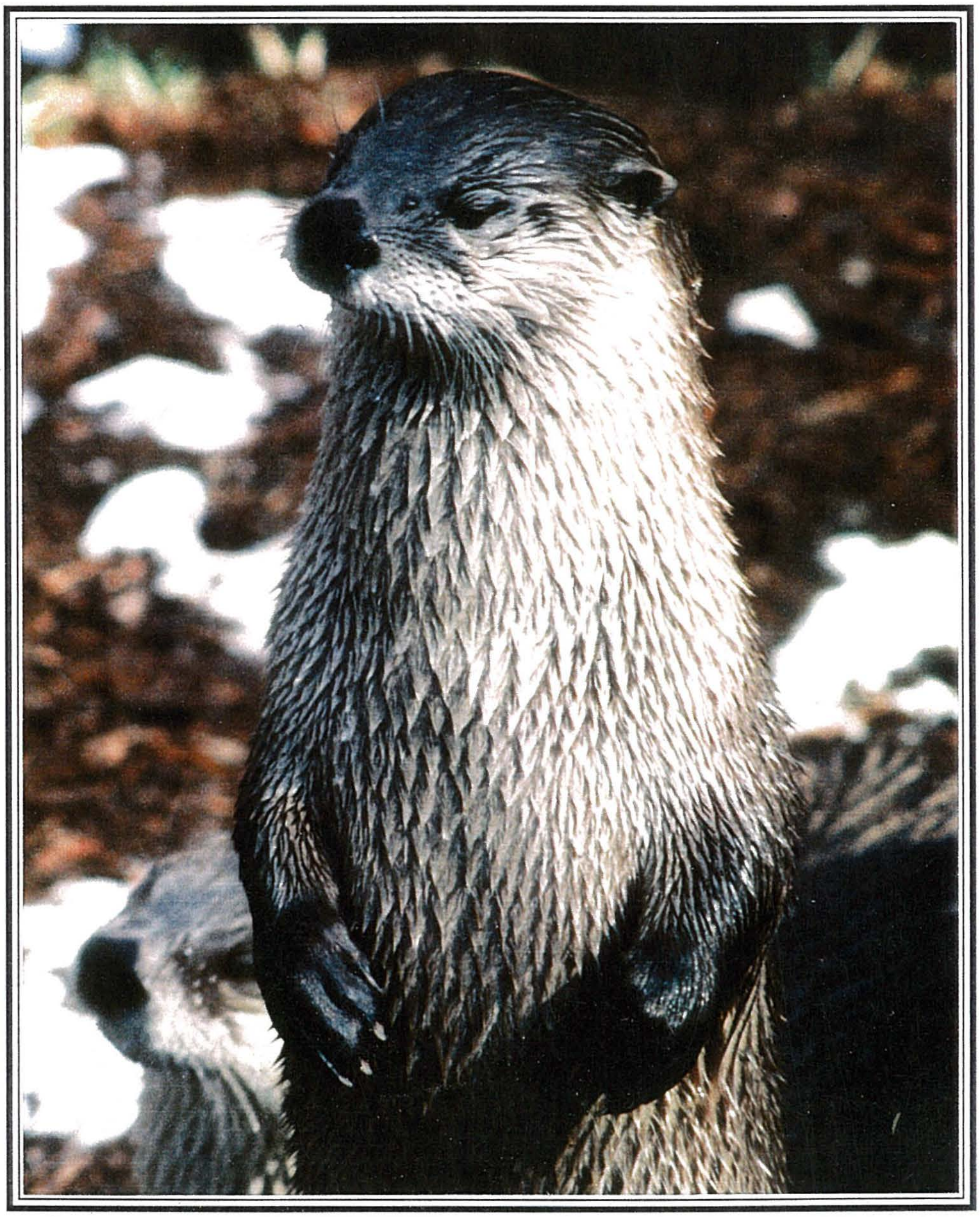
Alaska Department of Fish and Game
Division of Wildlife Conservation

Federal Aid in Wildlife Restoration
Survey-Inventory Management Report
1 July 1991 - 30 June 1994

FURBEARERS

Mary V. Hicks, Editor



Larsen

Grants W-23-5, W-24-1, and W-24-2
Study 7.0
December 1995

STATE OF ALASKA
Tony Knowles, Governor

DEPARTMENT OF FISH AND GAME
Frank Rue, Commissioner

DIVISION OF WILDLIFE CONSERVATION
Wayne L. Regelin, Director

Free copies of this report and other Division of Wildlife Conservation publications are available to the public. Please direct requests to our publications specialist.

Mary Hicks
Publications Specialist
ADF&G, Wildlife Conservation
P.O. Box 25526
Juneau, AK 99802
(907) 465-4190

CONTENTS

LOCATION

Game Management Units: Subunit 1A (5,290 mi^2) and 2 (3,620 mi^2)

Geographic Description: Subunit 1A - Unit 1 south of Lemesurier Point, including all areas draining into Behm and Portland Canals, 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 populations have remained at moderate to high population levels in Subunit 1A and Unit 2 during the past decade. Trapping pressure and harvests fluctuate annually, primarily because of weather conditions and changes in fur prices.

Southeast Alaska provides excellent habitat for river otters, and fur buyers consider pelts to be high in quality. Pelt prices were high during the late 1970s, declined during the 1980s and early 1990s, and increased during the past 2 seasons. Because otters are difficult to trap and pelt preparation is time consuming, prices must be high to substantially influence harvest levels.

Beaver prices have remained stable at low levels for several years. Trapper effort has similarly been low except along the roaded portions of Prince of Wales Island where easy access has enabled a few trappers to take several beavers. Beaver harvests can widely fluctuate annually because of the efforts of a few trappers.

More Southeast Alaska trappers are interested in martens than any other furbearer species. Martens are easy to trap, their pelts are easy to care for, and combined income from the pelts is generally greater than for any other furbearer species in Subunit 1A and Unit 2. With the exception of the 1986-87 season, when pelt prices jumped markedly, marten prices have remained consistent at moderate levels throughout the past decade. Easy access afforded by the extensive and expanding road system on Prince of Wales Island has increased marten vulnerability in Unit 2. Extensive logging in much of Subunit 1A and Unit 2 continues to remove uneven-aged, old-growth habitat required by martens. As a result, we believe the area's capacity to support marten populations is declining.

For at least the past decade, mink pelt prices have remained low and stable. This has resulted in moderate to low interest among trappers.

Weasel populations fluctuate yearly, independent from trapping. Harvest tends to be limited to incidental take while targetting other furbearers, primarily marten.

Muskrats are absent from Unit 2 and very few inhabit Subunit 1A. Harvests are very low and incidental to beaver trapping.

Wolverines only inhabit the mainland portion of Subunit 1A; very few are taken. Trappers do not generally target wolverines, and harvests tend to be incidental to wolf trapping. Neither foxes nor coyotes are in Subunit 1A and Unit 2, and lynx are only occasionally taken from the 1A mainland.

MANAGEMENT DIRECTION

Management Objectives

1 Regulate seasons and bag limits to maintain viewable and harvestable populations of furbearers

2 Seal harvested beaver, marten, otter, lynx, and wolverine pelts as they are presented for sealing

3 Contact reliable observers for general information about the status and trends of furbearer populations, including the use of an annual trapper survey.

METHODS

Our harvest data comes from mandatory sealing of marten, beaver, lynx, otter, and wolverine pelts. We obtained information about mink harvests from trappers who sealed marten pelts during 1990-91 and 1991-92; we have discontinued collecting this information.

Beaver pelts have been sealed for over twenty years. Wolverines were first sealed in 1971-72, and river otters have been sealed since 1978-79. Marten sealing was initiated in 1984-85.

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

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

RESULTS AND DISCUSSION

Population Status and Trend

Beaver populations have generally remained at moderate to high levels in Subunit 1A (Table 1). In Unit 2, however, trappers have reported a steady beaver decline from abundant in 1991-92 to scarce in 1993-94 (Table 2). We are unclear about the cause of this perceived decline, particularly since the 1993-94 harvest was well within the range noted during the past decade (Table 4). Trapping reduces local populations, especially near easily accessed roaded areas. We suspect this has resulted in the Unit 2 change.

Habitat changes can cause large fluctuations in beaver populations (Wood 1990). Although early successional second-growth habitat can support higher populations of beavers than old growth, when second-growth canopy closes in, which is approximately 20 years post-cutting, beaver numbers drop to low levels. Current pelt prices do not seem high enough to foster much trapping pressure except in easily accessed areas.

Marten populations tend to fluctuate annually throughout Southeast Alaska. Fluctuations are likely related to changes in prey abundance. In Subunit 1A trappers believe martens went from extremely abundant in 1991-92 to scarce during 1992-93, then to moderate levels during 1993-94 (Table 1). Unit 2 trappers reported moderate numbers of martens during 1991-92 and 1992-93 followed by low levels in 1993-94 (Table 2). But marten harvests from Unit 2 do not corroborate this perceived decline (Table 4). Discussions with trappers suggest that martens are concentrating in old-growth stands and avoiding clearcuts, thereby increasing trapper catch per unit effort. We anticipate that reductions in old-growth habitat will eventually result in reduced numbers of martens.

Mink populations are probably at moderate to high levels throughout Subunit 1A and Unit 2 (Tables 1 and 2). We do not expect this to change unless pelt prices increase and result in additional trapping effort.

Otter populations were low in the late 1970s when prices were high (Wood 1990). Since then, prices and trapper interest have dropped substantially. We believe that populations have steadily increased during the past decade and are presently at moderate to high levels. This is supported by information from trappers (Tables 1 and 2).

Mortality

Harvest. The reported Subunit 1A beaver harvest from 1991-92-1993-94 increased from the previous 3 seasons (Table 3). In Unit 2 the 1991-92 and 1993-94 harvests were on par with the past decade's take; however, the 1992-93 harvest of 64 was the lowest reported during the decade (Table 4). Trappers used road vehicles and boats to access beaver habitat in Subunit 1A, while road vehicles were most used in Unit 2 during 2 of the past 3 seasons (Table 5). The average number of beavers caught per trapper in Unit 2 was substantially higher than the average in Subunit 1A during 2 of the past 3 seasons (Table 6).

Marten harvests from Subunit 1A decreased from a 10-year high of 654 in 1991-92 to a 10-year low of 42 in 1993-94 (Table 3). Unit 2 marten harvests remained fairly stable at 575-700 per season (Table 4). Subunit 1A trappers predominantly used boats to access marten trapping areas; Unit 2 trappers primarily used road vehicles (Table 5). The average number of martens caught per trapper varied substantially in Subunit 1A but remained constant in Unit 2 (Table 6). We made no effort to ascertain habitats in which martens were caught subsequent to the 1989-90 season. The long range Unit 2 marten trapping outlook is poor. Increased road access into the interior of the island has eliminated refugia that was once available, eliminating the reservoir of untrapped animals (Wood 1990). Ongoing and scheduled logging will continue to reduce marten habitat in much of Subunit 1A and Unit 2.

Subunit 1A otter harvests were high during the last 3 seasons, reaching a 10-year high of 112 in 1993-94 (Table 3). After 3 consecutive seasons with low harvests, the Unit 2 otter harvest jumped to a 4-year high of 108 in 1993-94 (Table 4). Trapping was the predominant method of take in both Subunit 1A and Unit 2 (Tables 3 and 4). Most otter trappers used boats for transportation during all but 1 season; during 1993-94 half the Unit 2 trappers used boats and the other half used road vehicles (Table 5).

Four wolverines were trapped in Subunit 1A during the past 3 seasons (Table 3). Boats were used for transportation by all successful wolverine trappers (Table 5).

Seasons and Bag Limits.	Resident and nonresidents	
Units 1A and 2		
Hunting		
Wolverine	Nov. 10–Feb. 15	1 Wolverine
Trapping		
Beaver	Dec. 1–May 15	No limit
Lynx, Mink, Marten, Otter, Weasel, Muskrat	Dec. 1–Feb. 15	No limit
Wolverine	Nov. 10–April 30	No limit

Board of Game Actions and Emergency Orders. The same seasons and bag limits have been in effect for the past 9 years. Season opening dates for most species have been established using a combination of pelt primeness and standardized dates for species that could be taken in the same types of trap sets. Martens are considered prime before 1 December, 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. Closing dates are based on 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 breakup. Little beaver trapping occurs during the last month of the season because of low pelt prices.

Habitat

Clearcut logging of uneven aged old-growth forest in Subunit 1A and Unit 2 is affecting most furbearers. It is particularly harmful for martens, and we expect the conversion of old growth to second-growth habitat will ultimately lead to substantially reduced marten numbers in southern Southeast. We further expect roads to eliminate marten refugia, particularly in Unit 2. Under current roading and 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 larger stream and lake systems (Larsen 1983, Woolington 1984). However Woolington (1984) found natal dens up to one-half mile inland from saltwater beaches. Old-growth forest is preferred otter habitat and little use is made of cutover areas. Clearcut logging may reduce otter populations.

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

Beavers seem to reap short-term benefits from logging. Early clearcut stages produce abundant food and often support more beavers than does old growth. However, canopy closure eventually reduces populations to levels below those supported in old-growth stands.

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

CONCLUSIONS AND RECOMMENDATIONS

Furbearer populations in Subunit 1A and Unit 2 appear stable at this time. Trappers responding to our 1993-94 trapper questionnaire believe beaver populations are scarce in Unit 2 and marten populations are scarce in both Subunit 1A and Unit 2. Harvest data does not corroborate these reports. We believe pelt prices would have to increase substantially for trapping effort to affect most furbearer populations.

The extensive road system and widely distributed human population in Unit 2 creates much greater trapping pressure than in Subunit 1A. Along with high pelt prices this could lead to an overharvest of martens. Because marten and other species seasons correspond, the most acceptable solution would be to implement an access restriction on marten trapping.

Logging permanently removes uneven-aged, old-growth habitat, replacing it with even-aged, closed-canopy habitat which does not meet the requirements of several furbearer species. Therefore, it is important to publicize affects from land-use decisions so that tradeoffs for wildlife can be recognized and understood.

LITERATURE CITED

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

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.

Prepared By:

Douglas N. Larsen
Wildlife Biologist III

Submitted By:

Bruce Dinneford
Regional Management Coordinator

Table 1 Indices of abundance (IA)[a] for furbearer species, Subunit 1A, 1991-1993. Values derived from trapper responses to trapper questionnaires.

Species	Season 1991-92	1992-93	1993-94
Beaver	43	25	37
Lynx	--	--	--
Marten	73	17	25
Mink	67	45	42
Muskrat	--	--	--
Otter	65	54	50
Wolverine	--	--	--

[a] Species are considered abundant when IA >50, moderate when IA $\leq$50, and scarce when IA <20. Brand and Keith (1979).

Table 2 Indices of abundance (IA)[a] for furbearer species, Unit 2, 1991-1993. Values derived from trapper responses to trapper questionnaires.

Species	Season 1991-92	1992-93	1993-94
Beaver	62	50	12
Marten	44	39	12
Mink	67	45	42
Otter	67	45	50

[a] Species are considered abundant when IA >50, moderate when IA $\leq$50, and scarce when IA <20. Brand and Keith (1979).

Table 3 Reported harvest of beaver, marten, mink, otter, and wolverine from Subunit 1A, 1984-1993.

			Method of take (%)				Harvest chronology					
Species/ Year	Total take	% male	Shot	Trapped or snared	Unk	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
1991-92	46	--	0	100	0	17	11	5	4	8	0	1[a]
1992-93	14	--	0	100	0	7	2	2	1	2	0	0
1993-94	28	--	0	100	0	10	5	3	6	4	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
1991-92	654	62	0	100	0	215	111	149	0	0	0	179
1992-93	122	71	0	100	0	24	93	5	0	0	0	0
1993-94	42	74	0	100	0	15	14	1	0	0	0	12
Mink												
1990-91	144	--	0	100	0	27	34	4	0	0	0	79
1991-92	141	--	0	100	0	52	48	4	0	0	0	37
1992-93	--	--	--	--	--	--	--	--	--	--	--	--
1993-94	--	--	--	--	--	--	--	--	--	--	--	--

Table 3 Continued

			Method of take (%)			Harvest chronology						
Species/ Year	Total take	% male	Shot	Trapped or snared	Unk	Dec.	Jan.	Feb.	Mar.	Apr.	May	Unk
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
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
1991-92	84	55	19	81	0	31	39	14	0	0	0	0
1992-93	61	57	13	87	0	27	27	6	0	1	0	0
1993-94	112	62	11	89	0	64	38	10	0	0	0	0
Wolverine												
1984-85	1	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
1991-92	1	0	0	100	0	0	1	0	0	0	0	0
1992-93	2	0	0	100	0	0	1	0	0	1	0	0
1993-94	1	100	0	100	0	0	1	0	0	0	0	0

[a] One beaver was taken by ADF&G during the month of August.

Table 4 Reported harvest of beaver, marten, mink, and otter from Unit 2, 1984-1993.

Species/ Year	Total take	% male	Method of take (%) Shot	Trapped or snared	Unk.	Harvest chronology Dec.	Jan.	Feb.	Mar.	Apr	May	Unk
<u>Beaver</u>												
1984-85	234	--	0	100[a]	0	52	54	38	40	32	18	0
1985-86	364	--	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	100[b]	0	199	79	6	76	26	9	2
1990-91	172	--	0	100	0	18	56	59	17	17	5	0
1991-92	257	--	0	99	1	120	46	17	46	12	11	5
1992-93	64	--	0	98	2	36	4	10	2	11	1	0
1993-94	204	--	0	100	0	109	27	10	26	25	7	0
<u>Marten</u>												
1984-85	1039	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	1149	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
1991-92	700	53	0	100	0	475	127	66	0	0	0	32
1992-93	575	50	0	100	0	431	116	28	0	0	0	0
1993-94	656	58	0	100	0	510	104	42	0	0	0	0
<u>Mink</u>												
1990-91	168	--	0	100	0	69	24	14	0	0	0	61
1991-92	249	--	0	100	0	163	27	50	0	0	0	9
1992-93	--	--	--	--	--	--	--	--	--	--	--	--
1993-94	--	--	--	--	--	--	--	--	--	--	--	--

Table 4 Continued

Species/ Year	Total take	% male	Method of take (%) Shot	Trapped or snared	Unk.	Harvest chronology Dec.	Jan.	Feb.	Mar.	Apr	May	Unk
<u>Otter</u>												
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
1991-92	43	51	16	81	3	16	19	7	0	0	0	1
1992-93	66	56	23	74	0	18	26	21	1	0	0	0
1993-94	108	59	6	94	0	31	52	25	0	0	0	0

[a] One beaver was hit and killed by a car.
[b] One beaver was shot.

Table 5 Transportation methods used by trappers, Subunit 1A and Unit 2, 1984-1993.

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
1991-92	39	39	0	2	20	25	75	0	0	0
1992-93	43	57	0	0	0	45	38	0	0	17
1993-94	46	54	0	0	0	13	87	0	0	0
Marten										
1984-85	--	--	--	100	--	--	--	--	100	--
1985-86	--	--	--	100	--	--	--	--	100	00
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
1991-92	91	9	0	0	0	54	44	2	0	0
1992-93	97	3	0	0	0	45	52	0	0	3
1993-94	95	5	0	0	0	24	76	0	0	0
Mink										
1990-91	93	3	0	0	4	69	13	2	0	16
1991-92	91	9	0	0	0	54	44	0	2	0
1992-93	--	--	--	--	--	--	--	--	--	--
1993-94	--	--	--	--	--	--	--	--	--	--

Table 5 Continued

Species/ Year	Unit 1A Transportation Used (%)					Unit 2 Transportation Used (%)				
	Boat	Road	Air	Unk	Other[a]	Boat	Road	Air	Unk	Other[a]
Otter										
1984-85	--	--	--	100	00	--	--	--	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
1991-92	89	11	0	0	0	70	23	2	3	2
1992-93	80	18	0	2	0	70	23	0	0	7
1993-94	97	3	0	0	0	50	50	0	0	0
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]	--	--	--	--	--
1991-92	100	0	0	0	0	--	--	--	--	--
1992-93	100	0	0	0	0	--	--	--	--	--
1993-94	100	0	0	0	0	--	--	--	--	--

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

Table 6 Average furbearer take per trapper, and percent of marten harvest occurring in old growth habitat, Subunit 1A and Unit 2, 1986-1993.

Species-Year	Number of trappers		Average catch-trapper		Percent of harvest occuring in old growth	
	1A	2	1A	2	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	--	--
1991-92	9	17	2	15	--	--
1992-93	9	10	5	6	--	--
1993-94	7	20	4	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	--	--
1991-92	22	33	30	21	--	--
1992-93	12	30	10	19	--	--
1993-94	7	37	6	18	--	--
Mink						
1990-91	14	14	10	12	--	--
1991-92	14	19	10	13	--	--
1992-93	--	--	--	--	--	--
1993-94	--	--	--	--	--	--

Table 6 Continued

Species/ Year	Number of trappers		Average catch/trapper		Percent of harvest occuring in old growth	
	1A	2	1A	2	1A	2
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	--	--
1991-92	14	19	6	2	--	--
1992-93	12	20	5	3	--	--
1993-94	15	25	7	4	--	--
Wolverine						
1986-87	1	--	2	--	--	--
1987-88	1	--	1	--	--	--
1988-89	0	--	0	--	--	--
1989-90	1	--	1	--	--	--
1990-91	3	--	2	--	--	--
1991-92	1	--	1	--	--	--
1992-93	2	--	2	--	--	--
1993-94	1	--	1	--	--	--

LOCATION

Game Management Units: Unit 1B (2,980 mi^2) and Unit 3 (2,970 mi^2)

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

BACKGROUND

Furs, particularly those of the sea otter, attracted Russians to colonize Southeastern Alaska in the late 1700s and early 1800s. Ships from many nations came to the area to trade with natives for fur. In the early part of the twentieth century, fur farming was one of the biggest industries in Southeast. At one time there were 200 fur farms in operation, according to U. S. Forest Service archaeologist Larry Roberts. From the 1930s to 1950s 5–9 fur farms operated on Kupreanof Island. Petersburg was the center for the blue fox industry, supporting 60 fur farms located on a nearby island in the mid 1930s (Roppel 1983). The University of Alaska experimental fur farm on Mitkof Island was in operation from 1936 to 1972. They raised mink, fox, and martens. Several small islands had free-roaming fox, a system unique to Alaska. Blue and Silver fox and mink were the primary species raised, but there were attempts to raise raccoon, skunk, beaver, muskrat, and red fox (Burris, McKnight 1973).

Declines in some wild furbearer populations promoted regulations. In 1913 taking beaver was prohibited for 5 years with a renewal of the prohibition extending the closure another 5 years. In 1915 martens were protected for 5 years.

Today most furbearer trapping is used as a winter income supplement and as a form of recreation. Seasons and bag limits have remained stable in recent years.

MANAGEMENT DIRECTION

Management Objectives

1 Regulate seasons and bag limits to maintain viable and harvestable populations of furbearers

2 Seal harvested beaver, marten, otter, lynx, and wolverine pelts as they are presented for sealing

3 Contact reliable observers for general information about the status and trends of furbearer populations, including the use of an annual trapper survey

4 Maintain sufficient habitat to provide viable furbearer populations and provide adequate refugia for dispersal of young animals

5 Provide optimal harvest during peak primeness on the sustained yield principle

METHODS

Harvest information is collected for beaver, lynx, marten, otter, and wolverine from mandatory sealing. Location, harvest date, trapping method, transportation used, and sex of all species (except beaver) are obtained from sealing certificates. We measure pelt size on beavers and otters which provides an indication of harvested animals' age. Additional harvest information on these and other furbearer species are reported on fur export reports and fur acquisition reports.

Methods for estimating furbearer population abundance, trends, and distribution include Alaska trapper questionnaires, which 47 local trappers received during the report period; interviews with trappers and fur buyers; and ADF&G and Forest Service field observations.

We monitor logging operations, road construction, and other developments to assess potential habitat loss.

RESULTS AND DISCUSSION

Population Status and Trend

Beavers are abundant throughout Subunit 1B and Unit 3 in available habitat. The populations have remained stable.

Lynx occur infrequently when snowshoe hares become scarce in the interior of British Columbia (Gray 1915). No harvest was reported.

Martens remain abundant and the populations have remained stable. Trappers report that rodent populations were abundant during this reporting period.

Mink and river otter populations are abundant. The mink population has remained stable while river otters have apparently increased.

Wolverines remain at a low but stable density.

Mortalilty

Harvest

Season and Bag Limit	Resident and nonresident hunters	
Trapping		
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

Hunting

Wolverine	Nov. 10–Apr. 30	1 Wolverine

Trapper Harvest. The number of successful trappers, and probably the number of total trappers, was quite low in regulatory year 1992/93 (Tables 1-9). I am unsure of the cause. There was almost no beaver trapping effort in Subunit 1B during the last 3 years. One trapper reported taking 3 beavers in December 1993. The Unit 3 beaver harvest remained dynamic with 80 beavers taken in 1991/92 by 18 trappers. The 1991/92 marten harvest was one of the highest in recent years, with 363 reported in Subunit 1B and 216 in Unit 3. Interest in otter trapping was low in Subunit 1B with no harvest in 1991/92. The Unit 3 harvest and number of successful trappers remained stable with a peak harvest of 82 river otters in 1993/94. The number of successful wolverine trappers and wolverine harvested is about half of what it was in the previous reporting period for Subunit 1B. The Unit 3 wolverine harvest remained low.

Harvest level is no doubt related to fur prices. Mink and beaver pelt values have been low in recent years. Fur buyer Dean Wilson informed me that Southeast martens vary widely in quality and color and bring lower prices than Interior martens. The fur market favored Southeastern river otters, on the other hand, are by because of their larger size, good color, and silky fur. The Oriental market has been particularly interested in river otters in recent years and prices have increased.

Harvest Chronology. Most of the harvest takes place in December and January (Tables 10–16).

Transport Methods. Most trapping areas are accessed by boat. Beaver and marten trapping sites in Unit 3 are generally reached by highway vehicles (Table 18, 20). Another notable exception was the 1991/92 marten season in which trappers used snowmachines in Subunit 1B (Table 19).

CONCLUSIONS AND RECOMMENDATIONS

Furbearers are abundant and populations stable in their given habitat. Trapping effort is moderate, reflecting the current low to moderate fur prices. Harvest is well below sustained yield potential. Large areas of noncoastal habitat on the mainland and islands remain untrapped and provide refuge for furbearers.

I recommend no regulation changes at this time. We should review and comment on all land development plans regarding effects to furbearer populations and the trapping industry. ADF&G can maximize the value of the resource by working with local trappers through the Hunter and Trapper Education Programs.

LITERATURE CITED

Burris, O.E. and D.E. McKnight. 1973. Game Transplants in Alaska. Alaska Dept. of Fish and Game. Tech. Bull. No. 4. 30-38pp.

Roppel, P. 1983 Southeast Alaska: A Pictorial History. Library of Congress Cataloging in Publication Data. 111&137pp.

Gray, F. H. 1915. Smithsonian Institute Archives, Record Unit 7176, Box 7, Folder 3. U.S. Fish and Wildl. Serv. 1860-1961.

Prepared By:

Edward B. Crain
Wildlife Biologist II

Submitted By:

Bruce Dinneford
Regional Management Coordinator

Table 1 Subunit 1B beaver harvest, 1989-93

Regulatory Year	Reported Harvest	Method of Take Trap/Snare	Successful Total Trappers
1989/90	83	83	7
1990/91	2	2	1
1991/92	0	0	0
1992/93	0	0	0
1993/94	3	3	1

Table 2 Unit 3 beaver harvest, 1989-93

Regulatory		Method of Take			Successful
Year	Reported Harvest	Trap/Snare	Shot	Unknown	Total Trappers
1989/90	49	41	1	7	10
1990/91	25	25	0	0	7
1991/92	80	80	0	0	18
1992/93	34	33	1	0	8
1993/94	55	55	0	0	18

Table 3 Subunit 1B marten harvest, 1989-93

Regulatory	Reported Harvest						Successful
Year	M	(%)	F	(%)	Unk.	Total	Total Trappers
1989/90	174	(78)	50	(22)	0	224	14
1990/91	121	(75)	41	(25)	0	162	8
1991/92	266	(73)	97	(27)	0	363	10
1992/93	31	(63)	18	(37)	0	49	2
1993/94	92	(61)	57	(38)	3	152	6

Table 4 Unit 3 marten harvest, 1989-93

Regulatory Year	M	(%)	F	(%)	Unk.	Total	Successful Total Trappers
	Reported Harvest						
1989/90	174	(63)	96	(35)	8	278	22
1990/91	71	(70)	29	(29)	1	101	11
1991/92	129	(60)	87	(40)	0	216	20
1992/93	41	(57)	31	(43)	0	72	8
1993/94	118	(67)	58	(33)	1	177	12

Table 5 Subunit 1B otter harvest, 1989-93

	Reported Harvest						Method of Take					
Regulatory Year	M	(%)	F	(%)	Unk	Total	Trap/ Snare	(%)	Shot	(%)	Unk	Successful Total Trappers
1989/90	14	(70)	6	(30)	0	20	15	(75)	5	(25)	0	7
1990/91	15	(71)	6	(29)	0	21	16	(76)	2	(5)	3	5
1991/92	0	(0)	0	(0)	0	0	0	(0)	0	(0)	0	0
1992/93	15	(88)	2	(12)	0	17	17	(100)	0	(0)	0	3
1993/94	14	(67)	7	(33)	0	21	19	(90)	2	(10)	0	6

Table 6 Unit 3 otter harvest, 1989-93

	Reported Harvest						Method of Take				
Regulatory Year	M	(%)	F	(%)	Unk	Total	Trap/Snare	(%)	Shot	(%)	Successful Total Trappers
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
1991/92	20	(29)	37	(54)	12	69	69	(100)	0	(0)	12
1992/93	7	(54)	6	(46)	0	13	11	(85)	2	(15)	5
1993/94	53	(65)	29	(35)	0	82	82	(100)	0	(0)	17

Table 7 Subunit 1B wolverine harvest, 1989-93

Regulatory Year	Reported Harvest M	(%)	F	(%)	Unk	Total	Method of Take Trap/Snare	(%)	Shot	(%)	Successful Total Trappers
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
1991/92	4	(67)	2	(33)	0	6	6	(100)	0	(0)	3
1992/93	4	(57)	3	(43)	0	7	7	(100)	0	(0)	1
1993/94	6	(86)	1	(14)	0	7	7	(100)	0	(0)	4

Table 8 Unit 3 wolverine harvest, 1989-93

Regulatory Year	Reported Harvest M	(%)	F	(%)	Unk	Total	Method of Take Trap/Snare	(%)	Shot	(%)	Successful Total Trappers
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
1991/92	2	(100)	0	(0)	0	2	2	(100)	0	(0)	2
1992/93	1	(100)	0	(0)	0	1	1	(100)	0	(0)	1
1993/94	0	(0)	0	(0)	0	0	0	(0)	0	(0)	0

Table 9 Subunit 1B beaver harvest chronology by month, 1989-93

Regulatory Year	Harvest Periods November	December	January	February	March	April	May	*n*
1989/90	0	14	1	1	0	46	21	83
1990/91	0	0	0	0	0	2	0	2
1991/92	0	0	0	0	0	0	0	0
1992/93	0	0	0	0	0	0	0	0
1993/94	0	3	0	0	0	0	0	3

Table 10 Unit 3 beaver harvest chronology by month, 1989-93

Regulatory Year	Harvest Periods November	December	January	February	March	April	May	*n*
1989/90	0	30	1	2	11	2	2	48
1990/91	2	15	4	0	0	3	1	25
1991/92	4	16	20	22	13	5	0	80
1992/93	7	19	2	0	0	6	0	34
1993/94	0	31	18	2	2	2	0	55

Table 11 Subunit 1B marten harvest chronology by month, 1989-93

Regulatory Year	Harvest Periods December	January	February	*n*
1989/90	155	56	13	224
1990/91	39	121	2	162
1991/92	117	185	61	363
1992/93	20	29	0	49
1993/94	98	54	0	152

Table 12 Unit 3 marten harvest chronology by month, 1989-93

Regulatory	Harvest Periods				
Year	December	January	February	Unknown	*n*
1989/90	183	76	19	0	278
1990/91	85	16	0	0	101
1991/92	139	56	21	0	216
1992/93	44	27	0	1	72
1993/94	68	73	36	0	177

Table 13 Subunit 1B otter harvest chronology by month, 1989-93

Regulatory	Harvest Periods			
Year	December	January	February	*n*
1989/90	9	7	4	20
1990/91	5	10	6	21
1991/92	0	0	0	0
1992/93	4	5	8	17
1993/94	6	14	1	21

Table 14 Unit 3 otter harvest chronology by month, 1989-93

Regulatory	Harvest Periods			
Year	December	January	February	*n*
1989/90	29	32	9	70
1990/91	21	20	5	46
1991/92	37	16	16	69
1992/93	10	2	1	13
1993/94	28	45	9	82

Table 15 Subunit 1B wolverine harvest chronology by month, 1989-93

Regulatory	Harvest Periods						
Year	November	December	January	February	March	April	*n*
1989/90	0	3	4	5	2	1	15
1990/91	1	1	7	0	0	0	9
1991/92	0	0	3	3	0	0	6
1992/93	0	3	4	0	0	0	7
1993/94	1	3	3	0	0	0	7

Table 16 Unit 3 wolverine harvest chronology by month, 1989-93

Regulatory	Harvest Periods						
Year	November	December	January	February	March	April	*n*
1989/90	0	0	0	0	0	0	0
1990/91	0	1	1	0	0	0	2
1991/92	0	0	2	0	0	0	2
1992/93	0	1	0	0	0	0	1
1993/94	0	0	0	0	0	0	0

Table 17 Subunit 1B beaver method of transportation, 1991-93

Regulatory Year	Boat	3-Wheeler	Highway Vehicle	Skis/ Snowshoes	Total
1991/92	0	0	0	0	0
1992/93	0	0	0	0	0
1993/94	0	3	0	0	3

Table 18 Unit 3 beaver method of transportation, 1991-93

Regulatory Year	Boat	3-Wheeler	Highway Vehicle	Skis/ Snowshoes	Unknown	Total
1991/92	15	0	63	0	2	80
1992/93	5	0	29	0	0	34
1993/94	28	0	25	2	0	55

Table 19 Subunit 1B marten harvest method of transportation, 1991-93

Regulatory Year	Boat	3-Wheeler	Snowmachine	Highway Vehicle	Skis/ Snowshoes	Total
1991/92	202	0	140	0	21	363
1992/93	7	0	42	9	0	49
1993/94	75	68	0	0	30	152

Table 20 Unit 3 marten harvest method of transportation, 1991-93

Regulatory Year	Boat	3-Wheeler	Snowmachine	Highway Vehicle	Skis/ Snowshoes	Unknown	Total
1991/92	104	0	0	57	21	34	216
1992/93	39	0	12	21	0	0	72
1993/94	131	3	0	43	0	0	177

Table 21 Subunit IB otter method of transportation, 1991-94

Regulatory Year	Boat	Snowmachine	3-Wheeler	Total
1991/92	0	0	0	0
1992/93	16	0	1	17
1993/94	20	1	0	21

Table 22 Unit 3 otter method of transportation, 1991-94

Regulatory Year	Boat	Highway	Skis/Snowshoes	Total
1991/92	59	10	0	69
1992/93	12	1	0	13
1993/94	78	1	3	82

Table 23 Subunit I B wolverine method of transportation, 1991-94

Regulatory Year	Boat	Snowmachine	Highway	3-Wheeler	Total
1991/92	5	1	0	0	6
1992/93	0	7	0	0	7
1993/94	5	0	1	1	7

Table 24 Unit 3 wolverine method of transportation, 1991-94

Regulatory Year	Snowmachine	Highway	Total
1991/92	0	2	2
1992/93	1	0	1
1993/94	0	0	0

LOCATION

Game Management Unit: 1C (7600 mi^2)

Geographic Description: That portion of the 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 harvest of furbearers in Subunit 1C. Smaller numbers of wolverine and weasels are taken each year.

Beavers are at moderate levels in most drainages along the coastal mainland where habitat is suitable. There is limited natural or human-caused disturbance affecting beaver habitat in Subunit 1C. Berners Bay, Taku River, Herbert-Eagle River system, St. James Bay, and Shelter Island contribute to the total harvest. Few beavers have been sighted on Douglas Island.

River otters are fairly common along the mainland coast and most large islands in Subunit 1C. While little is known about otter populations, they are thought to be most abundant in sheltered waters provided by the many bays and inlets. Larsen (1983) and Woolington (1984) have studied river otter ecology in Southeast Alaska in recent years.

Marten harvests declined during the reporting period. Whether this was a reflection of low fur prices, declining populations, or a combination of these is not clear. Marten research elsewhere in northern Southeast Alaska during this period indicated a decline in marten numbers coincident with extremely low small mammal populations. The number of trappers sealing furs indicates effort was low.

Little information exists for wolverine and mink. Mink are not sealed, and most harvest information is anecdotal. Wolverines are in small numbers, and the sealing information provides little insight into population status or distribution. Although the wolverine is one of the more uncommon species in the subunit, the high pelt price encourages trappers to target them.

MANAGEMENT OBJECTIVES

1 Regulate seasons and bag limits to maintain viewable and harvestable populations of furbearers

2 Seal harvested beaver, marten, otter, lynx, and wolverine pelts as they are presented for sealing

3 Contact reliable observers for general information about the status and trends of furbearer populations, including the use of an annual trapper survey

METHODS

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

RESULTS AND DISCUSSION

Population Status and Trend

With the exception of the apparent decline in marten numbers, furbearer populations in Subunit 1C appear to be stable, based on trapper interviews and harvest data. Lynx remain uncommon, while otter, mink, and marten are common or moderately abundant. A rise in the lynx harvest during the reporting period is probably due to a temporary influx of animals due to snowshoe hare declines in Canada.

Beaver harvest rebounded from levels seen the preceding 2 years. The slump probably reflected low pelt prices, not population status.

Mortality

Harvest:

Hunting Seasons and Bag Limits.

Marten, otter, mink, beaver	No Open Season	
Lynx	Dec. 1–Feb. 15	Two
Wolverine	Nov. 10–Feb. 15	One

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/Trapper Harvest. The number of beaver harvested showed a rising trend during the period, from 11 in 1991 to 25 in 1993. These harvest levels compare to an average harvest of 41.8 beaver for the 5-year period preceding 1991. It is unknown whether beaver populations are smaller now than formerly, but differences in trapping effort are probably responsible for much of this variation. Nuisance beaver problems are becoming common in residential areas built near wetlands, so there is no indication animals are becoming less common. There is some indication that a failure to present fur for sealing may be affecting our data.

The river otter harvest was stable through the period at about a dozen animals annually. This level is about one third the number caught annually during the preceding 5 years. There were no indications that otter were less abundant, so trapper effort may have been involved here also.

The average harvest for wolverines was 5.3 each year during the period, somewhat under the 5-year average of 7.8 wolverine/year. Wolverines continue to be widely distributed and not uncommon.

No lynx were taken in Subunit 1C during the first year of the period; however, 1 was taken in 1992 and 5 were harvested in 1993. This was coincident with a marked rise in lynx harvest to the north at Haines and probably represents an influx of lynx from Interior habitats where hare populations had declined.

The marten harvest declined throughout the period, from 193 in 1991 to 44 in 1993, compared to an average of 252 marten/year from 1986 through 1990. These low levels probably reflect a regionwide decline in marten populations and a resultant drop in trapper effort. The marten harvest ranged from 54% to 68% males during the period with no indication the population is being overharvested. A regionwide decline in small mammals probably affected marten populations, but the trapping effort during the period seemed to be within the population's capabilities.

Harvest Chronology. In 1991 and 1993 most of the beaver harvest took place midwinter, with December being the month of heaviest harvest (60% in 1991, 40% in 1993). In 1992, however, 84% of the beaver taken were caught in late winter (39% in March, 45% in April).

When lynx were harvested, they tended to be caught in midwinter. Fifty percent of the lynx caught during the period were taken in December, 33% in January, and the remainder in March.

Otter harvest consistently peaked in midwinter also, with all but 3 animals being taken in December and January.

In 1991 almost half the season's wolverines were taken in November, with the rest spread between the late winter months. In 1992 and 1993 the wolverine harvest was later and spread over the period February through April.

The chronology of the marten harvest for the reporting period is shown in Table 2. December continues to be the best time to trap this species. In 1991 59% of the season's marten were taken in December, in 1992 51%, and in 1993 68%. The harvest during that month was dominated by males in the latter 2 years (66% in 1992; 80% in 1993) but was evenly split between sexes in 1991. The large number of females taken in December 1991 may be related to the decline the population was undergoing.

Transport Method. Boat travel continues to be the predominant form of transportation for trappers in Subunit 1C. To a minor extent, highway vehicles are used along the road system around Juneau to reach trapping areas that can be accessed on foot or snowmachine.

CONCLUSIONS AND RECOMMENDATIONS

Harvest of marten declined substantially during the reporting period. The drop in populations and reduction in effort can explain this, but the marten population bears watching. If we do not see improvements in harvest in the next several seasons, more restrictive trapping seasons may be appropriate. Beaver trapping has rebounded somewhat from the levels of the early 1990s, and trapping levels may be higher than reported harvest indicates. The number of lynx in the harvest increased, but this is probably a temporary situation caused by factors in Interior habitats. The number of otter sealed decreased, but there is no indication that populations are declining. The wolverine harvest remained similar to that in previous years.

Other than for marten and lynx, furbearer populations seem stable in the unit. Lynx harvest can be expected to decline as hare populations elsewhere recover. Assuming that the prey base for marten rebounds, the marten within Subunit 1C should become more plentiful again over the next reporting period. An apparent decline in trapper effort and/or harvest reporting may be involved in the trends noted above. Staff will work with trappers and enforcement personnel to improve reporting.

Based on the status of habitat in the subunit and the relatively low number of trappers, I believe the population bases that will support harvest of these species continue to exist and that we are meeting our management objectives.

LITERATURE CITED

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

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.

Prepared By:

Matthew H. Robus
Wildlife Biologist III

Submitted By:

W. Bruce Dinneford
Regional Management Coordinator

Table 1 Furbearer harvest in Subunit 1C, 1986 - 1993

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
1991	11	0	193	12	8
1992	21	1	73	12	2
1993	25	5	44	13	6

Table 2 Chronology of marten harvest by sex in Subunit 1C, 1991-1993.

	1991				1992				1993					
Month	Males	%	Females	%	Males	%	Females	%	Males	%	Females	%	Unknown	%
November	3	100.0	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
December	57	50.0	57	50.0	25	65.8	13	34.2	24	80.0	6	20.0	0	0.0
January	17	53.1	15	46.9	18	51.4	17	48.6	5	55.6	3	33.3	1	11.1
February	3	100.0	0	0.0	0	0.0	0	0.0	1	20.0	4	0.0	0	0.0
Unknown	25	61.0	16	39.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	105	54.4	88	45.6	43	58.1	31	41.9	30	68.2	13	29.5	1	2.3

LOCATION

Game Management Unit: 1D (2700 mi^2)

Geographic Description: That portion of the southeast Alaska mainland lying 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 correspondingly small. Lynx harvests are generally low and probably depend upon population levels in Canada. Mountainous terrain in the subunit provides extensive wolverine habitat, and harvests have been good in recent years. Beavers remain uncommon in the subunit, and the season has been closed since 1976.

MANAGEMENT OBJECTIVES

1 Regulate seasons and bag limits to maintain viewable and harvestable populations of furbearers

2 Seal harvested beaver, marten, otter, lynx, and wolverine pelts as they are presented for sealing

3 Contact reliable observers for general information about the status and trends of furbearer populations, including the use of an annual trapper survey

METHODS

Mandatory sealing of marten, otters, wolverine, and lynx has provided the best source of data on furbearer harvests. For each species we record method and month of take and transportation means. Sex composition of the marten harvest was noted. Pelt size and sex 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 declined dramatically during the reporting period, averaging less than one-fourth of harvests in the previous 5 years. It is unclear whether this trend is solely due to scarcity of marten, as changing effort and compliance with sealing regulations may be factors. However, the decline is coincident with lower harvests in other parts of the region, and research on Chichagof Island indicates that small mammal numbers have reached low levels. In 1991 and 1993 the proportion of males in the harvest was 71% and

81%, respectively, indicating no signs of overharvesting. In 1992 only 2 martens were reported harvested, both females.

Wolverine harvest increased through the period, beginning with the lowest catch in the past 8 years (1) and rising to the highest (10). The reason for the increase is unknown, although it may be that trappers are concentrating on wolverine because of the scarcity of marten. Because of the extensive suitable habitat, the wolverine population is probably stable.

Lynx, usually rare in the subunit, became relatively plentiful as animals moved from Interior habitats following a decline in their prey base. Trappers found them easy to catch and harvested them at levels that are not sustainable. However, since these were probably dispersing animals caught outside their normal range, the high catch should have little or no effect on lynx numbers in core habitats in Canada. As population levels in the Yukon Territory recover, fewer lynx should be found in Subunit 1D.

Otter harvests remained similar to those of the previous 5 years, and we know of no problem with the otter population.

Beavers are present in the subunit in low numbers; the trapping season has been closed for this species for many years. While it would be desirable from the standpoint of improving moose habitat to have more beaver in the subunit, Division of Wildlife Conservation staff received complaints that the few that are present are flooding logging roads.

Mortality

Harvest

Hunting Seasons and Bag Limits.

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

Trapping Seasons and Bag Limits.

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

Trapper Harvest. Table 1 lists trapper harvest for the reporting period. Lynx harvest rose from zero in 1990 to 11 in 1991, 27 in 1992, and 8 in 1993. Six otter were taken in 1991, 2 in 1992, and 3 in 1993. In 1991 1 otter was taken, with the number climbing to 8 and 10 in the following 2 seasons.

In 1991 51 marten were trapped, almost half the number of the previous year. In 1992 the reported harvest was only 2, with 17 reported in 1993. As noted above, the percentage of males in the harvest remained high except in 1992, when only females were caught.

Harvest Chronology. In the 1991 season, lynx harvest was spread evenly between December, January, and February. In 1992 the pattern was similar, although January harvest was lighter than in either December or February. In 1993 all lynx were caught within the same period, but January was the heaviest month of harvest.

Otter harvest extended from December through February in 1991, December through January in 1992, and in January only in 1993.

Wolverine harvest ranged from December through February, except in 1993 when several were taken in April.

The chronology of the marten harvest for the 3 years during the reporting period is represented in Table 2. December continues to be the dominant month for harvesting marten.

Transport Method. The most common method of accessing lynx traps was snowmachine (20 lynx during reporting period), followed by aircraft (8) and boat (6). Otter were most commonly taken with the aid of highway vehicles (3) or dogsleds (3), with snowmobiles the next most common mode (2). Wolverines were taken by trappers traveling on foot (5), by snowmobile (5) or dogsled (5), and with trappers using aircraft (2).

Habitat Assessment

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

CONCLUSIONS AND RECOMMENDATIONS

Marten harvests during the reporting period fell to extremely low levels. This is probably a reflection of low populations and correlated lowered trapper effort. With males continuing to dominate the harvest, there is no indication that any season or bag limit changes are necessary at this time. We should continue monitoring sex ratios in the marten harvest and interviewing trappers. Questionnaires should be used to gather qualitative information about marten abundance. Lynx harvests underwent a temporary surge as the result of immigrating animals, but recovering habitat conditions in the Interior should slow the influx, and harvest probably will return to low levels. Harvests of other species are low, and we are meeting management objectives.

Prepared By:

Matthew H. Robus
Wildlife Biologist III

Submitted By:

W. Bruce Dinneford
Regional Management Coordinator

Table 1 Furbearer harvest in Subunit 1D, 1986 - 1993.

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
1991	11	51	6	1
1992	27	2	2	8
1993	8	17	3	10

Table 2 Chronology of marten harvest by sex in Subunit 1D, 1991-1993.

	1991				1992				1993					
Month	Males	%	Females	%	Males	%	Females	%	Males	%	Females	%	Unknown	%
November	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
December	33	70.2	14	29.8	0	0.0	2	100.0	8	80.0	1	10.0	1	10.0
January	3	75.0	1	25.0	0	0.0	0	0.0	5	83.3	1	16.7	0	0.0
February	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Unknown	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	36	70.6	15	29.4	0	0.0	2	100.0	13	81.3	2	12.5	1	6.3

LOCATION

Game Management Unit: 4 (5,820 mi^2)

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

BACKGROUND

Furbearer trapping in Unit 4 was of greater importance in the past than it is today. Historically, local natives used furbearers for cultural and subsistence purposes. More recently, trapping provides significant income during the winter when other cash-generating opportunities are scarce. Fur prices and the relative strength of the local economy, rather than furbearer abundance, has always been the major factor influencing trapping effort. Today most trapping has a strong recreational aspect although income remains important. Because most trapping requires boat transportation, weather often affects the intensity of effort. Winter storms frequently preclude trapline access and, in extreme years, limit trapper activity. The use of motorized land vehicles is increasing in areas where logging roads remain open to public use.

Furbearers in Unit 4 include marten (*Martes americana*), land otter (*Lutra canadensis),* mink (*Mustela vison*), short-tailed weasel (*M. erminea*), red squirrel (*Tamiasciurus hudsonicus*), and beaver (*Castor canadensis*).

MANAGEMENT DIRECTION

Management Objectives

1 Regulate seasons and bag limits to maintain viewable and harvestable populations of furbearers

2 Seal harvested beaver, marten, otter, lynx, and wolverine pelts as they are presented for sealing

3 Contact reliable observers for general information about the status and trends of furbearer populations, including the use of an annual trapper survey

METHODS

Trappers were required to submit otter and marten hides to authorized personnel for sealing to comply with Federal regulations (as required by the Convention on International Trade in Endangered Species of Wild Fauna and Flora). At sealing each pelt was examined and sex determined. Otters were sexed by the presence or absence of the preputial orifice found in males. Marten pelts were sorted to sex by the larger size of males (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 (Lensink 1953). Width and length measurements were recorded for otters and beavers. Trappers provided data on the method of take (trap, snare, or firearm), primary transport mean, month of catch, and location of take.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size. In 1991 a joint U.S. Forest Service (USFS)/Alaska Department of Fish and Game (ADF&G) marten life history study began on northeast Chichagof Island (Flynn 1993). Densities of marten in the study areas declined during the winter of 1991/92 and remained low into 1993. At the same time populations of small mammals that marten prey upon documented a similar trend.

Mink are throughout Unit 4. Populations are thought to be stable, although no census techniques were employed.

Land otters live throughout the islands of Unit 4. No census data is available, but populations are thought to be stable.

Admiralty Island beaver populations are also probably stable. Beavers are in low numbers on Baranof Island. The season is currently closed on both Chichagof and Baranof islands.

Population Composition. In 1991-92 trappers caught 43% female martens, in 1992-93 34% females, and in 1993-94 40% females (Table 1). In the ADF&G research program 41% females were caught in 1991/92 (Flynn and Blundell 1992). In 1992/93 the ratio was 40% female (Flynn 1993). Because of sex-based differences in the vulnerability of marten to trapping, these ratios do not accurately reflect the sex ratio in the wild (Buskirk and Lindstedt 1989).

According to Flynn and Schumacher (1994), juvenile marten significantly increased in the population in 1993/94 from the low numbers recorded the previous years. This increase coincided with a two-fold increase of mice and voles on their study areas. They concluded that marten numbers were recovering on northern Chichagof Island, but that recruitment to the south appeared to be lagging a year behind the rest of the island.

River otters sex ratios taken by trappers were 47% females in 1991/92, 36% females in 1992/93, and 43% females in 1992/94 (Table 2).

Mortality

Harvest

Seasons and Bag Limits	Residents and nonresidents	
Hunting		
Coyote	Sept. 1–Apr. 30	Two
Wolverine	Nov. 10–Feb. 15	One

Trapping

1991/92 Regulatory Year

Beaver, east of Chatham Strait	Dec. 1–May 15	No limit
Beaver, west of Chatham Strait	No open season	No limit
Coyote, Red Fox, Lynx, Marten, Mink, Otter	Dec. 1–Feb. 15	No limit

1992/93 and 1993/94 Regulatory Years

Beaver, east of Chatham Strait	Dec.1–May 15	No limit
Beaver, west of Chatham Strait	No open season	No limit
Coyote, Red Fox, Lynx, Otter	Dec. 1–Feb. 15	No limit
Marten, and mink, that portion of Chichagof Island east of Idaho Inlet and north of the Trail River and Tenakee Inlet and north of a line from the headwaters of Trail River to the head of Tenakee Inlet	Dec. 1–Dec. 31	No limit
Marten and mink, remainder of Unit 4	Dec. 1–Feb. 15	No limit

Board of Game Action and Emergency Orders. None.

Trapper Harvest. Of 2104 marten pelts sealed in 1991/92, 1138 were males, 868 were females, and 98 were of unknown sex. In 1992/93, 494 were examined; 324 were males, and 170 were females. In 1993/94 there were 240 males, 157 females, and 1 of undetermined sex, for a total of 398. Table 1 summarizes the sexes of marten in the harvest for the 1989-1993 regulatory years.

In 1991/92 131 otters were sealed; 69 were males, 61 females, and 1 was of unknown sex. In 1992/93 there were 95 males and 54 females, for a total of 95. The 1993/94 harvest was only 63 otters; 36 males and 27 females. Harvest sex ratios since 1989 are presented in Table 2.

Trappers took 11 beavers in 1991/92 and zero in the other years in the report period. Beaver trapping remains prohibited in the area west of Chatham Strait.

Trapper Residency and Success. During the 1991/92 season, 52 trappers reported catching marten, 43 of which were residents of the unit. In 1992/93 there were 32 marten trappers reporting, 27 who listed residency in Unit 4. For 1993/94 there were 21 trappers (15 unit residents).

Of the 15 trappers sealing Unit 4 otters, 8 claimed unit residency in 1991/92. In 1992/93 19 otter trappers reported catching otters, 14 claiming Unit 4 residency. For 1993/94 there were 15 trappers, including 11 unit residents.

Of the 3 trappers sealing beaver in 1991/92, only 1 was a unit resident.

Harvest Chronology. The greatest marten harvest occurs in the first month of the trapping season. A total of 1338 (64%) of the 1990/91 marten were taken in December. In 1992/93, 441 (89%) marten were caught in December. In 1993/94 the December harvest was 293 (74%) (Table 3).

In 1991/92 77 (59%) of the otters were taken in December. For the 1992/93 and 1993/94 seasons, 93 (62%) and 45 (71%), respectively, were taken in December (Table 4).

Of the 11 beaver taken in 1991/92, 3 were taken in January, 7 in February, and 1 in March.

Transport Methods. Trappers using boats for transportation take most martens. In 1991/92 63% of the trappers reported using boats, in 1992/93 52%, and in 1993/94 77%. Other transportation means that may be important in any given year include snowmachines, 3-wheelers, highway vehicles, and walking. Weather conditions influence the degree to which these other transportation types were used yearly.

The take of otters is almost entirely with the aide of boats. For the 1991/92, 1992/93, and 1993/94 seasons, respectively, boats were reportedly used for 96%, 94%, and 88% of the harvest.

All beavers taken in 1991/92 were transported by boat.

Habitat Assessment

The carrying capability for some furbearers is decreasing in many areas in Unit 4 because of clear cutting of the old-growth habitats. Marten have been documented to spend most their time in old-growth forest (Flynn 1991). Clear cutting may also be impacting otters; Larsen (1983) reported otters made little use of shorelines associated with clear cuts.

CONCLUSIONS AND RECOMMENDATIONS

Seasons for most species have remained the same for many years. Federal subsistence regulations supersede State regulations on federal lands under the terms of the Alaska National Interest Lands Claim Act (ANILCA). On Chichagof Island Federal lands were closed to mink, marten, and weasel trapping, but nonfederal lands remained open under State regulations. The discrepancy between State and Federal regulations confused the public and created management problems.

The decline of marten populations during this report period may have been affected by trapping, but probably correlates directly to the densities of small mammals. In part, the high 1991/92 harvest probably occurred because nutritionally stressed martens were more vulnerable to trappers. As pointed out by Strickland and Douglas (1987), it is impractical to set harvest levels by determining an absolute population level. Young and Schenck (1991) recommended that martens in the unit be managed by reducing or closing seasons during periods of low densities to conserve breeding individuals. Since the magnitude of the peaks and lows in marten cycles are readily evident, managers can generally respond to these changes without specific programs to monitor populations. Once a "crash" occurs, conservative trapping regulations can be put into effect. The need for trapping restrictions can be supported by monitoring the sex ratio and the presence of juveniles in the harvest (Strickland and Douglas 1987, Young and Schenck 1991). Because the population is now increasing, existing trapping regulations are appropriate. With further population increase more liberal season dates may be appropriate. As martens are often captured in mink sets, the seasons for the 2 species should coincide to reduce the incidental take of martens at the low end of their cycle.

Otter populations appear to be healthy and trapping pressure is light. I do not recommend any change in trapping regulations at this time.

The beaver harvest remained low during the report period. This is probably because of a small demand for beaver and the dearth of habitat in the unit. Timber harvest in valley bottoms on Chichagof Island appears to be producing suitable habitat, but the absence of beaver in such areas may keep it from being utilized. Continued closure of beaver trapping west of Chatham Strait is recommended to encourage natural movement of beaver into areas of regrowth.

Given the cyclic nature of marten populations and economic factors that affect trapping effort for both species, management objectives based on past harvest levels are not realistic. Further, reasonable means of monitoring either species population densities over such a large area are not available to establish appropriate yearly harvest objectives. Therefore, the evaluation of population status will continue to be subjective. However, examining harvest statistics and anecdotal information from trappers and local residents can enhance our understanding of populations. With reduced fur prices and decreasing interest in trapping, the possibility for over-trapping most species seems low. Specific harvest or population objectives cannot be used as management standards without programs in place that document population status.

LITERATURE CITED

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

Flynn, R, W. and G. Blundell 1992. Ecology of martens in Southeast Alaska. Alaska Dep. Fish and Game, Fed. Aid in Wildl. Rest., Research Prog. Rep. Proj. W-23-5, Study 7.16, 32pp.

——. 1993. Ecology of martens in Southeast Alaska. Alaska Dep. Fish and Game, Fed. Aid in Wildl. Rest., Research Prog. Rep. Proj. W-24-1, Study 7.16, 49pp.

——. and T. V. Schumacher 1994. Age structure and fecundity of marten on Chichagof Island and northern Baranof Island, Southeast Alaska, during 1993-94. Alaska Dep. Fish and Game. Unpub. Rep. to USDA Forest Service. 14pp.

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

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

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.

Prepared By:	**Submitted By:**
James B. Faro	Bruce Dinneford
Wildlife Biologist III	Regional Management Coordinator

Table 1 Unit 4 marten harvest, 1989-94

Regulatory year	Reported harvest					Total Trappers
	M	F	(%)	Unk.	*n*	
1989/90	427	217	(34)	9	653	40
1990/91	469	235	(35)	4	708	35
1991/92	1,138	868	(43)	98	2,104	52
1992/93	324	170	(34)	0	494	32
1993/94	240	157	(40)	1	398	21

Table 2 Unit 4 otter harvest, 1989-94

Regulatory year	Reported harvest				Method of take				Total Trappers
	M	F	(%)	Unk.	Total	Trap/snare	(%)	Shot	
1989/90	80	68	(46)	1	149	119	(78)	29	23
1990/91	23	35	(60)	7	65	36	(51)	27	19
1991/92	69	61	(47)	1	131	71	(54)	60	15
1992/93	95	54	(36)	0	149	124	(83)	25	19
1993/94	36	27	(43)	0	639	40	(69)	18	15

Table 3 Unit 4 marten harvest chronology percent by time period, 1989-93

Regulatory year	Harvest periods				
	December	January	February	Unknown	*n*
1989/90	64	27	9	0	653
1990/91	50	28	8	14	708
1991/92	1,338	603	113	50	2,104
1992/93	441	34	9	10	494
1993/94	293	96	9	0	398

Table 4 Unit 4 otter harvest chronology percent by time period, 1989-93

Regulatory year	Total Harvest					
	November	December	January	February	Unknown	*n*
1989/90	0	42	49	9	0	149
1990/91	0	28	66	6	0	65
1991/92	0	77	33	21	0	131
1992/93	0	93	46	10	0	149
1993/94	0	45	16	2	0	63

LOCATION

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

Geographic 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 in fair abundance. Wolverines are in low numbers over extensive areas of range. Trapping pressure has historically been light throughout the Malaspina and Yakutat Forelands.

MANAGEMENT OBJECTIVES

1. Regulate seasons and bag limits to maintain viewable and harvestable populations of furbearers

2. Seal harvested beaver, marten, otter, lynx, and wolverine pelts as they are presented for sealing
3. Contact reliable observers for general information about the status and trends of furbearer populations, including the use of an annual trapper survey

METHODS

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

RESULTS AND DISCUSSION

Population Status and Trend

Trapping pressure is generally light within this subunit and trends in harvest reflect several factors in addition to furbearer population levels. One or two individuals changing their trapping intensity can have substantial impact on harvests. Indications are that with the exception of lynx, furbearer populations are stable in Unit 5. The lynx harvest jumped from no animals in the first 2 years of the period to 14 in 1993, probably because of immigration of lynx following a decline of hares in interior habitats in Canada. Little is known of marten abundance, although logging in recent years has provided trappers easy access to old-growth forest habitats. Otters are more common in Unit 5 than the harvest would indicate. The low trapping effort in the unit accounts for the scarcity of these animals in harvest records. As with other furbearers, we have no population estimate for wolverine. It is believed they are at low densities in areas remote from habitation or roads.

Mortality

Harvest

Hunting Seasons and Bag Limits

Beaver, marten, otter, mink,	No Open Season	
Coyote	Sep. 1–Apr. 30	Two
Red Fox	Nov. 1–Feb. 15	Two
Lynx	Dec. 1–Feb. 15	Two
Wolverine	Nov. 10–Feb. 15	One

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 harvest of furbearers since 1986. The beaver harvest fluctuated during the period, but averaged slightly higher than during the previous 5 years. The lynx harvest rose dramatically during the final year of the period, probably because cats moving in from Canada after a decline in hares were vulnerable to trappers. The number of marten harvested increased during the reporting period, yet decreased slightly from the previous 5-year average. The harvest level for otter rebounded during the period to the highest level since 1986, and wolverine harvest remains low, similar to that seen previous years.

Harvest Chronology. Most furbearers were caught in early to midwinter, possibly because travel conditions became worse in late winter as rains affected the snowpack. Based on the number of animals caught with the use of highway vehicles for transportation, the closure of the Yakutat road system may also affect the harvest timing. Except for 7 beaver taken in May 1993 as part of an effort to control flooding around the Yakutat airport, harvest was heavily weighted toward

November. Otter, lynx, and wolverine harvests centered around December, although several animals were caught in November and January.

Table 2 shows the chronology of the marten harvest. In 1991 and 1992 November and December accounted for the bulk of the harvest. In 1993 the sealing forms for most of the marten caught lacked information on the date of kill, but there is no reason to suspect that the harvest pattern was different.

Transport Methods. Highway vehicles were the most commonly used transport mode during this period, with airplanes a close second. Four-wheelers and boats were used to take smaller numbers of furbearers.

CONCLUSIONS AND RECOMMENDATIONS

Harvests were within sustainable limits during the reporting period, with the possible exception of lynx, which were very vulnerable to trapping in 1993. Therefore, except for the lynx population, furbearer harvest met management objectives. 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 for 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.

Prepared By:

Matthew H. Robus
Wildlife Biologist III

Submitted By:

W. Bruce Dinneford
Regional Management Coordinator

Table 1 Furbearer harvest in Subunit 5, 1986 - 1993

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
1991	8	0	47	1	0
1992	1	0	20	6	2
1993	9	14	76	7	0

Table 2 Chronology of marten harvest by sex in Unit 5, 1991-1993

	1991				1992				1993			
Month	Males	%	Females	%	Males	%	Females	%	Males	%	Females	%
November	24	77.4	7	22.6	1	100.0	0	0.0	7	46.7	8	53.3
December	0	0.0	3	100.	10	62.5	6	37.5	5	71.4	2	28.6
January	0	0.0	0	0.0	0	0.0	0	0.0	2	66.7	1	33.3
February	0	0.0	0	0.0	2	66.7	1	33.3	0	0.0	0	0.0
Unknown	6	46.2	7	53.8	0	0.0	0	0.0	21	41.2	30	58.8
Total	30	63.8	17	36.2	13	65.0	7	35.0	35	46.1	41	53.9

LOCATION

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

Geographic Description: Prince William Sound and north Gulf Coast

BACKGROUND

Beavers, coyotes, red foxes, lynx, marten, mink, muskrats, land otters and wolverines are all present in Unit 6. Density of individual species is variable, depending upon a variety of ecological factors and levels of harvest. Historical information on population status and trend is mostly anecdotal. We monitored harvests of beavers, lynx, land otters, and wolverines by sealing.

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 apparently did not find them on islands in PWS. J. Reynolds (ADF&G files 1976) documented occurrence on Hawkins and Hinchinbrook Islands, Simpson Bay, Rude River and Gravina River.

We have sealed beaver hides to monitor harvest since 1927 (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 harvest declined to a low of 27 and increased again to more than 300 in 1960 and 1963 (Griese 1990).

Coyotes are relatively 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. However, recent observations by trappers and ADF&G personnel indicate coyotes have declined in eastern Unit 6, while wolves have increased.

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 1988*b*).

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 indicate that Unit 6 may serve as a low density refugia for lynx when populations decline in adjacent units (Griese 1988*b*). Harvest between 1969 and 1990 was generally less than 3 animals; harvest did not include juveniles. Harvest peaks coincided with population crashes in adjacent populations.

Density of marten 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 1988*b*).

Mink are common in most of Unit 6. Observations made between 1931 and 1955 (ADF&G files) indicated 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. commun.). 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 due to 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 likely common in most of Unit 6. Heller (1910) reported that land otters were the most common carnivore in PWS 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* oil spill 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 peaked between 1972 and 1978 because of either increased trapper access and effort or greater numbers of wolverines (Griese 1988*b*).

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. We also sent questionnaires to trappers to collect information on relative abundance and trends in furbearer populations.

RESULTS AND DISCUSSION

Population Status and Trend

I did not complete any furbearer surveys during this reporting period. However, I estimated relative abundance and trend, using results of trapper questionnaires and incidental observations made by staff and the public. In 1991-92, questionnaires were sent to 34 trappers, and 21 responded. In 1992-93, 35 questionnaires were sent, and we received 19 responses. During 1993-94, 43 questionnaires were sent, with 21 responses received. All trappers who agreed to cooperate received a questionnaire. Numbers sent were relatively low because very few trappers were in Unit 6.

Beavers were abundant during this reporting period 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 probably high and stable. Cache surveys in 1988 and 1990 indicated 2400 and 3100 animals, respectively (Nowlin 1993).

Coyotes were abundant and most populations were probably 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 exception was near human population centers where trapping pressure may have reduced numbers.

Mink and land otters were both common, and numbers were probably stable in most of Unit 6. The exception was western PWS where oil-related mortality reduced numbers after the 1989 Exxon Valdez spill, and the population has not recovered.

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

Mortality

Harvest

Seasons and Bag Limits. The beaver trapping season during 1991-92 was 1 February to 31 March, and the bag limit was 20 beavers per season. During 1992-93 and 1993-94 the season was 1 December to 31 March, with a bag limit of 20.

The 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 1 September to 30 April, and the bag limit was 2 coyotes.

The red fox trapping season was from 10 November to 28 February with no bag limit.

There was no hunting season for red fox. The wolverine trapping season was from 10 November to 28 February, and there was no bag limit. The wolverine hunting season was from 1 September to 31 March, and the bag limit was 1 wolverine.

The lynx trapping season was 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 Board of Game lengthened the beaver season beginning in 1992-93 by opening it on 1 December rather than 1 February. The Board made this change because trapping pressure was low and numbers were high. We proposed the action, with support from the public.

Beginning in 1991-92, the Board changed the coyote hunting season in Subunits 6B and 6C from no closed season and no bag limit to a season of 1 September to 30 April, with a bag limit of 2. The original season was implemented because of concern about coyote predation on dusky Canada goose nests. The season failed to increase harvest, reduce the coyote population, and relieve nest predation. We, therefore, proposed a more conservative season that was consistent with other portions of Unit 6.

The hunting season for red fox was closed beginning in 1991-92. We proposed this change because red fox are scarce in Unit 6, and a hunting season is not justified.

Trapper Harvest. Beaver harvest reported on sealing forms was within an expected range of 20–70 (Table 1). Traps or snares were the only method of take, and the proportion of juveniles in the harvest varied widely. As in past years, 90%–100% of the harvest came from Subunit 6C.

The only reported lynx harvest during the past 5 years was 4 animals taken during January and February of 1992-93 from the Lowe River drainage near Valdez. They may have dispersed southward from Unit 13 into the area.

Land otter harvest was 43-89 during this reporting period (Table 2). Females were 32%–43% of the harvest, and most otters (88%–90%) were taken with traps or snares. The take of 89 otters in 1991-92 was the highest in the past 5 years.

The reported harvest of land otters for 1991-92 and 1992-93 included 43 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 6D. Specific locations and numbers taken included northeastern Hawkins Island-21, Nelson Bay-4, Simson Bay-6, Sheep Bay-9, and Port Gravina-3.

Wolverine harvest was 10–16 animals (Table 3). Males dominated the take and most were trapped or snared. This was the pattern for the past 5 years.

Harvest Chronology. Beaver harvest occurred primarily in February during 1991-92 (58%) (Table 4). During the following 2 years, much of the harvest shifted to December and January as trappers took advantage of the change in the season opening from 1 February to 1 December.

Most land otters were taken during November in 1991-92 (47%) (Table 5). During 1992-93 and 1993-94, December was the most important harvest month (38% and 31%, respectively). Harvest reported before the season opening date of 10 November were otters live-trapped for transport to Utah. Most wolverine harvest occurred from November through February during this reporting period and historically (Table 6).

Transport Methods. Beaver trappers consistently used highway vehicles for transportation (Table 7). Heavy reliance on highway vehicles occurred because the Copper River Highway provided easy access to high beaver populations in Subunit 6C. Land otter trappers used primarily boats for transportation during this reporting period and in 1990-91 (Table 8). However, in 1989-90 highway vehicles were most important (35%) and boats were second (27%). Wolverine trappers and hunters used mostly snow machines for transport during this reporting period and the previous 2 years (Table 9).

Other Mortality

Significant mortality of mink and land otters resulted from the 1989 *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 were affected by persistent oil contamination in the environment. However, we did not estimate population changes.

Injury assessment studies indicated a variety of impacts on land otters from 1989 through 1991. Analysis of blood revealed elevated haptoglobin and interleukin-6 immunoreactive protein, indicating persistent toxic effects of oil, and male otters from oiled areas had significantly lower body mass than males from unoiled areas (Duffy et al. 1993). Otters also abandoned latrine sites more often in oiled than in unoiled areas (Duffey et al. 1994*a*). However, by spring 1992 differences in blood parameters and body mass between oiled and unoiled areas were not apparent, indicating recovery may have begun (Duffy et al. 1994*b*).

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 we collect reliable harvest information.

Harvests of most furbearers were probably within sustainable limits, and no changes in seasons or bag limits are recommended. However, we should closely monitor river otter harvest in the oil-impacted area of western PWS. A trapping season closure should be considered if harvest increases significantly.

LITERATURE CITED

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

Duffy, L.K., R.T. Bowyer, J.W. Testa, and J.B. Faro. 1993. Differences in blood haptoglobin and length-mass relationships in river otters (Lutra canadensis) from oiled and nonoiled areas of Prince William Sound, Alaska. J. Wildl. Dis. 29:353-359.

———, ———, ———, ———. 1994a. Chronic effects of the Exxon Valdez oil spill on blood and enzyme chemistry of river otters. Environ. Tox. and Chem. 13:643-647.

———, ———, ———, ———. 1994b. Evidence for recovery of body mass and haptoglobin values of river otters following the Exxon Valdez oil spill. J. Wildl. Dis. 30:421-425.

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.

———. 1988*a*. 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. 109 pp.

———. 1988*b*. 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. 133 pp.

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.

Nowlin, R.A. 1993. Unit 6 furbearer survey-inventory management report. Pages 47-58 *in* S.M. Abbott, ed. Furbearer survey-inventory management report. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Rep. Proj. W-23-3, W-23-4, Study 7.0. Juneau. 303pp.

Rausch, R. 1977. Alaska wildlife management plans, southcentral Alaska. Alaska Dep. Fish and Game. Juneau. 291 pp.

Table 1 Unit 6 beaver harvest, 1989-1994

Regulatory	Reported harvest				Method of take				Successful
year	Juv.[a] (%)	Adults	Unk.	Total	Trap/snare(%)	Shot	(L&S)	Unk.	trappers
1989/90	3 (33)	6	11	20	20 (100)	0	0	0	6
1990/91	38 (58)	28	0	66	53 (100)	0	0	9	7
1991/92	31 (51)	30	0	61	61 (100)	0	0	0	7
1992/93	4 (21)	15	3	22	22 (100)	0	0	0	8
1993/94	13 (30)	30	1	44	44 (100)	0	0	0	7

[a] Beavers ≤ 52"

Table 2 Unit 6 land otter harvest, 1989-1994

Regulatory	Reported harvest				Method of take				Successful
year	M	F (%)	Unk.	Total	Trap/snare (%)	Shot	(L&S)	Unk.	trappers
1989/90	22	11 (33)	4	37	32 (86)	5	0	0	9
1990/91	28	24 (46)	7	59	41 (98)	1	0	17	9
1991/92	50	35 (41)	4	89	79 (90)	9	0	1	15
1992/93	29	22 (43)	23	74	67 (92)	6	0	1	20
1993/94	21	10 (32)	12	43	38 (88)	5	0	0	11

Table 3 Unit 6 wolverine harvest, 1989-1994

Regulatory	Reported harvest				Method of take				Successful
year	M	F (%)	Unk.	Total	Trap/snare (%)	Shot	(L&S)	Unk.	trappers
1989/90	6	2 (25)	0	8	7 (88)	1	0	0	6
1990/91	6	4 (40)	0	10	9 (90)	1	0	0	5
1991/92	9	1 (10)	0	10	8 (80)	2	0	0	6
1992/93	14	5 (26)	0	19	19 (100)	0	0	0	10
1993/94	10	5 (33)	1	16	14 (88)	2	0	0	7

Table 4 Unit 6 beaver harvest chronology percent by month, 1989-94

Regulatory	Harvest periods				
year	December	January	February	March	*n*
1989/90	0	10	35	55	20
1990/91	0	0	76	24	58
1991/92	0	0	58	42	55
1992/93	10	33	33	24	21
1993/94	42	21	5	33	43

Table 5 Unit 6 land otter harvest chronology percent by month, 1989-94

Regulatory year	Harvest periods							
	September	October	November	December	January	February	March	*n*
1989/90	19	30	3	8	19	19	3	37
1990/91	4	19	21	27	13	13	4	48
1991/92	1	23	47	7	4	8	10	83
1992/93	0	18	18	38	11	11	5	74
1993/94	0	0	12	31	14	14	29	42

Table 6 Unit 6 wolverine harvest chronology percent by month, 1989-94

Regulatory year	Harvest periods							
	September	October	November	December	January	February	March	*n*
1989/90	0	13	0	13	63	13	0	8
1990/91	0	0	0	30	10	50	10	10
1991/92	10	0	20	0	50	20	0	10
1992/93	0	0	41	19	22	19	0	27
1993/94	0	6	13	6	31	38	6	16

Table 7 Unit 6 beaver harvest percent by transport method, 1989-94

Regulatory year	Percent of harvest						
	Dogsled Skis Snowshoes	Boat	3-or 4-wheeler	Snowmachine	Highway vehicle	Unknown	*n*
1989/90	10	0	0	0	90	0	20
1990/91	0	0	0	2	65	33	66
1991/92	0	11	0	0	89	0	61
1992/93	0	5	5	0	91	0	22
1993/94	0	0	0	0	100	0	44

Table 8 Unit 6 land otter harvest percent by transport method, 1989-94

Regulatory year	Percent of harvest							
	Airplane	Dogsled Skis Snowshoes	Boat	Snowmachine	ORV	Highway vehicle	Unknown	*n*
1989/90	0	5	27	16	0	35	16	37
1990/91	0	7	44	0	0	24	25	59
1991/92	1	6	73	1	0	19	0	89
1992/93	0	7	68	8	0	16	1	74
1993/94	0	7	47	16	19	9	2	43

Table 9 Unit 6 wolverine harvest percent by transport method, 1989-93

Regulatory year	Percent of harvest: Airplane	Dogsled Skis Snowshoes	Boat	Snowmachine	Highway vehicle	*n*
1989/90	13	0	13	75	0	8
1990/91	10	10	0	60	20	10
1991/92	10	0	0	80	10	10
1992/93	11	5	5	53	26	19
1993/94	13	0	6	50	31	16

LOCATION

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

Geographic Description: Kenai Mountains

BACKGROUND

Historically, trapping was an important part of the Kenai Peninsula's culture and economy. Over the past 2 decades, trapping has evolved into primarily a recreational activity with few dedicated trappers remaining due to increased restrictions and reductions in pelt prices. Beaver, land otter, wolverine, lynx, coyote, mink and weasel are found throughout the Kenai Peninsula at varying density levels, dependent upon habitat quality or prey abundance. The distribution and density of red fox and marten are limited. Red fox were abundant before 1930, according to long-time Kenai residents, but quickly disappeared as coyotes established and rapidly increased during the 1930s. Subunit 15C currently supports a small remnant population of red fox with an occasional observation reported from other areas of the Kenai Peninsula. Coyotes are widely distributed and abundant.

Marten are moderately abundant in Unit 7 but are rare in Unit 15 with the exception of the portion of 15B-East, north of Kenai River. One marten was trapped in Subunit 15C during this reporting period as the first marten from this area. Since marten have never been common in Unit 15, it is suspected that habitat, rather than human-induced mortality, controls their distribution on the Kenai.

Beavers were common in suitable habitat on the Kenai Peninsula; however, population density and trends have not been measured and are poorly understood in most areas. Incidental observations and the trend in nuisance beaver complaints indicate that beaver populations peaked about 1984 and have remained relatively stable since that time.

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

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

Lynx are cyclically abundant in the forest habitats of the Kenai Peninsula. Early seral, mixed deciduous-spruce forests in Subunits 15A and 15B have a higher carrying capacity for snowshoe hares; consequently, lynx numbers are usually higher in these areas than in the subclimax spruce forests of Subunit 15C and Unit 7. Lynx density began to increase in about 1994-95 as the snowshoe density increased. Trapping season reopened in Unit 7 and Subunits 15 B and C in 1996-97, with a Jan. 1–31 season. These units were last opened in 1987-88. Subunit 15A was not reopened and has remained closed since 1984-85.

Mink and weasel are common throughout Units 7 and 15. Although their pelt value is generally low, they are an important furbearer for young and recreational trappers. Muskrats remained scarce throughout the units during this reporting period. Research has not been conducted to determine the controlling factors that regulate muskrat numbers; however, it is believed that mid-winter flooding of lakes and rivers due to overflow is the reason survival is low.

MANAGEMENT DIRECTION

Management Goals

Kenai Peninsula

- Maintain furbearer trapping seasons and bag limits consistent with population levels during periods of pelt primeness
- Maintain furbearer hunting seasons and bag limits consistent with population levels, but not necessarily limited to periods of pelt primeness
- Collect sufficient data to develop measurable population objectives

Management Objectives

Beaver: To maintain beaver populations capable of sustaining an average annual harvest of 150 through 2000.

Land Otter: To maintain otter populations capable of sustaining an annual harvest of 35 through 2000.

Wolverine: To maintain wolverine populations capable of sustaining an annual harvest of 20 through 2000.

Lynx: To maintain 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.

Marten: To maintain a population of marten capable of sustaining an annual harvest of 35 through 2000.

METHODS

Monitor harvest through mandatory sealing programs for lynx, land otter, wolverine, beaver 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 required to be sealed.

RESULTS AND DISCUSSION

Population Status and Trend

No formal research has been conducted to document the status and trend of furbearers in Units 7 and 15, except the U.S. Fish and Wildlife Service's monitoring of lynx. Preliminary results from their study indicated the population has recovered from a cyclic low period from 1987 to 1992. Distribution and abundance of other furbearers appears stable.

Population Size. No available data

Population Composition. No available data

Mortality:

Harvest

Season and Bag Limit:

Beaver. Season was open from February 1 to March 31 in Units 7 and 15 until 1992-93 when it was extended to December 1 to March 31. The bag limit was 20 beavers per person.

Coyote and Red Fox. Seasons were open from November 10 to February 28 in Units 7 and 15. The bag limit for fox was 1 and no limit was set for coyote.

Wolverine. Season was open from November 10 to February 28 in Unit 7, Subunit 15B, and 15C. The number allowed was not limited. Subunit 15A was closed to trapping wolverine, beginning in 1987.

Lynx. Season was closed beginning in 1987 for trapping and 1988 for hunting. Trapping season was reopened from January 1 to 31 in 1996, in Unit 7 and Subunits 15B and 15C. Subunit 15A and the hunting season for Units 7 and 15 remained closed.

Mink and Weasel. Seasons were open from November 10 to January 31 in Units 7 and 15. The number allowed was not limited.

Marten. Season in that portion of 15B east of Kenai River, Skilak Lake, and north of Skilak River was closed. The remainder of Unit 15 and Unit 7 were open from November 10 to January 31, with no bag limit.

Muskrat. Season was open from November 10 to May 15 for Units 7 and 15, with no bag limit.

Land Otter. Season was open from November 10 to January 31 in Subunits 15A and 15B and from November 10 to February 28 in Subunits 15C and Unit 7, with no bag limit.

Board of Game Actions and Emergency Orders. A thorough review of the trapping program on Kenai Peninsula was completed during the March 13 to 23, 1997 Board of Game meeting. The following actions were taken: Beaver trapping season was extended from December 1 to March 31 to November 10 to March 31. Bag limit of 20 beaver per person remained in place. Land otter seasons were extended in Subunits 15A and 15B to be consistent with the remainder of the peninsula. Season for trapping otters is now November 10 to February 28. Wolverine trapping season was reopened in Subunit 15A with the same season, November 10 to February 28, as the remainder of the peninsula. Coyote and wolf trapping seasons were extended from November 10 to February 28 to November 10 to March 31 for the peninsula. The mandatory 5-day sealing for wolves taken in Subunit 15A was repealed. Lynx season was extended from January 1 to 31 to January 1 to February 15, including Subunit 15A. A season allowing hunting for lynx from November 10 to February 15 was also approved with a bag limit of 2 per season.

Hunter/Trapper Harvest. Since 1992-93, the annual beaver harvest has exceeded 150 in 3 of 5 years and averaged 153 with a range of 87–209, according to sealing certificates (Table 1). Harvest declined from 173 in 1993-94 to 87 in 1994-95 but increased the next 2 years. The decline in 1994-95 was due to the severe winter, with deep snow restricting trapper activity. This decline does not reflect beaver density. Doubling the season length beginning in 1993-94 did result in a slightly higher average harvest. Historically, Subunit 15A produced the highest harvest; however, with increased restrictions on trapping within the Kenai National Wildlife Refuge portions of 15A, trapping effort has shifted to Unit 7. Unit 15A had the next highest harvest, followed by Units 15C and Unit 15B. Recreational trappers are responsible for most of the beaver harvest; few trappers take more than 10 beavers annually.

Marten were added to the list of species requiring mandatory sealing during the 1988-89 trapping season. Table 2 shows the past five years of trapping data. All marten, except one trapped in Subunit 15C, reported from Kenai Peninsula were trapped in Unit 7 with an annual average harvest of 67 and range of 31 to 110. The harvest was comprised of an average of 67 percent males. The suspected reason for low harvest reported from Unit 15 is unsuitable climate. Marten apparently are 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. However, increased sightings of marten tracks in Subunits 15B and C indicate marten range may be increasing.

Otter harvests have shown little variation in recent years with the exception of 1993-94 (Table 3). The mean annual, 5-year harvest was 55 otters with a range of 18–72. Males have consistently outnumbered females; the mean 5-year percentage of males in the harvest was 56 percent.

In the past 5 years, the reported wolverine harvest has been increasing (Table 4). The mean annual 5-year harvest was 23 wolverines, ranging from 16–34. Males have predominated in the harvests; the mean 5-year percentage of males was 65 percent.

Lynx population on Kenai Peninsula increased noticeably during the mid-1990s in response to hare abundance. The previous high in lynx density in Subunit 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. Unit 7 has not demonstrated the extreme changes in density when compared to Unit 15. The reason for a lower but more stable population in Unit 7 is the lack of widespread habitat to support snowshoe hares. Snowshoe hare populations seem to remain moderately abundant in Unit 7 compared to extreme cyclical fluctuations in density in Unit 15.

Lynx trapping season was reopened in 1996/97 in Unit 7 and Subunits 15B and C, resulting in a harvest of 52 lynx (Table 5). Subunit 15 A was not opened because current lynx research conducted by Kenai National Wildlife Refuge staff indicated lynx density in this Subunit was lower than other areas. The 1996/97 harvest was comprised of 40 (77%) adults and 12 (23%) kittens. Since trapping and hunting was closed from 1987 to 1996, the reported mortality in the first 4 years of this reporting period has been incidental. Incidental mortalities from 1992 to 1996 have averaged 3 animals per year with a range of 2–4.

Harvest Chronology. Tables 6 through 10 show the chronology for reported harvest by percent for beaver, marten, otter, wolverine and lynx. General analyses show most trapping success occurs early to mid season with the exception of wolverine trapping. Since wolverine are generally found in remote, mountainous terrain 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. In the past 5 years, most of the harvest occurred in January and February.

Transport Methods. Tables 11 through 15 show harvest percent by transport method for beaver, otter, wolverine and lynx. Reporting transport method used to harvest marten was not required until 1992-93. Since several (dogsled, skis and snowshoes) transport types are listed under one category, the reported transport method used is misleading as shown in these tables. Generally, trappers in Units 7 and 15 use a highway vehicle to access their trapline and travel along their trap-line, using either snowshoes or snowmachines. Aircraft and dog teams are used by less than 10 percent of the trappers. Trappers using these transport methods, however, are generally more successful compared to trappers using less efficient transport methods.

CONCLUSIONS AND RECOMMENDATIONS

Current increasing harvests for beaver do not seem excessive. Beaver populations are probably being underutilized in portions of the Peninsula and, in particular, Subunit 15C. Trapping effort appears to have decreased in 1994-95 due to the severe winter with deep snow accumulation. Establishment of beaver cache surveys along several representative drainages is recommended to monitor population trends and to determine whether additional harvesting is warranted.

Since harvests of marten have only been documented through mandatory sealing since 1988, data indicating long trends in harvests are unavailable. However, it was interesting to note that only 3 marten have been reported from Unit 15 in the past 2 decades outside of the closed area in 15B, indicating marten are rare in this unit. Since historical records suggesting marten were trapped in Unit 15 are also rare, and controversial as to authenticity, this data probably supports the theory that Unit 15 is poor marten habitat compared to Unit 7. Harvest was distributed over most of Unit 7; however, it was generally confined to areas near roads due to the unit's remoteness.

Land otter harvests increased sharply in 1993-94. The sharp increase in interest was probably due to an increase in pelt price and the lack of alternate furbearers to trap. Lynx season was closed and wolf pelts are generally worth little because of pelt damage by lice infestation. Reports from trappers and staff suggest land otters were as abundant during 1996-97 as the previous 4 years. The harvest of 72 in 1996-97 matches the previous high in 1993-94.

Wolverine harvests have increased steadily over the past 4 years with males predominating the harvest in all years except 1994-95 when trappers reported a catch of 45 percent males and females, and 10 percent of unknown sex. The increase in harvest can be attributed to a slight increase in effort: wolf pelts are generally not marketable, lynx trapping opened in 1996-97, deep snow allowed better snowmobile travel, and wolverines are at lower elevations during winters with deep snow, making them more vulnerable to trapping. The average male percentage of the harvest remained high (65%), and the overall impact to the wolverine population was probably minimal during the past 5 years.

Lynx management on the Kenai Peninsula has followed the recommendations of Brand and Keith (1979). Their study indicated that during a lynx population decline in Alberta, trapping mortality was additive to natural mortality. Using computer modeling, they showed that more lynx would be produced and greater long-term harvest achieved when trapping was curtailed for 3-4 years, beginning the 2nd year after the peak in the lynx harvest. This harvest strategy is currently implemented on the Kenai Peninsula. Staff observations and reports from longtime trappers indicate the hare cycle showed a slight increase beginning in 1993-94 and is moderately high. Lynx density has increased due to hunting and trapping closures and the increase in their primary prey, snowshoe hares. Spruce grouse numbers have been moderately high for the past 5 years.

Trapping for lynx was reopened in Unit 7 and Subunits 15B and C in 1996-97, following a 9-year closure. Hunting for lynx remained closed. Although reports from trappers and incidental observations from department staff indicated lynx density in Subunit 15A was higher than in other areas on the Kenai, and consequently should be reopened, research from Refuge staff demonstrated lower numbers in Subunit 15A. The January 1–31 trapping season resulted in the harvest of 52 lynx, including 4 incidental mortalities (2 killed by highway vehicles and 2 capture-related mortalities during the FWS study) in Subunit 15A. Carcasses collected from 26 of the 52 taken revealed 11 males and 15 females. Age composition was 14 (54%) adults, 5 (19%) yearlings, and 7 (27%) kittens. Seven of the 10 females, older than 1 year (2–5), exhibited placental scars.

In accordance with our harvest tracking strategy, I recommend we increase the season length by 2 weeks to January 1 to February 15 and reopen Subunit 15A. A hunting season with a limit of 2 lynx should also be approved for the entire peninsula from November 10 to February 15 in 1997-98.

LITERATURE CITED

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

Prepared By:

Ted H. Spraker
Wildlife Biologist

Submitted By:

Steve Machida
Wildlife Biologist

Table 1 Summary of annual beaver harvests on the Kenai Peninsula by game management unit, 1989-93

Regulatory year	Game Management Units					Total
	7	15A	15B	15C	All 15	
1989/90	65	3	9	17	29	94
1990/91	69	36	5	24	65	134
1991/92	34	18	5	10	33	67
1992/93[b]	38	63	3	26	92	130
1993/94[b]	80	41	5	47	93	173
Total	286	161	27	124	312	598
$\bar{x}$	57	32	5	25	62	120

[a] From furbearer sealing report summary.
[b] Season extended to Dec.1 - March 31 by Board of Game.

Table 2 Summary of annual marten harvests on the Kenai Peninsula by game management unit, 1989-93

Regulatory year	GMU	Males (%)	Females	Unk.	Total
1989/90	7	14 (64)	8	0	22
	15	--	--	--	--
1990/91	7	38(67)	19	--	57
	15	--	--	--	--
1991/92	7	13(68)	6	5	24
	15	--	--	2	2
1992/93	7	14(74)	5	12	31
	15	--	--	--	--
1993/94	7	25(78)	7	1	33
	15	--	--	--	--
Total		104	45	20	169
$\bar{x}$		21(70)	9	4	34

Table 3 Summary of land otter harvest on the Kenai Peninsula by game management unit, 1989-93

Regulatory year	GMU	Males (%)	Females (%)	Unk.	Total
1989/90	7	9	3	--	12
	15A	4	3	--	7
	15B	1	1	--	2
	15C	3	4	--	7
	Subtotal	17(61)	11	--	28
1990/91	7	5	4	13	22
	15A	3	2	--	5
	15B	1	--	--	1
	15C	9	6	--	15
	Subtotal	18(60)	12	13	43
1991/92	7	3	0	9	12
	15A	5	1	1	7
	15B	4	2	0	6
	15C	7	1	0	8
	Subtotal	19(83)	4	10	33
1992/93	7	1	2	2	5
	15A	7	5	5	17
	15B	--	--	--	--
	15C	6	9	6	21
	Subtotal	14(47)	16	13	43
1993/94	7	11	9	1	21
	15A	6	2	--	8
	15B	2	1	--	3
	15C	24	16	--	40
	Subtotal	43(61)	28	1	72
Total		111	71	37	219
$\bar{x}$		22(61)	14	7	44

Table 4 Summary of wolverine harvest on the Kenai Peninsula by game management unit, 1989-93

Regulatory year	GMU	Males (%)	Females (%)	Unk.	Total
1989/90	7	5	2	--	7
	15A	--	--	--	--
	15B	1	--	--	1
	15C	3	8	--	11
	Subtotal	9(47)	10	--	19
1990/91	7	7	4	--	11
	15A	--	--	--	--
	15B	1	1	--	2
	15C	5	3	--	8
	Subtotal	13(62)	8	--	21
1991/92	7	14	2	--	16
	15A	--	--	--	--
	15B	--	--	--	--
	15C	3	--	--	3
	Subtotal	17(90)	2	--	19
1992/93	7	6	5	--	11
	15A	--	--	--	--
	15B	2	1	--	3
	15C	2	--	--	2
	Subtotal	10(63)	6	--	16
1993/94	7	7	1	--	8
	15A	--	--	--	--
	15B	--	--	--	--
	15C	5	3	--	8
	Subtotal	12(75)	4	--	16
Total		61	30	--	91
$\bar{x}$		12(67)	6	--	18

Table 5 Summary of lynx harvest on the Kenai Peninsula by game management units, 1989-93

Regulatory year	GMU	Adults M	Adults F	Adults Unk.	Kittens M	Kittens F	Kittens Unk.	%	Unclass	Total
1989/90[a]	7	--	1	--	--	--	--		--	1
	15A	--	1	--	--	--	--		--	1
	15B	--	--	--	--	--	--		--	--
	15C	--	1	--	--	--	--		--	1
	Subtotal	--	3	--	--	--	--		--	3[b]
1990/91[a]	7	--	--	--	--	--	--		--	--
	15A	--	1	--	--	--	--		--	1
	15B	--	--	--	--	--	--		--	--
	15C	--	--	--	--	--	--		--	--
	Subtotal	--	1	--	--	--	--		--	1[c]
1991/92[a]	7	--	--	--	--	--	--		--	--
	15A	--	--	--	--	--	--		--	--
	15B	--	--	--	--	--	--		--	--
	15C	--	--	--	--	--	--		--	--
	Subtotal	--	--	--	--	--	--		--	--
1992/93[a]	7	1	--	--	--	--	--		--	1
	15A	--	1	--	--	--	--		--	1
	15B	1	--	--	--	--	--		--	1
	15C	--	--	--	--	--	--		--	--
	Subtotal	2	1	--	--	--	--		--	3
1993/94[a]	7	--	--	--	--	--	--		--	--
	15A	--	1	--	--	--	--		--	1
	15B	1	--	--	--	1	--		--	2
	15C	--	--	--	--	--	--		--	--
	Subtotal	1	1	--	--	1	--	33%	--	3
Total		3	6	--	--	1	--	11%	--	10
$\bar{x}$		1	1	--	--	--	--	2%	--	2

a Trapping season closed 1987/88. Hunting season closed 1988/1989.
b No open season, 1 road-kill, 1 DLP and 1 tagging mortality, USFWS study.
c Tagging mortality, USFWS study.

Table 6 Units 7 & 15 beaver harvest chronology percent by month, 1989-93

Regulatory year	Month						Total
	November	December	January	February	March	Unknown	
1989/90	--	--	--	54	36	10	94
1990/91	--	--	--	78	22	--	134
1991/92	--	--	--	54	37	9	67
1992/93a	--	25	13	28	32	2	130
1993/94a	--	29	24	24	23	1	173

a Season extended to Dec. 1 - March 31 in 1992

Table 7 Units 7 & 15 marten harvest chronology percent by month, 1989-93

Regulatory year	Month						Total
	November	December	January	February	March	Unknown	
1989/90	55	32	14	--	--	--	22
1990/91	30	37	33	--	--	--	57
1991/92	46	19	--	--	--	35	26
1992/93a	3	23	74	--	--	--	31
1993/94a	9	55	36	--	--	--	33

Table 8 Units 7 & 15 otter harvest chronology percent by month, 1989-93

Regulatory year	Month						Total
	November	December	January	February	March	Unknown	
1989/90	7	25	43	18	4	4	28
1990/91	16	47	19	19	--	--	43
1991/92	15	12	18	42	--	12	33
1992/93	2	51	33	12	2	--	43
1993/94	26	39	21	13	--	1	72

Table 9 Units 7 & 15 wolverine harvest chronology percent by month, 1989-93

Regulatory year	Month						Total
	November	December	January	February	March	Unknown	
1989/90	16	21	16	32	--	16	19
1990/91	--	14	10	52	10	14	21
1991/92	--	--	53	42	--	5	19
1992/93	--	6	38	38	6	13	16
1993/94	--	44	19	38	--	--	16

Table 10 Units 7 & 15 lynx harvest chronology percent by month, 1989-93

Regulatory	Month						
year	November	December	January	February	March	Unknown	Total
1989/90	--	--	33	33	--	33	3
1990/91	--	--	--	--	--	100	1
1991/92	--	--	--	--	--	--	--
1992/93	--	33	33	--	--	33	3
1993/94	--	--	--	67	33	--	3

Table 11 Units 7 & 15 beaver harvest percent by transport method, 1989-93

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk.	Total
1989/90	--	10	3	--	28	--	11	49	94
1990/91	--	30	--	--	19	--	43	9	134
1991/92	2	16	--	--	33	--	48	2	67
1992/93	13	5	--	--	41	--	28	14	130
1993/94	5	--	2	1	23	--	48	22	173

Table 12 Units 7 & 15 **marten harvest** percent by transport method, 1989-93

Regulatory year	Percent of harvest								Total
	Airplane	Dogsled	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway véhicle	Unk.	
1989/90[a]	--	--	--	--	--	--	--	--	--
1990/91[a]	--	--	--	--	--	--	--	--	--
1991/92[a]	--	--	--	--	--	--	--	--	--
1992/93	--	--	--	--	77	--	10	13	31
1993/94	--	--	--	--	24	--	58	18	33

a Transport method was not recorded in these years.

Table 13 Units 7 & 15 otter harvest percent by transport method, 1989-93

Regulatory year	Percent of harvest								Total
	Airplane	Dogsled	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk.	
1989/90	14	18	7	--	18	--	29	14	28
1990/91	--	49	28	5	7	--	--	12	43
1991/92	6	12	6	--	39	--	15	21	33
1992/93	16	--	7	--	14	--	30	33	43
1993/94	22	4	8	--	3	--	33	29	72

Table 14 Units 7 & 15 wolverine harvest percent by transport method, 1989-93

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk.	Total
1989/90	--	--	--	11	63	--	11	16	19
1990/91	5	24	29	--	29	--	5	10	21
1991/92	5	--	--	--	84	--	5	5	19
1992/93	6	6	--	6	38	--	6	38	16
1993/94	38	--	--	--	19	--	6	38	16

Table 15 Units 7 & 15 lynx harvest percent by transport method, 1989-93

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unk.	Total
1989/90	--	--	--	--	33	--	67	--	3
1990/91	--	--	--	--	--	--	--	100	1
1991/92	--	--	--	--	--	--	--	--	--
1992/93	--	--	--	--	--	--	33	67	3
1993/94	--	--	--	--	--	--	--	100	3

LOCATION

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

Geographic 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.

MANAGEMENT DIRECTION

Management Objectives

- Develop measurable objectives for all furbearer species
- 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 with a mandatory sealing program. We sent statewide trapper questionnaires to trappers annually.

RESULTS AND DISCUSSIONS

Population Status and Trend

Population Size. We have not estimated furbearer populations in Unit 8. Trappers and hunters reported furbearer populations were high during this reporting 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 trapping limit. The red fox hunting season was from 1 September to 15 February with a bag limit of 2 foxes.

Marten, weasel, and land otter trapping season was from 10 November to 31 January with no trapping limit. The muskrat trapping season was from 10 November to 10 June with no bag limit. There was no closed hunting or trapping season, nor bag limit, on squirrels.

Board of Game Actions and Emergency Orders. The Board of Game changed the red fox hunting season opening date from 1 November to 1 September beginning in 1991-92. The Board also removed the prohibition on hunting foxes on the same day as airborne that had been in effect since the 1988-89 season. That regulation had been implemented to facilitate enforcing prohibitions on hunting wolves, a species not present in Unit 8.

Hunter/Trapper Harvest. The annual beaver harvests ranged from a low of 35 in 1988-89 to a high of 98 in 1986-87 (Table 1). Land otter harvests ranged from a high of 142 in 1987-88 to a low of 68 in 1993-94 (Table 2). Only 11 trappers sealed otters in 1993-94, the lowest participation in 8 years.

Red foxes are the most commonly pursued furbearers in Unit 8, but current methods of monitoring harvest underestimate the take. Records of fur export indicated trappers shipped only 27 red foxes from Unit 8 in 1993-94. The average annual harvest by trappers and hunters is estimated at 300 red foxes. Some foxes are home-tanned, and we suspect that hides are sometimes 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 beaver and land otters are presented in Tables 3 and 4, respectively. No trends in harvest chronology are apparent.

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

Other Mortality

No data were collected.

Habitat

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

Nonregulatory Management Problems/Needs

We should develop a population trend estimation technique for land otters. The land otter is the furbearer most susceptible to overexploitation in Unit 8.

Beavers occasionally become nuisances by flooding gravel roads and are removed by ADF&G or Department of Transportation personnel, under a depredation permit issued annually since 1991.

Permits have also been issued to Ouzinkie and Port Lions villages to remove beavers from reservoirs.

Ground squirrels are a chronic nuisance at the Kodiak state airport, where they damage runway edges and 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 were reported dead in snares. Typically, inexperienced trappers are responsible for the snared deer; 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 500–600 animals. Land otters were potentially susceptible to overharvest; we should develop a population trend estimation technique for that species.

The annual bag limit of 30 beavers is not needed at the present average harvest of <75 animals per year. Beavers are abundant, widely distributed, and the population could support a much higher take.

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. Project 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.

Prepared By:

Roger Smith
Wildlife Biologist

Submitted By:

Karl B. Schneider
Management Coordinator

Table 1 Unit 8 beaver harvest 1986-94

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
1991-92	18	32	39	68	79	61	78	18	22	0	16
1992-93	11	18	51	82	65	56	86	9	14	0	8
1993-94	18	30	43	70	68	54	21	14	79	0	11

[a] Beavers ≤ 52"

Table 2 Unit 8 river otter harvest 1986-94

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
1991-92	73	(54)	61	(46)	10	144	130	(92)	10	(8)	4	20
1992-93	38	(51)	36	(49)	17	91	69	(84)	13	(16)	9	17
1993-94	37	(65)	20	(35)	11	68	6	(99)	1	(1)	0	11

Table 3 Unit 8 river otter harvest chronology percent by month, 1986-94

	Harvest periods					
Regulatory year	November	December	January	February[a]	No. Unk	*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
1991-92	40	25	35	0	0	144
1992-93	45	39	16	0	9	82
1993-94	24	24	53	0	0	68

[a] Season closed Jan. 31

Table 4 Unit 8 beaver harvest chronology percent by month, 1986-94

	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
1991-92	15	30	30	0	8	16	0	0	79
1992-93	15	31	6	29	18	0	0	0	65
1993-94	13	25	15	15	16	16	0	0	68

Table 5 Unit 8 land otter harvest percent by transport method, 1986-94

	Percent of harvest								
Regulatory year	Airplane	Foot/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
1991-92	22	7	63	5	0	0	3	5	139
1992-93	27	0	48	9	0	0	16	14	77
1993-94	41	4	31	4	0	0	19	0	68

Table 6 Unit 8 beaver harvest percent by transport method, 1986-94

	Percent of harvest								
Regulatory year	Airplane	Foot/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
1991-92	18	18	49	13	0	0	1	3	76
1992-93	13	0	28	48	0	0	13	25	40
1993-94	19	0	18	44	0	16	3	0	68

LOCATION

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

Geographic Description: Alaska Peninsula; Aleutian, and Pribilof Islands

BACKGROUND

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

Beavers are found on the mainland 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 extended their range. Coyotes are restricted to the mainland of Unit 9 and were rare before 1980. Relatively few are trapped, usually incidentally to fox, lynx, or wolf harvests. Sport hunters kill few coyotes.

Red foxes inhabit the mainland, some of the offshore Alaska Peninsula islands, and 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 introduction of arctic foxes. Rabies, mange, and distemper epidemics occur periodically in fox populations, resulting in widespread mortality.

Arctic foxes live 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 northwestern shore of Bristol Bay. Blue color–phase arctic foxes were introduced dating back to the Russian period. Arctic foxes are noted for their wide fluctuations in population levels with periodic peaks approximately every 4 years. Their population densities are linked to cyclic fluctuations in small rodent populations. Foxes also patrol beaches in search of carrion. Foxes are efficient predators of nesting birds, and attempts to eliminate foxes on some islands are underway.

Lynx are on the mainland north of Port Heiden. 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 on the mainland of the Alaska Peninsula and on Unimak Island. Microtine populations 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 move inland in search of prey. In some areas spring flooding may reduce populations by drowning young mink in dens.

Land otters live on the mainland, 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 occasionally drowns young otters in dens.

Wolverines live on the mainland 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 collecting information from trappers by questionnaires. Fieldwork for surveying furbearers was not funded this report period. We made incidental observations of furbearers during moose, caribou, and brown bear surveys.

Pelt sealing is required for beaver, lynx, otter, and wolverine and provides the most accurate and complete harvest information. Because furs kept for personal use were sometimes not represented, actual harvest exceeded that recorded from this data source.

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 furbearers and key prey species. The trapper questionnaire population abundance index (AI) was calculated by assigning rank values of 1 for "low," 5 for "moderate," and 9 for high." Similarly, the trend index (TI) used the same rank values for "fewer," "same," and "more" present than in the previous year.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size

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 during the reporting period (AI = 7.9, 8.3, and 6.5 for 1991-92, 1992–93 and 1993-94, respectively). Although the trend index remained above stable (6.1, 5.9, and 5.0), trappers apparently believed that at least the rate of increase was declining.

Coyote – Although trappers still rated the coyote population as being relatively low, both the AI (2.6, 3.4, and 4.5) and TI (5.0, 6.3, and 5.8) indicated an increase during 1991–93. Comments from hunters and observations by staff also indicate a slight increase in coyote numbers.

Red Fox – Trappers reported the red fox population remained high (AI = 7.1, 6.6, and 6.8 for 1991–92, 1992–93, and 1993–94, respectively). There was a moderate outbreak of rabies early in 1994 that may have been localized within the Naknek drainage.

Lynx – Trappers believed lynx abundance was low during 1991–93 (AI = 2.2, 3.0, and 3.5) but increased during the period (TI = 6.0, 5.6, and 5.7). Trappers reported that snowshoe hare abundance was moderate in 1991–92 (AI = 5.0) but low and declining (AI = 4.1 and 2.7; TI = 3.5 and 3.0) in 1992–93 and 1993–94.

The increase in lynx abundance was particularly noticeable within the Naknek River drainage since 1992–93 and occurred during a period of declining hare numbers. It was also notable that very few kittens were trapped during this period. These 2 circumstances indicate that most of the lynx increase was caused by emigration from Katmai National Park where the hare decline apparently began during 1991–92.

With a relatively low prey base and apparent low productivity, it is unlikely the lynx population could sustain itself, even without the recent high harvests.

Marten – Only 2 trappers per year rated marten abundance, precluding meaningful interpretation. Marten distribution is very limited within Unit 9 and changes in status are difficult to document.

Mink – Mink abundance was reported as moderate (AI = 5.4, 5.9, and 5.5 for 1991–92, 1992–93, and 1993–94, respectively. No particular trend was evident (TI = 4.5, 5.6, and 4.2).

Otter – Otter abundance was slightly greater than moderate during the reporting period (AI = 6.1, 6.2, and 6.1) and may have increased the last year (TI = 5.5, 5.3, and 7.0).

Wolverine – Trappers reported wolverine abundance as moderately low (AI = 3.7, 3.8, and 3.5) but relatively stable (TI = 4.8, 4.7, and 3.7) during the reporting period.

Mortality

Harvest

Season and Bag Limits. The 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 in these units was from 1 September to 30 April with a bag limit of 2.

The red fox and arctic fox trapping season in Units 9 and 10 was open from 10 November to 28 February with no bag limit. The red fox hunting season in both units was from 1 September to 15 February, and the bag limit was 2 foxes. The arctic fox hunting season in Unit 9 was open from 1 September to 30 April with a 2 fox limit. In Unit 10 there was no closed hunting season and no bag limit for arctic fox.

The lynx and marten trapping season in Unit 9 was 10 November to 28 February with no trapping bag limit for either species. The lynx hunting season in Unit 9 ran concurrent with the trapping season, but the bag limit was 2. 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 in Units 9 and 10 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 with no bag limit. The hunting season f or wolverines in Units 9 and 10 was from 1 September to 31 March with a bag limit of 1 per hunter.

Board of Game Actions and Emergency Orders. No Board actions or emergency orders affected trapping or hunting of furbearers in Units 9 or 10 during this reporting period.

Hunter/Trapper Harvest. Beaver harvests were relatively stable during the past 5 years (range 194–378 per year, Table 1) and were low, compared to 865 beavers taken in 1987–88.

Lynx harvests increased in 1992-93 and 1993-94 (Table 1) compared to previous years. This increase was particularly notable in Subunit 9C where 8, 17, and 32 lynx were taken in 1991-92, 1992-93, and 1993-94, respectively. During the 9 years before 1991, an average of only 1 lynx per year was taken in Subunit 9C. Less than 20% of the lynx taken in 1992-93 and 1993-94 were kittens, indicating the increased harvest was due more to emigration than to growth in the resident population.

Otter harvests were relatively stable during the past 5 years, ranging from 65 to 151 (Table 1). As with beaver, the peak kill was in 1991–92, which demonstrates the link between beaver and otter trapping effort.

During this reporting period, we sealed an average of 64 wolverines per year from Unit 9 (Table 1), which is the same as the average over the past 17 years. There has not been a reported harvest of wolverines from Unit 10 since 1980.

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

Trapper Residency and Success. Data on trapper residency and success have not been specifically analyzed. Virtually all of the 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. Annual variations in chronology usually reflect weather and travel conditions, but January and February consistently are the most important months for trapping (Table 2).

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, especially in parts of Unit 9 with unreliable or insufficient snowfall (Table 3).

Other Mortality

Several red foxes were confirmed rabid within the Naknek drainage in spring 1994. Although speculative, this outbreak coincided with the record caribou harvest along the Naknek–King Salmon road system. The abundance of caribou carcasses and gut piles may have concentrated fox activity and contributed to transmission of the disease.

Habitat

No formal habitat assessment programs were conducted in Unit 9. Habitat enhancement is not necessary or practical in this relatively inaccessible area.

CONCLUSIONS AND RECOMMENDATIONS

The furbearer harvests in Units 9 and 10 were low and relatively stable. Low fur prices, difficult travel conditions, and large refugia in National Parks have reduced harvests of most species below historic levels. Even though information on population sizes was lacking, harvests of furbearers appeared below sustainable yield.

Harvest information was sufficient for management purposes for all species of furbearers requiring sealing in Unit 9. Harvest information for unsealed species, based on export and acquisition reports, was incomplete and potentially biased because of inaccurate subunit coding by fur buyers and a lack of enforcement of fur export regulations. We have discontinued using these data.

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.

We lacked adequate field observations to augment harvest data and trapper questionnaires to evaluate population sizes and trends. New methodology for assessing lynx and wolverine population densities are under development in Interior Alaska but may not be easily applied in Unit 9 because of typically poor snow conditions. With the low trapping pressure in recent years and the lack of techniques to assess population status for most species, there is little impetus to intensify management or develop management objectives.

Prepared By:

Richard A. Sellers
Wildlife Biologist

Reviewed By:

Howard Golden
Wildlife Biologist

Submitted By:

Jeff Hughes
Management Coordinator

Table 1 Unit 9 beaver, lynx, otter and wolverine harvests, 1989-93

Regulatory year	Reported harvest							Method of take			Total trappers
	M	F	Unk.	Juv.	Adults	Unk.	Total	Trap/snare	Shot	Unk.	
Beaver											
1989-90	0	0	257	39	147	71	257	245	2	10	23
1990-91	0	0	211	35	119	57	211	211	0	0	23
1991-92	0	0	378	81	278	19	378	368	0	10	36
1992-93	0	0	258	50	115	93	258	238	0	20	29
1993-94	0	0	194	39	135	20	194	194	0	0	21
Lynx											
1989-90	0	0	12	5	6	1	12	11	1	0	5
1990-91	0	0	14	2	11	1	14	12	1	2	8
1991-92	0	0	26	0	23	3	26	24	2	0	11
1992-93	0	0	51	8	40	3	51	45	2	4	25
1993-94	0	0	54	9	38	7	54	41	10	3	29
Otter											
1989-90	40	25	12	0	0	77	77	54	10	13	25
1990-91	33	17	33	0	0	83	83	78	2	3	25
1991-92	69	41	41	0	0	151	151	146	5	0	40
1992-93	35	39	30	0	0	104	104	83	10	11	30
1993-94	28	29	8	0	0	65	65	64	1	0	21
Wolverine											
1989-90	46	22	8	0	0	76	76	41	35	0	34
1990-91	40	23	7	0	0	70	70	55	15	0	34
1991-92	34	20	34	0	0	88	88	70	18	0	37
1992-93	25	13	8	0	0	46	46	42	3	1	26
1993-94	36	18	4	0	0	58	58	49	9	0	32

Table 2 Unit 9 beaver, lynx, otter and wolverine harvests percent[a] chronolgy by month, 1989-93

Regulatory year	Harvest periods					
	Sep/Oct	November	December	January	February	March
Beaver						
1989-90	0	0	0	30	20	50
1990-91	0	0	0	35	48	17
1991-92	0	0	3	43	41	12
1992-93	0	0	0	51	23	26
1993-94	0	0	13	47	25	15
Lynx						
1989-90	0	17	25	50	8	0
1990-91	0	0	14	21	64	0
1991-92	0	5	26	21	37	11
1992-93	0	15	23	30	26	6
1993-94	0	9	28	43	20	0
Otter						
1989-90	0	25	15	20	10	3
1990-91	0	1	20	17	37	25
1991-92	0	5	21	35	28	12
1992-93	0	4	19	31	32	14
1993-94	0	3	23	48	23	3
Wolverine						
1989-90	7	3	23	29	25	13
1990-91	1	0	16	40	34	9
1991-92	3	0	24	30	35	8
1992-93	0	9	11	39	27	14
1993-94	7	0	19	40	25	9

[a] Unknown not included.

Table 3 Unit 9 beaver, lynx, otter and wolverine harvests percent by transportation method, 1989-93

Regulatory year	Percent of harvest							
	Airplane	Dogsled Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Beaver								
1989-90	8	23	0	7	58	0	0	4
1990-91	0	20	0	17	33	0	12	18
1991-92	1	13	1	32	38	0	0	16
1992-93	0	19	5	38	19	0	11	8
1993-94	0	7	0	24	60	2	1	0
Lynx								
1989-90	33	25	0	0	42	0	0	0
1990-91	0	7	0	0	79	0	14	0
1991-92	0	0	0	25	30	0	10	35
1992-93	0	9	0	19	49	0	13	11
1993-94	2	2	2	19	52	2	17	6
Otter								
1989-90	9	5	9	22	20	0	14	21
1990-91	0	13	5	28	24	0	13	17
1991-92	3	9	4	29	33	0	7	15
1992-93	0	6	3	25	45	0	11	11
1993-94	12	6	1	22	51	0	8	0
Wolverine								
1989-90	48	9	1	5	37	0	0	0
1990-91	7	9	1	17	53	0	0	13
1991-92	31	5	6	1	41	0	2	15
1992-93	2	3	0	7	78	0	7	0
1993-94	9	2	2	7	74	0	5	2

LOCATION

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

Geographic Description: Nelchina and Upper Susitna Rivers, Wrangell Mountains

BACKGROUND

Historic harvest data are limited for furbearers in Units 11 and 13 prior to the initiation of sealing requirements. Wolverine and beaver sealing became mandatory in 1971, followed by lynx and land otter in 1977. Before sealing began, fur buyer reports gave minimal information on fur harvest, and bounty records provided harvest data only on wolverines. Little research on furbearer populations has been conducted in either unit until recently; consequently, 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 department personnel are the only historic sources of information regarding furbearer abundance.

MANAGEMENT DIRECTION

Management Objective

To develop measurable objectives for management of furbearer populations

METHODS

We monitored yearly trends in lynx abundance for both units by conducting track surveys within favorable lynx habitat. Twenty-six aerial transects (7 in Unit 11 and 19 in Unit 13) were established in 1988 for the purpose of conducting yearly lynx track surveys. Randomly selected aerial transects, each approximately 2 miles long and 0.25 miles wide, were flown in late winter.

Beaver, lynx, river otter, and wolverine pelts were sealed, and trappers were interviewed at the time of sealing to collect harvest statistics for these species. A trapper questionnaire survey provided additional harvest and relative abundance information on both sealed and unsealed furbearers.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size

Unit 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 during aerial big game surveys indicated 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.

Land otters occurred in both units but were not considered abundant in either unit. Thirty-two percent of the trappers reported river otters were scarce on their lines in 1993–94; 51% reported them as common. Most trapper questionnaire responders reported river otter numbers had not changed in recent years.

Lynx numbers are declining in both Units 11 and 13, following a 10-year population cycle peak in 1992. During the peak in 1992, lynx were not thought to be as numerous as they were during the last cyclical peak in 1982. Lynx cycles have been of lower amplitude each cycle since the 1960s. Fifty-nine percent of the trappers responding on the 1993–94 trapper survey listed lynx as scarce or not present on their traplines. Aerial transects were flown in 1992 and 1993, and fresh lynx tracks were observed on 11 transects in both years, indicating lynx were abundant the year after the cycle peak. Unfortunately, transects were not flown in 1994.

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 in the Chugach Mountains in Subunit 13D in 1987 (Becker and Van Daele 1988). Both estimates were completed in the spring after harvests and overwinter mortality. Both were also located in areas considered to be favorable wolverine habitat. Wolverine densities in less mountainous portions of the unit were considered much lower than the surveyed areas. Because of differences in wolverine densities, unitwide extrapolation of the observed densities did not provide an accurate estimate unless adjustments were made for reduced densities in the nonmountainous portions. Additional surveys have not been completed.

Sixty-one percent of the trappers responding to the questionnaire considered wolverine scarce, 39% believed they were common, which was a slight increase in the number reporting more wolverine on their lines. Wolverine numbers may have increased slightly on traplines in favorable mountainous wolverine habitat. However, wolverine remained scarce in the timbered areas at lower elevations.

Marten numbers increased in both Units 11 and 13 during the mid-1980s, peaked in 1988, and since then have fluctuated yearly. The marten population is 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 1993–94 reported marten to be common and numbers stable. Yearly fluctuations in marten numbers are thought to represent changes in survival of young due to food availability. Marten numbers have increased enough in Units 13 and 11 to make them the most important furbearer in these units.

Coyotes were abundant and their numbers are stable at this time. Responses from the trapper survey show 65% of the trappers responding consider coyotes abundant, and 67% stated that coyote populations were stable. The many rivers throughout the units are especially favorable habitat and along these rivers, coyote numbers are high.

Fox numbers declined during the mid-1980s in areas where coyotes increased. Foxes are common over much of the forested lowlands and were abundant in subalpine and tundra habitats. The

1993–94 trapper survey responses as to abundance and trend for fox indicate 69% of the trappers thought fox were common or abundant, and 77% considered fox numbers to be stable or increasing. Based on the trapper questionnaire, fox numbers were much higher in Unit 13 than in 11.

Muskrat numbers were very low throughout both units. Sixty-two percent of surveyed trappers consider muskrats not present or scarce on their lines. Muskrats were abundant during the early 1980s, but their numbers declined dramatically during the mid-1980s. Reasons for the dramatic decline in numbers were not determined.

Mink abundance is difficult to determine from the trapper questionnaire because 46% reported mink not present or scarce and 54% reported them common. Population trends could not be determined as most (88%) reported mink stable on their lines.

More trappers (58%) considered hares scarce than common, and none listed hares as abundant. This important observation supports the conclusion that the amplitude of the current 10-year snowshoe hare cycle, like the lynx cycle, has been lower than the one preceding it. It appears that rabbit numbers peaked between 1991 and 1992 at a much lower level than observed in 1981 and 1982. Ptarmigan were also reported to be common but not abundant, while grouse were considered scarce to common. Red squirrel and mice were considered common or abundant.

Distribution and Movements

Beavers and river otters were throughout both units in favorable aquatic habitat. 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, Subunits 13D, eastern 13A, and southern 13C. Lynx moved freely between the 2 units because favorable habitat was continuous. Marked lynx have dispersed from both the Kenai Peninsula and Yukon Territory into Unit 13. 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. Prior to the late 1970s, wolverines were reportedly more numerous near settlements and on the Lake Louise Flats than today. Movement patterns for radiocollared wolverines in Unit 13 were reported by Gardner (1985). He observed that movements declined during the fall but increased again in February with the dispersal of juveniles into vacant habitat. A long distance dispersal of a radiocollared subadult out of the unit was also reported.

Mortality

Harvest

Seasons and Bag Limits. Beaver trapping season in Unit 13 was 10 October to 30 April, while in Unit 11 the season opened on 10 November and closed on 30 April. The bag limit was 30 beavers per season.

The coyote and river otter trapping season in Units 11 and 13 was from 10 November to 31 March, with no limit on the number of animals a trapper could legally take. The coyote hunting season was from 1 September to 30 April, and the bag limit was 2 coyotes.

The red fox 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 September to 15 February, with a bag limit of 2 foxes. Trapping season was 10 November–31 January for lynx, weasels, mink, wolverine and marten, except for 13E where the marten season was only 1 month long, closing on 10 December. There was a bag limit for wolverine trappers of 2 animals. Hunting seasons for lynx and wolverine were also 10 November–31 January with a bag limit of 2 lynx and 1 wolverine. The muskrat trapping season was from 10 November to 10 June and there was not a bag limit.

Board of Game Actions and Emergency Orders. The Board of Game, during its spring 1992 meeting, lengthened beaver season in Unit 13 by 30 days by moving the season opening from 10 November to 10 October. Marten season was shortened in Subunit 13E, and string sealing was required for all marten taken from this subunit.

Hunter/Trapper Harvest. There were no beaver reported as harvested in Unit 11 during the 1993–94 trapping season and only 5 reported taken the year before (Table 1). Historically, harvests fluctuate between years, with no evident trend.

The Unit 13 beaver harvest averaged 79 beavers (range 33–176) between 1972 and 1984, then increased dramatically in 1985 and peaked in 1986 with a record catch of 333 beaver. The 1993/94 reported take of 225 is virtually the same as the previous year's catch of 227 but 34% above the 5-year (1988-92) mean of 168 beavers (Table 2). The percentage of kits in the 1993–94 harvest was 24%, only slightly higher than the 5-year (1988-92) mean of 23% kits. The largest reported subunit harvest of beaver came from 13E with 92, followed by 13D with 66.

River otters were not taken in Unit 11 during the 1993–94 season (Table 3). River otter harvests in Unit 11 have been low, averaging only 4 animals per year (range = 0-11) since 1977 when sealing was first required. In Unit 13 the 1993–94 reported take was 42 otters (Table 4). Since sealing of otters became a requirement in 1977, the annual harvest has averaged 26 otters (range = 5–68) for Unit 13. Harvests fluctuate widely between years with no overall trend apparent. Otter harvests have fluctuated by subunit annually without any subunit showing a consistently higher percent of the total take.

The lynx harvest for Unit 11 presented in Table 5 spans a 4-year (1990-93) period that encompasses the peak population period of the current 10-year lynx cycle. The total take of 221 lynx during the current cycle is 40% lower than the harvest of 368 lynx, reported during the top 4 years of the previous cyclical high between 1980 and 1983. The lynx harvest in Unit 13 during the peak of the current lynx cycle is presented in Table 6. The total take for the 4-year period between 1990 and 1993 was 442 lynx. Between 1980 and 1983 when lynx were last high in Unit 13, the total take was 611 lynx. The total 4-year lynx harvest declined 29% between cyclical peaks in Unit 13. The most important lynx trapping subunit is 13D, accounting for 56% of the total unit lynx harvest.

Wolverine harvests from Units 11 and 13 are presented in Tables 6 and 7, respectively. The wolverine harvest has declined in Unit 11 over the past 5 years while remaining relatively stable in Unit 13 during this period. Historically, wolverine harvests were much higher in the 1970s in both units than currently observed. During the 1970s the average yearly wolverine harvest in Unit 11 was 28 and in Unit 13 it was 86. The lowest wolverine harvest ever reported from Unit 11 was in 1992 when 5 wolverines were sealed. In Unit 13 the lowest take was 16 in 1988, but the current Unit 13 harvest has doubled since bottoming out. Composition data showed males accounted for 55% (range = 43–60%) of the Unit 11 take during the past 5 years and 59% (range = 38–69%) in Unit 13. Harvest locations indicate most wolverine harvests occur in the mountainous portions of both units, especially from the Chugach Range in 13D and 11 and portions of the Alaska and Talkeetna Ranges in 13E.

Marten harvest figures are not obtained unitwide. Sealing of marten has been required for 2 years in Subunit 13E and harvest figures are available. During the 1992–93 season 3 trappers sealed 23 marten from Unit 13E, and in 1993–94, 4 trappers took 12 marten. Males predominated (74% and 63%) in the harvest both years. In the remainder of Unit 13, marten are the most important furbearers according to trapper survey responses. Individual catches that a few individuals have reported approach 200 marten, but most trappers take far fewer marten. During 1991-92 ADF&G purchased marten taken in Unit 11 and 13 for 5 dollars per carcass. A total of 843 marten carcasses were purchased, with 359 coming from Unit 11, 340 from Unit 13, and the remainder from trappers who trap both units and did not separate their catch. Composition breakdown of purchased carcasses resulted in a sex ratio of 1.5 males to 1 female. The number of carcasses purchased was much higher than expected and alerted us to the importance of marten to Unit 11 and 13 trappers.

<u>Hunter Residency and Trapper Success</u>. Trappers show little interest in beaver trapping in Unit 11, based on the number of trappers taking beavers. The highest catch per trapper in the last 5 years was 4.3 beaver (Table 1), and in 1993–94 no one sealed a beaver. Most trappers sealing beaver from Unit 11 were local residents. The number of successful beaver trappers in Unit 13 is listed in Table 2. Trapping effort as reflected by the number of successful trappers fluctuates yearly but is currently well below the 1986 figure of 55 successful trappers. During the past 5 years successful trappers in Unit 13 average 5.9 beavers. Trapping and snaring were the most successful harvest methods in Units 11 and 13.

Only 1 trapper reported taking river otter during 3 of the past 5 years in Unit 11 (Table 3). In Unit 13 the number of trappers taking otter increased during the reporting period (Table 4), and the average catch per trapper was 1.9 otter. Trapping and snaring were the most important methods of take reported for the otters taken in Units 11 and 13, although a few otters were reported shot in Unit 13.

Eighteen trappers reported an average catch of 5.9 lynx during the 1991–92 season when the lynx harvest peaked in Unit 11 (Table 5). The number of successful trappers and the catch per trapper were lower the last 2 years, reflecting a decline in the lynx cycle. Trapping pressure was higher, but the average catch per trapper was lower during the last cyclic high (1982–83) in Unit 11, when 32 trappers sealed an average of 4.0 lynx. In Unit 13, 61 trappers took an average of 2.1 lynx during the peak harvest year of 1992–93 (Table 6). Subsequent trapper success and average catch figures are lower because of a decline in lynx numbers. During the last cyclic high (1982–83) the average catch by 71 trappers in Unit 13 was 4.1 lynx. Trapping and snaring are the most important harvest method, but a few lynx are shot each year.

Five trappers in Unit 11 took an average of 1.4 wolverines during 1993–94 (Table 7). The number of trappers taking a wolverine in Unit 11 has been stable, averaging 5 for each year for the reporting period, but the catch per trapper has dropped from 1.8 reported in 1989. In Unit 13, 28 trappers took an average of 1.2 wolverines. The number of successful trappers has increased in Unit 13, but the catch per trapper has changed little.

All the wolverine taken in Unit 11 were trapped or snared. In Unit 13 trapping or snaring were also the most important method of take; however, shooting accounted for as much as 25% of the take in some years.

Questionnaire Response. One hundred (69%) of the 144 trappers contacted about the 1993–94 survey returned the trapper questionnaire. This response rate was somewhat better than past response rates (60–65%). Trapping pressure declined in 1993–94 as 45% of individuals responding to the survey reported they did not trap, compared to only 29% in 1992–93. Also, 46% of the individuals that did trap reported less trapping effort during the 1993–94 season. Those trappers who cooperated with the survey were, for the most part, very experienced with their area, having spent an average of 13 years trapping their current lines, which averaged 37.5 miles in length. Most trappers averaged about 50 sets on their line, but 11 (20%) trappers reported setting over 100 traps.

Harvest Chronology. The harvest chronology data for beavers in Units 11 and 13 are presented in Tables 9 and 10, respectively. In Unit 11 harvests are very low and months of catch vary yearly. In Unit 13 chronology data indicate most beavers are taken early or late in the season with few trappers expending much energy trying to take beaver during January or February. The early part of the season has been popular because the ice is thinner and beaver meat is sought for trap bait and sled dog food. High harvests in March reflected increased trapper activity associated with longer days, moderating temperatures, and closed trapping seasons for other furbearers.

Harvest chronology for otters in Unit 11 has not shown a particular pattern over the past 5 years 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.

Harvest chronology data for lynx in Units 11 and 13 are included in Tables 13 and 14, respectively. With such short seasons, chronology data probably reflect access and trapping conditions due to weather and snow depth more than differences in trapper effort. Most trappers start setting traps for lynx as soon as the season opens or whenever snow conditions and freeze-up allow travel to traplines after opening day.

Tables 15 and 16 present chronology data for wolverine harvest in Units 11 and 13. February and March have been important harvest periods historically, but by closing the season on 31 January, this harvest has been eliminated. Because the season is so short, the timing of the wolverine harvest, like lynx, probably reflects trapping conditions more than differences in trapping effort or changes in vulnerability of wolverine.

Transport Methods. Successful trappers for all species of furbearers in both units used snow machines and dog sleds/snow shoes/skis and highway vehicles (Tables 17–23). One notable change in transportation methods is the decline in aircraft use by wolverine trappers. In the 1980s aircraft were used extensively. A popular and effective wolverine trapping method was to fly until trappers located a dead ungulate and then set traps near the carcass. Short days and poor flying weather during the current short season limit the use of this technique.

CONCLUSIONS AND RECOMMENDATIONS

Furbearer track survey transects are important tools to monitor the population status of lynx and wolverine. Marten population trends may also be monitored with track surveys, but research on the technique has not been completed. The problem with employing track counts is obtaining adequate survey conditions. A combination of fresh snow, no wind, and bright sunlight is necessary to successfully complete track surveys. Suitable conditions will vary yearly; consequently, counts may not be completed each year. Emphasis should be placed on obtaining lynx transects yearly. In years when the lynx cycle is down and harvests are low or nonexistent, transects may provide the only data available to monitor trends in the lynx population. Transects are especially important when trying to determine when to liberalize lynx season after the cycle starts to increase. Wolverine transects are only necessary every few years to monitor long-term population trends because this species does not have a 10-year cycle.

Although trapping pressure is not directly measured, information gathered from trapper questionnaires, sealing data, and staff contact with trappers indicate trapping effort was down during the past 2 seasons. Fur prices were generally low, with only the highest quality fox and coyote being sold. The top price paid for lynx was 100 dollars, much lower than during the early 1980s when a 300 dollar average for a lynx was common. Also, marten averages have been below 50 dollars, compared to almost 100 in the late 1980s. Early and persistent deep snow over much of the Basin the last 2 years made the job of keeping traps operable and snow machine trails useable very difficult. All of these factors had negative impacts on trappers: traplines were generally shortened and trappers quit running lines earlier.

Beaver and otter harvests are well within sustainable limits in Units 11 and 13, and beaver and otter populations are harvested over large portions of both units. Most beaver and otter harvest come from roadside areas with remote sections of the unit remaining untrapped. One possible exception may be the Tiekel River in 13D where recent beaver harvests have been high because of roadside access along the Richardson Highway. In this area beaver numbers are down. No changes in beaver or otter trapping regulations are proposed at this time.

Current harvests of fox, coyote, mink, and weasels are lower than in previous years due to reduced trapping pressure and effort. This conclusion is based on responses to trapper questionnaires in which more individuals reported not trapping last year than the year before. If they did trap, the amount of effort was lower than in previous years. The reason for the decline in trapping pressure and effort was a combination of factors including deep snows and poor pelt prices. Questions of furbearer abundance indicate no population declines for these species. Harvests of fox, coyote, mink, and weasels are well within sustainable levels, and no changes in trapping or hunting regulations are recommended.

In Unit 13 lynx are managed by a tracking harvest strategy (THS). Under this management scheme, seasons are adjusted in length during the various stages of the lynx cycle to control the lynx harvest. The harvest objective for lynx under the THS is to reduce the catch of lynx after the initial decline in the lynx cycle. The trapper take would then remain low throughout the bottom of the cycle and 2 years into the recovery. The theory behind THS is that by reducing harvests during periods of lynx scarcity, trappers can harvest more during periods of abundance. Overall under a THS, the total lynx catch through a 10-year a cycle could be as much as 40% higher than when harvests are not restricted during cyclic declines. Current harvest figures show the lynx take during the last high between 1990 and 1993 was lower than the catch during the previous cycle. This was not a good evaluation of THS, however, because the management plan was not adopted until after the lynx cycle bottomed out and harvests were only restricted for 3 years. A management priority is to monitor THS over the next cycle and evaluate harvests.

To fully implement and evaluate THS, lynx harvest and abundance indices from track transects are monitored yearly. A harvest summary and a population trend estimate are made by 15 March. Recommendations as to season dates for the following year are completed by 20 April and forwarded to be included in next year's trapping regulation book by 1 May. Under the THS, emergency orders are not used to set season dates, as they only confuse the public. The current recommendation for next year is to maintain a 30–40 day season as the lynx population is declining toward the cyclic low. The current season of 1 December to 15 January is recommended. It may be necessary to further reduce the season as numbers reach a low level at the bottom of the cycle. At that time I would recommend a 30-day season with season dates running from 15 December to 15 January. I do not recommend a complete season closure at any time. The reasons for this recommendation are varied: strong trapper opposition to complete closure, no complete evaluation of THS, lower trapping effort for lynx due to continued low prices for fur, and the existence of refugia where lynx are not trapped because of lower trapping effort and which also are a source of broodstock for the next cycle.

A final recommendation concerning lynx is to continue buying carcasses. It is important to monitor reproduction by determining the percent kittens. Kittens should increase in the harvest as the cycle starts upward. Determining the percent kittens in the harvest based on pelt size is difficult because of trapper differences in the way pelts are handled and stretched. Also, ages and reproductive status of females can be determined by examining reproductive tracts.

Wolverine numbers appear at least stable and possibly increasing in more favorable habitat such as in the Chugach, Talkeetna and Alaska Range Mountains. Wolverine numbers are still very low in the forested habitats at lower elevations in Unit 13. Recent management actions of reducing season lengths and instituting a bag limit were directed at reducing the wolverine harvest to the point that animals would be abundant enough to promote dispersal to vacant habitat at lower elevations. Much of the unit with currently low wolverine numbers previously had higher populations; trappers tell of frequently taking wolverine near the road system as recently as the late 1970s. Part of the problem associated with attempts to increase wolverine numbers is the lack of suitable food sources. Moose are not as abundant throughout much of the timbered flats, and in recent years caribou have wintered in the Alaska Range or migrated east from both units.

Management recommendations include maintaining the current season until a population increase occurs. The bag limit of 2 wolverine is probably not an effective regulation as so few trappers even took more than 2 wolverine. The bag limit should be dropped as soon as it is documented that wolverine are increasing. Another recommendation is to complete wolverine censuses in 13A and 13D to monitor trends from the last census. It has been 8 years since we first started monitoring the wolverine population by censusing, and it is time to repeat some count areas.

Marten are currently considered the most important furbearer to those individuals currently still trapping in Units 11 and 13. Pelt prices have dropped by 50% from the 100 dollar averages of the late 1980s. In 1995 marten averaged only $42 at the Canadian auction. The drop in all pelt prices has resulted in a decrease in the number of individuals trapping all species. 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 indicate the marten population is relatively stable, but numbers fluctuate depending on food supply. Current harvest levels are probably sustainable. Because marten are such an important furbearer in Unit 13, an effort should be made to monitor trends and determine the harvest. The trapper questionnaire will now ask how many martens each trapper takes every year. Although this questionnaire is voluntary and undoubtedly many trappers will avoid listing their catch, it is hoped enough will comply to make this data worthwhile.

Measurable population objectives for furbearers have not been developed. This task will be very difficult given the current knowledge of furbearer populations. Funding is simply not available to census furbearers such as wolverine extensively enough to obtain unit population estimates and suitable census techniques have not been developed for particular species. Developing simple harvest guidelines for each species is a more practical approach for management.

LITERATURE CITED

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

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.

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

Prepared By:

Bob Tobey
Wildlife Biologist

Submitted By:

Ken Pitcher
Management Coordinator

Table 1 Unit 11 beaver harvest, 1989-94.

Regulatory year	Reported Harvest Adult	Juv (%)[a]	Total	Method of Take trap/snare (%)	Shot	(L&S)	Unk	Successful trappers
1989/90	10	1 (9%)	11	10 (91%)	1	0	0	5
1990/91	16	1 (6%)	17	17(100%)	0	0	0	4
1991/92	2	2(50%)	4	0 (0%)	0	0	4	1
1992/93	5	0 (0%)	5	4 (80%)	1	0	0	3
1993/94	0	0 (0%)	0	0 (0%)	0	0	0	0

[a]Beaver ≤ 52"

Table 2 Unit 13 beaver harvest, 1989-94.

Regulatory year	Reported Harvest Adult	Juv. (%)[a]	Total	Method of Take trap/snare (%)	Shot	(L&S)	Unk	Successful trappers
1989/90	133	26(16%)	160	147 (92%)	0	0	13	23
1990/91	75	26(26%)	101	91 (90%)	0	0	10	20
1991/92	139	39(22%)	178	173 (97%)	1	0	4	38
1992/93	164	63(28%)	227	227(100%)	0	0	0	38
1993/94	171	54(24%)	225	213 (95%)	0	0	12	32

[a]Beaver ≤ 52"

Table 3 Unit 11 otter harvest, 1989-94.

Regulatory	Reported Harvest				Method of Take				Successful
year	Males	Females	Unk.	Total	trap/snare(%)	Shot	(L&S)	Unk	trappers/hunters
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
1991/92	0 (0%)	1	0	1	1 (100%)	0	0	0	1
1992/93	0 (0%)	0	1	1	1 (100%)	0	0	0	1
1993/94	0 (0%)	0	0	0	0 (0%)	0	0	0	0

Table 4 Unit 13 otter harvest, 1989-94.

Regulatory	Reported Harvest				Method of Take				Successful
year	Males	Females	Unk.	Total	trap/snare(%)	Shot	(L&S)	Unk	trappers/hunters
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
1991/92	15 (65%)	7	1	23	20 (87%)	1	0	2	16
1992/93	6 (43%)	8	9	23	21 (91%)	0	0	2	11
1993/94	23 (68%)	11	8	42	37 (88%)	2	3	0	21

Table 5 Unit 11 lynx harvest, 1989-94.

Regulatory year	Reported Harvest Adults	Juv.(%)[a]	Total	Method of Take trap/snare(%)	Shot	(L&S)	Unk	Successful trappers/hunters
1989/90	No open season							
1990/91	28	7(20%)	38	38(100%)	0	0	0	7
1991/92	95	12(11%)	107	107(100%)	0	0	0	18
1992/93	52	2 (4%)	57	55 (96%)	2	0	0	16
1993/94	17	2(11%)	19	19(100%)	0	0	0	8

[a]Lynx ≤ 34" in length.

Table 6 Unit 13 lynx harvest, 1989-94.

Regulatory year	Reported Harvest Adults	Juv.(%)[a]	Total	Method of Take trap/snare(%)	Shot	(L&S)	Unk	Successful trappers/hunters
1989/90	No open season.							
1990/91	72	38(35%)	110	109(99%)	1	0	0	24
1991/92	105	17(14%)	122	119(98%)	3	0	0	37
1992/93	107	15(12%)	130	114(88%)	12	0	4	61
1993/94	70	10(13%)	80	77(96%)	3	0	0	38

[a]Lynx ≤ 34" in length.

Table 7 Unit 11 wolverine harvest, 1989-94.

Regulatory	Reported Harvest				Method of Take				Successful
year	Males(%)	Females(%)	Unk.	Total	trap/snare(%)	Shot	(L&S)	Unk	trappers/hunters
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
1991/93	6(60%)	4(40%)	0	10	10(100%)	0	0	0	5
1992/93	3(60%)	2 (4%)	0	5	5(100%)	0	0	0	4
1993/94	3(43%)	4(57%)	0	7	7(100%)	0	0	0	5

Table 8 Unit 13 wolverine harvest, 1989-94.

Regulatory	Reported Harvest				Method of Take				Successful
year	Males (%)	Females (%)	Unk.	Total	trap/snare(%)	Shot	(L&S)	Unk	trappers/hunters
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
1991/92	25(69%)	11(31%)	0	36	26(72%)	8	0	2	27
1992/93	19(59%)	10(31%)	3	32	23(72%)	8	0	1	25
1993/94	23(68%)	11(32%)	0	34	28(82%)	6	0	0	28

Table 9 Unit 11 beaver harvest chronology percent by time period, 1989-94.

Regulatory	Harvest periods								
year	October	November	December	January	February	March	April	Unk	*n*
1989/90	--	0	9	0	45	9	27	9	11
1990/91	--	0	0	47	6	47	0	0	17
1991/92	--	0	0	0	0	0	0	100	4
1992/93	--	20	40	0	40	0	0	0	5
1993/94	--	0	0	0	0	0	0	0	0

Table 10 Unit 13 beaver harvest chronology percent by time period, 1989-94.

Regulatory	Harvest periods								
year	October	November	December	January	February	March	April	Unk	*n*
1989/90	--	26	9	1	9	2	44	9	160
1990/91	10	20	17	7	3	7	25	11	101
1991/92	10	18	37	8	13	12	2	0	178
1992/93	9	13	27	3	5	29	13	1	227
1993/94	22	20	15	2	0	26	8	7	225

Table 11 Unit 11 otter harvest chronology percent by time period, 1989-94.

Regulatory year	Harvest periods							
	November	December	January	February	March	April	Unk	*n*
1989/90	25	0	50	25	0	0	0	4
1990/91	0	0	0	0	0	0	0	0
1991/92	0	0	100	0	0	0	0	1
1992/93	100	0	0	0	0	0	0	1
1993/94	0	0	0	0	0	0	0	0

Table 12. Unit 13 otter harvest chronology percent by time period, 1989-94.

Regulatory year	Harvest periods							
	November	December	January	February	March	April	Unk	*n*
1989/90	20	40	20	20	0	0	0	5
1990/91	37	13	31	13	0	0	6	16
1991/92	9	26	9	13	39	0	4	23
1992/93	17	30	4	0	48	0	0	23
1993/94	19	19	45	12	5	0	0	42

Table 13 Unit 11 lynx harvest chronology percent by time period, 1989-94.

Regulatory year	Harvest periods						
	October	November	December	January	February	March	*n*
1989/90	No open season						
1990/91	0	0	58	42	0	0	38
1991/92	0	10	45	45	0	0	107
1992/93	0	7	35	53	5	0	57
1993/94	5	10	32	53	0	0	19

Table 14 Unit 13 lynx harvest percent by transport method, 1989-94.

Regulatory year	Percent of harvest								
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	*n*
1989/90	No open season								
1990/91	0	3	0	0	85	0	8	4	110
1991/92	0	5	0	1	81	0	11	1	122
1992/93	1	1	0	0	55	1	17	25	130
1993/94	0	1	0	0	73	0	11	14	80

Table 15 Unit 11 wolverine harvest chronology percent by time period, 1989-94.

Regulatory year	Harvest periods						
	November	December	January	February	March	Unknown	*n*
1989/90	8	58	17	17	0	0	12
1990/91	0	8	46	31	15	0	13
1991/92	10	30	50	10	0	0	10
1992/93	0	60	40	0	0	0	5
1993/94	0	71	29	0	0	0	7

Table 16 Unit 13 wolverine harvest chronology percent by time period, 1989-94.

Regulatory year	Harvest periods								
	September	October	November	December	January	February	March	Unk.	*n*
1989/90	0	0	8	21	38	17	12	4	24
1990/91	3	0	11	29	31	26	0	0	35
1991/92	6	2	6	11	33	36	6	0	36
1992/93	3	0	6	41	44	6	0	0	32
1993/94	9	3	15	29	38	6	0	0	34

Table 17 Unit 11 beaver harvest percent by transport method, 1989-94.

	Percent of harvest								
Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
1989/90	36	27	9	0	27	0	0	0	11
1990/91	0	6	0	0	94	0	0	0	17
1991/92	0	0	0	0	0	0	0	100	4
1992/93	0	0	0	0	100	0	0	0	5
1993/94	0	0	0	0	0	0	0	0	0

Table 18 Unit 13 beaver harvest percent by transport method, 1989-94.

	Percent of harvest								
Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
1989/90	0	46	0	0	36	0	8	9	160
1990/91	0	25	5	0	31	0	13	26	101
1991/93	0	7	0	7	66	0	15	5	178
1992/93	0	8	2	2	71	0	13	4	227
1993/94	0	12	9	0	53	1	21	4	225

Table 19 Unit 11 otter harvest percent by transport method, 1989-94.

Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
	Percent of harvest								
1989/90	0	0	0	0	100	0	0	0	4
1990/91	0	0	0	0	0	0	0	0	0
1991/92	0	0	0	0	100	0	0	0	1
1992/93	0	0	0	0	100	0	0	0	1
1993/94	0	0	0	0	0	0	0	0	0

Table 20 Unit 13 otter harvest percent by transport method, 1989-94.

Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
	Percent of harvest								
1989/90	0	0	0	0	100	0	0	0	5
1990/91	6	6	0	0	50	0	25	13	16
1991/92	4	13	0	0	39	0	39	4	23
1992/93	0	4	0	0	83	0	4	9	23
1993/94	10	14	0	0	66	0	0	10	42

Table 21 Unit 11 lynx harvest percent by transport method, 1989-94.

Regulatory year	Percent of harvest: Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
1989/90	No open season								
1990/91	8	13	0	0	79	0	0	0	38
1991/92	0	14	0	0	81	0	0	5	107
1992/93	0	12	0	0	74	0	2	12	57
1993/94	0	0	0	0	79	0	5	16	19

Table 22 Unit 13 lynx harvest chronology percent by time period, 1989-94.

Regulatory year	Harvest periods: November	December	January	February	March	*n*
1989/90	No open season					
1990/91	0	55	45	0	0	110
1991/92	18	33	49	0	0	122
1992/93	25	37	38	0	0	130
1993/94	11	48	40	1	0	80

Table 23 Unit 13 wolverine harvest percent by transport method, 1989-94.

	Percent of harvest								
Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
1989/90	0	25	0	0	63	0	0	12	24
1990/91	17	11	0	3	51	0	6	11	35
1991/92	6	6	0	0	72	0	11	6	36
1992/93	9	0	0	0	69	0	6	16	32
1993/94	9	0	0	3	73	0	12	3	34

Table 24 Unit 11 wolverine harvest percent by transport method, 1989-94.

	Percent of harvest								
Regulatory year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
1989/90	0	8	0	0	83	0	0	8	12
1990/91	0	0	0	0	100	0	0	0	13
1991/92	0	20	0	0	80	0	0	0	10
1992/93	0	20	0	0	80	0	0	0	5
1993/94	0	29	0	0	71	0	0	0	7

LOCATION

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

Geographic 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. Between the early 1900s and 1920, trapping supplemented income of miners and Alaskan Natives. During the 1920s the gold rush ended and most of the miners moved out of the Fortymile area. 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 Units 12 and 20E. During population highs, muskrats are also economically important in Unit 12. Little intentional trapping effort is expended on coyotes, red foxes, mink, river otters, beavers, ermine, red squirrels, or wolverines because of low pelt values, low abundance, or difficulty and expense of trapping these species. Two recent 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 Units 12 and 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 Units 12 and 20E were 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, river 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, 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 lynx 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) ADF&G personnel field observations. We collected limited data by methods 2 and 3. Trapper responses in Units 12 and 20E to the voluntary statewide questionnaire program were low (34%). We did not do any specific furbearer fieldwork 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. To improve our ability to detect population trends for lynx, snowshoe hares, and river otter, we designed and will be conducting annual trend surveys beginning in March 1995.

We attempted to estimate the sustainable harvest for wolverines by developing a lotus model using research data from 2 Alaskan and 1 Yukon study and annual harvest data collected in Units 12 and 20E. The model included estimates of the sex and age structure of the population and of the harvest, reproductive rate, annual mortality rate, and the annual harvest.

RESULTS AND DISCUSSION

Population Status and Trend

Lynx: Based on track surveys, harvest data, and comments from area trappers, the lynx population in Unit 20E was at its cyclic high between 1990 and 1992. During this cycle, kit production became apparent in 1988, remained high through 1991, and declined substantially in 1992. According to local trappers, lynx remained uncommon during the 1989 trapping season but became common during 1990 and continued to increase. Lynx were abundant until 1992 and common during 1993. Based on movement data from a lynx project in the Yukon, a substantial portion of the lynx population in 1993 were transients from other areas. Preliminary data from the 1994 season indicates the Unit 20E lynx population has declined to a low level. The population is expected to remain low at least for the next 2 years based on current kit production.

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 during this period. The snowshoe hare population never increased to high numbers throughout Unit 12 but remained abundant in discrete areas. The percent kittens in the harvest declined to 3.5% in 1991. During 1992 and 1993, many of the lynx in Unit 12 were transients from other areas, similar to Unit 20E. Because of the influx of transients, harvest remained high until 1993. The 1994 Unit 12 preliminary harvest estimate (71) does not reflect a substantial decline in total catch, and the percent kittens (15.9%) was higher than expected. Twenty-four percent of the harvest and 73% of the kittens were caught in northwestern Unit 12. In the remainder of the unit, the percent kittens in the harvest was 6.3%.

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 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 Unit 20E, large populations of ground squirrels inhabit this area. Also, during the past 4 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 are important foods to wolverines in other areas of Alaska (Gardner 1985). Based on trapper questionnaires and incidental observations, the wolverine population is low and stable throughout the 2 units.

Marten: Marten populations declined after reaching a population high in 1987. Factors that may have caused the decline were low food availability, predators, and harvest. Incidental observations between 1990 and 1993 indicate that the microtine population was low in comparison with the 1980s. Low availability of microtines may affect marten natality 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 also have negatively affected marten population dynamics between 1990 and 1993. 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. Trapper questionnaires during 1993 and 1994 and incidental sightings by department personnel indicate the marten population may be increasing slowly in Units 12 and 20E.

In Units 12 and 20E, marten have contributed most of the income for area trappers during this report period. Competition among trappers for marten along the road system is high. Trappers use all accessible trails through marten habitat in both units. Lower marten populations and declining fur prices during 1992 and 1993 caused a slight reduction in trapper effort. Marten numbers began increasing in 1994 and pre-season fur price projections were optimistic, causing greater interest in marten trapping.

Red Fox: Based on trapper interviews and questionnaires and incidental sightings by department personnel, fox numbers declined during 1993 and 1994 in both units. Currently, most of the foxes' main prey populations are depressed (i.e., grouse, ptarmigan, snowshoe hares, and microtines). Because of low market value, there is little demand for foxes.

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. Between 1990 and 1992, muskrats were at low levels in both units, with little trapper effort. Based on observations by trappers in Northway, since 1993 muskrats are increasing in the Northway Flats, and village residents have increased trapping pressure.

Coyote: Coyotes increased in both units between the late 1980s and early 1990s and reached high numbers in certain areas, especially in southeastern Unit 12. Coyote populations declined following winter 1992 and are scarce or not present throughout Units 12 and 20E. There is little trapper demand for coyotes because of their low market value. Where coyotes are abundant, local residents have harvested high numbers.

Beaver: Beavers are common in both units in suitable, lowland habitats. Local trappers and residents report that beaver numbers are increasing in Unit 12 and are stable in Unit 20E.

Other Species: Trapper questionnaire results and sightings by area pilots and department personnel indicate that otters are uncommon in both Units 12 and 20E, ermine and red squirrel were common and stable, and mink were scarce. There is little trapper demand for these species. Respondents also listed hares, ptarmigan, and grouse as scarce. Microtines were reported as common and increasing.

Mortality

Harvest

Hunting Season and Bag Limits-Units 12 and 20E.

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

Trapping Seasons and Bag Limits-Units 12 and 20E.

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

Board of Game Actions and Emergency Orders. The Board of Game adopted a regulation during spring 1992 that allows the Department of Fish and Game to annually set lynx season independently of the board process for Interior Units 12, 20, and 25C. This action enhances the department's ability to apply the lynx tracking harvest strategy that was adopted as a board policy in 1987. That strategy is designed to afford the greatest protection to lynx population during the low part of the population cycle to allow for a more rapid and larger growth phase. In the future the Division of Wildlife Conservation will annually set season length and timing based on the trend of the lynx population. The next time the Board of Game will address furbearer proposals will be at the spring 1998 meeting.

Hunter/Trapper Harvest.

Lynx: The 1993 lynx harvest in Unit 12 was 121 (Table 1), the fourth consecutive year of high harvest. However, the 1993 harvest was lower than the annual average of 180 reported from 1990 to 1992 and reflects the declining trend of the lynx population. The percentage of kittens in the harvest was 2%, similar to percentages in 1991 (4%) and 1992 (2%). During the population growth phase and the first year at its peak, the average percent kittens in the harvest was 20%. Snowshoe hares declined substantially in 1991 and were only found in isolated pockets. Based on tracks, most of the lynx caught in 1993 were transients.

In Unit 12, 28 trappers reported harvesting 121 lynx during 1993 (Table 1). This represents a catch rate of 4.3 lynx per trapper. Lynx prices were relatively low during 1992 and 1993, and fewer trappers chose lynx. Most trappers used snowmachines for transportation (84%; Table 5) and leghold traps (68%) to catch lynx. Lynx trapping season during 1993 was 1 December to 31 January, and harvest was comparable between the 2 months (Table 3). Local trappers supported the season timing because it coincided with optimum fur primeness.

In Unit 20E the 1993 lynx harvest was 46, the lowest harvest since 1989 (Table 2). The percentage of kittens in the harvest was 2%, comparable with the 1992 level of 3% but substantially lower than the 1988-1991 average of 26%. Eleven trappers reported harvesting lynx during 1994 (Table 2). This represents a catch rate of 4.2 lynx per trapper. Most lynx were harvested with traps (74%). The primary method of trapper transportation was snowmachine (85%; Table 6). During 1993 the lynx harvest was split about equally between December and January (Table 4).

Wolverine: The 1993 wolverine harvest in Units 12 and 20E was 21 and 5, respectively (Tables 1 and 2). The Unit 12 harvest exceeded the 5-year average of 18. Most of the harvest in Unit 12 occurred in mountainous areas. Many trappers believe the wolverine population in Unit 12 has increased over the past 5 years due to the influx of 10,000 to 45,000 Nelchina and Mentasta caribou to the unit each winter since 1989. The 1993 Unit 20E wolverine harvest was comparable with the 5-year average of 6 wolverines. In Unit 20E there was no harvest concentration; instead, a few wolverines were captured in most trapping areas. This indicates the wolverine population is distributed at low densities across the area. Males have composed 73% (range = 59–94%) and 67% (range = 60–75%) of the harvest since 1989 in Units 12 and 20E, respectively.

To estimate sustainable harvests for wolverines, we varied the harvest rate for a given set of birth and mortality rates observed in other Alaskan and Yukon wolverine populations until the population growth rate stabilized near zero. Under these conditions, we estimated the sustainable harvest rate to be 4% to 15% of the fall wolverine population. To evaluate the current harvest in Units 12 and 20E, I estimated the area's wolverine populations using a density range found in 2 areas with comparable habitats in Unit 13 (Gardner and Becker 1991). I estimated there are 45 to 82 wolverines in Unit 20E and the current harvest rate was 8% to 14%. Under this harvest intensity, harvest is high enough to limit population growth in Unit 20E, considering the low food base and probable low reproductive rate. In Unit 12 I estimated the harvest rate to be as high as

20%. Most harvest is concentrated in the mountains and primarily is composed of males. I suspect that the resident population in that area has been overexploited and most of the harvest is dispersing young males from adjacent areas.

Beaver: Interest in beaver trapping has increased slightly in Units 12 and 20E the past 3 years. Most of the increased take in Unit 12 was due to increased trapping activity by a few individuals from Northway. Still, overall harvest is low in both Units 12 and 20E because of low pelt prices and difficult trapping conditions. The 1993 reported beaver harvest in Unit 12 was 35 (Table 1). This harvest was similar to the previous 2 years but higher than harvests between 1987 and 1990 (16). In Unit 20E the annual harvest averaged 8 the past 3 years, compared to the previous 5-year average of 3 (Table 2). Beavers in Unit 20E have been lightly trapped since the mining heyday in the early 1900s.

Otter: Otter populations in both Units 12 and 20E are low due to a lack of suitable habitat. Area trappers seldom select for otters due to the difficulty in catching them and the low fur price. Only 1 otter has been trapped in Unit 20E during the past 5 years, and an average of only 6 otters have been taken annually in Unit 12.

Habitat Assessment and Enhancement

Snowshoe hares never reached the expected high densities or extended their range to occupy all suitable habitat in Units 12 and 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. 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 Unit 20E because of wildfires. In these areas, the hare and lynx populations are much higher, compared with the rest of Units 12 and 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 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

Income from trapping continues to be important to many local residents. Most of the local trappers have a long history of trapping in the area ($\bar{x}$ = 18.4 years) and have developed extensive lines ($\bar{x}$ = 50 miles) monitoring between 50 and 400 traps. During each trapping season, the fur market primarily drives trapper effort. Trappers are able to conserve the furbearer populations along their lines because other trappers respect most of the established traplines. However, furbearer populations are heavily exploited along the area road system, especially marten, lynx, and fox because the area trappers consider public road corridors open lines, which has created intense competition and overexploitation in some areas.

Trapping pressure was not directly measured. However, information collected from sealing data, trapper questionnaires, and discussions with area trappers indicate that pressure on marten and lynx declined slightly in 1993 due to low fur prices for those species and high fur prices for wolves. Trappers selected for marten in 1994 due to early season projected fur prices and increasing marten numbers. Trappers expended little effort in trapping lynx and wolves because of the poor market for the species. Trapping pressure was low on wolverine, beaver, otter, muskrat, and fox during this report period; low populations and reduced pelt prices for these species have reduced trapper interest.

In most years marten are the most sought after furbearer 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 season length, bag limits, or methods and means of harvest.

Lynx are trapped intensively during periods of high fur price and population highs. Currently, lynx numbers are low in both units and the fur price is below normal. Under the lynx harvest tracking strategy, trapping will not limit lynx population growth.

During the report period I developed the following specific management objectives for lynx:

1 Apply the tracking harvest strategy using a) trends in harvest and b) other trend indicators, independent of harvest, to estimate changes in lynx and hare abundance.

2 Annually estimate lynx population reproductive performance and age structure using a) pelt measurements from harvested lynx and b) carcasses of harvested lynx.

To accomplish these objectives I plan to conduct the following additional activities beginning in regulatory year 1994.

1 Complete annual aerial surveys to estimate trend in lynx and hare relative abundance.

2 Examine carcasses purchased from trappers to estimate population reproductive performance and age structure.

Wolverines have declined since the 1960s and are currently stable at low levels in both units (Kelleyhouse 1990). Wolverine food resources in terms of ungulate biomass is low in Unit 20E but has increased in Unit 12 during the past 7 years due to the Nelchina and Mentasta caribou herds' wintering in the unit. Wolverine reproductive rate is dependent on food availability (Magoun 1985). Because of low ungulate densities and lack of ground squirrels in Unit 20E and in most of Unit 12, I believe the wolverine populations are food limited. Area trappers do not select for wolverines, but harvest is high enough to probably limit population growth and restrict any range expansion to the lowland habitats. Further restricting the wolverine trapping seasons would not substantially benefit population trend because the primary limiting factor is low prey availability.

All other furbearer populations are fluctuating within their historical range of values and do not warrant changes in seasons and bag limits or in methods and means.

Table 1 Unit 12 beaver, lynx, otter, and wolverine harvest, regulatory years 1986-1993

Regulatory year	Reported harvest M	F	Unk sex	Juv[a]	Adults	Unk age	Estimated harvest Unreported	Illegal	Method of take Trap/snare	Shot	(L&S)[b]	Unk	Total harvest	Successful trappers/ hunters
Beaver														
1986	0	0	55	5	50	0	20	0	44	3	0	8	75	16
1987	0	0	18	5	13	0	20	0	18	0	0	0	38	6
1988	0	0	15	2	13	0	20	0	15	0	0	0	35	7
1989	0	0	14	3	11	0	20	0	13	0	0	1	34	5
1990	0	0	18	6	12	1	20	0	18	0	0	1	39	7
1991	0	0	40	10	30	0	20	0	36	0	0	4	60	11
1992	0	0	34	1	33	0	20	0	34	0	0	0	54	6
1993	0	0	35	2	32	1	20	0	34	0	0	1	55	11
Lynx														
1986	0	0	80	11	69	0	0	0	78	0	0	2	80	32
1987	0	0	74	21	53	0	0	0	72	2	0	0	74	35
1988	0	0	70	13	57	0	0	0	65	5	0	0	70	29
1989	0	0	78	18	60	0	0	0	74	3	0	1	78	28
1990	0	0	133	23	110	0	0	0	131	2	0	0	133	40
1991	0	0	174	6	163	5	0	0	170	4	0	0	174	49
1992	0	0	232	5	227	0	0	0	218	6	0	8	232	43
1993	0	0	121	2	117	2	0	0	103	3	0	15	121	28
Otter														
1986	2	2	0	0	0	7	3	0	4	0	0	0	7	3
1987	1	8	1	0	0	13	3	0	7	3	0	0	13	5
1988	2	0	0	0	0	5	3	0	2	0	0	0	5	2
1989	0	0	0	0	0	3	3	0	3	0	0	0	3	0
1990	1	0	0	0	0	4	3	0	1	0	0	0	4	1
1991	0	0	6	0	0	6	3	0	6	0	0	0	6	4
1992	3	3	2	0	0	8	3	0	6	1	0	1	8	6
1993	0	0	0	0	0	0	3	0	0	0	0	3	3	0

Table 1 Continued

Regulatory year	Reported harvest M	F	Unk sex	Juv[a]	Adults	Unk age	Estimated harvest Unreported	Illegal	Method of take Trap/snare	Shot	(L&S)[b]	Unk	Total harvest	Successful trappers/ hunters
Wolverine														
1986	18	14	0	0	0	32	0	0	27	2	0	3	32	15
1987	13	5	1	0	0	19	0	0	18	0	1	0	19	12
1988	9	5	0	0	0	14	0	0	10	4	0	0	14	8
1989	8	4	0	0	0	12	0	0	10	0	0	2	12	11
1990	13	1	0	0	0	14	0	0	14	0	0	0	14	8
1991	16	10	1	0	0	27	0	0	25	2	0	0	27	16
1992	9	5	0	0	0	14	0	0	14	0	0	0	14	10
1993	15	3	3	0	0	21	0	0	19	2	0	0	21	15

[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 2. Unit 20E beaver, lynx, otter, and wolverine harvest, regulatory years 1986-1993.

Regulatory year	Reported harvest: M	F	Unk sex	Juv[a]	Adults	Unk age	Estimated harvest: Unreported	Illegal	Method of take: Trap/snare	Shot	(L&S)[b]	Unk	Total harvest	Successful trappers/ hunters
Beaver														
1986	0			0	5	0	5	0	1	0	0	4	10	2
1987	0			0	3	0	5	0	3	0	0	0	8	1
1988	0			0	1	0	5	0	1	0	0	0	6	1
1989	0	0	3	0	3	0	5	0	3	0	0	0	8	2
1990	0	0	3	0	3	0	5	0	3	0	0	0	8	2
1991	0	0	10	0	10	0	5	0	10	0	0	0	15	5
1992	0	0	6	1	5	0	5	0	6	0	0	0	11	3
1993	0	0	9	0	9	0	5	0	9	0	0	0	14	2
Lynx														
1986	0			0	11	0	0	0	11	0	0	0	11	5
1987	0			3	6	0	0	0	9	0	0	0	9	5
1988	0			7	18	0	0	0	25	0	0	0	25	10
1989	0	0	29	10	19	0	0	0	29	0	0	0	29	12
1990	0	0	70	19	51	0	0	0	68	2	0	0	70	22
1991	0	0	113	16	96	1	0	0	111	0	0	2	113	14
1992	0	0	97	3	89	5	0	0	93	3	0	1	97	21
1993	0	0	46	1	45	0	0	0	46	0	0	0	46	11
Otter														
1986[c]														
1987[c]														
1988[c]														
1989[c]														0
1990[c]														0
1991		1		0	0	0	0	0	1	0	0	0	1	0
1992[c]														1
1993	1	0		0	1	0	0	0	0	1	0	0	1	1

Table 2 Continued

Regulatory year	Reported harvest M	F	Unk sex	Juv[a]	Adults	Unk age	Estimated harvest Unreported	Illegal	Method of take Trap/snare	Shot	(L&S)[b]	Unk	Total harvest	Successful trappers/ hunters
Wolverine														
1986	5	5	0	0	0	10	0	0	8	0	0	2	10	9
1987	5	2	0	0	0	7	0	0	5	0	0	2	7	6
1988	1	0	0	0	0	1	0	0	1	0	0	0	1	1
1989	10	4	0	0	0	14	0	0	14	0	0	0	14	11
1990	3	1	0	0	0	4	0	0	4	0	0	0	4	4
1991	5	4	0	0	0	9	0	0	8	0	0	1	9	7
1992	3	2	0	0	0	5	0	0	5	0	0	0	5	5
1993	7	3	0	0	0	10	0	0	10	0	0	0	10	5

[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] No reported harvest.

Table 3 Unit 12 beaver, lynx, otter, and wolverine harvest[a] chronology by time period, regulatory years 1986-1993

Regulatory year	Harvest periods						
	Sep/Oct	Nov	Dec	Jan	Feb	Mar	Apr
Beaver							
1986	0	7	7	2	7	26	6
1987	0	9	0	0	0	7	2
1988	0	6	2	0	2	5	0
1989	0	9	1	0	0	4	0
1990	0	1	0	1	9	6	1
1991	0	4	4	0	1	9	18
1992	0	7	6	1	0	10	5
1993	0	13	4	0	3	3	5
Lynx							
1986	0	7	46	27	0	0	0
1987	0	0	34	34	1	0	0
1988	0	2	34	25	2	0	0
1989	0	3	51	23	0	0	0
1990	0	4	36	90	0	0	0
1991	0	33	58	79	4	0	0
1992	0	45	78	71	32	0	0
1993	0	1	47	56	2	0	0
Otter							
1986	0	0	0	0	2	2	0
1987	0	0	0	0	0	0	0
1988	0	0	1	0	0	0	1
1989	0	0	0	1	0	0	0
1990	0	0	0	0	0	1	0
1991	0	0	0	1	4	0	0
1992	1	0	0	2	1	3	0
1993	0	0	8	0	0	0	0
Wolverine							
1986	0	1	2	5	9	4	0
1987	4	1	1	4	4	0	0
1988	0	1	1	4	4	0	0
1989	0	1	3	6	0	0	0
1990	0	1	3	4	6	0	0
1991	1	2	6	8	10	0	0
1992	0	2	4	3	5	0	0
1993	1	1	2	7	10	0	0

[a] Unknown not included.

Table 4 Unit 20E beaver, lynx, otter, and wolverine harvest chronology by time period, regulatory years 1986-1993

Regulatory year	Harvest periods					
	Sep/Oct	Nov	Dec	Jan	Feb	Mar	Apr
Beaver							
1986	0	0	0	0	1	2	2
1987	0	1	2	0	0	0	0
1988	0	0	0	0	0	1	0
1989	0	0	2	0	0	1	0
1990	0	0	2	0	0	1	0
1991	0	2	6	0	0	2	0
1992	0	0	0	0	2	2	2
1993	0	2	2	0	0	0	0
Lynx							
1986	0	0	7	4	0	0	0
1987	0	0	5	4	0	0	0
1988	0	0	11	12	0	0	0
1989	0	0	19	9	1	0	0
1990	0	18	23	29	0	0	0
1991	0	20	55	37	0	0	0
1992	1	15	26	32	22	0	0
1993	0	0	24	22	0	0	0
Otter							
1986[a]							
1987[a]							
1988[a]							
1989[a]							
1990[a]							
1991	0	0	1	0	0	0	0
1992[a]							
1993	0	0	1	0	0	0	0
Wolverine							
1986	1	3	2	3	1	0	0
1987	0	0	0	4	2	0	0
1988	0	0	0	0	1	0	0
1989	0	1	6	7	0	0	0
1990	0	0	1	2	1	0	0
1991	0	1	3	4	1	0	0
1992	0	1	0	0	5	0	0
1993	0	0	1	6	3	0	0

[a] No reported harvest.

Table 5 Unit 12 harvest percent by transport method, regulatory years 1986-1993

Regulatory year	Percent of harvest							
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Beaver								
1986	0	20	0	0	56	0	7	16
1987	0	28	0	0	56	0	17	0
1988	0	0	0	0	73	0	27	0
1989	0	0	0	0	93	0	0	7
1990	0	0	0	0	47	0	5	47
1991	0	3	0	0	68	0	0	30
1992	0	0	38	0	62	0	0	0
1993	0	0	14	0	49	0	20	17
Lynx								
1986	0	1	0	0	85	0	10	4
1987	3	5	0	0	74	0	7	11
1988	1	1	0	0	86	0	11	0
1989	4	10	0	0	82	0	0	4
1990	2	5	0	0	89	0	2	3
1991	0	1	0	0	83	1	12	3
1992	0	1	0	0	88	0	8	4
1993	0	4	0	0	84	0	3	8
Otter								
1986[a]								
1987[a]								
1988[a]								
1989[a]								
1990[a]								
1991	0	0	0	0	100	0	0	0
1992	0	0	38	0	50	0	0	13
1993[a]								

Table 5 Continued

Regulatory year	Percent of harvest							
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Wolverine								
1986	34	0	0	0	50	0	6	9
1987	5	5	0	0	90	0	0	0
1988	29	0	0	7	57	0	0	7
1989	17	25	0	0	42	0	0	17
1990	0	21	0	0	57	0	0	21
1991	15	0	0	0	81	0	0	4
1992	0	0	0	0	100	0	0	0
1993	24	0	0	0	76	0	0	0

[a] No reported harvest.

Table 6 Unit 20E harvest percent by transport method, regulatory years 1986-1993

Regulatory year	Percent of harvest							
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Beaver								
1986	0	20	0	0	0	0	0	80
1987	0	0	0	0	100	0	0	0
1988	0	0	0	0	100	0	0	0
1989	0	0	0	0	100	0	0	0
1990	0	67	0	0	33	0	0	0
1991	8	20	0	0	80	0	0	0
1992	0	0	0	0	67	0	0	33
1993	0	0	0	0	100	0	0	0
Lynx								
1986	0	18	0	0	64	0	0	18
1987	0	33	0	0	67	0	0	0
1988	12	24	0	8	48	0	8	0
1989	0	45	0	0	48	0	7	0
1990	0	7	0	0	83	0	1	9
1991	25	4	0	0	66	0	0	5
1992	8	2	0	1	96	0	0	1
1993	9	0	0	4	85	0	2	0
Otter								
1986[a]								
1987[a]								
1988[a]								
1989[a]								
1990[a]								
1991	0	0	0	0	100	0	0	0
1992[a]								
1993	0	0	0	0	100	0	0	0

Table 6 Continued

Regulatory year	Percent of harvest: Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Wolverine								
1986	10	20	0	0	70	0	0	0
1987	29	0	0	0	29	0	14	29
1988	0	0	0	0	100	0	0	0
1989	14	36	0	0	50	0	0	0
1990	25	0	0	0	75	0	0	0
1991	44	0	0	0	44	0	0	11
1992	0	0	0	0	100	0	0	0
1993	70	10	0	0	20	0	0	0

[a] No reported harvest.

LOCATION

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

Geographic Description: Eastern Upper Cook Inlet

BACKGROUND

Game Management Unit 14 is divided into 3 subunits, and contains more than half (pop. 280,000) of the people living in Alaska. Currently, the human population is increasing. Most development has occurred in Subunits 14C and 14A, but in recent years many new roads and homes have been built in the western portion of Subunit 14B.

Before this development, fur populations probably fluctuated relative to weather effects and available habitat. Populations are currently affected by natural limiting factors, habitat alteration, human density, and technological advances allowing hunters and trappers access to most parts of the area. Most fur trapping and hunting is recreational; however, resource users generally do not go far from established roads or snowmachine trails. Fur trapping and hunting is prohibited or severely restricted in the western half of Subunit 14C; therefore, most consumptive use occurs in Subunits 14A and 14B.

MANAGEMENT DIRECTION

Management Goals

- Maintain existing populations to provide 1) the opportunity to trap and hunt furbearers and 2) for optimal harvest of furbearers

Management Objectives

- Develop measurable population objectives for all fur species

METHODS

We collected information on trapping conditions, trapper effort, and trends in fur abundance and distribution, using a trapper questionnaire sent in April to trappers sealing fur in Unit 14.

We collected harvest data for beaver, land otter, lynx, and wolverine by sealing all pelts presented for examination. Marten were sealed during the 1992-93 and 1993-94 seasons. During sealing, data on age (for beaver and lynx) and sex (for land otter, lynx, marten, and wolverine) were collected when practical. The month, method of take, and mode of trapper/hunter transport were also recorded. Minimum harvest data for other species were collected from voluntary responses included with the trapper questionnaire.

During 1991-92 harvest objectives, based on long-term average harvests, were established for the species (except marten) for which sealing is required (Masteller 1993). For Unit 14 the annual harvest objectives are land otter, 20; lynx, 12 (when the season is open); wolverine, 10; and beaver, 250.

To begin evaluating long-term trends in abundance, 4 furbearer track count trend lines were established in Units 14A (Knik River, Kings River, and Pt. MacKenzie) and 14B (Willow/Iron Creeks) during winter 1991-92. To help ensure comparable results between years, lines were surveyed the same number of hours after a recent snowfall, at roughly the same time during winter (Golden 1993). Trend lines varied from 5.9–9.7 miles in length and were surveyed from a snowmachine or 4-wheeler (Knik River). Generally, we counted tracks for large species (marten, fox, coyote, wolf, lynx, and wolverine) on the entire transect and counted tracks of smaller species on 1-mile segments of the transect (unless densities were low enough to record all tracks on the transect). Each trend line was surveyed once per winter, except Kings River, which was not surveyed during 1992-93.

We censused 10 muskrat pushup count areas adjacent to the Glenn Highway on and near the Palmer Hay Flats State Game Refuge (PHFSGR) in eastern Unit 14A during late March or early April of each year (Masteller 1993). Surveys were conducted by intensive ground search, and pushups were classified as small (<3 feet in diameter) or large. Changes in relative abundance over time were noted for each count area and for the entire area to help assess effects of mitigation efforts related to the expansion of the highway from 2 to 4 lanes (USDOT and DOT/PF 1988).

RESULTS AND DISCUSSION

Population Status and Trend

Population Size

During the reporting period, no studies were conducted to determine population size for any fur species in Unit 14.

On 23 February 1995 we conducted surveys to estimate the density of wolverines in Unit 14C (excluding Anchorage). The area was estimated to contain 17 wolverines (11–23 individuals at the 90% confidence interval), a density of $1.2/100mi^2$ (R. Sinnott, pers. commun.).

Population trend information was collected from trapper questionnaires and track transects. During the 3-year reporting period, the response rate to our questionnaire declined from 68–46%, with the number of trappers actively seeking fur declining from 40 to 24. This was probably due to poor fur prices, difficult weather conditions, and aging of the trapping public.

Trappers reported relative abundance of most fur species as common or abundant; however, marten, lynx, and wolverine were generally scarce. Most trappers classified hare numbers as low. When asked to classify trends in abundance, trappers identified no significant changes between years. Reports of newly colonized areas and continued “nuisance” activity indicate beaver numbers are healthy and probably increasing.

Track counts on trend lines indicate no significant trends in furbearer abundance during the last 3 years (Table 1); however, these transects should not be expected to reveal small changes in abundance over relatively short periods. These transects should discern large changes in abundance and also provide some distribution data.

Efforts by the Department of Transportation to inundate a portion of PHFSGR (in muskrat count area 1) to increase muskrat abundance have not succeeded (Weiss 1995). It appears insufficient water flow into the mitigation area has prevented an increase in water depth. Numbers of pushups have remained fairly constant over the entire study area but have fluctuated widely within count areas (Table 2). Count area 1 in 1994 had 13% fewer pushups than in 1991. Currently, the monitoring agencies are discussing alternatives to achieve the proper mitigation.

Distribution and Movements

Coyote and beaver are distributed throughout the lower-elevation portions of Unit 14. Lynx occur primarily in the Knik River drainage, although individuals are occasionally seen or harvested in other areas. During 1992-93 2 radiocollared lynx from Kluane Park (near Whitehorse in Canada's Yukon Territory) were trapped in Units 13 and 14. The hare population near Whitehorse had crashed during 1990-91, causing widespread dispersal of marked lynx during 1992-93 (Slough and Mowat 1993). Marten are uncommon throughout the area, primarily due to lack of continuous habitat. Smaller species are present in suitable habitat in most parts of Unit 14.

<u>Mortality</u>

Harvest

Harvest of those species for which sealing is required was moderate during the last 3 years and probably fluctuates primarily due to weather and market conditions. Beaver and otter harvests increased from those of the late 1980s but remained below historical levels (Tables 3 and 4, respectively). Lynx harvest, most of which occurs in the Knik River drainage, declined during the reporting period (Table 5). Wolverine harvest increased during the reporting period, fluctuating around the 10-year average (Table 6).

Harvests of beaver, lynx, and wolverine generally fluctuated at or below objective levels (250 beaver, 12 lynx, and 10 wolverine per year). During 1993-94 the otter harvest was substantially higher than the objective level (20 otters), probably reflecting strong market demand.

A regulation shortening the marten season to 1 month and requiring marten be sealed went into effect during the 1992-93 season. Reported harvest of marten was 6 and 11 during 1992-93 and 1993-94, respectively. However, some trappers may have been unaware of the new regulations, as marten harvest was reported (via the trapper questionnaire) to be 15 and 2 for 1992-93 and 1993-94, respectively. During 1990-91 and 1991-92 trappers reported taking 24 and 33 marten, respectively, in Unit 14. The lower harvest in recent years was probably due to the shortened season and difficult trapping and travel conditions.

Harvest of species for which sealing is not required is unknown, but minimum numbers are available from voluntary harvest returns. Response to our voluntary harvest report has been excellent; of the active trappers responding to our questionnaire, an average of 88% (n = 21–35) filled out the voluntary harvest form. During the reporting period minimum harvest ranges were coyote, 17–53; red fox, 22–42; mink, 37–112; weasels, 3–38; muskrats, 21–320; squirrels, 0–25.

Season and Bag Limit. During regulatory years 1991-92, 1992-93 and 1993-94, the seasons and bag limits were as follows:

Trapping

Species (Unit)	Season	Bag Limit
Beaver (14A,B)	Nov. 10-Apr. 30	30 per season
(14C)except 1991-92	Dec. 1 -Apr. 15	20 per season
(14C) 1991/92	Feb. 1 -Mar. 31	20 per season
Coyote (14A,B)	Nov. 10-Mar. 31	No limit
(14C)	Nov. 10-Feb. 28	No limit
Red Fox (14A,B)	Nov. 10-Feb. 28	No limit
(14C)	Nov. 10-Feb. 28	1 per season
Lynx	Dec. 15-Jan. 15	No limit
Marten (except 1991-92)	Nov. 10-Dec. 10	No limit
Marten (1991-92)	Nov. 10-Jan. 31	No limit
Mink/Weasels	Nov. 10-Jan. 31	No limit
Muskrat	Nov. 10-May 15	No limit
Land Otter (14A,B)	Nov. 10-Mar. 31	No limit
(14C)	Nov. 10-Feb. 28	No limit
Squirrels/Marmots	No closed season	No limit
Wolverine		
(except 1991-92)	Nov. 10-Jan. 31	2 per season
Wolverine (1991-92)	Nov. 10-Feb. 28	No limit

Hunting

Species (Unit)	Season	Bag Limit
Coyote	Sep. 1-Apr. 30	2 per season
Red Fox	No open season	
Lynx	Dec. 15-Jan. 15	2 per season
Wolverine	Sep. 1-Mar. 31	1 per season

Board of Game Actions and Emergency Orders. During spring 1991 the Board of Game closed the red fox hunting season in Units 1–7, 14, and 15. Biologists believed fox populations in these units were low, and the Board voted to limit harvest to those periods when the pelts were prime. During spring 1992 the marten season was reduced to 1 month (Nov. 10–Dec. 10) in Units 13E, 14, and 16. This was in response to 2 proposals, from trappers in the Skwentna and Talkeetna areas, seeking to close or reduce the season due to concern for low marten numbers. In spring of 1992 the Board of Game also approved a department proposal to require sealing of marten from those units.

The Board also modified lynx trapping regulations to allow the department to more easily implement the Tracking Harvest Strategy. The change set a general lynx season (Nov. 10–Feb. 28) but allowed the department to shorten or close the season within that period, depending on local lynx/hare abundance.

Hunter/Trapper Harvest. As a result of relatively low fur prices, variable weather and trapping conditions, and regular job and family commitments, most trappers in Unit 14 operate on a recreational basis. Many complained when the marten season was shortened, especially because unseasonably warm November weather made travel and trapping difficult in both 1992-93 and 1993-94.

Harvest Chronology. Weather and season dates govern the timing of most fur harvest. For species except beaver, small sample sizes should also be considered when interpreting harvest chronology. Most beavers were taken during spring (Table 7), when trapping was easier due to open water. Otter, lynx, and wolverine harvest occurred primarily in midwinter (Tables 8–10).

Transport Methods. Most trappers in Unit 14 worked from highway vehicles, snowmachines, and 4-wheelers (Tables 11–14). Airplanes were a significant transport method only for wolverine trappers. The use of dogsleds, skis, or snowshoes has declined greatly with improvements in snowmachine technology.

Other Mortality

During the reporting period 13, 9, and 8 beavers were taken in 1991-92, 1992-93 and 1993-94, respectively, under nuisance beaver control permits authorized by the department. Most beavers were taken by Alaska Railroad Corporation maintenance crews to prevent damage to road and rail beds.

CONCLUSIONS AND RECOMMENDATIONS

Unit 14 provides ample opportunity to trap and hunt furbearers. The furbearer populations in this area are used primarily by recreational trappers operating near established roads and snowmachine trails. Most cash income is derived from the harvest of beavers and otters. Harvest of other species is generally low, probably due to low fur prices, variable weather, and aging of the trapping public.

Without information on furbearer population density, composition and production, we have no way to determine if harvests are optimal. Based on the relatively large areas of unexploited habitat and known reproductive rates for fur species, we believe current harvest levels are within sustainable limits.

During the reporting period harvest levels for beaver, lynx, and wolverine fluctuated at or below the minimum harvest objectives. For most species there is no bag limit, and it is difficult to encourage more harvest when market forces, weather, and changes in human attitudes primarily govern trapping pressure. At the January 1995 Board of Game meeting, the department supported an extended trapping season (Nov. 10–May 15) and elimination of the trapping bag limit for beavers. This will provide more open-water trapping opportunity and may reduce the number of nuisance beaver complaints. These changes were adopted and will take effect during 1995-96.

Harvest of otters during 1993-94 was significantly higher than the minimum objective level, probably due to recent demand from Asian buyers. Future harvests and market fluctuations should be monitored; if trapper surveys and harvest trends indicate otter populations are being adversely impacted, we could consider recommending season or bag limit restrictions to reduce harvest.

For marten, I recommend a minimum harvest objective be developed when we have sealing data from 5 seasons. There are few trappers catching marten in Unit 14, and harvest probably will be affected mostly by weather during the 1-month season.

Developing measurable population objectives is difficult given the secretive nature of fur species. Funding levels do not allow direct measurement of fur populations, but track transects will indicate population trend, species distribution, and relative abundance over long periods if we follow proper survey protocol.

Because we assess local conditions by track transects, additional transects dispersed throughout the unit would provide a better assessment for the area. During winter 1994-95, 20 0.6-mile transects were established on Ft. Richardson Army Base in Subunit 14C (R. Sinnott pers. commun.). I recommend 2 additional track transects be established in Subunit 14B, in the Sheep Creek and Larson Lake areas. This should produce adequate coverage of Unit 14.

Some fur populations, and especially their prey, can fluctuate rapidly in 3- or 4-year periods. To collect optimum trend information, it would be best to survey each transect 3 times per season. However, personnel and time constraints preclude this sampling intensity, given the specific sampling protocol and its dependence on weather and tracking conditions. Attempting to survey each transect once per season would be a more realistic sampling intensity. If this proves difficult, we should schedule each transect for survey every other year. This would hopefully allow managers to note significant population changes.

LITERATURE CITED

Golden, H. N. 1993. Furbearer track count index testing and development. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Res. Prog. Rep. Proj. W-24-1, Study 7.17. Juneau. 48pp.

Masteller, M. A. 1993. Furbearers: survey-inventory management report.Pages 132-146 in Abbot, S. M., ed. Annual report of survey-inventory activities. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-23-3/4. Study 7.0. Juneau. 303pp.

Slough, B. G. and G. Mowat, 1993. Yukon lynx harvest study progress report. 7th Northern Furbearer Conference (agenda and abstracts), April 22 and 23, 1993. Whitehorse, Yukon Territory, Canada. 33pp.

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.

Weiss, E. W. 1995. Glenn Highway, Eklutna to Parks Highway project; wetlands mitigation monitoring project, 1994 year-end progress report.Alaska Dep. Fish and Game, Habitat and Rest. Div. Anchorage. 32pp.

Prepared By:

Mark Masteller
Wildlife Biologist

Submitted By:

Karl Schneider
Management Coordinator

Table 1 Number of furbearer tracks crossed on trend count transects, Game Management Subunits 14A and 14B, Matanuska-Susitna Valleys, Alaska, 1991-1994

		Tracks per Mile			
Species	Year	West Burma Rd. (14A-1)	Kings R. (14A-2)	Knik R. (14A-3)	Willow-Iron Ck. (14B-1)
Fox	1991-92	0.1	0.0	0.0	0.0
	1992-93	0.0	-	0.0	0.0
	1993-94	0.1	0.3	0.0	0.2
Coyote	1991-92	2.0	0.0	2.3	0.0
	1992-93	0.1	-	4.4	0.2
	1993-94	0.5	0.6	0.6	0.0
Lynx	1991-92	0.0	0.0	0.1	0.0
	1992-93	0.0	-	0.3	0.0
	1993-94	0.0	0.0	0.0	0.0
Marten	1991-92	0.0	0.1	0.0	1.2
	1992-93	0.2	-	0.0	1.5
	1993-94	0.2	0.2	0.0	0.0
Mink	1991-92	0.1	0.1	0.0	0.0
	1992-93	0.4	-	0.0	0.5
	1993-94	0.3	0.0	0.5	0.4
Weasel	1991-92	0.7	0.0	0.0	1.0
	1992-93	0.7	-	6.0	3.5
	1993-94	0.1	2.3	0.0	0.0
Wolverine	1991-92	0.0	0.0	0.0	0.0
	1992-93	0.0	-	0.0	0.0
	1993-94	0.0	0.0	0.0	0.0
Squirrel	1991-92	0.7	2.0	3.5	0.0
	1992-93	0.3	-	0.5	6.0
	1993-94	0.0	19.7	5.5	0.0
Hare	1991-92	1.7	3.0	51.5	0.0
	1992-93	0.3	-	107.0	5.0
	1993-94	0.2	2.6	55.5	1.3

Table 2 Number of muskrat pushups and houses seen in count areas along the Glenn highway on and near the Palmer Hay Flats State Game Refuge, 1991-1994

A.

Count Area	Number pushups counted 1991	1992	1993	1994
1	145	46	119	126
2	2	0	0	3
3	42	55	102	98
5	86	97	52	55
6	63	131	81	61
7	46	79	83	68
8	45	85	99	80
9	68	102	115	66
10	6	0	2	0
11	29	3	8	0
Total	532	598	661	557

B.

	Number Counted	Percent Change from 1991		
Count Area	1991	1992	1993	1994
1	145	-68	-17	-13
2	2	-100	-100	50
3	42	30	142	133
5	86	12	-39	-36
6	63	107	28	-3
7	46	71	80	47
8	45	88	120	77
9	68	50	69	-2
10	6	-100	-66	-100
11	29	-89	-72	-100
Total	532	12	24	4

Table 3 Unit 14 beaver harvest, 1984-1993

	Reported harvest			Method of Take			Successful	
Regulatory Year	Juv [a]	(%)	Adults	Trap/snare	Shot	Unk	Total	Trappers/hunters
1984-85	61	(21)	222	264	0	27	291	--
1985-86	83	(18)	386	424	0	45	469	--
1986-87	58	(17)	281	291	1	47	339	--
1987-88	29	(11)	237	233	0	33	266	--
1988-89	30	(15)	166	175	0	21	196	--
1989-90	41	(27)	113	135	0	19	154	39
1990-91	44	(28)	111	149	4	2	155	34
1991-92	36	(16)	185	206	4	15	225	37
1992-93	70	(28)	183	241	1	11	253	50
1993-94	43	(19)	187	219	1	10	230	61
Average	49	(20)	207	234	1	23	256	44

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

Table 4 Unit 14 land otter harvest, 1984-1993

	Reported harvest			Method of Take				Successful
Regulatory Year	Male	Female	Unk	Trap/snare	Shot	Unk	Total	Trappers/hunters
1984-85	22	21	7	43	0	7	50	--
1985-86	19	15	4	18	17	3	38	--
1986-87	12	14	8	32	0	2	34	--
1987-88	5	3	0	8	0	0	8	6
1988-89	3	4	1	8	0	0	8	8
1989-90	11	9	4	22	0	2	24	14
1990-91	1	7	2	8	2	0	10	7
1991-92	17	4	5	25	1	0	26	14
1992-93	5	3	5	9	0	4	13	7
1993-94	22	9	3	32	1	1	34	17
Average	12	9	4	20	2	2	25	10

Table 5 Unit 14 lynx harvest, 1984-1993

Regulatory Year	Reported Harvest: Sex Composition M	F	(%)	Unk	Age Composition Juv[a]	(%)	Ad	Unk	Method of Take Trap/ Snare	Shot	(L&S)[b]	Unk	Successful Total	Hunters/trappers
1984-85	5	9	(64)	1	4	(40)	6	5	8	1	---	6	15	10
1985-86	2	5	(71)	2	1	(33)	2	6	3	1	---	5	9	4
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
1991-92	4	3	(43)	8	2	(17)	10	3	14	1	(0)	0	15	6
1992-93	7	2	(22)	2	3	(30)	7	1	10	1	(0)	0	11	9
1993-94	3	4	(57)	3	0	(0)	7	3	7	1	(0)	2	10	4
Average[d]	4	4	(52)	3	2	(25)	6	3	8	1	(0)	2	11	6

[a] Lynx measuring $\leq$ 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.
[d] For years when season open

Table 6 Unit 14 wolverine harvest, 1984-1993

Regulatory Year	Reported Harvest				Method of Take				Successful	
	Male	Female	(%)	Unk	Trap/snare	Shot	(L&S)[a]	Unk	Total	Trappers/hunters
1984-85	6	4	(40)	1	8	3	---	0	11	8
1985-86	8	6	(43)	2	13	1	(1)	2	16	11
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
1991-92	5	2	(28)	1	7	1	(0)	0	8	8
1992-93	4	5	(56)	0	7	2	(0)	0	9	9
1993-94	9	4	(31)	0	13	0	(0)	0	13	10
Average	6	4	(40)	<1	9	1	(<1)	<1	10	8

[a] L&S (land and shoot) refers to animals recorded as "ground shot" when transportation indicated was "aircraft.".

Table 7 Unit 14 beaver harvest chronology, 1989-1993

Regulatory Year[a]	Percent harvested											Total Harvest
	Jun-Aug[b]	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Unk	
1989-90	0	0	1	15	14	15	8	12	32	1	1	154
1990-91	0	2	1	8	4	4	27	26	19	1	6	155
1991-92	0	0	0	8	6	34	26	15	3	4	3	225
1992-93	0	1	9	11	13	9	6	32	14	0	3	253
1993-94	0	2	5	11	13	14	11	21	22	0	1	230

[a] Information not collected prior to 1989

[b] These are beaver taken on damage control permits

Table 8 Unit 14 land otter harvest chronology, 1984-1993

Regulatory Year	Percent of Harvest								Total Harvest
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Unk	
1984-85	0	0	34	26	6	12	10	12	50
1985-86	0	0	5	21	45	16	5	8	38
1986-87	0	0	12	30	22	27	3	5	34
1987-88	0	12	12	25	25	25	12	0	8
1988-89	0	0	17	50	0	0	12	12	8
1989-90	0	0	20	25	8	42	8	0	24
1990-91	0	0	20	10	20	30	20	0	10
1991-92	4	0	4	15	31	19	27	0	26
1992-93	0	0	0	46	23	15	15	0	13
1993-94	0	0	9	12	50	18	12	0	34

Table 9 Unit 14 lynx harvest chronology, 1984-1993

Regulatory Year	Percent of Harvest						Total Harvest
	Nov	Dec	Jan	Feb	Mar	Unk	
1984-85	13	7	20	20	7	33	15
1985-86	11	11	22	0	0	56	9
1986-87	0	40	60	0	0	0	5
1987-88[a]	0	0	0	0	0	0	0
1988-89[a]	0	0	0	0	0	0	0
1989-90[a]	0	0	0	0	0	0	0
1990-91	0	38	62	0	0	0	13
1991-92	0	67	33	0	0	0	15
1992-93	0	73	27	0	0	0	11
1993-94	0	80	20	0	0	0	10

[a] Season closed

Table 10 Unit 14 wolverine harvest chronology, 1984-1993

Regulatory Year	Percent of Harvest								Total Harvest
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Unk	
1984-85	0	0	0	18	27	27	27	0	11
1985-86	0	0	19	25	12	12	19	12	16
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
1991-92	0	0	12	25	25	38	0	0	8
1992-93	11	0	0	22	67	0	0	0	9
1993-94	0	0	0	31	69	0	0	0	13

Table 11 Unit 14 beaver trapper transport methods, 1989-1993

Regulatory Year	Percent of Harvest								Total Harvest
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway Vehicle	Unk	
1989-90[a]	3	23	23	0	28	0	6	17	154
1990-91	0	32	0	1	43	0	17	6	155
1991-92	0	19	0	1	58	1	15	7	225
1992-93	0	1	8	5	47	0	20	19	253
1993-94	0	1	10	1	47	0	28	12	230

[a] Information not collected prior to 1989

Table 12 Unit 14 land otter trapper transport methods, 1987-1993

Regulatory Year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway Vehicle	Unk	Total Harvest
	Percent of Harvest								
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
1991-92	0	19	0	0	69	0	8	4	26
1992-93	0	8	0	0	54	0	8	30	13
1993-94	0	6	0	0	62	0	6	26	34

Table 13 Unit 14 lynx trapper transport methods, 1985-1993

Regulatory Year	Percent of Harvest								Total Harvest
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway Vehicle	Unk	
1985-86[a]	0	22	0	0	0	0	0	78	9
1986-87	0	100	0	0	0	0	0	0	5
1987-88[b]	0	0	0	0	0	0	0	0	0
1988-89[b]	0	0	0	0	0	0	0	0	0
1989-90[b]	0	0	0	0	0	0	0	0	0
1990-91	0	15	0	0	31	0	8	46	13
1991-92	0	0	0	27	47	0	27	0	15
1992-93	0	9	0	36	45	0	0	9	11
1993-94	0	10	0	50	20	0	0	20	10

[a] Information not collected prior to 1985
[b] Lynx season closed

Table 14 Unit 14 wolverine trapper transport methods, 1985-1993

	Percent of Harvest								
Regulatory Year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway Vehicle	Unk	Total Harvest
1985-86[a]	6	28	0	0	13	0	0	56	16
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
1991-92	38	0	0	12	25	0	0	25	8
1992-93	33	11	0	0	33	0	0	22	9
1993-94	31	0	0	8	54	0	0	8	13

[a] Information not collected prior to 1985

LOCATION

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

Geographic Description: West side of Cook Inlet

BACKGROUND

Game Management Unit 16, lying west of the lower Susitna River and upper Cook Inlet, contains large areas of unaltered wildlife habitat. There have been no major wildfires since the 1950s (D. Harkness, pers. commun.). Fishing and hunting lodges are scattered throughout the unit, many of which have winter caretakers who hunt and trap furbearers. Maintained roads are in the eastern and northern portions of Subunit 16A and near the villages of Tyonek and Beluga in Subunit 16B. Residents live along the Parks Highway and the Petersville Road and in Beluga and Tyonek. Because of its proximity to Alaska's largest population centers, the area receives a large amount of year-round recreational use. A few local residents still actively trap marten and beaver to generate income. Many other people utilize the area's fur species on a recreational basis.

MANAGEMENT DIRECTION

Management Goals

The management goals for this area are to maintain existing populations to provide 1) for optimal harvest of furbearers, and 2) the greatest opportunity to participate in trapping and hunting furbearers.

Management Objectives

The management objectives for this area are to develop measurable population objectives for all fur species.

METHODS

We collected information on trapping conditions, trapper effort, and trends in fur abundance and distribution, using a trapper questionnaire sent to trappers sealing fur in Unit 16. Questionnaires were mailed in April.

Harvest data were collected for beaver, land otter, lynx and wolverine by sealing all pelts presented for examination. Marten were sealed during 1992–93 and 1993–94. We collected data on age (for beaver and lynx) and sex (for land otter, lynx, marten, and wolverine) when practical. The month, method of take, and mode of trapper/hunter transport were also recorded. Minimum harvest data for other species were collected from the trapper questionnaire.

During 1991–92 harvest objectives, based on long-term average harvests, were established for otter, wolverine, and beaver (Masteller 1993). The annual harvest objectives are: land otter, 40; wolverine, 20; and beaver, 350. Too few lynx were taken to develop a harvest objective, and marten were not being sealed.

To begin evaluating long-term trends in abundance, 2 furbearer track count trend lines were established in road-accessible portions of Subunit 16A during winter 1991–92. To help ensure comparable results between years, lines were surveyed the same number of hours after a recent snowfall, at roughly the same time during winter (Golden 1993). Trend lines were 8.7 (Amber Lake) and 6.3 (Mile 131 Parks highway) miles long and were surveyed from a snowmachine. Generally, tracks for large species (marten, fox, coyote, wolf, lynx, and wolverine) were counted on the entire transect, and tracks of smaller species were counted on 1-mile segments of the transect (unless densities were low enough to record all tracks on the transect). We surveyed trend lines once during the winters of 1991–92 and 1992–93.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size

During the reporting period we did no studies to determine population size for any fur species in Unit 16.

Population trend information was collected from trapper questionnaires and track transects. During the 3-year reporting period, the response rate to our questionnaire declined from 76% to 62%, with the number of trappers actively seeking fur declining from 17 to 8. This was probably due to poor fur prices, difficult weather conditions, and aging of the trapping public.

Respondents to the trapper questionnaire rated relative abundance of marten as common during the reporting period. However, a few long-time area residents felt marten numbers had declined from historic levels and successfully lobbied the Board of Game to restrict the season. The subsequent 1-month season (Nov. 10–Dec. 10) angered many trappers, who not only encountered difficult travel and trapping conditions during the season, but observed plenty of marten sign once they could get around.

Trappers reported relative abundance of most other fur species as common or abundant (especially beaver); however, lynx and wolverine were reported to be scarce. Hare numbers were classified as low. When asked to classify trends in abundance, most trappers felt wolverine numbers were increasing, but for other species there were no significant changes between years. Reports of newly colonized areas and continued "nuisance" activity indicate beaver numbers are healthy and probably increasing.

Fur species have probably benefited from the carrion produced in Unit 16, an area with relatively high moose mortality due to winter weather and predation. Residents and users report the wolf population is increasing. Bear populations are healthy; surveys indicate moose populations are stable or declining.

For most species, track counts on trend lines did not change significantly from 1991–92 to 1992–93. The single exception was hare sign in the Amber Lake area, which declined from 12.5–0.0 tracks per mile between the 2 years. These transects should not be expected to reveal small changes in abundance over relatively short periods. Large changes in abundance should be discernible, however, and these transects also provide distribution data.

Mortality

Harvest

Harvest of species for which sealing is required was low to moderate and probably fluctuates because of trapping conditions and fur markets. Beaver harvests were well below historical levels (Table 1), while otter harvest has increased in recent years (Table 2). Lynx harvest has been very low, probably reflecting a lack of hare habitat (Table 3). Wolverine harvest declined during the reporting period but fluctuated around the 9-year average (Table 4). For these species, reported harvest previously peaked in 1986–87, probably due to strong demand on the fur market.

Harvests of beaver were well below the objective level (350) set during 1991–92. Otter and wolverine harvests were also below objective levels (40 and 20 animals per year for otter and wolverine, respectively). If market demand for otters remains strong, the harvest objective probably will be attained in the near future. Wolverine harvest will probably increase because most trappers and residents believe the wolverine population is increasing.

Reported harvest of marten, from sealing records, was 130 and 90 during 1992–93 and 1993–94, respectively. This compares favorably to voluntary harvest reports, which indicated 94 and 88 marten taken, respectively, during the same 2 years. Undoubtedly, some marten were not sealed after the requirement went into effect (1992–93). However, harvest probably declined with the reduced season, since travel and trapping conditions were generally poor during November of both 1992–93 and 1993–94. During 1991–92 trappers reported (via voluntary reports) taking 176 marten from Unit 16.

Harvest of species for which sealing is not required is unknown, but minimum numbers are available from voluntary harvest returns. Responses indicate that during the reporting period the minimum harvest ranges were coyote, 22–58; red fox, 25–35; mink, 14–36; weasels, 19–144; muskrats, 2–35; squirrels, 20–135.

Season and Bag Limit. During regulatory years 1991–92, 1992–93 and 1993–94 the seasons and bag limits were as follows:

Trapping

Species	Season	Bag Limit
Beaver	Nov. 10-Apr. 30	30 per season
Coyote)	Nov. 10-Mar. 31	No limit
Red Fox	Nov. 10-Feb. 28	No limit
Lynx	Dec. 15-Jan. 15	No limit
Marten (except 1991–92)	Nov. 10-Dec. 10	No limit
Marten (1991–92)	Nov. 10-Jan. 31	No limit

Mink/Weasels		Nov. 10-Jan. 31	No limit
Muskrat		Nov. 10-June 10	No limit
Land Otter		Nov. 10-Mar. 31	No limit
Squirrels/Marmots		No closed season	No limit
Wolverine	(1991-92)	Nov. 10-Feb. 28	No limit
Wolverine	(except 1991-92)		
16A		Nov. 10-Jan. 31	2 per season
16B		Nov. 10-Feb. 28	No limit

Hunting

Species		Season	Bag Limit
Coyote		Sep. 1-Apr. 30	2 per season
Red Fox		Sep. 1-Feb. 15	2 per season
Lynx		Dec. 15-Jan. 15	2 per season
Wolverine	(1991-92)	Sep. 1-Mar. 31	1 per season
Wolverine	(except 1991-92)		
16A		Sep. 1-Jan. 31	1 per season
16B		Sep. 1-Mar. 31	1 per season

Board of Game Actions and Emergency Orders. During spring 1992 the Board of Game made several changes in furbearer trapping and hunting seasons. The marten season was reduced to 1 month (Nov. 10–Dec. 10) in Units 13E, 14, and 16. This was in response to 2 proposals from trappers in the Skwentna and Talkeetna areas seeking to close or reduce the season due to declining marten numbers. The Board also approved a department proposal to require sealing of marten from those units.

Citing potential overharvest of wolverine in road-accessible areas, the department proposed shortening wolverine trapping and hunting seasons in Units 11 and 13 to close January 31 instead of March 31.The proposal was amended to include Units 14 and 16A, and adopted by the Board.

The Board also modified lynx trapping regulations to allow the department to more easily implement the Tracking Harvest Strategy. The change set a general lynx season (Nov. 10–Feb. 28) but allowed the department to shorten or close the season within that time period, depending on local lynx/hare abundance.

Hunter/Trapper Effort. During the reporting period trapper effort was relatively low, due to poor market demand and difficult early season travel and trapping conditions. Marten are the most important income-producing species in the unit, and many trappers were angry when the season was restricted to 1 month. The shortened season coincided with unusually late rain and warm weather during both 1992–93 and 1993–94, and many trappers complained they were unable to get out on their lines before the season ended. When they did get out, they reported increased marten sign.

Harvest Chronology. Most beavers are taken in spring (Table 5), when travel and water conditions make trapping and snaring easier. Most otters and wolverines are taken during mid-winter (Tables 6 and 7, respectively). Season dates governed harvest of marten, and trappers took lynx incidental to other trapping efforts.

Transport Methods. Most beaver trappers used snowmachines to access their trapping areas (Tables 8). Snowmachines and aircraft were the most important methods of transport for otter and wolverine trappers and hunters (Tables 9 and 10). From 1992–93 to 1993–94, 75% of the marten harvested were taken by trappers working from snowmachines.

Other Mortality

During the reporting period 4 beavers were taken during 1993–94 under nuisance beaver control permits authorized by the Department. Permits were issued to prevent road damage near Beluga and Tyonek.

CONCLUSIONS AND RECOMMENDATIONS

Currently, adequate opportunity is available to trap and hunt furbearers in Unit 16. Lacking population data, it is difficult to say whether harvests are optimal. The number of trappers and hunters working to derive income from trapping has declined; however, the number of people taking fur on a recreational basis is probably increasing.

It is unlikely direct population objectives will be developed at the current level of funding for management of furbearing species. I recommend we monitor trends in fur populations by surveying the 2 existing (ground) track transects in Subunit 16A and by establishing 8 aerial transects in Subunit 16B. Aerial transects should be distributed from the Drift River to the upper Yentna River. Data could be collected for marten and larger species; it would probably take 2 days to complete 8 transects. Completion of both ground and aerial transects would cost approximately $2,000 per year (or approximately $8 per animal trapped).

All transects should be surveyed every year because fur populations can change rapidly with changes in prey populations. If available resources do not allow this sampling schedule, each transect should be surveyed every other year, with the sampling effort dispersed over the entire unit each year. After several years, indirect minimum population objectives (in tracks/mile) could be established.

During the reporting period harvest levels for beaver, otter and wolverine fluctuated at or below the minimum harvest objectives. For most species there is no bag limit, and it is difficult to encourage more harvest when market forces, weather, and changes in human attitudes largely govern trapping pressure. At the January 1995 Board of Game meeting, the department supported an extended trapping season (Nov. 10–May 15) and elimination of the trapping bag limit. This will provide more open-water trapping opportunity and may reduce the number of nuisance beaver complaints. These changes were adopted and will take effect during 1995–96.

For marten, I recommend a minimum harvest objective be developed when we have sealing data from 5 seasons. Historically, too few lynx are taken in Unit 16 to justify a harvest objective. This may change if significant habitat alteration occurs.

Controversy surrounding the recent restriction in marten season length illustrates the importance of this species to trappers. At the January 1995 Board of Game meeting, there were several proposals to lengthen marten season in Unit 16. The Board lengthened the season (for 1995–96) to Nov. 10–Dec. 31 for that portion of Unit 16 north of the Beluga River, and Nov. 10–Jan. 31 for the area south of Beluga River. The difference resulted from pressure from trappers in northern 16B, who felt that closing the season on January 1 would prevent trapping and hunting pressure from nonlocal residents using snowmachines to access the area, since the Susitna River is generally impassable until after early January.

LITERATURE CITED

Golden, H. N. 1993. Furbearer track count index testing and development. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Res. Prog. Rep. Proj. W-24-1. Study 7.17. Juneau. 48pp.

Masteller, M. A. 1993. Furbearers: survey-inventory management report. Pages 147–156 *in* Abbot, S. M., ed. Annual report of survey-inventory activities. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-23-3/4. Study 7.0. Juneau. 303pp.

Prepared By:

Mark Masteller
Wildlife Biologist

Submitted By:

Karl Schneider
Management Coordinator

Table 1. Unit 16 beaver harvest, 1985-1993.

	Reported harvest				Method of Take				Successful
Regulatory Year	Juv [a]	(%)	Adults	Unk	Trap/snare	Shot	Unk	Total	Trappers/hunters
1985-86	44	(10)	391	9	0	0	444	444	---
1986-87	0	--	0	651	0	0	651	651	---
1987-88	0	--	0	394	0	0	394	394	---
1988-89	0	--	0	370	370	0	0	370	---
1989-90	22	(15)	123	0	145	0	0	145	16
1990-91	30	(17)	146	0	171	0	5	176	20
1991-92	32	(14)	192	4	209	5	14	228	30
1992-93	19	(21)	61	10	85	2	3	90	19
1993-94	16	(18)	71	0	87	0	0	87	15
Average [b]	27	(16)	164	4	178	1	4	287	20

[a] Beaver measuring $\leq$ 52 inches (length plus width).
[b] For years when data available.

Table 2. Unit 16 land otter harvest, 1985-1993.

	Reported harvest				Method of Take			Successful	
Regulatory Year	Male	Female	(%)	Unk	Trap/snare	Shot	Unk	Total	Trappers/hunters
1985-86	0	0	(--)	41	0	0	41	41	---
1986-87	29	32	(52)	7	63	0	5	68	---
1987-88	0	0	(--)	51	0	0	51	51	---
1988-89	25	13	(34)	9	43	0	4	47	---
1989-90	5	4	(44)	11	18	1	1	20	8
1990-91	6	3	(33)	6	15	0	0	15	7
1991-92	9	7	(44)	3	15	3	1	19	10
1992-93	1	2	(--)	11	13	1	0	14	8
1993-94	13	16	(55)	2	30	1	0	31	12
Average[a]	14	12	(44)	6	28	1	2	34	9

[a] For years when data available.

Table 3. Unit 16 lynx harvest, 1984-1993.

	Reported Harvest								Method of Take				Successful	
	Sex Composition				Age Composition									
Regulatory Year[a]	M	F	(%)	Unk	Juv[b]	(%)	Ad	Unk	Trap/ Snare	Shot	(L&S)[c]	Unk	Total	Hunters/ trappers
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)	0	0	--	0	6	0	0	(0)	6	6	---

1990-91	0	0	--	0	0	--	0	0	0	0	(0)	0	0	0
1991-92	0	0	--	1	0	(0)	0	1	1	0	(0)	0	1	1
1992-93	1	1	(50)	1	0	(0)	2	1	3	0	(0)	0	3	2
1993-94	1	2	(67)	1	0	(0)	4	0	2	1	(0)	1	4	3
Average[d]													2	1

[a] Season closed during 1987-88, 1988-89, and 1989-90.
[b] Lynx measuring $\leq$ 34 inches in length.
[c] L&S (land and shoot) refers to animals recorded as "ground shot" when transportation indicated was "aircraft."
[d] For years when season open; some columns not averaged due to low sample sizes.

Table 4. Unit 16 wolverine harvest, 1985-1993.

Regulatory Year	Reported Harvest				Method of Take				Successful	
	Male	Female	(%)	Unk	Trap/snare	Shot	(L&S)[a]	Unk	Total	Trappers/hunters
1985-86	8	1	(11)	4	7	6	--	0	13	--
1986-87	22	14	(39)	0	28	8	--	0	36	--
1987-88	0	0	--	25	0	0	--	25	25	--
1988-89	5	9	(64)	1	11	1	--	3	15	--
1989-90	7	6	(46)	0	12	1	(0)	0	13	7
1990-91	5	2	(29)	1	4	4	(0)	0	8	6
1991-92	15	5	(25)	1	14	7	(0)	0	21	11
1992-93	10	3	(23)	0	10	3	(0)	0	13	11
1993-94	8	3	(27)	1	8	4	(2)	0	12	12
Average[b]	19	5	(33)	1	13	4	(<1)	<1	16	9

[a] L&S (land and shoot) refers to animals recorded as "ground shot" when transportation indicated was aircraft).
[b] Data from 1987-88 not used in calculations.

Table 5. Unit 16 beaver harvest chronology, 1989-1993.

Regulatory Year[a]	Percent harvested											Total Harvest
	Jun-Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Unk	
1989-90	0	0	0	11	24	14	5	9	36	0	1	145
1990-91	0	0	0	4	1	9	31	22	27	0	6	176
1991-92	0	0	0	31	7	3	34	12	12	0	1	228
1992-93	0	0	0	9	5	10	17	44	11	0	3	90
1993-94	0	0	2	24	9	20	0	34	10	0	0	87

[a] Data not collected prior to 1989

Table 6. Unit 16 land otter harvest chronology, 1989-1993.

Regulatory Year[a]	Percent of Harvest								Total Harvest
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk	
1989-90	0	20	45	20	0	15	0	0	20
1990-91	0	7	7	40	13	26	7	0	15
1991-92	0	10	5	42	21	16	0	5	19
1992-93	0	0	36	21	29	7	0	7	14
1993-94	10	16	39	23	3	10	0	0	31

[a] Data not collected prior to 1989

Table 7. Unit 16 wolverine harvest chronology, 1989-1993.

Regulatory Year[a]	Percent of Harvest Sep	Oct	Nov	Dec	Jan	Feb	Mar	Unk	Total Harvest
1989-90	0	0	15	8	38	31	8	0	13
1990-91	0	0	0	0	12	50	38	0	8
1991-92	5	0	5	0	57	24	10	0	21
1992-93[b]	8	0	0	15	15	54	8	0	13
1993-94[b]	8	8	0	25	34	8	16	0	12

[a] Data not collected prior to 1989

[b] Season length different for subunits 16A (Nov. 10-Jan. 31) and 16B (Nov 10-Feb. 28).

Table 8. Unit 16 beaver trapper transport methods, 1986-1993.

Regulatory Year	Percent of Harvest								Total Harvest
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway Vehicle	Unk	
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
1991-92	6	2	1	0	79	0	3	9	228
1992-93	1	9	0	0	65	0	10	14	90
1993-94	1	0	0	5	77	0	7	10	87

Table 9. Unit 16 land otter trapper transport methods, 1986-1993.

	Percent of Harvest								
Regulatory Year	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway Vehicle	Unk	Total Harvest
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
1991-92	0	5	0	0	90	0	0	5	19
1992-93	29	0	0	0	43	0	0	28	14
1993-94	16	0	0	16	65	0	0	3	31

Table 10. Unit 16 wolverine trapper transport methods, 1986-1993.

Regulatory Year	Percent of Harvest								Total Harvest
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-wheeler	Snow-machine	ORV	Highway Vehicle	Unk	
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
1991-92	33	0	0	0	52	5	5	5	21
1992-93	31	0	0	0	54	0	8	8	13
1993-94	50	0	0	0	50	0	0	0	12

LOCATION

Game Management Unit: 17

Geographic Description: Northern Bristol Bay (18,800 mi^2)

BACKGROUND

Trapping is an important part of the culture and economy of the residents of northern Bristol Bay and was one of the main sources for the cash economy before the increase in prices paid for commercially caught salmon during the past 20 years. Each year in early March trappers still come to Dillingham from around the region to seal and sell pelts at the annual "Beaver Round-up." Fur buyers purchase thousands of pelts during the weeklong rendezvous and celebration.

Beavers have historically been the most important furbearer in Unit 17. They are abundant throughout most portions of the unit, in all major drainages and in many of the smaller tributaries. Beaver dams and the resulting reservoirs enhance waterfowl nesting habitat and attract otters. However, in some portions of the unit, particularly in the Wood–Tikchik lake system, beaver dams impede movements of migrating salmon, and siltation caused by the 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 portions 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. Nevertheless, the importance of beaver as food 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 are throughout the unit, preying primarily on ptarmigan during the winter months. 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 to late 1980s. Gradual increases were noted during this reporting period.

Land otter populations increased steadily during the 1980s and seemed stable during this reporting period. Otters are common throughout Unit 17.

Lynx are uncommon in Unit 17. The lynx population fluctuates, but they are generally found in low to moderate densities even during their peak. Much of the fluctuation is probably due to hare abundance and immigration from adjacent units. Lynx numbers were increasing in Unit 17 during this reporting period.

Wolverines are throughout Unit 17, ranging from ridge tops to river mouths. Although no data have been collected on the wolverine population in the unit, incidental observations and trapper reports indicate it is stable. Harvest levels fluctuate annually, but they have remained relatively constant since 1976.

Marten were uncommon in most of Unit 17 prior to 1970, but recent reports suggest they are becoming more widespread. Most of their habitat is 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 reporting period, although high pelt prices have maintained trapping interest in this species.

Mink are in most of the 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, there is little trapping effort targeted toward mink in this area.

Other furbearers in the unit include coyote, arctic fox, short-tailed weasels, and muskrats. Coyotes are becoming more common throughout Unit 17 as they extend their range westward from the Alaska Range. Arctic foxes are uncommon visitors to the unit, probably dispersing from the lower Kuskokwim River drainages 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 River and Togiak Rivers and on the Nushagak Peninsula during the first half of this century. They are currently rare throughout Unit 17.

MANAGEMENT DIRECTION

Management Goal

To obtain sufficient data to develop measurable population objectives

Management Objectives

Beaver: To 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.

To 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.

Otter: To maintain a population of land otters in Unit 17 capable of sustaining an average annual harvest of 200 otters through 1995.

Red Fox: To maintain a population of red foxes in Unit 17 capable of sustaining an average annual harvest of 400 foxes through 1995.

Wolverine: To 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 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 population status of various furbearer species was sent to a sample of trappers throughout the unit each spring. Beaver trapping pressure was accessed by periodic aerial surveys during the trapping season. Aerial cache surveys were flown most years from 1968 to 1986 to provide an index of abundance in the more heavily trapped portions of the unit. We conducted 2 cache counts in 1992.

RESULTS AND DISCUSSION

Population Status And Trend

Population Size and Distribution

Beaver populations in the unit were stable to increasing during this reporting period. Most trappers report high beaver densities along their lines, but low prices kept harvests low during this reporting period. Low beaver densities typically occur near villages and along portions of major winter trails. Reports of nuisance beavers, particularly on salmon spawning streams and along roads, have remained constant over the past several years.

The only objective beaver population data collected during this reporting period were aerial cache counts in October 1992 along the Kokwok and Iowithla River drainages. Forty river miles were surveyed in each drainage. The Kokwok yielded 1.08 active lodges per mile, and the Iowithla yielded 1.30 active lodges per mile.

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

Lynx populations increased throughout the area during this reporting period. Although never common in the unit, lynx numbers were very low between 1987 and 1990. Population data for lynx are derived from incidental observations and harvest records. Snowshoe hare populations appeared moderate in Subunits 17B and 17C during this reporting period.

Red fox populations appeared to be increasing during this reporting period, but densities remain below peak levels. Ptarmigan populations were at moderate to high levels and microtine populations were declining.

Coyotes were becoming more common in the unit, as their numbers and range continued to increase. Highest densities were along the lower Nushagak River.

No data were available to assess marten, mink, or weasel population trends. Trapper reports indicate these species are common in suitable habitat and that marten populations have extended their range in recent years.

Muskrats remained scarce throughout the unit during this reporting period. In spite of intensive human use of area waterways, observations of muskrats are rare. The only portions of the unit with viable populations appeared to be the Weary and Igushik River drainages.

Mortality

Harvest

Season and Bag Limit. Beaver season was open from January 1 to 31 in Subunit 17A and from January 1 to 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 November 10 to February 28, without a catch limit. Land otter and coyote seasons were open from November 10 to March 31, also without a catch restriction. Muskrat season was open from November 10 to June 10 with no catch limit.

Board of Game Actions and Emergency Orders. In 1993–94 the Alaska Board of Game issued an emergency regulation to extend the beaver trapping season by 1 month in Subunit 17A. The season was extended to include the entire month of February because warm weather and little snowcover in January precluded most trappers from getting out during the normal season. The Federal Subsistence Board changed their regulations to allow beaver trapping on federal lands in 17A from January 1 to February 28 each year.

Trapper Harvest. Beaver harvests during this reporting period (1991/92—1183, 1992/93—455, and 1993/94—676) were considerably lower than the average annual harvest for the previous 5 years (1986/91—1833) (Table 1). Trappers indicated that the main reasons for the reduced harvest were low prices and unfavorable weather conditions during the trapping season. Most trappers reported they reduced their effort because of these factors; the number of trappers afield also decreased (Table 2). The percentage of kits in the harvest has remained relatively consistent during the last 5 years in spite of dramatic fluctuations in the number of beavers harvested (Table 1). Snares continued to be the most common trapping method. Conibear traps are also important methods of trapping beavers in Unit 17 (Table 2). Prices paid by local fur buyers during this reporting period ranged from $5 for smalls to $50 for super blankets; however, in 1992–93 the highest price paid for a super blanket was $27.

The number of lynx caught increased during this reporting period (1991/92—5; 1992/93—15; and, 1993/94—15) in spite of relatively low prices and trapper effort. The average annual harvest from the previous 5 years (1986–91) was 4 lynx (Table 1). Most lynx caught in the past 5 years have been taken by a trap or snare (Table 3). Higher lynx harvests are a reflection of increasing lynx densities in the unit. Prices for lynx pelts ranged from $40 to $125.

Otter harvests during this reporting period (1991/91—103; 1991/92—83; and, 1993/94—96) were much lower than the average annual harvest for the previous 5 years (1986/91—172) (Table 1). During the past 5 years the sex ratio of the harvest has remained near 50:50 (Table 4). Successful trappers preferred Conibear traps over snares and firearms (Table 4). Prices paid for otter pelts during this reporting period were comparable to those paid for beaver.

Wolverine harvests fluctuated during this reporting period from 10 in 1992/93 to 51 in 1991/92. The average annual harvest during the previous 5 years (1986–91) was 42 (Table 1). There was no obvious reason for the fluctuations in the harvest. Traps were the most common method of harvest, followed by firearms and snares (Table 5). In 1993/94, an unusually large number of wolverines (5) were shot by hunters during September. Prices paid by local fur buyers during this reporting period ranged from $75–275 per wolverine.

Harvest data on furbearers that are not sealed are sketchy at best. Fur export and acquisition reports provide only minimum harvest levels because many furs are used locally during periods of low fur prices. The average price paid during this reporting period for marten was $25. In 1993–94, 47 marten were bought from the unit. Coyote pelts brought $20 from local fur buyers and no coyote pelts were reported in 1993–94. Red fox pelts increased in value during this reporting period from $10 to $50 for a prime pelt. Trappers sold 160 fox pelts from the unit in 1993–94.

Permit Hunts. One special permit for trapping nuisance beavers was issued to the Alaska Department of Transportation and Public Facilities staff in Dillingham to remove a beaver that was flooding a portion of the Aleknagik Lake Road. One adult beaver was killed under that permit in August 1993.

Trapper Residency and Success. Data on trapper residency and success have not been specifically analyzed. Local residents take essentially all of the furbearers trapped in Unit 17. Trappers residing in adjacent units (Nondalton, Iliamna, and Kuskokwim River villages) also take some furbearers in Unit 17. A few trappers from outside of the area have flown into Subunit 17B to harvest wolverine.

Transportation Methods. Snowmachines were the most common means of access used by successful trappers in Unit 17 (Tables 6, 7, 8, and 9). During most years snowmachines allow reliable access to most of the unit from late December to March.

Harvest Chronology. Beaver harvest chronology is dependent on weather conditions. Fluctuations noted in Table 10 should be viewed with caution because many trappers did not keep close track of when they trapped individual beavers. Most lynx harvested during this reporting period were taken in February (Table 11). Otters were caught throughout the trapping season, with most of the harvest during the beaver trapping season (January and February) (Table 12). Wolverine harvests were highest in February during each of the past 5 years (Table 13).

Other Mortality

Beaver, and occasionally otter, are sometimes caught in gill nets during the summer fishing season. The total number caught unitwide is probably less than 50 per year. These 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. High mortality rates can also occur for beavers along major rivers during severe spring break-up periods. During this reporting period weather conditions were moderate and natural mortality was low.

There were no reported cases of rabid foxes in Unit 17 during this reporting period; however, confirmed cases were reported in the Naknek–King Salmon area of Subunit 9C in 1993/94. In previous years, rabies outbreaks on the Alaska Peninsula preceded outbreaks in northern Bristol Bay drainages.

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 the major tributaries to those rivers, appeared to be in very good to excellent condition. Although there was evidence of heavy browsing, willow stands on gravel bars were abundant.

Enhancement

No 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, habitat enhancement activities are not practical or necessary at this time.

Nonregulatory Management Problems

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. commun.). Dams on spawning streams are typically destroyed in the summer, but beavers were not killed and the dams were 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 have 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 excess beavers were taken by other family members. 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 portion of the season that overlaps the Russian Orthodox Christmas and New Year holiday season in early January. Trappers in Subunit 17A would like to see the state beaver trapping season in their area include the month of February so that it conforms to the rest of the unit and with the federal subsistence season.

Wolverine harvests have been relatively consistent for the past several years and populations seemed stable. Prohibition of same-day-airborne hunting and elimination of the March portion of the trapping season have not reduced the harvest. Local fur sewers use most of the wolverine pelts, and prices have remained consistently high in spite of lower prices for wolverine outside the local area.

Lynx populations have rebounded from the low levels first noted in 1987–88. Liberal seasons have probably had 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 in the increasing phase of their population cycle during this reporting period. If this cycle is driven by periodic endemic rabies outbreaks, there are probably few practical measures the department can implement to achieve the population objective of maintaining a population that will support a harvest of 400 foxes per year.

Reasons for the low muskrat population in Unit 17 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 translocation into the area should be considered. If the department elects to consider such a strategy, a complete closure of muskrat trapping seasons in the translocation areas will be necessary.

Prepared By:

Lawrence J. Van Daele
Wildlife Biologist III

Submitted By:

Kenneth W. Pitcher
Regional Supervisor

Table 1 Reported harvest of furbearers in Unit 17, 1956–94 (sealing record data).

Regulatory	Beaver		Lynx		Land Otter				Wolverine			
year	% Kits	Total	% Kits	Total	Male	Female	Unk	Total	Male	Female	Unk	Total
1956/57	22.9	367	---	---	---	---	---	---	---	---	---	---
1957/58	19.1	3165	---	---	---	---	---	---	---	---	---	---
1958/59	19.6	3245	---	---	---	---	---	---	---	---	---	---
1959/60	24.3	3721	---	---	---	---	---	---	---	---	---	---
1960/61	23.1	2849	---	---	---	---	---	---	---	---	---	---
1961/62	29.5	1903	---	---	---	---	---	---	---	---	---	---
1962/63	23.3	2172	---	---	---	---	---	---	---	---	---	---
1963/64	28.4	1766	---	---	---	---	---	---	---	---	---	---
1964/65	22.1	957	---	---	---	---	---	---	---	---	---	---
1965/66	25.2	1424	---	---	---	---	---	---	---	---	---	---
1966/67	25.3	2711	---	---	---	---	---	---	---	---	---	---
1967/68	25.7	3158	---	---	---	---	---	---	---	---	---	---
1968/69	N/A	1750[a]	---	---	---	---	---	---	---	---	---	---
1969/70	22.6	1190	---	---	---	---	---	---	---	---	---	---
1970/71	27.5	824	---	---	---	---	---	---	---	---	---	---
1971/72	20.5	762	---	---	---	---	---	---	---	---	---	---
1972/73	23.9	1849	---	---	---	---	---	---	10	5	6	21
1973/74	23.9	1681	---	---	---	---	---	---	27	18	0	45
1974/75	15.8	929[b]	---	---	---	---	---	---	14	7	1	22
1975/76	22.2	637[b]	---	---	---	---	---	---	50	25	3	78
1976/77	17.7	766[b]	---	---	---	---	---	---	37	12	2	51
1977/78	23.5	802[b]	11.1	36	52	49	7	108	32	14	3	49
1978/79	20.5	959	26.7	30	70	54	9	133	26	14	3	43
1979/80	27.7	1478	32.0	25	68	62	9	140	28	19	0	47
1980/81	20.0	1673	37.5	40	82	80	0	160	30	10	0	40
1981/82	20.9	1693	11.8	17	94	83	1	179	28	10	0	38
1982/83	12.8	1824	12.0	25	100	72	31	204	34	17	1	52
1983/84	18.7	1360	8.3	12	94	63	3	165	10	4	0	14
1984/85	22.9	1661	27.6	29	105	94	20	219	39	16	2	57
1985/86	15.9	1452	12.5	8	49	46	6	101	13	8	2	23
1986/87	20.1	2817	21.4	14	87	90	11	188	31	9	0	40

Table 1 Continued. Reported harvest of furbearers in Unit 17, 1956/57–1993/94.

Regulatory	Beaver		Lynx		Land Otter				Wolverine			
year	% Kits	Total	% Kits	Total	Male	Female	Unk	Total	Male	Female	Unk	Total
1987/88	21.8	3048	---	1	133	133	1	267	22	20	2	44
1988/89	18.8	965	---	1	66	57	19	142	21	16	7	44
1989/90	19.7	1245	---	1	67	46	3	116	14	7	5	26
1990/91	20.2	1092	50.0	2	68	71	10	149	19	19	8	46
1991/92	21.8	1183	---	5	40	45	18	103	25	23	3	51
1992/93	29.9	455	13.3	15	38	36	9	83	8	2	0	10
1993/94	20.0	676[c]	13.3	15	46	40	10	96	18	10	1	29

a - no harvest records available, estimates only

b - beaver trapping season closed in subunits 17A and 17C.

c - beaver trapping season in subunit 17A extended by one month by emergency regulation.

Table 2 Unit 17 beaver harvest, 1989/90–1993/94.

Regulatory	Reported harvest			Method of take			Successful
year[a]	Kits[b](%)	Adults (%)	Total	Trap (%)	Snare (%)	Unk	Trappers
1989/90	243 (19.5)	1002 (80.5)	1245	428 (34.4)	779 (62.5)	38	109
1990/91	221 (20.2)	871 (79.8)	1092	449 (41.1)	642 (58.8)	1	109
1991/92	257 (21.8)	926 (78.2)	1183	569 (48.1)	604 (51.1)	10	93
1992/93	136 (29.9)	319 (70.1)	455	218 (47.9)	213 (46.8)	24	45
1993/94	135 (20.0)	541 (80.0)	676	345 (51.0)	320 (47.3)	11	57

a - Season dates: 1989/90 - 93/94 Subunit 17A: Jan.1 - Jan. 31 20 per season
Subunits 17B & 17C: Jan.1 - Feb. 28 20 per season
1993/94 Subunit 17A season extended to Jan. 1–Feb. 28 by emergency regulation.

b - juveniles < 52"

Table 3 Unit 17 lynx harvest, 1989/90–1993/94.

Regulatory	Reported harvest						Method of take			Successful
year[a]	Males (%)	Females (%)	Unk	Juveniles [b](%)	Adults (%)	Total	Trap/Snare (%)	Shot (%)	Unk.	Trappers
1989/90	0 (-----)	1 (100)	0	0 (-----)	1 (100)	1	1 (100)	0 (----)	0	1
1990/91	0 (-----)	1 (50.0)	1	1 (50.0)	1 (50.0)	2	2 (100)	0 (----)	0	1
1991/92	1 (20.0)	4 (80.0)	0	0 (-----)	5 (100)	5	4 (80.0)	1 (20.0)	0	3
1992/93	5 (33.3)	4 (26.7)	6	2 (13.3)	13 (86.7)	15	13 (86.7)	2 (13.3)	0	4
1993/94	5 (33.3)	7 (46.7)	3	2 (13.3)	13 (86.7)	15	14 (93.3)	1 (6.7)	0	11

a - Trapping season dates: 1989/90–1993/94 Unit 17 Nov. 10–Feb. 28 No limit
Hunting season dates: 1989/90–1993/94 Unit 17 Nov. 10–Feb. 28 Two lynx

b - juveniles < 34" in length

Table 4 Unit 17 otter harvest, 1989/90–1993/94.

Regulatory	Reported harvest				Method of take				Successful
year[a]	Males (%)	Females (%)	Unk.	Total	Trap (%)	Snare (%)	Shot (%)	Unk.	Trappers
1989/90	67 (57.8)	46 (39.7)	3	116	74 (63.8)	39 (33.6)	0 (---)	3	44
1990/91	68 (45.6)	71 (47.7)	10	149	87 (58.4)	44 (29.5)	0 (---)	18	47
1991/92	40 (38.8)	45 (43.7)	9	103	45 (43.7)	51 (49.5)	1 (1.0)	6	39
1992/93	38 (45.8)	36 (43.4)	9	83	60 (72.3)	20 (24.1)	1 (1.2)	2	29
1993/94	46 (47.9)	40 (41.6)	10	96	62 (64.6)	21 (21.9)	6 (6.3)	7	33

a - Season dates: 1989/90–1993/94 Unit 17 Nov. 10–Mar. 31 No limit

Table 5 Unit 17 wolverine harvest, 1989/90–1993/94.

Regulatory	Reported harvest				Method of take				Successful
year[a]	Males (%)	Females (%)	Unk.	Total	Trap (%)	Snare (%)	Shot (%)	Unk.	Trappers
1989/90	14 (53.8)	7 (26.9)	5	26	19 (73.1)	2 (7.8)	5 (19.2)	0	14
1990/91	19 (41.3)	19 (41.3)	8	46	28 (60.9)	7 (15.2)	10 (21.7)	1	29
1991/92	25 (49.0)	23 (45.1)	3	51	34 (66.7)	7 (13.7)	10 (19.6)	0	29
1992/93	8 (80.0)	2 (20.0)	0	10	8 (80.0)	0 (------)	2 (20.0)	0	10
1993/94	18 (62.1)	10 (34.5)	1	29	7 (24.1)	1 (3.4)	21 (72.4)	0	20

a - Trapping season dates: 1989/90–1993/94 Unit 17 Nov. 10–Feb. 28 No limit
Hunting season dates: 1989/90–1993/94 Unit 17 Sept. 1–Mar. 31 One wolverine

Table 6 Unit 17 beaver harvest percentage by transport method, 1989/90–1993/94.

	Percent of harvest								
Regulatory year	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
1989/90	0.1	0.2	---	---	96.3	0.1	---	3.3	1245
1990/91	---	1.8	---	---	97.7	---	0.3	0.2	1092
1991/92	0.0	0.0	0.0	1.5	95.9	---	---	2.3	1183
1992/93	---	---	---	---	96.3	---	---	3.7	455
1993/94	1.3	---	---	---	96.4	---	---	2.2	676

Table 7 Unit 17 lynx harvest percent by transport method, 1989/90–1993/94

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
1989/90	---	---	---	---	100.0	---	---	---	1
1990/91	---	---	---	---	100.0	---	---	---	2
1991/92	---	---	---	---	100.0	---	---	---	5
1992/93	---	---	---	---	100.0	---	---	---	15
1993/94	---	---	6.7	---	80.0	---	---	13.3	15

Table 8 Unit 17 otter harvest percentage by transport method, 1989/90–1993/94.

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
1989/90	---	15.5	---	---	81.9	---	---	2.6	116
1990/91	---	---	---	---	97.3	---	---	2.0	149
1991/92	---	---	---	---	94.2	---	---	5.8	103
1992/93	---	---	6.0	---	91.6	---	---	2.4	83
1993/94	---	---	10.4	---	80.2	---	---	9.4	96

Table 9 Unit 17 wolverine harvest percentage by transport method, 1989/90–1993/94.

Regulatory year	Airplane	Dogsled	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	*n*
	Percent of harvest								
1989/90	11.5	---	---	---	84.6	---	---	3.8	26
1990/91	4.3	2.2	---	---	93.5	---	---	---	46
1991/92	17.6	---	---	---	76.5	---	---	5.9	51
1992/93	---	---	---	---	100.0	---	---	---	10
1993/94	17.2	---	---	---	79.3	---	---	3.4	29

Table 10 Unit 17 beaver harvest chronology percentage by month, 1989/90–1993/94.

Regulatory	Month			
year	January	February	Other/Unknown	*n*
1989/90	50.7	48.3	1.0	1245
1990/91	55.4	42.9	1.7	1092
1991/92	44.2	53.6	2.2	1183
1992/93	71.2	27.9	0.9	455
1993/94	45.4	51.6	3.0	676

Table 11 Unit 17 lynx harvest chronology percentage by month, 1989/90–1993/94.

Regulatory year	Month						
	November	December	January	February	March	Other/Unknown	*n*
1989/90	---	---	---	100.0	---	---	1
1990/91	---	---	---	100.0	---	---	2
1991/92	---	20.0	20.0	60.0	---	---	5
1992/93	13.3	46.7	---	40.0	---	---	15
1993/94	8.3	33.3	13.3	53.3	---	---	15

Table 12 Unit 17 otter harvest chronology percent by month, 1989/90–1993/94

Regulatory year	Month						
	November	December	January	February	March	Other/Unknown	*n*
1989/90	12.9	10.3	43.1	26.7	6.9	---	116
1990/91	2.7	15.4	43.0	35.6	---	3.4	149
1991/92	4.9	1.9	41.7	50.5	1.0	---	103
1992/93	8.4	10.8	59.0	20.5	---	1.2	83
1993/94	14.6	24.0	34.4	18.8	1.0	7.3	96

Table 13 Unit 17 wolverine harvest chronology percentage by month, 1989/90–1993/94.

Regulatory	Month						
year	November	December	January	February	March	Other/Unknown	*n*
1989/90	7.7	26.9	15.4	50.0	---	---	26
1990/91	---	2.2	23.9	67.4	6.5	---	46
1991/92	---	---	41.2	47.1	7.8	3.9	51
1992/93	---	10.0	40.0	50.0	---	---	10
1993/94	---	10.3	13.8	51.7	3.4	20.7	29

LOCATION

Game Management Unit: 18 (42,000 mi^2)

Geographic Description: Yukon–Kuskokwim Delta

BACKGROUND

Furbearers were abundant in all areas of suitable habitat in Unit 18. Large numbers of aquatic (i.e., beavers, otters, mink, and muskrats) and terrestrial species (i.e., red foxes) inhabit Unit 18. In recent years up to one-third of all furbearers sealed in Alaska have been harvested from Unit 18. Production of unsealed furbearers (i.e., mink, muskrats, and red foxes) was also very high, although well below historical levels of the 1930s. Boreal forest species (i.e., lynx, marten, wolverines, and wolves) were limited to the eastern portion of Unit 18, because most of the Yukon-Kuskokwim Delta comprises lowland tundra and aquatic habitats, with no large populations of ungulates. Also, a fairly large arctic fox (white fox) population occurs along the coast, the mainland tundra, and offshore islands. The harvest of arctic fox has also decreased during recent times. Coyotes have been captured near the Kwethluk and Kisaralik River drainages south and east of the Kuskokwim River. However, until recently sightings by the general public have not taken place and only 5 coyote captures have been documented in Unit 18 for the last 3 years.

Furbearers have historically played an important role in the history of Unit 18. Prehistorically, furbearer species were probably more important to the Yukon–Kuskokwim (Y–K) Delta region's 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 into the region, and most of the region was far enough from the sea so that marine mammals were inaccessible. Use of mink and beaver for meat was not uncommon then, and isn't today. Fish and birds provided the food base, which was supplemented by furbearers. Furbearers are still a strong link in the lifestyle of most Unit 18 residents, using furbearers domestically for clothing, food, and craft items. However, since the first Russian and American fur traders began buying furs in the area, the commercial sale of furs has provided a considerable monetary benefit to the region's trappers and skin sewers. The value of the fur industry during the 1920s and the 1930s in the Y–K Delta probably exceeded the value of today's commercial salmon fishery, and may do so again in the near future.

Three of the many different furbearers available have played an important economic role on the Y-K Delta: beaver, mink, and red fox. The beaver, one of the more abundant furbearers on the delta, has been important for pelt production; 5000 pelts were sealed in 1 year during the last decade. Their dark underfur is also in demand for the sheared fur clothing market. A cottage industry has sprung up in the Yukon–Kuskokwim Delta for making warm beaver hats, in which the warm belly fur is used for the inside of the ear tabs and the remainder of fur is used on the outside to repel frost and snow. The Kuskokwim mink (*Mustela vison ingen*) is regarded as the standard throughout the world because of the large size, dark color, high durability, and density of straight guard hairs (Burns 1964). The red fox produces an equally fine pelt in our area as well. These pelts have dense long fur and usually are very large (Obbard 1987).

During the 1991–92 trapping season, trappers grossed an estimated $275,000. During the 1992-93 trapping season, trappers grossed an estimated $195,000, and during the 1993-94 season trappers grossed an estimated $ 300,000. Today furbearer-trapping activity is probably only 10% of what it had been during the 1920s. Recent declines of the prices offered for the pelts of almost all furbearer species in the Yukon–Kuskokwim Delta are partially due to the competition with ranch-raised furs in Europe and the contiguous United States, as well as changing fashions and marketability of certain furs. Fears of the anti-trapping campaign worldwide and the threat of the European Community ban on certain trapped furs from North America have added to the decline in pelt prices. During the reporting period unseasonably warm weather and early thaws hampered trappers' efforts to efficiently travel to traplines, causing declines in furs produced and in the value of furs for the 3 years.

MANAGEMENT DIRECTION

Management Goal

- To maintain viable furbearer populations and provide for sustained yield harvest.

Management Objectives

- To encourage increased furbearer harvest in Unit 18, by way of furbearer/trapper education, fur handling demonstrations, and pelt judging through the Yukon-Kuskokwim Mink Festival held each year in Bethel.
- To help in developing an educational program that can be made available to the seven different school districts within and around the Yukon-Kuskokwim Delta.
- To improve trapper contacts through the trapper questionnaire and village visits.
- To improve our knowledge of different furbearer populations through the sealing program and surveys.

METHODS

The area biologist encouraged increased furbearer harvest in Unit 18 with the Yukon-Kuskokwim Mink Festival, participating as chairman of the education committee and designing festival educational displays.

The department met other educational goals by developing a teacher's guide for trapper and furbearer education, geared toward students of the Y-K Delta. We produced a notebook combining local trapping techniques, ADF&G's *Wildlife Notebook Series*, and the *Alaska Trappers' Manual* to be used as a teacher's guide for junior high students to learn furbearer biology and trapping.

We collected information concerning furbearers in Unit 18 by interviewing local residents, trappers, and fur buyers. Harvest statistics were from sealing certificates and fur acquisition reports submitted by fur buyers (Table 1). Incidental observations were compiled during field-work directed at other species.

A trapper questionnaire was sent to 200 trappers after the 1992-93 season and after the 1993-94 season. The names of these trappers were gathered from fur acquisition reports; out of the 200, 60 trappers responded (30% response) after the 1992-93 season, and 58 trappers responded (29% response) after the 1993-94 season. Trappers were asked to classify the abundance of each species of furbearers on their trapline, as "scarce," "common," "abundant," or "not present." Trappers were also asked their opinions on population trends on their traplines, as being "fewer," "same," or "more." A value of 9 was given to the terms "abundant" and "more". A value of 5 was given to the terms "common" and "same." A value of 1 was given to "scarce" and "fewer." All responses were combined, and a mean was calculated for each species. These mean values were referred to as the Trend Index and Abundance Index (Table 2). 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 less than or equal to 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 relatively high population levels.

We also asked trappers about abundance of furbearer prey species such as ptarmigan, snowshoe hares, grouse, red squirrels, ground squirrels, and microtines (mice, voles, and lemmings). All indications are that all species of prey (except grouse and ptarmigan) important to fox, lynx, mink, and marten have remained unchanged or have been increasing slowly since the 1992-93 trapping season. When trappers were asked about other predators, such as hawks and owls, they indicated these birds were present in higher numbers (Table 3.).

RESULTS AND DISCUSSION

Population Status and Trend

Beaver: Beavers continued to expand and colonize new habitats, particularly in coastal regions from Nelson Island to Scammon Bay and tundra areas near the Johnson River. Beaver densities remained high throughout Unit 18, and they were highest southeast of the Kuskokwim River in the Kilbuck Mountains and along the lakes and sloughs of the Johnson River southwest of Bethel. Fur buyers continue to report incidence of bite scars on beaver pelts purchased, suggesting intraspecific competition has been occurring within the beaver population.

Respondents to the 1992-93 and 1993-94 trapper questionnaires indicated that beaver abundance was higher (Abundance Index = 6.45–6.76, n = 60 and n = 58) than last year's levels (Trend Index = 6.70–6.96, n = 60 and n = 58). Of furbearers, beavers had the highest Abundance Index.

River Otter: The Unit 18 questionnaire results indicated that river otter populations were increasing (Abundance Index = 5.00–6.45). The trend of the population was thought to be slightly increasing (Trend Index = 5.78–6.00). River otters were abundant throughout the delta lowlands southeast and west of the Kuskokwim River. Many frozen streams were criss-crossed by many otter slides and trails that are highly visible and distinguishable from aircraft.

Mink: Mink populations are very difficult to estimate as they are predominantly found under the ice throughout the winter. Responses to the trapper questionnaire about mink abundance was fairly low; however abundance was high (Abundance Index = 5.00 to 6.76). Most mink trappers of the Y-K Delta are found only in select areas west of Bethel on the tundra lakes and along the coast between the Kuskokwim and the Black River. Mink are probably not abundant throughout the whole unit, explaining the low response rate. There is a relatively high market demand for mink; however, trapper effort is presently low, and trappers must use special techniques to capture mink in marketable quantities. Trappers believe mink populations are stable (Trend Index = 5.20–5.33).

Muskrat: Muskrats are reestablishing populations throughout the delta. Many muskrats died during the 1988-89 winter from "freezing-out." Their lakes, ponds, and sloughs froze, not allowing them to escape and forage. Since the winter of 1989–90 through the 1993-94 season, the numbers of muskrat pushups observed on lakes near Bethel have increased significantly.

Fox: Both red fox and white fox populations steadily declined between the peak, 1987-88, until the 1992-93 season. As microtines become more abundant, the fox population is increasing again in Unit 18. According to the trapper questionnaire, red fox are the fourth most abundant furbearer in Unit 18, with an Abundance Index of 4.92 during the 1992-93 season, increasing during the 1993-94 season to an index of 5.46. The trend index reveals an upswing from 5.00 (stable) to 6.00 (increasing).

It is more difficult to determine the population status of white foxes because they are only found on the adjacent islands and coastal portions of Unit 18 and often retreat to the pack ice on the Bering Sea during winter, scavenging on birds, marine mammal carcasses, and fish. On Nunivak Island the red and white fox populations seem unnaturally high and do not follow the cycles of the mainland because of the very reliable food source of dead and dying reindeer during winter months and large aggregations of nesting seabird and waterfowl nesting sites throughout the island during spring and summer. White fox are a major source of predation upon certain threatened goose and brant species, and the U.S. Fish and Wildlife Service are proposing control efforts on Kigagik Island, adjacent to Nelson Island.

Lynx: Lynx populations have increased in recent years and harvest rose to 18 lynx during the 1992-93 season. Lynx are a rare occurrence 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 1992-93 season and slightly increasing during the 1993-94 season (Trend Index = 5.67). Snowshoe hare numbers have recently been lower than during the 1989-90 season. The lynx population should follow or lag behind the population of hares for several years. Hare populations in the Y-K Delta are not as reliable a prey item as those found in Interior Alaska because flooding often takes its toll of "rabbits" during the break-up of the river ice. All of the lynx harvest takes place within the eastern portion of Unit 18.

Wolverine: Wolverine populations mimic the wolf populations of Unit 18.Wolverines are low in abundance (Abundance Index = 2.50–2.67) and increasing (Trend Index = 5.00–5.33), especially in the Kilbuck Mountains and the upper portions of the Yukon River (between Marshall and Paimiut). Sound biological data concerning wolverine densities are nonexistent;

however, mandatory sealing of pelts has provided an account of reported harvest since 1971-72 (Table 1.). Large prey abundance has increased in the Kilbucks (caribou) and along the Yukon (moose). Even though wolverines rarely are able to bring down big game by themselves, wolf kill sites, winter mortality of big game, and an abundance of other alternative prey (ground squirrels, ptarmigan, and hares) has enabled the wolverine to take advantage of increasing trends of ungulate populations in Unit 18.

Marten: Marten populations are not well documented within Unit 18; however, they range as far down the Kuskokwim as the Kisaralik River and down the Yukon to Pilot Station. Some rare sightings of marten may occur in the forested fringes further downriver on both drainages. The marten habitat in Unit 18 is very limited, bound within the narrow bands of spruce forest along the eastern portions of the unit. Trappers report that marten are still rare within the unit (Abundance Index = 2.90–2.50). Trappers also believe the marten population is declining (Trend Index = 5.00–4.10). Trappers from Russian Mission began to capture marten in greater numbers during the 1990-91 season than they had in the past. This harvest has declined significantly the last 2 seasons.

Weasel: According to trappers, short-tailed weasel (ermine) populations are fairly scarce with an Abundance Index of only 2.00–3.77. The population trend according to the trapper questionnaire ranges from 2.00 to 3.75. Weasel populations are poorly understood throughout the region; they are often not trapped and are caught incidentally while targeting other species of furbearers, such as marten and fox. Weasels are probably more abundant than some trappers realize.

Coyote: Coyotes are the least common species of furbearer with an abundance index of only 2.00–3.00; however, according to trappers their potential for further population growth is greatest with a Trend Index of 7.00. The 1992-93 season was the second time coyotes were mentioned in the trapper questionnaire and the third time trappers and hunters have actually documented seeing or capturing coyotes in Unit 18. It has long been speculated that coyotes are within the southeast portion of Unit 18, as there is a small population of these animals on the eastern edge of the Kilbuck Mountains and the Tikchik Lake area of Units 17B and 19B. Only 5 coyotes were reportedly harvested within Unit 18 during the 1991-92 through 1993-94 seasons.

Mortality

Harvest

Hunting Seasons and Bag Limits

Arctic Fox	1 Sep-30 Apr	2 foxes
Red Fox	1 Sep-15 Mar	2 foxes
Lynx	10 Nov-31 Mar	2 lynx
Wolverine	1 Sep-31 Mar	1 wolverine
Coyote	1 Sep-30 Apr	2 coyotes

Trapping Seasons and Bag Limit.

Beaver	1 Nov-10 Jun	No limit
Arctic Fox	10 Nov-31 Mar	No limit
Red Fox	10 Nov-31 Mar	No limit
Lynx	10 Nov-31 Mar	No limit
Marten	10 Nov-31 Mar	No limit
Mink	10 Nov-31 Jan	No limit
Weasel	10 Nov-31 Jan	No limit
Muskrat	10 Nov-10 Jun	No limit
River Otter	10 Nov-31 Mar	No limit
Wolverine	10 Nov-31 Mar	No limit
Coyote	10 Nov-31 Mar	No limit
Red Squirrel	No closed season	No limit

Human-induced Mortality.

Beavers: Eighty-one trappers harvested 746 beaver during the 1993–94 season and 78 trappers reported taking 605 beavers in 1992–93, and 80 trappers sealed 1409 beavers during the 1991–92 season for an average of 8–17 beavers per trapper for all 3 years. The number of beavers taken per trapper is half the number of previous years. This decline in trapper effort for 1992-93 and 1993-94 was due to almost no snow during the months of December and January throughout the Y-K Delta and poor fur prices for most furbearers caught incidentally while beaver trapping. Most beavers are harvested during the months of November, December, and January. Approximately 75% of the harvest is during these 3 months. Twenty percent of the harvest takes place during the months of February and March, and the remainder of the legal harvest takes place during break-up months of April, May, and early June. The harvest of beaver in spring is mainly done by boat. During winter months snowmachines are the primary travel mode to the traplines, and snaring is the most common method of capture. Of the harvest for years 1990–91, 1992–93, and 1993–94, the average of all pelt size classes of beaver were as follows: 25% were small beaver (under 52"), 23% were between 52" and 59", 24% were blanket beaver (60"–64"), and 28% were super blanket beaver pelts (>65").

An estimated 10–25% of the beaver harvest is probably not reported, especially the smaller pelts of juvenile beaver and larger pelts that are poorly handled. These beaver are not often sealed and are made into hats and other garments for domestic use or commercial sale. These pelts are often documented several years after the season is over and after a tannery receives them unsealed with little or no information other than who the pelts are from.

River Otter: River otter harvests are influenced by fall and winter weather conditions and trapper access, rather than the abundance of otters. Trappers engaged in beaver and mink trapping caught most river otters incidentally. The number of otters reported sealed was 363 in 1991–92, 346 in 1992–93 and 139 in 1993–94. River otter prices remained low during the past 2 seasons. Fur buyers estimate that 15% of river otters are retained and not sealed for use in parkas, mukluks, and hats.

The sex ratio of the otter harvest was >60% males for the 1992–93 and the 1993–94 seasons to <40% females.

Mink: The mink harvest has fluctuated around several thousand per year in recent years, including the 1991–92 through the 1993–94 seasons. These harvest figures are well below historical levels that range from 6000 to 30,000 mink. Fur buyers 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 mink trappers was far lower than that observed 50 years ago when trapping was the only source of income available during winter. Most of the mink are taken by the "tundra" villages 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) natural resource staff, the Cooperative Extension Service agent, the Lower Kuskokwim School District's (LKSD) Yupik Life Styles Program, and the Department of Fish and Game to increase interest in trapping, handling, and marketing mink throughout the Y–K Delta. This cooperative effort to educate trappers and encourage trapping and furbearer management led to the formation of the "Yukon–Kuskokwim Mink Festival." Mink trappers come to Bethel to encourage the use and sale of furs, highlight the importance of the fur industry to the Yukon–Kuskokwim Delta, and share information about one of Unit 18's most valuable fur resources.

Muskrat: The reported muskrat harvest remains very poor. The Yukon-kuskokwim muskrats are fairly small and of low quality. Much of the harvest is during fall and late spring when rats can be shot with shotguns or .22's. Pelts are often damaged and not prime, resulting in low demand, poor prices paid to trappers, and a lack of interest in trapping. The harvest of muskrats is probably several thousand per year. Most are not sold; they are eaten or the pelts are made into domestic garments. The most recent price for a Nr. 1 muskrat in this area has averaged about $ 1.00 for the last 2 seasons. Historically, trappers and hunters have sold between 2000 and 25,000 muskrats annually. Muskrat numbers are increasing without a severe winter or severe flooding since 1988–89.

Red Fox: Red fox harvest improved slightly in the Yukon–Kuskokwim Delta for the past 2 seasons, as compared to the almost nonexistent harvest during the 1991–92 season. Although red foxes were abundant throughout the unit, their prices were low. Prices for white foxes were also very low during the reporting period, and most were used as parka lining or sold to tourists who do not report purchases. The red fox harvest as late as the 1988-89 season has been between 2000 and 3000 fox. Fox harvest will probably not increase until the price paid to trappers increases. Fur buyers estimated 35% of white foxes and 20% of red foxes harvested in Unit 18 were retained for domestic use. The harvest of red fox is mostly during the months of December and January when pelts are in the best condition. The guard hairs begin to slip in February and March and are usually not taken after February 15th. Conversely, the white (arctic) fox pelts do not become fully prime until late January through March, and most white fox trapping and hunting takes place in February and March.

It is estimated that half of the fox harvest is done by the use of snares and/or traps, and the other half is by shooting. Many of the villagers that I frequently visited and taught how to trap and snare fox had never used snares or traps to capture fox. Most fox along the coast and the tundra regions of Unit 18 are chased down by snowmachines and shot after being run over or exhausted by high-speed chases. This illegal practice, a misdemeanor, damages pelts and brings poor prices to trappers. Preventing these offenses remains extremely difficult.

Lynx: The harvest of lynx has fluctuated from only 4 animals in 1991-92 to 18 during the 1992-93 season, and then back again to 4 during the 1993-94 season. Low harvests are attributed to drastic declines in fur prices, lack of good lynx habitat, rarity of lynx in much of the unit, and reduced prey species such as snowshoe hares. Lynx are one of the least abundant species found on the Y-K Delta and are usually only found upriver near forested regions bordering Subunits 19A and 21E. Historically lynx harvests have ranged from 10 to 80 lynx in Unit 18, most of these animals being caught along the upper portions of the Yukon (near Russian Mission) and the Kuskokwim river (upper Tuluksak River) drainage near Nyac.

Marten: The number of reported marten harvested in Unit 18 and purchased by fur buyers fluctuates widely. Reported marten harvest has been between 75–400 animals in recent years. Estimated marten harvests have probably changed little in recent times and between 300-500 are probably trapped each year. Marten skins are frequently used for handicrafts, and many do not reach the market. However, the price for marten pelts continues to remain strong statewide. Trappers are beginning to target this particular species for cash sale. However, marten remain fairly rare in Unit 18 and occupy similar forested habitats as lynx near the borders of Subunits 19A and 21E. The actual harvest of marten in Unit 18 is unknown because many are reported as being harvested in Subunits 21E and 19A.

I am requesting that fur buyers begin recording the sex of marten taken in the future to insure the harvest ratio of males to females remains fairly high. All indications from fur buyers are that most of the pelts being sold are larger males; however, this has not been very well documented. I am also requesting buyers inquire more thoroughly where trappers actually caught the animals to lessen misrepresentation on Fur Acquisition Reports.

Wolverine: Most of the harvest of wolverines takes place between the months of January and March. Six wolverines, 8 wolverines, and 4 wolverines were sealed in Unit 18 during the 1991-92, 1992-93, and 1993-94 seasons, respectively. Historically, reported wolverine harvest has never exceeded 30 animals and average overall harvest is usually less than 10 animals per year. More than any other species, wolverines are used domestically for ruffs and most pelts are not sealed. Fur buyers 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 by taxidermists, for parka ruffs, and are still considered a novelty item. Like lynx, wolverines are one of the less abundant furbearers found on the Y–K Delta. Overall, the sex ratio of wolverines harvested in Unit 18 during the reporting period is 75% males to 25% females. The male wolverines are probably more susceptible to harvest by snowmachine hunters and trappers, especially during the breeding season when males are more free ranging.

Weasel: Short-tailed weasels are often caught incidentally in traps set for other species. No trapper effort was directed toward weasels during the reporting period because of low market demands. Some skins are used locally for trim on parkas and slippers.

Transport Methods. Almost all hunter/trappers used snowmachines to harvest furbearers in Unit 18.

Other Mortality

The abundance of furbearers in Unit 18 appears more related to weather and disease 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 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 during the winter of 1990 probably caused considerable fox mortalities. Declines of prey items such as snowshoe hares and microtines will have an adverse effect upon fox and other furbearer predator populations in the future.

Habitat

Assessment

Unit 18 contains vast amounts of lowland tundra, ponds, streams, sloughs, and rivers, accounting for tremendous production in aquatic furbearers. Boreal, montane, and Interior habitats are relatively limited. Species such as lynx and marten will probably remain relatively uncommon.

CONCLUSIONS AND RECOMMENDATIONS

Furbearers were abundant in all areas of suitable habitat in Unit 18. Aquatic species such as mink, beavers, otters, and muskrats were common in vast amounts of lowland tundra ponds, sloughs, rivers, and marshes. Forested habitat is limited and far fewer lynx, wolverines, and marten were harvested. Coyote populations will probably continue to move into Unit 18. Their harvest should be encouraged in the future because they will be competing for the same habitat and the same prey of red foxes. Coyotes are also predators of foxes. All furbearer habitats are relatively undisturbed. Trapping pressure affects furbearer densities only near towns and villages. No changes are recommended in seasons or bag limits.

I recommend we continue to support trapper education throughout the Yukon–Kuskokwim Delta through the Yukon/Kuskokwim Mink Festival, trapper manuals, and fur handling videos that promote trapping. We should increase our efforts to gather better fur harvest information through trapper interviews and increased numbers of fur sealers at villages.

In the future, beaver cache surveys may be necessary in the fall with capture–recapture of select beaver populations to determine the number of beavers per cache and measurement of cache sizes. We can achieve a better population estimate by using aerial cache counts. However, beaver populations are at an all time high, and funding restrictions may not allow for this type of inventory of beaver populations.

LITERATURE CITED

Burns, J. L. 1964. The ecology, economics, and management of the mink in the Yukon Kuskokwim Delta, Alaska. Ms. Thesis, University of Alaska-Fairbanks, AK.

Obbard, M. E. 1987. Fur grading and pelt identification. Pages 717-826. *in* M. Novak et al. Wild furbearer management and conservation in North America. 1150 pp.

Prepared By:

Randall H. Kacyon
Wildlife Biologist III

Submitted By:

Steven Machida
Survey-Inventory Coordinator

Table 1 Unit 18 estimated furbearer harvests, 1954-55 to 1993-94.

Year	Fox	Lynx	Mink	Muskrats	Otter	Wolverine	Beaver
1954-55	----	-----	40000	-----	---	--	----
1955-56	----	-----	-----	-----	---	--	----
1956-57	----	-----	-----	-----	---	--	----
1957-58	----	-----	-----	-----	---	--	----
1958-59	----	25000	-----	-----	---	--	2766
1959-60	----	11000	-----	-----	---	--	2013
1960-61	----	7000	-----	-----	---	--	1428
1961-62	----	-----	-----	-----	---	4	817
1962-63	----	-----	-----	-----	---	5	1503
1963-64	----	-----	-----	-----	---	6	666
1964-65	----	-----	-----	-----	---	3	264
1965-66	----	-----	-----	-----	---	5	411
1966-67	----	-----	-----	-----	---	4	765
1967-68	----	-----	-----	-----	---	7	1423
1968-69	----	-----	-----	-----	---	1	975
1969-70	----	-----	-----	-----	---	--	946
1970-71	----	-----	-----[a]	-----	---	--	385
1971-72	----	-----	-----[b]	-----	---[c]	3	961
1972-73	----[d]	-----	-----	-----	---[e]	9	1769
1973-74	----[f]	-----	1000	-----	300	11	684
1974-75	500	-----	1000	-----	300	5	1389
1975-76	----	-----	-----	-----	---	29	1350
1976-77	1000	25	1000	-----[g]	500	1	2209
1977-78	1000	56	800	-----	506	10	2054
19/78-79	----[h]	79	-----[i]	-----[h]	686	9	1225
1979-80	2750	66	900	15000	343	15	2067
1980-81	2500	55	10000	8000	645	10	2502
1981-82	3000	56	14000	9000	385	6	1819
1982-83	800	67	6600	5000	223	11	1187
1983-84	900	23	11000	1500	750	3	981
1984-85	1200	23	1000	3000	431	7	1550
1985-86	1000	13	6500	1500	206	3	2253
1986-87	1000	8	4500	2200	321	8	3722

Table 1 Continued

Year	Fox	Lynx	Mink	Muskrats	Otter	Wolverine	Beaver
1987-88	2500	10	6000	3000	566	5	4686
1988-89	2000	15	6000	10000	505	6	3022
1989-90	453	7	5677		456	2	2923
1990-91	358	4	4767	300	301	9	908
1991-92	200	4	3000	68	363	6	1409
1992-93	1000	18	4387	200	346	8	603
1993-94	300	4	3000	1000	139	4	746

[a] Prices reported as depressed.
[b] Record low harvest.
[c] Harvest up from previous years.
[d] Harvest highest in years.
[e] Otter reported to be abundant.
[f] Population peak.
[g] Population reported to be low.
[h] Popualation reported to be healthy.
[i] Population up, but few were harvested.

Table 2 Furbearer population status and trends during the 1992-93 and 1993-94 seasons based on trapper questionnaire mail returns from Unit 18.

Species	1992-93 Abundance	1993-94 Index	1992-93 Trend	1993-94 Index	Trend And Status
Lynx	1.50	1.67	5.00	5.67	Increasing/low
Arctic Fox	3.50	3.80	5.25	5.67	Increasing/low
Red Fox	4.92	5.46	5.00	6.00	Increasing/moderate
Marten	2.90	2.50	5.00	4.10	Decreasing/low
Muskrat	4.10	5.50	4.53	5.64	Increasing/moderate
Mink	5.00	6.76	5.20	5.33	Increasing/high
Beaver	6.45	6.76	6.70	6.96	Increasing/high
Wolverine	2.50	2.67	5.00	5.33	Stable/low
River Otter	5.00	6.45	5.78	6.00	Increasing/high
Ermine	2.00	3.77	2.00	3.75	Increasing/low
Coyote	2.00	3.00	6.00	7.00	Increasing/low

Table 3 The status and trend of common prey items and other predators that may compete with furbearers during the 1992-93 and 1993-94 seasons. This is based on trapper questionnaire mail returns from Unit 18.

Species	1992-93 Abundance	1993-94 Index	1992-93 Trend	1993-94 Index	Trend And Status
Hares	5.54	4.82	5.86	4.33	Decreasing/moderate
Red Squirrel	4.55	4.33	5.86	4.33	Decreasing/low
Ptarmigan	6.26	5.46	5.89	5.00	Decreasing/moderate
Grouse	5.00	4.33	5.55	4.33	Decreasing/moderate
Mice	5.00	6.26	4.33	5.86	Increasing/moderate
Owls-Hawks	3.74	5.00	5.25	5.89	Increasing/moderate

LOCATION

Game Management Unit: 19 (36,490 mi^2)

Geographic 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 have contributed to the economic base. Native people relied on furbearers for garments, food, and trading goods with other aboriginal cultures. The quest for wild pelts prompted early Russian settlement in the area. Local 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 the sale of wild pelts is cycled through the local economy several times.

Seasons and bag limits have varied dramatically since original regulations were adopted in the early 20th century. Recently, management has necessarily become more intensive. Dynamic season dates and bag limits for several species are designed to maintain or enhance furbearer populations.

Several factors, which may change yearly, influence harvest levels of the various furbearer species. These factors include species population, snow conditions that affect furbearer and trapper mobility, pelt prices, alternate species abundance and pelt prices, availability of alternate income, fuel prices, and regulations.

MANAGEMENT DIRECTION

Furbearer management is designed to annually assess populations, design regulations to encourage harvests, and maintain or enhance those populations. Specific management goals and objectives have undergone major changes during the past 8 years.

Management Goals and Objectives

- Annually determine both current status and trend of the various subpopulations for each furbearer species and their primary prey species.
- Obtain estimates of harvest for all furbearer species.
- Assess trapper effort and distribution.
- Maintain open communications with area trappers.

Beaver:

- Manage the various subpopulations to maintain a mean pelt size > 50 inches while maintaining <25% kits in the annual harvest.

- Manage the population to maintain a mean density of not less than 1 active colony per 3.2 km 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 (FAR), Fur Export Reports (FER), and trapper questionnaires.

- Manage the population to maintain >50% males in the annual harvest and a ratio of not more than 1 adult female per 2.0 juveniles in the annual harvest.

Lynx, River Otter, and Wolverine:

- Maintain accurate annual harvest records based on sealing documents and trapper questionnaires.

- For wolverine, manage the population to maintain >50% males in the annual harvest.

Muskrat, Mink, Red Fox, Coyote, Ermine, and Squirrel:

- Annually estimate trends and numbers harvested 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 collected information on specific location of harvest and sex and age of the animal. Crude harvest trends of 7 additional furbearer species were gathered from FARs and FERs. We adjusted and corrected these estimates by comparing them with trapper questionnaire responses.

Rather than relying on information obtained from the statewide trapper questionnaire, we have annually distributed our own version to area trappers. Names of trappers were obtained from sealing documents. Following the trapping seasons, questionnaires are mailed to approximately 100 trappers annually. Trappers were asked to list the number of animals of each species they harvested as well as their assessments of the population trend (decreasing, stable, or increasing) and current population level (low, moderate, or high). 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 are 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 $\leq$ 4.50 and $\geq$ 5.50 represented decreasing and increasing trends, respectively. For the AI, values $\leq$ 4.50 were assumed to represent low populations. Mean values between 5.51 and 5.49 were moderate. Those $\geq$ 5.50 represented relatively high population levels.

During October or November, aerial beaver cache trend areas are surveyed along the middle Kuskokwim River drainages. We analyzed data based on number of colonies per kilometer of river or on the basis of active colonies per square kilometer, depending on habitat.

Because of concerns regarding marten populations in Unit 19, I continued to collect and analyze carcasses. Sex and age estimates of the harvested segment of the marten population were obtained. 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. Several adult canines were extracted from cleaned skulls for aging (based on counts of cementum annuli) to determine exact ages.

I evaluated criteria for determining sex and age classes of marten: sagittal muscle closure method (Whitman 1978) for distinguishing juveniles from adults, cleaned femurs (<72 mm for females and >72 mm 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. During 1994–1995, research into aging techniques on male marten was continued and focused on baculum morphology and mass for determining ages.

Pelt prices were based on the listed average prices paid at North American Fur Auction sales. The average prices listed for the December, February, and March sales were averaged to produce a single, yearly average index price for each species.

RESULTS AND DISCUSSION

Population Status and Trend

Beaver

Population Size

We aerially surveyed areas considered optimal beaver habitat during October and November 1991–1994. Beaver populations appear relatively high, but survey data indicated that an annual average decline in colony density of 5.1% occurred between fall 1991 and 1994 (Table 1). That decline occurred in optimal habitat and is undoubtedly due to decreasing availability of high quality food, not to overharvest. Beavers in high-density populations are eating tree species of little nutritional value, not their nutritious foods of birch, willow, and aspen. To allow regeneration of these favored food supplies, trappers have been encouraged to harvest beavers from areas having poor quality food sources.

As in previous reports (Whitman 1990*a*,*b*; 1993), fewer active colonies are seen along the mainstem Kuskokwim drainages than in associated side sloughs. Decreased visibility of bank lodges and caches contribute to lower counts in the main channels, but densities are probably lower as well where seasonal water fluctuations are greater and where water is faster flowing. Even with the declines in active colonies, I suspect the density in good habitats is about 0.65 colonies/km^2.

In addition to active lodges, I observed inactive lodges during surveys. In most cases, inactive lodges were located on water bodies where 1 or more active lodges also occurred. The habitat appears saturated at or near the carrying capacity in the survey areas. Those surveys, however, were conducted in high-density areas and cannot be extrapolated to the entire unit. Beaver sealing documents indicate almost no harvest from the survey areas during the past 5 years. Unless harvest increases soon, habitat will continue to deteriorate and beaver populations will continue to decline.

Analyses of the Unit 19 trapper questionnaire responses also indicate beaver population status and trend. Questionnaire results support the findings of the cache surveys. Beaver abundance indices during regulatory years 1987 through 1993 remained extremely high (Table 2). Beaver are generally rated more abundant than any other furbearer species in Unit 19.

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 and can also indicate the population at large. The proportion of kits in the annual Unit 19 harvest has been declining (Fig 1), and there is a weak correlation between total beaver harvested and percent kits in the harvest. As harvests increase, the percent kits in the harvest increases (from 1956–1957 season through the 1993–94 season, $r = 0.40$). During the 5-year period from 1957–1958 through 1961–1962, an average of 3725 beaver were sealed, and the percent kits in the harvest was 17.1. During the 5-year period from 1989–1994, when an average of 244 beaver were sealed annually, only 8.5% of those were kits. Perhaps with the decreased pelt prices, especially for kits, many of them are not salvaged and sealed.

Sex of the harvested proportion of the beaver population appears to slightly favor females. However, sample sizes are low because sex is indeterminate from beaver pelts presented for sealing and must be determined from carcasses of trapped animals. During the period 1989–1995, I examined 75 beaver carcasses snared during those seasons and found 42 females (56%). Whether this reflects actual proportions in the at-large population is not known.

Distribution

Viable beaver populations are throughout Unit 19. Suitable waterways and high-quality food sources are less common in Units 19B and 19C than in Units 19A and 19D. Beaver populations in the various units reflect these habitat differences. However, even marginal habitat is generally occupied.

<u>Mortality</u>

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 (Fig 2). Reported harvest during 1993–1994 was at an all-time low, with only 71 beavers presented 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 Canadian fur auction houses are that beaver pelt prices may have reached a low point and may be recovering slowly.

Illegal and unreported harvest may be increasing. A significant proportion of beavers harvested in Unit 19 are 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 hat and mitts. Such pelts are often not presented for sealing, which leaves no record of their harvest.

Beaver trapping season dates in Unit 19 have not changed during the past 10 years. The individual bag limit was changed from 40 to 50 beavers in 1988. During its spring 1992 meeting, the Board of Game adopted a no bag limit regulation for Unit 19.

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 estimation of success rates can be obtained from the number of beavers harvested by each trapper who seals at least 1 beaver. Since 1970 the general trend of this ratio has increased and is about 9 beavers per trapper.

Other Mortality

No data exist concerning other sources of beaver mortality in Unit 19. However, overwinter mortality due to starvation does affect specific colonies. During some winters (e.g., 1991–1992), early freeze-up does not allow beavers to accumulate sufficient caches for overwinter sustenance, causing starvation. I suspect that wolf predation during summer and autumn also contributes to beaver mortality. Additionally, kit production and survival may decrease in beaver subpopulations at or near the saturation point.

River Otter

Although observations throughout the area suggest that river otters are widespread in moderate abundance, harvest is low. The 1992–1993 harvest of 27 was the lowest in the unit since mandatory sealing began. Unit 19A continued to produce more otters than other units (43%), followed by Units 19B (32%), 19D (22%), and 19C (4%). When harvest density from Unit 19 is compared with other harvest densities statewide, it appears moderate, probably reflecting both the density of otters and the density of trappers.

During the 1993 regulatory year, river otter harvests remained low (Fig 3), with the 5-year mean annual harvest significantly below any previous level since sealing began (1979 through 1983, $\bar{x}$ = 67, 1984 through 1988, $\bar{x}$ = 73, 1989 through 1993, $\bar{x}$ = 36).

The 5-year average of 64% males in the reported harvest during regulatory years 1989 to 1993 has not changed significantly from the previous 5-year mean of 62%. A higher proportion of males in mustelid harvests is common, probably reflecting the male's propensity to travel greater distances than females, increasing their chances of encountering traps.

Because of differences in individual pelt handling techniques, measuring techniques, and otter physiological growth characteristics, it is impossible to accurately distinguish between adults and juveniles based on measurements listed on sealing documents. However, it may be useful in documenting changes in pelt measurements, making the assumption that pelts <42 inches (length plus width) are juveniles, while those $\geq$ 42 inches are adults. During regulatory years 1984 to 1993, 16% of the sealed otters were assumed to be juveniles. When percent of annual harvest <42 inches is compared to total annual harvest figures, a correlation exists (n = 10, y = 10.6+2.5x, r = 0.46, P $\approx$ 0.19), indicating that when harvest pressures are extremely light, a higher proportion of adults than juveniles are captured. Pelt sizes during 1993–1994 (x =

47.5 inches) are not statistically different from previous years' measurements. However, over 10 years there was a strong correlation ($n = 10, y = 45.09+0.16x$, $r = 0.726$) revealing an increase in mean pelt size with harvest year.

Harvest chronology by month is relatively consistent throughout the season, with 15–24% of the harvest during each month between November and March. Harvests in April are light (1984–1985 through 1993–1994, $\bar{x} = 4\%$).

The number of trappers taking otters is declining, while numbers of otters taken per trapper is increasing. During 4 of the past 5 regulatory years, otters per trapper have been above the 10-year mean of 2.4 otters/trapper (Table 3).

The method of transport listed on fur sealing certificates has shifted from a preponderance of snowshoes, skis, or dog teams during the mid 1980s to a majority of trappers using mechanized access. During the period 1984–1985 through 1988–1989, only 1% of trappers used aircraft; 45% used snowshoes, skis, or dog teams; and 54% used snowmachines. In the subsequent 5 years (regulatory years 1989–1993), 12% used aircraft; 21% used snowshoes, skis, or dog teams; and 67% used snowmachines (Table 4). Method of take has not changed during the same 10-year period. Trapping, snaring, and shooting have consistently accounted for about 56%, 41%, and 3% of the reported harvest, respectively.

In Montana (Zackheim 1982), Minnesota (Berg and Kuehn 1984), and various southeastern states (Hill 1978), high correlations exist between beaver and river otter harvests. Contrary to earlier reports (Whitman 1990*a*,*b* 1993), there seems to be no significant correlation between annual beaver harvests and river otter harvests in Unit 19. An analysis of 16 years of data from regulatory years 1977 to 1992 showed only a weak correlation ($y = 35.92+0.03x$, $r = 0.543$, $P < 0.05$) between harvest levels of the 2 species. Likewise, no correlation exists ($n = 8$, $y = 54.72-0.25x$, $r = -0.287$, $P = 0.5$) between average river otter pelt prices and annual harvests. Thus, at the present time, it appears that otters are generally a nontargeted species, their take largely incidental to the harvest of other species.

Until the 1993–1994 season, pelt prices for Interior Alaska river otters were poor, providing little incentive for trappers to target them (Table 5). Mean pelt prices were in excess of $78 during the 1993–1994 regulatory year, more than doubling the previous 5-year average of $37. The total estimated value of otters unitwide during 1993–1994 was $2440, ranking them 5th in economic importance among the 12 furbearer species. Otters accounted for only 2% of the total estimated fur receipts from Unit 19 during 1993–1994.

Based on 18 questionnaires returned by area trappers concerning the 1993–1994 season, the abundance index (5.67) was slightly higher than at any time during the preceding 6 years. Currently, I assume river otter populations are moderate and stable.

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 unit harvests continue to come from those areas. The headwaters of the Aniak

River drainage in Unit 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 past 5 years has contributed a minor portion of the total income realized from the sale of wild fur pelts (Table 5). Trappers responding to the Unit 19 trapper questionnaire indicate that lynx populations are currently stable at very low levels.

Wolverine

Sound biological data concerning wolverine densities in Unit 19 are nonexistent. However, mandatory sealing of pelts has provided a reasonably accurate account of harvests since 1971 (Whitman 1993). Some harvest data exist from 1960–1969 bounty records. Numerous factors undoubtedly affect annual harvest, such as 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% (Whitman 1993). Wolverines are found throughout the unit. The 26 animals harvested during the 1988–1989 season constitutes the lowest harvest on record. This reflects a change in legal methods and means and decreased pelt prices rather than a decline in wolverine populations. The prohibition on shooting wolverines on the same day a person is airborne curtailed the total harvest.

Unit 19 trapper questionnaire results of the past 7 years indicate a moderate wolverine population, with an increasing trend (Whitman 1993). Winters of 1989–1990, 1990–1991, and 1994–1995 were severe, and these adverse conditions resulted in abundant food resources for wolverines in the form of moose, caribou, and sheep winter kills and wolf kills. Wolverine population increases were notable during 1991–1992 through 1994–1995 trapping seasons.

Marten

Marten are the most sought after and valuable furbearer species in the unit (Table 5). Pelt prices increased dramatically in the early 1980s, and trapper interest coincidentally increased. At the same time, marten populations apparently declined in the unit (Whitman 1990*a*,*b*; Fig 4). An emergency order was enacted in spring 1989, shortening the season to 1 November through 15 January. Marten increased in subsequent years, negating the need for additional emergency closures. Although many possible reasons have been advanced in an attempt to explain those population declines, no definitive answers are available. Potential causes that have been considered include parasites, food shortages, natural cycling, predation, and overharvesting. Previous furbearer management reports (Whitman 1990*a*,*b*) include complete discussions of marten population changes, abundance and trend indices, and other biological considerations.

Trapper questionnaire results have been gathered and analyzed from 1978 through 1994 (Table 5). Marten populations were thought to be moderate from 1978–1980. Estimates generally declined to low levels by 1982 and remained low through 1987, then rebounded to relatively high levels in 1988, where they have remained until present. It is unclear if the shortened season in 1988 was responsible for the population turnaround; dramatic increases in the population were noted in the years following the shortened season. Marten pelt prices continued to decline during the late 1980s and early 1990s. Although population levels were high, catches declined because of reduced effort in response to the low pelt prices.

Marten carcass collections and necropsies have continued. Sexing and aging criteria have been investigated in an effort to reduce the time involved in necropsy activities while concurrently increasing accuracy of the data. Sagittal crest formation, suture closure, femur growth characteristics, uterus size and conformation, and baculum mass (Fig 5) have been considered, and all are useful for determining sex and age of marten carcasses.

Data from carcass necropsies may reveal marten population status and trend (Whitman 1990*a*,*b*; 1993). Percent males in the harvest 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 the 1987–1988 season in Unit 19. This change to a more favorable ratio supports trapper assessments of population status and trend during respective years. The ratio of adult females to total numbers of juveniles in the harvest is positively correlated with trapper questionnaire responses (Fig 6). Development of marten population assessment techniques and population status monitoring will continue.

Mink

Market demand for wild-caught mink remains low. Consequently, few Unit 19 area trappers target them. Most catches are incidental to marten trapping activities. Mink harvests remained low, although trappers' collective assessments of populations were higher during 1993–1994 than at any time during the previous 8-year period (Table 6).

Mink populations are stable or slightly increasing, while harvests are generally declining. As mentioned, the mink harvest is largely incidental to marten trapping efforts, and lower prices for marten pelts have dramatically affected the amount of effort put forth by trappers. Mink pelts prime much earlier than those of most other species and are probably prime in early to mid October. On the other hand, pelts become "singed" in late January, and their market value declines. To encourage a higher use at a time when pelts are prime, earlier trapping seasons should be considered. Opening a mink season on 1 October rather than 1 November should be encouraged, with the stipulation that sets be made only under water. This would allow trappers to take mink, while minimizing the incidental harvest of marten at a time when marten pelts are not yet prime. The open season should extend through 28 February, allowing animals incidentally caught in marten sets to be legally sold.

Muskrat

Currently, poor pelt prices and very depressed muskrat populations combine to make muskrat one of the least valuable furbearer species in the area (Table 7). There remains some shooting effort during spring in scattered locations, but most pelts are probably used domestically in production of hats.

One of the greatest mysteries in furbearer management in Alaska is muskrat population dynamics. Historically, muskrats were plentiful throughout Unit 19 in suitable habitat, and spring shooting was a valued pursuit. It is difficult to ascertain precisely when, but by 1970 or 1975, populations declined. Since that time, populations have not rebounded. Founder populations still exist, but production and/or survival of kits have not been sufficient to enable population rebounds. Perhaps predation, disease, parasitism, or changing weather and habitat are factors that singularly or in combination, act to keep populations low.

Ermine and Red Squirrel

These 2 furbearer species contribute very little recreationally or economically to the region. Most of the harvest is incidental to marten trapping efforts. Pelt prices are extremely depressed for both these species, and most are not salvaged. Populations of both are secure, and no changes are recommended in regulations concerning them.

Coyote

Viable coyote populations in Unit 19 are restricted to areas in or near the Alaska Range. Their populations are extending into other areas of the unit. The estimated unit harvest remains less than 20 animals annually.

Red Fox

Red fox populations appear healthy throughout suitable habitats in Unit 19. During the regulatory year 1986 and 1987 seasons, trappers responding to the Unit 19 trapper questionnaire rated fox populations as moderate (Table 8). During regulatory years 1988–1993, questionnaires indicated a high red fox abundance index. However, low pelt prices during the past 8 years ($17.10) have resulted in low harvests (Table 8). The estimated mean annual harvest was 150 red foxes, including cross and silver color phases.

Early indications from the international fur sale houses suggest red fox pelt prices are increasing. This should encourage renewed interest in fox trapping. However, incidental observations during moose surveys and other aerial activities in the unit during fall 1994 indicate a decline in red fox populations.

Seasons and Bag Limit.

Trapping seasons and bag limits for Unit 19 furbearers were as follows:

Species	Dates	Bag Limit
Beaver	1 Nov-15 Apr	No limit
Coyote	1 Nov-31 Mar	No limit
Lynx	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
Red Fox	1 Nov-31 Mar	No limit
River otter	1 Nov-15 Apr	No limit
Wolverine	1 Nov-31 Mar	No limit

CONCLUSIONS AND RECOMMENDATIONS

Beaver populations remain high, but indications in saturated populations are that natural density regulation factors may be acting to reduce populations. Catches will continue to fluctuate with pelt prices. Current prices are low and harvest will remain minimal. The removal of beaver bag limits may encourage some additional harvest. Low beaver harvests will result in minor effort for otters. I recommend no regulation changes for river otter at this time. We should consider extending beaver seasons in lowland portions of Unit 19 (19A and 19D) and allowing shooting as a legal method of harvest to increase beaver harvests. Lynx harvest has also remained very low. Recent increases in hare abundance should allow slight rebounds in lynx numbers and harvests. Increases are expected to be minor.

Wolverine populations remain stable or increasing in Unit 19. Severe weather conditions during winters 1989, 1990, 1991, and 1994 resulted in abundant scavenging opportunities for wolverines. Their populations will probably continue to increase in response. Harvests in the past 20 years have declined substantially due to restrictions on same-day-airborne shooting. However, moderate pelt prices are encouraging additional effort by a few trappers. Harvests are expected to increase slightly through the 1990s.

Mink populations are moderate and largely stable. Harvest remained low during this reporting period because of weak market demand. No regulatory changes are recommended. Marten pelt prices have decreased since the late 1980s, with concurrent declines in trapping effort. Efforts to document changes in marten population status and trends through analyses of donated carcasses will continue.

Ermine and red fox are widespread and common, although fox populations are apparently experiencing a cyclic decline in many areas. Little intentional harvest occurs because of low pelt value. Coyote populations will continue to grow. Muskrat populations were lightly harvested because of low market value. I recommend no regulatory changes.

LITERATURE CITED

Archibald WR and RH 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.

Berg WE and DW Kuehn. 1984. Minnesota otters. River Otter Workshop. Columbia, Mo. 1p. Hill EP. 1978. Current harvest and regulation of trade of river otter in the southeastern United States in 1978. Pages 164–172 *in* RR Odom and L Landers, eds. Proceedings of the rare and endangered wildlife symposium. Georgia Dep Nat Resour., Game and Fish Div, Tech Bull WL4.

Quick HF. 1953. Wolverine, fisher, and marten studies in a wilderness region. Trans North Am Wildl Conf. 18:512–533.

Soukkala AM. 1983. The effects of trapping on marten populations in Maine. MS Thesis, Univ Maine, Orono. 41pp.

Strickland MA and CW Douglas. 1988. Marten. Pages 530–546 *in* M Novak, JA Baker, ME Obbard, and B Malloch, eds. Wild Furbearer Management and Conservation in North America. Ontario Trappers Association, North Bay.

Whitman JS. 1978. Sex and age determination of pine marten based on skull and baculum morphology. Forest, Wildlife and Range Exp Sta Bull, Univ Idaho, Moscow. 6pp.

———. 1990*a*. Unit 19 survey-inventory progress report. Pages 110-122 *in* SO 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.

———. 1990*b*. Unit 19 survey-inventory progress report. Pages 137-150 *in* SO 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-32-2. Juneau.

———. 1993. Unit 19 survey-inventory progress report. Pages 186-200 in SM Abbott, 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-23-3 and W-23-4. Juneau.

Yeager LE. 1950. Implications of some harvest and habitat factors on pine marten management. Trans North Am Wildl Conf. 15:319–334.

Zackheim H. 1982. Ecology and population status of the river otter in southwestern Montana. MS Thesis, Univ Montana, Missoula. 100pp.

Prepared by:

Jackson S. Whitman
Wildlife Biologist III

Submitted by:

Kenton P. Taylor
Management Coordinator

Reviewed by:

Mark E. McNay
Wildlife Biologist III

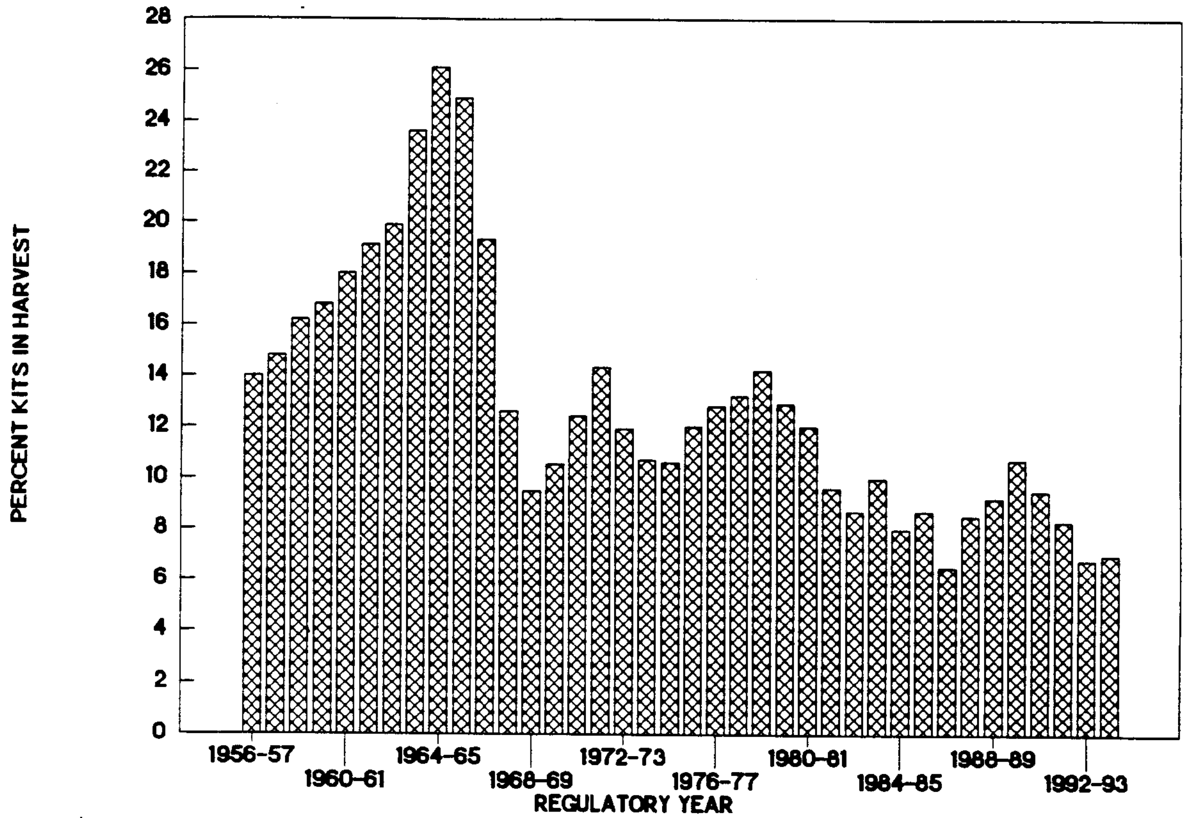


Figure 1. Percent kits in the annual beaver harvest in Unit 19, 1956-1957 through 1993-1994.

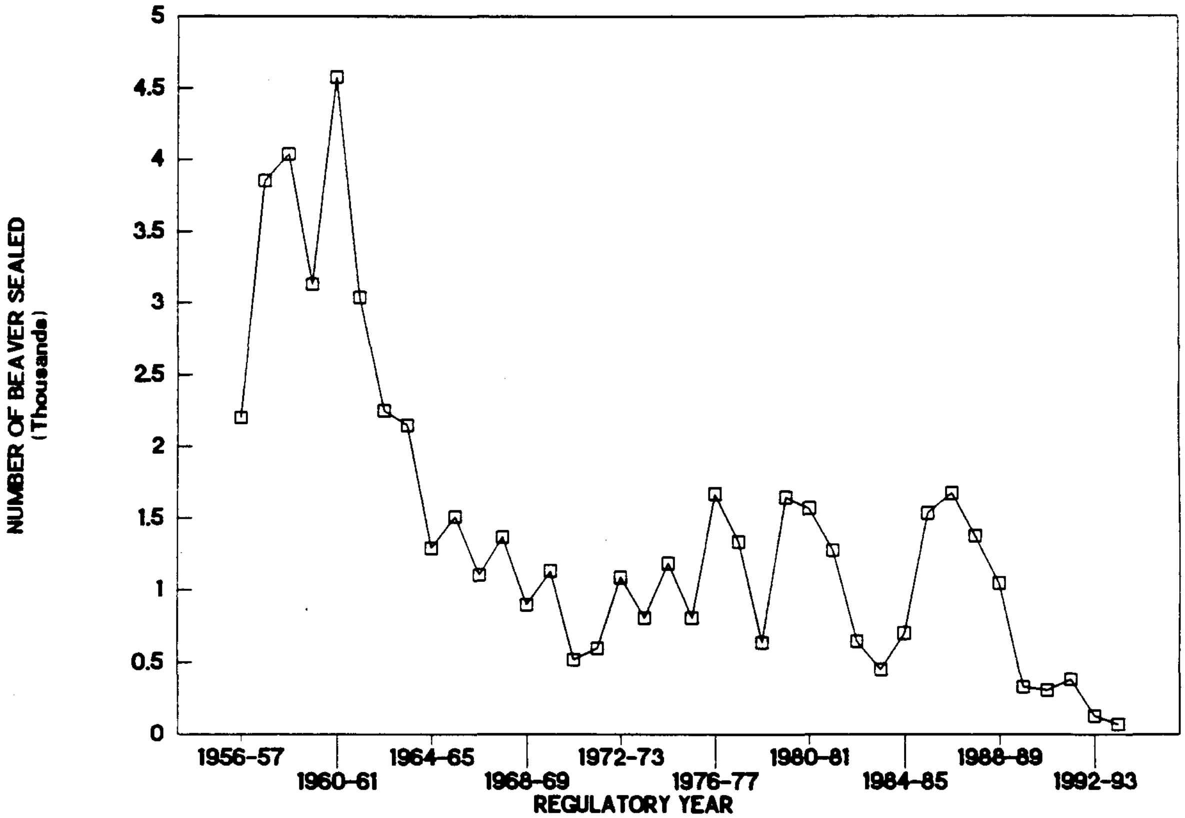


Figure 2. Number of beaver sealed from Unit 19, 1956-1957 through 1993-1994.

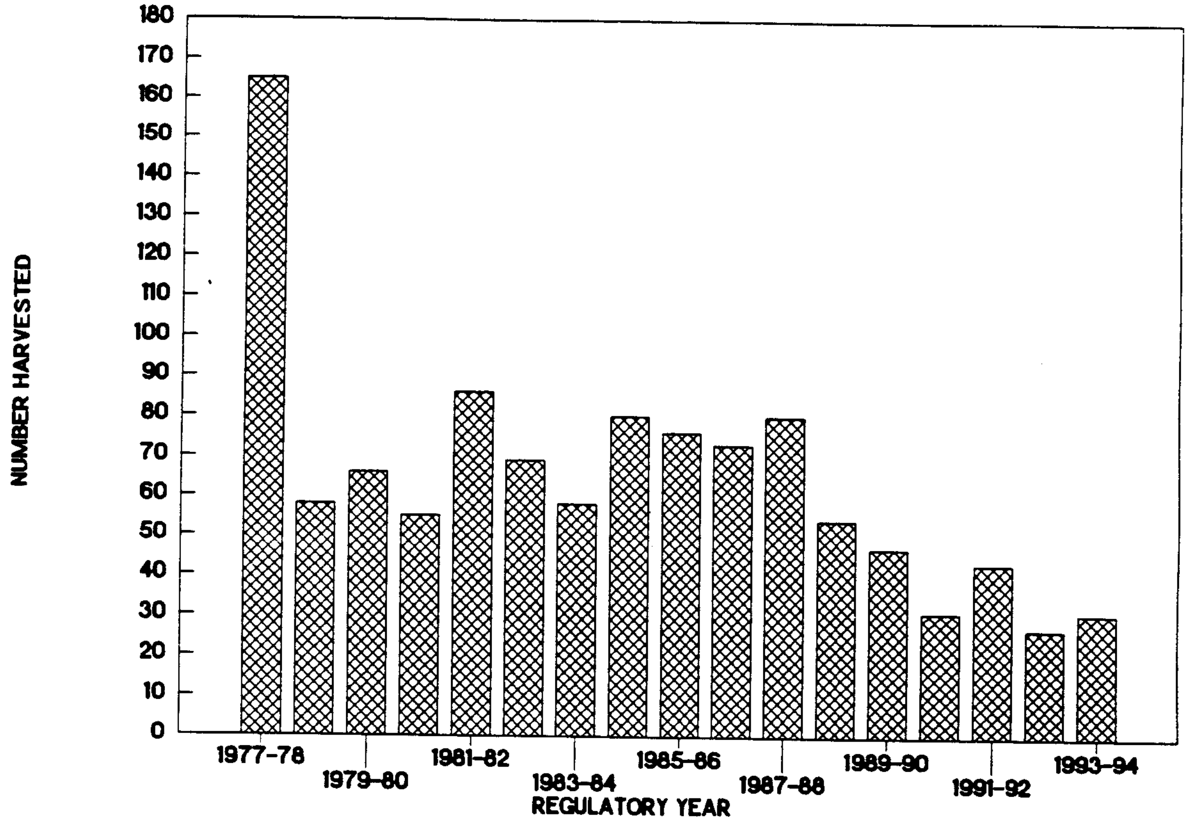


Figure 3. Number of river otter sealed from Unit 19, 1977-1978 through 1993-1994.

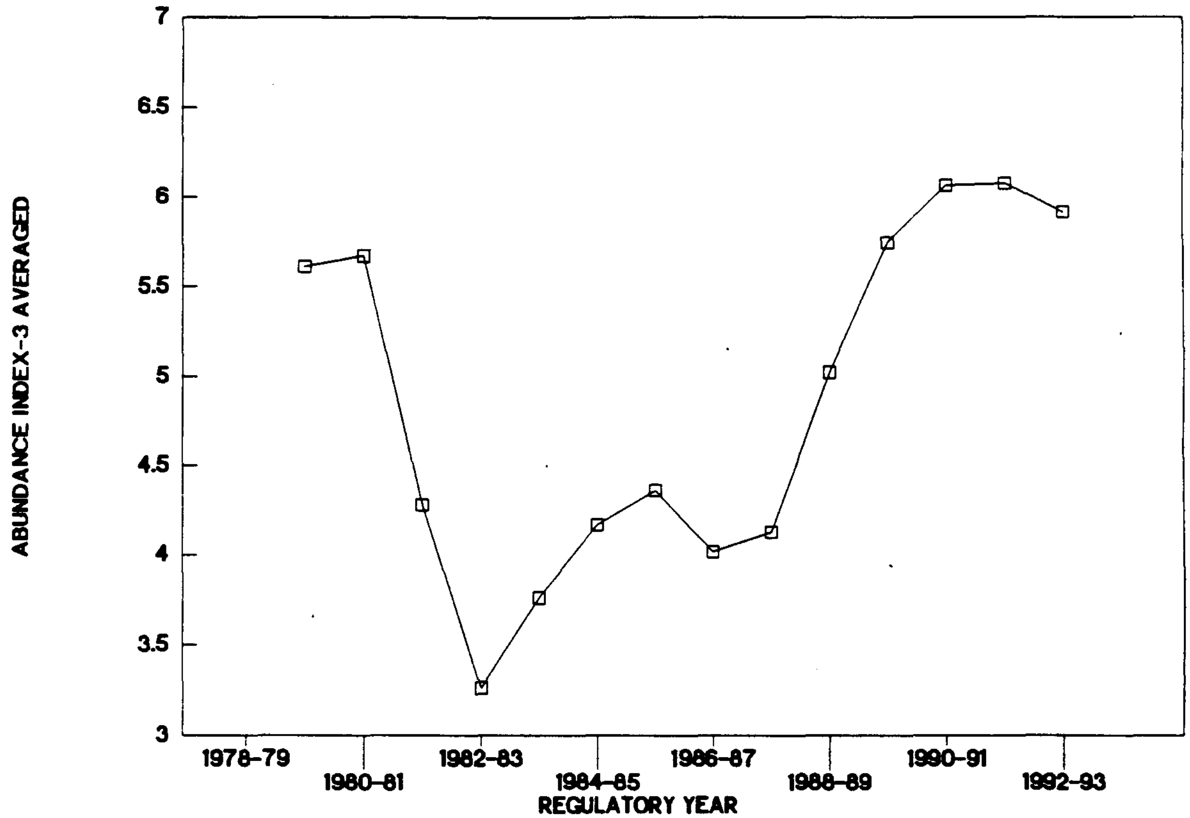


Figure 4. Marten abundance indices (3-averaged) from Unit 19, 1978-1979 through 1993-1994.

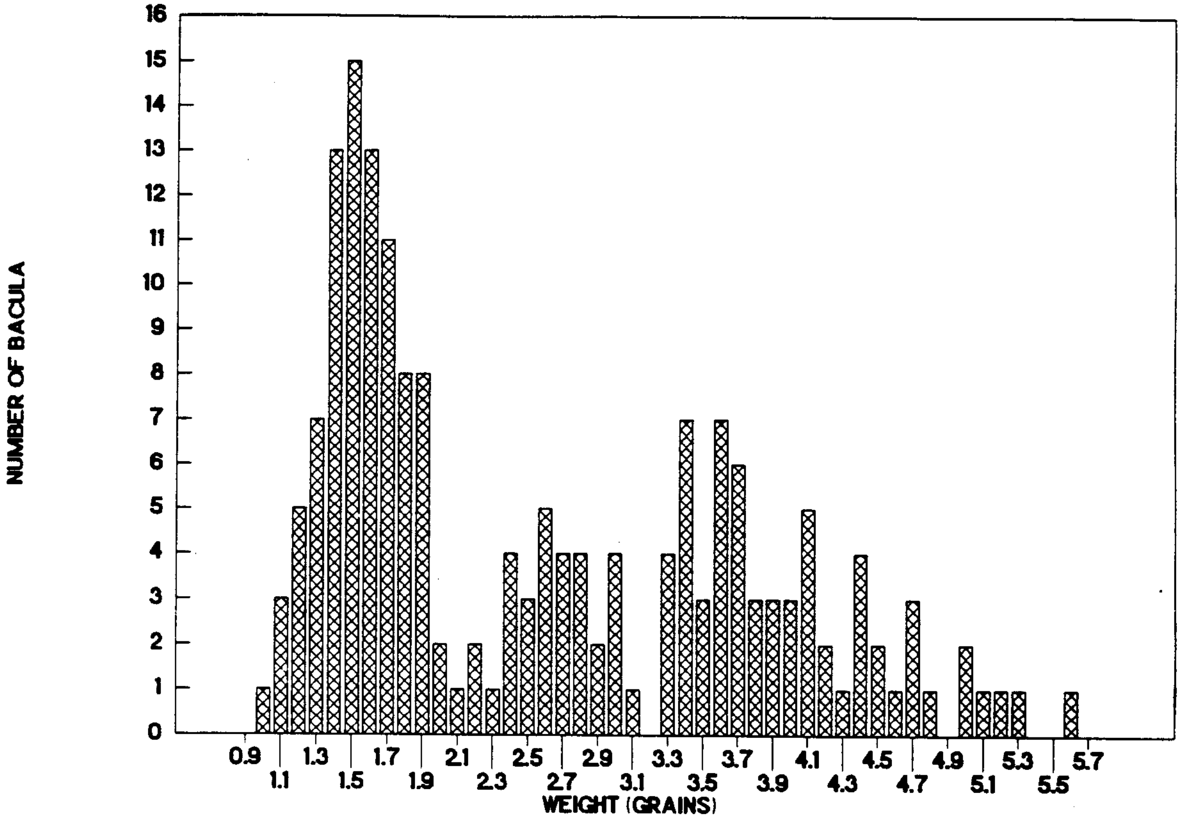


Figure 5. Marten bacula weights from Unit 19, 1994-1995 regulatory year.

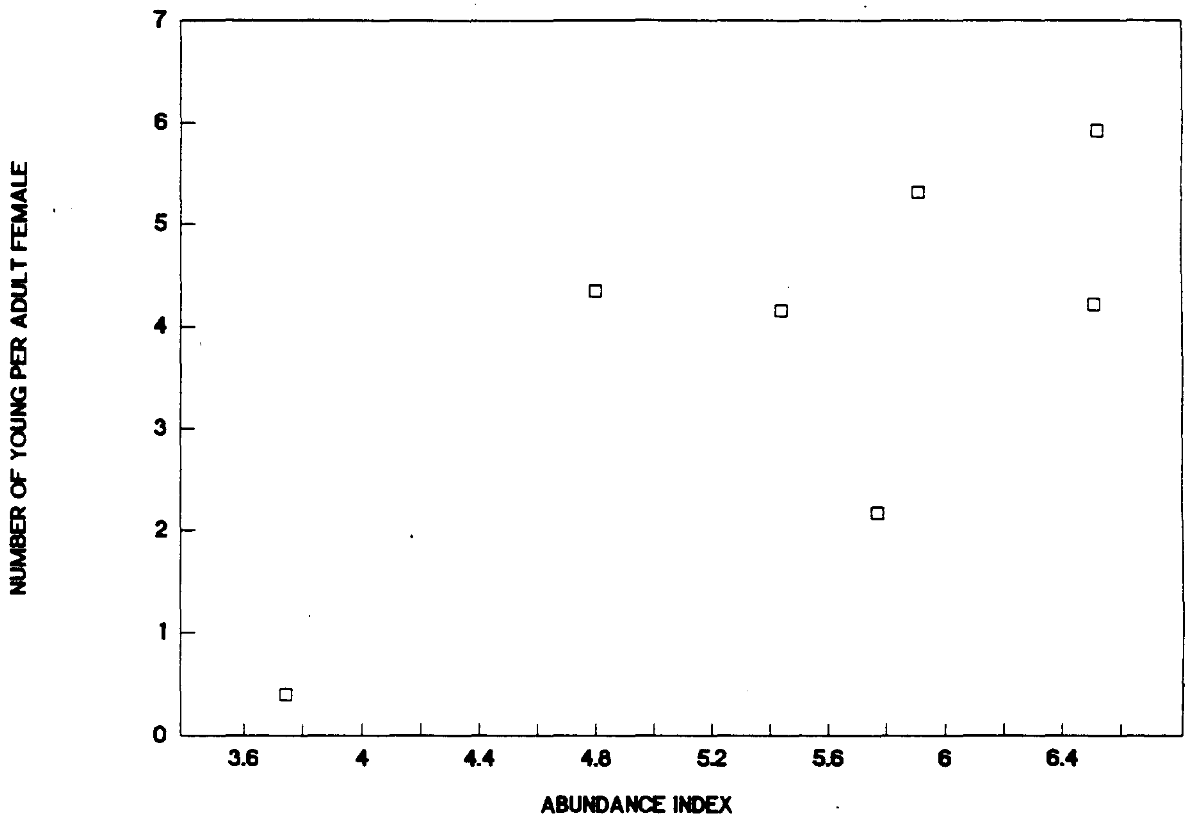


Figure 6. Correlation between young:adult female ratio and annual abundance indices from Unit 19.

Table 1 Beaver cache count results, Unit 19D, 1991-1994

Trend area name	Size (km^2)	No. active lodges (autumn caches) 1991	1992	1993	1994	Percent difference (annual)
Middle Fork	33.4	22	--	--	19	- 4.5%
Big River A	41.0	12	--	14	11	- 2.8%
Big River B	33.5	10	--	10	7	-10.0%
North Fork A	27.8	22	--	--	--	--
North Fork B	19.8	18	--	--	--	--
North Fork C	26.5	11	--	--	--	--
North Fork D	35.1	24	--	--	--	--
North Fork E	17.9	16	--	--	--	--
Wilson's	15.6	--	11	10	9	-9.1%
Stewart's Bend	79.3	--	23	--	21	-4.3%
Mark's Lake	31.2	--	6	--	6	0
Vinasale	52.0	--	--	--	21	--
Lower Takotna	18.2	--	10	11	9	-5.0%
Total	431.3	135	50	45	103x	= -5.1%

Table 2 Abundance and trend indices for beaver from Unit 19, 1987-1993

Regulatory year	Abundance index	*n*	Trend index	*n*
1987	7.47	43	6.07	30
1988	7.05	39	6.38	29
1989	7.00	40	5.75	32
1990	7.26	23	6.00	16
1991	6.94	31	5.96	25
1992	6.09	22	6.00	16
1993	7.44	18	6.25	16

Table 3 River otter harvest and abundance statistics from Unit 19, 1984-1994

Regulatory year	Number of trappers	Harvest	Otters per trapper	Abundance index
1984	28	80	2.86	--
1985	29	64	2.21	--
1986	39	76	1.95	--
1987	36	79	2.19	4.53
1988	23	55	2.39	5.11
1989	16	47	2.94	4.95
1990	11	25	2.27	4.80
1991	18	43	2.39	5.58
1992	8	18	2.25	4.20
1993	8	31	3.88	5.67
10-yr mean	21.6	51.8	2.40	4.98

Table 4 Transport methods of river otter harvesters in Unit 19, 1984-1994

Regulatory year	Method of transport				Total
	Airplane	Dogs or Walk	Snowmachine	Other/Unknown	
1984	1	55	22	2	80
1985	0	22	26	16	64
1986	0	21	49	6	76
1987	3	25	50	1	79
1988	0	23	31	1	55
1989	2	18	27	0	47
1990	0	7	18	0	25
1991	12	5	25	1	43
1992	4	4	10	0	18
1993	2	0	29	0	31
10-yr mean percentage	4.9	36.7	58.5	--	100.0

Table 5 Harvest, price, net worth, and relative economic rank of furbearers captured in Unit 19 during the 1993-1994 regulatory year

Species	No. caught	Avg. price	Net worth	Ranking
Beaver	114	19.72	2248.00	4
Coyote	12	29.79	357.00	9
Red fox	90	17.56	1580.00	6
Lynx	15	86.77	1302.00	7
Marten	1624	44.49	72,252.00	1
River otter	23	78.71	1810.00	5
Muskrat	12	2.24	27.00	12
Mink	51	22.44	1144.00	8
Squirrel	125	0.50	63.00	10
Ermine	20	1.50	30.00	11
Wolf	76	95.98	7294.00	2
Wolverine	29	113.78	3300.00	3
Total			91,407.00	

Table 6 Abundance, mean pelt price, estimated harvest, net worth, and ranking of mink captured in Unit 19, regulatory years 1987 through 1993

Regulatory year	Abundance index	Mean price ($)	Estimated harvest	Net worth ($)	Rank[a]
1986	4.47	27	40	1080	8
1987	3.68	48	188	9058	6
1988	4.06	42	266	11,076	4
1989	4.37	33	113	3757	5
1990	4.76	34	191	6542	4
1991	4.03	26	121	3179	5
1992	3.82	21	32	659	7
1993	5.00	22	51	1122	5

[a] Rank is net worth of all mink pelts in comparison with value of other furbearer species taken in the unit. There are 12 furbearer species in the ranking system.

Table 7 Abundance, mean pelt price, estimated harvest, net worth, and ranking of muskrats captured in Unit 19, 1987-1988 through 1993-1994

Regulatory year	Abundance index	Mean price ($)	Estimated harvest	Net worth ($)	Rank[a]
1987	2.64	3.39	86	292	10
1988	4.00	1.73	50	87	11
1989	2.33	1.71	86	147	10
1990	3.86	1.75	20	35	11
1991	2.00	2.08	44	92	10
1992	1.29	1.60	20	32	11
1993	2.38	2.24	12	27	11

[a] Ranking is net worth of all muskrat pelts in comparison with value of other furbearer species taken in the unit. There are 12 furbearer species in the ranking system.

Table 8 Abundance, mean pelt price, estimated harvest, net worth, and ranking of red fox captured in Unit 19, 1986-1987 through 1993-1994

Regulatory year	Abundance index	Mean price ($)	Estimated harvest	Net worth ($)	Rank[a]
1986	4.96	28	111	3108	6
1987	4.88	27	144	3881	7
1988	7.11	13	275	3537	7
1989	6.15	9	252	2228	7
1990	7.36	11	98	1120	7
1991	6.06	16	167	2707	6
1992	7.10	15	68	1036	7
1993	5.94	18	90	1580	4

[a] Ranking is net worth of all red fox pelts in comparison with value of other furbearer species taken in the unit. There are 12 furbearer species in the ranking system.

LOCATION

Game Management Unit: 20A, 20B, 20C, 20F, and 25C (44,760 mi^2)

Geographic 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 1988 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 Alaska Department of Fish and Game (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. With the exception of the 1993 season, we have annually collected lynx carcasses since winter 1988. During the last 5 years, we examined 345 lynx carcasses from Units 20A and 20B to provide information for recommending regulations. Those 2 subunits encompass 15,800 mi^2 around Fairbanks and represent the most intensively trapped portions of the area. Results of 3 years of carcass data were summarized at the Sixth Northern Furbearer Conference in spring 1991 (O'Connor 1991).

MANAGEMENT DIRECTION

Since the last management report (Eagan 1993), the management goals have changed by incorporating objectives with each management goal. Additional management objectives have been written for lynx that reflect the intensified monitoring of lynx populations necessary for implementation of the tracking harvest strategy. Additional objectives were also written for wolverine in Unit 20A.

Management Goals and Objectives

1 Maintain accurate records of furbearer harvest, pelt export, pelt acquisition, and population trends.

a Compile and summarize data on sealing certificates, fur export reports, fur acquisition reports, and trapper questionnaires.

2 Manage beaver in the lower Chena River portion of Unit 20B for an annual fall beaver colony density of 0.2 to 0.5 colonies/km of river and mitigate problems arising from beaver activities.

a Conduct annual fall beaver cache surveys in the lower Chena River and Badger Slough. Open a limited registration trapping season if densities are >0.2 colonies/km.

b Issue nuisance beaver permits to remove problem animals.

c Coordinate with Department of Transportation and Public Facilities (DOT&PF) to minimize dammed culverts and flooded roads.

3 Manage beaver in Units 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.

a Determine the proportion of harvested beaver that had pelts <52 inches (kits).

4 Manage lynx with a tracking harvest strategy whereby seasons are most liberal when lynx are abundant and most conservative when lynx are scarce.

a Estimate the annual sex, age, and reproductive performance of harvested lynx by examining carcasses from Units 20A and 20B.

b Develop and implement aerial track surveys in Units 20A and 20B to provide indices to trend in lynx and hare populations.

c Determine whether or not lynx pelt measurements can be used to estimate the number of kittens in the harvest.

d Develop maps of trapline distribution through interviews with successful lynx trappers.

5 Manage wolverine harvests in Unit 20A based on estimates of sustainable yield derived from density estimates and modeling.

a During winter 1995–1996 complete aerial surveys to estimate density of wolverine in Unit 20A.

b Use the model of Gardner et al. (1993) to estimate sustainable wolverine harvests in Unit 20A.

6 Maintain furbearer trapping seasons during periods of peak pelt primeness.

7 Summarize data on the status of wolverines in the Fairbanks Area.

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 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 and North American Fur Exchange for the 1991–1992 prices and only the North American Fur Exchange price list from 1992 through 1994. Prices were the average prices from December and February sales. Prices were based on high quality standards for each species including beaver, large, brown, good quality; marten, large, grade I-II, dark brown; mink, large-medium, grade I-II, northern, dark brown; red fox, Xlarge-large, grade I-II, Northwest; lynx, Large-medium, grade I-II, first color; otter, Xlarge-large, grade I-II, dark brown; wolverine, Xlarge, grade I-II, brown.

We sent questionnaires to 100–150 active area trappers to get their opinions on furbearer population levels and trends. Responses were compiled from the 1991–1992, 1992–1993, and 1993–1994 questionnaires (S Peterson, unpubl rep, ADF&G) and relative abundance and trend indices were calculated based on methods used by Brand and Keith (1979).

Trapper questionnaires are a useful aid in monitoring relative furbearer trend and abundance. However, trapper questionnaires may not accurately reflect small to moderate changes in furbearer populations for several reasons including:

1 Furbearer behavior is affected by snow, ice, and weather conditions; therefore, changes in furbearer track distribution and abundance may be independent of population size during some years.

2 Trapper responses are not weighted by effort or by the length of traplines. Trappers who run short lines and set few traps do not have the opportunity to get as broad a perspective as those who run long lines, but their responses are treated equally.

3 Questionnaire results are compiled by regions covering several thousand square miles. Changes in manageable furbearer populations within those regions may be masked by opposite changes in other parts of the same region.

The term "regulatory year" means July 1 through June 30 of the following calendar year and unless otherwise noted all years refer to the regulatory year.

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 to early October. We did not conduct a cache survey during fall 1992 because of unseasonably cold temperatures that froze the Chena River early. In 1993 we subjectively categorized cache size, based on its size relative to the 18′ boat (< 18′ = small, 18′ = medium, > 18′ = large). We mitigated problems arising from beaver activity by issuing nuisance or registration permits to trappers and by coordinating with the public and DOT&PF 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 ≤ 52 inches (length plus width) as a kit and any pelt >52 inches as an adult (Buckley and Libby 1953).

Lynx Harvest and Carcass Collection

To manage lynx with a tracking harvest strategy, we monitored the lynx population since 1988 (except 1993) by collecting carcasses, primarily from Units 20A and 20B, to determine the sex, age, and reproductive status of harvested lynx. Trappers provided information on the harvest date and location and were paid $15/carcass in 1988–1989 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, Mont.) 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 from 1989–1992 to Agriculture Canada (Saskatoon, Sask., Canada) to determine prevalence of *Trichinella* spp. larvae.

RESULTS AND DISCUSSION

Environmental Conditions Affecting Trapping

Maximum snow depth measured at Fairbanks International Airport for winters 1989 through 1992 were 91, 137, 79, and 117 cm, respectively. The snowfalls in winters 1990–1991 and 1992–1993 were deeper than any dating back to 1975–1976 (Fig 1). Both of these deep snow years generally reduced trapper efforts by limiting access.

This measure of maximum snow depth is not total snowfall, but I believe the depth of the snowpack is important because it affects trapper access. Because this data is collected in Fairbanks, it is also not necessarily a good index to snow depth throughout the entire Fairbanks Area (44,760 mi^2). Nonetheless, it is a relative index to the influence of snow depth on fur harvest.

Population Status, Trend, and Mortality

Abundance and Harvest

Beaver

1991. According to 1991 trapper questionnaire results, beavers were abundant in the lower Tanana Basin (Table 1a). The reported beaver harvests in 1991 (882) increased from 1990 (652; Table 2). This increase in harvest could have been a function of the abundance and/or the increase in price from 1990 ($13) to 1992 ($32; Table 3). However, the 1991 harvest was only half that taken during the period from 1985 through 1987. Recent lower harvests probably reflect low beaver trapping intensity because of recent low pelt prices. Most beavers (93%) were taken in Units 20B or 20C.

1992. Trapper questionnaire results from the 1992 season indicate that beavers in the lower Tanana Basin were abundant (Table 1b). Reported harvested in 1992–1993 (453) decreased from 1991 (882). This lower harvest could be attributed to the record snowfall and its affect on trapper access (Fig 1). The average pelt price dropped to $21 during 1992 (Table 3).

1993. Trapper questionnaires results indicate that beavers were abundant in the lower Tanana Basin during 1993 (Table 1c). Reported harvests from 1993 (924) increased from 1992 (453). That increase in harvest was probably influenced most by relatively light snowfall (Fig 1). Average pelt price was $26 in 1993.

Cache Surveys. Cache surveys indicated that beaver colony density in the lower Chena River has not changed substantially since 1986 (Table 4). Between 1986 and 1994 densities ranged from 0.6 to 0.7 colonies/km in the Chena River survey area and from 0.2 to 0.5 colonies/km in the Badger Slough survey area. Cache density was highest in the Fort Wainwright area of the Chena River survey area. No cache surveys were conducted during fall 1992. Most caches were medium or small in 1993 (71% of 21) and in 1994 (77% of 22 caches; Table 5). Using a mean of 5 beavers/colony (Boyce 1974) and considering gravel pits and other waterways within the lower Chena River, I estimate that approximately 300 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. During fall 1991 colony densities observed during our cache surveys (0.6 colonies/km) in the lower Chena River exceeded our objective of 0.2 to 0.5 colonies/km. During 1993 our colony density objective was met in both the lower Chena River (0.5 colonies/km) and Badger Slough (0.2 colonies/km). To maintain this level, we registered 8 to 10 trappers/year (first-come, first-served) to trap no more than 5 beavers each (Table 6). However, because of the drop in colony density in Badger Slough, I reduced the number of trappers from 2 to 1 for the 1993 season and closed Badger Slough to beaver trapping during the 1994 season. Since the 1991 registration season, combined Chena River and Badger Slough harvests have fluctuated from 15 to 31 beaver/year (only 2 of which were kits). Trapper success has been heavily influenced by weather, including deep snow and cold temperatures that directly affect the amount of overflow on the Chena. No lodges were "trapped out" and few conflicts occurred with people.

Nuisance Permits. Since 1991 we have recorded 14 to 29 complaints/year regarding nuisance beavers and the trend is increasing (Table 7). These records underestimate beaver problems because multiple complaints about the same problem area were tallied as 1 complaint and not all complaints were recorded. Most complaints pertained to areas outside the registration trapping area, open to general trapping.

In response to complaints, we have issued 18–24 nuisance permits/year since 1991, resulting in a harvest of 40 to 67 nuisance beaver/year (Table 7). We also coordinated with DOT&PF personnel to target many of their problem areas with this trapping effort. Before nuisance permits were issued, we advised landowners to fence trees or property whenever possible.

Percent Kits. In 1991, 1992, and 1993, we met the management objective to maintain <20% kits in the beaver harvest in subunits where more than 50 beaver were harvested (Table 8). The harvest in all subunits included ≤ 15% kits.

Lynx

1991. According to trapper questionnaire results, lynx in the lower Tanana Basin were common. Most trappers thought that snowshoe hares were also common in 1991 (Table 1a). The reported lynx harvest in 1991 was 549, an increase over the 1990 harvest (Table 2). The lynx harvest increase was primarily because of the good traveling (snow) conditions for trappers (Fig 1; Table 2). Average pelt prices decreased from $118 in 1990 to $106 in 1991 (Table 3). In 1991 most lynx (90%) were taken in Units 20A, 20B, or, 20C.

1992. Results of the trapper questionnaires indicate that lynx were common (Table 1b). Trappers indicated that the snowshoe hare population was declining. The reported lynx harvest during 1992 was 260, a decrease from the previous year (Table 2). Deep snow during the season limited trapper access, made trapping more difficult and contributed to the low harvest (Fig 1). The average pelt price decreased slightly from $106 in 1991 to $100 in 1992 (Table 3).

1993. Results of the trapper questionnaires indicate that lynx were scarce. Trappers also indicated that the snowshoe hare population was low and had not changed from the previous year (Table 1c). The reported lynx harvest in 1993 was 267, similar to 1992 (Table 2). Effects of snowfall on access and effort were minimal (Fig 1). Low harvest was probably a function of a lower population. The average pelt price was $104 in 1993.

I believe that high harvests reflect a higher lynx population and good trapping conditions. However, low harvests 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.

Recruitment. Detecting changes in recruitment is important for managing lynx under the tracking harvest strategy. Carcasses provided the opportunity to determine age structure of harvested lynx; 21–65% of the total reported harvest was collected each year from Unit 20A and 20B (Table 9).

Carcasses. From 1991 through 1992, the percentage of kittens in Units 20A and 20B collections declined from 11% to 3%. The age structure of the harvest each year remained very young; we only collected 15 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).

A statewide investigation of trichinosis in lynx was conducted from 1988 to 1993. Prevalence ranged from 18% to 30% in the Fairbanks Area (Table 11). Neither geographic location nor year of collection had any apparent relationship to prevalence of trichinosis in the various lynx populations (Zarnke et al. 1995).

Transmission of trichinosis occurs by means of ingesting infected meat. Humans are susceptible. Thorough cooking kills the parasite; properly cooked meat is safe for human consumption. Results of this survey and cooking recommendations have been publicized through newspapers and magazines.

River Otter

1991. Trapper questionnaire results indicated that river otter were common during the 1991 season (Table 1a). The reported harvest of otters increased from 15 in 1990 to 37 in 1991 (Table 2). Otters are mostly caught incidentally in beaver sets; the increase in harvest was probably a function of the increased effort. During 1990 effort was reduced because of deep snow (Fig 1). Average pelt prices for otter were $63 in 1991 (Table 3), a substantial increase from $37 in 1990.

1992. Trappers indicated through trapper questionnaires that river otters were scarce (Table 1b). The reported harvest in 1992 was 23, a decline from the previous year (Table 2). The 1992 decrease in harvest was probably from deep snow that created poor trapping conditions (Fig 1). Trapper perception of otter abundance can be strongly influenced by weather and ice conditions that affect the proportion of time that otters spend traveling above the ice where their tracks are visible. The average pelt price in 1992 increased slightly from the previous year to $66 (Table 3).

1993. The results of the 1993 trapper questionnaires indicated that river otters were common in the lower Tanana Basin (Table 1c). The reported harvest was 39, an increase from 23 in 1992. I believe weather and trapping conditions heavily influence otter harvests. The average pelt price increased from $66 in 1992 to $88 in 1993, which could have also helped increase harvest (Table 3).

Wolverine

1991. Trapper questionnaire results indicate that wolverines were scarce in the lower Tanana Basin (Table 1a). The reported harvest was 44, an increase from the previous year's 22 (Table 2). This increase may have resulted from the better weather that allowed access to remote wolverine habitat. The average pelt price increased to $213 in 1991 (Table 3) from $190 in 1990.

1992. Results of the trapper questionnaires indicated that wolverines were scarce in the lower Tanana Basin (Table 1b). The reported harvest was 19, a decrease from the previous year (Table 2). This decrease in harvest is probably due to deep snow that made access and trapping difficult. The average pelt price decreased substantially from $213 in 1991 to $113 in 1992 (Table 3).

1993. Trappers rated wolverines as scarce in 1993 (Table 1c). Wolverine harvests in the last 3 years (44 in 1991, 19 in 1992, and 42 in 1993, Table 2) have fluctuated and have been inversely related to snow depth (Fig 1). Average wolverine pelt prices were $175 in 1993 (Table 3).

The percentage of males in the harvest was 59–83% during the last 3 years (Table 12). Male wolverines have larger home ranges than females (Gardner 1985, Magoun 1985) and are more susceptible to trapping.

Gardner et al. (1993) developed a model for estimating sustainable wolverine harvest. The model is based on population parameters determined from 3 study populations in Alaska and Yukon Territories between 1978 and 1987. The model is dependent upon estimates of wolverine densities. As density estimates become available, we will incorporate the model in our wolverine harvest management.

Magoun (1985) stated that factors responsible for long-term wolverine population declines could include widespread declines in food resources, particularly the demise or shift in range of large ungulate populations, widespread habitat destruction, and heavy harvests over large areas.

Marten

1991. Results of the trapper questionnaires indicated that marten were common (Table 1a). In Unit 20 during 1991 more marten were reported sold to fur buyers (3983) or exported from Alaska (507) than all other furbearers combined (Table 13a). This is an increase in sold and exported marten since 1990, when 3419 were sold and 283 were exported. There are no sealing requirements for marten pelts, so the harvest is estimated from fur dealer acquisition reports and fur export reports.

1992. Results of the trapper questionnaires indicated that marten were scarce in the lower Tanana Basin (Table 1b). In Unit 20 during 1992, marten sales (972) and exports (209) were substantially below those of 1991 sales (3983) and exports (507; Tables 13a and 13b). I believe this decrease in harvest was probably because of the bad trapping conditions, including deep snow and late spring in 1992, which could have lowered the population. Late springs are speculated to attribute to poor survival of marten kits (J Whitman, pers commun).

1993. Results of the trapper questionnaires indicated that marten were again common, indicating an increase in marten numbers in the lower Tanana Basin, compared to 1992. In Unit 20 during 1993 the number of marten sold (2623) increased, compared to 1992 (972), and exports (163) decreased, compared with 1992 (207) (Table 13c). The increase in harvest is probably a function of the better weather and trapping conditions that existed during the 1993 season. I am not certain why the number of marten exported declined.

Other Furbearers

According to trapper questionnaires: 1) weasels were common in 1991 and 1992 and abundant in 1993; 2) squirrels were abundant during 1991, 1992, and 1993; 3) coyotes were common during all 3 years; 4) muskrats were common during 1991 and 1992 and were scarce during 1993; and 5) red fox were abundant during 1991 and were common during 1992 and 1993 (Tables 1a, 1b, and 1c).

Seasons and Bag Limits. See Figures 2a, 2b, 2c and 3 for current and historical furbearer trapping and hunting seasons and bag limits within this area.

Method of Take and Transportation. During the 3-year reporting period 1991 through 1993, snares were the most common method of harvesting beavers (74–89%) (Table 14). Traps were the most common method of harvesting lynx (83–85%), wolverines (74–87%), and river otter (66–73%). Snowmachines were the most commonly used method of transportation (65%) for harvesting these 4 species over the last 3 seasons.

Economic Use. In 1991, 1992, and 1993 the number of furbearers entering the fur trade from Unit 20 was 6580, 2349, and 4557, respectively. Most of these furs (68%, 50%, and 61%, respectively) were marten (Tables 13a, b, and c).

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 1992 more were sold or exported than were trapped, indicating some trappers held furs from the previous season.

Board of Game Actions and Emergency Orders. In March 1992 the Board of Game passed a proposal to give ADF&G discretionary powers to adjust the lynx seasons within a 1 November–28 February time frame. This will allow the department to be more responsive to changes in lynx population fluctuations to optimize a lynx harvest strategy.

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&PF 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 beavers.

Lynx 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. These will be continued in the future. The objective of looking at lynx pelt length versus age from collected teeth has not been completed.

For other furbearer species, we have not detected 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 regulatory changes at this time.

Wolverines exist at low densities in the Fairbanks Area, but little is known about actual wolverine densities or distribution. Aerial surveys using the TIP estimator (Becker et al. 1991) will be attempted in Unit 20A during winter 1995–1996 to estimate wolverine densities. We will estimate sustainable wolverine harvests, using a model presented by Gardner et al. (1993).

LITERATURE CITED

Becker EF. 1991. A terrestrial furbearer estimator based on probability sampling. *J Wildl Manage*. 55:730–737.

Berrie PM. 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 MS. 1974. Beaver population ecology in interior Alaska. MS Thesis. Univ Alaska Fairbanks. 161pp.

———. 1981. Habitat ecology of an unexploited population of beavers in Interior Alaska. Pages 155-186 *in* JA Chapman and D Pursley, eds. Proc Worldwide Furbearer Conf. Frostburg, MD.

Brand CJ and LB Keith. 1979. Lynx demography during a snowshoe hare decline in Alberta. *J Wildl Manage*. 43:827–849.

Buckley JL and WL Libby. 1953. Growth rates and age determination in Alaskan beaver. Trans North Am Wildl Conf. 20:495–507.

Eagan RM. 1993. Unit 20A, 20B, 20C, 20F, and 25C survey-inventory progress report. Pages 201-237 *in* SM Abbott, ed. Survey-Inventory Management Report. Furbearer. Alaska Dep Fish and Game. Fed Aid in Wildl Restor. Prog Rep. Proj W-23-3 and W-23-4. Juneau.

Gardner CL. 1985. The ecology of wolverines in southcentral Alaska. MS Thesis. Univ Alaska, Fairbanks. 82pp.

———, ME McNay, and R Tobey. 1993. Estimates of wolverine densities and sustainable harvests in the Nelchina Basin in southcentral Alaska. Seventh North Fur Conf. Abstracts, page 32.

Golden HN. 1987. Survey of furbearer populations on the Yukon Flats National Wildlife Refuge. Final Report. Alaska Dep Fish and Game and US Fish Wildl Serv Coop Agreement. Proj 14-16-007-84-7416. 86pp.

Magoun AJ. 1985. Population characteristics, ecology, and management of wolverines in northwestern Alaska. PhD Thesis. Univ Alaska, Fairbanks. 197pp.

———, and DJ 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 Rep. 130pp.

Nava JA Jr. 1970. The reproductive biology of the Alaska lynx (*Lynx canadensis*). MS Thesis. Univ Alaska, Fairbanks. 141pp.

O'Connor RM. 1984. Population trends, age structure, and reproductive characteristics of female lynx in Alaska, 1961 through 1973. MS Thesis. Univ Alaska, Fairbanks. 111pp.

———. 1991. Lynx management in the Fairbanks Area. Abstract *in* Sixth Northern Furbearer Conference, April 10–11, 1991. Fairbanks, Alas.

Schwartz CC, E Becker, and KJ 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 RO. 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.

Zarnke RL, A Gajadhar, G Tiffin, and J Ver Hoef. 1995. Prevalence of *Trichinella nativa* in lynx *Felis lynx* from Alaska, 1988–1993. *J Wildl Dis* (In press).

Prepared by:

Toby A. Boudreau
Wildlife Biologist II

Submitted by:

Kenton P. Taylor
Management Coordinator

Reviewed by:

Mark E. McNay
Wildlife Biologist III

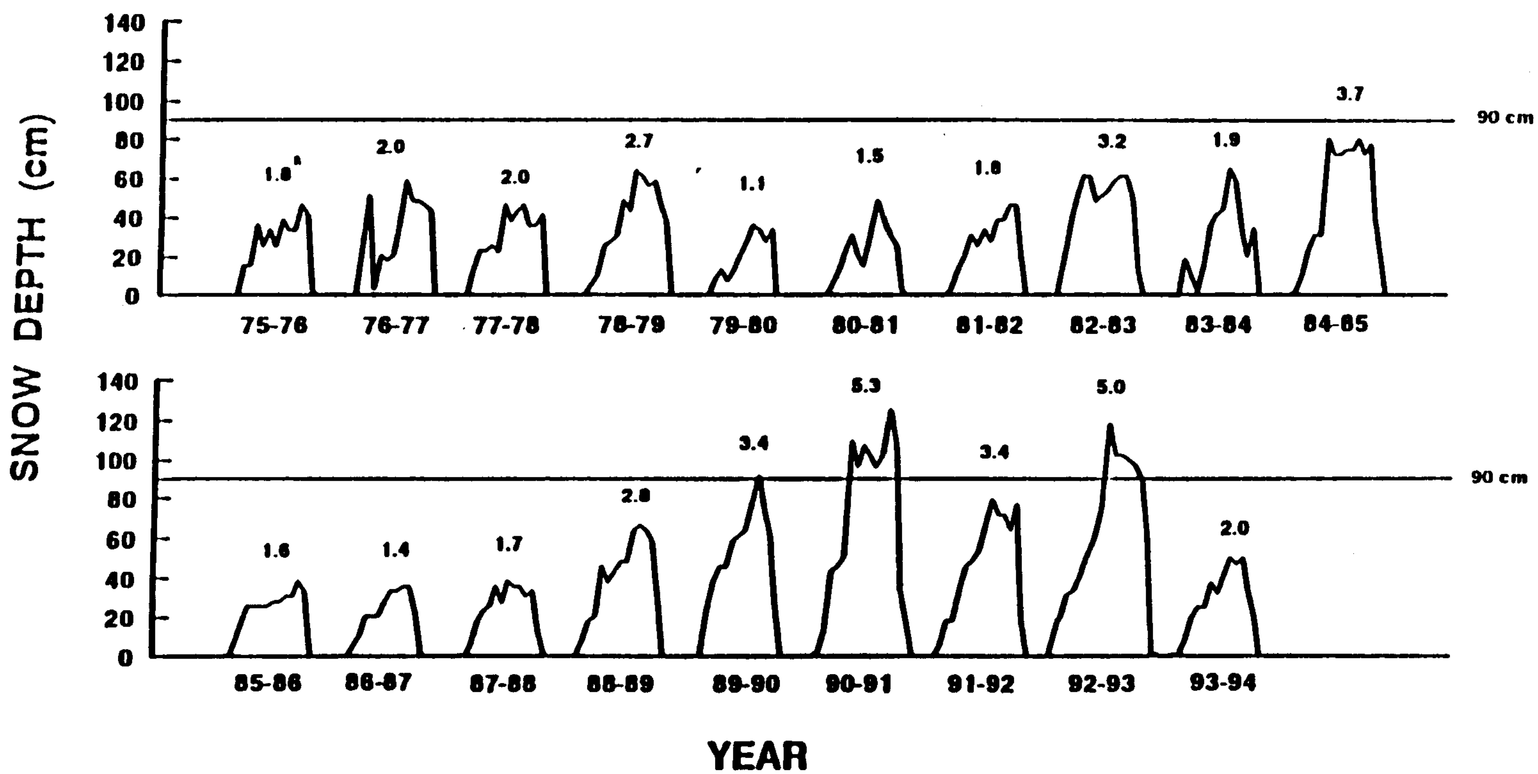


Figure 1. Snow depth at Fairbanks International Airport from 1975-1976 through 1993-1994. Cumulative Index[a] calculated by measuring area under curve. Snow depth measured first and fifteenth of each month.

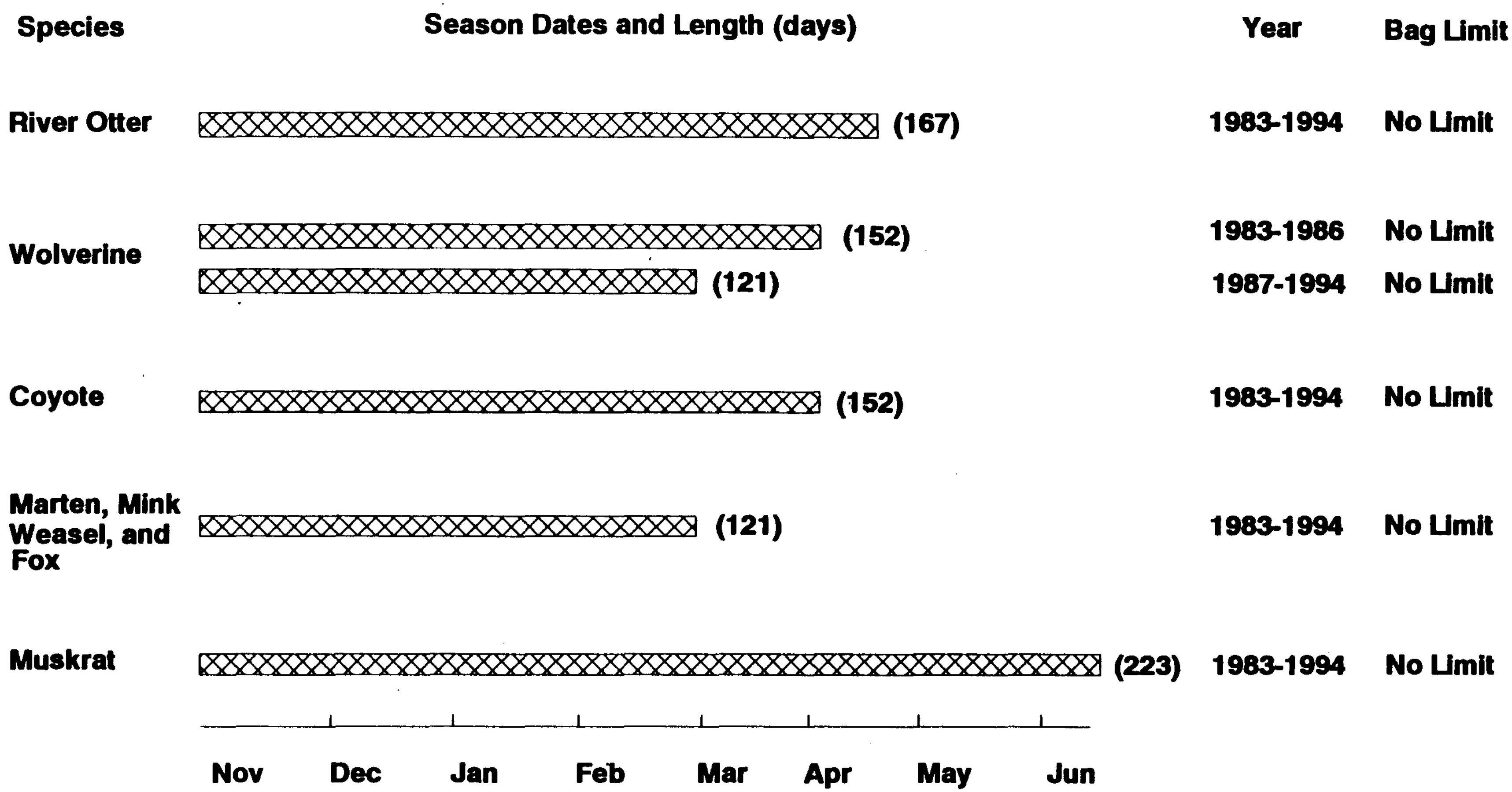


Figure 2a. Trapping seasons and bag limits for selected furbearers within the Fairbanks Area, 1983-1994. Unless otherwise noted seasons apply to the entire Fairbanks Area including Units 20A, 20B, 20C, 20F, and 25C.

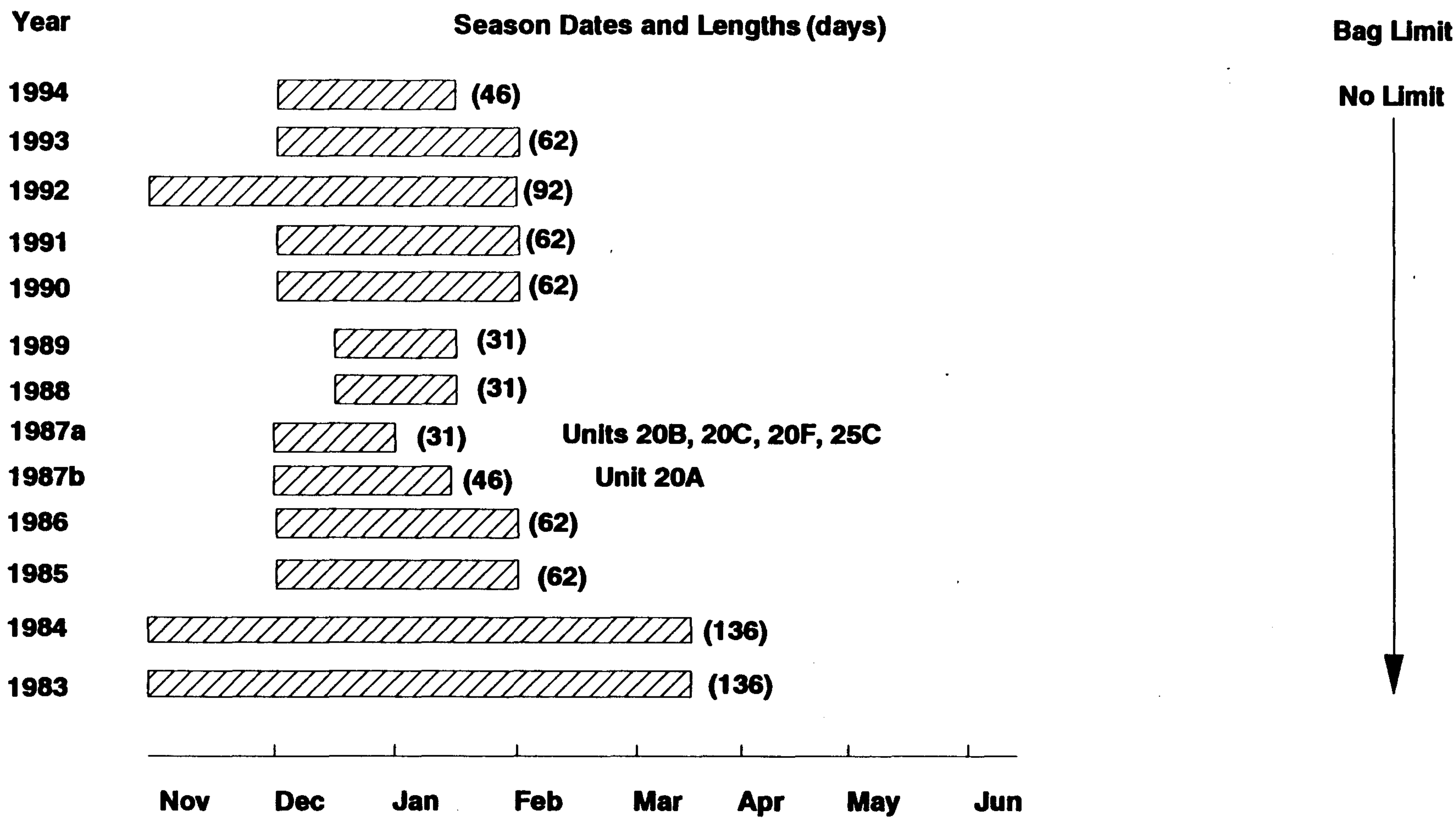
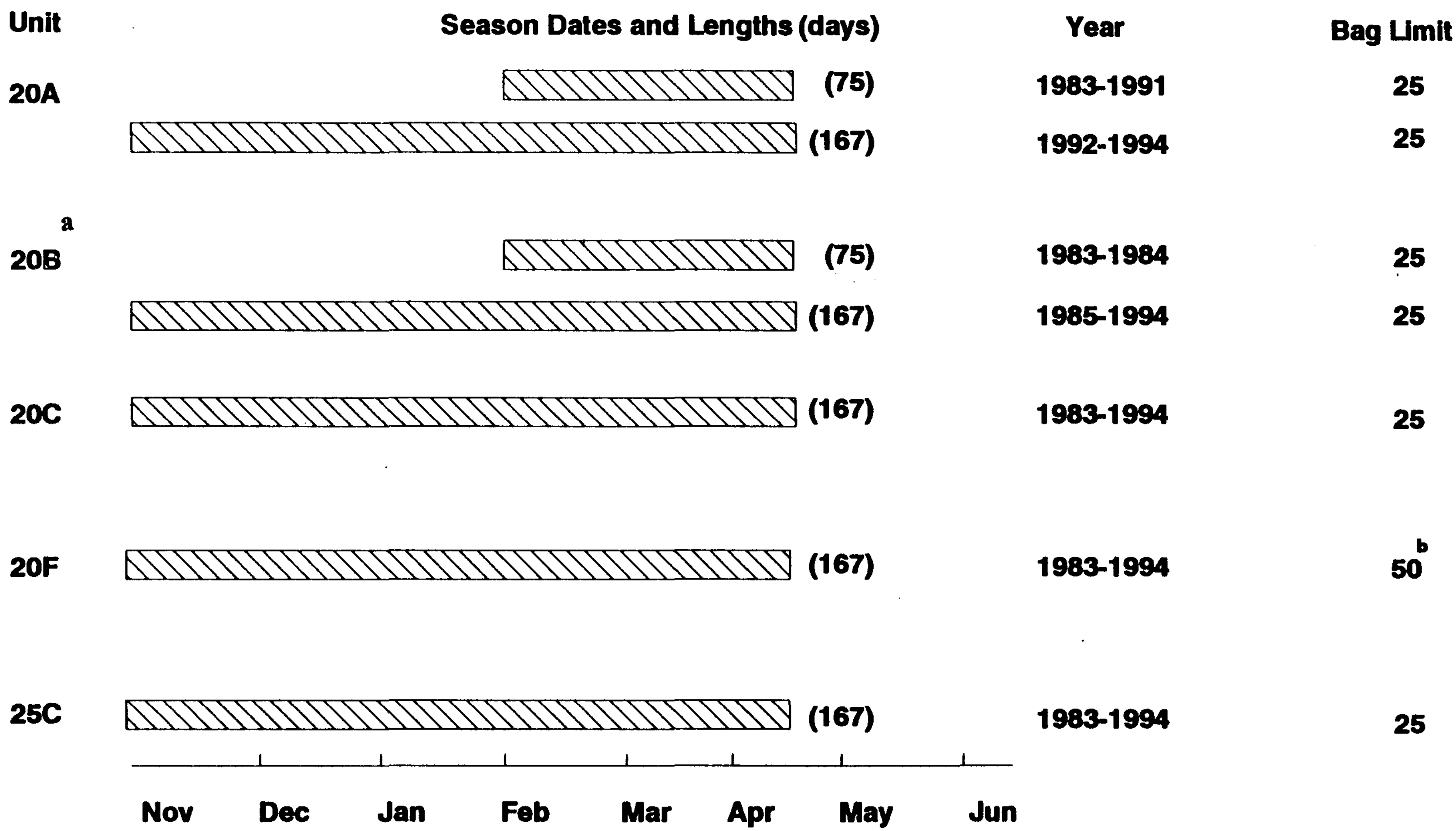


Figure 2b. Trapping seasons and bag limits for lynx within the Fairbanks Area, 1983-1994. Unless otherwise noted seasons apply to the entire Fairbanks Area including Units 20A, 20B, 20C, 20F, and 25C.



[a] A portion of Unit 20B including the Chena River downstream from its confluence with the Little Chena River, and Badger Slough downstream from Plack Road were closed to beaver trapping 1983-1987 and open by registration permit 1988-1994.

[b] Bag limit in Unit 20F was 25 from 1983-1987 and 50 from 1988-1994.

Figure 2c. Trapping seasons and bag limits for beaver within the Fairbanks Area, 1983-1994.

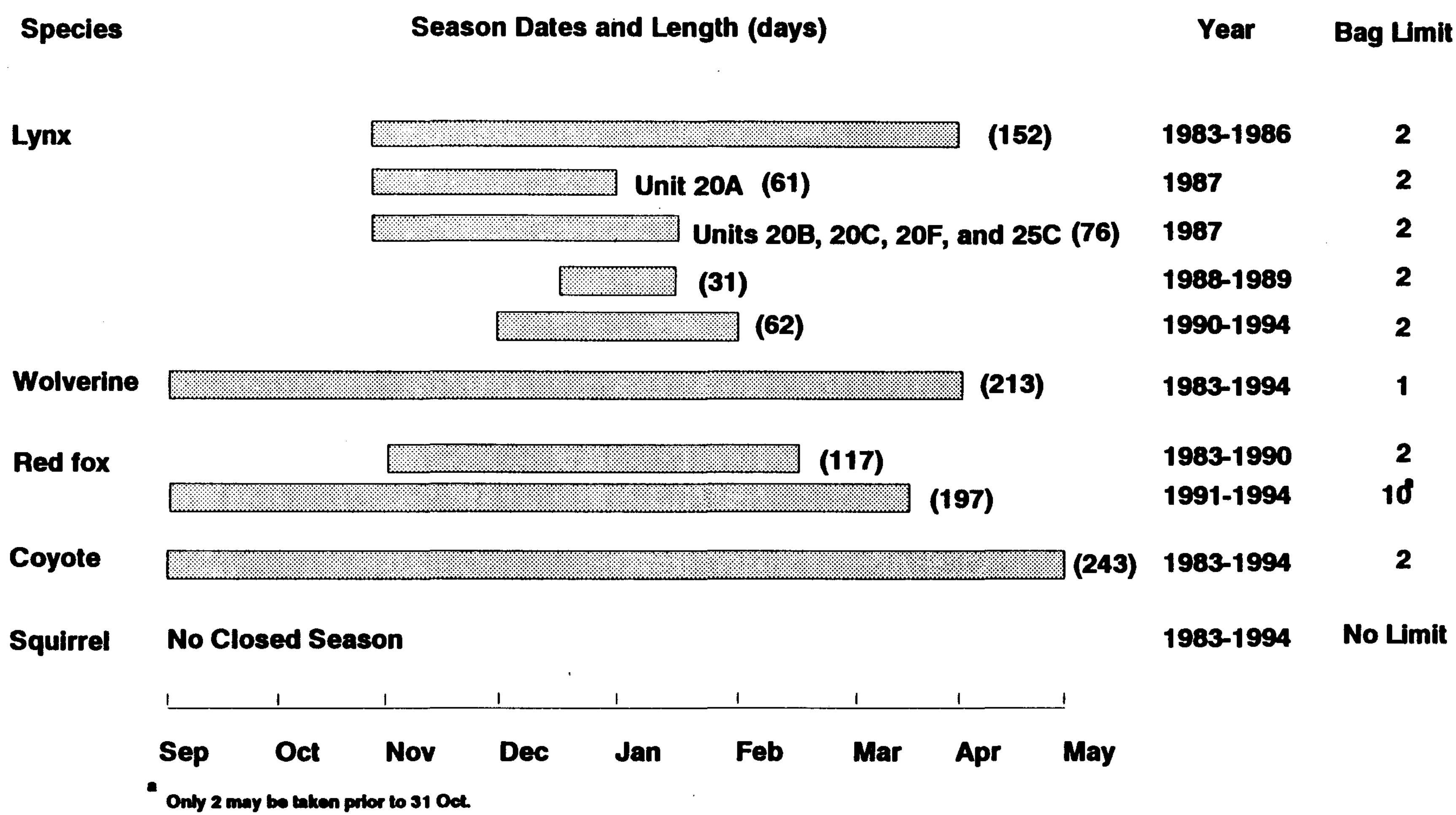


Figure 3. Hunting seasons and bag limits for selected furbearers within the Fairbanks Area, 1983-1994. Unless otherwise noted seasons apply to the entire Fairbanks Area including Units 20A, 20B, 20C, 20F, and 25C.

Table 1a Indices of relative abundance and trend of furbearer populations in Interior Alaska, regulatory year 1991

	Relative Abundance Index				Trend Index			
	LTB	UTB	MYK	UYB	LTB	UTB	MYK	UYB
Furbearers								
Arctic Fox	NP	NP	NP	12	NP	NP	NP	2.00
Beaver	63	44	83	73	2.19	2.25	2.17	2.43
Coyote	29	41	0	10	2.12	2.25	2.00	2.00
Lynx	32	50	40	42	2.47	2.65	2.36	2.20
Marten	42	36	50	55	1.86	1.43	2.08	2.09
Mink	28	24	33	10	1.78	1.93	2.00	1.50
Muskrat	24	45	8	44	1.97	2.00	1.43	2.27
Red Fox	69	50	72	76	2.26	1.85	1.90	2.24
Red Squirrel	62	64	62	57	2.00	2.12	1.67	2.15
River Otter	29	25	50	32	2.00	2.09	2.38	1.85
Weasel	38	36	31	50	1.94	1.75	1.56	2.06
Wolf	53	40	73	29	2.22	2.00	2.58	1.83
Wolverine	15	23	36	29	1.91	2.24	2.08	2.06
Prey								
Hare	36	31	56	56	1.73	1.68	2.22	1.80
Grouse	17	26	35	21	1.31	1.32	1.40	1.50
Ptarmigan	13	31	10	35	1.44	1.37	1.12	1.80
Mice/Rodents	49	31	45	67	1.96	1.58	2.22	2.00

Abundance: Index Values
Scarce = 0 through 19
Common = 20 through 50
Abundant = Greater than 50
NP = Not Present

Trend: Index Values
Fewer = 1 through 1.66
Same = 1.67 through 2.33
More = Greater than 2.33
NP = Not Present

Interior Descriptive Areas:
LTB = Lower Tanana R. Basin
UTB = Upper Tanana R. Basin, Charlie and Fortymile R.
MYK = Middle Yukon and Koyukuk
UYB = Upper Yukon R. Basin

Table 1b Indices of relative abundance and trend of furbearer populations in Interior Alaska, regulatory year 1992

	Relative Abundance Index				Trend Index			
	LTB	UTB	MYK	UYB	LTB	UTB	MYK	UYB
Furbearers								
Arctic Fox	NP	NP	NP	10	NP	NP	NP	1.50
Beaver	53	44	59	65	1.97	2.36	1.75	2.29
Coyote	31	31	25	12	2.10	2.20	1.50	2.00
Lynx	34	42	32	30	2.21	2.10	1.89	1.72
Marten	17	19	55	41	1.43	1.45	2.10	1.61
Mink	17	15	32	15	1.68	1.88	1.75	1.67
Muskrat	26	27	0	39	2.13	2.23	1.78	1.92
Red Fox	38	33	55	45	1.51	1.41	1.88	1.71
Red Squirrel	73	80	78	64	2.05	2.48	2.25	1.91
River Otter	19	23	45	31	1.85	2.07	1.88	1.92
Weasel	32	31	44	47	1.74	1.85	1.78	1.92
Wolf	44	46	64	52	2.20	2.17	2.20	2.38
Wolverine	14	18	35	30	1.68	2.00	1.75	2.13
Prey								
Hare	9	10	33	15	1.42	1.37	1.89	1.38
Grouse	12	6	28	20	1.50	1.42	1.56	1.46
Ptarmigan	8	8	19	26	1.49	1.50	1.89	1.62
Mice/Rodents	61	46	67	42	2.18	2.05	2.13	1.77

Abundance: Index Values
Scarce = 0 through 19
Common = 20 through 50
Abundant = Greater than 50
NP = Not Present

Trend: Index Values
Fewer = 1 through 1.66
Same = 1.67 through 2.33
More = Greater than 2.33
NP = Not Present

Interior Descriptive Areas:
LTB = Lower Tanana R. Basin
UTB = Upper Tanana R. Basin, Charlie and Fortymile R.
MYK = Middle Yukon and Koyukuk
UYB = Upper Yukon R. Basin

Table 1c Indices of relative abundance and trend of furbearer populations in Interior Alaska, regulatory year 1993

	Relative Abundance Index				Trend Index			
	LTB	UTB	MYK	UYB	LTB	UTB	MYK	UYB
<u>Furbearers</u>								
Arctic Fox	NP	NP	NP	33	NP	NP	NP	2.33
Beaver	52	42	67	42	2.05	2.33	2.00	2.00
Coyote	34	11	0	0	2.03	2.08	2.00	2.00
Lynx	18	16	33	27	1.81	1.74	2.13	2.29
Marten	36	32	50	47	1.86	1.89	2.33	2.18
Mink	15	16	10	4	1.76	2.00	1.80	1.93
Muskrat	16	38	20	36	1.91	2.09	2.00	2.53
Red Fox	38	34	44	50	1.69	1.72	1.71	1.87
Red Squirrel	67	67	67	57	2.02	2.24	1.60	2.00
River Otter	22	19	42	11	2.09	2.25	1.83	1.93
Weasel	46	42	57	40	2.07	2.00	2.14	2.21
Wolf	53	47	56	50	2.31	2.33	2.29	2.31
Wolverine	12	11	38	29	1.76	2.05	1.71	1.86
<u>Prey</u>								
Hare	12	5	25	31	1.89	1.67	2.17	1.94
Grouse	24	18	36	38	2.00	2.11	1.67	2.25
Ptarmigan	16	13	50	25	1.74	1.78	2.33	1.93
Mice/Rodents	51	39	62	53	2.05	2.00	2.50	2.13

Abundance: Index Values
- Scarce = 0 through 19
- Common = 20 through 50
- Abundant = Greater than 50
- NP = Not Present

Trend: Index Values
- Fewer = 1 through 1.66
- Same = 1.67 through 2.33
- More = Greater than 2.33
- NP = Not Present

Interior Descriptive Areas:
- LTB = Lower Tanana R. Basin
- UTB = Upper Tanana R. Basin, Charlie and Fortymile R.
- MYK = Middle Yukon and Koyukuk
- UYB = Upper Yukon R. Basin

Table 2 Number of pelts sealed[a] from selected furbearers in portions of Units 20 and 25C, regulatory years 1988 through 1993

Species	Unit	1988	1989	1990	1991	1992	1993
Beaver	20A	63	10	38	43	68	83
	20B	648	462	311	587	294	650
	20C	286	81	239	241	76	183
	20F	49	15	61	16	10	14
	25C	0	50	3	4	6	0
Total		1046	618	652	891	454	930
Lynx	20A	54	68	54	185	75	95
	20B	57	72	57	131	94	117
	20C	63	126	55	176	53	27
	20F	28	45	27	47	25	13
	25C	22	7	23	9	8	6
Total		224	318	216	548	255	258
River Otter	20A	12	2	5	8	6	8
	20B	31	20	8	20	14	21
	20C	10	8	2	8	3	7
	20F	5	1	0	1	0	0
	25C	0	0	0	0	0	0
Total		58	31	15	37	23	36
Wolverine	20A	11	5	4	15	8	16
	20B	4	2	5	8	5	13
	20C	10	8	7	16	2	4
	20F	5	4	3	2	3	3
	25C	2	0	3	3	2	7
Total		32	19	22	44	20	43

Table 3 Average North American furbearer pelt prices (US dollars), regulatory years 1991 through 1994

Species	1991[a]	1992[b]	1993[b]	1994[b]
Beaver Good quality large brown	32	21	26	25
Marten Large I-II dark brown	78	60	68	55
Mink Large-medium I-II dark brown North	38	32	24	26
Fox XL-large I-II Northwest	26	26	31	35
Lynx Large-medium I-II first color	106	100	104	100
Otter XL-large I-II dark brown	63	66	88	103
Wolverine XL I-II brown	213	113	175	135

[a] Data compiled by T Boudreau from Dominion Soudack and North American Fur Exchange.
[b] Data compiled by T Boudreau from North American Fur Exchange Prices only.

Table 4 Fall beaver cache surveys in the lower Chena River, Badger Slough, and Noyes Slough, Unit 20B, 1986-1994

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[b]	Badger Slough	5	13	0.4
1991				
2 Oct	Chena River	22	40	0.6
1992[d]				
1993				
22 Sep	Chena River	18	40	0.5
23 Sep	Badger Slough	3	13	0.2
1994				
29 Sep	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.
[d] No survey.

Table 5 Results of the lower Chena River beaver cache surveys, 1990-1994. Between year comparisons of cache sizes are not comparable due to differences in date of survey and weather conditions

Year	Survey area	Date	Cache size[a] Small	Med	Large	Total no. of caches observed
1990	Lower Chena downstream of Badger Slough	26 Sep	9	12	5	26
1991	Lower Chena downstream of Badger Slough	2 Oct	3	6	12	21
1992[b]						
1993[c]	Lower Chena River downstream of Nordale Rd and Badger Slough downstream of Plack Rd	22 Sep and 23 Sep	9	6	6	21
1994	Lower Chena River downstream of Nordale Rd and Badger Slough downstream of Plack Rd	29 Sep	7	10	5	22

[a] Cache size is judged subjectively, based on size relative to 18 ft boat; small = < 18 ft, medium = 18 ft, and large = > 18 ft.
[b] No survey was conducted during fall 1992, due to an early and unexpected freeze up.
[c] The water level was extremely high during the survey and some smaller caches could have been missed.

Table 6 Summary by year of the results of the registration beaver trapping season in the lower Chena River portion of Unit 20B, 1989-1993

Year	Season dates	No. of trappers	No. caches available	No. lodges trapped	Total available limit	Beavers trapped adults	kits	total
1989	16 Feb 1989 15 Mar 1989	7	16	10	35	14	0	14
1990	16 Feb 1990 15 Mar 1990	6	17+	9	30	15	0	15
1990	1 Dec 1990 31 Jan 1991	8	26	16+	40	21+	0	21+
1991	1 Dec 1991 31 Jan 1992	8	17+	16	40	30	1	31
1992	1 Dec 1992 31 Jan 1993	10	unk	19	50	14	1	15
1993	1 Dec 1993 31 Jan 1994	8	21	14	40	21	0	21

Table 7 Nuisance beaver complaints and action taken, Unit 20, 1990-1994

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
1990	7	4	4	16	12	26	23	16	30	3[c]
1991	5	1	0	26	24	26	31	25	26	8[d]
1992	2	1	20	12	17	20	14	18	40	0
1993	4	3	27	13	21	40	17	24	67	0
1994	2	0	0	27	15	51	29	15	51	0

[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 7 Sport Fish research mortalities on Chena and Tanana rivers and 1 road kill.

Table 8 Number of beaver sealed and percentage of kits in the harvest in Units 20A, 20B, 20C, 20F, and 25C, regulatory years 1989 through 1993

Regulatory year	Unit 20A			Unit 20B			Unit 20C			Unit 20F			Unit 25C		
	No. beaver sealed[a]	No. kits[b]	% kits[c]	No. beaver sealed[a]	No. kits[b]	% kits[c]	No. beaver sealed[a]	No. kits[b]	% kits[c]	No. beaver sealed[a]	No. kits[b]	% kits[c]	No. beaver sealed[a]	No. kits[b]	% kits[c]
1989	10	0	0	462	29	6	81	5	6	15	1	7	50	13	26
1990	37	5	14	312	21	7	240	19	8	65	2	3	2	0	0
1991	42	6	14	566	61	11	229	8	3	16	1	6	4	0	0
1992	66	4	6	248	38	15	68	1	1	10	0	0	6	2	33
1993	64	5	8	589	70	12	174	11	6	16	3	19	3	2	66

[a] Includes only sealed beavers that were dried and stretched.
[b] Pelt < 53 inches.
[c] The management objective for < 20% kits in the harvest only applied to units with harvests > 50.

Table 9 Lynx pelts sealed and carcasses collected, Units 20A and 20B, regulatory years 1988 through 1993

Regulatory year	Unit	No. pelts sealed	No. carcasses collected	% carcasses collected
1988	20A	54	29	54
	20B	57	16	28
	Total	111	45	41
1989	20A	68	53	78
	20B	72	38	53
	Total	140	91	65
1990	20A	54	21	39
	20B	57	30	53
	Total	111	51	46
1991	20A	185	68	37
	20B	131	52	40
	Total	316	120	38
1992	20A	78	9	12
	20B	96	28	29
	Total	174	37	21
1993[a]				

[a] No carcasses collected.

Table 10 Age distribution of lynx carcasses collected in Units 20A and 20B, regulatory years 1991 and 1992

	1991						1992					
	20A			20B			20A			20B		
Age (yrs)	M	F	T	M	F	T	M	F	T	M	F	T
Kitten	6	6	12	1	0	1	0	0	0	0	1	1
1	19	11	30	16	10	26	0	1	1	5	4	9
2	11	9	20	10	10	20	5	2	7	5	10	15
3	4	2	6	1	1	2	0	1	1	3	0	3
>3	0	0	0	1	1	2	0	0	0	1	0	1
Nonkitten[a] Unknown age	0	0	0	0	1	1	0	0	0	0	0	0
Total	40	28	68	29	23	52	5	4	9	14	15	29

[a] Body size confirmed that these carcasses were not kittens but no tooth was available for sectioning.

Table 11 Results of the lynx trichinosis prevalence study in the Fairbanks area, regulatory years 1989 through 1993[a]

Regulatory year	Adults				Juvenile				% Positive
	Male		Female		Male		Female		
	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	
1989	7	45	6	2	1	10	0	7	18
1990	5	18	5	16	0	5	0	3	19
1991	11	56	9	40	0	7	0	13	20
1992	16	29	9	30	2	1	1	6	30

[a] Includes only data from Fairbanks area, a subset of statewide survey.

Table 12 Wolverine harvest (number of pelts sealed) and percentage of males in the harvest, Units 20A, 20B, 20C, 20F, and 25C, regulatory years 1989 through 1993

Regulatory year	No. sealed[a]	No. males	% males[a]
1989	19	10	53
1990	22	13	59
1991	44	26	59
1992	20	15	75
1993	43	35	81

[a] Excludes wolverines of unknown sex.

Table 13a Unit 20[a], number of furs that were sealed, reported sold to fur dealers[a], or exported[b] from Alaska, regulatory year 1991

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	882	175	20	80	9	255	29
Coyote		33		15		48	
Cross fox		76		60		136	
Red fox		314		167		481	
Silver fox		1		9		10	
Lynx	549	383	70	89	16	472	86
Marten		3983		507		4490	
Mink		142		25		167	
Muskrat		1		3		4	
Otter	37	14	38	14	38	28	76
Red squirrel		316		3		319	
Weasel		24		4		28	
Wolf	184	87	47	22	12	109	59
Wolverine	44	28	64	5	11	33	75
Total	1696	5577		1003		6580	

[a] All subunits of Unit 20, including Units 20D and 20E which are not within the Fairbanks area.
[b] From fur acquisition forms.
[c] From fur export reports from trappers.

Table 13b Unit 20, number of furs sealed, reported sold to fur dealers[a], or exported[b] from Alaska in regulatory year 1992

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	453	95	21	71	16	166	37
Coyote		11		7		18	
Cross fox		7		20		27	
Red fox		19		48		67	
Silver fox		0		1	10	1	
Lynx		89	34	66	25	155	60
Marten	260	972		209		1181	
Mink		52		16		68	
Muskrat		1		1		2	
Otter	23	6	26	10	43	16	70
Red squirrel		531		0		531	
Weasel		11		0		11	
Wolf	197	62	31	23	12	85	43
Wolverine	19	13	16	8	42	21[c]	110
Total	952	1869		480		2349	

[a] From fur acquisition forms.
[b] From fur export reports from trappers.
[c] Some trappers must have held over a fur from the previous year and sold it in 1992-1993.

Table 13c Unit 20, number of furs sealed, reported sold to fur dealers[a], or exported[b] from Alaska in regulatory year 1993

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	924	327	35	75	88	402	47
Coyote		26		73		99	
Cross fox		37		22		59	
Red fox		127		48		127	
Silver fox		1		0		1	
Lynx	267	168	63	14	54	182	70
Marten		2623		163		2786	
Mink		124		19		143	
Muskrat		6		0		6	
Otter	39	17	44	4		21	
Red squirrel		436		0		436	
Weasel		63		9		72	
Wolf	423	110	26	35	8	145	34
Wolverine	42	23	55	7	19	30	83
Total	1695	4088		469		4509	

[a] From fur acquisition forms.
[b] From fur export reports from trappers.

Table 14 Method of take and transportation used to harvest furbearers from Units 20A, 20B, 20C, 20F, and 25C, regulatory years 1991 through 1993

	Method of take				Method of transportation			
Species	Ground shooting	Trapping	Snaring	Other/ unk	Airplane	Dog sled/ snowshoe/skis	Snow- machine	Other/ unk
1991								
Beaver	9	89	755	8	16	70	174	
Otter	0	24	12	0	0	22	2	
Lynx	3	451	92	1	3	450	1	
Wolverine	0	39	5	0	0	39	0	
1992								
Beaver	0	118	327	5	1	43	285	
Otter	0	16	6	0	1	0	18	
Lynx	5	202	32	1	0	30	186	
Wolverine	1	14	4	0	2	1	15	
1993								
Beaver	3	195	677	2	0	115	576	
Otter	2	27	8	1	1	1	28	
Lynx	4	197	31	3	0	14	190	
Wolverine	1	33	8	0	5	3	31	

LOCATION

Game Management Unit: 20D (5720 mi^2)

Geographic Description: Central Tanana Valley near Delta Junction

BACKGROUND

Furbearers are an important natural resource in Unit 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 major rivers.

MANAGEMENT DIRECTION

Management Goals

- Provide for an optimal harvest of furbearers
- Provide the greatest opportunity to participate in hunting and trapping furbearers

Management Objectives

1 Monitor furbearer population trends and annual harvests of furbearers using sealing documents, fur acquisition reports, fur export reports, trapper questionnaires, and trapper interviews.

a Seal furs as they are harvested and presented for sealing and analyze harvest patterns.

b Conduct trapper questionnaire and interviews to determine the status of various furbearer populations.

2 Monitor trends in abundance of furbearer prey species by establishing snowshoe hare and small mammal trend surveys.

a Conduct snowshoe hare track surveys and small mammal trapline surveys to monitor prey abundance.

3 Determine lynx reproductive status by purchasing and examining lynx carcasses and reproductive tracts as needed.

a Purchase lynx carcasses from trappers and examine for reproductive status as needed.

METHODS

We collected harvest data for beaver, lynx, otter, and wolverine by requiring trappers to have the furs sealed. Additional information collected at the time of sealing included the name of trapper, location and date of harvest, pelt measurements for beaver, lynx, and otter, sex of the furbearer except for beaver, method of take, and mode of transportation.

A trapper questionnaire was mailed to trappers in Unit 20D through the Statewide Furbearer Management Program. Trappers were asked to rate species abundance as scarce, common, or abundant. Trappers were also asked to rate species population trends as fewer, same, or more than the previous year.

Abundance indices and population trend indices were calculated for each species for each year. Peterson and Meddleton (1992–1993 ADF&G files) discuss the formulas for calculating each index and the assumptions made in the calculations.

The relative abundance index was calculated by assigning numerical values to responses on the questionnaire with 1 = scarce, 2 = common, and 3 = abundant. The index was derived from the formula:

$$I = (\sum_{i=1} R_i\text{-}n)/2n]\text{x}100$$

with R_i = numerical value, n = number of trappers, and I = abundance index. This index expresses the cumulative response value of trappers in a given region as a percentage of the range of possible values. Index values of 0% to 19% = scarce, 20% to 50% = common, and >50% = abundant (Peterson and Meddleton 1992–1993 ADF&G files).

The population trend index responses on the questionnaire were assigned a numerical value with fewer = 1, same = 2, and more = 3. We derived a trend index by calculating the average values for each species. An index of 1.00 to 1.66 = fewer animals, 1.67 to 2.33 = the same number of animals, and >2.33 = more animals (Peterson and Meddleton 1992–1993 ADF&G files).

Lynx carcasses were purchased from trappers during the 1994–1995 trapping season for $10 per carcass. Carcasses were kept frozen until they can be examined in spring 1995.

RESULTS AND DISCUSSION

<u>Population Status and Trend</u>

Table 1 lists furbearer and prey population abundance and trends based on responses to trapper questionnaires. Abundance and trend indices were not calculated for 1991–1992. Changes in abundance from 1992–1993 to 1993–1994 include coyotes reportedly increasing from common to abundant, lynx decreasing from common to scarce, marten increasing from scarce to common, weasels increasing from common to abundant, and wolves increasing from common to abundant. Changes to prey abundance included both grouse and ptarmigan increasing from scarce to common.

Population Size: Population size is unknown for furbearers in Unit 20D, except wolves. Wolf population data is reported in a separate management report.

Population Composition: Population composition is unknown for furbearers in Unit 20D. Sex and age composition of lynx harvested during 1991–1992 included 33% males, 40% females, and 27% unknown sex; 79% of lynx were adults. During 1992–1993, 31% of lynx were males, 51% females, and 18% were unknown sex; 82% of lynx were adults. During 1993–1994 sex composition included 35% males, 28% females, and 38% unknown sex; 88% of lynx were adults.

Distribution and Movements: No work was performed to determine furbearer distribution and movements during this report period.

Mortality

Harvest

Season and Bag Limit. Unit 20D furbearer trapping and hunting seasons and bag limits are listed in Table 2 for the 1991–1992 through 1993–1994 trapping seasons.

Board of Game Actions and Emergency Orders. At the December 1994 meeting of the Alaska Board of Game, the beaver trapping season was lengthened in Unit 20D south of the Tanana River and aligned with the remainder of Unit 20D. The season and bag limit for Unit 20D is now 1 November to 25 April with a bag limit of 25 beaver. This regulatory change was made because of the low beaver harvest in Unit 20D in recent years.

Hunter/Trapper Harvest. Estimates of Unit 20D harvest are available for the following species that are sealed: beaver, lynx, otter, and wolverine. Unit 20D fur export and acquisition data are lumped with all Unit 20 data and will be included in the Unit 20A furbearer management report.

Reported beaver harvest from 1991–1992 through 1993–1994 was below the mean harvest of 46 beaver/year for the previous 5 years. Harvest totaled 35 beaver in 1991–1992, then declined significantly to only 6 beaver harvested in 1992–1993 and 12 in 1993–1994 (Table 3). The low harvest is due to low beaver pelt prices during the report period.

Reported lynx harvest increased during 1991–1992 through 1993–1994 from the mean of 15 lynx/year for the previous 5 years. Lynx harvest increased to 48 in 1991–1992, increased further to 96 in 1992–1993 as the population increased. Harvest decreased to 40 in 1993–1994 (Table 3).

Otter harvest during this report period was typical of the mean harvest of 3 otter/year during the previous 5 years. Three otter were harvested per year in 1991–1992 and 1993–1994, and none was taken in 1992–1993 (Table 3).

Wolverine harvest during this reporting period did not vary significantly from the mean harvest of 8 wolverine/year during the previous 5 years. Twelve wolverine were harvested in 1991–1992, 6 were harvested in 1992–1993, and 9 were harvested in 1993–1994 (Table 3).

Harvest Chronology. Most beavers were harvested in the late winter/early spring months of

February–April during this reporting period, with 50–98% of all harvest occurring during these 3 months (Table 4).

Most lynx (84% to 100%) were captured during December and January each year from 1991–1992 through 1993–1994 (Table 4). However, shortened lynx seasons during this reporting period restricted the harvest to this time period.

The few otters taken were caught in January and February each year (Table 4).

There is no clear pattern to wolverine harvest, with wolverine being captured whenever the season is open (Table 4).

Transport Means. Snowmachines continue to be the most commonly used means of transportation for beaver, lynx, otter, and wolverine trappers in Unit 20D (Table 5).

Method of Take. Traps and snares were the most commonly used methods for capturing all furbearers in Unit 20D from 1991–1992 through 1993–1994 (Table 3). When lynx abundance was higher during 1992–1993, lynx calling became popular and 6 lynx were reported shot (Table 3).

Other Mortality

Rates of natural mortality are unknown for furbearers in Unit 20D.

Habitat Assessment and Enhancement

No habitat assessment or enhancement was accomplished during this report period.

CONCLUSIONS AND RECOMMENDATIONS

Furbearer management objectives number 1 and 3 were met, and number 2 was met with trapper questionnaires, although no field surveys were conducted. The most notable changes in harvest were the increased harvest of lynx (96), particularly during 1992–1993, and the decreased beaver harvest due to low pelt prices. The Board of Game lengthened the beaver trapping season in southern Unit 20D.

The most urgent furbearer management need is for further assessment of lynx population trends. To address this need, an attempt should be made to establish lynx track transects during the next report period.

Prepared by:

Stephen D. DuBois
Wildlife Biologist III

Submitted by:

Kenton P. Taylor
Management Coordinator

Reviewed by:

Mark E. McNay
Wildlife Biologist III

Table 1 Indices of relative abundance (RBI) and trend (TI) of furbearer populations in Unit 20D during 1992-1993 and 1993-1994, based on responses to trapper questionnaires

Furbearer	1992-1993[a] Abundance (RBI%)[c]		1992-1993[a] Trend (TI)[d]		1993-1994[b] Abundance (RBI%)[c]		1993-1994[b] Trend (TI)[d]	
Beaver	common	(41)	same	(2.00)	common	(50)	same	(2.08)
Coyote	common	(43)	same	(2.08)	abundant	(56)	same	(2.31)
Lynx	common	(37)	more	(2.69)	scarce	(30)	same	(2.00)
Marten	scarce	(7)	fewer	(1.25)	common	(35)	same	(1.80)
Mink	scarce	(9)	same	(1.78)	scarce	(13)	same	(2.10)
Muskrat	common	(43)	same	(2.14)	common	(27)	same	(1.89)
Red Fox	common	(27)	fewer	(1.50)	common	(35)	same	(1.85)
Red Squirrel	abundant	(67)	same	(1.82)	abundant	(53)	same	(1.92)
River Otter	scarce	(0)	same	(2.00)	scarce	(10)	same	(2.11)
Weasel	common	(21)	same	(1.75)	abundant	(57)	same	(2.17)
Wolf	common	(36)	same	(2.31)	abundant	(53)	more	(2.50)
Wolverine	scarce	(8)	fewer	(1.50)	scarce	(15)	same	(2.00)
Prey								
Hare	scarce	(14)	fewer	(1.31)	scarce	(12)	same	(2.07)
Grouse	scarce	(19)	fewer	(1.31)	common	(38)	same	(2.21)
Ptarmigan	scarce	(10)	fewer	(1.15)	common	(25)	same	(1.75)
Mice/Rodents	abundant	(68)	same	(2.08)	abundant	(60)	same	(2.08)

[a] 15 trapper questionnaires received.
[b] 17 trapper questionnaires received.
[c] RBI: 0% to 19% = scarce; 20% to 50% = common; 75% = abundant.
[d] TI: 1.00 to 1.66 = fewer; 1.67 to 2.33 = same; > 2.33 = more.

Table 2 Furbearer trapping and hunting seasons in Unit 20D from 1991-1992 through 1993-1994

Species	Trapping Season	Bag Limit	Hunting Season	Bag Limit
Beaver	1 Nov-15 Apr[a]	25	No open season	
	1 Feb-15 Apr[b]	15		
Coyote	1 Nov-31 Mar	No limit	1 Sep-30 Apr	2
Lynx	1 Dec-31 Jan	No limit	1 Dec-31 Jan	2
Marten	1 Nov-28 Feb	No limit	No open season	
Mink	1 Nov-28 Feb	No limit	No open season	
Muskrat	1 Nov-10 Jun	No limit	No open season	
Otter	1 Nov-15 Apr	No limit	No open season	
Red Fox	1 Nov-28 Feb	No limit	1 Sep-15 Mar	2[c], 10[d]
Red Squirrel	No closed season		No closed season	
Weasel	1 Nov-28 Feb	No limit	No open season	
Wolverine	1 Nov-28 Feb	No limit	1 Sep-31 Mar	1

[a] That portion of Unit 20D draining into the north bank of the Tanana River, including islands of the Tanana River.
[b] That portion of Unit 20D draining into the south bank of the Tanana River.
[c] 1991-1992 regulatory year.
[d] 1992-1993 regulatory year, with no more than 2 taken prior to 1 Oct.

Table 3 Unit 20D beaver, lynx, otter, and wolverine harvest, regulatory years 1986-1993.

Regulatory year	Reported harvest						Method of take				Total harvest	Successful trappers/ hunters
	M	F	Unk	Juv[a]	Adults	Unk	Trap/snare	Shot	(L&S)[b]	Unk		
Beaver												
1986-1987			70	13	57	0	64	0	0	6	70	
1987-1988			85	21	64	0	75	3	0	7	85	
1988-1989			34	2	22	10	25	0	0	9	34	
1989-1990			18	1	17	0	18	0	0	0	18	
1990-1991			23	1	22	0	21	0	0	2	23	
1991-1992			35	2	33	0	35	0	0	0	35	
1992-1993			6	0	6	0	6	0	0	0	6	
1993-1994			12	2	10	0	12	0	0	0	12	
Lynx												
1986-1987	5	12	3	4	16	0	20	0	0	0	20	
1987-1988	6	10	1	4	13	0	17	0	0	0	17	
1988-1989	3	4	3	1	9	0	8	2	0	0	10	
1989-1990	2	2	0	0	4	0	4	0	0	0	4	
1990-1991	7	8	7	3	19	1	23	0	0	0	23	
1991-1992	16	19	13	9	38	1	45	1	0	2	48	
1992-1993	30	49	17	16	79	1	85	6	0	9	96	
1993-1994	14	11	15	5	35	0	40	0	0	0	40	
Otter												
1986-1987	3	2	1				6	0	0	0	6	
1987-1988	2	1	0				2	1	0	0	3	
1988-1989	2	0	4				6	0	0	0	6	
1989-1990	0	0	0				0	0	0	0	0	
1990-1991	0	1	0				1	0	0	0	1	
1991-1992	2	1	0				3	0	0	0	3	
1992-1993	0	0	0				0	0	0	0	0	
1993-1994	1	0	2				1	0	0	2	3	

Table 3 Continued.

Regulatory year	Reported harvest						Method of take				Total harvest	Successful trappers/ hunters
	M	F	Unk	Juv[a]	Adults	Unk	Trap/snare	Shot	(L&S)[b]	Unk		
Wolverine												
1986-1987	5	0	1				5	1	0	0	6	
1987-1988	3	3	0				6	0	0	0	6	
1988-1989	8	6	1				15	0	0	0	15	
1989-1990	3	2	2				6	1	0	0	7	
1990-1991	5	1	1				7	0	0	0	7	
1992-1992	9	3	0				12	0	0	0	12	
1992-1993	3	3	0				6	0	0	0	6	
1993-1994	2	2	5				9	0	0	0	9	

[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 4 Unit 20D beaver, lynx, otter, and wolverine harvest chronology percent[a] by time period, regulatory years 1986-1993.

Regulatory year	Harvest periods							
	Sep/Oct	Nov	Dec	Jan	Feb	Mar	Apr	Unk
Beaver								
1986-1987	0	1	11	6	16	56	9	0
1987-1988	2	2	28	1	4	45	15	0
1988-1989	0	0	12	0	18	47	9	0
1989-1990	0	11	6	0	33	39	11	0
1990-1991	0	9	9	0	0	74	0	0
1991-1992	0	0	3	0	6	49	43	0
1992-1993	0	33	0	17	17	33	0	0
1993-1994	0	17	0	8	0	42	33	0
Lynx								
1986-1987	0	0	50	50	0	0	0	0
1987-1988	0	0	71	29	0	0	0	0
1988-1989	0	0	40	40	10	10	0	0
1989-1990	0	0	25	75	0	0	0	0
1990-1991	0	4	21	71	4	0	0	0
1991-1992	0	4	48	46	0	0	0	0
1992-1993	0	4	42	42	7	0	0	0
1993-1994	0	0	53	48	0	0	0	0
Otter								
1986-1987	0	0	0	60	40	0	0	0
1987-1988	0	0	33	0	0	67	0	0
1988-1989	0	0	0	67	17	17	0	0
1989-1990	0	0	0	0	0	0	0	0
1990-1991	0	0	0	0	100	0	0	0
1991-1992	0	0	0	100	0	0	0	0
1992-1993[b]	0	0	0	0	0	0	0	0
1993-1994	0	0	0	33	67	0	0	0
Wolverine								
1986-1987	17	0	17	33	17	17	0	0
1987-1988	0	0	17	83	0	0	0	0
1988-1989	0	7	33	47	7	0	0	0
1989-1990	0	0	0	14	29	57	0	0
1990-1991	0	0	14	29	57	0	0	0
1991-1992	17	25	17	42	0	0	0	0
1992-1993	17	33	17	33	0	0	0	0
1993-1994	11	67	22	0	0	0	0	0

[a] Percentage of unknown not included.
[b] No harvest.

Table 5 Unit 20D harvest percentage by transport method[a], regulatory years 1986-1993.

Regulatory year	Percent of harvest								
	Airplane	Dogsled	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Skis, Snowshoes	Unk
Beaver									
1986-1987	0	19	6	19	43	0	6	9	0
1987-1988	0	2	6	0	51	0	33	8	0
1988-1989	0	0	26	0	59	0	12	3	0
1989-1990	0	0	0	0	0	0	17	83[a]	0
1990-1991	0	26	0	0	65	0	0	9	0
1991-1992	0	0	9	0	91	0	0	0	0
1992-1993	0	0	0	0	100	0	0	0	0
1993-1994	0	0	58	0	33	0	8	0	0
Lynx									
1986-1987	10	0	0	5	85	0	0	0	0
1987-1988	6	6	0	0	78	0	12	0	0
1988-1989	0	0	0	0	80	0	20	0	0
1989-1990	0	0	0	0	100	0	0	0	0
1990-1991	0	0	0	0	100	0	0	0	0
1991-1992	0	2	0	0	71	0	17	6	4
1992-1993	0	1	0	4	66	4	10	6	9
1993-1994	0	0	0	0	73	5	23	0	0
Otter									
1986-1987	0	0	0	0	83	17	0	0	0
1987-1988	0	0	0	0	100	0	0	0	0
1988-1989	0	0	0	0	100	0	0	0	0
1989-1990	0	0	0	0	100	0	0	0	0
1990-1991	0	0	0	0	0	0	0	0	1
1991-1992	0	0	0	0	67	0	0	33	0
1992-1993[b]	0	0	0	0	0	0	0	0	0
1993-1994	0	0	0	0	33	0	0	0	67

Table 5 Continued.

Regulatory year	Percent of harvest: Airplane	Dogsled	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Skis, Snowshoes	Unk
Wolverine									
1986-1987	17	33	0	0	33	17	0	0	0
1987-1988	0	0	0	0	100	0	0	0	0
1988-1989	0	0	0	0	87	0	0	13	0
1989-1990	0	29	0	0	43	0	0	29	0
1990-1991	14	0	0	0	57	0	0	29	0
1991-1992	33	0	0	0	58	0	8	0	0
1992-1993	17	0	0	0	83	0	0	0	0
1993-1994	0	0	0	0	78	0	0	22	0

[a] Transportation codes were revised in 1989; however, some errors may exist due to use of some old sealing certificates.

[b] No harvest.

LOCATION

Game Management Unit: 21 (43,925 mi^2)

Geographical Description: Yukon River drainage above Paimuit 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 are rare. Weasels and red squirrels are common but not target species for trappers.

MANAGEMENT DIRECTION

Management Goals

- Protect, maintain, and enhance the furbearer populations and their habitats in concert with other components of the ecosystem
- Provide for continued use of furbearers by local Alaskan residents who have customarily and traditionally used the population
- Provide an opportunity to view and photograph furbearers
- 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 mail-out questionnaire in Units 21A and 21E and analyzed responses. Throughout the rest of Unit 21, we interviewed 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 throughout the unit within suitable habitat. Their populations are high and increasing. Muskrats are on a long-term decline, probably because of loss of habitat from pond succession. Where muskrats are found, they are numerous. Lynx were in the high phase of their 10-year cycle in the northern part of the unit. The population peaked during the 1991–1992 season. Red foxes are numerous throughout the unit and stable.

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 restricted movement of the animals so they do not produce many readily visible tracks.

Distribution and Movements: All furbearer species are throughout the unit. The US Fish and Wildlife Service (FWS) has radiotagged marten in the Nowitna River drainage in Unit 21B (Johnson et al. 1994). Marten were most abundant in a 1985 burn and least abundant in a 1966 burn. The upland area of the unburnt mature forest was preferred to drainage areas.

Trapping Conditions and Prey Species: Weather varied over the past 4 years with some extensive periods of heavier than normal snowfall that hampered accessibility. For most trappers, the trapping conditions were adequate.

Voles and shrews in Unit 21D were less numerous compared to those in 1990 (Table 1). In Unit 21B the FWS trapped in post-fire forest stands (Johnson et al. 1994). They found highest densities of voles and shrews in the new burn (1985), followed by the mature forest and old burn (1966). Hare populations are increasing throughout the unit, based on observed increases in track density. Willow ptarmigan and grouse populations appeared to peak in 1991 and were lower in subsequent years.

Mortality

Harvest

Season and Bag Limit.

Trapping seasons and bag limits for Unit 21 furbearer were as follows:

Beaver (except Unit 21E)	1 Nov–15 Apr	No limit
Beaver (Unit 21E)	1 Nov–1 Jun	No Limit
Coyote	1 Nov–31 Mar	No limit
Lynx	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
Red fox	1 Nov–28 Feb	No limit
River otter	1 Nov–15 Apr	No limit
Wolverine	1 Nov–31 Mar	No limit

Board of Game Actions and Emergency Orders. In 1992 the Board of Game changed the bag limit for beaver from 50 per year to no limit. At the same meeting they increased the open season in Unit 21E from April 15 to June 1. During the past 10 years, trapping seasons and bag limits remained the same for marten, coyote, lynx, fox, mink, muskrat, otter, and wolverine.

Trapper Harvest.

Beaver

During the report period, the harvest of beavers from the unit was low (Table 2), compared to a harvest of over 1000 during the late 1980s. Harvest 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 caused by trapping techniques employed by local trappers (Table 3). 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 4).

Lynx

Lynx populations reached the low point of their 10-year cycle during the mid-1980s. Populations peaked during the 1991–1992 season. Although lynx abundance is high, harvest has been low (Table 2). The low harvest was due to decreased trapper effort because of low 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 (Tables 2 and 3). Pelt prices for Interior otters are low, and trapping effort is minimal. Otters are incidentally taken in beaver sets, accounting for most of the otter harvest.

Wolverine

Trapper harvests are stable (Tables 2 and 3). Numerous wolverine tracks were seen during aerial wolf surveys in late March 1994. These observations indicate that harvests do not appear to be affecting population levels.

Other furbearers

Marten population numbers were moderate in the northern part of the unit. Marten harvest was greatly reduced due to lower trapping effort and lower prices than in previous seasons (Table 5). Fox populations continue to be high; however, pelt prices were low. Trappers have little incentive to pursue this species (Table 5). 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 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 areas with excessive harvest. The primary recommendation is to continue the present seasons and bag limits. Marten seasons should be reviewed annually. Data on population density can be gathered from trapper questionnaires, discussions with local fish and game advisory committees, and incidental trapper interviews. Trapping seasons could be adjusted according to local population fluctuations.

LITERATURE CITED

Johnson WN, TF Paragi, and DD Katnik. 1994. The relationship of wildfire to lynx and marten populations and habitat in interior Alaska. Annual rep 94-01. US Fish and Wildl Serv, Koyukuk/Nowitna Refuge complex, Galena, Alas. 85pp.

Prepared by:

Timothy O. Osborne
Wildlife Biologist III

Jackson S. Whitman
Wildlife Biologist III

Submitted by:

Kenton P. Taylor
Management Coordinator

Reviewed by:

Mark E. McNay
Wildlife Biologist III

Table 1 Number of small mammals caught in 3 habitats from August 1990-1994 in Unit 21D. Results from 90 trap-nights/habitat/year

Species	Open black spruce					Balsam poplar					Grass meadow				
	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994
Microtus xanthognathus (Yellow-cheeked vole)	0	0	0	0	0	0	0	0	0	0	0	5	7	17	0
Microtus pennsylvanicus (Meadow vole)	1	0	0	0	0	4	0	1	0	3	15	7	3	4	10
Clethironomys rutilus (Red-backed vole)	22	3	16	12	22	38	5	26	16	27	8	2	0	3	0
Zapus hudsonicus (Meadow Jumping mouse)	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0
Sorex sp. (Shrew)	34	25	21	21	18	30	24	19	19	13	45	8	14	5	11
Total	57	28	37	33	43	73	29	46	35	43	68	22	24	29	21

Table 2 Unit 21 estimated harvest of sealed furbearer species 1989-1994

Species	1989-1990	1990-1991	1991-1992	1992-1993	1993-1994
Beaver	279	365	319	218	270
Lynx	13	12	69	26	40
Otter	17	32	26	10	17
Wolverine	25	33	39	18	49

Table 3 Unit 21 beaver, lynx, otter, and wolverine harvest 1989-1994.

Regulatory	Reported harvest								Estimated harvest		Method of take					Successful	
year	M	F	(%)	Unk	Juv[a]	(%)	Adults	Unk	Unreported	Illegal	Trap/ snare	(%)	Shot	(L&S)	Unk	Total	Trappers/ hunters
Beaver																	
1989-1990	0	0			23		279		0	0	265		0		14	279	33
1990-1991	0	0			38		365		0	0	345		20		0	365	32
1991-1992	0	0			46		269		0	0	315		0		4	319	25
1992-1993	0	0			79		139		0	0	218		0		0	218	16
1993-1994	0	0			38		232		0	0	270		0		0	270	30
Lynx																	
1989-1990	0	0			1		12		0	0	13		0		0	13	6
1990-1991	0	0			5		7		0	0	10		0		2	12	7
1991-1992	0	0			7		62		0	0	69		0		0	69	15
1992-1993	0	0			2		24		0	0	26		0		0	26	16
1993-1994	0	0			0		40		0	0	40		0		0	40	12
Otter																	
1989-1990	4	4		9	--		--		0	0	15		1		1	17	8
1990-1991	15	13		4	--		--		0	0	28		4		0	32	11
1991-1992	9	12		5	--		--		0	0	26		0		0	26	13
1992-1993	2	1		7	--		--		0	0	18		0		2	10	7
1993-1994	6	2		9	--		--		0	0	15		2		0	17	6
Wolverine																	
1989-1990	10	4		1	--		--		10	0	15		0		0	25	11
1990-1991	12	9		2	--		--		10	0	22		1		0	33	21
1991-1992	16	8		5	--		--		10	0	26		3		0	39	24
1992-1993	3	3		2	--		--		10	0	8		0		0	18	7
1993-1994	14	23		2	--		--		10	0	36		2		1	49	18

[a] Beavers ≤ 52"; lynx ≤ 34" in length.

Table 4 Unit 21 beaver, lynx, otter, and wolverine harvest chronology by time period, 1989-1994.

Regulatory year	Harvest periods						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Beaver							
1989-1990	0	13	45	20	48	126	27
1990-1991	8	17	22	68	68	210	5
1991-1992	0	44	15	17	102	110	27
1992-1993	0	5	42	11	45	102	2
1993-1994	0	14	27	57	89	74	9
Lynx							
1989-1990	0	0	3	4	6	--	--
1990-1991	0	5	1	3	3	--	--
1991-1992	0	2	17	17	32	--	--
1992-1993	0	5	7	10	3	--	--
1993-1994	0	0	12	14	14	--	--
Otter							
1989-1990	0	2	10	0	1	4	0
1990-1991	0	3	7	12	9	1	0
1991-1992	0	7	3	4	7	4	0
1992-1993	2	3	2	0	0	2	1
1993-1994	0	0	2	4	5	3	2
Wolverine							
1989-1990	0	0	8	4	1	2	0
1990-1991	12	3	6	6	3	4	0
1991-1992	0	1	5	14	6	3	0
1992-1993	0	1	0	1	3	3	0
1993-1994	2	6	7	11	12	1	0

Table 5 Unit 21 estimated harvest[a] of unsealed furbearer species, 1989-1994.

Species	1989-1990	1990-1991	1991-1992	1992-1993	1993-1994
Coyote	0	1	0	0	1
Marten	2591	1608	1502	559	997
Mink	20	27	45	50	17
Muskrat	0	0	0	0	4
Red fox	55	15	21	1	25

[a] Estimates derived from Fur Acquisition Reports and Fur Export Permits.

LOCATION

Game Management Unit: 22 A, B, C, D, and E (23,000 mi^2)

Geographic Description: Seward Peninsula and that portion of the Nulato Hills draining westward into Norton Sound

BACKGROUND

Furbearers are most abundant in Units 22A and 22B in spruce and riparian willow habitat. Densities and harvests of furbearers in Unit 22 have fluctuated widely during past years. Although hunting and trapping pressure has at times reduced furbearer densities in areas adjacent to Unit 22 villages, major fluctuations were most likely caused by natural factors.

Harvesting activities within the unit are in most cases directly related to densities of furbearers and fur prices. When fur prices and population densities are high, the number of hunter/trappers is high as well. Very few local residents trap as their sole winter occupation. Most individuals harvest furbearers either recreationally or opportunistically.

MANAGEMENT DIRECTION

The following management goals and objectives have been established for furbearers in Unit 22:

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 and sealing agents 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.

6 Minimize conflicts between furbearers and the public.

METHODS

Research programs designed specifically to evaluate the population status of furbearer species have never been completed in Unit 22. Limited information regarding furbearer distribution and densities were gathered annually from observations reported by the staff and the public. We collected harvest information from sealing certificate records.

RESULTS AND DISCUSSION

Population Status and Trend

We gathered information regarding the status of Unit 22 furbearer populations from observations recorded while conducting surveys of other species and from information provided by interested local residents.

Beaver: Beaver numbers throughout the unit continued to increase as they move westward onto the Seward Peninsula. Densities are moderate to high in some drainages of Unit 22A and 22B because harvest pressure has been minimal. Densities in the eastern portions of Unit 22C and 22D have increased dramatically since 1990.

River Otter: Otters are distributed throughout most major drainages of the unit, although they are more common in Unit 22A, 22B and 22C. Their numbers seem stable.

Wolverine: Wolverine numbers remained stable throughout the unit although the annual harvest in some areas, particularly Unit 22C, appears quite high. We believe the availability of suitable habitat and food resources are the primary factors holding densities at the current levels. In Unit 22C hunting pressure is probably the most important factor regulating population density.

Lynx: Densities of lynx have remained low unitwide since the mid-1980s, and presumably will remain low until prey densities begin to increase.

Fox: Red fox numbers remained high throughout much of the Unit during the 1980s, but have declined during recent years, probably in response to reduced hare and ptarmigan numbers. White fox numbers have remained low since the early 1980s, and we believe they are not increasing in number within Unit 22.

Mink/Marten: Very little is known of the status of mink and marten populations in Unit 22. Most of the suitable habitat occurs in Units 22A and 22B. Limited information provided by individuals trapping in those subunits indicate that numbers are stable or increasing slightly.

Mortality

Harvest

Hunting Seasons and Bag Limits:

Species	Season	Bag Limit
Fox, Arctic	Sep. 1-Apr. 30	Two foxes
Fox, Red	Nov. 1-Feb. 15	Two foxes
Lynx	Nov. 1-Mar. 31	Two lynx
Wolverine	Sep. 1-Mar. 31	One 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

Human-Induced Mortality

Except for lynx and wolverine, fur prices for species found in Unit 22 remained low during the reporting period, and trapping effort also remained low. In addition, poor weather during some years discouraged trapping activity.

Accurate harvest data are lacking for all furbearer species taken in Unit 22, even for those species that are sealed. Because many furs used domestically are not sealed, all sealing certificate data presented should be considered minimum estimates of harvest.

Beaver: The Unit 22 beaver harvest ranged from a high of 41 beavers sealed in 1993/1994 to a low of 7 in 1990/91 (Tables 1 and 2). Average annual harvest for the 5-year period was 20 beavers. As reported in past progress reports, most of the harvest was reported taken from Units 22A and 22B during the 5-year period. However, harvests from Unit 22C have increased dramatically since 1990 probably in response to increasing population densities.

Lynx: The reported lynx harvest from Unit 22 remained low ranging from 5 animals sealed in 1990-1991 to a low of 2 in 1993-1994. As reported in past years, nearly all of the harvest was reported taken in Units 22A and 22B.

River Otter: The reported otter harvest during the reporting period was low ranging from 1 in 1989-1990 to 9 otters in 1993-1994. Most of the harvest was taken from Units 22A, 22B and 22C.

Wolverine: The annual harvest during the previous 5 years has ranged from 21 in 1989-1990 to 32 the following year (Table 2). The reported sex composition was 68% males and 32% females. Wolverines were reportedly taken from all subunits with a distribution as follows: Subunit 22A, 24%; Subunit 22B, 34%, Subunit 22C, 21%, Subunit 22D, 17%; and Subunit 22E, 4%. Trapping and snaring accounted for 42% of the wolverine taken, ground shooting accounted for 57%, and the remainder is unknown.

Hunter Residency and Success. Hunter/trappers who harvested furbearers within Unit 22 were primarily local residents. During the 5-year period from 1989 to 1994, only 1 beaver and 2 wolverines were harvested by individuals who were not residents of Unit 22. Success is difficult to accurately measure because most individuals take furbearers opportunistically while not specifically hunting or trapping furbearers.

Transport Methods. Unit 22 hunter and trappers almost exclusively used snowmobiles for transportation. Sealing certificate data from the past 5 years indicate that over 90% of all furbearers sealed were taken by individuals using a snowmachine.

CONCLUSIONS AND RECOMMENDATIONS

Except for beaver, Unit 22 furbearer populations in recent years have remained low to moderate in density. Beaver population densities, particularly in Units 22A, 22B, and 22C, appear to be increasing. Many of the furbearers harvested in Unit 22 were taken by recreational hunters/trappers rather than by individuals attempting to make a living through trapping.

Little is known of the impact hunter/trappers have on furbearer populations within Unit 22. Although our current regulations may at times affect species near some villages, it is doubtful the effects are significant unitwide.

The accuracy of our furbearer harvest data in Unit 22 needs to be improved. 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 remains unsealed for use in the domestic manufacture of 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. Continued public contact by biologists and enforcement personnel are needed to explain the importance of sealing requirements.

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

Prepared By:	Submitted By:
Steven Machida	Steven Machida
Wildlife Biologist III	Survey Inventory Coordinator

Table 1. Unit 22 furbearer harvests reported on sealing certificates, 1989-1994

Species	Regulatory Year				
	1989-1990	1990-1991	1991-1992	1992-1993	1993-1994
Beaver	23	7	19	10	41
Lynx	3	2	5	4	2
River Otter	1	2	2	3	9
Wolverine	21	32	29	24	23

Table 2. Unit 22 beaver harvest reported on sealing certificates, 1989-1994

Regulatory Year	Subunit				
	22A	22B	22C	22D	Unknown
1989/1990	11	7	0	0	5
1990/1991	2	5	0	0	0
1991/1992	13	2	3	1	0
1992/1993	6	3	1	0	0
1993/1994	11	4	25	1	0

Table 3. Unit 22 wolverine harvest, 1989-1994.

Regulatory Year	Reported harvest				Method of take		
	M	F	Unk.	Total	Trap/snare (%)	Shot (%)	Unk. (%)
1989/1990	9	6	6	21	16 (76)	5 (24)	0
1990/1991	17	7	8	32	11 (34)	21 (66)	0
1991/1992	18	9	2	29	13 (45)	15 (52)	1 (3)
1992/1993	14	8	2	24	8 (33)	15 (63)	1 (4)
1993/1994	14	4	5	23	6 (26)	17 (74)	0

LOCATION

Game Management Unit: 23 (43,422 mi^2)

Geographic Description: Kotzebue Sound and western Brooks Range

BACKGROUND

Furbearers that inhabit Unit 23 include lynx, beavers, marten, mink, muskrats, river (land) otters, red foxes, white (Arctic) foxes, wolverines, and wolves. Wolves are considered in a separate survey and inventory report.

The Inupiaq traditionally harvested furbearers for subsistence in Game Management Unit 23 (GMU 23) before a cash economy was introduced to the area in the early 1900s. After that, many Native and non-Native trappers supported themselves seasonally by trapping. Today, furbearer harvest in GMU 23 is by subsistence and recreational users and a few professional trappers. Furbearer harvest provides materials for fur garments manufactured locally and generates limited monetary income. While engaged in other activities, local residents harvest many furbearers opportunistically.

MANAGEMENT DIRECTION

Population Objectives

To 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.

To obtain sufficient data to develop one or more trend count areas for lynx by 1996.

METHODS

We gather information regarding the population status of lynx, wolverines, river otters, and beavers from fur sealing certificates, conversations with residents of the unit, and during other wildlife surveys as biologists' opportunistically observe furbearers and their tracks.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size:

Wolverine: In previous years, concern was expressed by some local residents that wolverine numbers were low in the area surrounding Kotzebue. Based on opportunistic sightings by staff and residents, wolverine populations in the unit are stable. High overwinter mortality of moose in the Noatak and Kobuk drainages from 1991 through 1993 and the presence of overwintering caribou in 1994 should have lead to favorable foraging conditions for wolverines in some areas of the unit.

Beaver: Beaver sign in the lower Noatak River drainage continued to be reported through 1994. The number of sightings have increased in this drainage since 1986 but are still restricted to only a few active sites in the lower Noatak. Most residents of the Kobuk drainage report beaver populations at "medium" levels and either stable or increasing. Beaver population levels in the Selawik are still high, based on reports by local residents and observations of beavers in marginal habitat.

Lynx: Lynx populations remained extremely low during 1991-94. Agency personnel and residents continue to observe single sets of tracks in the Noatak, Kobuk, and Selawik drainages. The snowshoe hare population is still low. Reported sightings in areas where the hares were first observed have not increased significantly. The last "high" occurred during 1980–81. Given what is known about hare population cycles, another population high was predicted between 1988 and 1992 but it did not occur. Currently, snowshoe hare populations appear to be recovering and extending their range very slowly. We anticipate it will be a number of years before lynx numbers significantly increase.

Mink and Marten: No information is available and no sightings were reported for mink. Presence of marten in the middle lower Kobuk represent a recent westward expansion of the species. Sightings of marten tracks in the lower Noatak and nearby vicinity have occurred during this and previous reporting periods.

Red Fox: The limited information available on red fox suggests that populations were stable or in some areas increasing. One case of rabies was confirmed in the village of Ambler in May 1994.

Mortality

Harvest

Season and Bag Limit

The seasons and bag limits for furbearers were the same for the 1991-92 through 1993-94 regulatory years. There were no differences in seasons or bag limits between subsistence, resident or nonresident hunters or trappers in either regulatory year.

Unit 23		
Wolverine	Sep 1-Mar 31	1 wolverine
Red Fox	Sep 1-Mar 15	10 (no more than 2 prior to Oct. 1)
Arctic Fox	Sep 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-Jun 10	No limit
River Otter	Nov 1-Apr 15	No limit
Beaver	Nov 1-Jun 10	30 beaver per season*

*50 beavers per season were allowed to be taken from the Kobuk and Selawik River drainages beginning in 1988-89.

Human-Induced Mortality

Beaver: Two hunters/trappers sealed 7 beavers from Unit 23 (Kobuk drainage) during 1991-92. Five were trapped in November and 2 were shot in June. During 1992-93, 2 hunters sealed 5 beavers. All animals were taken in April. In 1993-94 only one hunter had beaver sealed. He reported trapping 9 and shooting 1 beaver in the upper Kobuk in May. Most beavers harvested in the unit are taken south of the Kobuk and are unreported.

Lynx: One lynx was sealed from Unit 23 in 1991-1992. No lynx were sealed in 1992-93. Two hunters trapped 5 lynx (4 females, 1 male) in the Kobuk drainage in 1993-94.

River Otter: In 1991-92, 2 hunters sealed 3 otters. Two otters were sealed in 1992-93 by 2 hunters. One complimentary sealing was done in 1993-94. During this reporting period otters were taken from the Buckland drainage, Kotzebue sound vicinity, and the Wulik and Kobuk drainages.

Wolverine: Fourteen hunters sealed 37 wolverines (26 males, 10 females and 1 unknown) during 1991-92. Seventeen were harvested in the Noatak drainage, 13 in the Kobuk, 3 in the Buckland and adjacent northern Seward peninsula drainages, and 4 north of the Noatak near Kivilina and the Wulik River. Fourteen of the reported wolverines (38%) were shot, and 23 (62%) were trapped. All were taken by unit residents using snow machines. Most of the harvest occurred in March and April.

In the 1992-93 regulatory year, 11 hunters sealed 36 wolverine (25 males, 11 females). Reported harvest was highest in the Noatak and Kobuk Drainages (15 and 14 wolverine, respectively). The remaining 7 wolverine were harvested south of the Kobuk (Kiwalik, Buckland, and Selawik drainages). Twenty were trapped and 16 shot. All were taken by unit residents using snow machines.

Fewer wolverine were taken in 1993-94. Nineteen wolverines (11 males, 8 females) were harvested by 12 hunters. All but one hunter resided in Unit 23. Thirteen wolverine were ground shot, 5 were trapped, and 1 was taken by unknown means. Eight wolverine were taken from the Kobuk drainage, 3 from the Noatak, and the remaining 8 from south of the Kobuk on the northern Seward Peninsula. The decrease in harvest may be related to a very active Noatak drainage trapper who did not trap during this regulatory year.

Board of Game Actions and Emergency Orders. The Board of Game took action on methods and means for harvesting furbearers in Unit 23. In 1992 it became illegal to land and shoot wolves and wolverines the same day as being airborne. In 1993-94 regulatory year same-day-airborne became legal for trapping fox, coyote, and lynx as long as the trapper was 100 ft from the plane.

CONCLUSIONS AND RECOMMENDATIONS

The department should continue to maintain open communication with area trappers to assess trapper effort and distribution. Residents in the region make little distinction between taking game under hunting regulations versus trapping regulations since many furbearers are taken by gun. Assuming that all hunters will purchase a license and also identify themselves as trappers is incorrect. Because of this, village visits in which all hunters are contacted, regardless of whether they have a license or not, may be a better means of assessing harvest and population status of furbearers than using surveys based on license information.

With the early signs of lynx returning to the unit, we need to work with the public and advisory committees to develop a management strategy for lynx. As hare and lynx populations increase, monitoring population trends will be particularly important so hunting and trapping regulations can be adjusted accordingly (Caughly 1977, Brand and Keith 1979).

Lynx would be an excellent species for the department to demonstrate ways by which local knowledge can be incorporated in management efforts. Opportunities exist for including other local organizations wishing to participate in resource management. Possible benefits to the department would be assistance in identifying optimal areas for establishing monitoring areas or trend count areas for lynx and hares (Becker 1991).

We recommend the elimination of the bag limit on beaver in the Kobuk and Selawik River drainages to simplify regulations for local rural residents. Beaver populations have remained high in these drainages, despite the bag limit increase from 30 to 50 beavers per regulatory year in 1988-91. Sealing records indicate there is little likelihood of hunters or trappers affecting the population.

We recommend adoption of the same season dates for hunting and trapping furbearers in Unit 23. The inconsistency between seasons and bag limits for hunting and trapping has been addressed at numerous advisory committee and agency meetings. Given similar methods and means used by hunters during both hunting and trapping seasons, variations in season dates and bag limits make little sense and increase the complexity of regulations.

We need to either improve compliance with the current regulations requiring sealing of furbearers or establish an alternate means to collect harvest and population data on furbearers. Current sealing data is based on the activities of a few individuals that participate in the system and market their furs outside the region. Many furs are used locally and never sealed. Also due to the limited hunter/trapper participation the geographic distribution of harvest and of species abundance can not be determined by sealing certificates 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.

Prepared By:

Lee Anne Ayres
Game Biologist 11

Submitted By:

Steven Machida
Survey-Inventory Coordinator

Reviewed by:

Jim Dau
Game Biologist III

Table 1. Sex composition and method of take reported for lynx sealed in Unit 23, 1977-94.

Species	Total harvest	Percent 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	14	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
1991-92	1	--	0	1	0	0
1992-93	0	0	0	0	0	0
1993-94	5	20	0	5	0	0

Table 2 Sex composition and method of take reported for river otters sealed in Unit 23, 1977-94.

Species	Total harvest	Percent male	Method of Take			
			Shot	Trapped	Snared	Unknown
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
1986-87	12	--	0	12	0	0
1987-88	24	--	1	12	0	0
1988-89	7	--		0	7	0
1989-90	16	50	1	4	0	11
1990-91	11	--		1	6	4
1991-92	3	100	1	2	0	0
1992-93	2	100	2	0	0	0
1993-94	1	--		0	0	1

Table 3 Sex composition and method of take reported for wolverine sealed in Unit 23, 1977-94.

Species	Total harvest	Percent male	Method of Take			
			Shot	Trapped	Snared	Unknown
Wolverine						
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
1991-92	37	68	14	23	0	0
1992-93	36	69	16	20	0	0
1993-94	19	58	14	4	0	1

LOCATION

Game Management Unit: 24 (26,055 mi^2)

Geographic 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 enough 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

- Protect, maintain, and enhance the furbearer populations and their habitats in concert with other components of the ecosystem
- Provide for continued use of furbearers by local Alaskan residents who have customarily and traditionally used the populations
- Provide an opportunity to view and photograph furbearers
- 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 levels sufficient to provide people with sustained consumptive and nonconsumptive uses.

METHODS

We monitored harvests through sealing records, fur export reports, fur acquisition reports, and personal interviews. Trappers were interviewed about furbearer abundance. Furbearer carcasses were collected and analyzed by Gates of the Arctic National Park and Preserve staff during the report period (Swanson 1994). Incidental data were gathered during surveys of other species. Small mammals were monitored by Kanuti National Wildlife Refuge staff setting out grids with pitfall and snap traps.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size

Marten and red fox populations were moderately high and stable in the unit based on trapper reports. Trappers report moderate marten numbers in the central portion of the unit. Wolverine abundance was moderate and stable. Beavers and river otters were increasing in the southern portion of the unit and were high and increasing in the northern portions. Muskrats were still on a long-term decline. Large areas of former habitat have been lost because of natural succession. This decline in the muskrat population may be because of habitat loss. Lynx increased and were at the peak of their cycle during winter 1991–1992.

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 radiotagging studies on furbearers have been conducted in Unit 24. Trappers in the Wiseman area report that lynx moved in from the eastern portions of Unit 25 after population peaks in Unit 25.

Trapping Conditions and Prey Species

The weather was mild for most of the trapping seasons. The winter of 1992–1993 produced record snowfall at Bettles and severely limited trappers in all areas of the unit. This limitation is reflected in lower catches of all species (Tables 1 and 10). The snow covered up sets and caused rivers and streams to overflow.

Based on the snap-trap collections by Kanuti National Wildlife Refuge staff, from late summer 1991 to 1994, the small mammal prey populations in the southeastern part of the unit were low to moderate. Hare populations built up to a peak in 1991–1992 and then declined, except in a few isolated willow communities along major rivers. The grouse and ptarmigan densities were moderate in the unit.

Mortality

Harvest

Season and Bag Limit.

Beaver	1 Nov–15 Apr	No limit
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
Lynx	1 Nov–28 Feb	No limit

River otter	1 Nov–15 Apr	No limit
Wolverine	1 Nov–31 Mar	No limit

Board of Game Actions and Emergency Orders. In 1992 the Board of Game changed the bag limit for beaver from 50 per year to no limit. During the past 10 years, trapping seasons and bag limits remained the same for marten, coyote, lynx, fox, mink, muskrat, otter, and wolverine.

Trapper Harvest. Beaver harvest is down (Tables 1 and 2) even though there is no bag limit. Prices 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 3 or 4 times higher. The harvest from this area was down 50% from the previous year and comprised primarily adults. Low harvest of kits (Table 2) 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 3).

Harvest data indicated that lynx reached the high point in their 10-year cycle during 1991, yet lynx harvests did not dramatically decline after 1991 (Table 1). In contrast, percent kittens in the harvest (Table 4) were moderate to high from 1989 through 1991 (12% to 24%) but declined to low levels in regulatory years 1992 and 1993 (1% and 5%, respectively). Failure of the lynx harvest to drop sharply following the decline in the percent kittens could be a function of increased lynx movements caused by the decline in hare numbers (Poole 1994). Increased movement can increase vulnerability to trapping, and in eastern Unit 24 may result in significant immigration of lynx from Unit 25. Despite the relatively stable harvest rates, lynx densities are probably declining because of low kitten production and/or survival.

Trapping pressure for lynx in Unit 24 is relatively light. During the period 1989 through 1993, 22 to 43 trappers reported catching lynx in Unit 24 (67,482 km^2). The harvest density was 1.6 to 2.3 lynx/1000 km^2. Although a tracking harvest strategy (that dictates reduced seasons during the low phase of the lynx cycle) has been adopted for intensively trapped areas of Interior Alaska, that strategy is not necessary in Unit 24 where low harvests and low trapper density do not have the potential to significantly affect lynx population cycles. No trends are evident in harvest chronology (Table 5).

Otters are abundant. However, the harvest in the early 1990s was very low, compared to normal years (Table 1). Trapping effort was minimal (Table 6). Otters are occasionally taken in late season beaver sets (Table 7).

Reported wolverine harvest varied during the period (Table 1). Actual harvest may be higher by 10 per year because furs used for subsistence purposes are seldom sealed (Table 8). No harvest chronology pattern is readily discernible (Table 9). Swanson (1994) found a 2:1 male:female sex ratio in 44 wolverine carcasses she examined from 1988 through 1993. I have observed tracks often enough to consider the unit population to be at a moderate density.

Fox populations remained high, but low prices elicited little trapper interest (Table 10). Marten were in moderate numbers in the southern and central parts of the unit. Catches of marten were lower than previous seasons (Table 10) because heavy snow hampered trapper effort. Swanson (1994) reported 2.7 juveniles:adult female for 689 animals from 1988 through 1993 and a male:female ratio of 1.6:1 for 1000 animals during the same period.

CONCLUSIONS AND RECOMMENDATIONS

Furbearer populations were in good condition throughout the unit. The current known distribution of trappers indicates trapping pressure is light and compatible with furbearer population levels. The harvest of furbearers is currently well below sustainable harvest levels, and the 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.

LITERATURE CITED

Poole KG. 1994. Characteristics of an unharvested lynx population during a snowshoe hare decline. *J Wildl Manage* 58(4):608–618.

Swanson SA. 1994. Furbearer harvest study, Gates of the Arctic National Park and Preserve, Alaska. Natl Park Serv, Fairbanks, Alas. Tech Rep NPS/ARRNR/NRTR-94?21. 38pp.

Prepared by:

Timothy O. Osborne
Wildlife Biologist III

Submitted by:

Kenton P. Taylor
Management Coordinator

Reviewed by:

Mark E. McNay
Wildlife Biologist III

Table 1 Unit 24 estimated harvest of sealed furbearer species, regulatory years 1989–1993

Species	1989	1990	1991	1992	1993
Beaver	281	380	1209	78	320
Lynx	112	126	158	111	123
Otter	7	5	1	6	19
Wolverine	22	14	30	8	29

Table 2 Unit 24 beaver harvest, regulatory years 1989–1993

Regulatory	Reported harvest			Method of take			Successful	
year	Kits[a]	Adults	Unk	Trap/snare	Shot	Unk	Total	Trappers
1989	6	275	0	281	0	0	281	42
1990	39	341	0	379	0	1	380	20
1991	8	112	0	120	0	0	120	16
1992	13	65	0	76	0	2	78	10
1993	22	298	0	320	0	0	320	30

[a] Beavers ≤ 52".

Table 3 Unit 24 beaver harvest chronology by time period, regulatory years 1989–1993

Regulatory	Harvest periods					
year	Nov	Dec	Jan	Feb	Mar	Apr
1989	0	15	23	3	125	31
1990	10	4	31	153	177	5
1991	0	4	5	15	80	2
1992	8	12	0	20	31	0
1993	2	7	56	88	167	0

Table 4 Unit 24 lynx harvest, regulatory years 1989–1993

Regulatory year	Reported harvest: Kittens[a]	Adults	Unk	Method of take: Trap/snare	Shot	Unk	Total	Successful trappers
1989	16	112	0	88	0	0	112	36
1990	24	102	0	100	10	16	126	27
1991	12	146	0	152	3	3	158	43
1992	1	110	0	111	0	0	111	22
1993	6	117	0	123	0	0	123	35

[a] Lynx ≤ 34" in length.

Table 5 Unit 24 lynx harvest chronology by time period, regulatory years 1989–1993

Regulatory year	Harvest periods: Nov	Dec	Jan	Feb	Mar[a]
1989	7	32	30	38	0
1990	4	30	26	66	0
1991	22	35	48	52	1
1992	28	32	24	25	0
1993	12	28	45	37	1

[a] Season not open in March.

Table 6 Unit 24 otter harvest, regulatory years 1989–1993

Regulatory year	Reported harvest: M	F	Unk	Method of take: Trap/snare	Shot	Unk	Total	Successful trappers
1989	1	0	6	4	0	3	7	4
1990	2	2	1	5	0	0	5	2
1991	1	0	0	1	0	0	1	1
1992	0	3	3	6	0	0	6	4
1993	2	2	15	5	0	14	19	9

Table 7 Unit 24 otter harvest chronology by time period, regulatory years 1989–1993

Regulatory year	Harvest periods Nov	Dec	Jan	Feb	Mar	Apr
1989	1	1	2	0	0	0
1990	1	0	0	4	0	2
1991	0	0	0	1	0	0
1992	0	1	0	2	3	0
1993	8	0	1	8	2	0

Table 8 Unit 24 wolverine harvest, regulatory years 1989–1993

Regulatory	Reported harvest			Estimated harvest		Method of take				Successful
year	M	F	Unk	Unreported	Illegal	Trap/snare	Shot	Unk	Total	trappers/hunters
1989	14	5	3	10	0	21	0	1	32	12
1990	8	2	4	10	0	12	1	1	24	9
1991	21	8	1	10	0	29	1	0	30	16
1992	3	5	0	10	0	7	1	0	8	5
1993	16	9	4	10	0	27	0	2	29	15

Table 9 Unit 24 wolverine harvest chronology by time period, regulatory years 1989–1993

Regulatory year	Harvest periods Nov	Dec	Jan	Feb	Mar
1989	0	7	6	9	0
1990	2	6	2	3	1
1991	7	7	6	9	1
1992	3	1	0	2	1
1993	2	3	7	10	6

Table 10 Unit 24 estimated harvest[a] of unsealed furbearer species, regulatory years 1989–1993

Species	1989	1990	1991	1992	1993
Coyote	0	0	0	0	0
Marten	1489	756	945	252	609
Mink	6	9	14	6	3
Muskrat	0	0	0	2	1
Red Fox	18	9	23	2	6

[a] Estimates derived from Fur Acquisition Reports and Fur Export Permits.

LOCATION

Game Management Unit: 25A, 25B, 25D, 26B, and 26C (75,000 mi^2)

Geographic 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, river 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

1. Protect, maintain, and enhance furbearer populations in concert with other components of the ecosystem;

2. Provide sustained opportunities for commercial use of furbearers;

3. Provide people with sustained opportunities to participate in hunting, subsistence use, viewing, and photographing furbearers.

Management Objectives

1 Maintain accurate annual harvest records and indices of population trends based on sealing documents and trapper questionnaires.

   a Seal furs as they are harvested and presented for sealing and analyze harvest patterns.

   b Conduct trapper questionnaires and interviews to determine the status of various furbearer populations.

2 Develop more specific population objectives for furbearers by 1995.

METHODS

We analyzed harvest data from sealing certificates, fur acquisition reports, and fur export reports and evaluated reports from trappers. 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 Trend

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 (FWS-YFNWR, unpubl data). Beaver populations have been generally stable or slightly increasing since 1982. The possible limiting effects of beaver dams on migratory whitefish populations have become a concern among some local residents. 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. Lynx numbers and harvest declined substantially in 1992-1993 but increased somewhat in 1993-1994. Trappers report that mink, muskrats, weasels, and wolverines were moderately abundant. High water during spring 1992 reestablished water levels in a number of sloughs and lakes on the Yukon Flats. Many trappers report a subsequent increase in muskrat and mink populations. River otters and coyotes were generally scarce.

In Units 26B and 26C, red and arctic foxes continue to be common and wolverines are still at low density throughout the area.

Mortality

Harvest

Hunting Seasons and Bag Limits.

Unit 25	Bag Limit	Resident Season	Nonresident Season
Coyote	2 coyotes	1 Sep-30 Apr	Same
Arctic Fox	Closed		
Red Fox	2 foxes	1 Sep-15 Mar	Same
Lynx	2 lynx	1 Nov-28 Feb	Same
Wolverine	1 wolverine	1 Sep-31 Mar	Same
Unit 26			
Coyote	2 coyotes	1 Sep-30 Apr	Same
Arctic Fox	2 foxes	1 Sep-30 Apr	Same
Red Fox	2 foxes	1 Sep-15 Mar	Same
Lynx	2 lynx	1 Nov-28 Feb	Same
Wolverine	1 wolverine	1 Sep-31 Mar	Same

Trapping Seasons and Bag Limits.

Unit 25	Bag Limit	Resident Season
Beaver	50 beaver	1 Nov-15 Apr
Coyote	No limit	1 Nov-31 Mar
Arctic Fox	Closed	
Red Fox	No limit	1 Nov-28 Feb
Lynx	No limit	1 Nov-28 Feb
Marten	No limit	1 Nov-28 Feb
Mink & Weasel	No limit	1 Nov-28 Feb
Muskrat	No limit	1 Nov-10 Jun
River Otter	No limit	1 Nov-15 Apr
Wolverine	No limit	1 Nov-15 Apr

Unit 26		
Beaver	Closed	
Coyote	No limit	1 Nov-15 Apr
Arctic Fox	No limit	1 Nov-15 Apr
Red Fox	No limit	1 Nov-15 Apr
Lynx	No limit	1 Nov-15 Apr
Marten	No limit	1 Nov-15 Apr
Mink & Weasel	No limit	1 Nov-31 Jan
Muskrat	No limit	1 Nov-10 Jun
River Otter	No limit	1 Nov-15 Apr
Wolverine	No limit	1 Nov-15 Apr

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 Units 25A, 25B, and 25D. Before 1985 the season dates were from 1 November to 15 March. For the 1985-1986 season, this was reduced to 1 November-28 February. The following season 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 1988-1989. This season remained in place through 1993-1994. In contrast to more populated areas, trapping pressure is relatively light, especially following recent declines in fur prices. A "tracking" harvest strategy does not appear to be necessary in this area under present conditions.

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 and consequent reduction in trapper effort.

Lynx - The number of lynx harvested increased from about 500 annually in 1986-1987 and 1987-1988 to nearly 700 annually in 1988-1989 and 1989-1990. Harvest declined abruptly from 635 in 1991-1992 to 195 in 1992-1993 (Table 1). This harvest pattern reflects the increase, peak, and early part of the decline in the snowshoe hare cycle. In addition, flooding in spring 1992 virtually eliminated furbearer prey species in lowlands around Fort Yukon and resulted in low lynx populations near several important trapping areas.

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 mean proportion of kittens in the harvest declined from 25% in 1986 through 1990 to 7% in 1991 and 1992. In 1993-1994 the proportion of kittens in the harvest increased to 18% (Table 2). This observation agrees with trapper reports that indicate snowshoe hares began increasing in most areas near the end of 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). An increase in lynx numbers and harvest is anticipated during the late 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 are in eastern Unit 25D and in Unit 25B.

River Otter and Wolverine - Otter harvest continues to be low. Harvests declined from 1 to 13 in regulatory year 1986 (Table 1), probably as a result of lower fur prices and less trapping activity for beaver.

Most of the wolverine harvest comes from Unit 25 (Table 1). Harvest has been relatively stable, near 50, during the past 5 years. The only area where wolverine harvest has increased is in Unit 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 3). Fur prices declined to low levels for most species during this period. 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. A flood in 1992 restored water levels in some areas, allowing increase in muskrat and mink populations.

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 5 to 8 (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.

Harvest Chronology. The harvest of beavers in Unit 25 is greatest during February and March, when 50% to 70% of the harvest occurs (Table 4). 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 Units 26B and 26C is distributed throughout winter (Table 5).

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 6). In Unit 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 7).

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 indicate 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.

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 among local trappers and state and federal biologists. This program would include increased personal contact with trappers, extended 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. Continued involvement in trapper education programs is also important.

LITERATURE CITED

Golden HM. 1987. Survey of furbearer populations on the Yukon Flats National Wildlife Refuge. Final Rep 14-16-007-84-2416. Alaska Dep Fish and Game. US Fish and Wildl Serv, Yukon Flats Natl Wildl Refuge, Fairbanks, Alas. 86pp.

McLean LS. 1986. Beaver food cache survey, Yukon Flats National Wildlife Refuge, Alaska, 1985. Proj Rep 86–5. US Fish and Wildl Serv, Yukon Flats Natl Wildl Refuge, Fairbanks, Alas. 8pp.

Stephenson RO and PF 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.

Prepared by:

Robert O. Stephenson
Wildlife Biologist III

Submitted by:

Kenton P. Taylor
Management Coordinator

Reviewed by:

Mark E. McNay
Wildlife Biologist III

Table 1 Units 25A, 25B, 25D, 26B, and 26C furbearer harvest, regulatory years 1986-1993

Species/Year	Unit 25A	25B	25D	26B	26C	Unk	Total
Beaver							
1986	24	171	333	0	0	0	528
1987	23	136	287	0	0	0	446
1988	9	175	129	0	0	0	313
1989	5	51	67	0	0	0	123
1990	7	26	128	0	0	0	161
1991	6	38	71	0	0	0	115
1992	7	15	12	0	0	0	34
1993	8	3	68	0	0	0	79
Lynx							
1986	77	124	282	0	0	0	484
1987	117	127	278	0	0	0	522
1988	59	298	329	0	0	0	686
1989	41	430	214	0	0	0	685
1990	25	232	208	0	4	0	465
1991	34	267	334	0	0	0	635
1992	13	51	128	3	0	0	195
1993	8	89	262	4	0	0	363
River Otter							
1986	3	1	6	0	0	3	13
1987	3	0	2	0	0	0	5
1988	0	2	2	0	0	0	4
1989	1	0	0	0	1	0	3
1990	0	1	0	0	0	0	1
1991	0	1	5	0	0	0	6
1992	0	1	4	0	0	0	5
1993	0	0	1	0	0	0	1
Wolverine							
1986	16	19	19	0	0	0	54
1987	13	11	14	1	1	0	40
1988	13	10	21	4	1	0	49
1989	17	14	21	4	0	0	56
1990	15	14	18	5	0	0	52
1991	25	19	7	2	1	0	54
1992	16	17	6	3	1	0	43
1993	17	14	13	11	1	0	56

Table 2 Units 25A, 25B, 25D, 26B, and 26C beaver, lynx, otter, and wolverine harvest, regulatory years 1986-1993

Regulatory year	Reported harvest						Method of take				Total harvest	Successful trappers and hunters
	M	F	Unk	Juv[a]	Adults	Unk	Trap/snare	Shot	(L&S)[b]	Unk		
Units 25A, 25B, and 25D:												
Beaver												
1986			528	79	409	40	520	0	0	8	528	unk
1987			446	66	380	0	444	0	0	2	446	58
1988			313	67	246	0	313	0	0	0	313	29
1989			123	18	104	1	121	1	0	1	123	29
1990			161	34	122	5	159	2	0	0	161	26
1991			115	19	96	0	111	4	0	0	115	18
1992			34	7	26	1	34	0	0	0	34	8
1993			79	11	59	9	79	0	0	0	79	15
Lynx												
1986			484	100	380	4	481	1	0	2	484	unk
1987			522	110	412	0	510	2	0	10	522	119
1988			686	128	569	0	673	0	4	9	686	126
1989			685	136	549	0	648	5	0	32	685	90
1990			465	82	381	2	463	1	0	1	465	72
1991			635	52	582	1	589	0	0	45	635	84
1992			192	7	185	0	190	2	0	0	192	55
1993			363	53	304	6	350	3	0	10	363	85
Otter												
1986	unk	unk	unk	0	0	13	12	0	0	1	13	unk
1987	unk	unk	unk	0	0	5	5	0	0	0	5	5
1988	1	1	2	0	0	4	4	0	0	0	4	4
1989	1	0	2	0	0	2	2	0	0	1	3	3
1990	1	0	0	0	0	1	1	0	0	0	1	1
1991	0	3	0	0	0	3	6	0	0	0	6	4
1992	4	1	0	0	0	5	5	0	0	0	5	4
1993	1	0	0	0	0	1	1	0	0	0	1	1

Table 2 Continued

Regulatory year	Reported harvest						Method of take				Total harvest	Successful trappers and hunters
	M	F	Unk	Juv[a]	Adults	Unk	Trap/snare	Shot	(L&S)[b]	Unk		
Wolverine												
1986	unk	unk	unk	0	0	54	48	0	1	5	54	unk
1987	unk	unk	unk	0	0	40	36	0	4	0	40	29
1988	31	12	1	0	0	44	42	0	1	1	44	30
1989	29	19	4	0	0	52	52	0	0	0	52	31
1990	27	13	7	0	0	54	45	2	0	0	47	28
1991	32	18	1	0	0	51	46	5	0	0	51	27
1992	28	11	0	0	0	39	36	3	0	0	39	15
1993	22	9	11	0	0	42	40	2	0	1	44	10
Units 26B and 26C:												
Lynx												
1990			4	0	0	4	4	0	0	0	4	1
1991			0	0	0	0	0	0	0	0	0	0
1992			3	0	3	0	3	0	0	0	3	2
1993			4	0	4	0	4	0	0	0	4	1
Wolverine												
1988	2	2	1	0	0	5	2	1	1	1	5	5
1989	3	1	0	0	0	4	0	4	0	0	4	4
1990	3	2	0	0	0	5	0	5	0	0	5	4
1991	2	0	1	0	0	3	2	1	0	0	3	3
1992	3	1	0	0	0	4	2	2	0	0	4	4
1993	9	3	0	0	0	12	7	4	0	1	12	10

[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 Unit 25 estimated harvest[a] of unsealed furbearer species, regulatory years 1986-1993

Species	1986	1987	1988	1989	1990	1991	1992	1993
Coyote	0	0	0	0	0	1	1	2
Arctic Fox	0	2	0	0	0	1	2	5
Red Fox	464	286	198	47	171	187	41	115
Marten	5707	5086	3476	2357	2070	2769	883	1234
Mink	211	80	72	32	42	46	17	34
Muskrat	2360	1141	657	0	23	299	167	92
Weasel	60	55	87	9	6	17	5	11
Squirrel	6	31	53	0	25	54	24	4

[a] Estimates derived from Fur Acquisition Reports and Fur Export Permits.

Table 4 Units 25A, 25B, and 25D beaver, lynx, otter, and wolverine harvest chronology by time period, regulatory years 1986-1993

Regulatory year	Harvest periods						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Beaver							
1986	0	44	37	51	84	286	13
1987	0	32	23	50	55	234	52
1988	0	33	27	6	60	165	16
1989	0	16	12	12	22	52	0
1990	0	4	21	52	45	38	1
1991	0	13	10	6	18	63	5
1992	0	6	5	11	0	10	2
1993	0	0	12	5	8	35	8
Lynx							
1986	0	1	273	196	2	1	0
1987	0	1	267	247	2	2	0
1988	0	77	268	137	184	0	0
1989	0	55	328	184	102	1	0
1990	0	20	200	102	93	28	0
1991	0	56	260	213	86	2	0
1992	0	27	83	30	29	2	0
1993	0	34	162	111	55	1	0
River Otter							
1986	0	0	6	3	1	1	0
1987	0	1	1	3	0	0	0
1988	0	0	3	0	1	0	0
1989	0	1	1	0	0	0	0
1990	0	0	0	1	0	0	0
1991	0	1	2	2	1	0	0
1992	0	0	4	0	1	0	0
1993	0	1	0	0	0	0	0

Table 4 Continued.

Regulatory year	Harvest periods						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Wolverine							
1986	0	4	16	20	5	9	0
1987	0	2	14	15	5	3	1
1988	0	5	14	6	15	4	0
1989	0	6	18	9	16	3	0
1990	1	11	13	5	16	0	0
1991	0	9	16	10	13	3	0
1992	0	4	14	3	9	9	0
1993	1	5	10	10	11	2	0

Table 5 Units 26B and 26C lynx and wolverine harvest chronology by time period, regulatory years 1986-1993

Regulatory year	Harvest periods						
	Sep/Oct	Nov	Dec	Jan	Feb	Mar	Apr
Lynx							
1990	0	0	0	0	4	0	0
1991	0	0	0	0	0	0	0
1992	0	0	0	2	1	0	0
1993	0	0	0	0	4	0	0
Wolverine							
1986	unk	unk	unk	unk	unk	unk	unk
1987	unk	unk	unk	unk	unk	unk	unk
1988	0	0	1	2	1	1	0
1989	1	1	0	0	1	0	1
1990	3	2	1	2	0	0	0
1991	0	2	1	0	0	0	0
1992	1	0	0	0	0	2	1
1993	0	0	1	2	3	4	1

Table 6 Units 25A, 25B, and 25D beaver, lynx, otter, and wolverine harvest percent by transport method, regulatory years 1986-1993

Regulatory year	Percent of harvest							
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Beaver								
1986	1	8	0	0	92	0	0	0
1987	6	4	0	0	90	0	0	0
1988	0	8	0	0	92	0	0	0
1989	0	2	0	0	98	0	0	0
1990	21	3	0	0	76	0	1	0
1991	0	0	0	0	98	0	0	2
1992	0	0	0	0	94	0	0	6
1993	0	0	0	0	100	0	0	0
Lynx								
1986	3	8	0	0	89	0	0	0
1987	3	10	0	0	86	0	0	0
1988	13	7	1	0	80	0	0	0
1989	2	8	0	0	88	0	1	0
1990	2	7	0	0	91	0	0	0
1991	1	9	3	0	82	0	0	5
1992	3	4	0	0	88	0	1	4
1993	1	5	0	0	92	0	1	1
River Otter								
1986	0	9	0	0	91	0	0	0
1987	0	20	0	0	80	0	0	0
1988	0	25	0	0	75	0	0	0
1989	0	0	0	0	100	0	0	0
1990	0	100	0	0	0	0	0	0
1991	0	0	0	0	100	0	0	0
1992	0	0	0	0	100	0	0	0
1993	0	0	0	0	100	0	0	0

Table 6 Continued

Regulatory year	Percent of harvest							
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Wolverine								
1986	12	16	0	0	71	0	0	0
1987	10	18	0	0	69	0	3	0
1988	8	10	0	0	82	0	0	0
1989	2	17	0	0	81	0	0	0
1990	2	20	0	0	77	0	0	0
1991	2	14	0	0	80	0	0	4
1992	5	10	0	0	64	0	0	21
1993	7	7	7	0	77	0	0	2

Table 7 Units 26B and 26C lynx and wolverine harvest percent by transport method, regulatory years 1986-1993

Regulatory year	Percent of harvest							
	Airplane	Dogsled Skis Snowshoes	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown
Lynx								
1990	100	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	2	1
1993	0	0	0	0	0	0	4	0
Wolverine								
1986	unk	unk	unk	unk	unk	unk	unk	unk
1987	unk	unk	unk	unk	unk	unk	unk	unk
1988	0	0	0	0	25	0	75	0
1989	0	0	0	0	0	0	0	0
1990	25	25	0	0	0	0	50	0
1991	0	1	0	0	1	0	1	0
1992	1	0	0	0	1	0	0	1
1993	0	0	0	0	5	0	6	0

LOCATION

Game Management Unit: 26A (56,000 mi^2)

Geographic Description: Western North Slope

BACKGROUND

Red fox, arctic fox, and wolverine are the only furbearer species commonly found in Unit 26A. Because of limited habitat, boreal forest species such as lynx, marten, and coyote are rare and found only in the southern portion of the unit. Furbearers are harvested on the North Slope primarily for the domestic manufacture of garments. In addition, some furs are used to produce handicrafts and some are sold on the commercial fur market.

Rabid furbearers, particularly arctic foxes, continue to be a problem around human settlements. We work with the North Slope Borough to educate people on dealing with rabid animals and having their pets immunized. Arctic foxes that appear to be rabid are killed and tested for rabies when they are reported near villages.

MANAGEMENT DIRECTION

- Maintain productive populations and allow harvest opportunities within sustained yield limits
- Minimize adverse interactions between furbearers and the public

METHODS

We did not conduct specific furbearer population surveys; however, we did record incidental furbearer observations during surveys for other species. We summarized harvest data from sealing certificate records.

RESULTS AND DISCUSSION

Population Status and Trend

No quantitative population information is available for lynx, red foxes, arctic foxes, or coyotes in Unit 26A. Lynx were found at low density only in the southern portion of the unit. Red foxes were fairly abundant in interior regions of Unit 26A. Arctic foxes were abundant along the unit's coastal plain, and coyotes were occasionally seen along the southern border of Unit 26A.

The population status of wolverines in Unit 26A is not known with certainty. Magoun (1984) estimated a fall population size of 821 wolverines for Unit 26A, assuming that an overall density of 1 wolverine/54 mi^2 was valid for the entire unit. While conducting moose composition surveys in Unit 26A, we saw 11 wolverines during 35 hours of flight in 1984, and in 1991we saw 12 wolverines during 39 hours of flying.

Mortality

Harvest

Hunting Seasons and Bag Limits

Unit 26A		
Lynx	Nov. 1-Apr. 15	2 lynx
Red Fox	Sep. 1-Mar 15	2 foxes
Arctic Fox	Sep. 1-Apr. 30	2 foxes
Coyote	Sep. 1-Apr. 30	2 coyotes
Wolverine	Sep. 1-Mar 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

Human-Induced Mortality

Lynx. No lynx were sealed in Unit 26A during the reporting period. Because lynx only inhabit the southern portion of the unit and most residents live along the coast, only residents from Anaktuvuk Pass have opportunity to harvest lynx.

Fox. Local hunters and trappers harvested arctic and red foxes. Because there is no sealing requirement for these species, harvest information was not collected. Low fur prices resulted in relatively few foxes being trapped.

Coyotes. No coyote harvests were reported during the reporting period. There is no sealing requirement for coyotes, so harvest information was not collected. Because coyotes only inhabit the southern portion of the unit, only residents from Anaktuvuk Pass have opportunity to harvest them.

Wolverine. Two wolverines (1 male and 1 female) were sealed during the 1991–92 season. Both were ground shot. A snowmachine was used for transportation for one animal, and an airplane was used for the other. One was taken in September and 1 in March. One hunter was a resident of the unit, and 1 was a nonresident.

Eleven wolverines (8 males, 2 females, and 1 unknown) were sealed during the 1992–93 season. Eight were ground shot, 2 were trapped, and 1 was unknown. Snowmachines were used for transportation for 7 animals, airplanes for 3, and 1 was unknown. Three were taken in September, 1 in November, 6 in March, and 1 was unknown. Nine hunters were residents of the unit, 1 was a nonlocal resident, and 1 was a nonresident.

Fourteen wolverines (8 males, 3 females, and 3 unknown) were sealed during the 1993–94 season. Twelve were ground shot, 1 was trapped, and 1 was unknown. Snowmachines were used for transportation for 13 animals and 1 was unknown. Four were taken in November, 5 in March, 4 in April, and 1 was unknown. Eleven hunters were residents of the unit, 2 were nonlocal residents, and 1 was a nonresident.

We believe several wolverines were harvested and not reported. Magoun (1984) estimated that in some years less than 10% of the wolverines harvested in Unit 26A were sealed, and rarely were more than 50% sealed.

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 of the 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 their hides sealed only if they are selling them to fur buyers or sending them out for commercial tanning.

To collect more accurate harvest information on North Slope animals, we are working with the North Slope Borough to develop and implement a village harvest-monitoring program. Village residents have been hired to interview hunters and document harvest for several species of animals.

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 Unit 26A.

In order to minimize adverse interactions between furbearers and the public, we work with the North Slope Borough Public Health Department to educate people on dealing with rabid animals and having their pets immunized. We also destroy foxes that appear rabid and collect specimens so they can be tested for rabies.

Magoun (1984) estimated that Unit 26A could sustain an annual harvest of 300 wolverines if less than 90 females were harvested and the reproductive rate observed at the Driftwood study area was applicable to the entire unit. If Magoun's estimate of population size and productivity are still valid, 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. Job7.0. Juneau. 100pp.

———. 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. Job7.0. Juneau. 94pp.

———. 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.

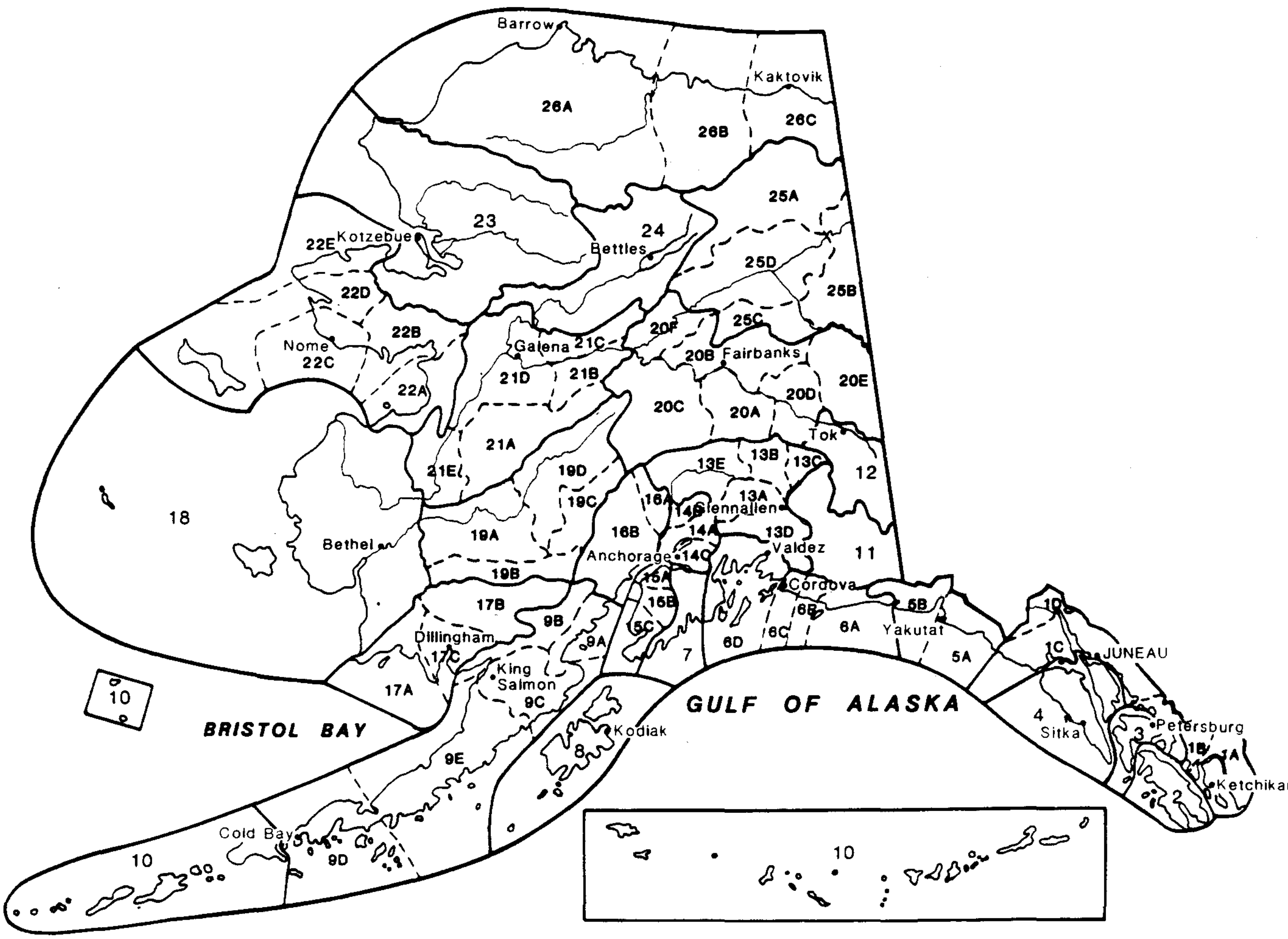
Prepared By:

Geoff Carroll
Wildlife Biologist III

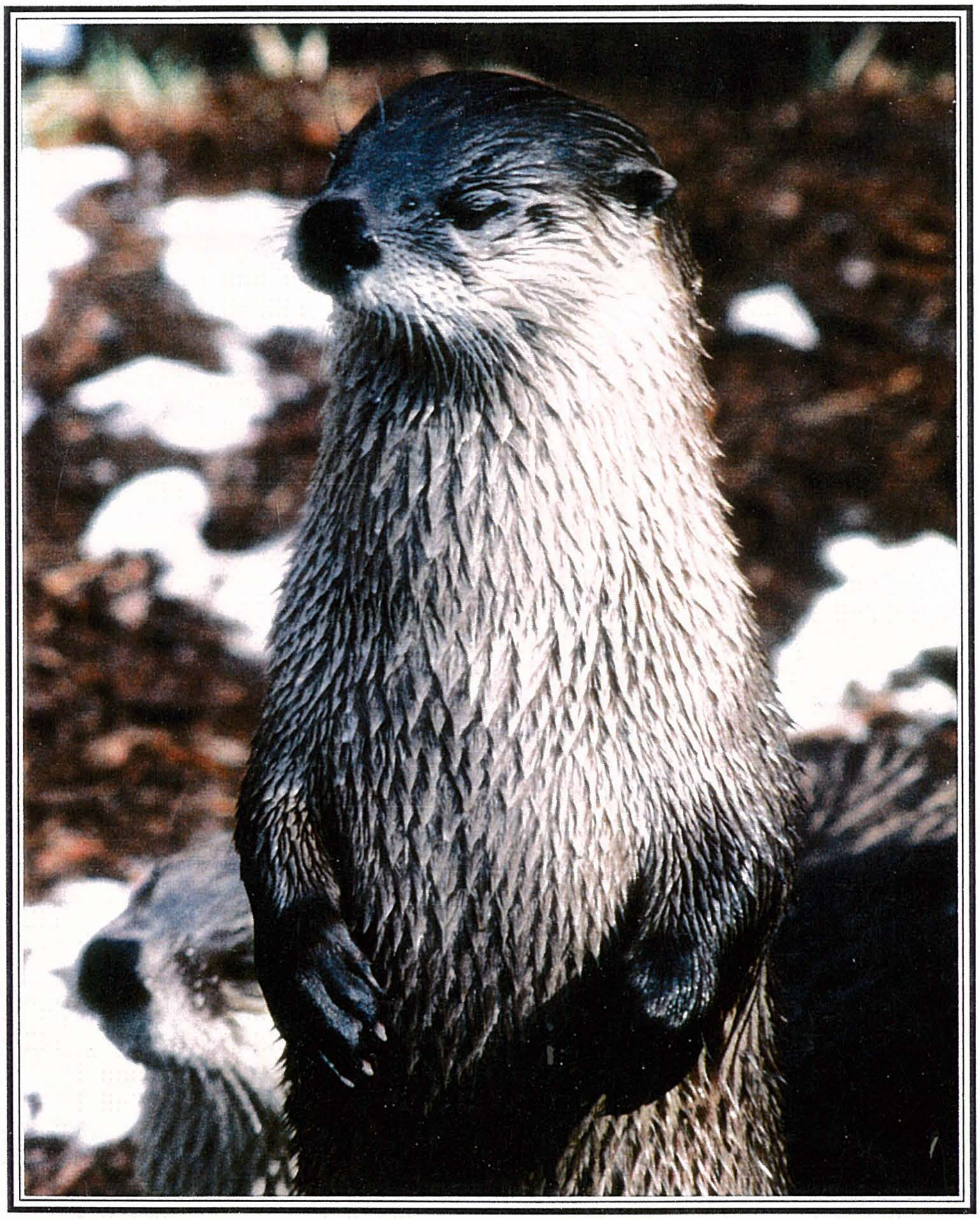
Submitted By:

Steve Machida
Survey-Inventory Coordinator

Alaska's Game Management Units



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 allots funds back to states through a formula based on each state's geographic area and number of paid hunting license holders. Alaska receives a maximum 5% of revenues collected each year. The Alaska Department of Fish and Game uses federal aid funds to help restore, conserve, and manage wild birds and mammals to benefit the public. These funds are also used to educate hunters to develop the skills, knowledge, and attitudes for responsible hunting. Seventy-five percent of the funds for this report are from Federal Aid.



Larsen