implications of some harvest and habitat factors on pine marten management. Trans. North Am. Wildl. Conf. 15:319-334 in Strickland, M.A. and C.W. Douglas. 1987. Marten. In Wild Furbearer Management and Conservation in North America. M. Novak, J.A. Baker, M.E. Obbard and B. Malloch, eds. pp.531-546. Ontario Ministry of Nat. Resources. Toronto.

Young, E.L. and T.E. Schenck. 1991. Development of Federal/State management criteria for an impacted marten (*Martes americana*) population in southeastern Alaska. Presented at N.W. Section of The Wildl. Soc. Silverdale, WA.

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Table 1. Unit 4 marten harvest, 1986-91.

Regulatory year	Reported harvest M	F	(%)	Unk.	n	Successful Total Trappers
1986/87	537	375	(41)	45	957	57
1987/88	700	503	(42)	76	1,279	70
1988/89	510	284	(36)	136	930	51
1989/90	427	217	(34)	9	653	40
1990/91	469	235	(35)	4	708	35

Table 2. Unit 4 otter harvest, 1986-91.

Regulatory	Reported harvest					Method of take			Successful
year	M	F	(%)	Unk.	Total	Trap/snare	(%)	Shot	Total Trappers
1986/87	82	79	(49)	0	161	64	(40)	97	29
1987/88	105	79	(43)	2	186	94	(51)	92	27
1988/89	58	58	(50)	3	119	19	(16)	100	18
1989/90	80	68	(46)	1	149	119	(78)	29	23
1990/91	23	35	(60)	7	65	36	(51)	27	19

Table 3. Unit 4 marten harvest chronology percent by time period, 1986-91.

Regulatory year	Harvest periods				
	December	January	February	Month Unknown	n
1986/87	53	12	2	32	957
1987/88	56	22	6	16	1,279
1988/89	72	13	4	11	930
1989/90	64	27	9	0	653
1990/91	50	28	8	14	708

Table 4. Unit 4 otter harvest chronology percent by time period, 1986-91.

Regulatory year	Harvest period					
	November	December	January	February	Month Unknown	n
1986/87	0	25	35	7	33	161
1987/88	0	45	31	24	0	186
1988/89	1	53	41	5	0	119
1989/90	0	42	49	9	0	149
1990/91	0	28	66	6	0	65

LOCATION

Game Management Unit: 5 (5,770 mi^2)

Geographical Description: Cape Fairweather to Icy Bay, eastern Gulf of Alaska coast

BACKGROUND

Furbearing species probably gained access to the Yakutat Forelands via the Alsek/Tatshenshini corridor (Klein 1965). Beaver, land otter, and mink are the common water-associated species; muskrats are noticeably absent. Lynx are present in small numbers, while marten are fairly abundant. Wolverine occur in low numbers over extensive areas of range. Trapping pressure has historically been light throughout the Malaspina and Yakutat forelands.

MANAGEMENT DIRECTION

Management objectives for Unit 5 are to maintain furbearer populations capable of sustaining harvests at the 1984 to 1989 average levels as follows: 5 beaver, 2 lynx, 46 marten, 1 otter, and 1 wolverine.

METHODS

Furbearer hides were sealed by Fish and Wildlife Protection and Division of Commercial Fisheries staff in Yakutat and Division of Wildlife Conservation staff in Douglas. Hunters and trappers were interviewed for observations made in the field.

RESULTS AND DISCUSSION

Population Status and Trend

Incidental observations and anecdotal evidence from trappers suggest that beaver numbers remain stable. Slight harvest declines are probably more related to trapper effort than any population change. Lynx numbers apparently decreased during the report period, after a harvest peak in 1988. Little is known about marten abundance, although recent logging has provided easy access to old-growth forest habitats. Otters are more common in Unit 5 than the harvest would indicate. Low trapping effort in the unit accounts for the scarcity of these animals in harvest records. As with other furbearers, no population estimate exists for wolverine. We believe they occur at low densities in remote areas.

Mortality

Hunting Seasons and Bag Limits.

Beaver, marten, otter, mink,	No Open Season	
Coyote	Sept. 1 - Apr. 30	2
Red Fox	Nov. 1 - Feb. 15	2
Lynx	Dec. 1 - Feb. 15	2
Wolverine	Nov. 10 - Feb. 15	1

Trapping Seasons and Bag Limits.

Beaver	Nov. 10 - May 15	No limit
Coyote	Dec. 1 - Feb. 15	No limit
Red Fox	Dec. 1 - Feb. 15	No limit
Lynx	Dec. 1 - Feb. 15	No limit
Marten, mink, weasel	Dec. 1 - Feb. 15	No limit
Otter	Nov. 10 - Feb. 15	No limit
Wolverine	Nov. 10 - April 30	No limit

Trapper Harvest: Table 1 shows the recent 5-year harvest of furbearers. The beaver harvest remains low, with the number taken varying slightly during the past 3 years. The lynx harvest has fallen off from the high seen before the report period; this was because of a response to falling numbers of hares in the unit and in neighboring areas in Canada. The number of marten harvested increased during the report period and during 1990 easily surpassed the management objective. This may be more because of increased ease of access to old-growth forest habitats and/or increased trapper effort than to an increase in marten abundance. The harvest levels for otter and wolverine were below management objectives in 1989 and above them in 1990. The low numbers of these animals probably reflects low trapping effort rather than population declines.

Harvest Chronology: During 1989, 2 beaver were harvested in early winter (one each in October and December) and two were taken in May. During 1990, all 3 beaver were harvested in May. The lynx taken in 1989 were killed in December (4) and January (2). During 1990 the otter was taken in November and the wolverine were killed in May.

Tables 2 and 3 show the chronology of the marten harvest. Because most animals had no harvest dates recorded on the sealing forms, it is not possible to determine a pattern of harvest with any confidence.

Transport Methods: In 1989 all 6 lynx were harvested by trappers using 4-wheelers for transport. Two beaver were taken by a trapper using an aircraft, one via boat, and one via snowmobile. During 1990, 2 wolves and all 3 beaver were taken by trappers using aircraft. A snowmobile was used by the trapper who took the single wolverine harvested, and a highway vehicle was used by the trapper who took an otter.

CONCLUSIONS AND RECOMMENDATIONS

Harvests were within sustainable limits during the report period, with the possible exception of marten because of the impact of logging and associated road construction occurring in Subunit 5A. Should Forest Highway 10 be extended east of the Dangerous River, previously unexploited furbearer habitats will become more accessible. Proposals for development in newly-accessed habitats should be evaluated for impacts to furbearers.

With the exception of lynx, which were probably responding to a cyclic decline of hares, the furbearer harvest met management objectives during the second year of the report period. It is not possible, though, to determine if the harvests indicate stable or increasing populations. One of the drawbacks of using harvest figures as management objectives without any accompanying data on population density or habitat condition is the inability to distinguish the cause of changes in harvests. For marten in particular, it will be important to obtain data, even if only qualitative, on the abundance of animals and the condition of their habitat. At a minimum, trapper interviews and questionnaires should be employed to track perceived abundance.

LITERATURE CITED

Klein, David R. 1965. Postglacial distribution patterns of mammals in the southern coastal regions of Alaska. Arctic, Vol. 18, No. 1. 14 pp.

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Table 1. Unit 5, furbearer harvest, 1986-1990.

Year	Beaver	Lynx	Marten	Otter	Wolverine
1986	8	0	38	2	2
1987	7	0	111	1	1
1988	3	10	17	0	0
1989	4	6	22	0	0
1990	3	0	83	1	3

Table 2. Chronology of marten harvest by sex in Unit 5, 1989.

	Males		Females	
Month	n	%	n	%
November	0	--	0	--
December	0	--	0	--
January	8	89	1	11
Unknown	11	85	2	15
Total	19	86	3	14

Table 3. Chronology of marten harvest by sex in Unit 5, 1990.

	Males		Females	
Month	n	%	n	%
November	0	--	0	--
December	7	58	5	42
January	0	--	0	--
Unknown	38	57	29	43
Total	45	57	34	43

LOCATION

Game Management Unit: 6 (10,140 mi^2)

Geographical Description: Prince William Sound and north Gulf of Alaska Coast

BACKGROUND

Beavers, coyotes, red foxes, lynx, marten, mink, muskrats, land otters, and wolverines are all present in Unit 6. Density of individual species varies, depending upon a variety of ecological factors and levels of harvest. Historical information on population status and trend is mostly anecdotal. Harvests of beavers, lynx, land otters, and wolverines have been monitored by sealing. Take of other species has been estimated from trapper questionnaires, fur export reports, and fur dealer acquisition reports.

Beavers are abundant in Subunits 6A, 6B, and 6C, where the deltas of the Copper and Bering rivers and other freshwater streams provide suitable habitat. Density is lower in Subunit 6D, Prince William Sound (PWS), where less habitat is available. Heller (1910) reported beavers in the Rude River drainage of eastern PWS, but he did not find them on islands in the sound. J. Reynolds (ADF&G files 1976) documented occurrence on Hawkins and Hinchinbrook islands, Simpson Bay, Rude River, and Gravina River.

Beaver harvest has been monitored since 1927 by mandatory sealing of hides (Courtright 1968). Most of the take was from the Copper and Bering river deltas where total harvest has fluctuated widely. In 1938, C. Rhode (ADF&G files) reported a harvest of 700 from the deltas. By 1951, the harvest declined to 27, and then increased again to more than 300 in 1960 and 1963 (Griese 1990). Harvest over the past 5 years ranged from 0 to 90.

Coyotes are new arrivals in Unit 6. Heller (1910) did not note their presence in 1908, and F. Robards (ADF&G files) suggested they became established as a dominant canid in 1938. Observations by trappers and ADF&G personnel suggests their dominance may be eroded in eastern Unit 6 because they could be displaced by increasing wolf populations.

Red foxes are relatively scarce. They were common in the early 1900s but may have been displaced as coyote populations increased (Griese 1990). The last significant harvest of foxes was reported in 1972 in Subunit 6C (Griese 1988b).

Lynx are also relatively scarce in Unit 6. Moreover, O. Koppen (ADF&G files) indicated in 1949 that numbers had always been low. Characteristics of the harvest suggest that Unit 6 may serve as a low density refugia for lynx when populations decline in adjacent units (Griese 1988b) Annual harvest between 1969 and 1990 was generally less than 3 animals, it did not include juveniles, and harvest peaks coincided with population crashes in adjacent populations.

Marten density is quite variable. In 1949, O. Koppen (ADF&G files) characterized populations as scattered. He felt the highest density occurred between Cape Suckling and Cape Yakataga. He also felt PWS and deltas of the Copper and Bering rivers were frequently subjected to excessive trapping, resulting in low numbers. Populations in the 1980s increased, except in heavily trapped areas near Valdez and Cordova (Griese 1988b).

Mink are probably common in most of Unit 6. Observations made between 1931 and 1955 (ADF&G files) suggested a potential for high numbers that may not have been realized because of periodic overharvest. During the 1980s, trapping effort declined because of low pelt prices and numbers probably increased throughout the unit (L. Kritchen, pers. comm.). However, this increase may have been slowed or reversed in 1989 in western PWS because of mortality caused by the *Exxon Valdez* oil spill.

Muskrats are found in Unit 6 east of PWS. Heller (1910) did not report muskrats in PWS in 1908, and J. Reynolds (ADF&G files) confirmed their absence in 1976. On the Copper River Delta, muskrats were plentiful during the 1930s (G. Nelson, ADF&G files); however, by 1935 icing and overflows had reduced numbers. O. Koppen (ADF&G files) also reported depressed numbers in 1948 because of predation. By 1955, the Copper River Delta population had recovered (F. Robards, ADF&G files) and that recovery appears to have persisted (Griese 1988a).

Land otters are probably common in most of Unit 6. Heller (1910) reported that land otters were the most common carnivore in Prince William Sound in 1908. However, trapping and hunting with dogs reduced them to low levels during the early 1930s (G. Nelson, ADF&G files). The population probably recovered during the 1940s (O. Koppen, ADF&G files) and became plentiful throughout the unit by 1951 (F. Robards, ADF&G files). The current exception may be western PWS, where the *Exxon Valdez* spill probably caused significant mortality.

Wolverines are present in most of the unit. In the late 1930s, they were plentiful and considered a nuisance (G. Nelson, ADF&G files). Bounties were placed on wolverines in 1954 that resulted in "undue" harvest pressure on the population, increasing the take 5-fold (F. Robards, ADF&G files). The bounty was removed in 1959. Harvest showed a peak between 1972 and 1978 that may have resulted from improved trapper access and increased effort, but it also may have reflected high population density (Griese 1988b).

MANAGEMENT DIRECTION

Management Objectives

The management goal is to provide optimum harvests and maximum opportunities to participate in the hunting and trapping of furbearers (Rausch 1977). Management objectives have not been established.

METHODS

We sealed hides of beavers, land otters, lynx, and wolverines taken by trappers and hunters. We recorded location and date of harvest, method of take, and type of transportation for all species. Sex was recorded for otters and wolverines, and we measured length and width of beavers, lynx, and otters. All purchases of hides by furbuyers and export of hides from the state were also recorded.

Questionnaires were sent to trappers to obtain information on relative abundance and trends in furbearer populations. In 1989-90, questionnaires were sent to 36 trappers, and 11 responded. In 1990-91, we sent 35 questionnaires and received 23 responses.

During fall 1990, staff completed a systematic survey of beaver caches on the Copper River Delta in Subunit 6C to assess the relative status of the beaver population. After leaf fall, we flew aerial surveys on randomly selected 1.0-1.5 mi^2 plots that represented roughly 25% of high, moderate, and low density wetlands. Cache density was estimated in each stratum, which served as a basis for estimating overall cache density and beaver population. We conducted searches in a Piper PA-18 aircraft.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Beavers were abundant in Subunits 6A, 6B, and 6C, particularly on the deltas of the Copper and Bering rivers. On the Copper River Delta in Subunit 6C, the population was high and increasing. Cache surveys in 1988 and 1990 indicated 2,400 and 3,100 animals, respectively.

Coyotes were abundant and most populations were stable. Possible exceptions were areas in eastern Unit 6 where they were declining because of displacement by increasing wolf populations. Griese (1990) estimated density at 0.1-1.0/mi^2 in suitable habitat.

Red foxes and lynx were very scarce and did not show signs of increasing. Marten density was probably moderate and unchanging. The possible exceptions were near population centers where trapping pressure reduced numbers.

Mink and land otters were common, and populations were stable in most of Unit 6. The probable exceptions were areas in western PWS impacted by the *Exxon Valdez* oil spill. Oil-related mortality may have reduced populations directly after the spill in March 1989; this decline may be continuing.

Muskrats were generally at low density and stable. However, increases may have occurred where trapping pressure was light. Wolverines were present at low to moderate density and were increasing because of reduced trapping pressure away from population centers.

Mortality

Harvest:

Seasons and Bag Limits. The beaver trapping season was 1 February to 31 March and the bag limit was 20 beavers per season.

Coyote trapping season in Subunit 6C, that portion south of the Copper River Highway and east of the Heney Range, was 10 November to 30 April; the trapping season in the remainder of Unit 6 was 10 November to 31 March. Trappers did not have a bag limit for coyotes. The coyote hunting season was not closed and there was not a bag limit in Subunits 6B and 6C; the hunting season in the remainder of Unit 6 was 1 September to 30 April and the bag limit was 2 coyotes.

Red fox trapping season was from 10 November to 28 February and there was no bag limit. Red fox hunting season was from 1 November to 15 February and the bag limit was 2 foxes. Wolverine trapping season was from 10 November to 28 February and there was no bag limit. Wolverine hunting season was from 1 September to 31 March and the bag limit was 1 wolverine.

There was no trapping season for lynx in 1989-90. The lynx trapping season in 1990-91 was from 15 December to 15 January with no bag limit. The trapping season for marten, mink, and weasels was from 10 November to 31 January with no bag limit. Muskrat trapping season was from 10 November to 10 June and there was no bag limit. Land otter trapping season was from 10 November to 31 March with no bag limit.

Board of Game Actions and Emergency Orders. The only Board of Game action during the report period was for lynx trapping. The season was opened in 1990-91 after being closed for 2 years. The closure was in response to statewide concerns over possible excessive harvest during a low point in the lynx population cycle. The season was opened when populations in surrounding units showed signs of recovery.

Trapper Harvest. Beaver harvest reported on sealing forms was within an expected range of 20-100 after being at an historic low of 2 animals during 1988-89 (Table 1). Traps or snares were the most common method of take and the proportion of juveniles in the harvest varied widely. As in past years, 90% of the harvest in 1989-90 and 94% of the take in 1990-91 came from Subunit 6C.

Ten to 20 coyotes were probably taken during each of the last 2 regulatory years. Griese (1990, 1988b) estimated a maximum of 20 taken during 1988-89, and felt that 10 were harvested during 1986-87. This persistently low harvest was unusual on the Copper River Delta, given a relatively high density of coyotes, road access, and extremely liberal seasons, bag limits, and methods of take.

No red foxes or lynx were reported taken. No harvest of red foxes has been reported in over 12 years. The lynx season was closed during 1988-89 and 1989-90. Before the closure, the harvest peaked at 7 animals in 1986-87.

Responses to the trapper questionnaire indicated at least 20 and 43 marten taken during 1989-90 and 1990-91, respectively. During 1986-1988, Griese (1990,1988b) estimated minimum harvests of 35, 120, and 49, respectively. Trapper questionnaires and fur acquisition reports suggested a minimum take of 42 mink in 1989/90 and 19 in 1990/90. Minimum harvest during the previous 3 years was probably 9, 76, and 81 (Griese 1990, 1988b). These estimates are probably a small fraction of the total take.

Results of the trapper questionnaire indicated a minimum take of 8 muskrats during 1989/90 and 1 during 1990/91. This was consistent with minimum estimates of 10 to 20 in 1988/89 and 9 in 1987/88 (Griese 1990).

Sealing records indicated a declining harvest of land otters (Table 2). Over the past 5 years, the take has fallen from nearly 200 to 37 in 1989/90 and 59 in 1990/91. This sharp reduction was probably because of a combination of low prices paid for pelts and the absence of 1 trapper who took 100 animals each year. Traps and snares were the most common method of taking land otters, and males were most frequently taken in the harvest. This was consistent during the past 5 years. The reported harvest of land otters for the past 3 years included 45 animals that were live-trapped and transported to Utah for release. Animals were taken by a local trapper authorized by a permit from Division of Wildlife Conservation. All otters were captured near Cordova in Subunits 6C and 6B. Specific locations and numbers taken include: northeastern Hawkins Island - 7, Simpson Bay - 12, Eyak Lake - 7; Nelson Bay - 5, and west Copper River Delta - 14.

Wolverine harvest was 8 and 10 animals during 1989-90 and 1990-91, respectively (Table 3). Mostly males were taken and most were trapped or snared. This was the pattern over the past 5 years.

Harvest Chronology. Beaver harvest occurred primarily in March (55%) during 1989-90 and in February (67%) during 1990-91 (Table 4). Over the previous 3 years, February was consistently the most important month for harvest. Departure from the historic pattern was probably because of unusually deep snow during February 1990 which restricted access in Subunit 6C, where most trapping occurred.

Land otter harvest was distributed from November through March during this report period (Table 5). During the previous 3 years, the take was concentrated during December and January ($\geq$ 50%). Wolverines were taken in October and in December through March during the past 2 years (Table 6). During the previous 3 years, harvest was distributed from November through March.

Transport Methods. Beaver trappers consistently used highway vehicles for transport (Table 7). The exception was in 1988-89 when only 2 animals were taken from a boat. Trappers relied heavily on highway vehicles because the Copper River Highway provided easy access to beaver populations.

Land otter trappers primarily used boats and highway vehicles for transport this report period (Table 8). During the previous 3 years, boats provided most transportation. This shift to highway vehicles was probably because of an increasing proportion of harvest coming from areas accessible along the Copper River Highway. Wolverine trappers and hunters used mostly snow machines for transport (Table 9). Snow machines were also important the previous 3 years, as were boats and 3- or 4-wheel off-road vehicles.

Other Mortality: Significant mortality of mink and land otter apparently resulted from the *Exxon Valdez* oil spill in western PWS. Intertidal areas that were heavily oiled are important habitat for both species. The animals were probably killed by contact with highly toxic fresh oil directly after the spill and may continue to be affected by persistent oil contamination in the environment. We obtained no estimates of population changes.

Injury assessment studies indicated a variety of impacts on land otters (*Exxon Valdez* Oil Spill Trustee Council Restoration Framework, April 1992). Analysis of blood in 1991 revealed moderately elevated haptoglobin and activities of amino transferase enzymes, indicating persistent toxic effects of oil. Radio telemetry showed animals in oiled areas had larger home ranges than animals in unoiled areas, suggesting that otters in oiled areas were forced to search more to find sufficient food. Body lengths, body weights, and variety of food were all less in oiled than in unoiled sites. Mussels, which are a food item for river otter, continued to be contaminated with oil in parts of western PWS.

CONCLUSIONS AND RECOMMENDATIONS

Quantifiable management objectives need to be established for beavers, lynx, land otters, and wolverines. Harvest information is readily available for all these species from sealing records, and application of existing and emerging methodologies may provide opportunities to monitor population trends. It will not be possible to establish objectives for the other furbearers until reliable harvest information is collected.

Harvests of most furbearers were within sustainable limits. Possible exceptions were land otters and mink. Populations of both species were reduced in western PWS as a result of the *Exxon Valdez* oil spill. The advisability of continued harvest within the spill area should be evaluated as additional results of injury assessment studies become available.

Live capture of land otters from the Cordova area for transport to other states should be more tightly controlled. Capture permits issued in the past left trapping locations to the discretion of the permittee. This resulted in concentrated effort in easily accessible areas and may lead to overharvest. I recommend that specific numbers be prescribed for individual geographic areas as a condition for future permits. The beaver population in Subunit 6C was growing and could sustain substantial additional harvest. I recommend a lengthened season of 1 December to 30 March.

LITERATURE CITED

Courtright, A.M. 1968. Game harvests in Alaska. Fed. Aid in Wildl. Rest. Rep. Juneau. 70pp.

Griese, H.J. 1990. Unit 6 furbearer survey-inventory progress report. Pages 42-55 in S.O. Morgan, ed. Annual report of survey-inventory activities. Part XIV. Furbearers. Vol. XX. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-23-2, Study 7.0. Juneau. 237 pp.

________ 1988a. Unit 6 furbearer survey-inventory progress report. Pages 24-26 in S.O. Morgan, ed. Annual report of survey-inventory activities. Part XIV. Furbearers. Vol. XVII. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-22-5, Job 7.0. Juneau. 109pp.

________ 1988b. Unit 6 furbearer survey-inventory progress report. Pages 31-44 in S.O. Morgan, ed. Annual report of survey-inventory activities. Part XIV. Furbearers. Vol. XVIII. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-22-6, Job 7.0. Juneau. 133pp.

Heller, E. 1910. Mammals of the 1908 Alexander Alaska expedition, with descriptions of the localities visited and notes on the flora of the Prince William Sound region. Univ. Calif. Pub. in Zoo. 5(11):321-360. Rausch, R. 1977. Alaska wildlife management plans, southcentral Alaska. Alaska Dep. Fish and Game. Juneau. 291pp.

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Wildlife Biologist

Table 1. Unit 6 beaver harvest, 1986-91.

Regulatory	Reported harvest			Method of take				Successful
year	Juv.[a](%)	Adults	Unk.	Trap/snare(%)	Shot	(L&S)	Unk.	Total trappers
1986/87	39 (42)	54	0	90 (97)	--	--	3	18
1987/88	23 (77)	7	0	30 (100)	0	0	0	7
1988/89	1 (50)	1	0	2 (100)	0	0	0	1
1989/90	3 (15)	6	11	20 (100)	0	0	0	6
1990/91	38 (58)	28	0	53 (80)	--	--	9	7

[a] Beavers ≤ 52"

Table 2. Unit 6 land otter harvest, 1986-91.

Regulatory	Reported harvest			Method of take				Successful
year	M	F (%)	Unk.	Trap/snare (%)	Shot	(L&S)	Unk.	Total trappers
1986/87	100	76 (41)	8	162 (88)	21	--	1	21
1987/88	117	64 (34)	12	174 (89)	22	--	0	18
1988/89	34	29 (39)	11	60 (81)	14	--	0	16
1989/90	22	11 (30)	4	32 (86)	5	--	0	9
1990/91	28	24 (41)	7	41 (69)	1	--	17	9

Table 3. Unit 6 wolverine harvest, 1986-91.

Regulatory	Reported harvest			Method of take				Successful
year	M	F (%)	Unk.	Trap/snare (%)	Shot	(L&S)	Unk.	Total trappers/hunters
1986/87	9	6 (38)	1	13 (81)	3	--	0	13
1987/88	6	1 (14)	0	7 (100)	0	--	0	4
1988/89	5	5 (45)	1	10 (91)	1	--	0	7
1989/90	6	2 (25)	0	7 (88)	1	--	0	6
1990/91	6	4 (40)	0	9 (90)	1	--	0	5

Table 4. Unit 6 beaver harvest chronology percent by time period, 1986-90.

Regulatory	Harvest periods			
year	February	March	April	n
1986/87	62	32	5	93
1987/88	50	50	0	30
1988/89	100	0	0	2
1989/90[a]	35	55	0	20
1990/91[b]	67	21	0	66

[a] 10% harvested in January.

[b] 6% unknown and 6% harvested in July.

Table 5. Unit 6 land otter harvest chronology percent by time period, 1986-91.

Regulatory	Harvest periods							
year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	n
1986/87	--	--	0	41	43	10	6	184
1987/88	--	--	0	59	23	15	2	196
1988/89[a]	--	--	30	18	32	4	0	74
1989/90	19	29	3	8	19	19	3	37
1990/91[b]	3	15	17	22	10	10	3	59

[a] 16% unknown.
[b] 19% unknown.

Table 6. Unit 6 wolverine harvest chronology percent by time period, 1986-91.

Regulatory	Harvest periods						
year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	n
1986/87	0	6	25	6	31	31	16
1987/88	0	0	57	43	0	0	7
1988/89	0	9	45	36	9	0	11
1989/90	13	0	13	63	13	0	8
1990/91	0	0	30	10	50	10	10

Table 7. Unit 6 beaver harvest percent by transport method, 1986-91.

	Percent of harvest								
Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3-or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	0	0	27	12	0	0	57	4	93
1987/88	7	0	17	0	7	0	70	0	30
1988/89	0	0	100	0	0	0	0	0	2
1989/90	0	10	0	0	0	0	90	0	20
1990/91	0	0	0	0	2	0	65	33	66

Table 8. Unit 6 land otter harvest percent by transport method, 1986-90.

	Percent of harvest								
Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3-or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	0	8	80	5	0	0	5	1	184
1987/88	6	7	85	2	0	0	1	1	196
1988/89	7	15	61	0	0	0	2	16	74
1989/90	0	5	27	0	16	0	35	16	37
1990/91	0	7	44	0	0	0	24	25	59

Table 9. Unit 6 wolverine harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3-or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	6	6	19	25	25	6	13	0	16
1987/88	0	14	43	43	0	0	0	0	7
1988/89	0	9	9	0	55	0	27	0	11
1989/90	13	0	13	0	75	0	0	0	8
1990/91	10	10	0	0	60	0	20	0	10

LOCATION

Game Management Units: 7 and 15 (8,397 mi^2)

Geographical Description: Kenai Mountains

BACKGROUND

Beavers, land otters, wolverines, lynx, coyotes, red foxes, marten, mink, muskrats, and weasels are found throughout the Kenai Peninsula at varying densities depending upon habitat quality or prey abundance. Information about furbearers on the Kenai Peninsula is imprecise for most species. Historically, trapping has been an important part of residents' culture and economy on the Kenai Peninsula. Over the past two decades trapping has evolved into a recreational activity with few dedicated trappers remaining because of increased restrictions and reductions in pelt prices.

Beavers are common in suitable habitat on the Kenai Peninsula. Land otters are also fairly common in drainages that support anadromous fish, streams connected to lakes, and in sheltered coastal waters such as the south shore of Kachemak Bay. The population dynamics of these two species in Units 7 and 15 are poorly understood.

Wolverines are commonly found in the Kenai Mountains, including the southern and eastern peninsula coastal areas, the Caribou Hills, and the hilly terrain at the headwaters of Deep Creek and the Anchor River. 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, harvest records suggest a wider distribution during the late 1960s and early 1970s when moose densities were high and wolf densities were low.

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

Coyotes are widely distributed and abundant. Red foxes were abundant before 1930 according to Kenai residents, however, they disappeared as coyotes became established and increased during the 1930s. Subunit 15C supports a small remnant red fox population with an occasional observation reported from other areas of the Kenai Peninsula.

Marten are moderately abundant in Unit 7 but are rare in Unit 15. Marten have never been common in Unit 15 and are probably limited in distribution and numbers by habitat suitability. Mink, muskrats, and weasels are well distributed throughout Units 7 and 15.

Although pelt values are generally low, these species are important furbearers for recreational and young trappers.

MANAGEMENT DIRECTION

Management Goals

The management goals for the Kenai Peninsula are to: 1) maintain furbearer trapping seasons and bag limits consistent with population levels during periods of pelt primeness; 2) maintain furbearer hunting seasons and bag limits consistent with population levels, but not necessarily limited to periods of pelt primeness; and, 3) obtain sufficient data to develop measurable population objectives.

Management Objectives

Units 7 and 15 furbearer management objectives are to: 1) maintain beaver populations capable of sustaining an average annual harvest of 150 animals through 1995; 2) maintain otter populations capable of sustaining an annual harvest of 35 otters through 1995; 3) maintain wolverine populations capable of sustaining an annual harvest of 20 animals through 1995; 4) maintain lynx populations capable of sustaining a harvest commensurate with the current population size, reproductive status, and trend (hunting and trapping seasons will be allowed only during years of lynx abundance); and 5) maintain a marten population capable of sustaining an annual harvest of 35 marten through 1995.

METHODS

Harvests were monitored through a mandatory sealing program for lynx, land otters, wolverines, beavers, and marten and reports from local trappers. We monitored lynx population status and trend periodically using a track count census technique in Subunit 15A. Fur acquisition reports provided additional harvest data for those species not requiring sealing.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Surveys have not been conducted to document the status and trend of furbearers in Units 7 and 15, except monitoring of lynx by the U.S. Fish and Wildlife Service (USFWS). Preliminary results from their study indicated lynx numbers were recovering from a cyclic low period from 1987 to 1991.

Lynx populations on the Kenai increased noticeably during the early 1980s in response to an abundance of hares. The density in Subunits 15A and 15B appeared to peak in either 1985 or 1986 compared to a 1987 peak in Subunit 15C according to harvests and reports from experienced trappers.

Incidental field observations and trapper reports indicate some of the status of furbearers in Units 7 and 15. Beavers were common in suitable habitat. The trend in nuisance beaver complaints indicated beaver populations in Subunit 15C peaked around 1984 and have remained relatively stable since. Marten were moderately abundant in Unit 7. Observations of land otter sign and harvest information indicated otters were fairly common and coyotes were abundant. Muskrats remained scarce in both units during this report period and it appeared that mid-winter flooding of lakes and rivers led to poor muskrat survival.

Mortality

Harvest:

Season and Bag Limit. Beaver trapping season was open from 1 February to 31 March in Units 7 and 15. The bag limit was 20 beaver per person.

The trapping seasons for coyotes and red foxes were open from 10 November to 28 February in Units 7 and 15. The bag limit for foxes was 1 and there was no limit on coyotes. The hunting season for coyotes was 1 September to 30 April and the bag limit was 1. There was no open hunting season for red foxes in Units 7 and 15.

The trapping season for wolverines was from 10 November to 28 February in Unit 7, Subunits 15B and 15C. The take was not limited. Subunit 15A was closed to trapping wolverine beginning in 1987. The hunting season for wolverines was from 1 September to 1 January and the bag limit was 1 animal.

The lynx season was closed during this report period. Mink and weasel seasons were open from 10 November to 31 January in Units 7 and 15 with no bag limit. Marten season in that portion of Subunit 15B east of the Kenai River, Skilak Lake, Skilak River, and Skilak Glacier was closed. The remainder of Units 15 and Unit 7 was open from 10 November to 31 January with no bag limit. Muskrat season was open from 10 November to 15 May for Units 7 and 15, with no bag limit. Land otter season was open from 10 November to 31 January in Subunits 15A and 15B and from 10 November to 28 February in Subunits 15C and Unit 7. There was no bag limit on land otters.

Board of Game Actions and Emergency Orders. The Board of Game did not take any actions affecting furbearers during this report period. However, board action during fall 1987 resulted in significant season reductions for trapping several furbearers in Units 7 and 15. These changes were initiated by joint proposals presented to the board by ADF&G and USFWS. The impetus for reducing seasons on coyotes, wolverines, and otters was to protect wolves. Since these furbearers were commonly caught in sets made for wolves all furbearers were treated equally when seasons were reduced.

In 1987, the USFWS also implemented a new permit requirement to trap on the Kenai National Wildlife Refuge. The requirement reduced the time interval between trap checks from 7 to 4 days on a portion of the refuge. The focus of this permit requirement was to reduce the number of days between trap checks in more remote portions of the Refuge. The reduction in season length by board action and the new trap check policy imposed by the USFWS reduced catch and trapper opportunity unnecessarily.

<u>Hunter/Trapper Harvest</u>. Since 1986-87, the annual beaver harvest exceeded 200 only 1 year and averaged 124 (range = 51-214) according to sealing certificates (Table 1). Harvest steadily declined from 1986 to 1988 then increased the next 2 years, primarily because of changes in trapping effort. The order of magnitude of harvest by subunits and unit during the past 5 years has been: 7 > 15C > 15A > 15B (Table 2). Kits represented 25% of the 5-year mean harvest, ranging from 13% to 30% (Table 1). Historically, Subunit 15A produced the highest harvest, however, with increased restrictions on trapping within the Kenai National Wildlife Refuge portions of Subunit 15A trapping effort has shifted to Unit 7. Recreational trappers were responsible for most beavers harvested; few trappers took more than 10 beavers annually.

Marten required mandatory sealing during the 1988-89 trapping season. All marten reported from the Kenai Peninsula were trapped in Unit 7 with an annual average harvest of 39 (range = 22-57). The total harvest averaged 67% males (Table 3). The suspected reason for an absence of harvest in Unit 15 was unsuitable climatic conditions. Marten apparently were better suited to mountainous habitat with consistent weather patterns and deep snow found in Unit 7. Unit 15 commonly has inconsistent weather with frequent periods of rain during mid-winter.

Otter harvests have varied little in recent years with the exception of 1988-89 and 1989-90 (Table 4). The mean annual, 5-year harvest was 35 otters (range = 20-43). Males have consistently outnumbered females; the mean 5-year percentage of males in the harvest was 61%.

In the past 5 years, the reported wolverine harvest has been relatively stable (Table 5) with a mean annual harvest of 22 wolverines (range = 19-26). Males have consistently predominated in the harvests; the mean, 5-year sex ratio was 2:1.

The reported harvest of 75 lynx (including 5 nonsport) in 1986-87 was the largest on record since mandatory sealing began in 1977. Since trapping was closed in 1987 and hunters did not take any lynx during 1-30 November 1987, the reported harvest over the past 4 years has been incidental (Table 6). The incidental take has averaged 4 animals per year with a range of 1 to 8.

<u>Harvest Chronology</u>. Tables 7-11 show the chronology for reported harvest by percent for beavers, marten, otters, wolverines, and lynx. General analyses show most trapping success occurs early to mid-season with the exception of wolverine trapping. Since

wolverines are often found in remote, mountainous areas where access is difficult, they are not readily available to trappers until late in the season when driven out of the mountains by deep snow. Most wolverines were caught in February.

Transport Methods. Tables 12 through 15 show harvest percent by transport method for beavers, otters, wolverines, and lynx. Reporting transport method used to harvest marten is not required. Since several (dogsled, skis, and snowshoes) transport types are listed under one category the reported transport method used is misleading. Trappers in Units 7 and 15 use a highway vehicle to access their trapline then travel along their trapline using either snowshoes or a snowmachine. Aircraft and dog teams are used by less than 10% of the trappers. Trappers using these transport methods, however, are generally more successful when compared to trappers using less efficient transport methods.

CONCLUSIONS AND RECOMMENDATIONS

Current harvest levels for beaver do not seem excessive and beaver populations are probably being underutilized in portions of the peninsula, particularly Subunit 15C. Trapping effort appears to have declined sharply during 1988-89 because of increased regulations and low pelt value. We recommend establishing beaver cache surveys along several representative drainages to monitor population trends and determine whether additional harvesting is warranted.

Since harvests of marten have been documented through mandatory sealing for only 3 years, trends in harvests are unavailable. However, it was interesting to note no harvest was reported from Unit 15, suggesting marten are perhaps rare in this unit. Historical records suggesting marten were trapped in Unit 15 are rare, and controversial as to the authenticity of the records. This supports the theory that Unit 15 is poor marten habitat compared to Unit 7. The harvest in Unit 7 was well distributed, however, trapping was generally near a road system because of the unit's remoteness.

Land otter harvests declined sharply in 1988-89 compared to the previous 2 years. A reduced season length in 1988-89 and overall reduced trapping efforts was believed the cause of reduced harvest. Reports from trappers and staff observation suggested land otters were as abundant during 1988-89 as the previous 2 years. The 1990-1991 land otter harvest of 43 was the highest over the past 5 years.

Wolverine harvests remained relatively stable the past 5 years with males making up most of the harvest in all years except 1989-90 when one trapper reported a catch of 11 wolverines comprised of three males and eight females. Consistent harvests can be attributed to several factors as reported by local trappers: 1) deep snow allowing for better snowmobile travel, and 2) wolverines occurring at lower elevations during winters with deep snow, making them more vulnerable to trapping. The average male to female ratio remained high (2.1:1.0), however, the overall impact to the wolverine population was minimal during the past 5 years.

Lynx management on the Kenai Peninsula, particularly on the Kenai National Wildlife Refuge, has been controversial in recent years. USFWS staff believed lynx have been overexploited on the refuge during the last decade, especially in accessible areas (Bailey *et al.* 1986). ADF&G believed trapping effort on the peninsula, during periods when lynx populations were high, has not exceeded sustained yield levels; however, as lynx numbers declined and enter the low population cycle, season reductions and trapping closures were advised to maintain optimum lynx numbers before entering the population rebuilding phase. Interagency and public discussions of lynx management on the Kenai Peninsula have resulted in a number of decisions by the ADF&G and Board of Game. Lynx season was closed in Subunit 15A (1984-85 to present), shortened in Unit 7 and Subunits 15B and 15C, and subsequently closed in these areas.

During a lynx population decline in Alberta, Brand and Keith (1979) suggested that trapping mortality added to natural mortality. Using computer modeling, they showed more lynx would be produced and greater long-term harvest achieved when trapping was curtailed for 3-4 years starting with the second year after the peak in lynx harvest. This harvest strategy was 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. We recommend a hunting and trapping closure for the 1992-93 season.

LITERATURE CITED

Bailey, T., E. Bangs, M. Portner, J. Malloy, and R. McAvenchey. 1986. An apparent over exploited lynx population on the Kenai Peninsula, Alaska. J Wildl. Manage. 50(2):279-290.

Brand, C. and L. Keith. 1979. Lynx demography during a snowshoe hare decline in Alberta. J. Wildl. Manage. 43(4):827-849.

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Table 1. Units 7 and 15 beaver harvest, 1986-1991.

Regulatory	Reported harvest			Method of take			Successful
year[a]	Kits (%)	Adults (%)	Total[a]	Trap (%)	Snare (%)	Unk.	trappers
1986/87	23 (13)	158 (87)	214	187 (89)	20 (10)	3 (1)	38
1987/88	39 (30)	91 (70)	130	95 (81)	22 (19)	0 (-)	22
1988/89	13 (26)	38 (74)	51	47 (92)	4 (8)	0 (-)	15
1989/90	27 (29)	65 (71)	94	72 (77)	15 (16)	7 (7)	18
1990/91	30 (26)	86 (74)	134	112 (84)	18 (13)	4 (3)	25

[a] Includes beavers of unknown age.

Table 2. Summary of annual beaver harvests on the Kenai Peninsula by game management unit, 1986-91.

Regulatory	Game Management Units					
year	7	15A	15B	15C	All 15	Total
1986/87	79	48	12[a]	75	135	214
1987/88	49	45	8	25	78	127
1988/89	10	14	6[b]	21	41	51
1989/90	65	3	9	17	29	94
1990/91[c]	69	36	5	24	65	134
Total	272	146	40	162	348	620
x	54	29	8	32	70	124

[a] Two non-sport harvests included.
[b] First year of restrictions on KNWR, i.e. one trap allowed per lodge.
[c] From furbearer sealing report summary.

Table 3. Units 7 and 15 marten harvest, 1986-91.

Regulatory year	Reported Harvest				Method of Take		Successful trappers
	Males (%)	Females (%)	Unk.	Total	Trap/Snare (%)	Shot	
1986/87[a]	--	--	--	--	--	--	--
1987/88[a]	--	--	--	--	--	--	
1988/89	26 (68)	12 (32)	0	38	38 (100)	0 (--)	9
1989/90	14 (64)	8 (36)	0	22	22 (100)	0 (--)	5
1990/91	38 (67)	19 (33)	0	57	57 (100)	0 (--)	8

[a] Mandatory sealing starting 1988/89.

Table 4. Units 7 and 15 land otter harvest, 1986-91.

Regulatory year	Reported Harvest				Method of Take				Successful trappers
	Males (%)	Females (%)	Unk.	Total	Trap (%)	Snare (%)	Shot	Unk.	
1986/87	26 (65)	14 (35)	2	42	33 (87)	2 (5)	1 (3)	2 (5)	16
1987/88	21 (53)	19 (47)	2	42	24 (77)	2 (7)	5 (16)	0 (-)	20
1988/89	14 (78)	4 (22)	2	20	18 (90)	0 (-)	2 (10)	0 (-)	10
1989/90	17 (61)	11 (39)	0	28	27 (96)	1 (4)	0 (-)	0 (-)	14
1990/91	18 (60)	12 (40)	13	43	41 (95)	1 (2)	1 (2)	0 (-)	17

Table 5. Units 7 and 15 wolverine harvest, 1986-91.

Regulatory	Reported Harvest				Method of Take				Successful
year	Males (%)	Females (%)	Unk.	Total	Trap (%)	Snare (%)	Shot	Unk.	trappers
1986/87	16 (76)	5 (24)	0	21	15 (71)	3 (14)	3 (14)	0	12
1987/88	17 (77)	5 (23)	0	22	16 (84)	2 (11)	1 (5)	0	13
1988/89	16 (73)	6 (27)	4	26	20 (77)	4 (15)	2 (8)	0 (-)	15
1989/90	9 (47)	10 (53)	0	19	16 (84)	0 (--)	3 (16)	0 (-)	9
1990/91	13 (62)	8 (38)	0	21	15 (71)	0 (--)	5 (24)	1 (5)	13

Table 6. Units 7 and 15 lynx harvest, 1986-91.

Regulatory	Reported harvest						Method of take			Successful
year	M (%)	F (%)	Unk.	Juv.[b](%)	Adults(%)	Total	Trap/Snare(%)	Shot(%)	Unk.(%)	trappers
1986/87	36 (50)	36 (50)	3	15 (21)	57 (79)	75	74 (98)	1 (1)	0 (--)	30
1987/88[a]	7 (87)	1 (13)	0	1 (13)	7 (87)	8	1 (17)	3 (50)	2 (34)	0
1988/89[a]	0	3(100)	0	2 (40)	3 (60)	5	1 (20)	2 (40)	2 (40)	0
1989/90[a]	0	2(100)	1	0	2(100)	3	1 (33)	2 (67)	0 (--)	0
1990/91[a]	0	1(100)	0	0	1(100)	1	0 (--)	0 (--)	1(100)	0

[a] Trapping closed, hunting Nov. 1-30, 1987 only, all incidental mortalities including USFWS tagging mortalities, incidental catches, DLP and road kills.

Table 7. Units 7 and 15 beaver harvest chronology percent by month, 1986-91.

Regulatory year	Month						n
	November	December	January	February	March	Unknown	
1986/87	--	--	--	54	40	6	211
1987/88	--	--	--	55	40	5	132
1988/89	--	--	--	65	33	2	51
1989/90	--	--	--	54	36	10	94
1990/91	--	--	--	78	22	0	134

Table 8. Units 7 and 15 marten harvest chronology percent by month, 1986-91.

Regulatory year	Month						n
	November	December	January	February	March	Unknown	
1986/87	--	--	--	--	--	--	--
1987/88	--	--	--	--	--	--	--
1988/89	21	53	13	0	0	13	38
1989/90	55	32	14	0	0	0	22
1990/91	30	37	33	0	0	0	57

[a] Sealing required in 1988-89.

Table 9. Units 7 and 15 land otter harvest chronology percent by month, 1986-91.

Regulatory year	November	December	January	February	March	Unknown	n
1986/87	8	5	42	37	8	0	38
1987/88	3	19	25	34	19	0	32
1988/89	15	45	25	10	5	0	20
1989/90	7	25	43	18	4	4	28
1990/91	16	47	19	19	0	0	43

Table 10. Units 7 and 15 wolverine harvest chronology percent by month, 1986-91.

Regulatory year	November	December	January	February	March	Unknown	n
1986/87	0	14	14	48	19	5	21
1987/88	5	11	26	53	5	0	19
1988/89	8	39	23	23	0	8	26
1989/90	16	21	16	32	0	16	19
1990/91	0	14	10	52	10	14	21

Table 11. Units 7 and 15 lynx harvest chronology percent by month, 1986-91.

Regulatory year	Month: November	December	January	February	March	Unknown	n
1986/87	1	40	53	1	3	1	75
1987/88[a]	13	0	0	38	0	50	8
1988/89	0	0	20	60	0	20	5
1989/90	0	0	33	33	0	33	3
1990/91	0	0	0	0	0	100	1

[a] Trapping closed, hunting allowed.

Table 12. Units 7 and 15 beaver harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest: Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk.	n
1986/87	1	24	4	6	20	0	36	9	211
1987/88	22	41	0	3	18	0	15	0	117
1988/89	22	39	0	2	26	0	0	12	51
1989/90	0	10	3	0	28	0	11	49	94
1990/91	0	30	0	0	19	0	43	9	134

Table 13. Units 7 and 15 land otter harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk.	n
1986/87	3	34	5	5	3	0	21	29	38
1987/88	10	52	0	0	19	7	13	--	31
1988/89	--	55	10	--	--	--	5	30	20
1989/90	14	18	7	0	18	0	29	14	28
1990/91	0	49	28	5	7	0	0	12	43

Table 14. Units 7 and 15 wolverine harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk.	n
1986/87	5	43	19	0	29	0	0	5	21
1987/88	11	53	5	--	16	--	16	--	19
1988/89	8	35	15	12	12	0	12	8	26
1989/90	0	0	0	11	63	0	11	16	19
1990/91	5	24	29	0	29	0	5	10	21

Table 15. Units 7 and 15 lynx harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk.	n
1986/87	9	20	3	0	12	0	27	29	75
1987/88	--	--	--	13	0	0	0	87	8
1988/89	--	--	--	--	60	--	--	40	5
1989/90	--	--	--	--	33	--	67	--	3
1990/91	--	--	--	--	--	--	--	100	1

LOCATION

Game Management Unit: 8 (5,097 mi^2)

Geographical Description: Kodiak and Adjacent Islands

BACKGROUND

Indigenous furbearers include red fox, land otter, and short-tailed weasel. Beavers, muskrats, marten, and red squirrels have been successfully introduced by wildlife agencies (Burris and McKnight 1973); a mink introduction was unsuccessful. Raccoons were illegally introduced, but sightings are rare. Both red and arctic foxes escaped or were released from fox farms in the early 1900s. Arctic foxes occur only on Chirikof Island. Red fox, land otter, beaver, and short-tailed weasel are the most abundant furbearers. Marten occur only on Afognak Island. Trappers most commonly pursue red foxes and land otters. Furbearer populations are stable and trapping pressure has declined since the early 1980s. No major changes in regulations occurred during this report period.

MANAGEMENT DIRECTION

Management Objectives

Management objectives for furbearers in Unit 8 are to: develop measurable objectives for all furbearer species; and collect harvest data on river otters and beavers through the mandatory sealing program and statewide trapper questionnaire.

METHODS

We monitored beaver and river otter harvests through a mandatory sealing program. We sent statewide trapper questionnaires to trappers for the 1988-89 through 1990-91 seasons.

RESULTS AND DISCUSSIONS

Population Status and Trend

Population Size: No objective estimates of furbearer populations have been done. Most trappers reported furbearer populations were high during this report period.

Mortality

Harvest:

Season and Bag Limit. Beaver trapping season was open from 10 November to 30 April. The bag limit was 30 beavers per trapper.

The red fox trapping season was open from 10 November to 31 March with no limit on the number of red fox a trapper could legally take. The red fox hunting season was from 1 November to 15 February and the bag limit was 2 foxes.

Marten, weasel, and land otter trapping season was from 10 November to 31 January with no limit on the number of these animals a trapper could catch. The muskrat trapping season was from 10 November to 10 June with no bag limit on muskrats. There was no closed hunting or trapping season on squirrels nor was there a bag limit on squirrels.

Board of Game Actions and Emergency Orders. The Board of Game made two changes in furbearer trapping and hunting regulations in this report period. The open season for beaver trapping was reduced from 10 November - 15 May to 10 November - 30 April; the bag limit of 30 beavers per season became effective in 1988-89. ADF&G supported this regulation primarily to create uniformity in furbearer regulations in southcentral Alaska. The Board of Game prohibited the shooting of red foxes on the same day airborne under both trapping and hunting regulations beginning in 1988-89. The regulation was imposed to enforce prohibitions on taking wolves via aircraft in mainland Alaska.

Hunter/Trapper Harvest. Annual harvest of beavers ranged from 35 to 98 and averaged 71 animals (Table 1). Similar annual fluctuations occurred in land otter harvests, with a peak of 142 otters and an average harvest of 103 otters (Table 2). A declining trend in both beaver and otter harvests, as well as in the number of trappers, was apparent.

Red foxes are the most commonly pursued furbearers in Unit 8, but current methods of monitoring harvest underestimate the take. The 1990-91 fur export permit data accounted for 149 foxes. The average annual harvest by trappers and hunters is estimated at 300 red foxes. Some foxes are home-tanned or dried for wall hangings, we suspect that hides are often shipped without fur export permits.

Harvests of marten, squirrels, weasels, and muskrats were negligible. Occasionally, trappers made sets for marten on Afognak Island, but little trapping effort occurred for the remaining species.

Harvest Chronology. Harvest chronology for beavers and land otters are presented in Tables 3 and 4, respectively. No trends in harvest chronology are apparent.

Transport Methods. Transport methods for beavers and land otters are presented in Tables 5 and 6, respectively. No trends in transport methods are evident.

Other Mortality. Crude oil from the *Exxon Valdez* contaminated many intertidal areas in Unit 8. Both land otters and red foxes were observed with oil-contaminated fur in 1989, but mortality could not be directly attributed to the oil. Dead, heavily oiled seabirds, were abundant in intertidal drift in April and May, and were consumed by red foxes to some extent, but fox mortality from ingesting oil was not verified.

A permit was issued to Nebraska Game, Fish and Parks and a local Kodiak trapper for live trapping otters for a transplant. The trapper shipped 28 otters to Nebraska in 1987 and 2 otters were shipped in 1989. Two otters died before being released.

Habitat

Logging on Afognak Island was the only major land use activity altering furbearer habitat. Clearcut logging of old-growth timber was detrimental to marten populations in southeastern Alaska (Young 1990). Studies of the effects of logging on furbearers have not been conducted in Unit 8.

Nonregulatory Management Problems/Needs

A population trend estimation technique for land otters should be developed. The land otter is the furbearer most susceptible to overexploitation in Unit 8. During the 1980-81 season, the harvest exceeded 400 otters, and in local areas up to 1 otter/mile of coast was harvested. Recent annual harvests have been low, but should fur prices improve, the otter harvest could quickly become a concern.

Beavers caused occasional flooding of roads by plugging culverts. Approximately 1-5 nuisance beavers were removed adjacent to roads in northeastern Kodiak Island annually by trapping and shooting. The Department of Transportation was issued a beaver depredation permit in 1991 to allow them to control nuisance beavers along the highway. A few complaints were received from people concerned that beavers in ponds and reservoirs used for domestic water sources cause giardiasis. A local municipal water quality technician stated that most giardiasis in the Kodiak area has been linked to childcare facilities.

Ground squirrels are a chronic nuisance at the Kodiak State airport, where they undermine runway edges and damage runway lights. The Department of Transportation has a permit to shoot ground squirrels.

Some conflicts between trappers and other recreational users occur where trappers make visible sets near beaches and roadsides. Deer are occasionally caught in fox snares, and

1-2 deer per year are reported dead in snares. Typically, inexperienced trappers are responsible for the snared deer, and better trapper education could alleviate the problem.

CONCLUSION AND RECOMMENDATIONS

Harvests of all furbearer species were low and furbearer populations were high. Less than 25 trappers were active each year, and the average annual harvest of all species was estimated at 500 animals. Land otters were potentially susceptible to overharvest and a population trend estimation technique should be developed for that species.

The bag limit of 30 beavers was unnecessary for conservation purposes because the total harvest has been 75 animals per year. However, the bag limit should not be increased as an eventual increase in trapper demand is anticipated. The annual bag limit of 30 beavers is not justified at the present average total harvest level of < 75 animals per year.

The regulation prohibiting taking red fox on the same-day airborne should be changed. The red fox population is lightly exploited and allowing foxes to be hunted on the same-day airborne would provide additional recreational opportunity. The regulation was intended to facilitate enforcement of regulations limiting the use of aircraft for hunting wolves, however, wolves are not present in Unit 8.

LITERATURE CITED

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

Young, E.L. 1990. Unit 4 furbearer survey-inventory progress report. Pages 26-31 in S.O. Morgan, ed. Annual report of survey-inventory activities. Part XIV. Furbearers Vol. XX. Alaska Dept. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Juneau, 238pp.

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Table 1. Unit 8 beaver harvest 1986-91.

Regulatory	Reported Harvest					Method of Take					Successful
Year	Juv.[a]	%	Adult	%	Total	Trap/Snare	%	Shot	%	Unk.	Trappers
1986-87	25	26	73	74	98	89	97	9	3	3	14
1987-88	20	23	68	77	88	81	94	5	6	2	18
1988-89	10	29	25	71	35	29	97	1	3	5	8
1989-90	16	21	62	79	78	76	99	1	1	1	15
1990-91	21	37	36	63	57	52	91	5	9	0	7

[a] Beavers ≤ 52"

Table 2. Unit 8 land otter harvest 1986-91.

Regulatory	Reported Harvest				Method of Take			Successful
Year	M (%)	F (%)	Unk	Total	Trap/Snare (%)	Shot (%)	Unk.	Trappers
1986-87	62 (56)	49 (44)	0	111	101 (91)	10 (9)	0	20
1987-88	77 (56)	61 (44)	4	142	139 (99)	2 (1)	1	24
1988-89	44 (54)	38 (47)	5	87	82 (100)	0 (0)	5	14
1989-90	49 (56)	39 (44)	6	94	76 (93)	6 (7)	12	21
1990-91	43 (54)	36 (46)	1	80	79 (99)	1 (1)	0	12

Table 3. Unit 8 land otter harvest chronology percent by time period, 1986-91.

	Harvest periods					
Regulatory year	November	December	January	February[a]	No. Unknown	n
1986-87	28	41	32	0	0	111
1987-88	25	50	25	0	0	142
1988-89	48	30	22	0	0	87
1989-90	15	42	43	0	0	94
1990-91	27	38	32	3	6	74

[a] Season closed 31 January

Table 4. Unit 8 beaver harvest chronology percent by time period, 1986-91.

	Harvest periods								
Regulatory year	November	December	January	February	March	April	May	No. Unk.	n
1986-87	15	35	21	27	0	0	2	0	98
1987-88	18	25	20	31	2	2	0	1	87
1988-89	9	12	9	12	24	33	0	2	33
1989-90	18	21	58	0	0	4	0	0	78
1990-91	46	33	9	2	0	11	0	0	57

Table 5. Unit 8 land otter harvest percent by transport method, 1986-91.

	Percent of harvest								
Regulatory year	Foot/ Airplane	Snowshoes	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	No. Unk.	n
1986-87	23	8	50	11	5	0	4	10	101
1987-88	27	11	32	17	0	0	13	17	125
1988-89	23	2	67	9	0	0	0	21	66
1989-90	10	23	43	5	0	0	19	21	73
1990-91	53	21	18	8	0	0	0	4	76

Table 6. Unit 8 beaver harvest percent by transport method, 1986-91.

	Percent of harvest								
Regulatory year	Foot/ Airplane	Snowshoes	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	No. Unk.	n
1986-87	3	35	37	21	0	0	4	0	98
1987-88	41	16	5	28	0	0	15	1	87
1988-89	7	10	31	38	0	0	14	6	29
1989-90	27	34	8	2	0	6	0	0	83
1990-91	26	4	0	61	0	0	9	0	57

LOCATION

Game Management Units: 9 ($45,522\ mi^2$) and 10 ($15,798\ mi^2$)

Geographical Description: Alaska Peninsula, Aleutian and Pribilof Islands

BACKGROUND

Furbearers in this area include beaver, coyote, red fox, arctic fox, lynx, marten, mink, muskrat, land otter and wolverine. All species except arctic fox are found on at least part of the mainland of Unit 9. There are fewer furbearer species on islands in both units. On some islands furbearers are present because of past introductions for fur farming or from efforts to establish harvestable wild populations.

Beavers are found on the mainland Alaska Peninsula north of Port Moller. The most productive beaver habitat has a dependable water supply with little fluctuation in stream flow and is adjacent to abundant and easily accessible willow, aspen, cottonwood, or birch vegetation. Beavers are found from sea level to elevations of 2,000 feet.

Coyotes apparently first arrived in Alaska about 1915 and rapidly expanded their range. Coyotes are restricted to the mainland of Unit 9. Relatively few are trapped, usually incidentally to fox, lynx, or wolf. A few coyotes are killed by sport hunters.

Red foxes occur on the mainland Alaska Peninsula, on some offshore Alaska Peninsula islands, and on larger islands of the eastern Aleutians. Red fox introductions to the Aleutians and Alaska Peninsula islands began during Russian occupancy and continued through 1932. Some earlier red fox introductions succeeded but foxes were later exterminated to facilitate introducing arctic foxes. Rabies, mange, and distemper epidemics occur periodically in fox populations, resulting in widespread mortality.

Arctic foxes occur in a narrow band along the marine coast, on open tundra, and on sea ice many miles from shore. Their natural distribution extends to the northwest shore of Bristol Bay. Blue color-phase arctic foxes were introduced during the Russian period. Arctic foxes are noted for their wide fluctuations in population levels with periodic peaks approximately every four years. Their population densities are linked to cyclic fluctuations in small rodent populations. Foxes also patrol beaches in search of carrion. Foxes are an efficient predator of nesting birds and the USFWS is attempting to eliminate them from many of the islands.

Lynx occur on the mainland of the Alaska Peninsula north of Port Heiden. Primarily a boreal species, when prey are scarce lynx venture onto the tundra in search of Arctic hares, lemmings and ptarmigan. The lynx-hare cycle is well known, and population highs can sometimes be predicted every 8 to 10 years. However, Unit 9 is on the fringe of the range for both lynx and snowshoe hare and the fluctuations for both species are less consistent than elsewhere in Alaska.

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

Mink are found on the mainland 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 Alaska Peninsula, some adjacent islands east of the Alaska Peninsula, and Unimak Island. Otter populations are relatively stable, with coastal areas providing abundant marine food. Parasites and disease are not normally important mortality factors. Spring flooding also occasionally drowns young otters in dens.

Wolverines live on the mainland Alaska Peninsula and Unimak Island. Compared to other furbearers, wolverines never attain high densities, partially because of their large territorial requirements and low reproductive rate.

MANAGEMENT DIRECTION

Management Objective

Management objectives for furbearers in Units 9 and 10 have not been developed.

METHODS

We assessed population trends indirectly by monitoring harvests of sealed species, and by obtaining information from trappers on trapper questionnaires. Field work for surveying furbearers was not funded this report period. Field observations of furbearers were from incidental observations during moose, caribou, and brown bear surveys.

Recorded annual furbearer harvests came from furbearer sealing certificates and the combined total of fur trapper export plus dealer acquisition reports. Since furs kept for personal use were sometimes not reported, actual harvest exceeded those obtained from these sources. Pelt sealing provided the most accurate and complete data. We sealed four species (beaver, lynx, otter, and wolverine). Because of their high commercial value, the number of lynx sealed were thought to be very close to the actual number harvested.

The harvest of unsealed furbearers (coyote, red fox, arctic fox, marten, mink, and muskrat) could not be estimated with any confidence. However, trapper questionnaires and other incidental information provided a rough, qualitative index to trends in populations of both unsealed furbearers and key prey species.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Tables 1 and 2 include information on furbearer abundance and trends derived from the trapper questionnaire.

Beaver - Beaver cache surveys have not been conducted since 1987. General observations during other survey flights, comments from trappers, and complaints from the public indicated beaver populations remained high north of Subunit 9D. Trappers believed abundance was high through 1989-90 and 1990-91 season and that the population was increasing slightly.

Coyote - Trappers believed coyote abundance was low during the 1989-90 trapping season but increased slightly during 1990-91 trapping season.

Red Fox - Trappers reported the red fox population was stable at moderate densities in 1989-90 and increased in the 1990-91 trapping season. There have not been any reports of rabies since the last outbreak reported in Subunit 9D during winter 1989-90.

Lynx - Trappers believed lynx abundance was low during 1989-90 and 1990-91 but increased slightly during the latter period. Trappers reported that snowshoe hare abundance was moderate to high during the 1989-90 and 1990-91 trapping seasons. Trappers reported stable to slightly increasing snowshoe hare population trends this report period. This information suggested lynx populations may increase in the near future.

Marten - Trappers rated marten abundance as low during the 1989—90 and 1990-91 trapping season. There was no clear trend in abundance ratings between years.

Mink - Mink abundance was reported as moderate. The 1989-90 abundance was rated as less than 1988-89. Trappers felt the mink population trend was stable during the 1990-91 season.

Muskrat - Trappers believed muskrat abundance was low but stable during the 1989-90 and 1990-91 trapping seasons.

Otter - Otter abundance was moderate to high during the 1989-90 and 1990-91 trapping seasons with similar densities during the two years.

Wolverine - Trapper survey information reported wolverine abundance as low to moderate during both the 1989-90 and 1990-91 trapping seasons. Densities were reported as stable in Unit 9.

Mortality

Harvest:

Season and Bag Limits. Beaver trapping season in Unit 9 was 1 January to 31 March. The bag limit was 40 beavers per trapper. Unit 10 was not open for beaver trapping.

The coyote trapping season in Units 9 and 10 was 10 November to 31 March with no trapping bag limit. The coyote hunting season was from 1 September to 1 April and the bag limit was 2 coyote per season.

The red fox and arctic fox trapping season was open from 10 November to 28 February and with no bag limits. The red fox hunting season was from 1 November to 15 February and the bag limit was 2 foxes. The arctic fox hunting season in Unit 9 was open from 1 December to 15 March and in Unit 10 there was not a closed season. There was no bag limit in either unit.

The lynx and marten trapping season in Unit 9 were 10 November to 28 February with no trapping bag limits. The lynx hunting season in Units 9 and 10 was from 1 November to 31 March and the bag limit was two per person. Unit 10 was not open for lynx or marten trapping or hunting.

The mink trapping season was 10 November to 28 February in Units 9 and 10 with no bag limit. The muskrat trapping season in Units 9 and 10 was 10 November to 10 June with no bag limit. The otter trapping season was from 10 November to 31 March with no bag limit.

The trapping season for wolverines in Units 9 and 10 was from 10 November to 28 February. Trappers had no bag limit for wolverines. The hunting season for wolverines was from 1 September to 31 March with a bag limit of 1 wolverine per hunter.

Board of Game Actions and Emergency Orders. The Board of Game made regulation changes for trapping in 1988 which were effective for the 1989-90 season. These changes involved season lengths and provided continuity in regulations for southwest Alaska. These changes did not effect harvest levels. Since then the board has not considered furbearer proposals. No emergency orders were issued for trapping in Units 9 or 10 during this report period.

Hunter/Trapper Harvest. We sealed 257 beavers in Unit 9 in 1989-90 and 211 animals were sealed the following year (Table 3). This may represent a stable harvest after the significant drop from 865 beavers taken in 1987-88 to 239 taken in 1988-89.

Harvest data from export and acquisition summaries indicated 4 coyotes harvested in Unit 9 during 1990-91. There were no reports of animals being taken in the unit in 1989-90 and there were no reports of coyotes being taken in Unit 10 either year.

There were no reliable estimates of the red fox harvest from Unit 9. The totals of 27 (1989-90) and 138 (1990-91) red foxes reported taken in Unit 9 and 2 (1990-91) taken in Unit 10 were completely inaccurate. The increase in harvest from 1989-90 to 1990-91 was from miscoding by a fur dealer. The actual harvest of red foxes in Unit 9 was probably well over 300 per year. Trappers sent most of these furs out for tanning and sold them locally. If the use of export permits was more strictly enforced, more accurate harvest numbers would be available. The only arctic foxes reported taken during the report period were 14 blue-phase foxes taken in Unit 10 during 1990-91.

The 1989-90 harvests of 10 lynx in Subunit 9B and 2 in Subunit 9E were similar to previous harvests (Table 4). In 1990-91 the harvest changed slightly. Subunit 9A had its first known harvest of lynx in 14 years. The first lynx in 4 years was sealed in Subunit 9C, and the Subunit 9B harvest was similar to preceding years (Table 4).

There was little harvest information for marten, mink, and muskrats. Trappers reported taking 4 marten in 1989-90 and 134 in 1990-91 in Unit 9. In Unit 9, trappers reported taking 9 mink in 1989-90 and 54 in 1990-91. These increases in the marten and mink harvests were in error because of improper coding of fur acquisition reports by fur dealers. There were no reports of muskrats taken during this report period.

We sealed 80 otters in Unit 9 during 1989-90, and 83 otters were sealed the following year. The lower harvests these two years, compared to the previous 12-year average of 144 otters, (Table 5) were probably because of lower fur prices.

We sealed 76 wolverines in Unit 9 during 1989-90 and 70 were sealed the following year, representing a typical harvest over the past 14 years (average = 64) (Table 6). No wolverines have been reported harvested from Unit 10 since 1980.

Permit Hunts. No special permits for trapping nuisance beavers were issued in Unit 9 during this report period.

Trapper Residency and Success. Data on trapper residency and success have not been specifically analyzed. Virtually all furbearers trapped in Unit 9 were taken by local residents from villages within the unit. A few trappers from outside the area have flown into Subunits 9A and 9B to trap.

Harvest Chronology. The harvest chronology should be viewed cautiously because trappers do not always keep close track of their harvest. Beaver harvest was low in January, peaked in February, and decreased to moderate levels in March (Table 7).

Lynx were harvested at low levels throughout the season with a peak in February (Table 8). Land otters were caught throughout the season with most of the harvest occurring during beaver season as lynx were often caught incidentally in beaver sets (Table 9). Wolverine harvest was low in October and November, increased in December, peaked in January and February, and decreased in March (Table 10).

Transport Methods. Snowmachines were the most common means of access for beaver, lynx, otter, and wolverine trappers. ATVs were also an important means of access in parts of Unit 9 with unreliable or insufficient snowfall (Tables 11, 12, 13, and 14).

Other Mortality: A rabies outbreak was confirmed in Subunit 9D during winter 1989-90. This was a substantial and widespread epizootic and probably affected 75% of the red fox population. The red fox population then rebounded that summer with many large litters of pups. No other species in Subunit 9D were confirmed to be affected by the outbreak. No other cases of significant natural mortality were documented for this report period.

Habitat

No formal habitat assessment programs were conducted in Unit 9. Human-induced habitat enhancement was not necessary or practical in this relatively inaccessible area.

CONCLUSIONS AND RECOMMENDATIONS

Furbearer harvests in Units 9 and 10 appeared low; even though information on population sizes was lacking, harvests of furbearers appeared below sustainable yield.

Harvest information was sufficient for management purposes for all furbearers requiring sealing in Unit 9. Harvest information for unsealed species, based on export and acquisition reports, was incomplete and potentially biased. This was because of inaccurate coding by furbuyers and a lack of enforcement of fur export regulations.

Reports from trappers through both personal contact and trapper questionnaires provided a useful relative index to abundance and trend, but the number of responses per subunit were generally inadequate to detect local trends. A greater effort should be made to increase circulation and inform trappers that it was in their best interest to return questionnaires promptly and filled-out accurately.

We lacked adequate field observations to augment harvest data and trapper questionnaires, and to evaluate population sizes and trends. For many species, methods for obtaining this information have not been addressed and funding was inadequate to conduct surveys. Monitoring trends in lynx and wolverine populations by field surveys should be standardized, funded, and implemented in areas where management concerns were greatest. No progress in developing management objectives has been made.

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Table 1. Unit 9 furbearer and small game population abundance and trend indices based on Trapper Questionnaire.

	Abundance in 1989-90				Compared with 1988-89			
Species	Low	Moderate	High	Index[a]	Fewer	Same	More	Index[b]
Beaver	1	3	8	7.9	1	7	4	6.0
Coyote	5	1	0	1.6	1	3	1	5.0
Red Fox	0	6	7	7.2	6	6	2	3.9
Lynx	4	2	1	3.3	3	2	1	3.7
Marten	2	0	0	1.0	0	1	1	7.0
Mink	2	7	2	5.0	4	5	1	3.8
Muskrat	3	2	0	2.6	0	4	0	5.0
Otter	1	8	3	5.7	2	7	2	5.0
Wolverine	5	4	2	3.9	3	6	4	5.3
Wolf	4	4	0	3.0	2	6	0	4.0
Snowshoe hare	0	5	5	7.0	3	3	4	5.4
Red Squirrel	2	1	1	4.0	0	2	1	6.3
Mice/rodents	2	3	3	5.5	5	7	0	3.3
Grouse	2	4	2	5.0	2	6	1	4.6
Ptarmigan	1	4	6	6.8	1	5	5	6.5

[a] Index was calculated from the number of answers to each question; not all cooperators answered every question. Low values indicate scarcity; high values indicate that a species is common.

[b] Index values range from 1.0 through 9.0 and were derived by assigning an arbitrary value of 9.0, 5.0, and 1.0 to each "High" (More), "Moderate" (Same), and "Low" (Fewer) answer, respectively. The total value of the answers for each species was divided by the number of answers to that question. Low values indicate that a species was less abundant than the previous year; high values indicate that a species was more abundant than during the previous year.

Table 2. Furbearer and small game population abundance and trend indices based on Unit 9 Trapper Questionnaire.

	Abundance in 1989-90				Compared with 1988-89			
Species	Low	Moderate	High	Index[a]	Fewer	Same	More	Index[b]
Beaver	1	6	11	7.2	2	9	7	6.1
Coyote	5	6	0	3.2	2	5	5	6.0
Red Fox	1	8	12	7.1	3	10	5	5.4
Lynx	10	3	0	1.9	0	7	4	6.5
Marten	3	3	0	3.0	1	5	0	4.3
Mink	0	10	7	6.6	1	17	0	4.8
Muskrat	3	4	1	4.0	0	5	3	5.3
Otter	1	13	4	5.7	3	13	1	4.5
Wolverine	13	28	2	3.9	8	34	2	4.5
Wolf	8	9	0	3.2	3	10	4	5.2
Snowshoe hare	6	8	4	4.6	0	10	4	6.1
Red Squirrel	0	3	3	7.1	0	6	1	5.6
Mice/rodents	1	8	6	6.3	1	10	3	5.6
Grouse	7	4	2	2.7	1	10	0	4.6
Ptarmigan	0	8	8	7.0	0	8	8	7.0

[a] Index was calculated from the number of answers to each question; not all cooperators answered every question. Low values indicate scarcity; high values indicate that a species is common.

[b] Index values range from 1.0 through 9.0 and were derived by assigning an arbitrary value of 9.0, 5.0, and 1.0 to each "High" (More), "Moderate" (Same), and "Low" (Fewer) answer, respectively. The total value of the answers for each species was divided by the number of answers to that question. Low values indicate that a species was less abundant than the previous year; high values indicate that a species was more abundant than during the previous year.

Table 3. Unit 9 beaver harvest, 1986-91.

Regulatory	Reported harvest				Method of take					Successful
year	Juv.[a]	(%)	Adults	Unk.	Trap/snare	(%)	Shot	(L&S)	Unk.	Total Trappers/hunters
1986/87	106	(18)	497	1	588	(97)	1	0	15	52
1987/88	153	(18)	713	0	853	(98)	10	0	3	61
1988/89	60	(32)	130	49	233	(97)	0	0	6	23
1989/90	39	(21)	147	71	245	(95)	2	0	10	23
1990/91	35	(23)	119	57	211	(100)	0	0	0	23

[a] Beavers $\leq$ 52".

Table 4. Unit 9 lynx harvest, 1986-91.

Regulatory	Reported harvest				Method of take					Successful
year	Juv.[a]	(%)	Adults	Unk.	Trap/snare	(%)	Shot	(L&S)	Unk.	Total Trappers/hunters
1986/87	12	(25)	36	2	44	(86)	0	0	1	21
1987/88	0	(0)	10	0	10	(100)	0	0	0	7
1988/89	4	(57)	3	5	11	(92)	1	0	0	8
1989/90	5	(45)	6	1	11	(92)	1	0	0	5
1990/91	2	(15)	11	1	12	(86)	-	0	2	8

[a]Lynx $\leq$ 34" in length.
[b]L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 5. Unit 9 otter harvest, 1986-91.

Regulatory year	Reported harvest M	F	(%)	Unk.	Method of take Trap/snare	(%)	Shot	(L&S)	Unk.	Total	Successful Trappers/hunters
1986/87	86	63	(42)	14	149	(91)	11	--	3		52
1987/88	112	65	(37)	43	217	(99)	1	--	2		48
1988/89	57	54	(49)	31	127	(91)	12	--	0		12
1989/90	40	25	(38)	12	54	(73)	10	--	10		25
1990/91	33	17	934)	33	78	(94)	2	--	3		25

Table 6. Unit 9 wolverine harvest, 1986-91.

Regulatory year	Reported harvest M	F	(%)	Unk.	Method of take Trap/snare	(%)	Shot	(L&S)	Unk.	Total	Successful Trappers/hunters
1986/87	49	19	(28)	2	58	(83)	12	--	0		38
1987/88	49	16	(25)	7	54	(75)	18	--	0		30
1988/89	40	18	(31)	6	43	(67	21	--	0		40
1989/90	46	22	(32)	8	41	954)	35	--	0		34
1990/91	40	23	(37)	7	55	(79)	15	-	0		34

Table 7. Unit 9 beaver harvest chronology percent by time period, 1986-91.

Regulatory year	Harvest periods			n
	January	February	March	
1986/87	4	56	41	603
1987/88	6	68	27	852
1988/89	21	41	40	239
1989/90	30	20	50	255
1990/91	35	48	17	211

Table 8. Unit 9 lynx harvest chronology percent by time period, 1986-91.

Regulatory year	Harvest periods					n
	November	December	January	February	March	
1986/87	0	12	18	51	18	51
1987/88	10	10	40	30	10	10
1988/89	8	50	25	17	0	12
1989/90	17	25	50	8	0	12
1990/91	0	14	21	64	0	14

Table 9. Unit 9 land otter harvest chronology percent by time period, 1986-91.

Regulatory year	Harvest periods					
	November	December	January	February	March	n
1986/87	5	10	12	60	14	160
1987/88	4	23	28	28	17	209
1988/89	1	10	18	51	19	139
1989/90	25	15	20	10	30	61
1990/91	1	20	17	37	25	83

Table 10. Unit 9 wolverine harvest chronology percent by time period, 1986-91.

Regulatory year	Harvest periods						
	October	November	December	January	February	March	n
1986/87	0	2	3	22	44	29	70
1987/88	0	3	12	35	28	22	72
1988/89	11	4	22	11	41	11	64
1989/90	7	3	23	29	25	13	76
1990/91	1	0	16	40	34	69	70

Table 11. Unit 9 beaver harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3 or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	5	20	5	44	11	0	0	15	604
1987/88	3	20	2	37	33	0	3	2	866
1988/89	15	1	4	42	29	0	6	3	239
1989/90	8	23	0	7	58	0	0	4	257
1990/91	0	20	0	17	33	0	12	18	211

Table 12. Unit 9 lynx harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3 or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	2	50	0	28	10	0	0	10	51
1987/88	10	30	0	10	50	0	0	0	10
1988/89	17	33	17	0	33	0	0	0	12
1989/90	33	25	0	0	42	0	0	0	12
1990/91	0	7	0	0	79	0	14	0	14

Table 13. Unit 9 otter harvest percent by transport method, 1986-91.

Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3 or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
	Percent of harvest								
1986/87	10	25	2	25	16	0	5	17	163
1987/88	13	11	6	52	9	0	3	6	220
1988/89	33	7	8	20	13	0	15	4	142
1989/90	9	5	9	22	20	0	14	21	77
1990/91	0	13	5	28	24	0	13	17	83

Table 14. Unit 9 wolverine harvest percent by transport method, 1986-91.

Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3 or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
	Percent of harvest								
1986/87	14	58	0	6	14	0	2	6	64
1987/88	32	21	4	21	15	0	3	4	72
1988/89	44	9	1	18	7	0	3	1	64
1989/90	48	9	1	5	37	0	0	0	76
1990/91	7	9	1	17	53	0	0	13	70

LOCATION

Game Management Units: 11 (13,257 mi^2) and 13 (22,857 mi^2)

Geographical Description: Nelchina and Upper Susitna Rivers, Wrangell Mountains

BACKGROUND

Historic harvest data are limited for furbearers in Units 11 and 13 before the initiation of sealing requirements. Wolverine and beaver sealing became mandatory in 1971. Lynx and land otter sealing became mandatory in 1977. Before sealing began, furbuyer reports gave minimal information about fur harvest and bounty records provided harvest data only on wolverines. Little research on furbearer populations has been conducted in either unit until recently, and data pertaining to population densities, movements, and distribution of furbearers are limited. Other than harvest records, reports by hunters and trappers, and field observations by ADF&G personnel are the only sources of information about furbearer abundance.

MANAGEMENT DIRECTION

The management objective for area furbearers is to develop measurable objectives for management of furbearer populations.

METHODS

Yearly trends in lynx abundance for both units were monitored by conducting track surveys within favorable lynx habitat. Twenty-six aerial transects (19 in Unit 13 and 7 in Unit 11) were established in 1988 for the purpose of conducting lynx track surveys on a yearly basis. Randomly selected aerial transects, each two miles long and 0.25 miles wide, were flown in late winter. In addition, 30 miles of trap line and seismic lines were surveyed for tracks by snow machine.

A wolverine density estimate was obtained in part of Subunit 13A in conjunction with a density estimation technique being developed by ADF&G. This estimator is based on the distance travelled by wolverines during the time between a snowfall and the aerial survey. The technique requires determining the distance travelled by an individual wolverine whose tracks cross predetermined transects flown soon after a fresh snow.

Beaver, lynx, river otter, and wolverine pelts were sealed, and trappers were interviewed at the time of sealing to obtain harvest statistics for these species. Wolverine and lynx carcasses from animals taken in Units 11 and 13 were purchased from trappers for $20 and $10 each, respectively. Reproductive status and age were obtained from these carcasses. A trapper questionnaire survey provided added harvest and relative abundance information on both sealed and unsealed furbearers. Plans were initiated to purchase marten carcasses for the 1991-92 season at a price of $5.00 each.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Unitwide population estimates were not available for furbearers in Units 11 or 13. Beavers were relatively abundant in both units. Although beaver cache surveys were not flown, frequent field observations of beaver ponds and food caches made during aerial big game surveys suggested beaver numbers were high. Trappers responding to the trapper questionnaire also considered beavers to be abundant on their lines and indicated that current population levels were similar to those reported in previous trappers surveys. There was no information suggesting a decline in population trend.

Land otters occurred in both units but were not considered abundant. Some trappers reported land otters were scarce on their lines in 1990-91; others reported them as common. There was no information that suggested a decline in population trend.

Lynx numbers were moderate and appeared to be increasing. Lynx began to increase in 1988-89 after several years in the low-density stage of an approximate 10-year cycle. Sixty-three percent of the trappers responding on the 1990-91 trapper survey listed lynx as scarce or not present on their traplines, while 37% felt they were common or abundant; however, 65% of the responding trappers reported lynx numbers were increasing. We observed only 8 sets of lynx tracks during the 1989 survey. Twenty-four transects were flown in 1990 and 32 sets of tracks were observed in 18 transects. Six different family groups were identified. In 1991 only 8 of the 26 aerial transects were flown. All but one had fresh lynx tracks and 4 family groups were identified. Overall, lynx were considered common in both 1990 and 1991 on those transects located in favorable habitat.

In addition to aerial transects, track counts were conducted by snow machine. On a 10-mile transect in 13A, 2 lynx tracks were observed in both 1989 and 1990 and three in 1991. A 19-mile transect was established in Subunit 13D during 1990. This transect was located in good lynx habitat, and provided lynx population information indicative of good habitat types throughout Subunit 13D. In 1990, a total of 21 lynx tracks were observed, and thought to represent 7 single lynx and 4 family groups numbering 14 members. Snowshoe hares were numerous. This transect was surveyed again in 1991 but the number of lynx observed was down substantially (52%) as only 10 lynx were found. Overall on this transect, lynx and hares were considered less numerous than in 1990. At least 3 lynx were harvested along this transect before it was surveyed in 1991, which contributed to the observed decline. Tracks of 16 individual lynx were counted along a 25-mile transect along the Klutina River in Subunit 13D in 1991. This transect was last surveyed in 1989 and tracks of only 2 lynx were counted.

Wolverines were considered abundant in the more remote, mountainous regions of each unit but were relatively scarce in the forested basin. A density estimate of 4.5 wolverine/1,000 km^2 was obtained during 1991 in Subunit 13A in the eastern Talkeetna Mountains (Gardner and Becker 1991). This estimate was somewhat lower than the 5.2 wolverine/1,000 km^2 obtained in the Chugach Mountains in Subunit 13D in 1987. Both estimates were obtained in the spring after harvests and much of the overwinter mortality had occurred. Both estimates were made for areas considered to be favorable wolverine habitat. Wolverine densities in less mountainous portions of the unit were considered much lower than in areas surveyed. Because of differences in wolverine densities, unitwide extrapolation of observed densities did not provide an accurate estimate unless adjustments were made for reduced densities in the non-mountainous portions.

Sixty-eight percent of the trappers responding to the questionnaire considered wolverine scarce, 27% believed they were common, and only 5% felt they were abundant. Trapper reports and comments suggested wolverine numbers may have declined in both units over the past 20 years. Wolverines were considered stable or decreasing by 77% of the responding trappers, while only 22% felt they had increased.

Marten numbers increased in both Units 11 and 13 during the mid-1980s, appeared to peak about 1988, then declined somewhat in 1989. Marten numbers were considered stable, but we really have no way to determine population trends other than abundance estimates from the trapper questionnaire. Trappers with traplines located in favorable marten habitats in 1990-91 reported marten to be common. However, 33% of all the trapper reports received indicated fewer marten on their lines, 47% reported similar numbers. Sixty percent of the trappers responding to the questionnaire felt marten numbers were not abundant enough to warrant a longer season in 1991.

Coyotes were abundant and their numbers increased in both units. Before 1980, coyotes occurred along the larger rivers such as the Copper and Chitina. They have become numerous along most waterways. Fox numbers declined during the mid-1980s in areas where coyotes increased. Foxes were common over much of the forested lowlands and were considered abundant in subalpine and tundra habitats. Fox numbers were considered to be much higher in Unit 13 than in 11 by trappers responding to the questionnaire.

Muskrat numbers were very low in both units. Muskrats were abundant during the early 1980s but their numbers declined dramatically during the mid-1980s. Trapper responses to the questionnaire suggested muskrats were relatively scarce, with little population increase noted. Reasons for the dramatic decline in numbers were not determined.

Mink were reported to be scarce by some trappers responding to the questionnaire, while others reported mink as common. Population trends could not be determined.

Snowshoe hares were considered common but not abundant. This was a rather important observation and leads to the prediction of a lower hare cycle during the 1990s. Since we should be well into the cyclic hare high, trappers should be listing hares as very abundant. Also, only 38% felt hares had increased between 1990 and 1991. Again, during this phase of the 10-year hare cycle, an expected questionnaire response would be that snowshoe hares were increasing throughout the unit. Grouse and ptarmigan were also reported to be common but not abundant.

Distribution and Movements: Beavers and land otters were found throughout both units wherever favorable aquatic habitat occurs. Unit 13 has substantially more riparian habitat than Unit 11, and generally supports larger numbers of aquatic furbearers.

Lynx distribution follows that of the spruce forest habitat in both units. Lynx numbers were higher in the southern portions of Unit 11, especially in the Chitina Valley, and in Subunits 13D, eastern 13A, and southern 13C. Lynx moved freely between the 2 units because the favorable habitat types were continuous. Two incidents of long-distance dispersal of lynx into Unit 13 were also documented. The first was an adult male lynx radio-collared and ear-tagged by the USFWS on the Kenai Peninsula. This lynx was last observed on the Kenai National Wildlife Refuge in April 1987, then trapped in December 1987 near Chitina in Subunit 13D. This was a straight-line movement of at least 250 miles within a 7-month period, and included crossing a major mountain range. In December 1990, a lynx was caught in Subunit 13D near Copper Center that had been radio-collared near Kluane Lake, Yukon during March 1990. This was also a movement of several hundred miles that required negotiating the Wrangell Mountains. These movements suggest immigration could be an important component of the cyclic increase in lynx in Units 11 and 13, and may contribute a number of animals to the population.

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

Mortality

Harvest:

Seasons and Bag Limits. Beaver trapping season in Units 11 and 13 was from 10 November to 15 April. The bag limit was 30 beavers per season.

The coyote and land otter trapping season in Units 11 and 13 was from 10 November to 31 March with no bag limit. The coyote hunting season was from 1 September to 30 April and the bag limit was 2 coyotes.

The red fox and wolverine trapping season in Units 11 and 13 was from 10 November to 28 February with no bag limit. The red fox hunting season was from 1 November to 15 February with a bag limit of 2 foxes. The wolverine hunting season was 1 September to 31 March with a bag limit of 1 wolverine.

The lynx trapping and hunting seasons in the 2 units were concurrent from 15 December to 15 January. There was not a bag limit for trappers but lynx hunters were restricted to a bag limit of 2 lynx.

The marten, mink, and weasel trapping season was 10 November to 31 January with no bag limit. The muskrat trapping season was 10 November to 10 June with no bag limit.

Board of Game 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 28 days by closing the season on 31 January, effective for the 1988-89 season. Beginning with the 1988-89 season, the board increased the bag limit on beavers in Unit 13 from 20 to 30 but changed the Unit 11 bag limit from no limit to 30 beaver. After a 3-year closure, the board opened a 30-day lynx trapping season starting in 1990-91, with season dates of 15 December to 15 January. Fox hunting season was also lengthened by 60 days with the season opening on 1 September instead of 1 November, beginning in 1991. Furbearer regulation proposals were scheduled to be considered by the board during their spring 1991 meeting; however, all furbearer proposals were tabled until spring 1992 because of the large number of subsistence regulations for big game requiring immediate board action in 1991. Because no Board of Game actions concerning furbearers in either unit occurred during 1991, ADF&G extended the lynx trapping seasons 50 days in Units 11 and 13 by emergency order on 30 September 1991. The dates for the 1991-92 lynx trapping season in both units were 10 November to 31 January.

Hunter/Trapper Harvest. The 1990-91 beaver harvest in Unit 11 was 17, up from the previous year's reported take of 11, but 47% below the 5-year average take of 32 from 1985-1990 (Table 1). The 1990-91 harvest was higher than the average annual take of 12 animals (range 0-22) reported between 1971 and 1984. The highest reported catch in this unit was in 1985 when 56 beavers were taken. The percentage of kits in the 1990-91 harvest averaged 6%, appreciably below the 5-year (1985-90) average of 15%.

The Unit 13 beaver harvest declined during the last 4 years after a record high take of 333 beaver in 1986 (Table 2). The 1990-91 harvest of 101 was down by 37% from the 1989-90 take of 160 and 57% below the 5-year (1985-90) mean take of 233 beavers. The

1990-91 harvest was higher than the average yearly take of 79 beaver (range 33-176) reported between 1972 and 1984. The percentage of kits in the 1990-91 harvest was 26%, higher than the 5-year (1985-90) mean of 19% kits. The largest reported subunit-harvest of beaver came from Subunit 13D with 39, followed by Subunit 13E with 25.

Land otters were not taken in Unit 11 during the 1990-91 season (Table 1). Land otter harvests in Unit 11 have been low, averaging 4 animals per year (range 0-11) since 1977 when sealing was first required. In Unit 13 the 1990-91 reported take was 16 otters (Table 2). The lowest unitwide harvest of river otters reported in Unit 13 was the 1989-90 take of 5 animals. Since otter sealing became a required in 1977, the annual harvest has averaged 25 otters (range 5-68) for Unit 13. Otter harvests have fluctuated by subunit annually with no subunit showing a higher percentage of the total take.

The lynx hunting and trapping seasons were closed in both units between 1987 and 1990 in response to the lynx harvest tracking strategy adopted by the board. This management strategy called for greatly reducing or eliminating lynx harvests during the cyclic low. In theory lynx should be more abundant during the next cycle, and trappers could take more lynx overall than if they trapped every year. In Unit 11 during the 30-day 1990-91 season, 38 lynx were presented for sealing (Table 1). This reported harvest was more than twice as high as the last reported take of 16 lynx taken during the 1986-87 season. It was still well below the 137 lynx taken in 1982-83, the high point in the previous lynx cycle. The 1990-91 reported lynx harvest in Unit 13 was 110 lynx, which was still appreciably below the 290 lynx reported taken during the last cyclic high in 1982-83. The harvest in 1986, the last year the season was open, was only 9 lynx (Table 2). Subunit 13D provided 56% of the harvest and continued to be the most important subunit for lynx trapping. During 1990-91, kittens comprised 20% ($\underline{n}$ = 7) of the Unit 11 lynx harvest and 35% ($\underline{n}$ = 38) of the Unit 13 take.

Wolverine harvests from Units 11 and 13 since 1986 are presented in Tables 1 and 2, respectively. The Unit 11 wolverine harvests declined from the early 1970s until 1981, then increased during the 3-year period between 1982 and 1984. The high harvests reported between 1982 and 1984 probably reflected increased trapping activity associated with the peak of the last lynx cycle. Between 1971 and 1984 the average annual take was 28 wolverines. Harvests over the past 5 years, however, averaged only 10 wolverines per year. The lowest harvest ever reported was 7 animals taken in 1988. The 1990-91 harvest of 13 was up somewhat from the 1988 low. Composition data showed males accounted for 64% of the take during the past 5 years, with a yearly range of 54-78%.

Wolverine harvest figures from Unit 13 also showed a down trend from 1971, when sealing was initiated, until 1988. During the 1970s the average annual take of wolverine from Unit 13 was 86 (range 58-140) compared to an average of 55 a year (range 33-98) between 1980 and 1986, and 26 per year since 1987. The 1988-89 harvest of 16 wolverines was the lowest number of animals sealed since 1971. Harvests increased by 50% and 46% each year over the past 2 years. Males comprised 58% (range 38-74%) of the take 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 Residency and Trapper Success. During the 1990-91 season, 4 trappers took an average of 4.2 beavers in Unit 11 (Table 1). Since 1985, an average of 8 trappers have also averaged 4 beavers per trapper. The number of individuals trapping beavers in Unit 13 dropped from a high of 55 in 1986-87 to 27 in 1990-91 (Table 2). The catch per trapper in Unit 13 dropped by over 2 animals from 7.5 in 1987-88 to 5.1 in 1990-91. Trapping and snaring were the most successful harvest methods, accounting for all known reported methods of take in Units 11 and 13.

Otters were not taken in Unit 11 during 1990-91, though 1 trapper took four in 1989-90 (Table 3). In Unit 13, 9 trappers took an average of 1.8 otters per trapper during the 1990-91 season (Table 4). Since 1983 the average catch per trapper in Unit 11 was 1.6 otters and 1.9 otters in Unit 13. Trapping or snaring was the method of take reported for all otters taken in Units 11 and 13 in 1989-90 and for 81% of the otters taken in Unit 13 in 1990-91. During 1990-91, shooting accounted for 19% of the Unit 13 otter take.

Seven trappers each took an average of 5.4 lynx in Unit 11 during the 30-day 1990-91 season (Table 5). Unit 11 trappers each averaged 3.6 lynx during the prior 5 years with an open lynx season. During the last cyclic high (1982-83) in Unit 11, 32 trappers sealed at least 1 lynx, for an average catch per trapper of 4.0 lynx. In Unit 13, 24 trappers took an average of 4.6 lynx in 1990-91 (Table 6). The 1990-91 average catch per trapper was well above the 2.7 lynx per trapper average obtained during the previous 5-year period with open lynx seasons. During the last cyclic high (1982-83) the average catch per trapper in Unit 13 was 4.1 lynx, with 71 individuals sealing at least 1 lynx.

Six trappers in Unit 11 took an average of 2.2 wolverines during 1990-91, a catch rate slightly higher than the 5-year average of 7 trappers reporting 1.7 wolverines each (Table 7). In Unit 13, 23 trappers took an average of 1.5 wolverines, similar to the 5-year average of 23 trappers reporting 1.3 animals each (Table 8).

The most successful method of taking wolverines in Unit 11 during the 1990-91 season and over the past 5 years was trapping (92%) followed by snaring (8%). Over the past 5 years, trapping and snaring accounted for 74% of the wolverines harvested from Unit 13, while ground shooting accounted for 15%. The land-and-shoot method was legal in 1986 and 1987 and accounted for 10% of the harvest. Trapping and snaring accounted for 97% of the 1990-91 harvest with only 1 (3%) wolverine shot.

Questionnaire Response: Seventy-three (64%) of the 113 trappers contacted about the 1990-91 survey returned the trapper questionnaire. This response rate was similar to past response rates (approximately 60%). Of those responding, 16 (22%) did not trap during the 1990-91 season. The main reasons given for not trapping was low fur prices. Those trappers that cooperated were, for the most part, very experienced with their area. Unit 11 trappers reported an average of 13 years of trapping experience in the unit and had a 46-mile long trapline. Unit 13 trappers averaged 19 years of trapping experience in the unit. Trapping pressure declined in 1990-91 with both Unit 11 and Unit 13 trappers reporting reduced effort. Most trappers averaged about 50 sets on their line, but 2 trappers reported setting over 200 traps. The questionnaire response indicated marten were the most important furbearer in terms of availability, number taken, and value. In Unit 13 other important furbearers were beavers and red foxes.

<u>Harvest Chronology</u>. In Unit 11, 47% of the 1990-91 beaver harvest occurred in January and March (Table 9). The chronology of the beaver harvest in this unit has shown little trend over the past 5 years, with every month of the season showing different harvest rates each year. Beaver harvests tended to be larger at the beginning and the end of the season in Unit 13. In 1990-91, 37% of the harvest was reported taken during November and December, and 25% in April (Table 10). The early part of the season has been popular because the ice is thinner and beaver meat is sought for trap bait. High harvests in April reflected increased trapper activity associated with longer days, moderating temperatures, and because beaver are the only major furbearer with the season still open.

Harvest chronology for otter in Unit 11 has not shown any particular pattern over the past 5 years, probably because of the small number taken (Table 11). The Unit 13 harvest chronology also fluctuated, but it appeared that more otters were taken in the first 3 months of the season (Table 12). This pattern generally reflected overall trapping pressure. It was interesting the March and April reported harvest was low, suggesting few otters were caught incidentally while trapping beavers late in the season.

Harvest chronology data for lynx indicated 58% of Unit 11 (Table 13) and 55% of Unit 13 (Table 14) harvests occurred in December, with the remainder taken in January. During past open seasons, the lynx take in Unit 11 was distributed throughout the season with no particular pattern evident. In Unit 13, however, November or December have always been important months with consistently high harvests. The difference in the chronology of harvest between these 2 units generally reflected different trapping patterns in these units. In Unit 13 there were more trappers and intense competition, the emphasis was on taking furs early before anyone else. In Unit 11 there were fewer trappers, individuals tended to have more traditional trapping areas, and there was less competition. Weather and snow conditions often dictated when trapping pressure was the heaviest in Unit 11, rather than competition from other trappers.

Harvest chronology data for wolverines in both units show more animals were taken later in the season (Tables 15 and 16). Before the season was shortened in 1985 to end February 28, almost one-half of the total wolverine harvest occurred during February and March. During the past 5 years (1986-91), 31% of the Unit 13 and Unit 11 wolverine take occurred during February.

Transport Methods. The transportation methods most used by successful trappers for all species of furbearers in both units were snow machines and dog sleds/snow shoes/skis and highway vehicles (Tables 17-23). Wolverine trappers in Unit 13 also reported aircraft as an important transportation method (Table 23). A popular and effective wolverine trapping method was to fly until a dead ungulate was located, then set traps near the carcass.

CONCLUSIONS AND RECOMMENDATIONS

The track survey transects currently used could b important management tools for monitoring the population status and trend of a number of important furbearers. Much work is still needed to fully develop the techniques that will give the best indication of population status/trend. Special emphasis should be given to determine the best time interval after a snowfall to conduct surveys. The effect of changes in animal density and movement patterns on survey results must be evaluated and survey techniques modified to compensate for these changes. Currently lynx track surveys are very useful to distinguish whether lynx are scarce or common, but cannot be used to indicate population trends once they are abundant. Survey techniques should also be evaluated to determine which species they can be used for.

Lynx ground transects should be evaluated and additional snowmachine lines established. All aerial and ground transects for lynx should be surveyed yearly. Lynx transects are very important in years with little or no harvest because of reduced or closed trapping seasons. Transects then become the best, if not the only way to monitor the population.

Additional wolverine surveys should be completed in Subunits 13B, 13C, and 13E so density estimates can be derived and an extrapolated population estimate for Unit 13 obtained. Part of the forested areas in Subunit 13A should be stratified as part of this attempt to determine wolverine distribution and densities. This is marginal habitat and densities are usually much lower than in mountainous areas. Periodic estimates could then be obtained on more heavily trapped areas to determine wolverine population trends.

Though trapping pressure is not directly measured, information gathered from trapper questionnaires, sealing data, and staff contact with trappers suggest that trapping effort was down substantially the past 2 seasons. Fox and coyote prices were very low and only the highest quality pelts were sold. Mink and beaver prices declined, but not as much as for canids. The lynx season was reopened but prices paid for lynx were around $100, much lower than obtained during the early 1980s when over $300 for a lynx was common. Marten prices dropped by 20% to 30% and numbers were stable or somewhat lower than in previous years. Early and persistent deep snow over much of the Basin for 3 years between 1989 and 1991 made it difficult to keep both snowmachine trails useable and traps operable. All of these factors negatively impacted on trappers. Traplines were generally shortened and trappers quit running lines earlier in the year.

The beaver harvest in Unit 13 continued to decline this year following record harvests in 1986. Beaver harvests increased in the mid-1980s, because the population was increasing and the trapping season had been liberalized by 82 days. The current decline in the beaver harvest is attributed to decreased trapping effort because of low pelt prices and 3 winters with deep snow conditions making beaver trapping more work for less profit. The percentage of kits in the harvest averaged 20%, and was below the level that would suggest overharvest (Buckley and Libby, 1955). Harvest location data suggested a large portion of the beaver harvest comes from colonies adjacent to the road system. Remote beaver populations were virtually untrapped.

Localized overtrapping and a high proportion of kits in the harvest were observed along a short stretch of the Richardson Highway near the Tiekel River in Subunit 13D and could be expected to occur in accessible areas elsewhere. Management guidelines will be needed to address overharvests in specific locations that are highly visible and accessible because they are next to the road system and have high use potential for wildlife viewing. This would allow for both consumptive and nonconsumptive uses. Local trappers are alerted to the fact they may be overharvesting localized colonies and they usually respond with a reduced effort. However, complete restriction of trapping near viewing areas should not occur, as colonies die out after all the available food is used up. Limited harvests are needed to assure that viewing opportunities are maintained. In viewing areas only every 3rd or 4th colony should be trapped on a rotation basis but every beaver should be taken from the trapped colony to allow the food supply to recover.

Management should promote increased trapping, especially of more remote populations. Beaver populations are thought to be underutilized over most of Unit 13. Additional opportunity could be provided by opening the season in October. Beaver meat is also valuable for human food, dog food, and trapping bait. An October opening would provide a good source of beaver meat for these winter activities that spring-caught beaver does not supply. Also, fall pelts are more desirable than spring ones. Pelts coming into prime are more valuable than pelts going out of prime. An early opening would allow pelts to compete with beaver taken in other states and Canada in early sales, as well as be available for home sewing and handcraft sales later in winter. I recommend lengthening the fall beaver season to begin on 1 October or no later than 10 October.

Lynx numbers have been increasing somewhat in both units after several years of low population densities. Lynx numbers were thought to be substantially lower in the recent low phase of the lynx cycle than during the previous low in the late 1970s. Until the season was closed, lynx harvests during the current cycle were below those reported a decade earlier. Lynx numbers started increasing in 1989-90 and we should be approaching a cyclic high. However, trapper questionnaire responses as well as track surveys suggest this cyclic high will also be lower than the previous high in 1982. Hare abundance appears much lower during the current hare cycle also. Since lynx depemd directly on hares for food, a lower hare cycle could mean fewer lynx produced. Regardless of the number of lynx taken or how high the cycle goes, lynx trapping should be maintained between 10 November and 31 January at least through January 1993. Evaluation of lynx numbers at that time should determine future season lengths. Because of a lack of recruitment during cyclic lows, trapping mortality appears additive and lynx become vulnerable to overharvesting. Therefore, as soon as the current cycle starts down, seasons need to be cut back. Trapper opposition is strong against complete season closures. As a result, future management options for reducing the lynx harvest include maintaining an open season, but reducing the length of the season and establishing a bag limit. Timing of future management actions will be based on track counts, total harvests, and harvest composition data. When track counts and harvests drop-off and the percent of kittens in the harvest declines, it will be necessary to reduce the lynx take. Because the percentage of kittens in the harvest is one of the best indicators of recruitment, pelts should continue to be measured at the time of sealing. The purchase of lynx carcasses for necropsy and placental scar examination should be continued.

A decline in the number of wolverines sealed in recent years and reports of low numbers on trapper questionnaire responses suggest wolverine numbers have declined in portions of both units. Because of the downward trend in wolverine numbers, I recommend that the wolverine season be closed on 31 January in both Units 11 and 13. This earlier closure should reduce the harvest by 25%, as it would be timed when wolverine movements are increasing and trappers are more successful. Protection of dispersing animals may allow individuals to find and inhabit territories now vacant. Moose and caribou have increased substantially in Unit 13 in recent years, thus providing additional food supplies. A reduction in the wolverine harvest may allow them to increase in areas formerly having higher numbers, unless these areas were abandoned by wolverines because of increased human settlement.

Marten are currently considered the most important furbearer in both Game Management Units 11 and 13. Pelt prices remained good but dropped slightly following a high that averaged about $100 per marten in the late 1980s. Marten numbers increased in both units during the 1980s and probably peaked by 1988 or 1989. Current trends in marten numbers are not known. Trapper questionnaire responses suggest overall marten numbers are stable at a lower level; however, some localized declines were reported. Current season dates should be maintained. By closing the season at the end of January, the number of females harvested should be reduced. Males, especially juveniles, are caught early in the season, while females are taken later on. By maintaining a closed season during February the late winter dispersal will help repopulate trapped areas. Measurable population objectives have not been developed but they should be completed as soon as possible.

LITERATURE CITED

Becker, E. and L. Van Daele. 1988. Wolverine density estimate in GMU 13. Unpub. Rep. Alaska Dep. Fish and Game. Anchorage.

Buckley, J.L. and W.L. Libby. 1955. Growth rates and age determination in Alaskan beaver. Trans. N. A. Wildl. Conf. 20:495-507.

Gardner, C.L., and E.F. Becker. 1991. Wolf and wolverine density estimation techniques. Fed. Aid in Wildl. Rest. Res. Prog. Rep., Proj. W-23-4. Alaska Dep. Fish and Game. Juneau. 8pp.

Gardner, C.L. 1985. The ecology of wolverines in southcentral Alaska. M.S. Thesis, Univ. Alaska, Fairbanks. 82pp.

_________ and W.B. Ballard. 1982. Big Game Studies Vol. VII. Wolverine. Final Phase I Rep. Susitna Hydroelectric Proj. Alaska Dep. Fish and Game. Juneau. 21pp.

_________, and E.F. Becker. 1991. Wolf and wolverine density estimating techniques. Fed. Aid in Wildl. Rest. Res. Prog. Rep., Proj. W-23-4. Alaska Dep. of Fish and Game, Juneau. 8pp.

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Table 1. Unit 11 beaver harvest, 1986-91.

Regulatory year	Reported Harvest			Method of Take				Successful trappers
	Adult	Juv.(%)[a]	Total	trap/snare(%)	Shot	(L&S)	Unk	
1986/87	40	6(13%)	46	46(100%)	0	0	0	12
1987/88	17	4(19%)	21	21(100%)	0	0	0	7
1988/89	21	3(13%)	24	24(100%)	0	0	0	--
1989/90	10	1(9%)	11	10(91%)	1	0	0	5
1990/91	16	1(6%)	17	17(100%)	0	0	0	4

[a] Beaver $\leq$ 52"

Table 2. Unit 13 beaver harvest, 1986-91.

Regulatory year	Reported Harvest			Method of Take				Successful trappers
	Adult	Juv.(%)[a]	Total	trap/snare(%)	Shot	(L&S)	Unk	
1986/87	262	68(21%)	333	300(98%)	5	0	0	55
1987/88	251	49(16%)	300	290(96%)	8	0	2	40
1988/89	137	36(21%)	173	169(98%)	0	0	4	27
1989/90	133	26(16%)	160	147(92%)	0	0	13	23
1990/91	75	26(26%)	101	91(90%)	0	0	10	20

[a] Beaver $\leq$ 52"

Table 3. Unit 11 otter harvest, 1986-91.

Regulatory year	Reported Harvest				Method of Take				Successful trappers/hunters
	Males	Females	Unk.	Total	trap/snare(%)	Shot	(L&S)	Unk	
1986/87	3(60%)	2	0	5	5(100%)	0	0	0	4
1987/88	0(0%)	1	2	3	3(100%)	0	0	0	2
1988/89	1(50%)	1	0	2	2(100%)	0	0	0	1
1989/90	1(25%)	3	0	4	4(100%)	0	0	0	1
1990/91	0(0%)	0	0	0	0(0%)	0	0	0	0

Table 4. Unit 13 otter harvest, 1986-91.

Regulatory year	Reported Harvest				Method of Take				Successful trappers/hunters
	Males	Females	Unk.	Total	trap/snare(%)	Shot	(L&S)	Unk	
1986/87	18(58%)	13	5	36	36(100%)	0	0	0	23
1987/88	8(62%)	5	3	16	13(81%)	3	0	0	9
1988/89	9(60%)	6	8	23	14(61%)	6	0	3	13
1989/90	4(80%)	1	0	5	5(100%)	0	0	0	3
1990/91	9(56%)	7	0	16	13(81%)	2	1	0	9

Table 5. Unit 11 lynx harvest, 1986-91.

Regulatory	Reported Harvest			Method of Take				Successful
year	Adults	Juv.(%)[a]	Total	trap/snare(%)	Shot	(L&S)	Unk	trappers/hunters
1986/87	14	2 (13%)	16	16 (100%)	0	0	0	13
1987/88	No open season.							
1988/89	No open season.							
1989/90	No open season.							
1990/91	28	7 (20%)	38	38 (100%)	0	0	0	7

[a] Lynx $\leq$ 34" in length.

Table 6. Unit 13 lynx harvest, 1986-91.

Regulatory	Reported Harvest			Method of Take				Successful
year	Adults	Juv.(%)[a]	Total	trap/snare(%)	Shot	(L&S)	Unk	trappers/hunters
1986/87	8	1(11%)	9	8(89%)	1	0	0	7
1987/88	No open season.							
1988/89	No open season.							
1989/90	No open season.							
1990/91	72	38(35%)	110	109(99%)	1	0	0	24

[a] Lynx $\leq$ 34" in length.

110

Table 7. Unit 11 wolverine harvest, 1986-91.

Regulatory year	Reported Harvest				Method of Take				Successful trappers/hunters
	Males(%)	Females(%)	Unk.	Total	trap/snare(%)	Shot	(L&S)	Unk	
1986/87	7 (78%)	2 (22%)	0	9	9 (100%)	0	0	0	8
1987/88	8 (73%)	3 (27%)	0	11	10 (91%)	0	1	0	10
1988/89	4 (57%)	2 (29%)	1	7	6 (86%)	0	0	1	4
1989/90	7 (58%)	5 (42%)	0	12	12 (100%)	0	0	0	5
1990/91	7 (54%)	2 (15%)	4	13	13 (100%)	0	0	0	6

Table 8. Unit 13 wolverine harvest, 1986-91.

Regulatory year	Reported Harvest				Method of Take				Successful trappers/hunters
	Males(%)	Females(%)	Unk.	Total	trap/snare(%)	Shot	(L&S)	Unk	
1986/87	24 (57%)	14 (33%)	4	42	29 (69%)	5	8	0	39
1987/88	20 (74%)	7 (26%)	0	27	16 (59%)	3	8	0	21
1988/89	9 (56%)	6 (38%)	1	16	11 (69%)	4	0	1	14
1989/90	9 (38%)	12 (50%)	3	24	18 (75%)	6	0	0	19
1990/91	22 (63%)	12 (34%)	1	35	34 (97%)	1	0	0	23

Table 9. Unit 11 beaver harvest chronology percent by time period, 1986-91.

Regulatory	Harvest periods								
year	October	November	December	January	February	March	April	Unknown	n
1986/87	--	22	9	4	39	24	2	0	46
1987/88	--	14	19	10	5	52	0	0	21
1988/89	--	38	8	33	0	0	0	21	24
1989/90	--	0	9	0	45	9	27	9	11
1990/91	--	0	0	47	6	47	0	0	17

Table 10. Unit 13 beaver harvest chronology percent by time period, 1986-91.

Regulatory	Harvest periods								
year	October	November	December	January	February	March	April	Unknown	n
1986/87	--	13	33	8	13	21	7	6	333
1987/88	--	21	24	8	8	31	5	3	300
1988/89	--	36	13	5	3	8	32	2	173
1989/90	--	26	9	1	9	2	44	9	160
1990/91	10	20	17	7	3	7	25	11	101

Table 11. Unit 11 otter harvest chronology percent by time period,1986-91.

Regulatory	Harvest periods							
year	November	December	January	February	March	April	Unknown	n
1986/87	0	20	20	40	0	0	20	5
1987/88	0	0	67	33	0	0	0	3
1988/89	0	0	100	0	0	0	0	2
1989/90	25	0	50	25	0	0	0	4
1990/91	0	0	0	0	0	0	0	0

Table 12. Unit 13 otter harvest chronology percent by time period, 1986-91.

Regulatory	Harvest periods							
year	November	December	January	February	March	April	Unknown	n
1986/87	3	22	44	25	6	0	0	36
1987/88	25	25	6	13	13	0	19	16
1988/89	13	26	13	22	26	0	0	23
1989/90	20	40	20	20	0	0	0	5
1990/91	37	13	31	13	0	0	6	16

Table 13. Unit 11 lynx harvest chronology percent by time period, 1986-91.

Regulatory year	Harvest periods November	December	January	February	March	n
1986/87	0	44	50	6	0	16
1987/88	No open season					
1988/89	No open season					
1989/90	No open season					
1990/91	0	58	42	0	0	38

Table 14. Unit 13 lynx harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	11	44	0	0	44	0	0	0	9
1987/88	No open season								
1988/89	No open season								
1989/90	No open season								
1990/91	0	3	0	0	85	0	8	4	110

Table 15. Unit 11 wolverine harvest chronology percent by time period, 1986-91.

Regulatory year	Harvest periods November	December	January	February	March	Unknown	n
1986/87	0	33	44	22	0	0	9
1987/88	9	18	37	27	9	0	11
1988/89	0	14	29	43	0	14	7
1989/90	8	58	17	17	0	0	12
1990/91	0	8	46	31	15	0	13

Table 16. Unit 13 wolverine harvest chronology percent by time period, 1986-91.

Regulatory year	Harvest periods September	October	November	December	January	February	March	Unk.	n
1986/87	2	5	5	17	29	31	12	0	42
1987/88	0	4	11	30	37	18	0	0	27
1988/89	13	0	0	13	6	50	13	6	16
1989/90	0	0	8	21	38	17	12	4	24
1990/91	3	0	11	29	31	26	0	0	35

Table 17. Unit 11 beaver harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	0	2	0	17	78	0	0	2	46
1987/88	19	28	0	0	48	0	5	0	21
1988/89	0	58	0	0	42	0	0	0	24
1989/90	36	27	9	0	27	0	0	0	11
1990/91	0	6	0	0	94	0	0	0	17

Table 18. Unit 13 beaver harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3 or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	0	20	0	0	56	0	9	14	333
1987/88	6	34	0	0	41	0	18	1	300
1988/89	3	39	0	0	43	0	8	7	173
1989/90	0	46	0	0	36	0	8	9	160
1990/91	0	25	5	0	31	0	13	26	101

Table 19. Unit 11 otter harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	20	0	0	0	80	0	0	0	5
1987/88	0	33	0	0	33	0	0	33	3
1988/89	0	0	0	0	100	0	0	0	2
1989/90	0	0	0	0	100	0	0	0	4
1990/91	0	0	0	0	0	0	0	0	0

Table 20. Unit 13 otter harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	6	22	0	0	69	0	3	0	36
1987/88	0	25	0	0	69	0	6	0	16
1988/89	26	22	0	0	26	0	13	13	23
1989/90	0	0	0	0	100	0	0	0	5
1990/91	6	6	0	0	50	0	25	13	16

Table 21. Unit 11 lynx harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1986/87	0	38	0	0	56	0	0	6	16
1987/88	No open season								
1988/89	No open season								
1989/90	No open season								
1990/91	8	13	0	0	79	0	0	0	38

Table 22. Unit 13 lynx harvest chronology percent by time period, 1986-91.

Regulatory year	Harvest periods					
	November	December	January	February	March	n
1986/87	0	33	44	11	11	9
1987/88	No open season					
1988/89	No open season					
1989/90	No open season					
1990/91	0	55	45	0	0	110

Table 23. Unit 13 wolverine harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								n
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
1986/87	26	21	0	0	33	0	19	0	42
1987/88	33	26	0	0	22	19	0	0	27
1988/89	25	25	0	0	38	0	6	6	16
1989/90	0	25	0	0	63	0	0	12	24
1990/91	17	11	0	3	51	0	6	11	35

Table 24. Unit 11 wolverine harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								n
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
1986/87	0	11	0	0	67	0	0	22	9
1987/88	9	27	0	0	64	0	0	0	11
1988/89	0	29	0	0	57	0	0	14	7
1989/90	0	8	0	0	83	0	0	8	12
1990/91	0	0	0	0	100	0	0	0	13

LOCATION

Game Management Units: 12 (10,000 mi^2) and 20E (11,000 mi^2)

Geographical Description: Upper Tanana, White, Fortymile, Ladue, and Charley river drainages

BACKGROUND

Historically, furbearer trapping has been an important part of the economy in eastern interior Alaska. Trapping supplemented income of miners and Alaskan Natives during the early 1900s. During the 1920s the gold played out. Large numbers of miners moved out of the Fortymile area, and the number of trappers was reduced. However, trapping still augmented incomes for many area residents. Today the economy of the area is primarily seasonal. Trapping continues to provide for subsistence use and additional income for many local residents.

Marten and lynx are the most economically important furbearers in Unit 12 and Subunit 20E. During population highs, muskrats are also economically important in Unit 12. Little intentional trapping effort is expended on coyotes, red foxes, mink, land otters, beavers, ermine, red squirrels, or wolverines because of low pelt values, low abundance, or difficulty and expense of trapping these species. Two factors may reduce the importance of trapping for income for rural trappers: 1) the recent decision by the European community to ban fur trade with countries allowing the use of leghold traps, and 2) the continued efforts of animal rights groups to ban trapping.

MANAGEMENT DIRECTION

Management Goals

Management goals for Unit 12 and Subunit 20E are to: 1) provide for an optimal harvest of furbearers and 2) provide the greatest opportunity to participate in hunting and trapping furbearers.

Management Objectives

Management objectives for Unit 12 and Subunit 20E are to: 1) maintain accurate annual harvest records based on sealing documents, and 2) develop specific population objectives for furbearers.

METHODS

We obtained annual harvest estimates from sealing certificates. Information obtained during the sealing process includes the specific location and date of take, harvest method, sex of the animals, and estimates of age (young-of-the-year or adult). Sealing of pelts is mandatory for wolves, wolverines, lynx, land otters, and beavers. Annual harvest estimates for these species include a subjective estimate of unreported take because some pelts, especially those of beaver and otter, are used domestically and are not sealed. Harvest trend is also obtained through the Raw Fur Skin Export Report which is a record of all furbearer pelts exported from Alaska from each unit.

We estimated the proportion of kits in the harvest for beavers and lynx by using pelt measurements from the sealing certificates. Beaver pelts <53 inches (length plus width) (Buckley and Libby 1953) and lynx pelts <35 inches long (Stephenson 1988) are accepted standards for kits. Some overlap exists between pelt lengths of kits and yearlings.

We used several methods to obtain subjective estimates of furbearer population abundance, trend, and distribution. These methods included: (1) trapper interviews, (2) a statewide trapper questionnaire, and (3) field observations by ADF&G personnel. We collected limited data by methods (2) and (3). Trapper responses in Unit 12 and Subunit 20E to the voluntary statewide questionnaire program was low. We did not do any specific furbearer field work this report period. The best information about furbearer abundance and trapping pressure was collected during periodic interviews with the area's long-term trappers and pilots.

RESULTS AND DISCUSSION

Population Status and Trend

Lynx: Based on harvest data and comments from area trappers, the lynx population in Subunit 20E was at its cyclic low between 1985 and 1988. After 1988, kit production increased as did the harvest. According to trapper questionnaires, lynx remained uncommon during the 1989 trapping season but they became common during the 1990 trapping season and continued to increase. Preliminary data from the 1991 season reflect an increase in the harvest but a decline in the percentage of kittens in the harvest. Based on the amount and distribution of snowshoe hare sign and the declining number of kittens in the harvest, I expect the lynx population in Subunit 20E will begin to decline within the next 2 years.

In Unit 12, the lynx harvest was stable between 1986 and 1989 and then increased substantially in 1990 (Table 1). The percentage of kittens in the harvest ranged from 17 to 23. The snowshoe hare population never increased to high numbers throughout Unit 12 but remained abundant in discrete areas. The preliminary harvest estimate for 1991 indicates an increase in the overall harvest but a decline in the percentage of kittens. I expect the lynx population in Unit 12 will begin to decline rapidly during the next year.

Wolverine: Wolverines were abundant in both units during the 1960s, corresponding to the period of high ungulate and wolf densities. According to the area's long-term trappers, wolverine numbers have declined during the past 20 years coinciding with the decline in moose and caribou. The only area within the two units where wolverines are still common is in the mountainous habitats of Unit 12. Unlike Subunit 20E, large populations of ground squirrels inhabit this area. Also, during the past four years all or part of the Nelchina and Mentasta caribou herds have spent portions of the winter in Unit 12, increasing the amount of carrion available to wolverines. Ungulate carrion and ground squirrels have been found to be important foods to wolverines in other areas of Alaska (Gardner 1985). Based on trapper questionnaires and incidental observations, the wolverine population is presently low and stable throughout the two units.

Marten: Currently, marten populations are declining after reaching a population high in 1987. Factors that may be driving the decline are low food availability, predators, and harvest. Incidental observations during 1990 indicate that the microtine population has declined over the past year. Low availability of microtines may affect marten natality rates and kit survival. The most successful marten trapper in the area reported catching fewer marten kits during 1990 compared with past years. His observations indicate a decline in productivity. Predation may have negatively impacted marten population dynamics during the past four years. Observations by long-term trappers in eastern Alaska and the adjacent Yukon Territory indicate that marten numbers decline when numbers of hares and lynx increase. Snowshoe hares and hare predators have increased in both units since 1988. I expect the marten population will continue to decrease as long as the microtine populations remain low and hare predators remain high.

In Unit 12 and Subunit 20E, marten have contributed most of the income for area trappers during this report period. Competition for marten is high. Trappers use all accessible trails through marten habitat in both units.

Red Fox: Foxes remained abundant in both units. Responses to the trapper questionnaire indicate stable fox numbers. Presently, several of the foxes' main prey populations are declining (i.e., grouse, ptarmigan, and microtines). However, snowshoe hares are still common. I expect fox populations will decline in concert with the hare population unless other prey species become more available. Presently, there is little trapper demand for foxes because of the low market value.

Muskrat: The Northway-Tetlin Flats has been one of the most productive trapping areas in Alaska for muskrats. Muskrat populations were high and heavily trapped during the mid-1970s and again in the mid-1980s. Presently, muskrats are at low levels in both units and there is little trapper effort.

Coyote: Coyotes are increasing in both units but populations are still low. Based on observations by trappers and ADF&G personnel, coyotes are abundant along the north side of the Wrangell Mountains in Unit 12. There is little trapper demand for coyotes because of their low market value. Where coyotes are abundant, local residents have harvested high numbers. One local resident harvested 30 on one lake this past winter.

Beaver: Beavers are common in both units in suitable, lowland habitats. The population trend in Unit 12 is not known. In Subunit 20E, the population appears to be declining slightly. The beaver population increased in a portion of Subunit 20E in response to wolf control during the early 1980s.

Other Species: Trapper questionnaire results indicated that in 1990, populations of otters were uncommon. Mink, ermine, and red squirrel were reported common. There is little trapper demand for these species. Respondents also listed hares as abundant and stable. Grouse, ptarmigan, and microtines were reported as common.

Mortality

Harvest:

Hunting Season and Bag Limits-Both Units.

Coyote	Sept. 1-Apr. 30	2 coyotes
Red Fox	Sept. 1-Mar. 15	2 foxes
Lynx	Nov. 1-Jan. 31	2 lynx
Squirrel	No closed season	No limit
Wolverine	Sept. 1-Mar. 31	1 wolverine

Trapping Seasons and Bag Limits-Both Units.

Beaver	Nov. 1-Apr. 15	15 beavers-Unit 12 25 beavers-Unit 20E
Coyote	Nov. 1-Feb. 28	No limit
Red Fox	Nov. 1-Feb. 28	No limit
Lynx	Nov. 1-Jan. 31	No limit
Marten	Nov. 1-Feb. 28	No limit
Mink/Weasel	Nov. 1-Feb. 28	No limit
Muskrat	Sept. 20-Jun 10	No limit
Land Otter	Nov. 1-Apr. 15	No limit
Squirrel/marmot	No closed season	No limit
Wolverine	Nov. 1-Feb. 28	No limit

Board of Game Actions and Emergency Orders. No board actions were taken during this report period. The Board of Game will address furbearer proposals at its spring 1992 meeting.

Hunter/Trapper Harvest. The 1990 lynx harvest in Unit 12 was 133 (Table 1). This is substantially higher than the annual average of 75 reported from 1986 to 1989. The percentage of kittens in the harvest declined to 17% from an average of 25% for the three previous years. Snowshoe hares did not range across all suitable habitats in Unit 12 during this report period but rather occurred in pockets. In response, the lynx population did not increase to the level of the last cyclic high in 1981-83. During that period, trappers harvested an average of 211 lynx (D. Kelleyhouse, unpubl. data).

In Unit 12, 40 trappers reported harvesting 133 lynx during 1990 (Table 1). This represents a catch rate of 3.3 lynx per trapper. Most trappers used snowmachines for transportation (89%) (Table 5) and leghold traps to catch lynx (86%). During 1990, most lynx (69%) were caught during January (Table 4). The season was open during November. Trappers did not select for lynx until December and January. They preferred to wait until the fur was most prime.

In Subunit 20E, the 1990 lynx harvest was 70, exceeding the 5-year average of 29 (Table 2). The percentage of kittens in the harvest (29%) was high, but lower than the past 2-year average of 35%. Twenty-two trappers reported harvesting 70 lynx during 1990 (Table 2). This represents a catch rate of 3.2 lynx per trapper. Most lynx were harvested with traps (81%). The commonest method of trapper transportation was snowmachine (91%) (Table 6). During 1990, most lynx (41%) were captured during January (Table 5).

The 1990 wolverine harvest in Unit 12 and Subunit 20E was 14 and 4, respectively (Table 1 and 2). The harvest was lower than the 5-year mean (17 in Unit 12, 7 in Subunit 20E). Most of the harvest in Unit 12 occurred in mountainous areas. In Subunit 20E there was no harvest concentration, but rather a few wolverines captured in most areas where trapping occurred. This indicates that the wolverine population is distributed at low densities across the area. Males have composed 67% (range of 53-93%) and 68% (range of 50-83%) of the harvest in Unit 12 and Subunit 20E, respectively.

Interest in beaver and otter trapping is low in both Unit 12 and Subunit 20E because of low pelt prices and difficult trapping conditions. The 1990 beaver harvest in Unit 12 was 19 (Table 1). This harvest was similar to the previous three years but less than harvests during the early 1980s. In Subunit 20E, the annual harvest averaged three (range 1-5) (Table 2). Beavers in Subunit 20E have been underutilized probably since the mining heyday in the early 1900s. No otters have been trapped in Subunit 20E during the past 5 years and an average of only 3 otters have been taken annually in Unit 12.

Habitat Assessment and Enhancement

Snowshoe hares have not reached the expected high densities or expanded their range to occupy all of the suitable habitat in Unit 12 and Subunit 20E during this cycle. The main factor that may have restricted greater snowshoe hare population growth is inadequate food resources. Seral plant communities, which are highly productive hare forage, are limited in this area because of the lack of wildfires. More than 30 years of strict fire suppression activities have occurred in the Upper Tanana area. The result is an older, less diverse mosaic of habitats than would have existed under a natural fire regime. There are several large areas of early to mid-seral habitats in Subunit 20E because of wildfires. In these areas, the hare and lynx populations are much higher than compared with the rest of Unit 12 and Subunit 20E. A result of the lower magnitude snowshoe hare peak is a lower magnitude lynx cycle.

The Alaska Interagency Fire Management Plan for the Upper Tanana area became effective in 1984. This plan outlines areas that will be afforded limited fire suppression. All the land-managing agencies agreed to the plan. This approach should restore a more natural fire regime and eventually improve habitat heterogeneity. Having a more diverse mosaic of habitats will benefit all furbearer species.

CONCLUSIONS AND RECOMMENDATIONS

Trapping pressure was not directly measured. However, information collected from sealing data, trapper questionnaires, and discussions with area trappers suggest that pressure on marten has remained high during the report period. Trapping pressure was moderate on lynx and low on wolverine, beaver, otter, and fox. Low pelt prices have caused lower interest in these other species.

Competition for marten is now high in both units. Access to these units is limited. Thus, large refuge areas exist for marten. Based on marten distribution and abundance data there is no need for any changes in the season length, bag limits, or methods and means of harvest.

Wolverines have declined since the 1960s and are currently stable at low levels in both units (Kelleyhouse 1990). Wolverine food resources have increased in the past 5 years as moose and caribou numbers have increased in parts of the 2 units. Area trappers do not select for wolverines, and harvest has been low the past 5 years. These 2 factors should enable wolverines to increase and expand into the lowland habitats. All other furbearer populations are fluctuating within historical ranges and do not warrant changes in seasons and bag limits or in methods and means.

LITERATURE CITED

Buckley, J.L., and W.L. Libby. 1953. Growth rates and age determination in Alaskan beaver. Trans. North Am. Wildl. Conf. 20:495-507.

Gardner, C.L. 1985. The ecology of wolverines in southcentral Alaska. M.S. Thesis. Univ. Alaska, Fairbanks. 82pp.

Kelleyhouse, D.G. 1990. Unit 12 and 20E survey-inventory progress report. Pages 94-101 and 185-190 in S.O. Morgan, ed. Annual report of survey-inventory activities. Furbearers. Vol. XX, Part XIV. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Proj. W-23-2. Juneau.

Stephenson, R.O. 1988. Development of techniques for evaluating lynx population status in Alaska. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-22-6. Juneau. 6pp.

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Table 1. Unit 12 beaver, lynx, otter, and wolverine harvest, 1986-91.

Regulatory	Reported harvest						Estimated harvest		Method of take				Total	Total trappers/
year	M	F	Unk.	Juv.[a]	Adults	Unk.	Unreported	Illegal	Trap/snare	Shot	(L&S)[b]	Unk.	harvest	hunters
Beaver														
1986-87	0	0	55	5	50	0	20	0	44	3	0	8	75	16
1987-88	0	0	18	5	13	0	20	0	18	0	0	0	38	6
1988-89	0	0	15	2	13	0	20	0	15	0	0	0	35	7
1989-90	0	0	14	3	11	0	20	0	13	0	0	1	34	5
1990-91	0	0	18	6	12	1	20	0	18	0	0	1	39	7
Lynx														
1986-87	0	0	80	11	69	0	0	0	78	0	0	2	80	32
1987-88	0	0	74	21	53	0	0	0	72	2	0	0	74	35
1988-89	0	0	70	13	57	0	0	0	65	5	0	0	70	29
1989-90	0	0	78	18	60	0	0	0	74	3	0	1	78	28
1990-91	0	0	133	23	110	0	0	0	131	2	0	0	133	40
Otter														
1986-87	2	2	0	0	0	7	3	0	4	0	0	0	7	3
1987-88	1	8	1	0	0	13	3	0	7	3	0	0	13	5
1988-89	2	0	0	0	0	5	3	0	2	0	0	0	5	2
1989-90	0	0	0	0	0	3	3	0	3	0	0	0	3	0
1990-91	1	0	0	0	0	4	3	0	1	0	0	0	4	1
Wolverine														
1986-87	18	14	0	0	0	32	0	0	27	2	0	3	32	15
1987-88	13	5	1	0	0	19	0	0	18	0	1	0	19	12
1988-89	9	5	0	0	0	14	0	0	10	4	0	0	14	8
1989-90	8	4	0	0	0	12	0	0	10	0	0	2	12	11
1990-91	13	1	0	0	0	14	0	0	14	0	0	0	14	8

[a] Beavers ≤52"; lynx ≤35" in length.

[b] L&S (land and shoot) refers to animals taken by hunters the same day hunters were airborne.

[c] Unknown.

Table 2. Subunit 20E beaver, lynx, otter, and wolverine harvest, 1986-91.

Regulatory year	Reported harvest						Estimated harvest		Method of take				Total harvest	Total trappers/ hunters
	M	F	Unk.	Juv.[a]	Adults	Unk.	Unreported	Illegal	Trap/snare	Shot	(L&S)[b]	Unk.		
Beaver														
1986-87	0			0	5	0	5	0	1	0	0	4	10	2
1987-88	0			0	3	0	5	0	3	0	0	0	8	1
1988-89	0			0	1	0	5	0	1	0	0	0	6	1
1989-90	0			0	3	0	5	0	3	0	0	0	8	2
1990-91	0			0	3	0	5	0	3	0	0	0	8	2
Lynx														
1986-87	0			0	11	0	0	0	11	0	0	0	11	5
1987-88	0			3	6	0	0	0	9	0	0	0	9	5
1988-89	0			7	18	0	0	0	25	0	0	0	25	10
1989-90	0			10	19	0	0	0	29	0	0	0	29	12
1990-91	0			19	51	0	0	0	68	2	0	0	70	22
Otter														
1986-87	No reported harvest													0
1987-88	No reported harvest													0
1988-89	No reported harvest													0
1989-90	No reported harvest													0
1990-91	No reported harvest													0
Wolverine														
1986-87	5	5	0	0	0	10	0	0	8	0	0	2	10	9
1987-88	5	2	0	0	0	7	0	0	5	0	0	2	7	6
1988-89	1	0	0	0	0	1	0	0	1	0	0	0	1	1
1989-90	10	4	0	0	0	14	0	0	14	0	0	0	14	11
1990-91	3	1	0	0	0	4	0	0	4	0	0	0	4	4

[a] Beavers ≤52"; lynx ≤35" in length.

[b] L&S (land and shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 3. Unit 12 beaver, lynx, otter, and wolverine harvest[a] chronology by time period, 1986-91.

Regulatory year	Harvest periods					
	Sep/Oct	November	December	January	February	March	April
Beaver							
1986-87	0	7	7	2	7	26	6
1987-88	0	9	0	0	0	7	2
1988-89	0	6	2	0	2	5	0
1989-90	0	9	1	0	0	4	0
1990-91	0	1	0	1	9	6	1
Lynx							
1986-87	0	7	46	27	0	0	0
1987-88	0	0	34	34	1	0	0
1988-89	0	2	34	25	2	0	0
1989-90	0	3	51	23	0	0	0
1990-91	0	4	36	90	0	0	0
Otter							
1986-87	0	0	0	0	2	2	0
1987-88	0	0	0	0	0	0	0
1988-89	0	0	1	0	0	0	1
1989-90	0	0	0	1	0	0	0
1990-91	0	0	0	0	0	1	0
Wolverine	0	2	9	4	10	5	0
1986-87	0	1	2	5	9	4	0
1987-88	4	1	1	4	4	0	0
1988-89	0	1	1	4	4	0	0
1989-90	0	1	3	6	0	0	0
1990-91	0	1	3	4	6	0	0

[a] Unknown not included.

Table 4. Subunit 20E beaver, lynx, otter, and wolverine harvest chronology by time period, 1986-91.

Regulatory	Harvest periods						
year	Sep/Oct	November	December	January	February	March	April
Beaver							
1986-87	0	0	0	0	1	2	2
1987-88	0	1	2	0	0	0	0
1988-89	0	0	0	0	0	1	0
1989-90	0	0	2	0	0	1	0
1990-91	0	0	2	0	0	1	0
Lynx							
1986-87	0	0	7	4	0	0	0
1987-88	0	0	5	4	0	0	0
1988-89	0	0	11	12	0	0	0
1989-90	0	0	19	9	1	0	0
1990-91	0	18	23	29	0	0	0
Otter							
1986-87	No reported harvest						
1987-88	No reported harvest						
1988-89	No reported harvest						
1989-90	No reported harvest						
1990-91	No reported harvest						
Wolverine							
1986-87	1	3	2	3	1	0	0
1987-88	0	0	0	4	2	0	0
1988-89	0	0	0	0	1	0	0
1989-90	0	1	6	7	0	0	0
1990-91	0	0	1	2	1	0	0

Table 5. Unit 12 harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest							
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Beaver								
1986-87	0	20	0	0	56	0	7	16
1987-88	0	28	0	0	56	0	17	0
1988-89	0	0	0	0	73	0	27	0
1989-90	0	0	0	0	93	0	0	7
1990-91	0	0	0	0	47	0	5	47
Lynx								
1986-87	0	1	0	0	85	0	10	4
1987-88	3	5	0	0	74	0	7	11
1988-89	1	1	0	0	86	0	11	0
1989-90	4	10	0	0	82	0	0	4
1990-91	2	5	0	0	89	0	2	3
Otter								
1986-87	No reported harvest							
1987-88	No reported harvest							
1988-89	No reported harvest							
1989-90	No reported harvest							
1990-91	No reported harvest							
Wolverine								
1986-87	34	0	0	0	50	0	6	9
1987-88	5	5	0	0	90	0	0	0
1988-89	29	0	0	7	57	0	0	7
1989-90	17	25	0	0	42	0	0	17
1990-91	0	21	0	0	57	0	0	21

Table 6. Subunit 20E harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest							
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Beaver								
1986-87	0	20	0	0	0	0	0	80
1987-88	0	0	0	0	100	0	0	0
1988-89	0	0	0	0	100	0	0	0
1989-90	0	0	0	0	100	0	0	0
1990-91	0	67	0	0	33	0	0	0
Lynx								
1986-87	0	18	0	0	64	0	0	18
1987-88	0	33	0	0	67	0	0	0
1988-89	12	24	0	8	48	0	8	0
1989-90	0	45	0	0	48	0	7	0
1990-91	0	7	0	0	0	83	1	9
Otter								
1986-87	No reported harvest							
1987-88	No reported harvest							
1988-89	No reported harvest							
1989-90	No reported harvest							
1990-91	No reported harvest							
Wolverine								
1986-87	10	20	0	0	70	0	0	0
1987-88	29	0	0	0	29	0	14	29
1988-89	0	0	0	0	100	0	0	0
1989-90	14	36	0	0	50	0	0	0
1990-91	25	0	0	0	75	0	0	0

LOCATION

Game Management Unit: 14 (6,625 mi^2)

Geographical Description: Eastern Upper Cook Inlet

BACKGROUND

Unit 14 is divided into 3 subunits, and contains half (270,000) of the people living in Alaska. The human population increased 122% in the Matanuska-Susitna valley between 1980 and 1990 (Alaska Department of Labor). Human development occurred primarily in Subunits 14A and 14C, and along the highway/railroad corridor in Subunit 14B. No detailed records exist, but indications are that most fur species were abundant, relative to available habitat, before extensive human development.

Although large portions of Unit 14 remain uninhabited, all areas are affected by their proximity to Anchorage (which contains 2 large military bases) and the communities along the highway corridors. Most fur trapping and hunting is recreational, and occurs in locations easily accessible by road. In most of the western half of Subunit 14C (Anchorage and Chugach State Park) trapping is prohibited or severely restricted. As a result, most residents of Anchorage desiring to trap or hunt furbearers travel to Subunits 14A and 14B. In recent years, access to backcountry areas has improved greatly with increased use of snowmachines and 3- and 4-wheelers.

MANAGEMENT DIRECTION

Management Goals

Management goals for this area are to: 1) maintain existing populations; 2) provide the opportunity to trap and hunt furbearers; and 3) provide for optimal harvest of furbearers.

Management Objective

The management objective for this area is to develop measurable population objectives for all furbearer species.

METHODS

Information on trapping conditions, trapping effort, and trends in furbearer abundance and distribution were collected using a standard trapper questionnaire developed by the ADF&G staff and sent to trappers sealing fur in Unit 14. During 1989-90, 90 questionnaires were mailed, and 39 trappers responded. During 1990-91, we mailed 92 questionnaires and 32 trappers responded. Three area-specific questions were added, regarding lynx, marten, wolverine, and beaver regulations.

We collected harvest data on wolverines, lynx, land otters, and beavers by sealing all pelts presented for examination. Minimum harvest information for other species was gathered using furbearer acquisition reports (which furbuyers are required to submit to ADF&G) and, in 1990-91, from a voluntary response form requesting harvest data on species not sealed (included with the trapper questionnaire). During sealing, data on age (for beavers and lynx) and sex (for land otters, lynx, and wolverines) were collected when practical.

During fall 1989, we conducted aerial surveys to count beaver lodges and caches on selected rivers. These surveys were flown primarily to test the feasibility of this technique in helping to determine trends in beaver abundance.

During March 1991, 11 count areas for muskrat pushups were delineated on the eastern portion of Palmer Hay Flats State Game Refuge. These areas were established to determine trends in the number of muskrat pushups in areas affected by the Glenn Highway (Eklutna to Parks Highway) widening project (USDOT and DOT/PF 1988). Biologists conducted ground surveys, counting all pushups in 10 count areas. All count areas were surveyed from a Piper PA-18 Supercub as well, in an attempt to determine the suitability of using aircraft to count pushups.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Extensive studies have not been conducted to determine population status or trend for any fur species in Unit 14. Limited information was available from trapper questionnaires, but the response rate to the questionnaire was low; of 39 respondents to our 1989-90 questionnaire (90 survey forms mailed), only 29 actively trapped that season; of 32 respondents to our 1990-91 questionnaire (92 survey forms mailed), only 19 trapped during that season. Low fur prices and unfavorable weather conditions contributed to the lack of trapping effort.

Abundance of beavers, coyotes, mink, red foxes, squirrels, land otters and weasels was rated as "common." Lynx, marten, and wolverine abundance was commonly as "scarce." Muskrat abundance was rated "abundant" during 1989-90, but divided between "common" and "scarce" during 1990-91. Prey species such as grouse and mice were called "common" both years, but most trappers rated hare and ptarmigan abundance as "common" during 1989-90 and "scarce" during 1990-91.

Trend data were derived by asking trappers to compare numbers of furbearers between winters. Most trappers felt that coyote and ptarmigan (and lynx and hare, to a lesser degree) numbers increased between the 1988-89 and 1989-90 trapping seasons, while all other fur and prey species remained the same. During 1990-91, most trappers felt numbers of both prey and fur species remained the same compared to 1989-90, with the exception of red foxes; most trappers felt fox numbers declined between those 2 seasons.

Biologists felt the beaver lodge/cache surveys were of limited use (William Collins pers. comm.), as beaver distribution followed expected patterns, with relatively unharvested beaver populations in major river systems (Susitna, Little Susitna, Matanuska and Knik) providing a stable source of immigrants to the smaller, more heavily-trapped creeks.

Five person-days were required to ground-survey 10 muskrat pushup count areas. The number of pushups found in each area ranged from 2-145, but pushup density has not been calculated. Aerial surveys took about 1.5 hours, but there was not a constant relationship between the number of pushups seen from the air and the number seen during ground surveys (Table 1). This was because of the large number of pushups in willow/alder/spruce habitats and the large variability in pushup sizes.

During informal interviews, most long-time trappers/hunters indicated that hare numbers were low throughout Unit 14. These interviews yielded no consistent response when trappers were asked about the last peak in hare numbers in this area. Hare sign can be found in isolated pockets, and these areas may receive heavy hunting pressure. Hare numbers in the Denali National Park area peaked during winter 1990-91 (Victor Van Ballenberge, pers. comm.), but the trend did not hold for Unit 14.

Distribution and Movements: Coyotes and beavers appeared to be distributed throughout the lower-elevation (<3000 feet) areas of Unit 14. Harvest data indicated most lynx occurred in the Knik River drainage, but lynx have been reported occasionally in many areas, including urban areas. Wolverines were generally caught in the mountainous areas of Unit 14. Marten appear to be distributed throughout most rural areas, and red foxes occurred in most lower elevation areas north of Eagle River. Information was scarce on most other species, but I believe these species were generally distributed throughout available habitats.

Mortality

Harvest:

Seasons and Bag Limits. Beaver trapping season in Subunits 14A and 14B was from 10 November to 30 April and the bag limit was 30 per season. The beaver trapping season in Subunit 14C was from 1 February to 31 March with a bag limit of 20 per season.

Coyote trapping season in Subunits 14A and 14B was from 10 November to 31 March and the season in Subunit 14C was from 10 November to 28 February. Trappers did not have a bag limit for coyotes in the unit. Coyote hunting season in Unit 14 was from 1 September to 30 April with a bag limit of 2 per season.

Trapping season for red foxes in Unit 14 was from 10 November to 28 February. The bag limit in Subunit 14C was 1 per season however in Subunits 14A and 14B there was no trapping bag limit on foxes. Red fox hunting season in Unit 14 was from 1 November to 15 February with a bag limit of 2 per season.

Lynx hunting and trapping seasons were closed in the unit during 1989-90. In 1990-91, lynx hunting and trapping seasons were from 15 December to 15 January. The hunting bag limit was 2 lynx per season, however, trappers had no bag limit.

Trapping season for wolverines was from 10 November to 28 February and there was no bag limit. Wolverine hunting season was from 1 September to 31 March with a bag limit of 1 per season.

Trapping season for land otters in Subunits 14A and 14B was from 10 November to 31 March while the season in Subunit 14C was from 10 November to 28 February. There was no otter bag limit in the unit.

Trapping season for marten, mink, and weasels was from 10 November to 31 January and there was no bag limit. Trapping season for muskrats was from 10 November to 15 May and there was no bag limit.

Board of Game Actions and Emergency Orders. In a report to the Board of Game (ADF&G 1987), ADF&G recommended a "tracking harvest strategy" for lynx management. The board and ADF&G adopted this system which resulted in an emergency closure of the 1987-88 season, and closure of the 1988-89 and 1989-90 seasons. A 1-month season was established for the 1990-91 season.

Hunter/Trapper Harvest. Sealing records for beavers, land otters, lynx, and wolverines indicated relatively low harvest levels with moderate variability between years. The beaver harvest was similar during the 1989-90 and 1990-91 seasons, but was lower than any season since 1984-85 (Table 2). Land otter harvest has fluctuated between 8 and 50 in the last 10 years (Table 3). The lynx season was closed from fall 1987 to spring 1990. During 1990-91, 13 lynx were taken; a harvest similar to the average harvest of the 6 seasons before closure (Table 4). Wolverine harvest varied from 7 to 16 during the last decade (Table 5). Most trappers used traps and snares for these species (Tables 2-5).

Harvest of species for which sealing was not required was unknown, but minimum numbers were available from fur acquisition and export reports. Marten harvest was at least 12 and 101 during the 1989-90 and 1990-91 seasons, respectively. Muskrat harvest was at least 88 and 129, respectively, during the same seasons. Harvest of other species was usually less than 20 for these 2 seasons. However, ADF&G was unable to measure whether fur acquisition and export reports accurately reflected harvest. Many furbearers were never sold to furbuyers, especially in an area where most people trapped for recreation. Results from the voluntary reporting form included in the 1990-91 trapper questionnaire indicated at least 25 coyotes, 24 marten, 47 mink, 21 muskrats, 10 red foxes, 25 red squirrels, and 14 weasels were taken that season.

Many trappers indicated that excessive snow conditions, poor weather, and low fur prices hampered their efforts during 1989-90 and 1990-91 trapping seasons. The eruption of Mt. Redoubt and resulting ash deposits, contributed to poor snow conditions. Most trappers in Unit 14 limited their trapping to areas easily accessible by road, so there was not much trapping pressure in the backcountry. Comments at local trapper's meetings indicated that most trappers had work and family responsibilities that limited their trapping effort.

Harvest Chronology. Harvest chronology can vary greatly depending on weather conditions and season dates. Chronology data for beaver harvests before the 1989-90 season were not summarized; data for other species encompassed the last 10 trapping seasons. Most beaver were taken in spring (Table 6), and land otter harvest occurred throughout the trapping season (Table 7). Lynx and wolverine harvests closely reflected the open seasons (Tables 8 and 9); there were no data on incidental harvest of lynx during other (longer) fur trapping seasons.

Transport Methods. Data on the mode of transportation trappers used to get to their trapping areas were not collected before 1986. For beavers and land otters, these data were not summarized before the 1989-90 and 1987-88 seasons, respectively. To harvest beavers, land otters, and lynx, most trappers used modes of transport accessible from the road system (Tables 10, 11 and 12); few used aircraft. For wolverines, however, an average of 17% of trappers used aircraft (Table 13). Results from 1989-90 and 1990-91 trapper questionnaires indicated that in both years 53% of the respondents used highway vehicles to get to their trapping areas, and 42% and 51% (in 1989-90 and 1990-91, respectively) used snowmachines to travel around their traplines.

Other Mortality: During the 1989-90 and 1990-91 regulatory years, 10 and 8 beavers, respectively, were taken under nuisance beaver control permits authorized by ADF&G. Most of these beaver were taken by Alaska Railroad Corporation track maintenance crews, and state or borough road maintenance crews to prevent damage to roadbeds.

CONCLUSIONS AND RECOMMENDATIONS

The furbearer populations in Unit 14 are used primarily by recreational trappers who enjoy getting out on weekends and taking a few animals. Beavers are the prevalent money-producing species. Harvests of other species are relatively low, probably because of increasing human population pressures and, in the recent past, to low fur prices. The goal to provide opportunity to trap/hunt furbearers is being met, however, we do not have a way to measure whether fur harvests are optimal.

Progress toward establishing management objectives for furbearers is slow. The trapper questionnaire is the primary tool we use to discern trends in fur population abundance and trapper effort. This questionnaire is limited in its utility, but should continue until resources are devoted to more useful and quantitative methods. During the 1991-92 trapping season, we established 4 track count trend lines in Subunits 14A (n=3) and 14B (n=1). If strict protocol is followed, these lines will begin to provide useful data on population trends for terrestrial furbearers and their prey. Muskrat pushup surveys on Palmer Hay Flats State Game Refuge should also continue.

The only reliable harvest data are provided through sealing of pelts. The extent of incidental catch and subsequent sealing during a legal season for any species is unknown. The best way to minimize this is to have concurrent seasons, but this is difficult in an area where species such as coyotes are abundant, but lynx and wolverines occur in limited areas. Also, the lynx tracking harvest strategy depends on flexible season dates. It may be useful to allow trappers to keep a limited number of incidental catches (assuming they are reported), however, this may not adequately protect isolated populations when they need protection. Reliable track count data (including production data for lynx) may be the only way to assess local lynx population trends. After this "independent" measure of population trends is in place for a time, biologists could better evaluate effects of incidental catches on population recovery/trends.

Little is known about historic marten abundance and habitat use, or about the importance of marten to local trappers. However, most respondents to our trapper survey indicated marten seasons should be restricted or closed to allow marten populations to recover. Collins (1990) discussed marten abundance and habitat requirements, and the effects of trapping on marten, and recommended the marten season be reduced 52 days (15 December to 15 January). I concur with this recommendation and would like to see a requirement that marten be sealed as well. Marten prices are relatively high and rising, yet we collect almost no data to help us monitor harvest.

Traditionally, many people hunted hares in Unit 14, and we get many inquiries concerning hare population size and distribution. Trend area lines will help determine hare population trends, and it may be helpful to consider turd transects (Krebs et. al 1987) in the future. If trends in hare populations become evident in the future, it may be useful to test a hare management strategy that tracks population trends to provide adequate protection for refugia during periods of low population numbers. I speculate that cycles in hare numbers may be dampened, extended, or eliminated near major population centers because of continued harvest pressure on habitats that normally serve as refugia. Peaks in hare abundance may also reflect land use practices; e.g., large-scale land clearing for development may cause a subsequent local increase in hare numbers, which might be mistaken for a peak in the hare cycle.

We need to formulate management objectives for fur species that are measurable, achievable and time-specific. We are currently limited to harvest data (and thus harvest objectives), for those species for which sealing is required. Since fur harvest depends heavily on weather, fur prices, and trapper effort, it may be best to base any harvest objective on some average harvest. Assuming current harvest levels are not excessive and prices are relatively low, I would propose annual harvest objectives of 20 land otters and 10 wolverines for the next 5 years (fall 1991 through spring 1996). These values are based on the current 10-year average harvest (Tables 3 and 5). I would propose an annual harvest objective of 250 beavers, based on the recent 7-year average (Table 2). This objective would also be evaluated in 5 years. Assuming the lynx season will be closed periodically, I propose an annual harvest objective of 12 lynx during open seasons. This value is based on the average annual harvest of 11 during the 6 years before the adoption of the tracking harvest strategy and subsequent closed seasons (Table 4).

Being minimum values, these annual harvest objectives may help determine management action when harvest falls below objectives, but they will not provide an indication of whether a particular harvest level provides or exceeds optimal yield. Track count trend lines (and transects specifically for hares and other prey species) may provide a means to help establish population trend objectives, and refine harvest objectives, in the future.

LITERATURE CITED

Alaska Department of Fish and Game. 1987. Report to the Board of Game on lynx management. Alaska Dept. Fish and Game, Div. of Wildl. Cons., Juneau. 30pp.

Alaska Department of Fish and Game. 1989. Report to the Board of Game on lynx management: an update. Alaska Dept. Fish and Game, Div. of Wildl. Cons., Juneau. 15pp.

Collins, W.B. 1990. Furbearers: survey-inventory progress report. Pages 102-114 in Morgan, S.O., ed. Annual report of survey-inventory activities. Vol. XX. Part XIV. Alaska Dept. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-23-2. Juneau.

Krebs, C.J., B.S. Gilbert, S. Boutin, and R. Boonstra. 1987. Estimation of snowshoe hare population density from trend transects. Can. J. Zool. 65:565-567.

U.S. Department of Transportation and Alaska Department of Transportation and Public Facilities. 1988. Glenn Highway, Eklutna to Parks Highway, Anchorage and

Matanuska-Susitna Borough, Alaska: final environmental impact statement/section 4(f) evaluation. 292pp.

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Table 1. Number of muskrat pushups observed in count areas adjacent to the Glenn highway on Palmer Hay Flats State Game Refuge, 27 March - 1 April 1991.

Count Area	Number Pushups Observed		Percent ground pushups seen from air
	Ground	Aerial	
1	145	50	34
2	2	1	50
3	42	24	57
4	not surveyed	---	
5	86	39	45
6	63	24	38
7	46	43	93
8	45	31	69
9	68	55	81
10	6	4	67
11	29	11	38

Table 2. Unit 14 beaver harvest, 1986-91.

Regulatory	Reported harvest			Method of take			Successful
year	Juv[a] (%)	Adults	Total	Trap/snare	Shot	Unk.	Trappers/hunters
1986-87	58 (17)	281	339	291	1	47	---
1987-88	29 (11)	237	266	233	0	33	---
1988-89	30 (15)	166	196	175	0	21	---
1989-90	41 (27)	113	154	135	0	19	39
1990-91	44 (28)	111	155	149	4	2	34

[a] Beaver measuring $\leq$ 52 inches (length plus width).

Table 3. Unit 14 land otter harvest, 1986-91.

Regulatory	Reported harvest				Method of take			Successful
year	Male	Female	Unk.	Total	Trap/snare	Shot	Unk.	Trappers/hunters
1986-87	12	14	8	34	32	0	2	---
1987-88	5	3	0	8	8	0	0	6
1988-89	3	4	1	8	8	0	0	8
1989-90	11	9	4	24	22	0	2	14
1990-91	1	7	2	10	8	2	0	7

[a] No harvest data for Game Management Subunit 14C available.

Table 4. Unit 14 lynx harvest, 1986-91.

Regulatory	Reported harvest						Method of take					Successful
year	M	F (%)	Unk.	Juv[a] (%)	Ad	Unk.	Trap/snare	Shot	(L&S)[b]	Unk.	Total	Trappers/hunters
1986-87	1	2 (67)	2	0 (0)	3	2	5	0	(0)	0	5	3
1987-88[c]	0	0 (0)	0	0 (0)	0	0	0	0	(0)	0	0	0
1988-89[c]	0	0 (0)	0	0 (0)	0	0	0	0	(0)	0	0	0
1989-90[c]	0	0 (0)	0	0 (0)	0	0	0	0	(0)	0	0	0
1990-91	8	5 (38)	0	7 (54)	6	0	11	2	(0)	0	13	8

[a] Lynx measuring ≤ 34 inches in length.
[b] L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.
[c] Season closed.

Table 5. Unit 14 wolverine harvest, 1986-91.

Regulatory	Reported harvest			Method of take					Successful
year	Male	Female (%)	Unk.	Trap/snare	Shot	(L&S)[a]	Unk.	Total	Trappers/hunters
1986-87	4	3 (43)	0	6	1	(0)	0	7	6
1987-88	4	3 (43)	0	5	1	(1)	1	7	6
1988-89	6	4 (40)	0	10	0	(0)	0	10	5
1989-90	5	3 (37)	0	6	2	(0)	0	8	6
1990-91	9	7 (44)	0	16	0	(0)	0	16	10

[a] L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 6. Unit 14 beaver harvest chronology percent by time period, 1989-91.

Regulatory	Harvest period										
Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Unk.	Total
1989-90	0	1	15	14	15	8	12	32	1	1	154
1990-91	2	1	8	4	4	27	26	19	1	6	155

Table 7. Unit 14 land otter harvest chronology percent by time period, 1986-91.

Regulatory	Harvest period							
Year	October	November	December	January	February	March	Unk.	Total
1986-87	0	12	30	22	27	3	5	34
1987-88	12	12	25	25	25	12	0	8
1988-89	0	17	50	0	0	12	12	8
1989-90	0	20	25	8	42	8	0	24
1990-91	0	20	10	20	30	20	0	10

Table 8. Unit 14 lynx harvest chronology percent by time period, 1986-91.

Regulatory Year	Harvest period								Total
	September	October	November	December	January	February	March	Unk.	
1986-87	0	0	0	40	60	0	0	0	5
1987-88[a]	0	0	0	0	0	0	0	0	0
1988-89[a]	0	0	0	0	0	0	0	0	0
1989-90[a]	0	0	0	0	0	0	0	0	0
1990-91	0	0	0	38	62	0	0	0	13

[a] Season closed

Table 9. Unit 14 wolverine harvest chronology percent by time period, 1986-91.

Regulatory Year	Harvest period								Total
	September	October	November	December	January	February	March	Unk.	
1986-87	0	0	0	43	0	57	0	0	7
1987-88	0	0	0	43	14	14	29	0	7
1988-89	0	0	0	10	10	80	0	0	10
1989-90	12	0	25	0	63	0	0	0	8
1990-91	0	0	12	31	6	50	0	0	16

Table 10. Unit 14 beaver harvest percent by transport method, 1989-91.

Regulatory Year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	Total
1989-90	3	23	23	0	28	0	6	17	154
1990-91	0	32	0	1	43	0	17	6	155

Table 11. Unit 14 land otter harvest percent by transport method, 1987-91.

Regulatory Year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	Total
1987-88	0	88	0	0	12	0	0	0	8
1988-89	0	25	0	0	25	0	38	12	8
1989-90	0	71	0	0	8	0	13	8	24
1990-91	0	60	0	0	0	0	40	0	10

Table 12. Unit 14 lynx harvest percent by transport method, 1986-91.

Regulatory Year	Percent of harvest								Total
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
1986-87	0	100	0	0	0	0	0	0	5
1987-88[a]	0	0	0	0	0	0	0	0	0
1988-89[a]	0	0	0	0	0	0	0	0	0
1989-90[a]	0	0	0	0	0	0	0	0	0
1990-91	0	15	0	0	31	0	8	46	13

[a] Lynx season closed.

Table 13. Unit 14 wolverine harvest percent by transport method, 1986-91.

Regulatory Year	Percent of harvest								Total
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
1986-87	0	72	0	0	14	0	0	14	7
1987-88	57	14	0	0	14	0	14	0	7
1988-89	10	30	0	0	60	0	0	0	10
1989-90	12	38	0	12	0	0	38	0	8
1990-91	19	44	0	0	12	0	0	25	16

LOCATION

Game Management Unit: 16 (12,225 mi^2)

Geographical Description: West side of Cook Inlet

BACKGROUND

Unit 16 contains few people, but receives a large amount of recreational use by people living in Anchorage, the Matanuska-Susitna Valley and the Kenai Peninsula. Permanent residents of this area live primarily in the villages of Beluga and Tyonek, and along the Parks Highway and Petersville Road. Wildlife habitat remains largely unaltered, and furbearers are expected to occur at naturally-regulated densities in suitable habitats. No major fires have occurred since the late 1950s (D. Harkness, pers. comm.). Most fur trapping/hunting is recreational, but a few local residents trap for their primary winter income (Harkness 1990). Recreational trappers appear to exert considerable influence on marten and wolverine populations (J. Delia, pers. comm.).

MANAGEMENT DIRECTION

Management Goals

Management goals for this area are to: 1) maintain existing furbearer populations; 2) provide for optimum harvest of furbearers; and 3) provide for the greatest opportunity to participate in trapping and hunting furbearers.

Management Objective

The management objective for this area is to develop measurable population objectives for all furbearer species.

METHODS

We collected information on trapping conditions, trapping effort, and trends in furbearer abundance and distribution from interviews with long-time trappers, and by using a standard ADF&G trapper questionnaire sent to trappers sealing fur in Unit 16. We collected harvest data for wolverines, lynx, land otters, and beavers by sealing all pelts presented for examination. We gathered minimum harvest information for other species using furbearer acquisition reports (which furbuyers were required to submit to ADF&G) and fur export reports (for furs exported by individual trappers). During sealing, we collected data on age (for beavers and lynx) and sex (for land otters, lynx, and wolverines) when practical.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: No extensive studies have been conducted to determine population status or trend for any fur species in Unit 16. Response to the trapper questionnaire has been poor, probably because limited trapping effort which resulted from low fur prices and difficult weather conditions during the 1989-90 and 1990-91 trapping seasons. Interviews with long-time trappers indicate coyote numbers have increased in the past 20 years, and marten, lynx, and wolverine numbers have decreased (D. Harkness, pers. comm.). Near Skwentna, marten populations peaked during winter 1986-87 (based on harvest), and lynx, wolverine, and hare populations have remained low for at least 20 years (J. Delia, pers. comm.). Beavers appeared plentiful in available habitat, and other fur and prey species we assumed were common in suitable habitats.

Mortality

Harvest:

Seasons and Bag Limits. During regulatory years 1989-90 and 1990-91 the seasons and bag limits in Unit 16 were as follows. Beaver trapping season was from 10 November to 30 April and the bag limit was 30 per season. Coyote and land otter trapping seasons were from 10 November to 31 March with no bag limit. Coyote hunting season was from 1 September to 30 April and the bag limit was two per season. Trappers were allowed to take red foxes from 10 November to 28 February and had no bag limit. Red fox hunting season was from 1 November to 15 February and the bag limit was 2 foxes per season. The lynx season was not open during 1989-90, however, trappers were allowed to take an unlimited number of lynx and hunters 2 lynx per season between 15 December to 15 January in 1990-91. Trapping season for wolverines was from 10 November to 28 February with no bag limit. Wolverines could be hunted between 1 September to 31 March and the bag limit was one per season. Trapping season on marten, mink, and weasels was 10 November to 31 January with no bag limit. Muskrats could be trapped in unlimited numbers between 10 November and 10 June.

Board of Game Actions and Emergency Orders. In a report to the Board of Game (ADF&G 1987), ADF&G recommended a "tracking harvest strategy" for lynx management. The board and ADF&G adopted this system (ADF&G 1989), which resulted in an emergency closure of the 1987-88 season, and closure of the 1988-89 and 1989-90 seasons. A one-month season was established for the 1990-91 season.

Hunter/Trapper Harvest. Winter 1989-90 brought record snowfall to the Susitna Valley. Heavy snowfall began in October and continued through the winter. Early winter snow accumulation during 1990-91 was similar to that of 1989-90, but snowfall after January 1991 was relatively light compared to 1989-90. Many trappers indicated that excessive snow conditions, poor weather and low fur prices hampered their efforts during the 1989-90 and 1990-91 trapping seasons. The eruption of Mt. Redoubt (late 1989), and resulting ash deposits, also affected snow conditions during that season.

Harvests of beavers, land otters, and wolverines during 1989-90 and 1990-91 declined from previous years and were well below the 6-year average harvests for these species (Tables 1-3). No lynx were reported taken during 1990-91; lynx season had been closed the previous 3 seasons (Table 4). Almost all trappers used traps or snares to catch beavers and land otters (Tables 1 and 2). Most wolverines were caught with traps and snares as well, but a significant portion were reported shot from the ground (Table 3).

Harvest of species for which sealing was not required were based on minimum numbers available from fur acquisition and export reports. At least 106 and 98 marten were reported taken during 1989-90 and 1990-91, respectively, from Unit 16. Acquisition reports indicated low ($\leq$ 26 individuals) harvests of other species per season (primarily mink and red foxes). ADF&G has no way to measure whether fur acquisition and export reports accurately reflect harvests. Many furs were not sold to furbuyers, especially in an area where most people trap for recreation. Responses from a voluntary harvest report form included with the 1990-91 trapper questionnaire indicated at least 17 marten and 21 coyotes were taken in Subunit 16A; people trapping Subunit 16B were not queried in a similar manner.

Harvest Chronology. Most beavers were taken in spring (Table 5). While land otter and wolverine harvests occurred throughout the trapping season (Tables 6 and 7). Harvest chronology can vary greatly with weather conditions and season dates. Chronology data for beaver, land otter, wolverine, and lynx harvests before the 1989-90 season were not available. Lynx season was closed during 1989-90, and none were taken during the 1990-91 open season.

Transport Methods. Data on the method of transportation trappers used to get to their trapping areas were not collected before 1986. For beavers and land otters, most trappers used snow machines or dogsleds, and a few used airplanes (Tables 8 and 9). During the past 3 seasons, most wolverines were taken by trappers using airplanes, followed by those using snow machines and dogsleds (Table 10). Data were not available on transport methods used by lynx trappers before the closure of lynx season in 1987-88, and lynx were not taken in 1990-91.

CONCLUSIONS AND RECOMMENDATIONS

Adequate opportunity appears available to trap and hunt furbearers in Unit 16. ADF&G does not have a measure of whether fur harvests are optimum. Little progress has been made toward the establishing measurable population objectives for any species.

The best harvest data collected are provided through sealing of pelts. For serious trappers, marten are probably the most valuable fur species available, and marten are considered relatively easy to catch. Little is known, however, about historic marten abundance and habitat use, or on the importance of marten to local trappers. Information on species preyed upon by marten is also lacking. Since marten numbers have apparently declined, I recommend that ADF&G begin monitoring marten harvest more closely. his would best be accomplished through a requirement that marten be sealed.

To begin collecting population trend information, several track count trend area lines should be established in Unit 16. Subunit 16A has adequate road access to allow trend lines to be run from snow machines (and two such lines were established during winter 1991-92), but aerial transects are probably more appropriate for Subunit 16B. Transects specifically for hares (and other prey species) should also be considered.

Better management of fur species requires ADF&G begin to formulate management objectives that are measurable, achievable, and time-specific. In the absence of population data for wolverines, beavers, otter, and lynx, conservative harvest objectives should be adopted to prevent populations from being depressed for extended periods. Since fur harvest depends heavily on weather, fur prices, and trapper effort, it may be best to base any harvest objective on some average harvest. Assuming current harvest levels are not excessive and prices are relatively low, I would propose annual harvest objectives of 40 land otters and 20 wolverines for the next 5 years (fall 1991 through spring 1996). These values are based on the most recent 6-year average harvest (Tables 2 and 3). I would propose an annual harvest objective of 350 beaver, based on the recent 6-year average harvest (Table 1). This objective would also be re-evaluated 5 years hence.

Current very low, annual harvests of lynx in Unit 16 may make it difficult to implement a "tracking harvest strategy" tailored to this area. It may be necessary to rely primarily on local trapper interviews (and secondarily on harvests in Units 13, 14, and 15) to adequately set seasons and bag limits. Assuming lynx season will be closed periodically, I propose an annual harvest objective of 5 lynx during open seasons. This value is based on the average annual harvest during the 4 years before the adoption of the tracking harvest strategy (Table 4).

Harvest data (and harvest-based management objectives) alone are inadequate for proper management of any species. Annual harvest objectives may help guide management actions when harvests are below objectives, but they will not indicate whether a particular harvest level provides or exceeds optimal yield. It will be important to relate future harvests first to trapper effort, and ultimately to population densities and trends. Information now collected via trapper questionnaire does not adequately quantify trapper effort. It may be possible to get some motivated trappers to keep detailed records of both the number of sets they use and the number of days each set was active. ADF&G could select a representative sample of both recreational and "serious" trappers, and provide simple forms to collect these data. Many trappers already keep a journal, and many are willing to help if it will result in better management.

Access to portions of Unit 16 has improved in recent years, and further road access is proposed. This could affect furbearer population density and trapper effort. In the short term, collecting trapper effort data may be more practical than measures to gather population trend or density data. However, to adequately address the effects of future human endeavors, trend and density data are necessary to establish management objectives based on population indices rather than harvest data.

LITERATURE CITED

Alaska Department of Fish and Game. 1987. Report to the Board of Game on lynx management. Alaska Dep. Fish and Game, Div. of Wildl. Cons., Juneau. 30pp.

Alaska Department of Fish and Game. 1989. Report to the Board of Game on lynx management: an update. Alaska Dept. Fish and Game, Div. of Wildl. Cons., Juneau. 15pp.

Harkness, D.B. 1990. Furbearers: survey-inventory progress report. Pages 122-126 in Morgan, S.O., ed. Annual report of survey-inventory activities. Vol. XX. Part XIV. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-23-2. Juneau.

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Table 1. Unit 16 beaver harvest, 1986-91.

Regulatory year	Reported harvest				Method of take			Successful Trappers/hunters
	Juv[a] (%)	Adults	Unk.	Total	Trap/snare	Shot	Unk.	
1986/87	0 ---	0	651	651	0	0	651	---
1987/88	0 ---	0	394	394	0	0	394	---
1988/89	0 ---	0	370	370	370	0	0	---
1989/90	22 (15)	123	0	145	145	0	0	16
1990/91	30 (17)	146	0	176	171	0	5	20

[a] Beaver measuring ≤ 52 inches (length plus width).

Table 2. Unit 16 land otter harvest, 1986-91.

Regulatory year	Reported harvest				Method of take			Successful Trappers/hunters
	Male	Female (%)	Unk.	Total	Trap/snare	Shot	Unk.	
1986/87	29	32 (52)	7	68	63	0	5	---
1987/88	0	0 ---	51	51	0	0	51	---
1988/89	25	13 (34)	9	47	43	0	4	---
1989/90	5	4 (44)	11	20	18	1	1	8
1990/91	6	3 (33)	6	15	15	0	0	7

[a] Data from 1985-86 and 1987-88 not used in calculations.

Table 3. Unit 16 wolverine harvest, 1986-91.

Regulatory	Reported harvest				Method of take				Successful
year	Male	Female (%)	Unk.	Total	Trap/snare	Shot	(L&S)[a]	Unk.	Trappers/hunters
1986/87	22	14 (39)	0	36	28	8	---	0	---
1987/88	0	0 ---	25	25	0	0	---	25	---
1988/89	5	9 (64)	1	15	11	1	---	3	---
1989/90	7	6 (46)	0	13	12	1	(0)	0	7
1990/91	5	2 (29)	1	8	4	4	(0)	0	6

[a] L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 4. Unit 16 lynx harvest, 1983-91.

Regulatory	Reported harvest							Method of take				Successful
year[a]	M	F (%)	Unk.	Juv[b] (%)	Ad	Unk.	Total	Trap/snare	Shot	(L&S)[c]	Unk.	Trappers/hunters
1983-84	0	0 --	10	0 --	0	10	0	0	(0)	10	10	---
1984-85	0	0 --	1	0 --	0	1	0	0	(0)	1	1	---
1985-86	0	0 --	2	0 --	0	2	2	0	(0)	0	2	1
1986-87	0	6(100)	6	0 --	0	6	0	0	(0)	6	6	---
1990-91[c]	0	0 --	0	0 --	0	0	0	0	(0)	0	0	0

[a] Season closed during 1987-88, 1988-89 and 1989-90.
[b] Lynx measuring ≤ 34 inches in length.
[c] L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 5. Unit 16 beaver harvest chronology percent by time period, 1986-91.

Regulatory Year[a]	Harvest period										
	August	September	October	November	December	January	February	March	April	Unk.	Total
1986/87[a]											
1987/88[a]											
1988/89[a]											
1989/90	1	0	0	11	24	14	5	9	36	0	145
1990/91	0	0	0	4	1	9	31	22	27	6	176

[a] Data not available.

Table 6. Unit 16 land otter harvest chronology percent by time period, 1986-91.

Regulatory Year[a]	Harvest period							
	November	December	January	February	March	April	Unk.	Total
1986/87[a]								
1987/88[a]								
1988/89[a]								
1989/90	20	45	20	0	15	0	0	20
1990/91	7	7	40	13	26	7	0	15

[a] Data not available.

Table 7. Unit 16 wolverine harvest chronology percent by time period, 1986-91.

Regulatory	Harvest period						
Year[a]	November	December	January	February	March	Unknown	Total
1986/87[a]							
1987/88[a]							
1988/89[a]							
1989-90	15	8	38	31	8	0	13
1990-91	0	0	12	50	38	0	8

[a] Data not available.

Table 8. Unit 16 beaver harvest percent by transport method, 1986-91.

	Percent of harvest								
Regulatory Year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	Total
1986-87	8	0	0	0	67	0	12	13	651
1987-88	0	0	0	0	0	0	0	100	394
1988-89	9	22	0	0	58	0	0	11	370
1989-90	12	28	0	0	57	0	1	1	145
1990-91	3	17	3	0	74	0	0	3	176

Table 9. Unit 16 land otter harvest percent by transport method, 1986-91.

Regulatory Year	Percent of harvest								Total
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
1986-87	15	0	0	0	65	0	7	13	68
1987-88	0	0	0	0	0	0	0	100	51
1988-89	17	47	0	0	34	0	0	2	47
1989-90	15	55	0	0	25	0	0	5	20
1990-91	7	40	0	0	53	0	0	0	15

Table 10. Unit 16 wolverine harvest percent by transport method, 1985-91.

Regulatory Year	Percent of harvest								Total
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
1986-87	61	0	0	0	0	0	0	39	36
1987-88	0	0	0	0	0	0	0	100	25
1988-89	33	13	0	0	27	0	0	27	15
1989-90	38	16	0	0	38	0	0	8	13
1990-91	50	12	0	0	38	0	0	0	8

LOCATION

Game Management Unit: 17 ($18,800\ mi^2$)

Geographical Location: Northern Bristol Bay

BACKGROUND

Trapping is an important part of the culture and economy of the residents of northern Bristol Bay. Trapping was one of the main sources for the cash economy before prices paid for commercially caught salmon increased during the past decade. During late February trappers come to Dillingham from around the region to seal and sell pelts at the annual "Beaver Round-up". Furbuyers purchase thousands of pelts during the week-long rendezvous and celebration.

Beavers have historically been the most important furbearer in the northern Bristol Bay area. They are abundant throughout most portions of Unit 17, occurring in all major drainages and in many smaller tributaries. Beaver dams and the resulting reservoirs enhance waterfowl nesting habitat in the unit. These dams are also frequented by otters. In some portions of the unit, particularly in the Wood-Tikchik Lake system, beaver dams impede the movement of migrating salmon, and siltation caused by dams can destroy spawning habitat. Intensive trapping and adverse weather conditions in late fall and winter are the most significant mortality factors for beavers in Unit 17. Season closures in parts of the unit have been imposed on several occasions since 1900 to allow populations to recover. Pelt prices are a significant factor in the annual beaver harvest. Commercial salmon prices also affect beaver trapping effort in the Bristol Bay area; as salmon prices rise, fur trapping effort declines. However, the importance of beaver as a food item for local residents assures a base level of harvest regardless of other factors.

Red foxes are the second most commonly trapped furbearer in Unit 17. They occur throughout the unit, preying primarily on ptarmigan during winter. Fox populations fluctuate widely, apparently as a result of periodic rabies outbreaks. Fox populations peaked in 1979-80 and declined sharply the following year. Similar peaks and crashes were noted in the mid and late 1980s. Gradual increases were noted this report period.

Land otter populations have increased steadily during the 1980s. They are common in Subunit 17A and abundant in Subunits 17B and 17C. Most otters are caught incidentally during the beaver trapping season.

Lynx are rare to uncommon in Subunits 17A and 17C. The lynx population fluctuates in Subunit 17B, but lynx are generally found in low-to-moderate densities even during their peak. Much of the fluctuation is probably because of hare abundance and immigration from adjacent units. Lynx numbers were very low in Unit 17 during the report period.

Wolverines occur throughout Unit 17, ranging from ridgetops to river mouths. Although no data have been collected on the wolverine population in the unit, incidental observations and trapper reports suggest it is stable to increasing. Harvest levels have remained relatively constant since 1976.

Marten were uncommon in most of Unit 17 before 1970, but recent reports suggest they are becoming more widespread. Most of their habitat occurs along the Wood-Tikchik Lake system and the spruce forests along the Nushagak and Mulchatna rivers. Marten were reported in relatively low numbers during the report period, although high pelt prices have maintained trapping interest in this species.

Mink occur in most riparian areas of Unit 17, but the size of the population and its relative trend are unknown. Pelt sizes are smaller than mink found in the Kuskokwim River drainage and prices paid for Unit 17 mink are lower. Consequently, little trapping effort is targeted on mink.

Other unit furbearers include coyote, arctic fox, short-tailed weasel, and muskrat. Coyotes are becoming more common in Subunits 17B and 17C as they expand west from the Alaska Range. Arctic fox are uncommon visitors to the unit, probably dispersing from the Yukon-Kuskokwim delta during peaks in their population cycles. Weasels are common throughout the unit, but there is little trapping effort targeting the species. Long-term residents of the unit report that muskrats were common along the lower Nushagak and Togiak rivers, and on the Nushagak Peninsula during the first half of this century. They are scarce throughout Unit 17. Reasons for the dramatic decrease are unknown.

MANAGEMENT DIRECTION

Management Goal

The furbearer management goals for Unit 17 are to obtain sufficient data to develop measurable population objectives.

Management Objectives

The management objective for Unit 17 furbearers are to: 1) increase beaver populations in Subunit 17A to a level sufficient to maintain an average stream density index of 1.0 cache per river mile by 1995; 2) maintain beaver populations throughout Subunits 17B and 17C through 1995 at a level sufficient to sustain an average stream density of 1.2 caches per river mile; 3) maintain a population of land otters in Unit 17 capable of sustaining an average annual harvest of 200 otters through 1995; 4) maintain a population of red foxes in Unit 17 capable of sustaining an average annual harvest of 400 foxes through 1995; and 5) maintain a population of wolverines in Unit 17 capable of sustaining an average annual harvest of 50 wolverines through 1995.

METHODS

We collected harvest data when beavers, wolverines, lynx, and otters pelts were 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 populations status of various furbearer species was sent to a sample of trappers throughout the unit. Beaver trapping pressure was accessed by periodic aerial surveys during the trapping season. Aerial cache surveys were flown most years between 1968 to 1986 to provide an index of abundance in more heavily trapped areas of the unit. No cache counts were conducted.

RESULTS AND DISCUSSION

Population Status And Trend

Population Size: Beaver populations were stable to increasing this report period. Most trappers reported high beaver densities along their lines, but low prices kept harvest low. Low beaver densities occur near villages and along parts of major winter trails. Reports of nuisance beavers, particularly on salmon spawning streams and on roads, were constant the past several years. We collected no objective population data this report period.

Otter and wolverine populations appeared stable to increasing. Both species occur throughout the unit with the highest populations in Subunits 17B and 17C. No objective population data have been collected on these species in Unit 17.

Lynx populations remained at severely depressed levels throughout the unit. Although never common in the unit, lynx numbers have been very low since 1986/87. Snowshoe hare populations appeared moderate in Subunits 17B and 17C.

Red fox populations appeared to increase, but densities remained below peak levels. Ptarmigan populations were moderate to high and microtine populations appeared at moderate levels.

Coyotes were still uncommon in the unit, but their numbers and range were increasing. Highest densities were along the lower Nushagak River.

No data were available to assess marten, mink, or weasel population trends. Trapper reports indicated that these species were common in suitable habitat throughout the unit and that marten populations expanded their range in recent years.

Muskrats remained scarce throughout the unit during this report period. In spite of intensive human use of area waterways, observations of muskrats were rare.

Mortality

Harvest

Seasons and Bag Limits: Beaver season was from 1-31 January in Subunit 17A, and from 1 January to 28 February 28 in Subunits 17B and 17C. The bag limit was 20 beavers per trapper. Wolverine, fox (red and arctic), lynx, marten, mink, and weasel seasons were open from 10 November to 28 February with no bag limit for trappers. Land otter and coyote seasons were open from 10 November to 31 March with no bag limit for trappers. Muskrat season was open from 10 November to 10 June with no bag limit for trappers.

Board of Game Actions and Emergency Orders. No Board of Game actions or emergency orders were issued affecting Unit 17 furbearer seasons or bag limits during this report period.

Trapper Harvest. Beaver harvests (1989/90-1,245; 1990/91-1,092) were considerably lower than the average annual harvest for the previous 5 years (Table 1). Trappers indicated that the main reasons for the reduced harvest were low prices and unfavorable weather conditions. The percentage of kits in the harvest remained relatively consistent during the last 5 years in spite of dramatic fluctuations in number of beavers harvested (Table 2). Snares continued as the most common trapping method. Conabear traps are also important methods of trapping beavers in Unit 17 (Table 2). Prices paid by local furbuyers ranged from $5 for small to $45 for super blankets.

Only 3 lynx were caught this report period (1989/90 - 1; 1990/91 - 2), well below the average annual harvest of the previous 5 years (1984-89 - 10.6) (Table 1). No male lynx have been harvested from the unit since 1986/87. All lynx caught in the past 5 years were taken by trap or snare (Table 3). Low lynx harvests reflect low lynx densities in the unit.

Otter harvests were much lower (1989/90 - 116; 1990/91 - 149) than the average annual harvest for the last 5 years (1984-89, 181.4) (Table 1). During the past 5 years the sex ratio of the harvest has remained near 50:50 (Table 4). Traps (conabears) are the most common method used by successful trappers, followed by snares and firearms (Table 4). Prices paid for otter pelts were comparable to those paid for beaver.

Wolverine harvests fluctuated from 26 in 1989/90 to 46 in 1990/91. The average annual harvest during the previous 5 years (1984-89) was 41.6 (Table 1). There was no obvious reason for the fluctuations in harvest. Trappers noted that in 1990/91 wolverines were more prevalent than usual throughout the unit. Traps were the most common method of harvest, followed by firearms and snares (Table 5). Prices paid by local furbuyers ranged from $175-$275 per wolverine.

Harvest data on furbearers that are not sealed are sketchy at best. Fur export and acquisition reports are of little value because many furs are used locally when fur prices are low. The average price paid this report period was $45 for marten and $20 for coyote. Many trappers retained red fox pelts for personal use because furbuyers accepted only exceptional pelts and paid up to $10 for those.

Permit Hunts. No special permits were issued for trapping nuisance beavers in Unit 17 during this report period.

Trapper Residency and Success. Data on trapper residency and success have not been specifically analyzed. Virtually all furbearers trapped in Unit 17 were taken by local residents. Individuals from villages within the unit accounted for most of the harvest. Trappers residing in adjacent units (Nondalton, Iliamna, and Kuskokwim river villages) also took some furbearers in Unit 17. A few trappers from outside the area have flown into Subunit 17B to harvest wolverines.

Harvest Chronology. Beaver harvest chronology depended on weather conditions. Fluctuations noted on Table 6 should be viewed with caution because many trappers did not keep close track of when they trapped individual beavers. All lynx harvested this report period were taken in February (Table 7). Otters were caught throughout the trapping season with most harvest occurring during beaver trapping season (January and February)(Table 8). Wolverine harvests were highest in February during each of the past 5 years (Table 9).

Transport Methods. Snowmachines were the most common transport means used by successful trappers in Unit 17 (Tables 10, 11, 12, and 13). Snowmachines allow reliable access to most of the unit from late December through March.

Other Mortality. Beavers and otters are occasionally caught in gill nets during the summer fishing season. The number caught unitwide is probably less than 50 per year. Incidental catches are rarely reported and carcasses are either used for food or discarded.

Natural mortality of beavers can be high in the Bristol Bay area during winters of low temperatures and low snowfall when beaver caches in shallow areas become ice-bound. Beavers may also suffer high mortality rates along major rivers during severe spring break-up periods. This report period had moderate weather and natural mortality was low. No cases of rabid foxes were reported in the Bristol Bay area during this report period.

Habitat

Assessment: No formal habitat monitoring programs were conducted in Unit 17. Furbearer habitat along the Nushagak and Mulchatna rivers and along the lower reaches of major tributaries to those rivers, appeared in very good to excellent condition. Although there was evidence of heavy browsing, willow stands on gravel bars were abundant.

Enhancement: No human-caused habitat enhancement activities have been documented in Unit 17. Because of the relative inaccessibility of most of the unit, and the occurrence of natural enhancement, human-caused habitat enhancement is not practical or necessary at this time.

Nonregulatory Management Problems: Division of Commercial Fisheries biologists reported conflicts with beavers and spawning salmon along streams flowing into the north shore of Lake Nerka and along streams at the south end of Nunavaugalik Lake (J. Skrade, ADF&G, pers. comm.). ADF&G staff typically destroy dams on spawning streams in summer, but the beavers survive and dams are usually rebuilt.

CONCLUSIONS AND RECOMMENDATIONS

Most furbearer populations in Unit 17 appear healthy and stable. Low prices paid for pelts coupled with high fuel prices reduced trapping pressure on beavers and otters in many areas. Local trappers are generally satisfied with current beaver and otter seasons and bag limits. Existing bag limits for beaver are often circumvented as trappers claim other family members took excess beavers. Some residents of Nushagak River villages have expressed a desire to extend or shift the beaver trapping season in Subunit 17B to close on 15 March, as it did before the 1988/89 trapping season. Many trappers in that area do not go afield during the part of the current season that overlaps the Russian Orthodox Christmas and New Year holiday season (Slavi) in early January.

Wolverine harvests have been consistent for the past several years and populations seemed stable to increasing. Prohibition of same-day-airborne hunting and elimination of the March portion of the trapping season have not reduced the harvest. Most wolverine pelts are used by local fur sewers and prices remained consistently high.

Lynx populations have not rebounded from the low levels first noted in 1987/88. Liberal seasons will probably have little effect on the recovery of the lynx population because most trappers in the unit catch lynx incidentally in marten sets.

Red fox populations were on the increasing cycle during this reporting period. If this cycle is driven by periodic endemic rabies outbreaks, there are probably few practical measures ADF&G can implement to achieve the population objective of maintaining a population that will support a harvest of 400 foxes per year. As long as the price for fox pelts remains low, liberal seasons are appropriate. If the price increases substantially, harvest restrictions may have to be considered.

Reasons for the reduction in the Unit 17 muskrat population remain a mystery. More research into the historic abundance and distribution of this species in the Bristol Bay area is needed. If suitable habitat is found within the historic range, a transplant into the area should be considered. If ADF&G elects to consider such a transplant, a closure of muskrat trapping seasons will be necessary.

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Table 1. Reported harvest of furbearers in Unit 17, 1956-1991 (sealing record data).

Regulatory year	Beaver % Kits	Beaver Total	Land Otter MM	Land Otter FF	Land Otter Unk	Land Otter Total	Lynx % Kits	Lynx Total	Wolverine MM	Wolverine FF	Wolverine Unk	Wolverine Total
1956/57	23	367	--	--	--	--	---	--	--	--	--	--
1957/58	19	3,165	--	--	--	--	---	--	--	--	--	--
1958/59	20	3,245	--	--	--	--	---	--	--	--	--	--
1959/60	24	3,721	--	--	--	--	---	--	--	--	--	--
1960/61	23	2,849	--	--	--	--	---	--	--	--	--	--
1961/62	30	1,903	--	--	--	--	---	--	--	--	--	--
1962/63	23	2,172	--	--	--	--	---	--	--	--	--	--
1963/64	28	1,766	--	--	--	--	---	--	--	--	--	--
1964/65	22	957	--	--	--	--	---	--	--	--	--	--
1965/66	25	1,424	--	--	--	--	---	--	--	--	--	--
1966/67	25	2,711	--	--	--	--	---	--	--	--	--	--
1967/68	26	3,158	--	--	--	--	---	--	--	--	--	--
1968/69	N/A	1,750[a]	--	--	--	--	---	--	--	--	--	--
1969/70	23	1,190	--	--	--	--	---	--	--	--	--	--
1970/71	28	824	--	--	--	--	---	--	--	--	--	--
1971/72	21	762	--	--	--	--	---	--	--	--	--	--
1972/73	30	1,849	--	--	--	--	---	--	10	5	6	21
1973/74	24	1,681	--	--	--	--	---	--	27	18	0	45
1974/75	16	929[b]	--	--	--	--	---	--	14	7	1	22
1975/76	22	637[b]	--	--	--	--	---	--	50	25	3	78
1976/77	18	766[b]	--	--	--	--	---	--	37	12	2	51
1977/78	24	802[b]	52	49	7	108	11	36	32	14	3	49
1978/79	21	959	70	54	9	133	27	30	26	14	3	43
1979/80	28	1,478	68	62	9	140	32	25	28	19	0	47
1980/81	20	1,673	82	80	0	160	38	40	30	10	0	40
1981/82	21	1,693	94	83	1	179	12	17	28	10	0	38
1982/83	13	1,824	100	72	31	204	12	25	34	17	1	52
1983/84	19	1,360	94	63	3	165	8	12	10	4	0	14
1984/85	23	1,661	105	94	20	219	28	29	39	16	2	57
1985/86	16	1,452	49	46	6	101	13	8	13	8	2	23

Table 1 (Continued).

Regulatory year	Beaver		Land Otter				Lynx		Wolverine			
	% Kits	Total	MM	FF	Unk	Total	% Kits	Total	MM	FF	Unk	Total
1986/87	20	2,817	87	90	11	188	21	14	31	9	0	40
1987/88	22	3,048	133	133	1	267	---	1	22	20	2	44
1988/89	19	965	66	57	19	142	---	1	21	16	7	44
1989/90	20	1,245	67	46	3	116	---	1	14	7	5	26
1990/91	20	1,092	68	71	10	149	50	2	19	19	8	46

[a] No harvest records available, estimates only

[b] Beaver trapping season closed in subunits 17A and 17C.

Table 2. Unit 17 beaver harvest, 1986-1991.

Regulatory year[a]	Reported harvest			Method of take			Successful Trappers
	Kits[b] (%)	Adults (%)	Total	Trap (%)	Snare (%)	Unk	
1986/87	566 (20)	2,251 (80)	2,817	501 (18)	2,226 (79)	90	159
1987/88	664 (22)	2,384 (78)	3,048	598 (20)	2,222 (73)	218	224
1988/89	181 (19)	784 (81)	965	310 (32)	636 (66)	19	96
1989/90	243 (20)	1,002 (81)	1,245	428 (34)	779 (63)	38	109
1990/91	221 (20)	871 (80)	1,092	449 (41)	642 (59)	1	109

[a] Season dates:	1986/87-87/88	Subunit 17	Jan. 1 - Jan. 31	20 per season
		Subunit 17B & 17C	Jan. 15 - Mar. 15	20 per season
	1988/89-90/91	Subunit 17A	Jan. 1 - Jan. 31	20 per season
		Subunits 17B & 17C	Jan. 1 - Feb. 28	20 per season

[b] Juveniles < 52"

Table 3. Unit 17 lynx harvest, 1986-1991.

Regulatory year[a]	Reported harvest M (%)	F (%)	Unk.	Juv.[b] (%)	Adults (%)	Total	Method of take Trap/Snare(%)	Shot(%)	Unk.	Successful Trappers
1986/87	6 (43)	3 (21)	5	0 (-)	13 (93)	14	14 (100)	0 (-)	0	9
1987/88	0 (-)	1(100)	0	0 (-)	1 (-)	1	1 (100)	0 (-)	0	1
1988/89	0 (-)	1(100)	0	0 (-)	0 (-)	1	1 (100)	0 (-)	0	1
1989/90	0 (-)	1(100)	0	0 (-)	1(100)	1	1 (100)	0 (-)	0	1
1990/91	0 (-)	1 (50)	1	1 (50)	1 (50)	2	2 (100)	0 (-)	0	2

[a] Trapping season dates: 1986/87-87/88 Unit 17 Nov. 10 - Mar. 31 No limit
1988/89-90/91 Unit 17 Nov. 10 - Feb. 28 No limit

Hunting season dates: 1986/87-88/89 Unit 17 Nov. 1 - Mar. 31 Two lynx
1989/90-90/91 Unit 17 Nov. 10 - Feb. 28 Two lynx

[b] Juveniles < 34" in length

Table 4. Unit 17 otter harvest, 1986-1991.

Regulatory year[a]	Reported harvest M (%)	F (%)	Unk.	Total	Method of take Trap(%)	Snare(%)	Shot(%)	Other/Unk.	Successful Trappers
1986/87	87 (46)	90 (48)	11	188	90 (48)	69 (37)	10 (5)	19	60
1987/88	133 (50)	133 (50)	1	267	142 (53)	87 (33)	9 (3)	29	93
1988/89	66 (47)	57 (40)	19	142	71 (50)	55 (39)	9 (6)	7	50
1989/90	67 (58)	46 (40)	3	116	74 (64)	39 (34)	0 (-)	3	44
1990/91	68 (46)	71 (48)	10	149	87 (58)	44 (30)	0 (-)	18	47

[a] Season dates: 1986/87-90/91 Unit 17: Nov. 10-Mar. 31 No limit

Table 5. Unit 17 wolverine harvest, 1986-1991.

Regulatory year[a]	Reported harvest				Method of take				Successful Trappers
	M (%)	F (%)	Unk.	Total	Trap(%)	Snare(%)	Shot(%)	Other/Unk.	
1986/87	31 (78)	9 (23)	0	40	17 (43)	5 (13)	14 (35)	4	16
1987/88	22 (50)	20 (46)	1	44	38 (86)	0 (-)	5 (11)	1	21
1988/89	21 (48)	16 (36)	7	44	26 (59)	5 (11)	11 (25)	2	29
1989/90	14 (54)	7 (27)	5	26	19 (73)	2 (8)	5 (19)	0	14
1990/91	19 (41)	19 (41)	8	46	28 (61)	7 (15)	10 (22)	1	29

[a] Trapping season dates:	1986/87-87/88	Unit 17	Nov. 10-Mar. 31	No limit
	1988/89-90/91	Unit 17	Nov. 10-Feb. 28	No limit
Hunting season dates:	1986/87	Unit 17	Sept. 1-Mar. 31	One wolverine
	1987/88	Unit 17	Nov. 10-Feb. 15	One wolverine
	1988/89-90/91	Unit 17	Sept. 1-Mar. 31	One wolverine

(same-day-airborne hunting prohibition began in 1988/89)

Table 6. Unit 17 beaver harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk	n
1986/87	---	1	1	4	34	---	---	60	2,817
1987/88	7	2	0	1	84	---	---	7	3,048
1988/89	---	3	2	3	91	---	---	2	965
1989/90	0	0	---	---	96	0	---	3	1,245
1990/91	---	2	---	---	98	---	0	0	1,092

Table 7. Unit 17 lynx harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk	n
1986/87	7	---	---	---	57	---	---	36	
1987/88	100	---	---	---	---	---	---	---	1
1988/89	100	---	---	---	---	---	---	---	1
1989/90	---	---	---	---	100	---	---	---	1
1990/91	---	---	---	---	100	---	---	---	2

Table 8. Unit 17 otter harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk	n
1986/87	0	0	1	0	22	---	---	72	188
1987/88	3	3	8	3	67	---	---	16	267
1988/89	---	1	1	---	93	---	---	4	142
1989/90	---	16	---	---	82	---	---	3	116
1990/91	---	---	---	---	97	---	1	2	149

Table 9. Unit 17 wolverine harvest percent by transport method, 1986-91.

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk	n
1986/87	28	8	---	---	15	---	---	50	40
1987/88	30	5	2	---	61	---	---	2	44
1988/89	11	5	2	---	80	---	2	---	44
1989/90	12	---	---	---	85	---	---	4	26
1990/91	4	2	---	---	94	---	---	---	46

Table 10. Unit 17 beaver harvest chronology percent by month, 1986-1991.

Regulatory year	Month			n
	January	February	Other/Unknown	
1986/87	29	64	7	2817
1987/88	24	56	20	3048
1988/89	34	64	3	965
1989/90	51	48	1	1245
1990/91	55	43	2	1092

Table 11. Unit 17 lynx harvest chronology percent by month, 1986-1991.

Regulatory year	Month						n
	November	December	January	February	March	Other/Unknown	
1986/87	7	7	7	43	36	---	14
1987/88	---	---	---	100	---	---	1
1988/89	---	---	---	100	---	---	1
1989/90	---	---	---	100	---	---	1
1990/91	---	---	---	100	---	---	2

Table 12. Unit 17 otter harvest chronology percent by month, 1986-1991.

Regulatory year	Month						n
	November	December	January	February	March	Other/Unknown	
1986/87	5	7	19	54	7	7	188
1987/88	5	9	22	53	2	9	267
1988/89	13	7	35	37	1	7	142
1989/90	13	10	43	27	7	---	116
1990/91	8	15	43	36	---	3	149

Table 13. Unit 17 wolverine harvest chronology percent by month, 1986-1991.

Regulatory year	Month						n
	November	December	January	February	March	Other/Unknown	
1986/87	---	13	28	28	23	10	40
1987/88	2	7	27	27	16	21	44
1988/89	5	11	21	43	7	14	44
1989/90	8	27	15	50	---	---	26
1990/91	---	2	24	67	7	---	46

LOCATION

Game Management Unit: 18 (42,000 mi^2)

Geographical Description: Yukon-Kuskokwim Delta

BACKGROUND

Furbearers were abundant in all areas of suitable habitat in Unit 18. Large numbers of aquatic (i.e., beaver, river otter, mink, and muskrat) and terrestrial species (i.e., red and white fox) are found in Unit 18. In recent years, up to one-third of all furbearers sealed in Alaska were harvested from Unit 18. Harvests of unsealed furbearers (i.e., mink, muskrat, and red fox) were also high, although well below historical levels reported in the 1930s. Boreal forest species (i.e., lynx, marten, wolverine, and wolf) were limited to the eastern portion of Unit 18 because most of the Yukon-Kuskokwim Delta is composed of lowland tundra and aquatic habitats. Also, a fairly large white (arctic) fox population occurs along the coast, the mainland tundra, and offshore islands. The harvest of white fox has also decreased recently.

MANAGEMENT DIRECTION

Population management goals and objectives established for furbearers in Unit 18 are to: 1) maintain viable furbearer populations and provide for a sustained yield harvest; and 2) minimize adverse interactions between furbearers and the public.

METHODS

We collected information about furbearer populations in Unit 18 by interviewing local residents, trappers and fur buyers. We obtained harvest statistics from Fur Acquisition reports submitted by furbuyers and sealing certificates (Table 1). We compiled incidental observations during field work directed at other species.

We also sent an annual trapper questionnaire to 200 trappers during May of 1990 and 1991. Names of these trappers were gathered from Fur Acquisition reports. Seventy-two trappers responded (36% response) after the 1989-90 season, and 68 trappers responded (34% response) after the 1990-91 season. We asked trappers to determine the abundance of each furbearer species on their trapline as "scarce", "common", "abundant", or "not present." Trappers were also asked about their thoughts on population trends of species on their traplines, as being "fewer", "same", or "more." A rank value of 9 was given to an assessment of "abundant" and "more." A rank value of 5 was given to "common" and "same", and a rank value of 1 was given to "scarce" and "fewer" responses. All ranks were summarized, and a mean was calculated for each species. These mean values are referred to as the "Trend Index" and "Abundance Index." In analyzing the Trend Index, mean values between 4.50 and 5.50 were assumed to represent stable trends; values of less than or equal to 4.50 and greater than or equal to 5.50 represented decreasing and increasing trends, respectively. For the Abundance Index, values of $\leq$ 4.50 were assumed to represent low populations, values between 4.51 and 5.50 were moderate, and those greater than or equal to 5.50 represented high population levels.

Trappers were also asked about the abundance of furbearer prey species such as ptarmigan, snowshoe hares, grouse, red squirrels, and microtenes (mice, voles, and lemmings), and of other predators such as hawks and owls. A similar procedure as described above was used to analyze responses.

RESULTS AND DISCUSSION

Population Status and Trend

Beaver: Beavers continued to expand and colonize new habitats, particularly in coastal regions from Kipnuk to Scammon Bay. Beaver densities remained high throughout Unit 18, and were highest southeast of the Kuskokwim River in the Kilbuck Mountains, and along the lakes and sloughs of the Johnson River southwest of Bethel. Furbuyers continued to report a high incidence of bite scars on beaver pelts purchased, suggesting that intraspecific competition has been occurring in the beaver population.

Respondents to the 1989-90 and 1990-91 trapper questionnaires indicated that beaver abundance was higher (Abundance Index = 6.45 to 6.76, n = 68 and n = 66) than last year's levels (Trend Index = 6.70 to 6.96, n = 68 and n = 66). Beaver had the highest Abundance Index among all furbearers reported.

River Otter: Trapper Questionnaire results indicated that river otter densities were moderate (Abundance Index = 4.48 to 5.00), and the trend of the population was thought to be slightly increasing (Trend Index = 5.52 to 5.78). River otters were abundant throughout the delta lowlands southeast and west of the Kuskokwim River. Many frozen streams were criss-crossed by large numbers of otter slides and trails that were highly visible from aircraft.

Mink: The status of mink populations is very difficult to assess as mink are primarily found under the ice during winter. The number of responses to the trapper questionnaire on mink abundance were fairly low. Those trappers who did respond indicated that mink abundance was considered high (Abundance Index = 5.62 to 5.67). Most mink trappers of the Yukon-Kuskokwim Delta are found only in select areas west of Bethel on the tundra lakes, and along the coast between the Kuskokwim and Black river. Mink probably are not uniformly distributed throughout the unit. Although the market demand for mink is a relatively high, trapper effort is presently low and trappers must use special techniques to capture mink in marketable quantities. Trappers perceived the mink populations to be stable (Trend Index = 5.20 to 5.33).

Muskrat: Populations of muskrats are currently rebuilding throughout the Delta. Mortality attributable to "freeze-outs" was substantial during winter 1988-89. Muskrats were seen above the ice during this severe winter after their lakes, ponds, and sloughs froze solid. The number of muskrat pushups observed on lakes near Bethel has not changed significantly since the winter of 1989-90.

Fox: Red fox populations have steadily declined since they peaked during the 1987-88 season. Evidence of this decline was less reported incidence of rabies, less nuisance reports of foxes within the city limits of Bethel and other villages, less body fat on trapped foxes, and reported declines of prey species such as mice, voles, and lemmings. According to the trapper questionnaire, red fox were the third most abundant furbearer in Unit 18, with an Abundance Index of 5.46 during the 1989-90 seasons, dropping to fourth during the 1990-91 seasons with an Abundance Index of 4.92. The Trend Index reveals a slight decline from 5.00 (stable) to 4.40 (decreasing).

It is more difficult to determine population status of white fox because they often are only found on adjacent islands and coastal portions of Unit 18, and often retreat onto the pack ice of the Bering Sea during winter to scavenge on birds, marine mammal carcasses, and fish. We believe that white fox numbers have declined. On Nunivak Island, red and white fox populations remained unnaturally high, and apparently do not follow cycles observed on the mainland. Dead reindeer during winter and large aggregations of nesting seabird and waterfowl nesting sites throughout the island during spring and summer form a large, stable food source. White fox are perceived as a major source of predation upon certain threatened goose and brant species, and control efforts are being proposed by the USFWS on Kigagik Island, adjacent to Nelson Island. These control efforts will be monitored by ADF&G personnel to ensure that white foxes are not destroyed needlessly while attempting to rebuild select waterfowl populations.

Lynx: Populations of lynx have increased in size during recent years. However, harvest has remained poor since the 1989-90 season. Lynx are relatively uncommon in Unit 18 with an Abundance Index of only 1.50 to 1.67. Trappers perceived the population as stable with a Trend Index of 5.00 for the 1989-90 season, and slightly increasing during the 1990-91 seasons (Trend Index = 5.67). Snowshoe hare populations have begun to decline after the peak of the 1989-90 season. The lynx population will continue to lag behind the population of hares for several years, and will begin their own population decline. Hare populations in the Yukon-Kuskokwim Delta are not as reliable a prey item as those found in interior Alaska because spring flooding often causes substantial mortality among hares during the breakup of the river ice. All of the lynx harvest normally occurs within the eastern portion of Unit 18.

Wolverine: The distribution of wolverines seems to mimic wolf distribution in Unit 18. Trappers indicated that wolverines were low in abundance (Abundance Index = 2.67 to 2.50), but continued to increase (Trend Index = 5.52 to 5.58), especially in the Kilbuck Mountains and the upper portions of the Yukon River between Marshall and Paimiut. Quantitative biological data concerning wolverine densities are nonexistent. However, mandatory sealing of pelts has provided an account of reported harvest since 1971-72 (Table 1). Increasing abundance of caribou in the Kilbuck Mountains, and of moose along the Yukon River has undoubtedly helped wolverine populations grow. Even though wolverines rarely are able to bring down ungulates on their own, wolf kill sites and winter mortality among ungulates has enabled wolverines to take advantage of increasing numbers of moose and caribou available in Unit 18.

Marten: The status of marten populations is not well documented within Unit 18. They appear to range down the Kuskokwim River to the Kwethluk River drainage, and as far down the Yukon River drainage as Pilot Station. Sightings of marten occasionally occur in forested fringes downriver on both drainages. Marten habitat in Unit 18 is limited to narrow bands of spruce forest that exist along the eastern portions of the unit. Trappers believe that marten remained scarce throughout the unit (Abundance Index = 2.50 to 2.90). However, they also perceive that marten populations were growing (Trend Index = 5.86 to 6.00). Trappers from Russian Mission have began to capture marten in greater numbers than in the past, and have indicated that many are juvenile males.

Weasels: According to trappers, short-tailed weasel (ermine) populations are fairly scarce and have an Abundance Index of only 1.91 to 3.77. The population Trend Index according to the trapper questionnaire ranged from 3.75 to 2.00. Weasel populations are poorly understood throughout the region. They are often not trapped, and are usually caught incidentally while targeting other species of furbearers, such as marten and fox. Weasels are probably more abundant than some trappers realize.

Coyotes: Coyotes are the least common species of furbearer with an Abundance Index of only 1.0. According to trappers, however, their potential for further population growth is greatest with a Trend Index of 7.0. The 1990-91 seasons was the first time trappers and hunters have actually reported seeing coyotes in Unit 18. It has long been speculated that coyotes exist within the southeast portion of Unit 18 because apparently a small population of these animals reside on the eastern edge of the Kilbuck Mountains and the Tikchik Lake area of Subunits 17B and 19B. No coyotes were actually harvested within Unit 18 during the 1990-91 seasons.

Mortality

Hunting Seasons and Bag Limits:

Unit 18	Arctic Fox	Sept. 1-Apr. 30	2 foxes
	Red Fox	Sept. 1-Mar. 15	2 foxes

	Lynx	Nov. 10-Mar. 31	2 lynx
	Wolverine	Sept. 1-Mar. 31	1 wolverine
	Coyote	Sept. 1-Apr. 30	2 coyotes

Trapping Season and Bag Limits:

Unit 18	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-Mar. 31	No limit
	Weasel	Nov. 10-Mar. 31	No limit
Unit 18	Muskrat	Nov. 10-June 10	No limit
	River Otter	Nov. 10-Mar. 31	No limit
	Wolverine	Nov. 10-Mar. 31	No limit
	Coyote	Nov. 10-Mar. 31	No limit
	Red Squirrel	No closed season	No limit

Harvest

Human-induced Mortality:

Beavers. One-hundred and thirty-nine trappers harvested 2,923 beavers during the 1989-90 season, and 52 trappers reported taking 1,093 beavers in 1990-91. An average of 21 beavers per trapper was harvested during both years. The decline in trapper effort for 1990-91 was because of poor snow fall during December and January throughout the Y-K Delta. Poor fur prices for most of the other furbearers that are caught incidentally while beaver trapping also contributed to an overall lack of interest in trapping.

Most beaver were harvested during November, December, and January. Approximately 75% of the harvest occurred during these 3 months. Twenty percent of the harvest took place during February and March, and the remainder of the legal harvest occurred during breakup (April, May, and early June).

Beaver are harvested in spring by hunters shooting the swimming animals from boats. During winter snowmachines are the primary mode of transportation to traplines, and snaring is the most common method of capture. Twenty-two percent of the harvest were small beaver (under 52 inches), 28% were between 52-59", 20% were blanket beaver (60-64"), and 30% were super blanket beaver pelts (>65").

An estimated 10-25% of the beaver harvest is probably not reported, especially the smaller-sized pelts of juvenile beaver, and larger-sized pelts that are poorly handled. These beaver are not often sealed, and are manufactured locally into hats and other garments for domestic use or commercial sale. These pelts are often submitted for sealing several years after the season is over after a tannery receives them. Frequently, they come with little or no information other than who the pelts are from.

River Otter. Harvests of river otter have usually been influenced by fall and winter weather conditions and trapper access rather than by abundance of otters. Most river otters were caught incidentally by trappers engaged in beaver and mink trapping. The number of otters reported sealed in 1989-90 (456 otters) and in 1990-91 (301 otters) has followed a declining harvest trend since the 1987-88 season. River otter prices have declined during the past 2 seasons, increasing the probability that individuals will tan the pelts for domestic use or later commercial sale. Furbuyers estimate that 15% of river otters are retained for use in parkas, mukluks, and hats. The below average harvest for the 1990-91 season may also be attributed to poor travel conditions during December and January.

The sex ratio of the otter harvest has exceeded 55% males for the 1989-90 season, and 44% females for the 1990-91 season. However, the sex composition was unknown for 22% of the total otter harvest for both years. Village fur sealers are often inexperienced in sexing otter pelts, and better instructions will be necessary in the future.

Mink. The mink harvest has fluctuated around several thousand per year in recent years, and during the 1989-90 and 1990-91 seasons harvests were not exceptionally high. These harvest estimates are well below historic levels that ranged from 6,000-30,000 mink. Furbuyers estimate that 95% of the mink taken in Unit 18 reach the commercial market, because the cash value of the world-class Kuskokwim mink is high. However, with alternative sources of income available, the number of active mink trappers afield is now far lower than that observed 50 years ago when trapping was the only source of income available during winter. Most mink were harvested by the residents of "tundra" villages located in the Delta lowlands, and the coastal villages northwest of Bethel.

The Unit 18 mink resource is underutilized. Recent interest has been generated by the Alaska Village Council Presidents (AVCP), the Cooperative Extension Service, the Lower Kuskokwim School District (LKSD) Yupik Life Styles Program, and ADF&G in promoting trapping, handling, and marketing of mink in the Yukon-Kuskokwim Delta. This cooperative effort to educate trappers, encourage trapping, and facilitate furbearer management has resulted in establishing the "Yukon-Kuskokwim Mink Festival," where mink trappers come to Bethel to celebrate the use and sale of furs, the importance of the fur industry in the area, and share information about mink.

Muskrat. The 1989-90 and 1990-91 reported muskrat harvest was very low. Fur Acquisition data indicated that only 300 muskrats were sold during the 1990-91 season. Yukon-Kuskokwim muskrats are fairly small, and have a poor reputation among furbuyers as being of low quality because they are often "shot" muskrats. Because these muskrats are harvested by shooting during the open water season in late spring and early fall, the pelts are often damaged and not very prime, resulting in low demand and poor prices paid to trappers. The current harvest of muskrats is probably several thousand per year, although most are not sold. The price for a #1 muskrat in this area has averaged about $1.00 for the last 2 seasons. Historically, between 2,000 and 25,000 muskrats taken in Unit 18 have been sold annually by trappers and hunters.

Fox. The red fox harvest was very low the past 2 seasons. Although red foxes were abundant throughout the unit, prices were extremely low. After December 1990, local furbuyers quit buying red fox pelts after the price dropped from $200 to $7 per pelt. Prices for white fox were also very low, and most were used as parka lining or sold to individuals who do not report purchases, such as tourists. Furbuyers reportedly purchased 453 and 299 white and red foxes during the 1989-90 and 1990-91. The red fox harvest as late as the 1988-89 season has ranged from 2,000-3,000 foxes. Furbuyers estimated that 35% of white foxes and 20% of red foxes harvested in Unit 18 were retained for domestic use. The harvest of red fox occurs mainly during December and January when pelts are prime. Guard hairs begin to slip in February and March, and animals usually are not taken after February 15th. White fox pelts do not become fully prime until late January through March, and most white fox trapping and hunting occurs during February and March.

I estimate that half of the fox harvest is done by the use of snares and traps, and the other half is by shooting after being chased by snowmachine. Many harvesters from the villages I often travel to had never used snares or traps to capture fox. Many foxes harvested along coast and tundra regions of Unit 18 are chased down by snowmachine and shot after being run over or tired out. This has often resulted in trappers getting poor prices from furbuyers because the pelts are frequently damaged by this illegal practice.

Lynx. The lynx harvest declined to 7 animals in 1989-90, and 4 during 1990-91. Low harvests are attributed to drastic declines in fur prices, lack of quality habitat, and reduced abundance of prey species. Lynx are one of the least abundant furbearer species in Unit 18, and are usually found only near the forested regions bordering Subunits 19A and 21E. Historic lynx harvests have ranged from 10-80 lynx in Unit 18. Most animals were caught along the upper portions of the Yukon River drainage near Russian Mission, and in the upper Kuskokwim River near the upper Tuluksak River.

Marten. The number of marten reported harvested in Unit 18 and purchased by furbuyers has fluctuated widely. Three hundred sixty-seven marten were reported harvested in the 1989-90 season, and 195 marten during the 1990-91 seasons. Reported marten harvest has ranged from 75 to 400 animals in recent years. The actual harvest of marten in Unit 18 remains unknown, because many taken in Unit 18 may be reported as from Subunit 21E and Subunit 19A. Estimated marten harvests have probably changed little in recent times, and between 300 and 500 marten are probably trapped each year. Marten skins were frequently used for handicrafts, and many do not reach the market. However, the price for marten pelts has remained strong statewide. Trappers are beginning to key in on this particular species for cash sale. However, marten remained fairly rare in Unit 18, and occupy similar forested habitats as lynx near the borders of Subunits 19A and 21E.

I requested furbuyers to begin recording the sex of marten taken in the future to ensure that the ratio of males to females in the harvest remains high. All indications from furbuyers are that most the pelts being sold are of larger males. This has not been well documented. I also requested that furbuyers inquire more thoroughly about where trappers caught the animals, so that they are not misrepresented on Fur Acquisition Reports.

Wolverine. Two wolverines and 9 wolverines were sealed in Unit 18 during the 1989-90 and 1990-91 seasons, respectively. The historic reported harvest has never exceeded 30 wolverines annually, and the average harvest is usually less than 10 animals per year. More than any other species, wolverines are used domestically and most pelts are not sealed. Furbuyers believe that only 25% of the wolverines taken in Unit 18 are actually sealed. Prices remain good for wolverine pelts, as they are in high demand for taxidermy and domestic use, and are still considered a novelty item. As with lynx, wolverines are one of the least abundant furbearers found on the Yukon-Kuskokwim Delta. Overall, the sex ratio of wolverines harvested in Unit 18 during the report period averaged 75% males and 25% females. Male wolverines are more susceptible to harvest by hunters and trappers using snowmachines, especially during breeding seasons when males are more free-ranging. Most of the harvest occurred during January and March.

Weasel. Short-tailed weasels are often caught incidentally in traps set for other species. Little trapper effort was directed toward weasels during the report period because of low market demand. Some skins are used locally for trim on parkas and slippers.

Transport Methods: Most of the furbearer harvest in Unit 18 was conducted using snowmachines as transportation.

Natural Mortality: Furbearer abundance in Unit 18 appears more related to weather and disease factors than to trapping mortality. Muskrat and beaver populations in marginal habitats are subject to heavy winter mortality during conditions of thick ice, cold temperatures, and little snow. Fox, muskrat, and lynx abundance also appears highly cyclic. Fox populations, in particular, are subject to drastic declines caused by epizootics of distemper and rabies. The combination of rabies and extreme wind-chill conditions during winter 1990 probably caused considerable fox mortality. Declines of prey animals such as snowshoe hares and microtenes will adversely effect fox and other furbearer predators populations in the future.

Habitat Assessment

Unit 18 contains vast amounts of lowland tundra, ponds, streams, sloughs, and rivers, which accounts for the tremendous production of aquatic furbearers. Boreal, montane, and interior habitats are relatively limited, and species such as lynx and marten will probably remain relatively uncommon.

CONCLUSIONS AND RECOMMENDATIONS

Furbearers have been historically important in Unit 18. Originally, furbearers were probably more important to the region's indigenous people as sources of red meat than as sources of furs. Large ungulates were generally not present in the Delta region after the arrival of the Russians, and the introduction of firearms. Most of the region was far enough from the sea so that marine mammals were inaccessible. Fish, birds, and furbearers provided much of the food base. Furbearers are a still strong link in the lifestyle of many Unit 18 residents who use furbearers for clothing, food, and craft items.

Since the first Russian and American furtraders began buying furs in the area, commercial fur sales have also provided considerable cash income to the region's trappers and skin-sewers. The value of the fur industry during the 1920s and the 1930s in the Yukon-Kuskokwim Delta probably exceeded the value of the present day commercial salmon fishery, and may do so again in the near future. During the 1989-90 trapping season, trappers grossed an estimated $400,000, and during the 1990-91 trapping seasons, trappers grossed an estimated $386,000. Furbearer trapping activity at present represents about 10% of what occurred during the 1920s. Recent price declines in pelts of nearly all furbearer species found in the Yukon-Kuskokwim Delta is partially because of competition with ranch-raised furs in Europe and the Lower 48. This has been compounded by fears of the anti-trapping campaign worldwide, and the threat of the European Economic Community ban on all trapped furs from North America.

Furbearers were abundant in all areas of suitable habitat in Unit 18. Aquatic species such as mink, beavers, otters, and muskrats were common in the vast amount of lowland tundra, sloughs, rivers, and marsh habitat available. Forested habitat is limited, and far fewer lynx, wolverines, and marten were harvested. Coyote populations will probably continue to expand into Unit 18. All furbearer habitats are relatively undisturbed. Trapping pressure appears to effect furbearer densities only near towns and villages. In the future, beaver cache surveys may need to be conducted in fall to monitor population trend. A capture-recapture study of select beaver populations will be necessary to determine the mean number of beavers per cache and measure cache sizes. Results of this study will enable us to better estimate population size in addition to population trend from cache survey results. Beaver populations are at record high levels, and funding restrictions may give this inventory work a low priority. No changes in seasons or bag limits are recommended at this time.

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Table 1. Unit 18 estimated furbearer harvests, 1954 to 1991.

Year	Fox[a]	Lynx	Mink	Muskrats	Otter	Wolverine	Beaver	Marten
1954-55	-	-	40,000	-	-	-	-	-
1955-56	-	-	-	-	-	-	-	-
1956-57	-	-	-	-	-	-	-	-
1957-58	-	-	-	-	-	-	-	-
1958-5	-	-	25,000	-	-	-	2,766	-
1959-60	-	-	11,000	-	-	-	2,013	-
1960-61	-	-	7,000	-	-	-	1,428	-
1961-62	-	-	-	-	-	4	817	-
1962-63	-	-	-	-	-	5	1,503	-
1963-64	-	-	-	-	-	6	666	-
1964-65	-	-	-	-	-	3	264	-
1965-66	-	-	-	-	-	5	411	-
1966-67	-	-	-	-	-	4	765	-
1967-68	-	-	-	-	-	7	1,423	-
1968-69	-	-	-	-	-	1	975	-
1969-70	-	-	-	-	-	-	946	-
1970-71	-	-	-[b]	-	-	-	385	-
1971-72	-	-	-[c]	100+	-[d]	3	961	-
1972-73	-[e]	-	-	-	-[f]	9	1,769	-
1973-74	-[g]	-	1,000	-	300	11	684	-
1974-75	500	-	1,000	-	300	5	1,389	-
1975-76	-	-	-	-	-	29	1,350	-
1976-77	1,000	25	1,000	-[h]	500	1	2,209	-
1977-78	1,000	56	800	-	506	10	2,054	-
1978-79	-[i]	79	-[j]	-[i]	686	9	1,225	-
1979-80	2,750	66	900	15,000	343	15	2,067	-
1980-81	2,500	55	10,000	8,000	645	10	2,502	-
1981-82	3,000	56	14,000	23,000	385	6	1,819	-

Table 1. (continued)

Year	Fox[a]	Lynx	Mink	Muskrats	Otter	Wolverine	Beaver	Marten
1982-83	800	67	6,600	5,000	223	11	1,187	-
1983-84	900	23	11,000	1,500	750	3	981	-
1984-85	1,200	23	10,000	3,000	431	7	1,550	182
1985-86	1,000	13	6,500	1,500	206	3	2,253	300+
1986-87	1,000	8	4,500	2,200	321	8	3,722	300+
1987-88	2,500	10	6,000	3,000	566	5	4,686	200+
1988-89	2,000	15	6,000	10,000	505	6	3,022	75+
1989-90	453	7	5,677	-	456	2	2,923	367
1990-91	299	4	4,898	300	301	9	1,092	195

[a] Red and White fox combined harvest (1990-91 white fox harvest was 66 fox)
[b] Prices reported as depressed.
[c] Record low harvest.
[d] Harvest up from previous year.
[e] Highest harvest in years.
[f] Otter reported to be abundant.
[g] Population peak.
[h] Population reported to be poor.
[i] Population reported to be healthy.
[j] Population up, but few were harvested.

Table 2. Furbearer population status and trends during the 1989-90 and 1990-91 seasons based on trapper questionnaire mail returns form Unit 18.

Species	1989-90 Abundance	1990-91 Index	1989-90 Trend	1990-91 Index	Trend and status
Lynx	1.50	1.67	5.00	5.67	Increasing/low
Arctic fox	3.80	3.50	5.25	4.75	Stable/low
Red fox	5.46	4.92	5.00	4.40	Decreasing/moderate
Marten	2.50	2.90	5.86	6.00	Increasing/low
Muskrat	5.15	4.51	5.64	4.43	Decreasing/moderate
Mink	5.62	5.67	5.20	5.33	Stable/high
Beaver	6.45	6.76	6.70	6.96	Increasing/high
Wolverine	2.67	2.50	6.10	6.10	Increasing/low
River otter	4.48	5.00	5.52	5.78	Increasing/moderate
Ermine	3.77	1.91	3.75	2.00	Decreasing/low
Coyote	-	1.00	-	7.00	Increasing/low

Table 3. The status and trend of common prey items and other predators during the 1989-90 and 1990-91 seasons as reported on trapper questionnaire mail returns from Unit 18.

Species	1989-90 Abundance	1990-91 Index	1989-90 Trend	1990-91 Index	Trend and status
Hares	5.54	4.827	6.62	5.27	Stable/moderate
Red squirrel	4.55	4.33	5.86	4.33	Decreasing/low
Parka squirrel	2.60	3.12	4.43	5.36	Stable/low
Ptarmigan	7.25	6.26	7.07	5.89	Increasing/high
Grouse	4.33	6.17	5.15	5.55	Stable/moderately high
Mice	5.46	5.00	4.43	4.33	Decreasing/moderate
Owls-hawks	3.74	3.67	5.25	5.36	Stable/low

LOCATION

Game Management Unit: 19 ($36{,}490\ mi^2$)

Geographical Description: All drainages into the Kuskokwim River upstream from Lower Kalskag

BACKGROUND

As long as humans have existed in western Alaska, furbearers have played an important part in the subsistence lifestyle and contributed to the economic base. Native peoples relied on furbearers for garments, food, and trading with other aboriginal cultures. The quest for wild pelts prompted early Russian settlement in the area. Current economies are still influenced by the sale of various furs. Unit 19 produces between a quarter and a half million dollars worth of fur annually. Most income realized from sale of wild pelts is cycled through the local economy several times.

Seasons and bag limits have varied widely since original regulations were adopted in the early 20th century. Recently, management has become more intensive. Dynamic seasons and bag limits for many species are designed to maintain furbearer populations.

Several factors affect the harvest level of any particular furbearer species during any one year, including species population levels, snow conditions that affect trapper and furbearer mobility, pelt prices, alternate species abundance and pelt prices, availability of alternate employment, fuel prices, and regulations.

MANAGEMENT DIRECTION

Furbearer management is designed to assess populations annually, design regulations to encourage harvests, and maintain or enhance those populations. Specific management goals and objectives have undergone major changes during the past 3 years.

Management Goals and Objectives

Management goals and objectives for furbearers in Unit 19 are to: 1) annually determine both current status and trend of the population for each furbearer species and their primary prey species; 2) obtain estimates of harvest for all furbearer species; 3) assess trapper effort and distribution; and 4) maintain open communications with area trappers.

Beaver:

- Manage the various subpopulations to maintain a mean pelt size >50 inches and <25% kits in the annual harvest.
- Manage the population to maintain a mean density of not less than one active colony per 3.2 km^2 of suitable waterway, or 0.2 active colonies per km^2 in suitable habitat, as determined during periodic fall cache surveys.

Marten:

- Obtain accurate estimates of annual harvests through comparisons of Fur Acquisition Reports (FARs), Fur Export Reports (FERs), and trapper questionnaires.
- Manage the population to maintain >50% males in the annual harvest and a ratio of not more than one adult female per two juveniles in the annual harvest.

Lynx, River Otter, and Wolverine:

- Maintain accurate annual harvest records based on sealing documents.
- For wolverine, manage the population to maintain >50% males in the annual harvests.

Muskrat, Mink, Red Fox, Coyote, Ermine, and Squirrel:

- Annually estimate numbers harvested, as well as trends in the respective populations.

METHODS

We gathered harvest statistics for beaver, river otter, lynx, and wolverine from sealing documents. During the course of sealing, we obtained information on specific location of harvest, date of harvest, sex of the animal, and estimate of age. Crude harvest trends of seven additional furbearer species were gathered from FARs and FERs. We adjusted and corrected these estimates by comparing them with questionnaire results.

The statewide furbearer management program has distributed a trapper questionnaire annually. More specific questionnaires were also sent to trappers who operated in Unit 19. We obtained names of trappers from sealing documents. Questionnaires are distributed through the mail in late spring each year. Trappers were asked to list the number of animals of each species they harvested as well as their assessments of the population trend (increasing, stable, or decreasing) and current population level (high, moderate, low). Increasing, stable, and declining population trends were assigned values of 9, 5, and 1, respectively. Identical values were assigned to high, moderate, and low population levels. A mean value was calculated for each species. These mean values will be referred to as the Trend Index (TI) and Abundance Index (AI). In analyzing the TI, mean values between 4.51 and 5.49 were assumed to represent stable trends. Values ≤ 4.50 and ≥ 5.50 represented decreasing and increasing trends, respectively. For the AI, values ≤ 4.50 were assumed to represent low populations. Values between 4.51 and 5.49 were moderate. Those $\geq$ 5.50 represented relatively high population levels.

During mid-November 1991, we spent 2.2 hours surveying beaver populations along the lower Middle Fork Kuskokwim, North Fork Kuskokwim, and Big rivers in Subunit 19D. We analyzed data based on the number of colonies per kilometer of river.

Because of concerns regarding marten populations in Unit 19, we continued to collect carcasses. Sex and age estimates of the harvested segment of the marten population were gathered based on estimation of those carcasses. A gross examination of digestive tracts was conducted to determine incidence of particular macro-parasites. Skulls, femurs, bacula, and uteri were collected for research on aging techniques. During spring 1989, several canine teeth were extracted from marten whose ages were questionable. These teeth were assigned ages based on counts of cementum annuli.

We evaluated various criteria for determining sex and age class of marten: sagittal muscle closure method (Whitman 1978) for distinguishing juveniles from adults; cleaned femurs ($\leq$ 72mm for females and >72mm for males), and presence of the suprasesamoid tubercle for adults and the absence for young-of-the-year. This quick and accurate method makes it easy for trappers to collect and transport large numbers of samples.

RESULTS AND DISCUSSION

Population Status and Trend

Beaver

Population Size: During November 1991, we spent 2.2 hours conducting beaver cache counts along the lower reaches of the Middle Fork Kuskokwim, North Fork Kuskokwim, and Big rivers in Subunit 19D. Areas surveyed were considered representative of optimal beaver habitat in Unit 19. We recorded 135 active beaver colonies (those with associated food caches) on nine sample units totaling 235 km^2. Colonies per km^2 ranged from 0.3 to 0.9, and averaged 0.6 (Table 1).

We observed few active colonies along the main stem drainages. The apparent paucity of beaver colonies noted on main rivers is believed a result of poor sightability rather than an absence of lodges. Side sloughs closely associated with the drainages contained relatively high beaver populations (Table 1). To obtain complete counts, aerial and boat surveys would be needed to count active colonies on the sloughs and rivers.

Approximately 20% more active colonies are believed to be present that were not visible in main stem rivers. In highest density areas currently listed as 0.9 colonies/km^2, (Table 1) the actual number may be as high as 1.1 colonies/km^2. Mean colony density for all surveyed areas is shown as 0.6 colonies/km^2 (Table 1). Adding 20% yields an estimate of 0.7 colonies/km^2. A mean of 5 beavers is associated with each colony (Boyce 1974). Survey areas contain approximately 800 beavers.

In addition to active lodges, we observed inactive lodges during surveys. In most cases, inactive lodges were located on water bodies where one or more additional active lodges were noted. The habitat appears currently saturated at or near the carrying capacity in the survey areas. Surveys were conducted in high-density areas and cannot necessarily be extrapolated to the entire unit. However, there are certainly many such "saturated" beaver subpopulations throughout the area. Beaver sealing documents indicate almost no harvest came from the survey areas during the last 4 years. Unless harvest increases in the near future, habitat may deteriorate and beaver populations may decline notably.

Analysis of the Unit 19 trapper questionnaire also indicates beaver population status and trend. Survey results support the findings of the cache surveys. Beaver abundance indices during the years 1987-88 through 1990-91 remained extremely high (Table 2). Beaver are rated more abundant than any other furbearer species. Beaver populations are high throughout Unit 19. Pelt prices are depressed, and there is very little incentive to harvest beaver. They are currently the most underutilized fur resource in the area. In many locations, beaver populations will probably begin to decline in 2-3 years because of overuse of their food source.

Population Composition: Beaver pelts ≤ 52 inches (length plus width) are considered kits. Measurements recorded when pelts are sealed can indicate the age composition of the harvested segment of the beaver population. Beaver pelt sizes have been recorded since 1956. The proportion of kits in the harvest fluctuates widely between years. However, the general trend over the past 30 years has been slightly decreasing. Over the past 10 years (1981-90), the trend appears stable.

We consider the sex composition of the population balanced. We are unable to determine sex of a harvested animal from pelt characteristics. Examination of 34 beaver carcasses from Subunit 19D harvested during 1989 and 1991 revealed a balanced sex ratio.

Distribution: Viable beaver populations occur throughout Unit 19. Suitable waterways and high-quality food sources are less common in Subunits 19B and 19C than in Subunits 19A and 19D. Beaver populations in the subunits reflect these parameters. However, even marginal habitat is generally occupied.

Mortality

Harvest: Beaver harvests in Unit 19 have fluctuated widely since record-keeping began in 1956. Since the mid-1960s those fluctuations have been in a low range, with harvest trends slightly declining. Reported harvest during the 1990-91 season was at an all-time low. Only 267 beavers were submitted for sealing. This low harvest is not indicative of population level. Rather, it reflects low pelt prices. It is not economically feasible to spend time, effort, and fuel for the minimal monetary returns. A significant portion of the beaver harvest has been motivated by recreation rather than economics. Recent indications from the Canadian fur auction houses are that beaver pelt prices may have reached a low point and may be recovering slowly.

Unreported and illegal take may be increasing slightly. A significant proportion of beavers harvested from Unit 19 is taken by local subsistence-based residents for human food or dog food. Often, pelts are not salvaged. There may also be increased local use of pelts for garments such as hats and mittens. Such pelts are often not presented for sealing.

Season and Bag Limit: Beaver trapping season in Unit 19 runs from 1 November to 15 April. These dates have not changed during the past five years. The bag limit was raised from 40 to 50 in 1988. During its spring 1992 meeting, the Board of Game considered a proposal to eliminate bag limits in the unit. The proposal was justified by expanding beaver populations and low pelt prices.

Trapper Residency and Success: Virtually all beaver trappers in Unit 19 are area residents or are temporarily residing in the unit for other reasons. There are no data on catch per unit effort. However, a gross indication of success rates can be obtained from the number of beavers harvested by each trapper who seals at least one beaver. Since 1970, the general trend of this ratio has increased. During the 1990-91 season the ratio was 8.6 beavers per successful trapper.

Other Mortality: No data exist concerning other sources of beaver mortality in Unit 19. However, overwinter mortality does affect specific colonies. In autumn 1991, rivers froze during a period of low water level. Such conditions negatively affect overwinter survival. Beaver populations in Unit 19 seem to be at the saturation point. In such areas, kit production and/or recruitment may be declining.

River Otter

Trapper questionnaire results indicate the river otter population has been moderate and stable during the last 5 years. Pelt prices remain low, so otters remain largely an untargeted species. Most otters are captured incidental to beaver trapping. The declining catches (Table 3) are not based on otter population declines, but rather on a decline in beaver snaring efforts. Subunit 19A continues to contribute the major portion of the harvest. Snaring is the commonest method of take. Snowmachines are the most commonly used method of transportation.

Lynx

Lynx have probably never been abundant in Unit 19. Some drainages, especially in the foothills of the Alaska Range, contain snowshoe hare populations capable of sustaining limited lynx populations. Most small unitwide harvests generally come from those locations. The headwaters of the Aniak River drainage in Subunit 19B also contribute a few pelts annually to the lynx harvest. With declining pelt prices, the number of trappers specifically targeting lynx has declined. Sale of lynx pelts during the previous 5 years has contributed a very minor portion of income realized from the sale of wild pelts (Table 4). Trappers responding to the trapper questionnaire indicate that lynx populations are currently stable at very low levels.

Wolverine

Sound biological data concerning wolverine densities are nonexistent. However, mandatory sealing of pelts has provided a reasonably accurate account of harvests since 1971. Some harvest data exist from 1960-69 bounty records. Numerous factors undoubtedly affect annual harvest, i.e., weather, access, pelt prices, legal or accepted harvest methods and means, and value of alternate species.

During the 20-year period from 1971 to 1990, wolverine harvest in Unit 19 averaged 53 animals annually. Percent males in the harvest has not dropped below 50% (Table 5). Wolverines currently occur throughout the unit. The 26 animals harvested during the 1988-89 season were the lowest amounts since sealing began. This reflects a change in legal methods and means rather than a real population decline. The prohibition on shooting of wolverines the same day a person was airborne curtailed the total harvest.

Unit 19 trapper questionnaire results of the past 4 years indicate a moderate to low wolverine population, with a stable or increasing trend (Table 6). Winters 1989-90 and 1990-91 were severe. The adverse conditions presumably resulted in abundant food resources for wolverines in the form of moose and caribou winter kills and wolf kills. Wolverine population increases will be notable during the 1991-92 trapping season.

Marten

Marten are the most valuable and most sought-after furbearer species in the unit (Table 7). Pelt prices increased dramatically in the early 1980s. Trapper interest coincidentally increased. Within the same time frame, marten populations apparently declined in the unit (Whitman 1990a,b) (Table 8). An emergency order was enacted in spring 1989 shortening the season to 1 November through 15 January. Marten catches increased in subsequent years. The emergency order has not been re-enacted since. Although many possible reasons have been advanced in an attempt to explain apparent population declines, research has not fully answered the question. Potential causes that have been considered are parasites, food shortages, natural cycling, predation, and overharvesting. No definitive answers are available. A complete discussion of marten population changes, abundance and trend indices, and other biological discussions appears in previous furbearer management reports (Whitman 1990a,b).

Trapper questionnaire results for Unit 19 were analyzed for 1978 through 1990. Not many trappers participated from 1978 to 1987 (Table 8). Marten populations were thought to be moderate to high from 1978 to 1980. Estimates declined to low levels by 1982 and remained low through 1987. Populations rebounded to relatively high levels in 1988, where they have remained until the present time. It is unclear if the shortened season in 1988 was responsible for the population turn-around. However, dramatic increases in population were noted in following years. Marten pelt prices continued to decline during the late 1980s and early 1990s. Catches declined because of reduced effort, not because of marten population declines.

Data from carcass necropsies may reveal status of marten populations (Whitman 1990a,b). Percent males in the trapped population is an indicator of population status. A preponderance of males is desirable (Yeager 1950, Quick 1953, Soukkala 1983, Archibald and Jessup 1984). Of greater importance is the ratio of juveniles to adult females (Strickland and Douglas 1988). This ratio has dramatically changed since 1987-88 in Unit 19 (Table 9). This change to a more favorable ratio supports trapper assessments of population status and trend during respective years.

Mink

Market demand for wild-caught mink is low. Therefore, very few trappers in Unit 19 specifically target them. Most catches are incidental to marten trapping activities. Harvests of mink remained low during the previous 5-year report period (Table 10). Trapper assessments of mink population status and trend have remained relatively constant, with a slight increasing trend (Table 11).

Muskrat, Ermine, and Red Squirrel

These species contribute little to the overall recreational or monetary benefits to the region. Muskrat populations and market value are quite low and there is little incentive to trap them. Ermine and tree squirrel populations vary considerably from year to year. Market value is very low. Most of the harvest is incidental to marten trapping efforts.

Coyote

Viable coyote populations in Unit 19 are restricted to areas in or near the Alaska Range. Their populations are expanding into other areas of the unit. They are not yet common anywhere. The estimated unitwide harvest remains less than 10 animals annually.

Red Fox

Red fox populations appear well established throughout Unit 19. However, there is little trapper interest in their harvest. During 1988-89, there appeared to be a red fox population explosion in much of the unit. Harvests increased substantially (Table 12). Early season sales at Canadian fur auction houses during the 1991-92 season indicated a renewed interest and increasing pelt prices. Increased trapper activity in pursuit of this species is anticipated in the near future.

CONCLUSIONS AND RECOMMENDATIONS

Beaver populations remain high. Catches will vary in response to pelt prices. Current prices are extremely low and harvests remain minimal. Individual bag limits should be removed to encourage additional harvest. River otter harvests remain incidental to beaver harvests. Low beaver pelt prices will result in minor effort. Thus, river otter harvests are also expected to remain low. I recommend no regulation changes for river otters at this time. Lynx harvest has also remained very low. Recent increases in hare abundance should allow slight rebounds in lynx numbers and lynx harvests. Increases are not expected to be great.

Wolverine populations remain stable to slightly increasing in Unit 19. Severe weather conditions during 1989-90 and 1990-91 winters resulted in abundant food resources for scavenging wolverines. Their populations will probably increase in response. Harvests declined substantially because of restrictions on same-day-airborne shooting. However, moderate to high pelt prices are encouraging additional effort by some trappers. Harvests are expected to increase slightly during the early 1990s.

Mink populations are moderate and largely stable. Harvests remained low during this report period because of weak market demand. No regulatory changes are recommended. Marten pelt prices have moderated during the last 2 years from previously high levels. Thus, trapping effort has significantly declined in the unit. Efforts to document changes in population status and trends through analyses of donated carcasses should continue.

Ermine and red fox are widespread and common. Little intentional harvest occurs because of low pelt value. Coyote populations will continue to expand. Population densities of red foxes and coyotes appear inversely related. To maintain viable fox populations, coyote trapping and hunting regulations should remain liberal. Because of low market value, muskrat populations were lightly harvested. I recommend no regulatory changes.

LITERATURE CITED

Archibald, W.R., and R.H. Jessup. 1984. Population dynamics of the pine marten (*Martes americana*) in the Yukon Territory. Pages 81-97 in R. Olson, R. Hastings, and F. Geddes, eds. Northern ecology and resource management: memorial essays honoring Don Gill. Univ. Alberta Press, Edmonton.

Quick, H.F. 1953. Wolverine, fisher, and marten studies in a wilderness region. Trans. North Am. Wildl. Conf. 18:512-533.

Soukkala, A.M. 1983. The effects of trapping on marten populations in Maine. M.S. Thesis, Univ. Maine, Orono. 41pp.

Strickland, M.A., and C.W. Douglas. 1988. Marten. Pages 530-546 in M. Novak, J.A. Baker, M.E. Obbard, and B. Malloch, eds. Wild Furbearer Management and Conservation in North America. Ontario Trappers Association, North Bay.

Whitman, J.S. 1978. Sex and age determination of pine marten based on skull and baculum morphology. Forest, Wildlife, and Range Exp. Sta. Bull., Univ. of Idaho, Moscow. 6pp.

_____. 1990a. Unit 19 survey-inventory progress report. Pages 110-122 in S.O. Morgan, ed. Annual report of survey-inventory activities. Part XIV. Furbearers. Vol. XIX. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-23-1. Juneau.

_____. 1990b. Unit 19 survey-inventory progress report. Pages 137-150 in S.O. Morgan, ed. Annual report of survey-inventory activities. Part XIV. Furbearers. Vol. XX. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-23-2. Juneau.

Yeager, L.E. 1950. Implications of some harvest and habitat factors on pine marten management. Trans. North Am. Wildl. Conf. 15:319-334.

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Table 1. Beaver cache count results, Subunit 19D, 13 and 15 November 1991.

Trend Area	Sample unit size km^2	No. active lodges	Colonies per km^2
Middle Fork	33.4	22	0.66
Big River A	41.0	12	0.29
Big River B	33.5	10	0.30
North Fork A	27.8	22	0.79
North Fork B	19.8	18	0.91
North Fork C	26.5	11	0.42
North Fork D	35.1	24	0.68
North Fork E	17.9	16	0.89
Total/Mean	235.0	135	0.57

Table 2. Abundance and trend indices for beaver from Unit 19, 1987-90.

Regulatory year	Index		Index	
	Abundance	n	Trend	n
1987-88	7.47	43	6.07	30
1988-89	7.05	39	6.38	29
1989-90	7.00	40	5.75	32
1990-91	7.26	23	6.00	16

Table 3. River otter catches, mean pelt price, value, and abundance and trend indices in Unit 19, 1986-90.

Regulatory year	Number sealed	Mean pelt price ($)	Net worth ($)	Rank	% of total ($)	Abundance index	Trend index
1986-87	73	38	2,774	7	0.6	--	--
1987-88	80	41	3,241	8	0.6	4.69	5.46
1988-89	54	39	2,099	8	0.5	5.11	5.15
1989-90	47	26	1,223	8	0.4	4.95	5.00
1990-91	31	24	746	8	0.4	4.80	5.31

Table 4. Unit 19 lynx catches, mean pelt price, value, and abundance and trend indices, 1986-91.

Regulatory year	Number sealed	Mean pelt price ($)	Net worth ($)	Rank	% of total ($)	Abundance index	Trend index
1986-87	26	320	8,320	5	1.7	--	--
1987-88	37	314	11,620	5	2.2	2.55	5.16
1988-89	23	220	5,071	5	1.3	2.33	4.69
1989-90	26	108	2,819	6	0.9	1.28	4.10
1990-91	16	100	1,607	6	0.8	1.89	5.29

Table 5. Unit 19, historical wolverine harvests by sex, 1960-91.[a]

Regulatory year	Male	Female	Unk. sex	Total	% Male
1960-61	2	5	0	7	29
1961-62	4	20	1	25	17
1962-63	19	13	1	33	59
1963-64	11	10	1	22	52
1964-65	10	7	2	19	59
1965-66	13	11	1	25	54
1966-67	--	--	--	25	--
1967-68	--	--	--	16	--
1968-69	--	--	--	18	--
1969-70	--	--	--	--	--
1970-71	--	--	--	--	--
1971-72	15	10	5	30	60
1972-73	21	11	2	34	66
1973-74	29	11	0	40	73
1974-75	28	13	1	42	68
1975-76	43	19	2	64	69
1976-77	41	33	0	74	55
1977-78	42	31	2	75	58
1978-79	38	19	2	59	67
1979-80	39	21	2	62	65
1980-81	37	14	2	53	73
1981-82	29	23	18	70	56
1982-83	43	19	4	66	69
1983-84	35	18	6	59	66
1984-85	30	26	4	60	54
1985-86	24	12	2	38	67
1986-87	28	15	9	52	53
1987-88	38	28	2	68	58
1988-89	12	10	4	26	55
1989-90	22	10	3	35	69
1990-91	28	12	11	51	70

[a] Data before the 1971-72 season are based on bounty records. Subsequent data are from sealing documents.

Table 6. Unit 19 wolverine abundance and trend indices, 1987-91.

Regulatory year	Abundance index	Trend index
1987-88	4.43	5.74
1988-89	4.28	5.62
1989-90	3.63	5.00
1990-91	4.40	6.33

Table 7. Unit 19, estimated total catches, mean pelt prices, and value of marten taken 1986-1991.

Regulatory year	Estimated total harvest	Mean pelt price ($)	Total value ($)	Marten value as % of all furbearers
1986-87	4,311	87	375,057	77
1987-88	3,879	104	404,696	75
1988-89	4,096	74	301,261	81
1989-90	3,908	63	245,970	78
1990-91	2,875	54	155,308	74
Mean	3,814	76	296,458	77

Table 8. Unit 19, marten abundance and trend indices based on trapper questionnaire returns, 1978-1991.

Regulatory year	Index Abundance	Index n	Trend	n	Status
1978-79	5.50	16	4.58	19	Moderate
1979-80	6.00	4	6.00	4	High
1980-81	5.33	12	5.80	10	Moderate
1981-82	NA	0	NA	0	Unknown
1982-83	3.22	9	2.71	7	Low
1983-84	3.29	14	3.00	12	Low
1984-85	4.76	17	5.00	17	Moderate
1985-86	4.47	15	3.93	15	Low
1986-87	3.86	21	NA	0	Low
1987-88	3.74	37	3.65	33	Low
1988-89	4.80	40	5.97	29	High
1989-90	6.51	41	6.79	38	High
1990-91	5.91	22	6.41	17	High

Table 9. Unit 19, age and sex ratios of a harvested sample of marten during 1987-91 trapping seasons.

Age class/sex	1987-88		1988-89		1989-90		1990-91	
	n	%	n	%	n	%	n	%
Adult male	122	46	53	20	227	29	39	32
Juvenile male	20	8	104	38	236	30	32	26
Adult female	101	38	41	15	109	14	13	11
Juvenile female	20	8	74	27	223	28	37	31
All adults	223	85	94	35	336	42	52	43
All juveniles	40	15	178	65	459	58	69	57
All males	142	54	157	58	463	58	71	59
All females	121	46	115	42	332	42	50	41
Male:female	1.17:1		1.37:1		1.39:1		1.42:1	
Juv:ad female	0.40:1		4.34:1		4.21:1		5.31:1	

Table 10. Unit 19, estimated catches, mean pelt prices, and net worth of mink harvested during 1986-90.

Regulatory year	Estimated no. caught	Mean pelt price ($)	Net worth ($)
1986-87	40	27	1,080
1987-88	188	48	9,058
1988-89	266	42	11,076
1989-90	113	33	3,757
1990-91	191	34	6,542

Table 11. Unit 19, abundance and trend indices for mink during 1986-91.

Regulatory year	Index Abundance	n	Index Trend	n
1986-87	4.47	15	NA	0
1987-88	3.68	33	4.24	30
1988-89	4.06	34	5.33	24
1989-90	4.37	38	5.21	29
1990-91	4.76	17	5.00	13

Table 12. Unit 19, estimated catches, mean pelt prices, and total value of red fox pelts taken from 1986 to 1990.

Regulatory year	Estimated no. caught	Mean pelt price ($)	Net worth ($)
1986-87	111	28	3,108
1987-88	144	27	3,881
1988-89	275	13	3,537
1989-90	252	98	2,228
1990-91	98	11	1,120

LOCATION

Game Management Subunits: 20A, 20B, 20C, 20F, and 25C (44,760 mi^2)

Geographical Description: Central and lower Tanana Valley and middle Yukon River drainage

BACKGROUND

The fur trade is one of Alaska's oldest industries. Furbearers provide an important source of income and livelihood for many trappers, especially in remote areas where alternate sources of income are limited. Trapping also provides an important source of wildlife-related activity in more accessible areas on the road system. Nonconsumptive use of furbearers is also important as many people enjoy watching furbearers or finding evidence of their activities. Continued use of furbearers will require conservation and continued support and acceptance of the fur industry.

Little is known about factors limiting furbearer populations. Most furbearers are difficult to study because of their secretive habits. Information on furbearers has come primarily from harvest data. Trapper questionnaires have been issued annually since 1965. Furbearer investigations in the last 25 years in interior Alaska have included research on: (1) lynx population dynamics (Nava 1970, Berrie 1973, O'Connor 1984, Stephenson 1988), (2) beaver population ecology (Boyce 1974, 1981), (3) the effects of fire on furbearers (Stephenson 1984, Magoun and Vernam 1986), and (4) development of techniques to survey furbearer populations using track counts (Golden 1987, Schwartz et al. 1988, Stephenson 1988).

Beaver activities (e.g., cutting trees, building dams) have caused substantial property damage along waterways where densities of beavers and humans are high. Although beaver trapping was closed in the lower Chena River from 1969 through 1987 to provide an opportunity for people to view and photograph beaver in the Fairbanks area, a limited registration beaver trapping season has been in effect since then to help decrease human-beaver conflicts by decreasing beaver densities.

Because of concern about possible overtrapping of lynx, in 1987 the Board of Game adopted an ADF&G proposal to manage lynx with a tracking harvest strategy. Under this strategy, trapping regulations are more conservative when lynx are scarce and more liberal when lynx are abundant. During the last four years, we have examined 307 lynx carcasses from Subunits 20A and 20B to provide information for recommending regulations. These two subunits encompass 15,800 mi^2 around Fairbanks and represent the most intensively trapped portions of the area. Results of three years of carcass data were summarized at the Sixth Northern Furbearer Conference in spring 1991 (O'Connor 1991). Four changes in seasons were made because of changes in lynx abundance.

MANAGEMENT DIRECTION

Since the last management report (Beasley 1990), we slightly modified management objectives for furbearers in this area (ADF&G, in press) as follows:

1. Maintain records of furbearer harvest, fur export, fur acquisition, and population trends.
2. Manage beaver in the lower Chena River portion of Subunit 20B (a) for an annual fall beaver colony density of < 0.5 colonies/km of river, and (b) by mitigating problems arising from beaver activities.
3. Manage beaver in Subunits 20A, 20C, 20F, 25C, and the remainder of 20B for an annual subunit harvest that includes < 20% kits when the harvest for that subunit exceeds 50 beaver.
4. Manage lynx with a tracking harvest strategy.
5. Maintain furbearer trapping seasons during periods of peak pelt primeness.
6. Establish species-specific management objectives by 1993.

METHODS

Harvest Data

We maintained accurate records of harvest by compiling data from the required sealing documents for beavers, lynx, otters, and wolverines. A Uniform Coding Unit (UCU) was assigned to each pelt sealed to monitor distribution of harvest. Sealing data provide minimum harvest estimates because some pelts are used domestically and are not reported. Additional harvest data on these and other species were available from fur export reports and fur acquisition reports. Fur prices were compiled from data provided by Dominion Soudack, Seattle Fur Exchange, and Edmonton Fur Auction (R. Zarnke, pers. commun.).

We sent questionnaires to 100-150 active area trappers to get their opinions on furbearer population levels and trends. Responses were compiled from the 1990-91 questionnaires (H. Melchior, unpubl. rep., ADF&G) and relative abundance and trend indices were calculated based on methods used by Brand and Keith (1979).

Beaver Density and Percent Kits

To determine fall beaver colony density in the lower Chena River (downstream from the confluence with the Little Chena River, including Badger Slough downstream from Plack Road), we conducted beaver cache surveys from a riverboat in late September/early

October. In 1990 and 1991, we subjectively categorized cache size based on its size relative to the 18' boat (< 18'=small, 18'=medium, > 18'=large, >> 18'=extra large). We mitigated problems arising from beaver activity by issuing nuisance or registration permits to trappers, and by coordinating with the public and Department of Transportation highway crews to minimize dammed culverts and flooded property.

We estimated the proportion of beaver kits in the harvest using pelt measurements from sealing certificates and classifying any pelt $\leq$ 52 inches (length plus width) as a kit and any pelt > 52 inches as an adult (Buckley and Libby 1955).

Lynx Harvest and Carcass Collection

To manage lynx with a tracking harvest strategy, we have monitored the lynx population since 1988-89 by collecting carcasses, primarily from Subunits 20A and 20B, to determine the age structure and reproductive status of harvested lynx. Trappers provided information on the harvest date and location and were paid $15/carcass in 1988-89 and $10/carcass since then. Staff recorded standard measurements and collected samples from carcasses. To determine the age of each lynx, we collected a canine tooth and skull from each carcass. Canines with "open" tooth roots were considered kittens and were not sectioned. Matson's Laboratory (Milltown, MT) sectioned, examined, and assigned ages to the canine teeth. We evaluated the reproductive status of female carcasses by slitting the uteri and counting placental scars. We also hardened the ovaries in 10% formalin, sectioned them, and macroscopically counted corpora lutea.

We also attempted to determine whether or not lynx pelt measurements could be used to index the number of kittens in the harvest. We compared pelt lengths from the sealing certificates with known ages of carcasses from those same lynx. Several of the most active fur sealers also noted on the sealing form whether they thought the pelt was from a kitten or an adult; these notations were also compared with the known ages. R. Zarnke sent lynx tongues from carcasses collected in 1989-90 and 1990-91 to Agriculture Canada (Saskatoon, Saskatchewan, Canada) to determine prevalence of *Trichinella* spp. larvae.

RESULTS AND DISCUSSION

Environmental Conditions Affecting Trapping

During winter 1988-89, the Fairbanks area experienced record snowfall of 145 inches, compared with 78 inches during the previous year. This deep snow made it difficult for many trappers to access their traplines and trapping pressure was considerably less.

Population Status, Trend, and Mortality

Beaver

Abundance and Harvest. According to 1990-91 trapper questionnaire results, beavers were abundant in the lower Tanana Basin and the population was approximately the same as the previous year (Table 1). However, the reported beaver harvests in 1989-90 (622) and 1990-91 (656) were only 35-40% of harvests from 1985-86 through 1987-88 (Figure 1, Table 2). These lower harvests probably reflect low beaver trapping intensity because of decreasing pelt prices in recent years. In 1990-91, average price was $13/pelt (Table 3). In 1990-91, most beavers (84%) were taken in Subunits 20B or 20C. Average harvest ranged from 5 beaver/trapper in Subunit 20A to 13 beaver/trapper in Subunit 20C.

Cache Surveys. Cache surveys indicated that beaver colony density in the lower Chena River and Badger Slough has not changed substantially during the last 6 years. Densities were usually 0.6 colonies/km in the Chena River and 0.4 colonies/km in Badger Slough (Table 4). Density was highest (1.4 colonies/km) in the Chena River through Fort Wainwright. In 1990, most (81% of 26) caches were medium or small (Table 5); however, in 1991, most (76% of 21) caches were medium or large. This apparent increase in cache size may have been because of the later survey date in 1991. Using a mean of 5 beavers/colony (Boyce 1974) and considering gravel pits and other waterways within the lower Chena River, I estimate that 200 beaver inhabit the lower Chena drainage.

Registration Trapping Season. Boyce (1981) concluded that 0.5 colonies/km is a saturation density for beaver in interior Alaska. Between 1988-89 and 1991-92, colony densities observed during our cache surveys in the lower Chena River exceeded our objective of <0.5 colonies/km. Therefore, we registered 6-8 trappers/year (first-come, first-served) to trap up to 5 beavers each in this area (Table 6). Harvests from this registration trapping season have steadily increased, ranging from 14 to 31 beaver/year (only one of which was a kit). No lodges were "trapped out" and very few conflicts occurred with people.

Nuisance Permits. Since 1988, we have recorded 20-31 complaints/year about nuisance beavers (Table 7). These records underestimate beaver problems because multiple complaints about the same problem area were tallied as one complaint and not all complaints were recorded. Most complaints pertained to areas outside the registration trapping area, open to general trapping.

To respond to these complaints, we issued 12-25 nuisance permits/year since 1988, resulting in a harvest of 17-30 nuisance beaver/year. We also coordinated with Department of Transportation personnel to target many of their problem areas with this trapping effort. Before being issued nuisance permits, we advised landowners to fence trees or property whenever possible.

Percent Kits. In 1989-90 and 1990-91, we met the management objective to maintain < 20% kits in the beaver harvest in subunits where more than 50 beaver were harvested (Table 8). With one exception, the harvest in all subunits included ≤ 14% kits. In Subunit 25C, 26% of the 1989-90 harvest were kits; however, only 50 beaver were harvested in the whole subunit. Therefore, we did not consider the higher proportion of kits a problem.

Lynx

According to trapper questionnaire results, lynx in the lower Tanana Basin were common in 1990-91 and the population increased from the previous year (Table 1). Most trappers thought that snowshoe hares were abundant in 1990-91 and that populations had not changed much since the previous year.

Harvest: In 1990, the lynx population was considered in the increasing phase of its population cycle and the 1990-91 trapping season was extended one month. Trappers only harvested 210 lynx that winter, which was only 66% of the previous year's harvest (Fig. 2, Table 2). This unexpectedly low harvest was probably because of record snow depths in the area, which made it difficult for many trappers to access their traplines.

In 1991-92, preliminary results indicate that 512 lynx were harvested, which is the highest reported harvest since 1982-83. I believe that this high harvest reflects a higher lynx population. Low harvest in 1990-91 would have allowed a larger cohort of female lynx to produce more offspring during 1991. Harvest trends do not necessarily reflect population trends and should be interpreted with caution. Other factors that can influence harvest include: (1) changes in season lengths, (2) publicity encouraging trappers to restrict their harvest of lynx during the low phase of the cycle, (3) environmental conditions affecting trapping effort, and (4) pelt prices.

Pelt prices. Average pelt price for lynx declined steadily from $528 to $118 between 1986-87 and 1990-91 (Fig. 2, Table 3).

Recruitment: Detecting changes in recruitment by tracking harvest strategy is important for managing lynx. Carcasses provided the opportunity to determine age structure of harvested lynx. Data from Subunit 20A/20B carcass collections should be fairly representative of lynx harvested from these subunits because 38-65% of the total reported harvest was collected each year (Table 9).

Carcasses: From 1988-89 through 1991-92, the percentage of kittens in Subunit 20A/20B collections declined from 30% (13/43), to 20% (18/91), to 16% (8/51), to 17% (20/120). However, the age structure of the harvest each year remained very young; we only collected a few lynx ≥ 3 years old (Table 10).

Analysis of female reproductive tracts is incomplete at this time; however, preliminary data indicate that most yearling and adult females ovulated. When hares are scarce, many yearling females do not ovulate (O'Connor 1984).

Pelt measurements: Carcasses can be expensive to collect and time consuming to process. Other methods of assessing productivity, such as using pelt measurements, have been explored (Quinn and Gardner 1984, Stephenson and Karczmarczyk 1989, O'Connor 1991). Some biologists consider pelts shorter than 35 inches to be from kittens. Interpreting pelt measurement data is difficult for several reasons. The degree of overlap between kittens and yearlings may not be consistent between years or between areas. Years or areas with longer trapping seasons can include kittens taken late in the season and yearlings taken early so there is a good possibility pelt lengths of kittens and yearlings will overlap. Some trappers stretch pelts longer than others. Kittens may grow larger when hares are abundant. Changes in the age structure of the harvest (e.g., more yearlings) could result in a higher proportion of pelts in the overlapping range.

In our study, the estimate of the proportion of kittens in the harvest was lower using the < 35-inch pelt length criteria than the estimate based on the carcass collection. In Subunits 20A and 20B combined, 12% (13/109) of the pelts sealed were < 35 inches; however, 39% (13/40) of the carcasses were kittens. If the carcass collection was representative of the harvest, most kittens had pelts ≥ 35 inches. A complete analysis of these findings will be in the next report.

Land Otter

Results of trapper questionnaires showed that otters were common in 1990-91 and populations did not change much from the previous year (Table 1). Otter pelt prices hardly changed between 1986-87 and 1990-91, ranging from $36 to $50/pelt (Table 3).

Otter harvest decreased between 1989-90 and 1990-91, with 31 and 15 otters reported harvested, respectively (Fig. 3, Table 2). Most otters are trapped incidentally in beaver sets; therefore, the decreased otter harvest is thought to be a by-product of the decreased beaver harvests during the same period. In 1990-91, more male than female otter were taken (9 male, 6 female). Chronology of harvest included 1 in November, 5 in December, 4 in January, 2 in February, and 3 in March.

Wolverine

Trappers rated wolverines as scarce in 1990-91 and thought that the population had declined from the previous year (Table 1). Wolverine pelt prices between 1986-87 and 1990-91 were relatively stable bringing $190-250/pelt, except in 1989-90 when average pelt price rose to $380 (Table 3).

Wolverine harvests in the last 2 years (19 in 1989-90, 22 in 1990-91) have been lower than those recorded since 1983-84 (Fig. 4, Table 2). Season length was restricted by 1 month in 1988-89. Only 1 wolverine was reported harvested by a hunter during fall.

The percentage of sex males in the harvest was 58-59% during the last 3 years (Table 11). Male wolverines have larger home ranges than females (Gardner 1985, Magoun 1985) and are more susceptible to trapping. Although correlations between sex ratios and overharvesting have not been established, we will monitor the wolverine harvest closely.

Magoun (1985) stated that factors responsible for long-term wolverine population declines could include: (1) widespread declines in food resources, particularly the demise or shift in range of large ungulate populations; (2) widespread habitat destruction; and (3) heavy harvests over large areas. Only one of these factors might apply to the decreased wolverine harvest in the Fairbanks area. The Delta caribou herd in Subunit 20A declined approximately 45% between 1989 and 1991. Coincidentally, the Subunit 20A wolverine harvest declined more than the other subunits during this period.

Marten

Trappers considered marten to be common during the 1990-91 season, with fewer marten present than the previous year. In Unit 20 during 1990-91, more marten were reported sold to fur buyers (3,419) or exported from Alaska (284) than all other furbearers combined (Table 7). There are no sealing requirements for marten pelts, so the harvest is estimated from these fur dealer acquisition reports and fur export reports.

The impact of different harvest rates on marten populations is unknown. Strickland and Douglas (1987) suggested that harvesting more than 1 adult/3 juveniles indicates possible overharvesting. This relationship needs more investigation. A field technique for sexing and aging marten (Magoun et al. 1988) is being used to collect baseline data.

Other Furbearers

According to trapper questionnaires: (1) weasels were common and had decreased; (2) squirrels were abundant; (3) coyotes and muskrats were scarce and had decreased, and (4) red fox were abundant and had increased. We had numerous calls about fox sightings in Fairbanks in 1991-92. Coyote predation may have contributed to the Dall sheep population decline in Subunit 20A and should be investigated more thoroughly.

Seasons and Bag Limits. See Tables 13 and 14 for current and historical furbearer trapping and hunting seasons and bag limits within this area.

Method of Take and Transportation. Snares were the commonest method of harvesting beavers (91%) (Table 15). Traps were the commonest method of harvesting lynx (78%), wolverines (73%), and otters (66%). Snowmachines were the most commonly used method of transportation (72%) for harvesting these 4 species.

Economic Use. In 1989-90 and 1990-91, the number of furbearers entering the fur trade from Unit 20 was 5,438 and 6,071, respectively. Most of these furs (77% and 68%, respectively) were marten (Table 12).

This information from the fur trade cannot easily be used to estimate harvest of species that do not require sealing. Simply multiplying these numbers by a correction factor will not provide an accurate estimate of area harvest. The percentage of sealed furs that enter the fur trade has not been consistent among species or between years. For example, in 1989-90, the proportion of pelts sealed and that also entered the fur trade ranged from 74% for otter to 45% for lynx. For beaver, this proportion ranged from 53% to 66% between the 2 years. Although we do not have an accurate count of the number of trappers in the study area, fur acquisition reports for Unit 20 show that fur dealers purchased furs from approximately 500 different trappers in 1987-88.

Board of Game Actions and Emergency Orders. Since the last furbearer management report, the Board of Game made the following changes effective July 1991: 1) red fox hunting season had been open 1 November-15 February and the board extended the season to 1 September-15 March; 2) coyote bag limit was increased from 2 to 4 coyotes; and 3) lynx trapping and hunting seasons had been open 15 December-15 January and the board extended the seasons to 1 December-31 January.

CONCLUSIONS AND RECOMMENDATIONS

In some areas, beaver densities exceed management objectives and/or resulted in human-beaver conflicts. These situations are being addressed: (1) with a registration trapping season, (2) by issuing nuisance beaver trapping permits for problem areas, (3) by working with DOT to clear dammed culverts, and (4) by advising the public on how to avoid beaver damage. Beaver harvests in the rest of the area have met our management objective of < 20% kits in the harvest when the subunit harvest exceeds 50 beaver.

During the last 8 years, the Board of Game has changed the lynx trapping/hunting seasons 4 times to reflect changes in lynx abundance. A proposal passed by the Board of in spring 1992 gives ADF&G the authority to adjust lynx seasons within a 1 November-28 February window. This new authority will allow ADF&G to be more responsive in changing seasons as lynx abundance changes, rather than waiting every 2-3 years for the board schedule to open for furbearer regulations. Carcass collections and trapper questionnaires have supplemented harvest data and allowed us to monitor changes in lynx abundance more closely for this tracking harvest strategy.

For other furbearer species, we have not detected any problems requiring management changes. We will continue to monitor harvest and establish criteria for evaluating population status. Trappers will continue to be an important source of information. Communication with the trappers should be improved by: (1) expanding the trapper questionnaire, (2) visiting traplines, (3) writing articles about furbearer research and management projects for the Alaska Trapper's Association Magazine, (4) soliciting input regarding management issues, and (5) trying to keep trappers informed about issues affecting them. I recommend no other regulatory changes at this time.

LITERATURE CITED

Alaska Department of Fish and Game. In press. Furbearers. Annual Performance Report of Survey-Inventory Activities 1 July 1991-30 June 1992. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Proj. W-23-5, Study 7.0. Juneau.

Beasley, R.M. 1990. Unit 20A, 20B, 20C, 20F, and 25C survey-inventory progress report. Pages 151—176 in S.O. Morgan, ed. Annual report of survey-inventory activities. Part XV. Furbearer. Vol. XX. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-23-2. Juneau.

Berrie, P.M. 1973. Ecology and status of the lynx in Interior Alaska. Pages 4-41 in R. L. Eaton, ed. The world's cats, Vol. I. World Wildl. Safari. Winston, OR.

Boyce, M.S. 1974. Beaver population ecology in interior Alaska. M.S. Thesis. Univ. Alaska, Fairbanks. 161pp.

________. 1981. Habitat ecology of an unexploited population of beavers in Interior Alaska. Pages 155-186 in J.A. Chapman and D. Pursley, eds. Proc. Worldwide Furbearer Conf. Frostburg, MD.

Brand, C.J., and L.B. Keith. 1979. Lynx demography during a snowshoe hare decline in Alberta. J. Wildl. Manage. 43:827-849.

Buckley, J.L., and W.L. Libby. 1953. Growth rates and age determination in Alaskan beaver. Trans. North Am. Wildl. Conf. 20:495-507.

Gardner, C.L. 1985. The ecology of wolverines in southcentral Alaska. M.S. Thesis. Univ. Alaska, Fairbanks. 82pp.

Golden, H.N. 1987. Survey of furbearer populations on the Yukon Flats National Wildlife Refuge. Final Report. Alaska Dep. Fish and Game and U. S. Fish Wildl. Ser. Coop. Agreement. Proj. 14-16-007-84-7416. 86pp.

Magoun, A.J. 1985. Population characteristics, ecology, and management of wolverines in northwestern Alaska. Ph.D. Thesis. Univ. Alaska, Fairbanks. 197pp.

_____, and D.J. Vernam. 1986. An evaluation of the Bear Creek burn as marten (*Martes americana*) habitat in Interior Alaska. Bureau Land Management and Alaska Dep. Fish and Game. Spec. Coop. Proj. AK-950-CAH-0. Final Report. 130pp.

_____, R.M. Gronquist, and D.J. Reed. 1988. Development of a field technique for sexing and aging marten. Cooperative study Alaska Dep. Fish and Game and Nowitna Natl. Wildl. Refuge. Final Report. 33pp.

Nava, J.A., Jr. 1970. The reproductive biology of the Alaska lynx (*Lynx canadensis*). M.S. Thesis. Univ. Alaska, Fairbanks. 141pp.

O'Connor, R.M. 1984. Population trends, age structure, and reproductive characteristics of female lynx in Alaska, 1961 through 1973. M.S. Thesis. Univ. Alaska, Fairbanks. 111pp.

_____. 1991. Lynx management in the Fairbanks Area. Abstract in Sixth Northern Furbearer Conference, April 10-11, 1991. Fairbanks, Alaska.

Quinn, W.S., and J.F. Gardner. 1984. Relationships of age and sex to lynx pelt characteristics. J. Wildl. Manage. 48(3):953-956.

Schwartz, C.C., E. Becker, and K.J. Hundertmark. 1988. Development of population assessment techniques for lynx. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Final Rep. Proj. W-23-1. Juneau. 8pp.

Stephenson, R.O. 1984. The relationship of fire history to furbearer populations and harvest. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Final Rep. Proj. W-22-2. Juneau. 86pp.

_________. 1988. Development of techniques for evaluating lynx population status in Alaska. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-22-6. Juneau. 6pp.

_____, and P.F. Karczmarczyk. 1989. Development of techniques for evaluating lynx population status in Alaska. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-23-1. Juneau. 95pp.

Strickland, M.A., and C.W. Douglas. 1987. Marten. Pages 530-546 in M. Novak, J.A. Baker, M.E. Obbard, and B. Malloch, eds. Wild furbearer management and conservation in North America. Ontario Trappers Association, North Bay.

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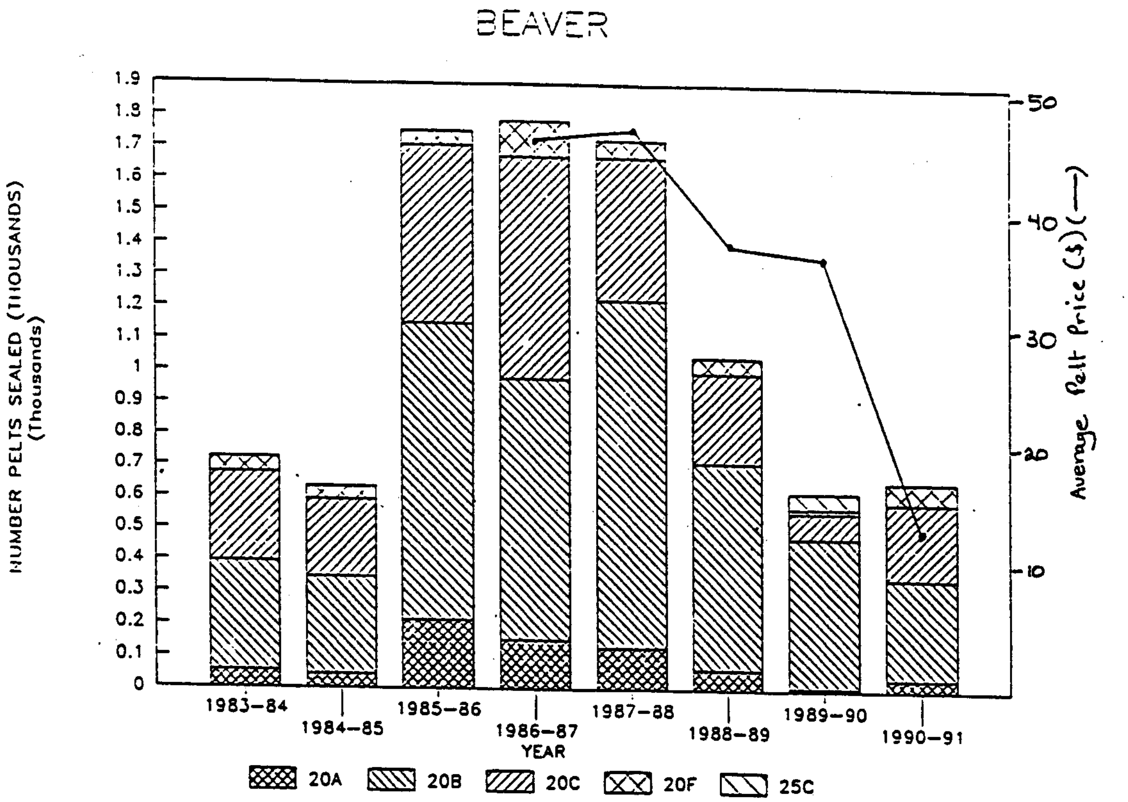


Figure 1. Beaver harvest and average pelt price, 1983-84 through 1990-1991.

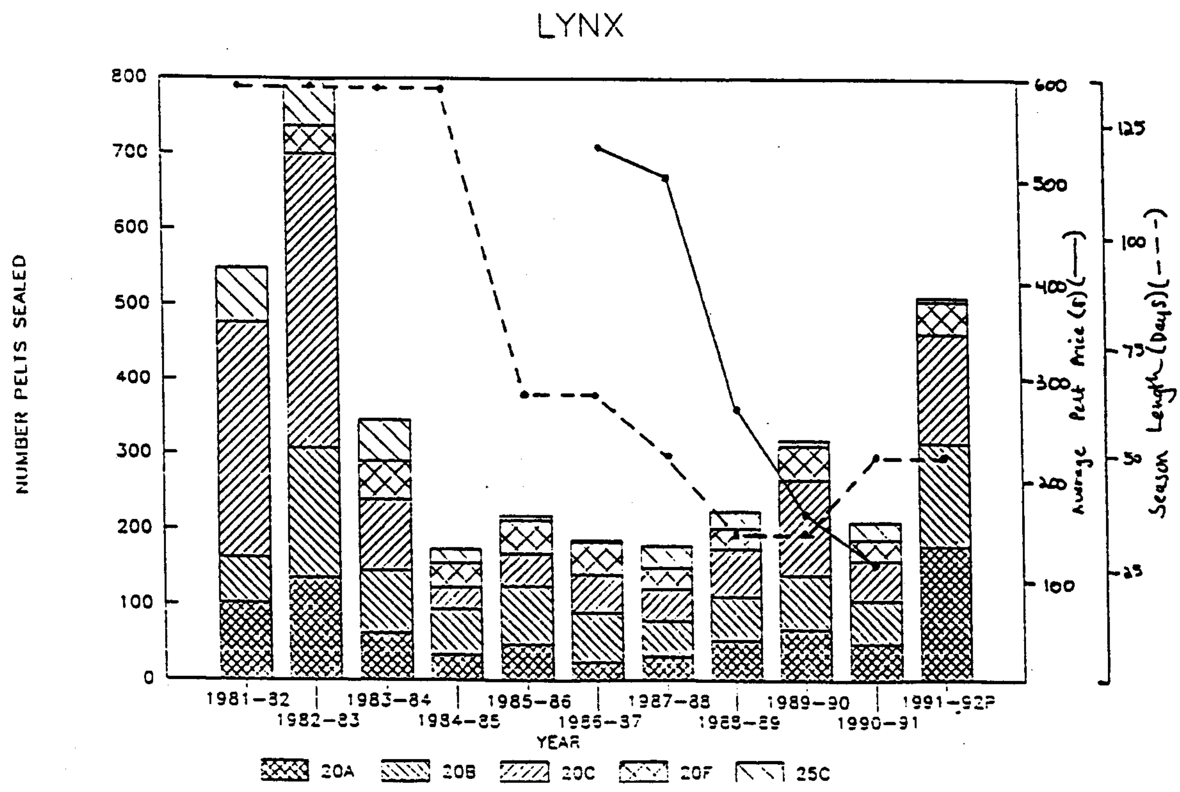


Figure 2. Lynx harvest, pelt price, and season length, 1981-82 through 1991-92 (preliminary).

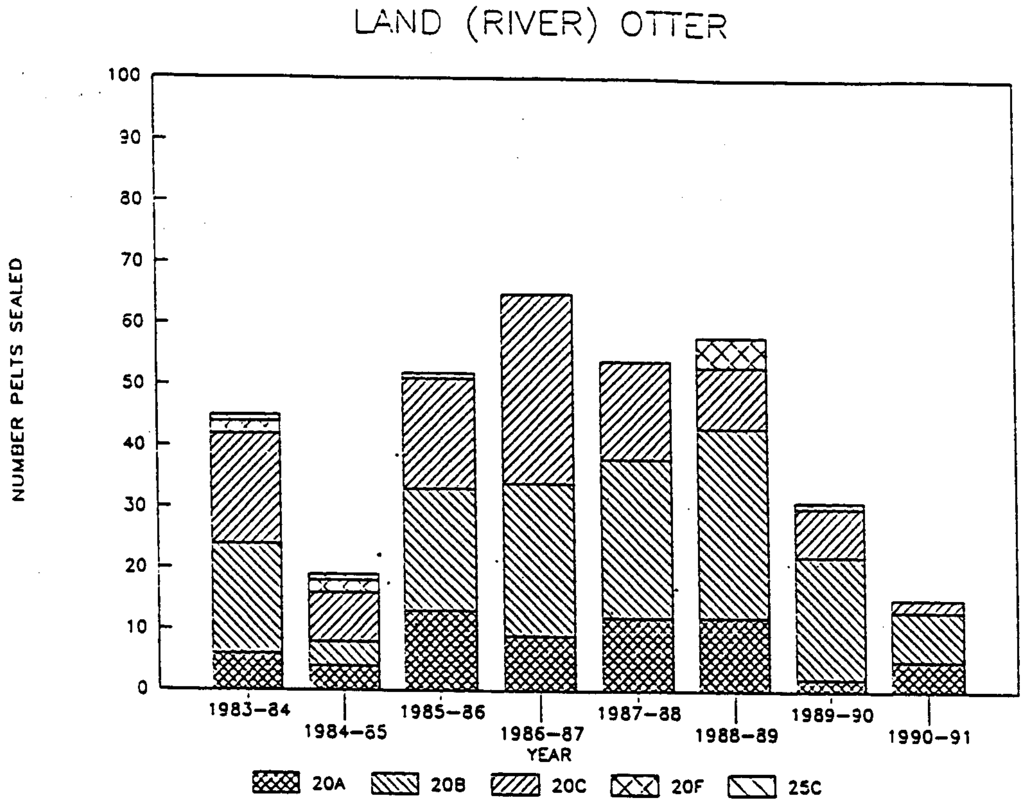


Figure 3. Land otter harvest, 1983-84 through 1990-91.

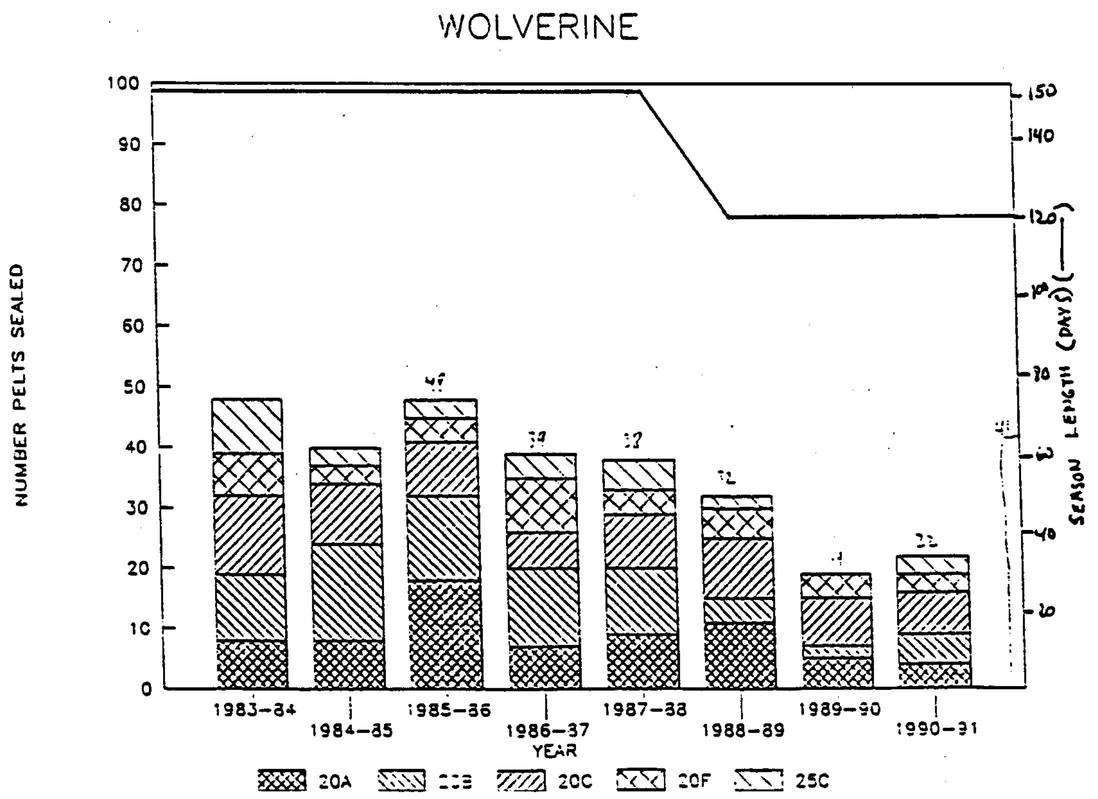


Figure 4. Wolverine harvest and season length, 1983-84 through 1990-91.

Table 1. Indices of relative abundance[a] and trend[b] of furbearer populations in Interior Alaska[c], 1990-91.

	Relative Abundance Index				Trend Index			
	LTB	UTB	MYK	UYB	**LTB**	UTB	MYK	UYB
Furbearers:								
Arctic Fox	**NP**	NP	0	17	**NP**	NP	1.75	2.00
Beaver	**65**	13	59	46	**1.80**	2.20	1.88	1.82
Coyote	**15**	10	0	0	**1.46**	2.10	1.33	1.80
Lynx	**37**	41	18	23	**2.38**	2.76	1.86	2.13
Marten	**32**	59	31	43	**1.37**	1.64	1.50	1.60
Mink	**44**	21	20	17	**1.79**	1.92	1.40	1.50
Muskrat	**19**	28	8	0	**1.48**	1.89	1.46	1.73
Red Fox	**68**	65	37	58	**2.44**	2.25	1.80	2.17
Red Squirrel	**77**	46	42	73	**1.77**	1.79	1.85	1.73
River Otter	**37**	25	36	21	**1.77**	1.80	1.71	1.50
Weasel	**47**	31	25	55	**1.59**	1.85	1.43	2.00
Wolf	**38**	37	43	32	**2.00**	2.05	2.00	1.71
Wolverine	**8**	17	29	13	**1.62**	1.89	1.43	1.27
Prey:								
Hare	**56**	56	27	50	**2.13**	2.06	2.07	2.17
Grouse	**34**	44	50	35	**1.50**	1.28	1.53	1.54
Ptarmigan	**34**	41	41	35	**1.68**	1.65	1.69	1.77
Mice/Rodents	**51**	53	43	67	**1.90**	1.72	1.50	1.92

[a] Abundance Index Values
NP=Not PresentNP =
Scarce=0 through 19
Common=20 through 50
Abundant=greater than 50

[b] Trend: Compared with 1989-90
Not Present
Fewer = 1 through 1.66
Same = 1.67 through 2.33
More = 2.34 through 3.00

[c] LTB = Lower Tanana River Basin
UTB = Upper Tanana River Basin, Charley & Fortymile River
MYK = Middle Yukon & Koyukuk Rivers
UYB = Upper Yukon River Basin

[d] From 1990-91 Trapper Questionnaire Statewide Report, ADF&G. 46pp. Compiled by H. Melchior, unpubl. data, ADF&G.

Table 2. Number of pelts sealed[a] from selected furbearers in portions of Unit 20 and in Subunit 25C, 1985-86 to 1990-91.

Species	Subunit	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91[b]	1991-92 Prelim.
Beaver	20A	214	153	129	63	10	37	
	20B	935	823	1,095	648	466[c]	312	
	20C	557	697	445	286	81	240	
	20F	42	113	55	49	15	65	
	25C	4	0	0	0	50	2	
Total		1,752	1,786	1,724	1,046	622	656	
Lynx	20A[d]	48	25	32	54	68	50	178
	20B	76	65	47	57	72	56	138
	20C	43	50	43	63	126	53	147
	20F	44	43	28	28	45	28	43
	25C	6	3	29	22	7	23	6
Total		217	186	179	224	318	210	512
Land otter	20A	13	9	12	12[e]	2	5	6
	20B	20	25	26	31	20	8	20
	20C	18	31	16	10	8	2	8
	20F	1	0	0	5	1	0	1
	25C	0	0	0	0	0	0	0
Total		52	65	54	58	31	15	35
Wolverine	20A	18	7	9	11	5	4	15
	20B	14	13	11	4	2	5	8
	20C	9	6	9	10	8	7	14
	20F	4	9	4	5	4	3	2
	25C	3	4	5	2	0	3	2
Total		48	39	38	32	19	22	41

[a] Data from S&I reports prior to 1987-88 and from original sealing certificates since 1987-88. See Tables 13a and 13b for changes in season length.
[b] Lynx data from hand tally of sealing certificates.
[c] This is a correction from data in tables from previous years.
[d] Due to an ADF&G lynx research project, one major lynx trapper did not trap lynx from 1984-85 through 1986-87 and most of 1987-88.
[e] This includes one mortality due to Sport Fish research activities.

Table 3. Average North American furbearer pelt prices (U.S. dollars), 1986-87 to 1990-91.[a]

Species	1986-87	1987-88	1988-89	1989-90	1990-91
Beaver Good quality large brown	45	46	37	36	13
Marten Large I-II dark brown	115	87	110	71	65
Mink Large-medium I-II dark brown North	48	50	40	31	34
Fox XL-large I-II Northwest	54	32	24	20	17
Lynx Large-medium I-II first color	528	500	260	155	118
Otter XL-large I-II dark brown	49	50	49	29	37
Wolverine XL I-II brown	190	250	200	380	190

[a] Data compiled by R. Zarnke from Dominion Soudack, Seattle Fur Exchange, Edmonton Fur Auction.

Table 4. Fall beaver cache surveys in the lower Chena River, Badger Slough, and Noyes Slough, Subunit 20B, 1986-91.

Date	Location[a]	No. caches	Stream distance (km)	Density (caches/km)
1986				
unknown	Chena River	25	40	0.6
2 Oct	Noyes Slough	8	9	0.9
1987				
21 Oct	Chena River	25	40	0.6
1988				
5 Oct	Chena River	28	40	0.7
16 Oct	Noyes Slough	6	9	0.7
unknown[b]	Badger Slough	7	13	0.5
1989				
29 Sep	Chena River	24	40	0.6
12 Oct[c]	Badger Slough	5	13	0.4
1990				
26 Sep	Chena River	26	40	0.6
2 Oct[c]	Badger Slough	5	13	0.4
1991				
2 Oct	Chena River	22	40	0.6

[a] Chena River downstream from confluence with Little Chena River, Badger Slough downstream from Plack Road.
[b] Per Terry Anderson, local resident.
[c] From PA-18 aircraft.

Table 5. Size[a] of beaver caches in Subunit 20B, the Chena River downstream from the confluence with Badger Slough, 26 September 1990[b] and 2 October 1991.

	1990					1991				
Zone	Small	Medium	Large	X Large	Total	Small	Medium	Large	X Large	Total
1	Not surveyed									
2	1	1	0	0	2	2	1	1	0	4
3	0	2	0	0	2	0	0	2	0	2
4	0	1	2	1	4	0	0	2	1	2
5	3	1	0	0	4	0	0	2	0	2
6	0	3	0	0	3	0	2	0	0	2
7	0	3	0	0	3	1	1	1	1	4
City limits	3	0	2	0	5	1	1	2	0	4
8	2	1	0	0	3	0	1	0	0	1
Total	9	12	4	1	26	3	6	10	2	21

[a] Cache size judged subjectively, based on size relative to 18' boat. Small <18', Medium 18', Large >18', and X Large >>18'.
[b] Cache survey done about 1 week earlier than normal. Therefore, cache sizes not comparable with other years.

Table 6(a). Results of registration beaver trapping season in the lower Chena River portion of Subunit 20B, 1 February 1989 through 15 March 1989.

Zone[a] (1 permittee/ zone)	No. lodges w/cache	No. lodges trapped	No. beavers trapped			Any lodges trapped out?	Any conflicts with people?	Comments
			Adult	Kit[b]	Total			
1(a)		1	0	0	0	N	Y	"Do not trap" signs on lodge from landowner.
(b)	7	0	0	0	0	N	N	Did not trap-went out of town.
(c)		0	0	0	0	N	N	Difficult to locate live lodges.
2(a)		unk	0	0	0	N	Y	Other permittee wanted to trap same lodges.
(b)	6	5	5	0	5	N	N	Prefer later season concurrent with regular season.
(c)		2	3	0	3	N	Y	Permittees wanted to trap same lodges. Hard to locate live lodges.
3	3	2	6	0	6	N	N	Landowner requested beaver removal near Pikes Landing.
Total	16	10	14	0	14			

[a] Location of zones was not consistent from year to year.
[b] Pelts <53 inches.

Table 6(b). Results of registration beaver trapping season in the lower Chena River portion of Subunit 20B, 16 February 1990 through 15 March 1990.

Zone[a] (1 permittee/ zone)	No. lodges w/cache	No. lodges trapped	No. beavers trapped Adult	Kit[b]	Total	Any lodges trapped out?	Any conflicts with people?	Comments
1	unk.	0	0	0	0	N	N	2' overflow prevented trapping.
2	4	0	0	0	0	N	N	Could not locate live lodges. Prefer later season.
3	2	0	0	0	0	N	N	Thin ice prevented trapping via snowmachine. Want permits in fall, season earlier.
4	3	5	5	0	5	N	N	Limit too low. Should be no limit if we want to thin out beaver.
5	2?	2	5	0	5	N	N	Issue permits in fall. People supportive.
6	2	2	5	0	5	N	N	Issue permits earlier so lodges can be located in fall.
Total	17(+)	9	15	0	15			

[a] Location of zones was not consistent from year to year.
[b] Pelts <53 inches.

Table 6(c). Results of registration beaver trapping season in the lower Chena River[a] portion of Subunit 20B, 1 December 1990 through 31 January 1991.

Zone[a] (1 permittee/ zone)	No. lodges w/cache	No. lodges trapped	No. beavers trapped			Any lodges trapped out?	Any conflicts with people?	Comments
			Adult	Kitten[b]	Total			
1	3	Unk.						Did not report?
2	3	2	2	0	2	N	N	
3	3	3	1	0	1	N	N	Lots of overflow and heavy snow.
4	4	2	0	0	0	N	N	Overflow, thin ice, cold weather.
5	4	3	5	0	5	N	N	Lost one set to tampering-some friendly discussion about killing beaver.
6	3	2	5	0	5	N	N	Another fun year.
7	3	2	5	0	5	N	N	This section of ice very thin and hazardous. Two beaver retrieved from open water following heavy snow. A challenge, but fun.
8	3	2	3	0	3	N	N	Need to take more beaver and longer season.
Total	26	16+	21(+)	0	21(+)			

[a] Location of zones was not consistent from year to year.
[b] Pelts <53 inches.

Table 6(d). Results of registration beaver trapping season in the lower Chena River portion of Subunit 20B, 1 December 1991 through 31 January 1992.

Zone[a] (1 permittee/ zone)	No. lodges w/cache	No. lodges trapped	No. beavers trapped			Any lodges trapped out?	Any conflicts with people?	Comments
			Adult	Kit[b]	Total			
1	unk.	1	3	1	4	N	N	Locals reported beaver damage near Rust Road.
2	4	2	5	0	5	N	Y	Kids took two snares, landowner unhappy with trespass.
3	2	0	0	0	0	NA	NA	Did not trap because of personal injury.
4	3	2	4	0	4	N	N	All beaver had pellets and .22 bullets in flesh. Some local residents admitted shooting them because of damage. Evidence that someone killed beavers prior to season. Recommend increasing bag limit to 8-10.
5	2?	3	6	0	6	N	N	Good percentage of beaver had bullet holes in them.
6	2	3	7	0	7	N	N	
7	3	3	5	0	5	N	N	Authorized to take four more beaver.
8	1?	2	0	0	0	N	N	Ice 4' thick, hard to locate runs.
Total	17(+ zone 1)	16	30	1	31			

[a] Permittees from zones 4, 5, 6, and 7 worked together; pelt sizes and harvest by zone may not be accurate. Location of zones not consistent from year to year.
[b] Pelts <53 inches.

Table 7. Nuisance beaver complaints and action taken, Unit 20, 1988-91.

Calendar year	Inside "Closed" area[a] No. complaints	Inside "Closed" area[a] No. permits issued[b]	Inside "Closed" area[a] No. beavers harvested	Outside "Closed" area No. complaints	Outside "Closed" area No. permits issued	Outside "Closed" area No. beavers harvested	Total No. complaints	Total No. permits issued	Total No. beavers harvested	Other nontrapping beaver mortality
1988	7	3	9	13	9	21	20	12	30	0
1989	8	2	4	13	15	13	21	17	17	0
1990	7	4	4	16	12	26	23	16	30	3[c]
1991	5	1	0	26	24	26	31	25	26	8[d]

[a] Area open by registration permit. Includes Chena River downstream from confluence with Little Chena River and Badger Slough downstream from Plack Rd.
[b] Does not include multiple permits given for same site.
[c] Sport Fish research mortality--caught in fish nets on Chena River.
[d] Includes seven Sport Fish research mortalities on Chena and Tanana Rivers and one road kill.

Table 8. Number of beaver sealed and percentage of kits in beaver harvest in Subunits 20A, 20B, 20C, 20F, and 25C, 1989-90 and 1990-91.

Subunit	1989-90 No. beaver sealed	1989-90 No. kits[a]	1989-90 % kits[b]	1990-91 No. beaver sealed	1990-91 No. kits[a]	1990-91 % kits[b]
20A	10	0	0	37	5	14
20B	462	29	6	312	21	7
20C	81	5	6	240	19	8
20F	15	1	7	65	2	3
25C	50	13	26	2	0	0
Total	618	48	8	656	47	7

[a] Pelts <53 inches.
[b] The management objective for <20% kits in the harvest only applied to subunits with harvests of >50.

Table 9. Lynx pelts sealed and carcasses collected, Subunits 20A and 20B, 1988-89 to 1990-91.

Year	Subunit	No. pelts sealed	No. carcasses collected	% carcasses collected
1988-89	20A	54	29	54
	20B	57	16	28
	Total	111	45	41
1989-90	20A	68	53	78
	20B	72	38	53
	Total	140	91	65
1990-91	20A	54	21	39
	20B	57	30	53
	Total	111	51	46
1991-92 (Prelim. data)	20A	178	64	36
	20B	138	56	41
	Total	316	120	38
All years combined		678	307	46

Table 10. Age distribution of lynx carcasses collected in Subunits 20A and 20B, 1988-89 to 1990-91.

	1988-89								1989-90						1990-91						
	20A				20B				20A			20B			20A				20B		
Age (yrs)	M	F	Unk	T	M	F	Unk	T	M	F	T	M	F	T	M	F	Unk	T	M	F	T
Kitten	7	6	0	13	0	0	0	0	10	5	15	1	2	3	3	0	0	3	2	3	5
1	6	3	1	10	7	5	1	13	18	6	24	19	10	29	6	3	1	10	9	8	17
2	0	0	0	0	1	1	0	2	3	5	8	1	4	5	3	3	0	6	4	3	7
3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
>3	0	1[a]	0	1	0	0	0	0	1[b]	0	1	0	0	0	0	0	0	0	0	0	0
Nonkitten[c]	1	2	0	3	0	0	0	0	4	1	5	1	0	1	0	0	0	0	0	0	0
Unknown age	1	0	0	1	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	1
Total	16	12	1	29	9	6	1	16	36	17	53	22	16	38	14	6	1	21	15	15	30

[a] 6-year-old had been radio-collared.
[b] 9-year-old.
[c] Body size confirmed that these carcasses were not kittens but no tooth was available for sectioning.

Table 11. Wolverine harvest (number of pelts sealed) and percentage of males in the harvest, Subunits 20A, 20B, 20C, 20F, and 25C, 1989-90 through 1991-92.

Year	No. sealed[a]	No. males	% males[a]
1988-89	31	23	74
1989-90	17	10	58
1990-91	22	13	59
1991-92 (Prelim.)	42	25	59

[a] Excludes wolverines of unknown sex.

Table 12(a). Unit 20, number of furs sealed, reported sold to fur dealers[a], or exported[b] from Alaska in 1989-90.

Species	No. pelts sealed	Pelts sold to fur dealers No.	Pelts sold to fur dealers % of sealed	Pelts exported by trappers No.	Pelts exported by trappers % of sealed	Total sold or exported No.	Total sold or exported % of sealed
Beaver	589	311	53	75	13	386	66
Coyote		1		6		7	
Cross fox		22		44		66	
Red fox		62		120		182	
Silver fox		7		9	10	16	
Lynx	344	120	35	36	10	156	45
Marten		3,723		950		4,673	
Mink		199		38		237	
Muskrat		0		19		19	
Otter	31	13	42	10	32	23	74
Red squirrel		179		0		179	
Weasel		42		9		51	
Wolf	121	47	39	10	8	57	47
Wolverine	40	11	28	8	20	19	48
Total	1,125	4,737		1,334		6,071	

[a] From fur acquisition forms.
[b] From fur export reports from trappers.

Table 12(b). Unit 20, number of furs that were sealed, reported sold to fur dealers[a], or exported[b] from Alaska, 1990-91.

Species	No. pelts sealed	Pelts sold to fur dealers		Pelts exported by trappers		Total sold or exported	
		No.	% of sealed	No.	% of sealed	No.	% of sealed
Beaver	655	280	41	78	11	358	53
Coyote		1		2		3	
Cross fox		41		40		81	
Red fox		110		77		187	
Silver fox		6		9		15	
Lynx	275	97	34	54	20	151	55
Marten		3,419		284		3,703	
Mink		147		23		170	
Muskrat		2[c]		1		3	
Otter	15	14[c]	93	1	7	15	100
Red squirrel		428		2		430	
Weasel		16		7		23	
Wolf	167	45	27	14	8	59	35
Wolverine	30	9	30	5	17	14	47
Total	1,142	4,615		597		5,212	

[a] From fur acquisition forms.
[b] From fur export reports from trappers.
[c] These represent corrections from Statistics Section printout of 30 August 1991.

Table 13(a). Trapping seasons and bag limits for selected furbearers in portions of Units 20 and 25, 1983-84 to 1991-92.

Species	Bag limit	Unit	1983-84 1984-85	1985-86 1986-87	1987-88[a]	1988-89 1989-90	1990-91 1991-92
Beaver	25 (except 50 beaver in Subunit 20F in 1988-89)	20A	1 Feb-15 Apr				
		20B[b]	Closed			See footnote b	
		20B[c]	1 Feb-15 Apr	1 Nov-15 Apr			
		20C,F;25C	1 Nov-15 Apr				
Lynx	No limit	20A,B,C,F;25C	1 Nov-15 Mar	1 Dec-31 Jan	1-31 Dec(20A) 1 Dec-15 Jan(20B,C,F,25C)	15 Dec-15 Jan	1 Dec-31 Jan
Land otter	No limit	20, 25	1 Nov-15 Apr				
Wolverine	No limit	20, 25			1 Nov-28 Feb		
Coyote	No limit	20, 25	1 Nov-31 Mar				
Marten, Mink, Weasel, Red fox	No limit	20, 25	1 Nov-28 Feb				
Muskrat	No limit	20, 25	1 Nov-10 Jun				

[a] Changes for lynx and wolverine were effective 30 November 1987 by Emergency Order.

[b] That portion of the Chena River downstream from its confluence with the Little Chena River, and Badger (Piledriver) Slough downstream from Plack Road. Season after 1987 open by limited registration permit.

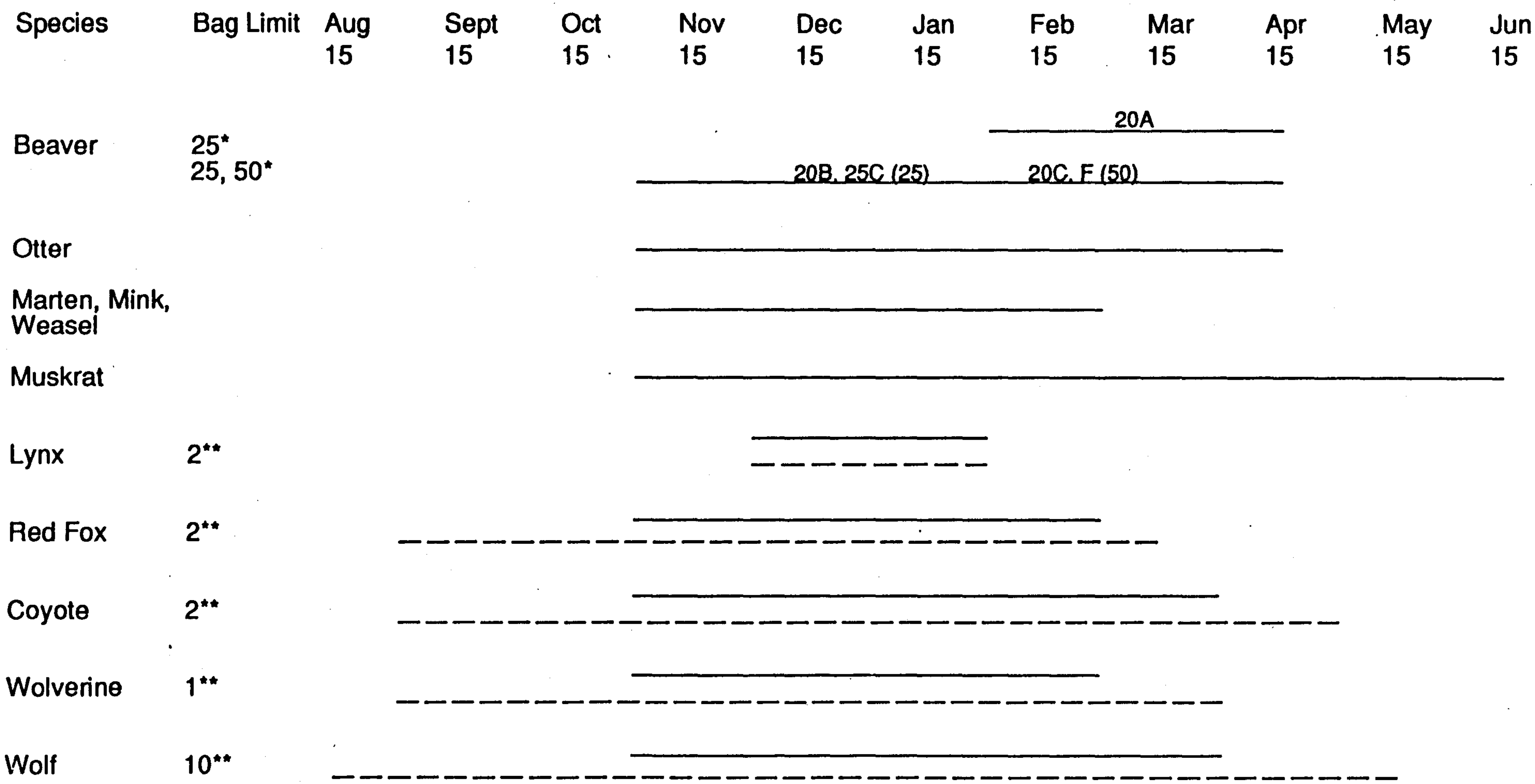
[c] The remainder of Subunit 20B.

Table 13(b). General hunting seasons and bag limits for fur animals and wolverines in Subunits 20A, 20B, 20C, 20F, and 25C 1983-84 to 1991-92.

Species (bag limit)	1983-84 through 1986-87	1987-88	1988-89	1989-90	1990-91	1991-92
Lynx[a] (2)	1 Nov-31 Mar	1 Nov-31 Dec (20A) 1 Nov-15 Jan (20B, C,F,25C)	15 Dec-15 Jan		1 Dec-31 Jan	
Wolverine (1)	1 Sep-31 Mar					
Red fox (2)	1 Nov-15 Feb					1 Sep -15 Mar
Coyote (2)	1 Sep-30 Apr					
Squirrel (no limit)	No closed season					

[a] 1987-88 seasons changed by Emergency Order effective 30 November 1987.

Table 14. 1991-92 Furbearer Trapping and Hunting Seasons
GMU's 20A,B,C,F and 25C



* Trapping Bag Limit
** Hunting Bag Limit
No number indicates no bag limit

Trapping Season ————————
Hunting Season — — — — — — — —

Table 15. Method of take and transportation used to harvest furbearers from Subunits 20A, 20B, 20C, 20F, and 25C, 1990-91.

	Method of take				Method of transportation			
Species	Ground shooting	Trapping	Snaring	Other/ unk.	Airplane	Dog sled/ snowshoe/skis	Snow-machine	Other/ unk.
Beaver	8	33	602	14	22	101	437	97[b]
Land otter	0	10	5	0	0	1	13	1
Lynx	0	159	45	0	0	12	181	11
Wolverine	2	16	4	0	2	1	13	2
Total	10	218	656	14	24	115	644	111

[a] From Statistics Section computer printout (4-17-92).
[b] Includes 38 beavers from trappers using highway vehicles.

LOCATION

Game Management Subunit: 20D (5,720 mi^2)

Geographical Description: Central Tanana Valley near Delta Junction

BACKGROUND

Furbearers are an important natural resource in Subunit 20D. Species include beaver, coyote, lynx, marten, mink, muskrat, otter, red fox, red squirrel, weasel, wolverine, and wolf. Wolves will be discussed in a separate management report. Both recreational and commercial trappers use the area. Competition for traplines and furbearers is intense. Much of the area is easily accessible from the road system and/or major rivers.

MANAGEMENT DIRECTION

Management Objectives

Management objectives for Subunit 20D furbearers are to: 1) monitor furbearer population trends and annual harvests of furbearers using sealing documents, fur acquisition reports, fur export reports, trapper questionnaires, and trapper interviews; 2) monitor trends in abundance of furbearer prey species by establishing snowshoe hare and small mammal trend surveys; and 3) determine lynx reproductive status by examining lynx carcasses and reproductive tracts.

METHODS

We collected harvest data from furbearer sealing documents for beaver, lynx, otter, and wolverine. Additional information collected at the time of sealing included: name of trapper; location of harvest; date of harvest; pelt measurements for beaver, lynx, and otter; sex of the furbearer except for beaver; method of take; and method of transportation used.

We sent the annual trapper questionnaire to selected trappers in Subunit 20D through the Statewide Furbearer Management Program. We analyzed questionnaires from trappers who reported trapping during this report period. We used the information to estimate population abundance and population trend for furbearers and prey species.

Small mammal traplines were established in 1991 to monitor furbearer prey. Three habitat types were included: mature white spruce forest near Quartz Lake to represent pine marten habitat; recently harvested barley fields at the University of Alaska Experimental Farms to represent red fox and coyote habitat; and farm fields that have been fallow for approximately eight years on Tract E of the Delta Agricultural Project to also represent red fox and coyote habitat. We used museum special snap traps and pitfall cone traps to collect small mammals. We established two parallel transects in each habitat type sampled. Transects were approximately 92 m apart and each transect was approximately 335 m long. Each transect had 20 stations spaced approximately 15.2 m along the line. Two museum special traps and one pitfall trap were set at each station. We baited museum special traps with peanut butter and oatmeal. We trapped for two days in each habitat type and traps were checked and reset daily.

We purchased lynx carcasses from trappers during the 1991-92 trapping season for $10 per carcass. Carcasses were kept frozen until examined. We collected the following data on each carcass: sex, total length, length of tail, circumference of neck, and circumference of chest. Quantity of internal fat was rated subjectively as little, moderate, or abundant, and xyphoid fat was removed and weighed. We removed upper canine teeth for aging. The uterus was removed from females and examined for placental scars.

RESULTS AND DISCUSSION

Population Status and Trend

Beaver were common and stable, based on trapper questionnaire responses (Table 1). The number of beaver trapped was low. This low harvest was probably a function of low beaver pelt prices, rather than of declining populations.

Coyote populations are not evenly distributed in Subunit 20D. Nearly equal numbers of trappers rated coyotes as scarce, common, and abundant (Table 1). Most trappers reported stable coyote populations. My observations indicated that coyotes were common to abundant in Subunit 20D south of the Tanana River. Coyotes were observed frequently along the Delta, Gerstle, and Johnson rivers, and in the Delta Agricultural Project. Numerous Dall sheep hunters reported seeing coyotes in the Delta Controlled Use Area and some sheep hunters reported observing coyotes preying on Dall sheep.

Lynx populations are increasing based on increased rates of harvest (Table 2). Most trappers reported lynx as scarce during 1989-90 and 1990-91 seasons. Trappers reported lynx population trends as stable or increasing (Table 1). Lynx carcasses collected during the 1991-92 trapping season will be examined. To help identify lynx population trends, results will be reported at a later date.

Marten appeared scarce to common during this report period based on trapper questionnaires (Table 1). Most trappers thought populations were stable and reported that red foxes were common to abundant and generally increasing (Table 1). Population status and trend for other furbearers in Subunit 20D are listed in Table 1.

Population Size: Population size is unknown for furbearers in Subunit 20D.

Population Composition: Population composition is unknown for furbearers in Subunit 20D. Sex composition of lynx captured during the 1991-92 trapping season will be reported from carcass examinations at a later date. No lynx kittens (pelts ≤ 35 inches in length) were taken during the 1989-90 season. Three kittens (14% of known-age harvest) were taken during 1990-91.

Distribution and Movements: No work was performed to determine furbearer distribution and movements during this report period.

Mortality

Season and Bag Limit. Subunit 20D furbearer trapping and hunting seasons and bag limits are listed below for the 1989-90 and 1990-91 regulatory years.

Species	Trapping Season	Bag Limit	Hunting Season	Bag Limit
Beaver	Nov. 1-Apr. 15[a]	25	No open season	
	Feb. 1-Apr. 15[b]	15		
Coyote	Nov. 1-Mar. 31	No limit	Sep. 1-Apr. 30	2
Lynx	Dec. 15-Jan. 15[c]	No limit	Nov. 1-Mar. 31	2
	Dec. 1-Jan. 31[d]	No limit	Dec. 1-Jan. 31[d]	1
Marten	Nov. 1-Feb. 28	No limit	No open season	
Mink	Nov. 1-Feb. 28	No limit	No open season	
Muskrat	Nov. 1-Jun. 10	No limit	No open season	
Otter	Nov. 1-Apr. 15	No limit	No open season	
Red fox	Nov. 1-Feb. 28	No limit	Nov. 1-Feb. 12	2
Red squirrel	No closed season	No limit	No closed season	No limit
Weasel	Nov. 1-Feb. 28	No limit	No open season	
Wolverine	Nov. 1-Feb. 28	No limit	Sep. 1-Mar. 31	1

[a] That portion of Subunit 20D draining into the north bank of the Tanana River, including islands of the Tanana River.
[b] That portion of Subunit 20D draining into the south bank of the Tanana River.
[c] 1989-90 regulatory year.
[d] 1990-91 regulatory year.

Board of Game Actions and Emergency Orders. During 1989-90, the lynx trapping season was from 15 December to 15 January. The Board of Game changed the season to 1 December-31 January for 1990-91.

Hunter/Trapper Harvest. Estimates of Subunit 20D harvest are available for the following species that are sealed: beaver, lynx, otter, and wolverine. Subunit 20D fur export and acquisition data are lumped with all Unit 20 data and will be included in the Unit 20 discussion by Fairbanks management staff.

Reported beaver harvest in 1987-88 was 85. Harvest declined significantly to 17 in 1989-90 and 23 in 1990-91 (Table 2). This decline is believed because of low beaver pelt prices during the report period.

Four lynx were harvested during 1989-90. Reported harvest increased to 23 during the 1990-91 trapping season (Table 2). Otter harvest was very low, with one otter harvested during the 1990-91 trapping season (Table 2). Wolverine harvest was steady during this report period with seven harvested each season during 1989-90 and 1990-91 (Table 2).

Harvest Chronology. Most beavers continue to be trapped during February and March in Subunit 20D (Table 3). During 1989-90, 72% of all beavers were harvested during these months. The corresponding value for 1990-91 was 74%. Most lynx were trapped in January. Too few otters were trapped to establish a chronological harvest pattern. Wolverine harvest varies annually within the legal trapping season (Table 3).

Transport Means. Snowmachines are the most commonly used means of transportation for beaver, lynx, otter, and wolverine trappers in Subunit 20D (Table 4).

Method of Take. Traps and snares were the most commonly used method for catching all furbearers in Subunit 20D during 1989-90 and 1990-91 (Table 2).

Other Mortality: Rates of natural mortality are unknown for furbearers in Subunit 20D.

Prey Population Abundance: Small mammals were most abundant in the white spruce habitat and least abundant in recently cut barley fields (Table 5). The white spruce habitat was trapped from 14 to 16 September 1991. Trap success was 0.21 captures per trap night. Red-backed voles were captured most often, and shrews were the second most commonly captured group (Table 5).

Recently cut barley field habitat was trapped from 20 to 21 September 1991. Trap success was 0.03 captures per trap night (Table 5). Captures included two *Microtus* sp. and one shrew. The fallow field habitat was trapped from 25 to 26 September 1991. Trap success was 0.10 captures per trap night. Shrews and *Microtus* sp. were captured in near equal numbers (Table 5).

Based on trapper questionnaire results, snowshoe hares were common to abundant and generally stable to increasing during the 1989-90 and 1990-91 trapping seasons (Table 1). Trappers reported "mice/rodents" as common and stable. Most trappers thought grouse were scarce and declining, while ptarmigan were scarce to common with no clear consensus in trend.

Habitat Assessment and Enhancement

No habitat assessment or enhancement was accomplished during this report period.

CONCLUSIONS AND RECOMMENDATIONS

Red foxes are abundant and increasing in Subunit 20D. Lynx are still low but increasing because of an abundance of snowshoe hares. Harvest of beavers has declined significantly because of low pelt prices. Coyotes are common. A few hunters are starting to complain about coyote predation of Dall sheep. The most urgent furbearer management need is for further assessment of lynx population trends. To address this need, an attempt will be made to establish lynx track transects during the next report period.

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Table 1. Number of trappers responding to questionnaire rating abundance and trend of furbearers and their prey in Unit 20D during the 1989-90 and 1990-91 trapping seasons.[a] .

	Abundance						Trend					
	Scarce		Common		Abundant		Fewer		Same		More	
	89-90	90-91	89-90	90-91	89-90	90-91	89-90	90-91	89-90	90-91	89-90	90-91
Beaver	2(50)	0	2(50)	7(100)	0	0	1(33)	0	2(67)	7(88)	0	1(13)
Coyote	2(33)	2(22)	4(67)	4(44)	0	3(33)	1(17)	1(10)	5(83)	7(70)	0	2(20)
Lynx	3(75)	7(88)	1(25)	1(13)	0	0	0	0	3(75)	5(63)	1(25)	3(38)
Marten	2(33)	4(40)	4(67)	4(40)	0	2(20)	1(17)	1(10)	4(67)	6(60)	1(17)	3(30)
Mink	3(60)	3(33)	2(40)	6(67)	0	0	0	0	5(100)	9(100)	0	0
Muskrat	1(33)	4(67)	1(33)	1(17)	1(33)	1(17)	0	3(50)	2(67)	3(50)	1(33)	0
Red Fox	1(17)	0	2(33)	2(20)	3(50)	8(80)	0	0	1(17)	1(10)	5(83)	9(90)
Red Squirrel	1(25)	0	2(50)	4(40)	1(25)	6(60)	0	0	3(75)	10(100)	1(25)	0
River Otter	1(50)	4(67)	1(50)	2(33)	0	0	0	0	1(100)	6(100)	0	0
Weasel	1(33)	0	1(33)	8(100)	1(33)	0	0	0	2(100)	7(100)	0	0
Wolverine	3(75)	5(63)	1(25)	3(38)	0	0	1(33)	2(25)	2(67)	6(75)	0	0
Hares	0	1(10)	1(20)	4(40)	4(80)	5(50)	0	3(30)	1(20)	5(50)	4(80)	2(20)
Grouse	3(60)	7(70)	2(40)	2(20)	0	1(10)	3(50)	10(100)	3(50)	0	0	0
Ptarmigan	1(20)	3(30)	4(80)	6(60)	0	1(10)	0	4(40)	3(60)	5(50)	2(40)	1(10)
Mice/Rodents	0	0	4(80)	8(80)	1(20)	2(20)	0	1(10)	4(80)	9(90)	1(20)	0

[a] There were six usable questionnaires in 1989-90 and 11 usable questionnaires in 1990-91. Numbers in parentheses are percentages.

Table 2. Subunit 20D beaver, lynx, otter, and wolverine harvest, 1986-91.

Regulatory	Reported harvest						Estimated harvest		Method of take				Total	Total
year	M	F	Unk.	Juv.[a]	Adults	Unk.	Unreported	Illegal	Trap/snare	Shot	(L&S)[b]	Unk.	Harvest	Trappers/ hunters
Beaver														
1986-87				13	57	0			64	0		6	70	
1987-88				21	64	0			75	3		7	85	
1988-89				2	22	10			25	0		9	34	
1989-90				1	17	0			18	0		0	18	
1990-91				1	22	0			21	0		2	23	
Lynx														
1986-87	5	12	3	4	16	0			20	0		0	20	
1987-88	6	10	1	4	13	0			17	0		0	17	
1988-89	3	4	3	1	9	0			8	2		0	10	
1989-90	2	2	0	0	4	0			4	0		0	4	
1990-91	7	8	7	3	19	1			23	0		0	23	
Otter														
1986-87	3	2	1						6	0		0	6	
1987-88	2	1	0						2	1		0	3	
1988-89	2	0	4						6	0		0	6	
1989-90	0	0	0						0	0		0	0	
1990-91	0	1	0						1	0		0	1	
Wolverine														
1986-87	5	0	1						5	1		0	6	
1987-88	3	3	0						6	0		0	6	
1988-89	8	6	1						15	0		0	15	
1989-90	3	2	2						6	1		0	7	
1990-91	5	1	1						7	0		0	7	

[a] Beavers ≤52"; lynx ≤35" in length.
[b] L&S (land and shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 3. Subunit 20D beaver, lynx, otter, and wolverine harvest chronology percentage[a] by time period, 1986-91.

Regulatory year	Harvest periods						
	Sep/Oct	November	December	January	February	March	April
Beaver							
1986-87	0	1	11	6	16	56	9
1987-88	2	2	28	1	4	45	15
1988-89	0	0	12	0	18	47	9
1989-90	0	11	6	0	33	39	11
1990-91	0	9	9	0	0	74	0
Lynx							
1986-87	0	0	50	50	0	0	0
1987-88	0	0	71	29	0	0	0
1988-89	0	0	40	40	10	10	0
1989-90	0	0	25	75	0	0	0
1990-91	0	4	21	71	4	0	0
Otter							
1986-87	0	0	0	60	40	0	0
1987-88	0	0	33	0	0	67	0
1988-89	0	0	0	67	17	17	0
1989-90	0	0	0	0	0	0	0
1990-91	0	0	0	0	100	0	0
Wolverine							
1986-87	17	0	17	33	17	17	0
1987-88	0	0	17	83	0	0	0
1988-89	0	7	33	47	7	0	0
1989-90	0	0	0	14	29	57	0
1990-91	0	0	14	29	57	0	0

[a] Percentage of unknown not included.

Table 4. Subunit 20D harvest percentage by transport method, 1986-91.

Regulatory year	Percent of harvest							
	Airplane	Dogsled, Skis, Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Beaver								
1986-87	0	19	6	19	43	0	6	9
1987-88	0	2	6	0	51	0	33	8
1988-89	0	0	26	0	59	0	12	3
1989-90	0	0	0	0	0	0	17	83[a]
1990-91	0	26	0	0	65	0	0	9
Lynx								
1986-87	10	0	0	5	85	0	0	0
1987-88	6	6	0	0	78	0	12	0
1988-89	0	0	0	0	80	0	20	0
1989-90	0	0	0	0	100	0	0	0
1990-91	0	0	0	0	100	0	0	0
Otter								
1986-87	0	0	0	0	83	17	0	0
1987-88	0	0	0	0	100	0	0	0
1988-89	0	0	0	0	100	0	0	0
1989-90	0	0	0	0	100	0	0	0
1990-91								
Wolverine								
1986-87	17	33	0	0	33	17	0	0
1987-88	0	0	0	0	100	0	0	0
1988-89	0	0	0	0	87	0	0	13
1989-90	0	29	0	0	43	0	0	29
1990-91	14	0	0	0	57	0	0	29

[a] Harvest not broken down by method of transport for 1989-90 season.

Table 5. Number of small mammals captured in 3 habitat types of Subunit 20D, using snap and pitfall traps during September 1991.[a]

Species	White Spruce		Barley Field		Fallow Field	
	Snap (120)	Pitfall (80)	Snap (120)	Pitfall (0)	Snap (120)	Pitfall (80)
Red-backed vole	26	1	0	--	1	1
Microtus sp.	1	0	2	--	8	0
Shrew	5	9	1	--	5	4

[a] Number in parentheses is number of trap nights (1 trap set for 24 hours) for each trap type.

LOCATION

Game Management Unit: 21

Geographical Description: Yukon River drainage above Paimiut to Tozitna River including Koyukuk River to Dulbi Slough

BACKGROUND

Furbearers have traditionally been an important resource in Unit 21. They supply food, clothing, and trade items. With the arrival of Europeans, furbearers also became an item of commerce. Fur populations have always been sufficient to meet local demand but have been subject to cycles of abundance. The following species found in Unit 21 are listed in order of their economic importance: marten, beaver, lynx, red fox, wolverine, wolf, mink, river otter, and muskrat. Coyotes occasionally occur but are rare. Weasels and red squirrels are common but not target species.

MANAGEMENT DIRECTION

Management Goals

Management goals for area furbearers are to: 1) protect, maintain, and enhance the furbearer populations and their habitats in concert with other components of the ecosystem; 2) provide for continued use of furbearers by local Alaskan residents who have customarily and traditionally used the population; 3) provide an opportunity to view and photograph furbearers; and 4) provide for scientific and educational use of furbearers.

Management Objectives

No detailed management objectives have been established for the unit. The general objective is to maintain populations at high enough levels to provide for maximum consumptive and nonconsumptive uses.

METHODS

We monitored harvest through sealing records, fur export reports, fur acquisition reports, and personal interviews. We used a mailout questionnaire in Subunits 21A and 21E and analyzed responses. Throughout the rest of Unit 21, we interviewed some trappers about furbearer abundance, and gathered incidental data during surveys of other species. We measured small mammal abundance using snap and pitfall traps on annual census lines.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Beavers and river otters are found throughout the unit where suitable habitat occurs. Their populations are high and increasing. Muskrats are on a long-term decline, probably because of loss of habitat resulting from pond succession. Where muskrats do occur, they are numerous. Lynx are in the high phase of their 10-year cycle in the northern part of the unit. The population is expected to peak during the 1991-92 season. Red foxes are numerous throughout the unit and appear to be increasing.

Marten populations are moderate throughout most of the northern half of the unit. Local pockets of lower and higher marten numbers occur but the population trend appears stable. Most trappers report periods during the trapping season when marten are absent. These apparent absences are temporary and are caused either by local migrations or very restricted movement of the animals so they do not produce many readily visible tracks. In Subunits 21A and 21E, responses to the trapper questionnaire indicated marten populations were moderate to increasing.

Distribution and Movements: All furbearer species are found throughout the unit. USFWS has radio-tagged marten in the Nowitna River drainage in Subunit 21B. Results of this study will be discussed in future reports.

Trapping Conditions and Prey Species: Weather was mild most of the trapping season. Heavier than normal snowfall occurred during the 1990-91 season (Table 1). This snow covered up sets and caused rivers and streams to overflow which limited some trappers. Early in the 1991-92 season, lack of snowfall made snowmachine travel difficult and severely limited most trappers. Overall, trapping conditions were not very good.

Voles and shrews were less numerous compared with previous years (Table 2). In Subunit 21B the USFWS trapped in post-fire forest stands. They found similar densities of voles and shrews in mature forest, old burn (1966), and new burn (1985). Hare populations are increasing throughout the unit, based on observed increases in track density. Responses from the Subunits 21A and 21E trapper questionnaire also revealed a perceived increase in snowshoe hare numbers. Willow ptarmigan and grouse populations during the 1990-91 winter were high in most of the unit.

Mortality

Harvest:

Season and Bag Limit.

Beaver	1 Nov.—15 Apr.	50 beavers

Coyote	1 Nov.–31 Mar.	No limit
Red fox	1 Nov.–28 Feb.	No limit
Marten	1 Nov.–28 Feb.	No limit
Mink & Weasel	1 Nov.–28 Feb.	No limit
Muskrat	1 Nov.–10 Jun.	No limit
River otter	1 Nov.–15 Apr.	No limit
Wolverine	1 Nov.–31 Mar.	No limit

Board of Game Actions and Emergency Orders. During the past 12 years trapping seasons and bag limits remained the same for marten, coyote, fox, mink, muskrat, otter, and wolverine. 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. Concern was that lynx pelt quality declined by early March and pelts were not in prime condition.

When the board restricted aerial trapping for wolves they also restricted same-day-airborne shooting for foxes and wolverines. This restriction is reflected in the decline of the wolverine harvest.

The bag limit for beavers has been increased by the board three times in response to proposals submitted by ADF&G. Before these changes, limits in all the subunits were not uniform and for the most part were without biological basis.

During 1987, the Grayling/Anvik/Shageluk/Holy Cross Fish and Game Advisory Committee submitted a proposal to the board to shorten the marten trapping season. The board took no action on the proposal, but asked ADF&G to monitor the situation. Further declines in marten numbers were perceived in Subunits 21A and 21E. An emergency order was issued to shorten the marten trapping season to 1 November through 15 January during the 1988-89 season, but reverted back to the previous 1 November-28 February season in subsequent years.

Trapper Harvest.

Beaver. During the report period, the harvest of beavers from the unit was very low compared with previous years (Table 3). Subunit 21D had a 1990-91 harvest of 207 with only 28 animals coming from the Kaiyuh Flats. This harvest represents a decline of 81% from five years ago for this area. The harvest in Subunit 21E was down 76% to 96 animals despite a liberal season. Harvest in both subunits continues to decline because of falling pelt prices. The overall catch is only a fraction of the harvestable population.

The low kit harvest is mainly because of trapping techniques employed by local trappers (Table 4). They use snares with large diameter openings and place their sets outside the food cache away from the lodge. Trapper effort is greatest during spring (Table 5).

Lynx. Lynx populations reached the low point of their 10-year cycle during the mid-1980s. Populations are expected to peak during the 1991-92 season. Although lynx abundance is high, harvest has been declining (Table 4). We believe this low harvest during the late 1980s was because of decreased trapper effort. This declining effort was because of falling pelt prices. If pelt prices increase, trapper effort and harvest are also expected to increase.

Otter. Although otters are abundant in the unit, harvest remains relatively low and stable (Table 4, 5). Pelt prices for Interior otters are low, and trapping effort is minimal. A major portion of the harvest occurs when otters are incidentally taken in beaver sets.

Wolverine. Trapper harvests of wolverines declined (Tables 4, 5) because of prohibition of land-and-shoot hunting. Numerous wolverine tracks were seen during aerial wolf surveys in late March 1989 and February 1991. These observations indicate that only harvests and not population levels have decreased.

Other Species. Marten population numbers were moderate in the northern part of the unit. Marten harvest was lower than in previous seasons (Table 6). Fox populations continue to be very high; however, pelt prices were very low. Trappers have little incentive to pursue this species (Table 6). Coyotes are scarce but a few are caught each year. Wolves are abundant in the unit. Interspecific strife between wolves and coyotes may keep coyote numbers low. Mink continue to be a minor furbearer in the unit. The pelt price for wild-caught Interior mink is very low, therefore few trappers set for them.

CONCLUSIONS AND RECOMMENDATIONS

With the exception of coyotes and lynx, furbearer populations throughout the unit are stable or increasing at moderate to high levels. We are not aware of any areas with excessive harvest. The primary recommendation is to continue the present seasons and bag limits, except for beavers which should have no bag limit. Beavers are an abundant resource and prices and trapping techniques limit harvest more than regulations. Marten seasons should be reviewed annually. Data on population density can be gathered from trapper questionnaire results, discussions with local fish and game advisory committees, and incidental trapper interviews. Trapping seasons could be adjusted according to local population fluctuations.

LITERATURE CITED

U.S. Department of Commerce. 1991. Climatological data: Alaska. Natl. Oceanic and Atmos. Adm. Vol. 77.

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Table 1. Climatological data for the Galena weather station, 1989-91 (U.S. Department of Commerce, NOAA).

	1989-90							1990-91						
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Snowfall (inches)	10	21	11	11	8	16	77	8	12	42	8	3	24	97
Snow on ground at end of month (inches)	4	15	20	23	23	22	NA[a]	6	10	31	20	19	26	NA[a]
Min. temp (°F)	-7	-35	-53	-54	-55	-33	NA[a]	-6	-52	-51	-68	-53	-33	NA[a]
Max. temp (°F)	48	19	36	29	12	41	NA[a]	43	39	36	41	38	36	NA[a]
Avg. daily min. temp (°F)	18	-13	-6	-24	-36	-2	NA[a]	20	-8	-19	-16	-11	-7	NA[a]
Avg. daily max. temp (°F)	30	0	10	-7	-17	22	NA[a]	30	4	-1	1	5	16	NA[a]
Monthly mean temp (°F)	24	-6	2	-15	-26	10	NA[a]	25	-2	-10	-7	-3	5	NA[a]
No. days below -30 °F	0	3	7	17	20	1	48	0	3	14	12	6	1	36

[a] Not applicable.

Table 2. Number of small mammals caught in three habitats from August 1987 to August 1991 in Subunit 21D. Results from 90 trap-nights/habitat/year.

	Open black spruce					Balsam poplar					Grass meadow				
Species	1987	1988	1989	1990	1991	1987	1988	1989	1990	1991	1987	1988	1989	1990	1991
Microtus xanthognathus (Yellow-cheeked vole)	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
Microtus pennsylvanicus (Meadow vole)	0	3	1	1	0	0	1	0	4	0	38	16	52	15	7
Clethrionomys rutilus (Red-backed vole)	3	41	13	22	3	18	12	4	38	5	2	1	0	8	2
Zapus hudsonicus (Meadow jumping mouse)	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Sorex sp. (Shrew)	12	31	12	34	25	7	9	11	30	24	7	17	8	45	8
Total	16	75	26	57	28	20	22	16	73	30	47	37	60	68	22

[a] The results are from 90 trap-nights and no data were available for 1986.

Table 3. Unit 21 estimated harvest of sealed furbearer species, 1986-91.

Species	1986-87	1987-88	1988-89	1989-90	1990-91
Beaver	1838	1717	1095	279	365
Lynx	62	71	33	13	12
Otter	62	67	44	17	32
Wolverine	30	34	23	15	23

[a] Estimates derived from Fur Acquisition Reports and Fur Export Permits.

Table 4. Unit 21 beaver, lynx, otter, and wolverine harvest, 1986-91.

Regulatory	Reported harvest						Estimated harvest		Method of take				Total	Total trappers/
year	M	F	Unk.	Juv.[a]	Adults	Unk.	Unreported	Illegal	Trap/snare	Shot	(L&S)[b]	Unk.	harvest	hunters
Beaver														
1986-87	0	0	1838	155	1683	0	0	0	1678	0	0	160	1838	128
1987-88	0	0	1717	95	1622	0	0	0	1695	0	0	22	1717	
1988-89	0	0	1095	49	1046	0	0	0	1014	0	0	81	1095	92
1989-90	0	0	279	23	256	0	0	0	265	0	0	14	279	33
1990-91	0	0	365	38	327	0	0	0	345	20	0	0	365	32
Lynx														
1986-87	16	11	35	1	35	26	0	0	61	0	0	1	62	41
1987-88	0	0	71	6	65	0	0	0	70	0	0	1	71	16
1988-89	0	0	33	4	29	0	0	0	33	0	0	0	33	16
1989-90	0	0	13	1	12	0	0	0	13	0	0	0	13	6
1990-91	0	0	12	5	7	0	0	0	10	0	0	2	12	7
Otter														
1986-87	15	8	39	0	0	62	0	0	62	0	0	0	62	33
1987-88	20	17	30	0	0	62	0	0	61	0	0	1	62	
1988-89	10	10	22	0	0	44	0	0	42	0	0	2	44	23
1989-90	4	4	4	0	0	17	0	0	15	1	0	1	17	8
1990-91	15	13	4	0	0	32	0	0	28	4	0	0	32	11
Wolverine														
1986-87	16	8	6	0	0	30	10	0	17	10	0	3	40	29
1987-88	19	10	5	0	0	34	10	0	17	10	0	2	44	
1988-89	11	7	5	0	0	23	10	0	29	3	0	0	33	27
1989-90	10	4	1	0	0	15	10	0	15	0	0	0	15	11
1990-91	12	9	2	0	0	23	10	0	22	0	1	0	33	21

[a] Beavers $\leq$52"; lynx $\leq$34" in length.
[b] L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 5. Unit 21 beaver, lynx, otter, and wolverine harvest chronology by time period, 1986-91.

Regulatory year	Harvest periods						
	October	November	December	January	February	March	April
Beaver							
1986-87	44	4	90	126	270	1202	102
1987-88	41	4	57	173	571	838	33
1988-89	46	67	57	25	222	522	179
1989-90	0	13	45	20	48	126	27
1990-91	8	17	22	68	68	210	5
Lynx							
1986-87	0	7	14	14	24	3	0
1987-88	0	0	16	23	22	6	0
1988-89	0	4	2	15	12	--[a]	--
1989-90	0	0	3	4	6	--	--
1990-91	0	5	1	3	3	--	--
Otter							
1986-87	8	6	4	5	10	25	4
1987-88	0	14	12	14	10	17	0
1988-89	2	5	3	5	6	21	0
1989-90	0	2	10	0	1	4	0
1990-91	0	3	7	12	9	1	0
Wolverine							
1986-87	1	3	5	3	9	9	0
1987-88	1	3	1	7	18	5	0
1988-89	1	4	8	3	4	3	0
1989-90	0	0	8	4	1	2	0
1990-91	1	3	6	6	3	4	0

[a] Season not open in March after 1988-89.

Table 6. Unit 21 estimated harvest[a] of unsealed furbearer species, 1986-91.

Species	1986-87	1987-88	1988-89	1989-90	1990-91
Coyote	0	0	0	0	1
Red fox	85	65	95	55	15
Marten	3,909	2,597	3,201	2,591	1,608
Mink	105	149	238	20	27
Muskrat	43	94	34	0	0
Weasel	1	7	28	0	0
Squirrel	0	0	0	0	0

[a] Estimates derived from Fur Acquisition Reports and Fur Export Permits.

LOCATION

Game Management Unit: 22 (23,000 mi^2)

Geographical Description: Seward Peninsula and that portion of the Nulato Hills draining westward into Norton Sound.

BACKGROUND

Furbearers are most abundant in Subunits 22A and 22B where spruce and riparian willow vegetation tend to be most common. Densities and harvests have fluctuated in the past. Because data are lacking or are imprecise, we do not know whether these fluctuations were caused by hunting mortality or natural factors. Although hunting and trapping pressure at times noticeably reduced furbearer and other small game numbers in areas near some Unit 22 villages, major fluctuations were probably caused by natural factors.

Harvesting activities within the unit are in most cases directly related to densities of furbearers. When furbearer densities are high, so are the number of hunter/trappers. There are very few local residents whose sole winter occupation is trapping. Most individuals harvest furs recreationally or opportunistically.

MANAGEMENT DIRECTION

Management goals and objectives established for furbearers in Unit 22 are to: 1) establish and maintain viable numbers of furbearers; 2) assess harvest, interview hunter/trappers, and seal all furs presented for sealing; 3) establish and maintain license vendors in all Unit 22 villages; 4) improve compliance with current sealing requirements through public communication and education; 5) conduct aerial beaver cache counts in selected areas of the unit to develop an index of relative abundance; and 6) minimize conflicts between furbearers and the public.

METHODS

Research programs designed specifically to evaluate the population status of furbearer species in Unit 22 have never been conducted. We gather limited data on furbearer distribution and densities annually from biologists' observations in the field, and through general conversation with Unit 22 residents. We obtained harvest information from sealing records and from Fur Acquisition records submitted by furbuyers (Table 1). We discontinued using a trapper questionnaire used until fall 1989 because of poor hunter/trapper participation, and because sample sizes were too small to develop meaningful conclusions.

RESULTS AND DISCUSSION

Population Status and Trend

Because research projects and specific surveys were not conducted in Unit 22 to ascertain the population status and trend of furbearers, we collected information about the health and well-being of these populations from observations while conducting other surveys, and from information provided by local residents.

Beaver: Beaver numbers throughout the unit continue to increase as they move westward onto the Seward Peninsula. Densities are quite high in some drainages within Subunits 22A and 22B because little or no effort is being expended on harvest.

River Otters: Otters are moderately distributed throughout most major drainages of the unit. Their numbers appear to be increasing slightly, and otter sign is becoming more common during winter, particularly in Subunits 22A, 22B, and 22C.

Wolverine: Wolverine numbers continued to increase and/or remain stable throughout Unit 22 even though the annual harvest in some areas appears quite high. Suitable habitat and available food resources are probably the primary factors holding densities at moderate to high levels.

Lynx: Densities of lynx have remained low unitwide since the mid-1980s, and presumably will remain low until prey densities increase.

Fox: Red fox numbers have remained high throughout much of the unit in past years, but declined during the past year, presumably in response to reduced ptarmigan numbers. White fox numbers have remained low since the early 1980s, and current information suggests that they are not increasing anywhere in the unit.

Mink/Marten: Very little is known of the status of mink and marten populations in Unit 22. Most of the suitable habitat occurs in Subunits 22A and 22B. Limited information provided by individuals trapping in those Subunits indicate that numbers are stable and/or increasing slightly.

Mortality

Hunting Seasons and Bag Limits:

Species	Season	Bag Limit
Fox, Arctic	Sep. 1-Apr. 30	2 foxes
Fox, Red	Nov. 1-Feb. 15	2 foxes
Lynx	Nov. 1-Mar. 31	2 lynx

Wolverine	Sep. 1-Mar. 31	1 wolverine

Trapping Seasons and Bag Limits:

Species	Season	Bag Limit
Beaver (22A, 22B)	Nov. 1-Jun. 10	50 per season
(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-Jun. 10	No Limit
Otter	Nov. 1-Apr. 15	No Limit
Wolverine	Nov. 1-Apr. 15	No Limit

Board of Game Actions and Emergency Orders: At its spring 1987 meeting, the Board of Game extended the beaver trapping season 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 harvesting beavers in Unit 22. No other board actions regarding furbearers were taken during the report period.

Harvest:

Human Induced Mortality. Adverse weather conditions (i.e., extreme cold temperatures and excessive snow fall) during much of the report period were some of the worst on record, and a lack of effort to harvest furbearers is probably attributable to these conditions. Many hunter/trappers were reluctant to venture out, particularly because the densities of many furbearers were low within the unit.

Harvest data for those species sealed from 1986 through 1991 along with data acquired from the Fur Acquisition Reports submitted by furbuyers are presented in Table 1. Care needs to be taken when interpreting the fur acquisition data because they represent the number of furs sold in a particular year, and not the years in which those furs were taken.

We lack accurate harvest data for all furbearer species taken in Unit 22, and discrepancies are apparent when comparing sealing certificate information, and Fur Acquisition Reports. Because of these inconsistencies, and the fact that many furs used domestically are not sealed, all data presented in the Table 1 are considered as minimum estimates of harvest.

Beaver. The Unit 22 beaver harvest ranged from a high of 40 beavers sealed in 1987/88 to a low of seven in 1990/91. Average harvest for the 5-year period was 17 beavers annually. Subunit 22A accounted for 73% of the harvest, and Subunits 22B and 22C accounted for 25% and 2%, respectively.

Lynx. The reported lynx harvest from Unit 22 remained low ranging from 18 animals sealed in 1986/87 to a low of two in 1990/91. As reported in past years, the harvest during the report period was composed primarily of males (63%). The harvest distribution was 33% for Subunit 22A, 60% for Subunit 22B, and 7% for Subunit 22C.

River Otter. The reported otter harvest was low ranging from none in 1988/89 to 5 otters sealed in 1986/87. Sex composition of the 9 otters taken during the 5-year period was 2 males, 3 females, and 4 of unknown sex. Six otters were harvested from Subunit 22A, 2 from Subunit 22B, and 1 from Subunit 22C. All but 1 otter, which was shot, were taken with traps or snares.

Wolverine. The average annual harvest during the previous 5 years was 25 wolverines sealed, and ranged from 30 in 1987/88 to 15 the following year. The reported sex composition was 60% males, and 40% females. Wolverines were reportedly taken from all Subunits with a distribution as follows: Subunit 22A, 38%; Subunit 22B, 36%, Subunit 22C, 14%, Subunit 22D, 11%; and Subunit 22E, 1%. Trapping and/or snaring accounted for 56% of the wolverine taken, and ground shooting accounted for the remainder.

Hunter Residency and Success: Hunter/trappers who harvested furbearers within Unit 22 were primarily local residents. During the 5-year period from 1986 to 1990, 65% of the beavers, 93% of the lynx, 89% of the otters, and 89% of the wolverines were harvested by Unit 22 residents. Success is difficult to measure accurately because most individuals take furbearers opportunistically.

Transport Methods: The snowmobile was used almost exclusively for transportation by hunter/trappers taking furbearers within Unit 22. Sealing certificate data from theõ¼ past 5 years indicate 91% of all furbearers sealed were taken using a snowmachine as transportation.

CONCLUSIONS AND RECOMMENDATIONS

Unit 22 furbearer populations have remained low recently. Because there appears to be a direct relationship between the number of hunter/trappers afield and the abundance of furbearers, activities revolving around furbearer harvest has also been low. Many furbearers harvested in Unit 22 were taken by recreational hunters/trappers rather than by individuals attempting to make a living through trapping.

We know little about the impact hunter/trappers have on furbearer populations within Unit 22. Although current regulations may at times impact species close-to some villages, we doubt that these impacts are significant 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 Unit 22 furbearer harvest is not sealed and sold, but rather remains unsealed for domestic manufacture into garments and handicrafts. It is presently unclear to many village residents why furs need to be sealed, particularly if they are to be used locally. Biologists and enforcement personnel need to continue public contacts to explain the importance of sealing requirements. We recommend no changes in the Unit 22 furbearer trapping and hunting regulations at this time.

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Table 1. Unit 22 furbearer harvests reported on sealing certificates and Reports of Fur Acquisition, 1986-1991.

	1986-87		1987-88		1988-89		1989-90		1990-91	
Species	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Beaver	9	0	40	6	15	17	23	9	7	2
Lynx	18	5	3	10	4	1	3	0	2	0
Otter	5	0	1	1	0	0	1	0	2	0
Wolverine	27	1	30	1	15	2	22	0	32	1
Red/Cross Fox		91		158		30		0		3
Marten		43		93		17		28		14
Mink		0		4		3		0		0

(1) Harvest numbers taken from sealing certificates.
(2) Numbers obtained from Reports of Fur Acquisition.

LOCATION

Game Management Unit: 23 (43,000 mi^2)

Geographic Description: Kotzebue Sound and western Brooks Range

BACKGROUND

Unit 23 furbearer species include lynx, beaver, marten, mink, muskrat, river otter, red fox, arctic fox, and wolverine. The Inupiaq traditionally harvested furbearers for subsistence in Unit 23 before a cash economy was introduced during the early 1900s. Many Native and non-Native trappers have supported themselves seasonally by commercial and subsistence trapping. Today, furbearers are harvested in Unit 23 by subsistence and recreational users, and professional trappers. Furbearer harvests generate cash income, provide raw materials for garments manufactured locally, and food for local users. Local residents harvest many furbearers opportunistically while engaged in other activities.

MANAGEMENT DIRECTION

Population management goals and objectives established for Unit 23 furbearer populations are to: 1) maintain furbearer populations capable of sustaining harvests at the 1983-84 to 1988-89 levels, recognizing that populations will fluctuate in response to environmental factors; and 2) obtain sufficient data to develop one or more trend count areas for lynx by 1994.

METHODS

We gathered information on the population status of lynx, wolverine, river otter, and beaver from fur sealing certificates, conversations with unit residents, and opportunistic observations of furbearers and their tracks while conducting other wildlife surveys.

The Trapper Survey is an annual questionnaire which we started using in Unit 23 during 1985. During May 1990, 238 unit residents received surveys by mail (Table 1). Survey results were summarized in a report distributed to participants (Tables 2-4). The survey was discontinued during the 1990-91 season because of staffing and time constraints.

Before 1985, only 2 aerial beaver cache surveys were conducted in Unit 23. A trend count area established in 1985 was surveyed through 1988. The 139 mi^2 (356 km^2) trend count area extends south from the confluences of the Selawik, Kugarak and Tagagawik rivers. Active and inactive lodges were discerned by the presence of fresh feed piles near the lodge. Total number of lodges were recorded, and their locations mapped on a U.S.

Geological Survey 1:63,360 topographic map. Because some evidence suggests that the number of active caches in an area is a poor indicator of beaver population size (Payne 1981, Swenson et al. 1983), surveys were not completed in 1989 or 1990.

RESULTS AND DISCUSSION

Population Status and Trend

Wolverine: No track counts for wolverines were conducted in Unit 23 during 1989-91. In previous years, some local residents expressed concern that wolverine numbers were low around Kotzebue. However, opportunistic sightings by staff and local residents indicate that wolverine populations are stable. Individuals responding to the Trapper Survey in 1990 assessed population status as "medium" and stable in areas away from Kotzebue. High overwinter mortality among ungulates in the Noatak and Kobuk drainages in 1990 and 1991 probably provided favorable foraging conditions for wolverines.

Beaver: Sightings of beaver sign in the lower Noatak River drainage continued to be reported through 1991. The number of sightings has not increased nor has the distribution of sightings changed in this drainage since 1986. Most residents of the Kobuk River drainage reported beaver populations at "medium" levels and either stable or increasing in number. Because many beavers were observed occupying marginal habitat, we believe that population levels in the Selawik River drainage were still high.

Lynx: Lynx populations remained extremely low during 1989-91. Agency personnel and local residents observed single sets of tracks in the Noatak, Kobuk and Selawik river drainages. The snowshoe hare population is still low but reported sightings are increasing, especially in southern portions of the unit. We anticipate a corresponding increase in lynx numbers will occur within the next few years.

Mink and Marten: No information is available about the status of mink. The reported presence of marten in the middle Kobuk River drainage, and of a single individual in the Igichuk Hills may represent the beginning of a northern range extension for the species.

Fox: Limited information available on red fox suggests that populations were stable or decreasing in some areas. No rabies cases were reported during 1989-90 or 1990-91. We know little about the status of white fox in Unit 23.

Mortality

Hunting Seasons and Bag Limits:

Unit 23	Wolverine	Sept. 1-Mar. 31	1 wolverine
	Red fox	Nov. 1-Feb. 15	2 foxes

	Arctic fox	Sept. 1-Apr. 30	2 foxes
	Lynx	Dec. 1-Jan. 15	2 lynx

Trapping Seasons and Bag Limits:

Unit 23	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-June 10	No limit
	River otter	Nov. 1-Apr. 15	No limit
	Beaver	Nov. 1-Jun. 10	30 per season*

*50 beaver per season were allowed to be taken from the Kobuk and Selawik River drainages in both 1989-90 and 1990-91.

Harvest

Human Induced Mortality:

Beaver. Six hunters/trappers sealed 65 beavers from Unit 23 during 1989-90. Four individuals sealed 36 beavers during 1990-1991. Most beaver were taken from the upper Kobuk River. One beaver each year was harvested in the Selawik River drainage. As in past years, probably many beaver were shot during breakup and not sealed.

Lynx. No lynx were sealed from Unit 23 in either 1989-90 or 1990-1991. The last year lynx were sealed in the unit was in 1986-87 (Table 5).

River Otter. Sixteen river otter were sealed from Unit 23 in 1989-90. Ten of the 16 hides were estimated to have been harvested up to 15 years ago. Of the 6 otters actually taken in 1989-90, 4 were from the upper Kobuk River, and 1 was from the Baldwin Peninsula, and 1 was unknown. During 1990-91, 10 river otters were sealed, but 4 were taken in previous years. Of the 6 otters actually taken during 1990-91, 4 were from the Buckland River area, 1 was from the upper Kobuk River drainage, and 1 was from the Squirrel River drainage. In both years, hunters used either snowmachine, or a combination of snowmachine and aircraft as transportation (Table 5).

Wolverine. Eighteen wolverines (14 males, 3 females, 1 unreported sex) were sealed during 1989-90. Nine were harvested in the Noatak River drainage, 7 in the middle Kobuk drainage, 1 in the upper Kobuk drainage, and 1 in the Buckland River drainage. All wolverines sealed were taken by unit residents. Three wolverines (17%) were shot, and 13 (72%) trapped. All were taken by unit residents using snowmachines as transportation (Table 5). ADF&G personnel knew of 4 other wolverines taken in 1989 in the Kobuk drainage that were not sealed. Most of the harvest occurred during March.

During the 1990-1991 regulatory year, 13 hunters sealed 27 wolverines (17 males, 9 females, and 1 unreported sex). The highest harvest was from the Kobuk River drainage with 17 reported (4 upper Kobuk River, 6 Squirrel River, and 7 unknown). Two wolverines were taken from the Noatak River drainage and another from the Wulik/Kivalina River area. The remaining 6 were harvested south of the Selawik River. Fourteen were shot and 11 trapped (Table 5). Three wolverines were taken in the fall by individuals residing outside the unit.

Board of Game Actions and Emergency Orders

No Board of Game actions or Emergency Orders affecting Unit 23 furbearer regulations were enacted during 1989-90 or 1990-91.

CONCLUSIONS AND RECOMMENDATIONS

The ADF&G should continue to maintain open communication with local trappers to assess trapper effort and distribution. Visits to villages and trapper questionnaire surveys may be the best means to accomplish this. The proposed statewide trapper survey may provide a means to collect local knowledge of furbearer population trends. If the statewide trapper survey proves to be inadequate, the local Unit 23 trapper survey should be reinstated. ADF&G should also continue to seek opinions from resident hunters and trappers about lynx population levels. As hare and lynx populations increase, monitoring population trends will be particularly important if hunting and trapping regulations are to be adjusted accordingly (Caughly 1977, Brand and Keith 1979). ADF&G staff should consider delineating one or more trend count areas for lynx track surveys (Becker 1991) to monitor population trends. The northern Seward Peninsula, Kobuk River drainage, and Selawik River drainage contain potential trend count areas.

Although sealing data provides information on the relative abundance and distribution of furbearers in Unit 23, many furs are used locally and never sealed. Therefore, sealing data only provide a minimum harvest estimate. The geographic distribution of harvest determined from sealing certificates is probably not a good indicator of the spatial abundance of furbearers in Unit 23 because trappers from different areas differ in their willingness and ability to get furs sealed.

Currently, there is no biological necessity for a bag limit on beaver in the Selawik and Kobuk river drainages. In these drainages, beaver have remained abundant despite the bag limit increase from 30 to 50 beavers per regulatory year that became effective in 1988. If beaver densities remain high for another year, we recommend that ADF&G consider eliminating the limit on beaver in the Kobuk and Selawik river drainages.

The inconsistency between seasons and bag limits for hunting and trapping has been discussed at various advisory committee meetings. Variations in season dates are apparently not based on biological considerations about furbearer management in Unit 23. The variations in season dates and bag limits increases the complexity of the regulations for those who both hunt and trap, and we recommend adoption of the same season dates and bag limits for hunting and trapping regulations in Unit 23.

LITERATURE CITED

Becker, E.F. 1991. A terrestrial furbearer estimator based on probability sampling. J. Wildl. Manage. 55(4):730-737.

Brand, C.J. and L.B. Keith. 1979. Lynx demography during a snowshoe hare decline in Alberta. J. Wildl. Manage. 43:827-849.

Caughly, G. 1977. Analysis of vertebrate populations. John Wiley & Sons, London. 234pp.

Payne, N.F. 1981. Accuracy of aerial censusing for beaver colonies in Newfoundland. J. Wildl. Manage. 45:1014-1016.

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.

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Table 1. Results of the Trapper Survey sent to select Unit 23 residents during May 1990.

Community	No. People sent surveys	Number of People Who Responded		
		No. that trapped	No. that didn't trap	Total
Ambler	22	3	1	4
Buckland	21	0	2	2
Deering	9	1	0	1
Kiana	16	1	3	4
Kivilina	13	0	1	1
Kobuk	7	1	0	1
Kotzebue	62	1	15	16
Noatak	17	1	5	6
Noorvik	20	2	4	6
Point Hope	14	0	0	0
Selawik	23	0	4	4
Shungnak	12	0	0	0
Total	236	10	35	45

Table 2. Unit 23, numbers of responses by trappers to status and trend of furbearer species, 1989-90.

Status/ trend	Beaver	Lynx	Marten	Mink	Muskrat	Otter	R. Fox	W. Fox	Wolf	Wolverine
Kivalina - Wulik Rivers										
Low	2	0	1	0	0	0	1	0	1	0
Medium	0	0	0	0	1	0	1	1	0	0
High	0	0	0	0	0	0	0	0	0	0
Less	0	0	0	0	0	1	0	0	0	0
Same	2	0	1	0	1	0	2	0	0	0
More	0	0	0	0	0	0	0	1	1	0
Noatak River										
Low	4	12	3	2	4	1	4	5	2	4
Medium	1	0	2	6	6	9	10	5	10	9
High	0	0	0	0	0	0	0	1	3	0
Less	1	1	1	1	5	1	4	2	1	2
Same	2	5	0	6	2	8	6	5	8	8
More	1	0	2	1	1	1	2	1	4	0
Kobuk River										
Low	2	12	4	4	8	1	4	4	0	2
Medium	6	0	7	6	3	7	7	0	8	8
High	3	0	0	0	0	2	1	0	4	1
Less	1	2	3	2	7	0	3	1	0	0
Same	4	7	6	6	3	9	9	2	6	7
More	6	0	0	0	1	1	0	0	6	4

(continued next page)

Table 2. (continued)

Status trend	Beaver	Lynx	Marten	Mink	Muskrat	Otter	R. Fox	W. Fox	Wolf	Wolverine
<u>Selawik River</u>										
Low	0	6	2	0	1	1	0	2	0	4
Medium	2	1	2	5	3	5	5	0	4	3
High	5	0	0	1	2	1	2	0	3	0
Less	0	2	1	0	2	0	0	1	0	4
Same	4	4	2	4	3	5	5	0	4	2
More	2	1	1	1	0	1	1	0	2	0
<u>Buckland River - Northern Seward Peninsula</u>										
Low	1	4	0	0	0	0	0	1	0	0
Medium	1	0	2	2	3	4	2	2	2	3
High	2	0	0	0	1	0	2	0	1	0
Less	1	1	0	1	0	0	0	0	0	0
Same	0	3	0	0	4	3	1	3	1	2
More	3	0	1	1	0	1	3	0	2	1

Table 3. Unit 23, numbers of responses by trappers to status and trend of prey species, 1989-90.

	Mice, Voles and Lemmings	Ptarmigan	Hares
<u>Kivilina-Wulik Rivers</u>			
Low	0	0	1
Medium	0	0	0
High	0	1	0
Less	0	0	0
Same	0	1	1
More	0	0	0
<u>Noatak River</u>			
Low	6	0	13
Medium	2	4	0
High	0	10	0
Less	6	2	4
Same	2	4	4
More	0	6	0
<u>Kobuk River</u>			
Low	4	2	12
Medium	7	3	0
High	0	6	1
Less	3	2	4
Same	8	6	6
More	0	3	2
<u>Selawik River</u>			
Low	1	0	7
Medium	1	2	0
High	2	4	0
Less	1		2
Same	2	3	2
More	1	2	2
<u>Buckland River - Northern Seward Peninsula</u>			
Low	0	0	1
Medium	1	0	1
High	2	3	1
Less	0	0	1
Same	2	0	1
More	1	3	1

Table 4. Unit 23, indices of abundance (IA) for furbearer and prey species. Values based on responses from unit trappers to Trapper Surveys, 1985-1990.

		Season			
Species	1985-86	1986-87	1987-88	1988-89	1989-90
Beaver	59.5	55.0	56.8	66.7	57.5
Lynx	5.1	17.6	1.6	6.1	0.0
Marten	26.2	31.2	13.9	29.6	29.6
Mink	23.2	26.1	22.9	33.3	38.6
Muskrat	21.1	34.1	58.9	62.1	32.1
Otter	46.7	39.6	50.0	52.6	48.3
Red Fox	36.5	35.7	43.0	76.1	45.7
White Fox	4.2	8.3	14.6	30.3	21.7
Wolf	34.8	40.0	41.7	55.4	62.2
Wolverine	36.8	41.1	36.8	39.8	36.4
Mice/Voles	---	---	---	72.4	36.0
Ptarmigan	---	---	---	94.7	80.9
Hares	---	---	---	14.4	4.4

[a] Species considered abundant when IA larger that 50; medium when IA between 20 and 50; and scarce when IA less than 20.

Table 5. Sex composition and method of take reported for lynx, river otters, and wolverines sealed in Unit 23, 1977-91.

Species	Total harvest	% male	Method of take: Shot	Trapped	Snared	Unknown
Lynx						
1977-78	230	55	0	223	5	2
1978-79	385	53	2	341	3	39
1979-80	407	54	1	378	3	12
1980-81	306	60	3	254	1	41
1981-82	483	54	7	444	0	32
1982-83	277	--	6	265	1	5
1983-84	98	--	3	93	0	2
1984-85	26	61	3	23	0	0
1985-86	45	51	7	37	0	1
1986-87	16	62	2	13	1	0
1987-88	0	0	0	0	0	0
1988-89	0	0	0	0	0	0
1989-90	0	0	0	0	0	0
1990-91	0	0	0	0	0	0
Otter						
1977-78	12	--	1	11	0	0
1978-79	15	--	2	13	0	0
1979-80	19	--	10	9	0	0
1980-81	29	--	0	27	2	0
1981-82	9	--	0	9	0	0
1982-83	7	--	1	5	0	1
1983-84	8	--	1	7	0	0
1984-85	5	--	0	5	0	0
1985-86	5	--	1	4	0	0
1986-87	12	--	0	12	0	0
1987-88	24	--	1	12	0	0
1988-89	7	--	0	7	0	0
1989-90	16	50	1	4	0	11
1990-91	11	--	1	6	0	4

Table 5. (continued)

Species	Total harvest	% male	Method of take			
			Shot	Trapped	Snared	Unknown
<u>Wolverine</u>						
1977-78	75	67	26	49	0	0
1978-79	45	73	9	34	0	0
1979-80	26	63	12	14	0	0
1980-81	18	76	11	7	0	0
1981-82	48	75	13	35	0	0
1982-83	37	67	16	20	1	0
1983-84	46	59	17	27	1	1
1984-85	37	61	19	15	2	2
1985-86	35	77	7	27	1	0
1986-87	64	56	28	28	1	7
1987-88	40	72	11	28	1	0
1988-89	39	56	8	31	0	0
1989-90	18	82	3	13	1	1
1990-91	27	65	14	11	0	2

LOCATION

Game Management Unit: 24 (26,055 mi^2)

Geographical Description: Koyukuk River drainage above the Dulbi River

BACKGROUND

Furbearers have been an important resource in Unit 24, supplying food, clothing, and trade items. With the arrival of Euro-Americans, furbearers also became a commercial item. Although furbearer populations have been abundant to meet local demands, they have been subject to fluctuations in abundance. The order of their economic importance is as follows: marten, beavers, lynx, wolves, wolverines, red foxes, mink, river otters, and muskrats. Coyotes are rare. Weasels and squirrels are common but not often sold.

MANAGEMENT DIRECTION

Management Goals

Management goals for Unit 24 furbearers are to: 1) protect, maintain, and enhance the furbearer populations and their habitats in concert with other components of the ecosystem; 2) provide for continued use of furbearers by local Alaskan residents who have customarily and traditionally used the populations; 3) provide an opportunity to view and photograph furbearers; and 4) provide for scientific and educational use of furbearers.

Management Objectives

No detailed furbearer management objectives have been established for the unit. The general objective is to maintain populations at high enough levels to provide for maximum consumptive and nonconsumptive uses.

METHODS

We monitored harvests through sealing records, fur export reports, fur acquisition reports, and personal interviews. National Park Service staff conducted furbearer distribution and abundance surveys during the mid-1980s within the Gates of the Arctic National Park and Preserve (GAAR) (Golden 1988). Trappers were interviewed about furbearer abundance. Furbearer carcasses were collected and analyzed by GAAR staff during the late 1980s (Swanson 1992). Incidental data were gathered during surveys of other species.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Marten and red fox populations were moderately high and increasing in GAAR in 1988 and are still believed to have the same status (Golden 1988). Trappers report moderate marten numbers in the central portion of the unit. Wolverine abundance was low but stable. Beavers and river otters were increasing in the southern portion of the unit and were high and increasing within GAAR. Muskrats were still on a long-term decline. Large areas of former habitat have dried up because of natural succession. This decline in the muskrat population may be because of habitat loss. Lynx were increasing and are expected to be at the peak of their cycle during winter 1991-92.

Distribution and Movements: Most species are found in the unit. Some species reach the northern limits of their ranges in the southern Brooks Range. Marten, mink, river otters, beavers, and muskrats occur only on the southern slopes of the Brooks Range. No radio-tagging studies on furbearers have been conducted Unit 24. Trappers in the Wiseman area report that lynx moved in from Unit 25 after population peaks in Unit 25.

Trapping Conditions and Prey Species: The weather was mild for most of the 1990-91 trapping season. Heavier than normal snowfall (Table 1) limited some trappers by covering up sets and causing rivers and streams to overflow. During the early part of the 1991-92 season, lack of snowfall severely limited most unit trappers. However, cold weather during this period may have contributed to early pelt primeness. Trapping conditions were not very good during the period.

Based on the snap-trap collections during summer 1990, vole populations in the southern part of the unit were higher than those for the previous two years. Hare populations were still low throughout the unit, except in a few isolated willow communities along major rivers. The hare population is thought to be increasing based upon a perceived increase in track density. Golden (1988) found that hares were highest around Norutak Lake, the Jack White Range, and in a few drainages of the Dietrich River. Hare populations were low elsewhere. Golden (1988) also thought that grouse and ptarmigan were at low-to-moderate densities and increasing within GAAR.

Mortality

Harvest:

Season and Bag Limit.

Beaver	Nov. 1—Apr. 15	50 beavers
Coyote	Nov. 1—Mar. 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—Jun. 10	No limit
River otter	Nov. 1—Apr. 15	No limit
Wolverine	Nov. 1—Mar. 31	No limit

Board of Game Actions and Emergency Orders. During the past 12 years trapping seasons and bag limits remained the same for marten, coyotes, foxes, mink, muskrats, otters, and wolverines. In 1987, the Board of Game shortened the lynx season by two weeks because the Koyukuk River Advisory Committee believed lynx pelts were not in prime condition in early March. When the board restricted aerial trapping for wolves in 1990, they also restricted the land-and-shoot harvest of foxes and wolverines. Twice the board has increased the bag limit for beavers, from 25 to 40 and from 40 to 50, because of proposals submitted by ADF&G.

Trapper Harvest. Beaver harvest is down (Table 2) even though there is a liberal bag limit of 50 beavers. Prices (Table 3) have always determined the harvest more than bag limits. Less than half the harvest was taken in the southern part of the unit near Huslia. Beaver harvest in this area is normally three or four times higher. The harvest from this area was down by 50% from the previous year, and it was composed primarily of adults. Low harvest of kits (Table 4) was mainly because of techniques employed by local trappers. Trappers use snares with large-diameter openings and place their sets outside the food cache away from the lodge. Sets made in spring are most common (Table 5).

Harvest data indicated that lynx reached the low point in their 10-year cycle during 1988-89 and 1989-90. They are currently on the increase (Table 2). Golden (1988) examined carcasses and found a relatively low proportion of juveniles during 1988, indicating a low level of productivity. However, Swanson (1991) found 56% of the females with placental scars during 1988-91 suggesting increased productivity. Increased productivity is also evident in the number of kits in the harvest for the 1989-90 and 1990-91 seasons (Table 6). No trends are evident in harvest chronology (Table 7).

Otters are abundant. However, the harvest was very low, compared with those of past years (Table 2). Prices for Interior otters are low and trapping effort was minor (Table 8). Otters are occasionally taken in late season beaver sets (Table 9).

Reported wolverine harvest was low (Table 2). Actual harvest may be higher by 10 per year because furs used for subsistence purposes are seldom sealed (Table 10). No harvest chronology pattern is readily discernible (Table 11). Golden (1988) found only one set of wolverine tracks during his surveys. I have observed tracks often enough to consider the unit population to be at a low-to-moderate density. During a wolf survey in February 1991, I saw fresh tracks every 10 miles along the Hogatza River.

Fox populations remained high, but low prices elicited little trapper interest (Table 12). Marten were in moderate numbers in the southern and central parts of the unit. Catches of marten were lower than previous seasons (Table 12) because heavy snow hampered trapper effort. One trapper reported 7 juveniles/adult female for the first 2 months of the 1991-92 season and 4 juveniles/adult female for the remainder of the season. Based upon track densities, marten populations were highest around the Jack White Range and moderate within the southern preserve during 1988 (Golden 1988).

CONCLUSIONS AND RECOMMENDATIONS

Furbearer populations were in good condition throughout the unit. Golden's (1988) conclusions, while dated, 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." I recommend continuing the present seasons and bag limits, except for beaver bag limits. There should be no limit for beavers in the unit because they are abundant. Prices and trapping techniques limit the harvest more than regulations do.

LITERATURE CITED

Golden, H.N. 1988. Distribution and relative abundance, population characteristics, and harvest of furbearers in Gates of the Arctic National Park and Preserve. Final report NRFR AR-8808, National Park Service, Anchorage. 33pp.

U.S. Department of Commerce. 1991. Climatological data: Alaska. Natl. Oceanic and Atmos. Admin. Vol. 77.

Swanson, S.A. 1992. Furbearer carcass study, Gates of the Arctic National Park and Preserve, Alaska--Three year summary. Natl. Park Serv., Fairbanks, Alaska. GAAR-91-003. 29pp.

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Table 1. Unit 24, climatological data for the Bettles weather station, 1989-91 (U.S. Department of Commerce).

	1989-90							1990-91						
Month	10	11	12	1	2	3	Total	10	11	12	1	2	3	Total
Snowfall (inches)	8	11	18	11	7	31	86	17	13	22	29	6	35	122
Snow on ground at end of month (inches)	4	7	20	20	25	24	NA[a]	7	16	32	43	30	33	NA[a]
Min. temp (°F)	-12	-46	-54	-55	-55	-30	NA[a]	-13	-53	-46	-54	-48	-35	NA[a]
Max. temp (°F)	48	20	27	12	8	40	NA[a]	44	33	29	35	33	30	NA[a]
Ave. daily min. temp (°F)	-14	-16	-17	-24	-41	-1	NA[a]	12	-21	-22	-16	-16	-9	NA[a]
Ave. daily max. temp (°F)	26	-3	9	-9	-18	23	NA[a]	24	-5	-7	0	4	15	NA[a]
Monthly mean temp (°F)	20	-10	1	-16	-30	11	NA[a]	18	-13	-14	-8	-6	3	NA[a]
No. days below -30 °F	0	8	5	11	22	1	47	0	10	12	11	10	2	45

[a] Not applicable.

Table 2. Unit 24 estimated harvest of sealed furbearer species, 1986-91.

Species	1986-87	1987-88	1988-89	1989-90	1990-91
Beaver	904	468	301	281	380
Lynx	127	89	76	112	126
Otter	22	25	9	7	5
Wolverine	20	22	23	22	14

Table 3. Average fur prices[a], 1986-91.

Species	1986-87	1987-88	1988-89	1989-90	1990-91
Beaver Good quality large brown	45	46	37	36	13
Marten Large I-II dark brown	115	87	110	71	65
Mink Large-medium I-II dark brown north	48	50	40	31	34
Fox XL-large I-II northwest	54	32	24	20	17
Lynx Large-medium I-II first color	528	500	260	155	118
Otter XL-large I-II dark brown	49	50	49	29	37
Wolverine XL I-II brown	190	250	200	380	190

[a] All prices in U.S. dollars. Data from Dominion Soudack, Seattle Fur Exchange, Edmonton Fur Auction.

Table 4. Unit 24 beaver harvest, 1986-91.

Regulatory year	Reported harvest M	F	Unk.	Juv.[a]	Adults	Unk.	Estimated harvest Unreported	Illegal	Method of take Trap/snare	Shot	(L&S)[b]	Unk.	Total harvest	Total trappers/ hunters
1986-87	0	0	902	59	843	0	0	0	761	2	0	141	904	68
1987-88	0	0	468	46	422	0	0	0	463	0	0	5	468	43
1988-89	0	0	301	13	288	0	0	0	299	0	0	2	301	38
1989-90	0	0	281	6	275	0	0	0	281	0	0	0	281	42
1990-91	0	0	380	39	341	0	0	0	379	0	0	1	380	20

[a] Beavers $\le$52"; lynx $\le$34" in length.

[b] L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 5. Unit 24 beaver harvest chronology by time period, 1986-91.

Regulatory year	Harvest periods Unknown	November	December	January	February	March	April
1986-87	138	1	33	4	135	554	39
1987-88	0	5	10	38	85	311	13
1988-89	0	3	18	4	27	240	9
1989-90	0	0	15	23	3	125	31
1990-91	0	10	4	31	153	177	5

Table 6. Unit 24 lynx harvest, 1986-91.

Regulatory year	Reported harvest						Estimated harvest		Method of take				Total harvest	Total trappers/ hunters
	M	F	Unk.	Juv.[a]	Adults	Unk.	Unreported	Illegal	Trap/snare	Shot	(L&S)[b]	Unk.		
1986-87	34	34	59	7	120	0	0	0	113	2	0	12	127	64
1987-88	36	21	32	8	81	0	0	0	89	0	0	0	89	32
1988-89[c]	0	0	76	21	50	5	0	0	69	3	0	4	76	37
1989-90	0	0	112	16	96	0	0	0	88	0	0	0	112	36
1990-91	0	0	126	24	102	0	0	0	100	10	0	16	126	27

[a] Lynx $\leq$34" in length.
[b] L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.
[c] Sex not recorded after July 1988.

Table 7. Unit 24 lynx harvest chronology by time period, 1986-91.

Regulatory year	Harvest periods				
	November	December	January	February	March
1986-87	9	35	44	0	0
1987-88	4	18	34	16	17
1988-89	8	22	14	23	7
1989-90	7	32	30	38	-[a]
1990-91	4	30	26	66	-[a]

[a] Season not open in March after 1988-89.

Table 8. Unit 24 otter harvest, 1986-91.

Regulatory year	Reported harvest						Estimated harvest		Method of take				Total harvest	Total trappers/ hunters
	M	F	Unk.	Juv.[a]	Adults	Unk.	Unreported	Illegal	Trap/snare	Shot	(L&S)[b]	Unk.		
1986-87	7	4	11	0	0	22	0	0	21	0	0	1	22	15
1987-88	9	12	4	0	0	25	0	0	25	0	0	0	25	10
1988-89	3	3	3	0	0	9	0	0	9	0	0	0	9	6
1989-90	1	0	6	0	0	7	0	0	4	0	0	3	7	4
1990-91	2	2	1	0	0	5	0	0	5	0	0	0	5	2

[a] Beavers ≤52"; lynx ≤34" in length.
[b] L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 9. Unit 24 otter harvest chronology by time period, 1986-91.

Regulatory year	Harvest periods						
	Unknown	November	December	January	February	March	April
1986-87	1	1	3	2	10	4	1
1987-88	0	4	3	8	8	2	0
1988-89	0	1	2	2	1	3	0
1989-90	0	1	1	2	0	0	0
1990-91	2	1	0	0	4	0	0

Table 10. Unit 24 wolverine harvest, 1986-91.

Regulatory year	Reported harvest M	F	Unk.	Juv.[a]	Adults	Unk.	Estimated harvest Unreported	Illegal	Method of take Trap/snare	Shot	(L&S)[b]	Unk.	Total harvest	Total trappers/ hunters
1986-87	9	7	4	0	0	20	10	0	19	1	0	0	30	14
1987-88	15	7	0	0	0	22	10	0	13	5	0	4	32	16
1988-89	13	9	1	0	0	23	10	0	21	1	0	1	33	13
1989-90	14	5	3	0	0	22	10	0	21	0	0	1	32	12
1990-91	8	2	4	0	0	14	10	0	12	1	0	1	24	9

[a] Beavers ≤52"; lynx ≤34" in length.

[b] L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 11. Unit 24 wolverine harvest chronology by time period, 1986-91.

Regulatory year	Harvest periods November	December	January	February	March
1986-87	3	2	5	5	4
1987-88	1	2	5	6	8
1988-89	6	8	0	4	5
1989-90	0	7	6	9	0
1990-91	2	6	2	3	1

Table 12. Unit 24 estimated harvest[a] of unsealed furbearer species, 1986-91.

Species	1986-87	1987-88	1988-89	1989-90	1990-91
Coyote	0	0	0	0	0
Red fox	53	83	42	18	9
Marten	1,608	2,311	2,634	1,489	756
Mink	185	51	90	6	9
Muskrat	57	21	0	0	0
Weasel	27	7	85	0	6
Squirrel	2	0	8	0	0

[a] Estimates derived from Fur Acquisition Reports and Fur Export Permits.

LOCATION

Game Management Subunits: 25A, 25B, 25D, 26B, and 26C (75,000 mi^2)

Geographical Description: Eastern Interior, Eastern Brooks Range, and Central and Eastern Arctic Slope

BACKGROUND

The upper Yukon River valley in eastern Interior Alaska has long been known as one of Alaska's most productive furbearer areas. Diverse and abundant habitats include wetlands, riparian, and upland seral vegetation communities. The area supports extensive populations of a variety of furbearers, especially beaver, lynx, and fox. Furbearer abundance and species composition on the Arctic Slope are comparatively limited. Wolves, wolverines, and foxes are the most important species for trappers in this area.

Information on furbearers comes from pelt sealing records for beaver, lynx, land otter, and wolverine; fur acquisition reports; export reports; and trapper questionnaires. Beaver populations have been surveyed periodically in the Yukon Flats National Wildlife Refuge (YFNWR) since 1982 (McLean 1986). Limited surveys of other furbearers were conducted in the 1980s (Golden 1987).

MANAGEMENT DIRECTION

Management Goals

Management goals for area furbearers are to: 1) protect, maintain, and enhance furbearer populations in concert with other components of the ecosystem and to assure their capability of providing sustained opportunities for commercial use of furbearers; and 2) provide for sustained opportunities to participate in hunting, subsistence use, viewing, and photographing furbearers.

Management Objectives

Management objectives for area furbearers are to: 1) determine the relative abundance of lynx, marten, and beavers by 1991; 2) determine age and sex ratios of harvested lynx and marten by 1991; 3) develop accurate estimates of furbearer harvest by 1991; 4) identify trapper use patterns by 1991; 5) determine marten habitat use and dispersal by 1992; and 6) determine lynx habitat use, movements, and density in and near burned areas of different successional stages from 1991 through the lynx population peak.

METHODS

We analyzed harvest data from sealing certificates, fur acquisition reports, and fur export reports. Reports from trappers were evaluated. The only population surveys conducted were beaver lodge and food cache surveys done by YFNWR biologists in 1987 and 1991.

RESULTS AND DISCUSSION

Population Status and Trends

Population Size:

Beaver, marten, and red fox occurred in high numbers on the Yukon Flats, as has been the case for several years. Aerial surveys of beaver lodges and food caches indicate that beaver activity fluctuates from year to year (USFWS-YFNWR, unpubl. data). Beaver populations have been generally stable or slightly increasing since 1982. Trapper reports and harvest data indicate that lynx numbers were high during the late 1980s and early 1990s. This was especially evident in the eastern and central portions of Unit 25. Trappers report that mink, muskrats, weasels, and wolverines were moderately abundant. Land otters and coyotes were generally scarce.

Red and arctic foxes continued to be common in Subunits 26B and 26C. Wolverines continued to occur at low density throughout the area.

Mortality

Harvest:

Hunting Seasons and Bag Limits.

Unit 25	Bag Limit	Resident Season	Nonresident Season
Coyote	2 coyotes	Sep. 1-April 30	Same
Arctic Fox	Closed		
Red Fox	2 foxes	Sep. 1-Mar. 15	Same
Lynx	2 lynx	Nov. 1-Feb. 28	Same
Wolverine	1 wolverine	Sep. 1-Mar. 31	Same
Unit 26			
Coyote	2 coyotes	Sep. 1-April 30	Same
Arctic Fox	2 foxes	Sep. 1-April 30	Same
Red Fox	2 foxes	Sep. 1-Mar. 15	Same
Lynx	2 lynx	Nov. 1-Feb. 28	Same

Wolverine	1 wolverine	Sep. 1-Mar. 31	Same

Trapping Seasons and Bag Limits.

Unit 25	Bag Limit	Resident Season
Beaver	50	Nov. 1-Apr. 15
Coyote	No limit	Nov. 1-Mar. 31
Arctic Fox	Closed	
Red Fox	No limit	Nov. 1-Feb. 28
Lynx	No limit	Nov. 1-Feb. 28
Marten	No limit	Nov. 1-Feb. 28
Mink & Weasel	No limit	Nov. 1-Feb. 28
Muskrat	No limit	Nov. 1-June 10
Land Otter	No limit	Nov. 1-Apr. 15
Wolverine	No limit	Nov. 1-Apr. 15
Unit 26		
Beaver	Closed	
Coyote	No limit	Nov. 1-Apr. 15
Arctic Fox	No limit	Nov. 1-Apr. 15
Red Fox	No limit	Nov. 1-Apr. 15
Lynx	No limit	Nov. 1-Apr. 15
Marten	No limit	Nov. 1-Apr. 15
Mink & Weasel	No limit	Nov. 1-Jan. 31
Muskrat	No limit	Nov. 1-Jun. 10
Land Otter	No limit	Nov. 1-Apr. 15
Wolverine	No limit	Nov. 1-Apr. 15

Board of Game Actions and Emergency Orders. Significant regulatory changes were made to lynx trapping seasons. There has been concern about the effects of trapping lynx during the low phase of their population cycle. This concern led the Board of Game to reduce the season in Subunits 25A, 25B, and 25D. Before 1985, the season ran from 1 November to 15 March. For the 1985-86 season, this was reduced to 1 November-28 February. The following season it was again reduced to 1 December-31 January. As lynx numbers began to recover, the season was again lengthened to 1 November-28 February in 1988-89. This season remained in place through 1989-90 and 1990-91.

Hunter/Trapper Harvest.

Beaver. Beavers are most commonly taken in and near major drainages such as the Black, Little Black, Coleen, Hodzana, Chandalar, and Christian rivers, and Birch and Beaver creeks. The trend in beaver harvest in Unit 25 has been generally downward

(Table 1). The proportion of kits in the harvest ranged from 15% to 21% during the report period (Table 2). The harvest decline is probably related to lower pelt values (Table 3).

Lynx. The number of lynx harvested increased from about 500 annually in 1986-87 and 1987-88 to nearly 700 annually in 1988-89 and 1989-90. Harvest declined to 465 in 1990-91 (Table 1). This harvest pattern reflects the increase, peak, and early part of the decline in the snowshoe hare cycle.

Snowshoe hares are the primary prey of lynx. Production and survival of lynx kittens are highly dependent on the abundance of this cyclic prey species. The proportion of kittens in the harvest has declined somewhat from about 21% to near 18% during the 5-year period but is still relatively high (Table 2). This observation agrees with trapper reports indicating that snowshoe hares were abundant in most areas during the study period. During the low phase of the hare cycle, the proportion of kits in the harvest may be as low as 3% (Stephenson and Karczmarczyk 1989). A decline in lynx numbers and harvest is anticipated during the early and mid-1990s.

The harvest of lynx occurs over an extensive area, but is greatest in the Chandalar, Christian, Black, Little Black, Salmon Fork, Porcupine, and Sheenjek drainages. The largest harvests occur in eastern Subunit 25D and in Subunit 25B.

Land otter and wolverine. Otter harvest continues to be low. It has declined from 10 in 1986-87 to two in 1990-91. One otter was reported taken in Subunits 26B and 26C during both 1989-90 and 1990-91 (Table 1).

Most of the wolverine harvest comes from Unit 25 (Table 1). Harvest has been relatively stable, near 50, during the past 5 years. Likewise, harvest has been stable in most subunits. The only area where wolverine harvest has increased is in Subunit 26B (Table 1). This is probably a result of improved access from the Dalton Highway. The number of animals taken is still small relative to the area's size.

Unsealed species. The reported harvest of most species of unsealed furbearers continued to decline during the late 1980s (Table 4). Fur prices declined to low levels for most species during this period (Table 3). A resulting decline in trapping effort probably accounts for much of the decline in harvest. Temporary declines in furbearer population numbers may have also contributed to an unknown degree. Muskrats were historically taken in large numbers. The dramatic decline in harvest is in large part attributable to a drying trend. Many lakes and ponds have diminished in size or disappeared and muskrat habitat has decreased. A dramatic long-term decline in mink populations is probably also related to the drying trend.

Reasons for the marten harvest decline are not well understood. Some observers speculate that marten populations decline during the high phase of the lynx-hare cycle. The general decline in fur prices has probably reduced trapper effort and furbearer harvests.

Trapper Success. Among sealed species, beaver and lynx are the most commonly taken animals (Table 1). The average number taken by each reporting trapper ranged from five to eight (Table 2). The number of marten taken by individual trappers is unknown. Numerically and economically, marten have been the most important furbearer to most trappers in recent years. Comments on trapper questionnaires indicate furbearer populations have been high and that the major deterrents to higher harvests are lower pelt values and severe weather (Table 5).

Harvest Chronology. The harvest of beavers in Unit 25 is greatest during February and March, when 50% to 70% of the harvest occurs (Table 6). Lynx are harvested primarily in December and January, when from 60% to 97% of the harvest takes place. This corresponds to the period of peak primeness for lynx pelts. The harvest of otter and wolverine is distributed over a broader period. Most are harvested in December, January, and February when trapping activity for other species is greatest. The small harvest of wolverine in Subunits 26B and 26C is distributed throughout the winter (Table 7).

Harvest and Transport Methods. Traps and snares are by far the predominant method for harvesting furbearers in Unit 25 (Table 2). Only a few lynx and wolverine are taken with firearms. Snowmachines are the most common method of transportation, accounting for more than 80% of the furbearers taken in most years. A few are taken with the aid of aircraft, dogsled, skis, snowshoes, or highway vehicles (Table 8). In Subunit 26B, highway vehicles are used by trappers on the Dalton Highway and are used in connection with most of the reported harvest of wolverine (Table 9).

CONCLUSIONS AND RECOMMENDATIONS

We lack quantitative data on furbearer population status in the upper Yukon and eastern Arctic. However, harvest data and anecdotal reports from trappers suggest that furbearer populations are not adversely affected by existing harvest levels. Present seasons and bag limits appear reasonable in terms of providing for both trapping and hunting opportunity and conservation. Recent declines in fur prices should reduce trapping activity somewhat, which further suggests that existing regulations are adequate.

Most management objectives listed earlier have not been met, largely because of budget limitations and changes in personnel. Objectives should be reevaluated in light of current budgets and reversed in the near future.

It would be desirable to establish a program of annual track counts that would provide information on furbearer population trends, particularly for lynx, marten, and wolverine. If funding limitations make such a program impossible, I recommend we focus our efforts on increasing communication between local trappers and state and federal biologists. This program would include increased personal contact with trappers, expanded efforts to communicate through the trapper questionnaire, and efforts to help local residents understand that reporting furbearer harvests (by sealing fur and using fur export reports) is in their best interest.

LITERATURE CITED

Golden, H.M. 1987. Survey of furbearer populations on the Yukon Flats National Wildlife Refuge. Final Rep. 14-16-007-84-2416. Alaska Dep. Fish and Game, Fairbanks, Alaska and U.S. Fish and Wildlife Service, Yukon Flats National Wildlife Refuge, Fairbanks, Alaska. 86pp.

McLean, L.S. 1986. Beaver food cache survey, Yukon Flats National Wildlife Refuge, Alaska, 1985. Proj. Rep. 86-5. U.S. Fish and Wildlife Service, Yukon Flats National Wildlife Refuge, Fairbanks, Alaska. 8pp.

Stephenson, R.O., and P.F. Karczmarczyk. 1989. Development of techniques for evaluating lynx population status in Alaska. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Final Rep. Proj. W-23-1. Juneau. 95pp.

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Table 1. Subunits 25A, 25B, 25D, 26B, and 26C furbearer harvest, 1986-91.

Species/Year	Subunit 25A	25B	25D	26B	26C	Unk	Total
Beaver							
1986-87	24	171	333	0	0	0	528
1987-88	23	136	287	0	0	0	446
1988-89	9	175	129	0	0	0	313
1989-90	5	51	67	0	0	0	123
1990-91	7	26	128	0	0	0	161
Lynx							
1986-87	77	124	282	0	0	0	483
1987-88	117	127	278	0	0	0	522
1988-89	59	298	329	0	0	0	686
1989-90	41	430	214	0	0	0	685
1990-91	25	232	208	0	4	0	465
Land Otter							
1986-87	3	1	6	0	0	0	10
1987-88	3	0	2	0	0	0	5
1988-89	0	2	2	0	0	0	4
1989-90	1	0	0	0	1	0	3
1990-91	0	1	0	0	1	0	2
Wolverine							
1986-87	16	19	19	0	0	0	54
1987-88	13	11	14	1	1	0	40
1988-89	13	10	21	4	1	0	49
1989-90	17	14	21	4	0	0	56
1990-91	15	14	18	5	0	0	52

Table 2. Subunits 25A, 25B, 25D, 26B, and 26C beaver, lynx, otter, and wolverine harvest, 1986-91.

Regulatory	Reported harvest						Estimated harvest		Method of take				Total	Total trappers/
year	M	F	Unk.	Juv.[a]	Adults	Unk.	Unreported	Illegal	Trap/snare	Shot	(L&S)[b]	Unk.	harvest	hunters
Subunits 25A, 25B, and 25D:														
Beaver														
1986-87	0	0	528	79	409	40	0	0	520	0	0	8	528	unk
1987-88	0	0	446	66	380	0	0	0	444	0	0	2	446	58
1988-89	0	0	313	67	246	0	0	0	313	0	0	0	313	29
1989-90	0	0	123	18	104	1	0	0	121	1	0	1	123	29
1990-91	0	0	161	34	122	5	0	0	159	2	0	0	161	26
Lynx														
1986-87	0	0	487	100	383	4	0	0	484	1	0	2	487	unk
1987-88	0	0	522	110	412	0	0	0	510	2	0	10	522	119
1988-89	0	0	686	128	569	0	0	0	673	0	4	9	686	126
1989-90	0	0	685	136	549	0	0	0	648	5	0	32	685	90
1990-91	0	0	465	82	381	2	0	0	463	1	0	1	465	72
Otter														
1986-87	unk	unk	unk	0	0	13	0	0	12	0	0	1	13	unk
1987-88	unk	unk	unk	0	0	5	0	0	5	0	0	0	5	5
1988-89	1	1	2	0	0	4	0	0	4	0	0	0	4	4
1989-90	1	0	2	0	0	2	0	0	2	0	0	1	3	3
1990-91	1	0	0	0	0	1	0	0	1	0	0	0	1	1
Wolverine														
1986-87	unk	unk	unk	0	0	58	0	0	52	0	1	5	58	unk
1987-88	unk	unk	unk	0	0	40	0	0	36	0	4	0	40	29
1988-89	31	12	1	0	0	44	0	0	42	0	1	1	44	30
1989-90	29	19	4	0	0	52	0	0	52	0	0	0	52	31
1990-91	27	13	7	0	0	54	0	0	45	2	0	0	47	28

Table 2. Continued.

Regulatory year	Reported harvest M	F	Unk.	Juv.[a]	Adults	Unk.	Estimated harvest Unreported	Illegal	Method of take Trap/snare	Shot	(L&S)[b]	Unk.	Total harvest	Total trappers/ hunters
Subunits 26B and 26C:														
Lynx														
1990-91	0	0	4	0	0	4	0	0	4	0	0	0	4	1
Wolverine														
1986-87	unk	unk	unk	unk	unk	unk	unk	unk	unk	unk	unk	unk	0	unk
1987-88	unk	unk	unk	unk	unk	unk	unk	unk	unk	unk	unk	unk	0	unk
1988-89	2	2	1	0	0	5	0	0	2	1	1	1	5	5
1989-90	3	1	0	0	0	4	0	0	0	4	0	0	4	4
1990-91	3	2	0	0	0	5	0	0	0	5	0	0	5	4

[a] Beavers ≤52"; lynx ≤34" in length.

[b] L&S (land-and-shoot) refers to animals taken by hunters the same day hunters were airborne.

Table 3. Average fur prices[a], 1986-91.

Species	1986-87	1987-88	1988-89	1989-90	1990-91
Beaver Good quality large brown	45	46	37	36	13
Marten Large I-II dark brown	115	87	110	71	65
Mink Large-medium I-II dark brown North	48	50	40	31	34
Fox XL-large I-II northwest	54	32	24	20	17
Lynx Large-medium I-II first color	528	500	260	155	118
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Wolverine XL I-II brown	190	250	200	380	190

[a] All prices in U.S. dollars. Data from Dominion Soudack, Seattle Fur Exchange, Edmonton Fur Auction.

Table 4. Unit 25 estimated harvest[a] of unsealed furbearer species, 1986-91.

Species	1986-87	1987-88	1988-89	1989-90	1990-91
Coyote	0	0	0	0	0
Arctic Fox	0	2	0	0	0
Red Fox	464	286	198	47	171
Marten	5,707	5,086	3476	2,357	2,070
Mink	211	80	72	32	42
Muskrat	2,360	1,141	657	0	23
Weasel	60	55	87	9	6
Squirrel	6	31	53	0	25

[a] Estimates derived from Fur Acquisition Reports and Fur Export Permits.

Table 5. Climatological data for the Fort Yukon weather station 1989-90 (U.S. Department of Commerce, NOAA).

Month	1989-90 Oct	Nov	Dec	Jan	Feb	Mar	Total
Snowfall (inches)	9	8	1	14	6	7	45
Snow on ground at end of month (inches)	9	14	9	17	21	15	NA[a]
Min. temp (°F)	-14	-51	-41	-59	-60	-31	NA[a]
Max. temp (°F)	50	10	16	7	4	48	NA[a]
Avg. daily min. temp (°F)	12	-20	-12	-34	-43	-2	NA[a]
Avg. daily max. temp (°F)	25	-10	4	-19	-25	23	NA[a]
Monthly mean temp (°F)	18	-15	-4	-27	-34	10	NA[a]
No. days below -30 °F	0	10	6	19	21	1	57

[a] Not applicable.

Table 6. Subunits 25A, 25B, and 25D beaver, lynx, otter, and wolverine harvest chronology by time period, 1986-91.

Regulatory year	Harvest periods						
	October	November	December	January	February	March	April
Beaver							
1986-87	0	44	37	51	84	286	13
1987-88	0	32	23	50	55	234	52
1988-89	0	33	27	6	60	165	16
1989-90	0	16	12	12	22	52	0
1990-91	0	4	21	52	45	38	1
Lynx							
1986-87	0	1	273	196	2	1	0
1987-88	0	1	267	247	2	2	0
1988-89	0	77	268	137	184	0	0
1989-90	0	55	328	184	102	1	0
1990-91	0	20	200	102	93	28	0
Land Otter							
1986-87	0	0	6	3	1	1	0
1987-88	0	1	1	3	0	0	0
1988-89	0	0	3	0	1	0	0
1989-90	0	1	1	0	0	0	0
1990-91	0	0	0	1	0	0	0
Wolverine							
1986-87	0	4	16	20	5	9	0
1987-88	0	2	14	15	5	3	1
1988-89	0	5	14	6	15	4	0
1989-90	0	6	18	9	16	3	0
1990-91	1	11	13	5	16	0	0

Table 7. Subunits 26B and 26C lynx and wolverine harvest chronology by time period, 1986-91.

Regulatory year	Harvest periods						
	Sep/Oct	November	December	January	February	March	April
Lynx							
1990-91	0	0	0	0	4	0	0
Wolverine							
1986-87	unk	unk	unk	unk	unk	unk	unk
1987-88	unk	unk	unk	unk	unk	unk	unk
1988-89	0	0	1	2	1	1	0
1989-90	1	1	0	0	1	0	1
1990-91	3	2	1	2	0	0	0

Table 8. Subunits 25A, 25B, and 25D beaver, lynx, otter, and wolverine harvest percentage by transport method, 1986-91.

Regulatory year	Percentage of harvest							
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Beaver								
1986-87	1	8	0	0	92	0	0	0
1987-88	6	4	0	0	90	0	0	0
1988-89	0	8	0	0	92	0	0	0
1989-90	0	2	0	0	98	0	0	0
1990-91	21	3	0	0	76	0	1	0
Lynx								
1986-87	3	8	0	0	89	0	0	0
1987-88	3	10	0	0	86	0	0	0
1988-89	13	7	1	0	80	0	0	0
1989-90	2	8	0	0	88	0	1	0
1990-91	2	7	0	0	91	0	0	0
Land Otter								
1986-87	0	9	0	0	91	0	0	0
1987-88	0	20	0	0	80	0	0	0
1988-89	0	25	0	0	75	0	0	0
1989-90	0	0	0	0	100	0	0	0
1990-91	0	100	0	0	0	0	0	0
Wolverine								
1986-87	12	16	0	0	71	0	0	0
1987-88	10	18	0	0	69	0	3	0
1988-89	8	10	0	0	82	0	0	0
1989-90	2	17	0	0	81	0	0	0
1990-91	2	20	0	0	77	0	0	0

Table 9. Subunits 26B and 26C lynx and wolverine harvest percentage by transport method, 1986-91.

	Percentage of harvest							
Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Lynx								
1990-91	100	0	0	0	0	0	0	0
Wolverine								
1986-87	unk	unk	unk	unk	unk	unk	unk	unk
1987-88	unk	unk	unk	unk	unk	unk	unk	unk
1988-89	0	0	0	0	25	0	75	0
1989-90	0	0	0	0	0	0	0	0
1990-91	25	25	0	0	0	0	50	0

LOCATION

Game Management Subunit: 26A (56,000 mi^2)

Geographical Description: Western North Slope

BACKGROUND

Red fox, arctic fox, and wolverine are the only furbearer species commonly found in Subunit 26A. Because of limited habitat, boreal forest species such as lynx, marten, and coyotes are found only in the southern portion of Subunit 26A. Indigenous residents of the North Slope have harvested furbearers extensively for use in the domestic manufacture of garments. Local hunters and trappers in Subunit 26A still harvest furbearers for domestic and handicraft use, as well as for sale to the commercial fur market.

MANAGEMENT DIRECTION

Population management objectives established for furbearers in Subunit 26A are to: 1) maintain productive populations and to allow harvest opportunities within sustained yield limits; and 2) minimize adverse interactions between furbearers and the public.

METHODS

We did not conduct specific surveys to assess the status of furbearer populations in Subunit 26A during the report period. We recorded incidental observations of furbearer activity during surveys conducted for other species. We summarized harvest data for species requiring sealing from sealing certificate records.

RESULTS AND DISCUSSION

Population Status and Trend

No quantitative population information is available for lynx, red and white fox, and coyote in Subunit 26A. Lynx are found only at low density in the southern portion of the subunit. Red foxes were fairly abundant in interior areas of Subunit 26A. Arctic foxes were abundant along the coastal plain in Subunit 26A during 1990-91. Coyotes are occasionally seen along the southern border of Subunit 26A.

The population status of wolverines in Subunit 26A is not known with certainty. Magoun (1984) estimated a fall population size of 821 wolverines for Subunit 26A, assuming that an overall density of 1 wolverine/54 mi^2 was valid for the entire subunit. While conducting moose composition surveys in Subunit 26A, 11 wolverines were seen during 35 hours of flight in 1984, and 12 were seen during 39 hours of flight in 1991.

Mortality

Hunting Seasons and Bag Limits:

Unit 26A	Lynx	Nov. 1-Apr. 15	2 lynx
	Red Fox	Sept. 1-March 15	2 foxes
	Arctic Fox	Sept. 1-Apr. 30	2 foxes
	Coyote	Sept. 1-Apr. 30	2 coyotes
	Wolverine	Sept. 1-March 31	1 wolverine

Trapping Seasons and Bag Limits:

Unit 26A	Lynx	Nov. 1-Apr. 15	No limit
	Red Fox	Nov. 1-Apr. 15	No limit
	Arctic Fox	Nov. 1-Apr. 15	No limit
	Coyote	Nov. 1-Apr. 15	No limit
	Wolverine	Nov. 1-Apr. 15	No limit

Harvest

Human Induced Mortality:

Lynx. No lynx were sealed in Subunit 26A during the report period. Because lynx only occur in the southern portion of the subunit and most residents live along the coast, only residents from Anaktuvuk Pass have opportunity to harvest lynx.

Fox. Arctic and red foxes were harvested by local hunters and trappers. Because there is no sealing requirement for these species, adequate harvest information was not obtained. Low fur prices resulted in few foxes being trapped.

Wolverine. Four wolverines (1 male and 3 females) were sealed during 1990-91 season. All were ground shot, and snowmachines were used for transportation for 3 animals and skis for 1. One was taken in September, 1 in November, 1 in March, and 1 in April. Three hunters were residents of the subunit, and 1 was a nonresident. We believe many wolverines were harvested and not reported. Trent (1988) estimated that local residents harvested approximately 100 wolverines annually from Subunit 26A. Magoun (1984) estimated that in some years less than 10% of the wolverines harvested in Subunit 26A were sealed, and rarely were more than 50% sealed.

Coyotes. Two coyotes were harvested by Anaktuvuk Pass residents. Snowmachines were used for transportation.

CONCLUSIONS AND RECOMMENDATIONS

We need to obtain more accurate population and harvest information for furbearers, particularly wolverines. Few people comply with sealing requirements for the following reasons: 1) there are no sealing agents in most villages because there is little financial incentive for anyone to act as a fur sealer; 2) many residents are not aware of sealing requirements; 3) many people are reluctant to comply with state regulations; and, 4) most hides are used locally. Most rural residents have hides sealed only if they are selling them to furbuyers or sending them out for commercial tanning.

There are several possible methods to obtain improved furbearer harvest information. One possibility is to provide adequate financial compensation for people to become fur sealers, and increase our efforts to inform residents of our need for sealing information. However, working through the sealing program will always have limitations because it requires that hunters and trappers buy licenses before harvest information can be reported, and not all individuals purchase licenses. Another approach would be to buy carcasses or skulls from hunters. This would provide a monetary incentive for people to report their harvest, and would provide additional biological information about the animals harvested. The National Park Service (NPS) is collecting harvest information successfully by purchasing wolf carcasses in Anaktuvuk Pass. We are currently working with the North Slope Borough to develop a village harvest monitor program. Village residents will be hired to collect harvest information about selected animal species.

The population status of wolverines needs closer monitoring. A track intercept technique has been used to estimate wolverine density in other areas of Alaska (Becker 1991), and may be useful for evaluating population trends in portions of Subunit 26A.

At present, our staff members do not have adequate time or resources to collect population and harvest information needed to properly manage furbearers in Subunit 26A. If we decide it is important to collect additional information on furbearers, we must reduce efforts for other species or assign additional staff to monitor furbearer populations.

Because of their vulnerability and desirability to local hunters, overharvesting of wolverines is possible. Magoun (1984) estimated the subunit could sustain an annual harvest of 300 wolverines under certain conditions. She assumed that this high harvest rate would be sustainable only if less than 90 females were harvested, and the reproductive rate observed at the Driftwood study area applied to the entire subunit. If Magoun's estimate of population size and productivity are still valid, and Trent's (1988) harvest estimate of 100 wolverines is accurate, overharvesting is probably not occurring. I recommend no changes in seasons and bag limits at this time.

LITERATURE CITED

Becker, E.F. 1991. A terrestrial furbearer estimator based on probability sampling. J. Wildl. Manage. 55(4):537-562.

Magoun, A.J. 1984. Population characteristics, ecology, and management of wolverines in northwestern Alaska. Ph.D Dissertation, Univ. Alaska, Fairbanks. 197pp.

Trent, J.N. 1984. Unit 26A furbearer survey-inventory progress report. Pages 77-79 in B. Townsend, ed. Annual report of survey-inventory activities. Part XIV. Furbearers. Vol. XV. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-22-3. Job 7.0. Juneau. 100pp.

Trent, J.N. 1985. Unit 26A furbearer survey-inventory progress report. Pages 72-73 in B. Townsend, ed. Annual report of survey-inventory activities. Part XIV. Furbearers. Vol. XVI. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-22-4. Job 7.0. Juneau. 94pp.

Trent, J.N. 1988. Unit 26A furbearer survey-inventory progress report. Pages 87-89 in S. Morgan, ed. Annual report of survey-inventory activities. Part XIV. Furbearers. Vol. XVII. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-22-5. Job 7.0. Juneau. 109pp.

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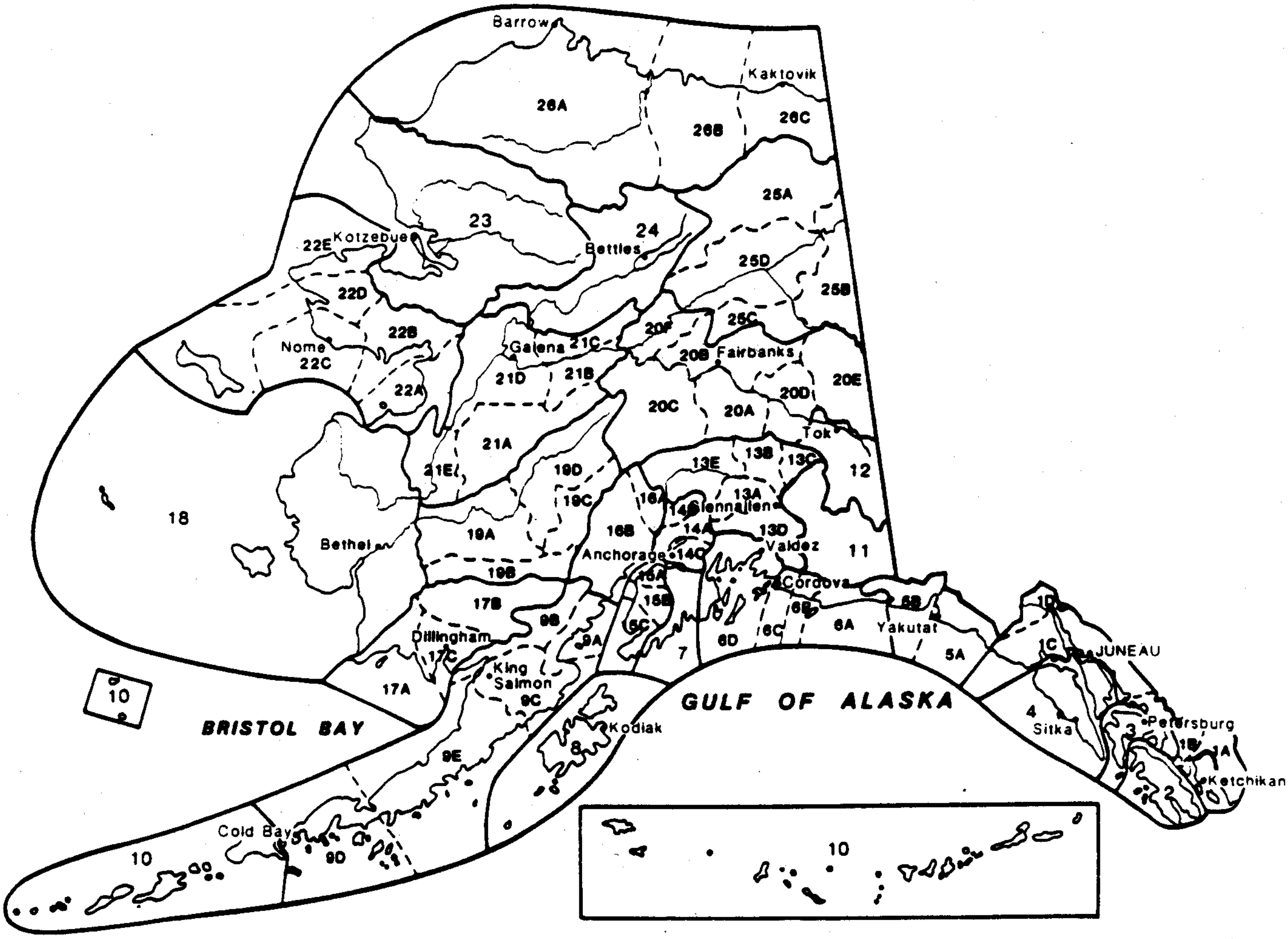

Federal Aid in Wildlife Restoration

The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sales of handguns, sporting rifles, shotguns, ammunition, and archery equipment. The Federal Aid program then allots the funds back to states through a formula based on each state's geographic area and the number of paid hunting license holders in the state. Alaska receives 5% of the revenues collected each year, the maximum allowed. The Alaska Department of Fish and Game uses the funds to help restore, conserve, manage, and enhance wild birds and mammals for the public benefit. These funds are also used to educate hunters to develop the skills, knowledge, and attitudes necessary to be reponsible hunters. Seventy-five percent of the funds for this project are from Federal Aid.