

MINNESOTA CANADA LYNX STATUS REPORT, 1977

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Introduction

In 1977, the Minnesota Department of Natural Resources (DNR) was asked by the United States Department of Interior to prepare a status report on the Canada lynx. Available data on the distribution, harvest, population, status, and management of Canada lynx was reviewed and it was concluded that this species was neither threatened nor endangered.

The Canada lynx occurs across an extensive portion of Alaska, the Northwest Territories, Canada, and in some northern portions of the continental United States. It is a low-density, wilderness furbearer which has sustained annual fur harvests across this broad region for more than 200 years.

Consideration of the status of the Canada lynx in Minnesota requires the review of several items: (1) harvest and mortality statistics, (2) consideration of contiguous populations in Canada, (3) cyclic fluctuations related to snowshoe hare cycles, and (4) current management programs.

There exists a low peripheral population of resident Canada lynx in northern Minnesota along the Canadian border. This habitat in Minnesota is extremely inaccessible and few resident lynx are apparently taken within this range. Most of this land is in public ownership (W.B. Nye, unpubl.).

During cyclic highs, lynx respond to high snowshoe hare populations and produce litters averaging five kittens. This high production is accompanied by a general dispersal of animals from northern Minnesota and neighboring Canada into marginal and unsuitable habitat of the northeastern half of Minnesota. These displaced animals experience high mortality through natural

causes, accidents, hunting, and trapping. However, this mortality does not affect the survival of lynx populations in their main range and is therefore ecologically acceptable. Over 500 lynx have been taken in Minnesota in 1952, 1962, 1963, and 1973. The next predicted high is 1982. The current low harvest figures are considered to be a short-term cyclic phenomenon and not an indication that lynx are experiencing survival problems (Nellis et al. 1972, Brand et al. 1976, L.D. Mech, unpubl.).

The designation of the Canada lynx as a game animal in 1975 by the Minnesota legislature and the establishment of a 2-month season with a composite bag limit of five bobcats and lynx per hunter/trapper is a significant improvement in managing these important furbearers and should insure the continued long-term welfare of the species.

Canada Lynx Harvest in Minnesota

The number of Canada lynx in Minnesota fluctuates greatly because of the cyclic trends in their populations. These population levels are reflected in the annual trapper harvest. The harvest by trappers from 1930 to 1976 has been determined by mail surveys and is shown in Table 1. A total of 5,494 Canada lynx are estimated to have been trapped in Minnesota in the last 47 years for an average of 117 per year (SD=117.5). The 10-year lynx cycle was roughly indicated by high numbers which occurred in 1938-1940, 1952, 1962, and 1972-1973. Low levels were evident in 1933, 1942-1950, 1957-1961, 1965-1971, and from 1975 to the present (unpubl. rep., Minn. DNR 1967, 1974, 1980).

The highly variable harvest was broken down according to the number of years in which each harvest level occurred (Table 2). This along with Table 1 shows that harvests of 50 animals or fewer occurred in 18 different years (38% of all years) and fewer than 25 Canada lynx in Minnesota have been trapped in 10 years out of 47. The trapper harvest has been 100 or fewer in 30 of 47 years, and it was between 101 and 200 seven times. The harvest has exceeded 200 ten times.

Trapping harvest records only present a partial picture of Canada lynx mortality because some deaths are accounted for in incidental kills by big game and small game hunters, road kills, and hunting dogs. A better idea of mortality from all causes was obtained from the bounty records of 1952 to 1964 (Henderson, unpubl. data). These records combined bobcat and lynx claims, however. The data can still be used if one is willing to assume that the ratio of lynx to bobcats in the bounty kill is the same as the ratio of lynx to bobcats in the trapping take. Using this assumption, it is possible to derive the annual percentage of lynx among all cats trapped from 1952

to 1964 and apply those annual percentage rates to the annual total of cats bountied (Table 3, Fig. 1).

The annual harvest by trappers is included in Figure 1 and clearly illustrates how the mortality rate by means other than trapping is much greater during irruptive periods than when the Canada lynx are at the low points of their cycles. By selecting 200 as an arbitrary harvest level to separate high harvest levels from low harvest levels, it was estimated that trapping accounts for 81.4% of known lynx mortality during cyclic lows and 57.9% of known lynx mortality during cyclic highs. These rates prevailed during the period when lynx were unprotected at all times of the year. Current lynx mortality would be somewhat different because the lynx is now a game animal which can be hunted or trapped only from 1 December to 31 January and there is an aggregate bag limit of five lynx and bobcats. Proficient cat trappers would, therefore, be prevented from making large catches, and incidental kills by hunters and landowners during the closed season would also be reduced.

By applying the average trapper harvest rates of 57.9% and 81.4% to high and low harvests, respectively, it is possible to project long-term Canada lynx harvests in Minnesota and to develop expanded harvest statistics which account for all known mortality (Table 4, Fig. 2). The total Canada lynx harvest for the past 47 years was 8,342 animals. The harvest was analyzed by decade (Table 5), and showed that while the long-term harvest rate was 177 per year, the take has averaged 121 per year during the past decade. This was 32% below the long term average.

Composite Analysis of Canada Lynx Harvest for Minnesota, Manitoba, and Ontario

Analysis of the status of Canada lynx in Minnesota requires consideration of the fact that the lynx populations are on the southern periphery of more extensive lynx range in Manitoba and Ontario. A common fault of current endangered and threatened species considerations is that there is a tendency to apply them on the basis of political boundaries rather than for the entire range of a species. The range of the lynx in Minnesota was hypothesized by Dr. L. David Mech to include the area indicated in Figure 3. However, this limited range is only peripheral to the much larger range occupied by lynx in adjacent Manitoba and Ontario (Mech 1973).

Long-term harvest figures for Minnesota, Ontario, and Manitoba are given in Table 6. During the 47-year period from 1930 to 1976 a total take of 8,342 lynx was estimated for Minnesota (Minn. DNR unpubl. Rep. 1967, 1974, 1980). During the same period, 78,490 lynx were harvested in Ontario and, through 1975, 88,207 were taken in Manitoba (W.H. Koonz,

unpubl. rep.). Minnesota, then, only accounted for 4.8% of the total harvest of lynx in these three areas.

The long-term annual average lynx harvest for Minnesota is 177, but it is 121 for the past decade. This is a decline of 31.6%. However, the Ontario long term annual harvest is 1,670, and the average annual harvest for the past decade is 2,286. This is an increase of 36.9%. The Manitoba long-term annual harvest is 1,934, and the average for the past decade is 3,401. This is an increase of 79.9%. Most of the lynx trapped in Manitoba and Saskatchewan during the past decade were taken prior to 1972 when the average pelt price was less than \$40.00, so the increased harvest there is probably more a reflection of increased population levels than of increased fur prices and trapping effort (Henderson, unpubl. data, Koonz, unpubl. rep.).

The origins of lynx in Minnesota are variable because of the great vagility of this species. Lynx born in Manitoba and Saskatchewan wander southward into Minnesota during irruptions. Likewise, Minnesota-born lynx are known to move northward into Canada on some occasions. A lynx marked by Mech was found to have moved about 300 miles from northeastern Minnesota to Keeper Lake in western Ontario between 1974 and 1977 (Mech 1977).

Because of the small range occupied by lynx in Minnesota, it is felt that most lynx taken in the state are displaced individuals from Canada, primarily from Ontario. The displacement of these animals into marginal habitat which is outside the normal range of this species subjects them to high mortality which is characteristic of these irruptive periods. The harvesting of these surplus, displaced animals is felt to be an ecologically acceptable management strategy which in no way jeopardizes the survival of the species in its native range.

Canada Lynx and Snowshoe Hare Cyclic Relationships

Wallace Byron Grange wrote in 1949 in "The Way to Game Abundance" about the regularity of cyclic population phenomena and generalized that cyclic highs have occurred in northern areas in each year ending in "2" since the year 1852. He was correct in predicting a high of lynx and snowshoe hare in Minnesota for 1952, and similar highs have occurred in 1962 and 1973. Grange stated that the cyclic highs may vary 2 years either before or after the predicted year, but that nevertheless, the long term regularity of the 10-year cycle is maintained. The next period of cyclic abundance for snowshoe hares and Canada lynx would then be around 1982.

Conversely, Grange wrote that in each decade the year ending in "7", give or take 2 years, the cyclic game species would become extremely scarce. This pattern has existed at least since 1857.

The status of Canada lynx in Minnesota is an ecological reflection of the status of the major prey species, the snowshoe hare, and of the habitat which supports snowshoe hares. The cyclic fluctuations of the snowshoe hare are illustrated in Figure 4, which represents the Minnesota trapper and hunter harvest figures from 1938 to 1975 (Minn. DNR unpubl. rep. 1967, 1974, 1980). This is compared with the Canada lynx harvest figures (Fig. 5), and the cyclic peaks and valleys correlate very well. This population model was developed by taking the average harvest for the decade years (i.e. 1931, 1941, 1951; 1932, 1942, etc.) since 1930 for lynx, and since 1950 for snowshoe hares. Snowshoe hare harvest figures have usually peaked in each decade in the years ending in "1" and "2", and Canada lynx harvest figures have usually peaked in each decade in the years ending in "2" and "3". The 1-year lag in population peaks between the predator and its prey is not unexpected, and there is a correlation ($r=0.75$) between the snowshoe hare harvest of 1 year and the Canada lynx harvest of the following year. There is a lesser correlation ($r=0.30$) between the snowshoe hare harvest and the lynx harvest for the same year.

The long-term welfare of resident Canada lynx populations in Minnesota is, therefore, ecologically dependent on forest successional stages which will sustain significant numbers of snowshoe hares. Much of the range occupied by lynx in Minnesota is secure because it is very remote and is in public ownership.

Periodic scarcity caused by cyclic phenomena is to be expected each decade and should not be interpreted on the short term to indicate that the species is becoming endangered. Lynx are currently going through a period of such temporary scarcity.

Canada Lynx Management

In the publication "The Uncommon Ones" by Dr. John B. Moyle of the DNR, the lynx was classified as a species of changing or uncertain status. The text mentioned that "The lynx has never had the status of a game animal in Minnesota. Such action is necessary so protection can be given when and where needed." The status of the lynx was changed from "unprotected species" to that of a protected game species by the 1975 session of the Minnesota Legislature.

Current regulations in Commissioner's Order No. 1976 stipulate that Canada lynx may be taken with legal firearms, bow and arrow, or by trapping from 1 December to 31 January. When hunted, the lynx can only be taken from one-half hour before sunrise to sunset. No person is allowed to take more than five lynx and bobcats in aggregate in one season by either hunting or trapping or both techniques. Each lynx taken by hunting or trapping shall be tagged at the site where taken with a tag showing the name and address of the hunter or trapper, license number, and year of issue. Hunters under the age of 16 shall put their firearms safety certificate number, or the license number of their guardian, on the tag. Other persons legally hunting or trapping without a license shall put their name and address on the tag. The tag shall be provided by the hunter or trapper and shall be made of plastic, cardboard or metal and shall be secured to the carcass by heavy cord or wire. All lynx taken must be registered by a wildlife manager or conservation officer within 48 hours after the season's close. Lynx may be taken statewide.

Data were collected by DNR personnel and by Dr. L. David Mech during the Canada lynx irruption which began in 1971 and subsided by 1974. Information was collected for 256 observations of lynx, categorized as follows: 160 killed by man, seven car kills, 70 sightings of lynx, ten sightings of lynx tracks, seven trapped and released for research, two fate unknown (Henderson, unpubl. data).

The locations of these lynx occurrences in Minnesota from 1971 to 1974 have been plotted in Figure 6 by township.

The circumstances regarding lynx mortality during this period helped assess the impact which the new lynx season will have on lynx in Minnesota. Car kills accounted for 4% of the total mortality, and the other 96% were killed by man. The method of taking was noted for 121 lynx. Trapping accounted for 59 lynx, or 48% of the total taken by man. Shooting accounted for the other 62 lynx, or 52% of the total. Twenty-four lynx, or 41% of the total number of lynx trapped, were taken within the new season time frame -- 1 December to 31 January.

Lynx mortality by shooting fell into several major categories. Few lynx were taken by hunters intentionally hunting lynx. Most were taken either by grouse hunters, deer hunters, or landowners who discovered a lynx in the back yard or farmyard. At least 18 of the 62 lynx shot (29%) were taken by grouse hunters, and 11 lynx (18%) were killed when they were encountered near human residences. The most significant factor related to the shooting of lynx was that as an unprotected species they were shot at all times of the year. Only

six of 62 lynx shot (10%) were taken within the new season time frame. Considering mortality by both trapping and shooting, only 29% of all lynx killed in the period from 1971 to 1974 were taken within the new season time frame. The new season and bag limit should, therefore, be an effective management tool for regulating the harvest of this species.

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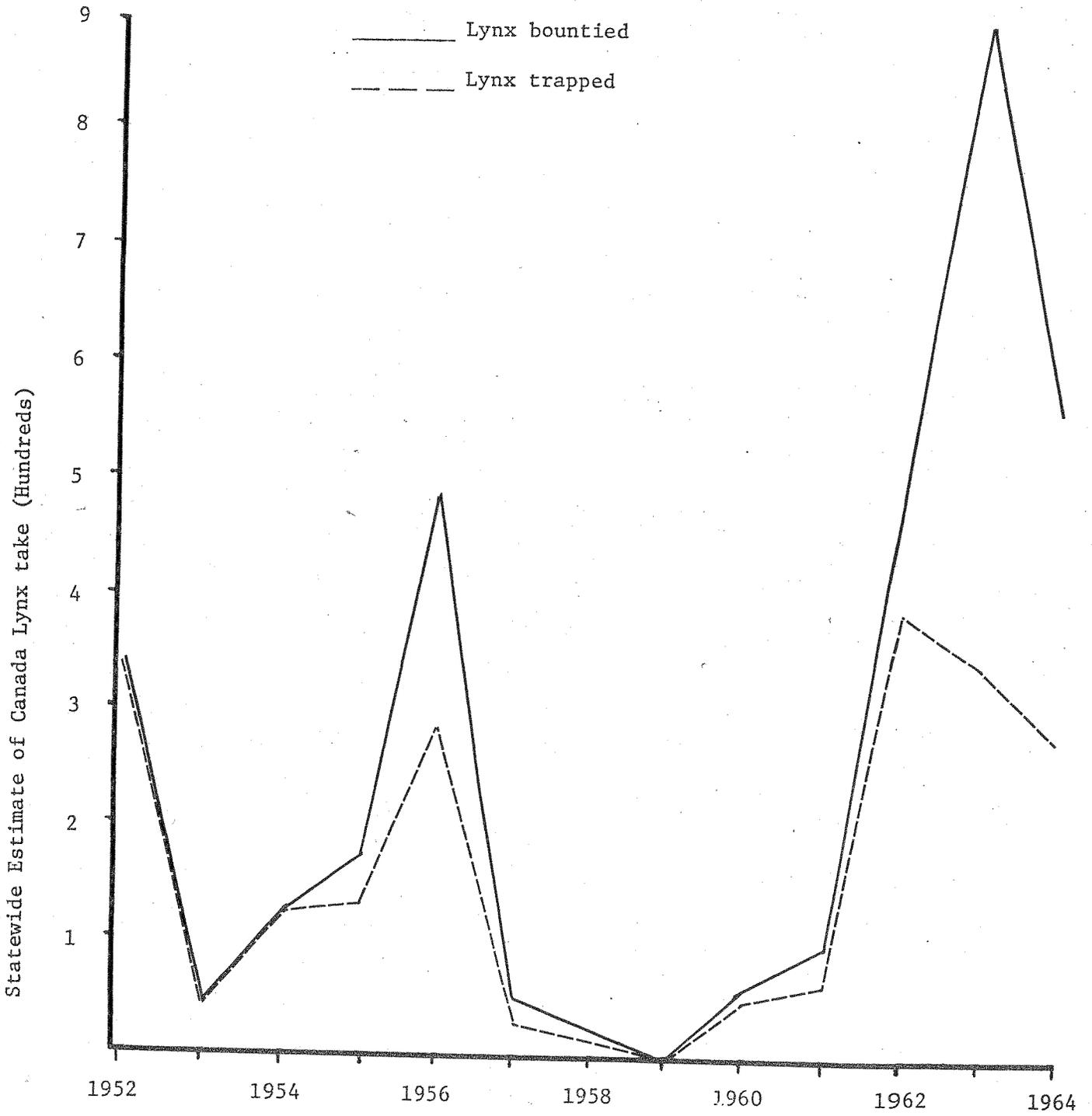


Figure 1. Comparison of the numbers of Canada lynx trapped and bountied from 1952 to 1964.

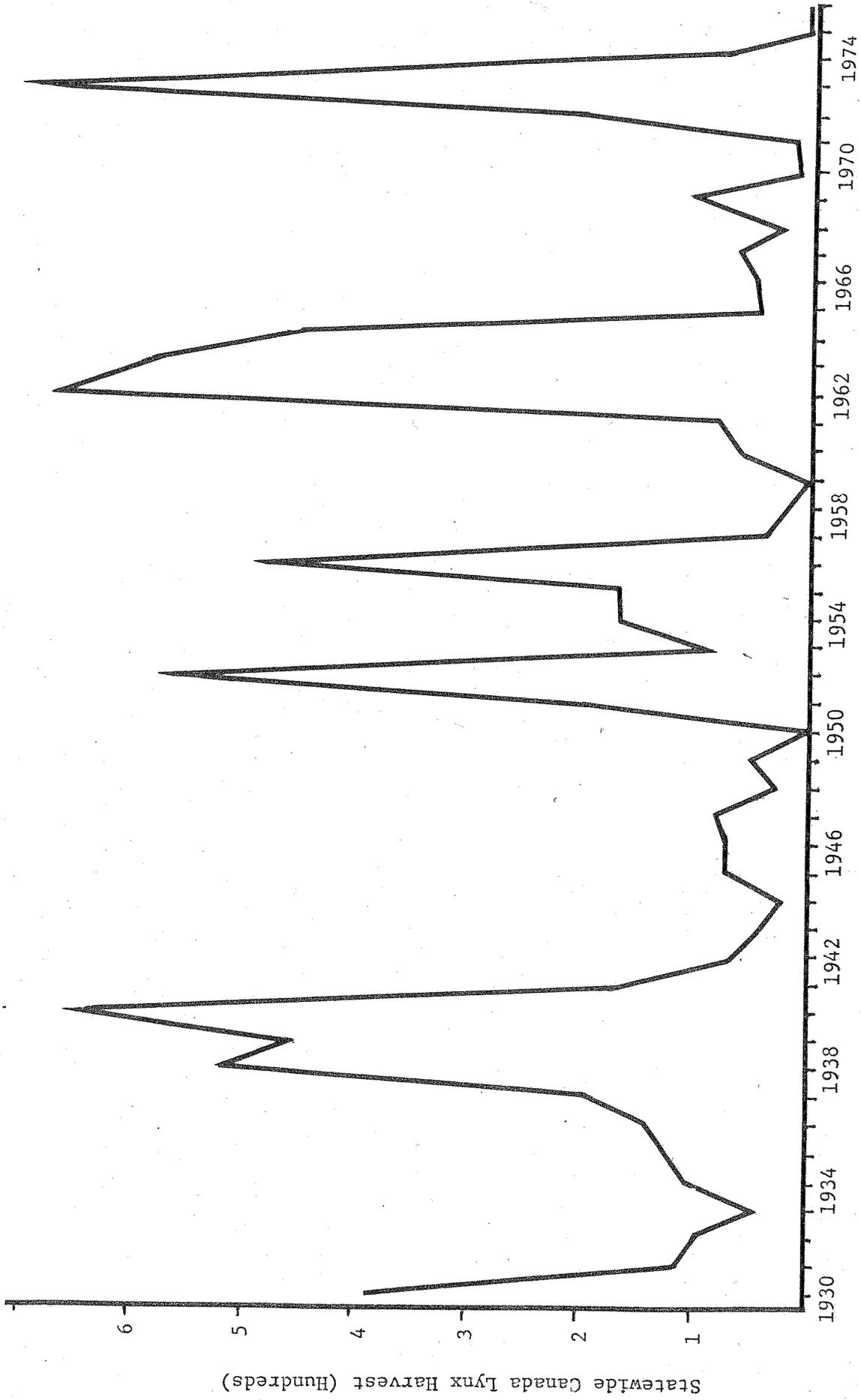


Figure 2. Long-term expanded Canada Lynx harvest estimate.

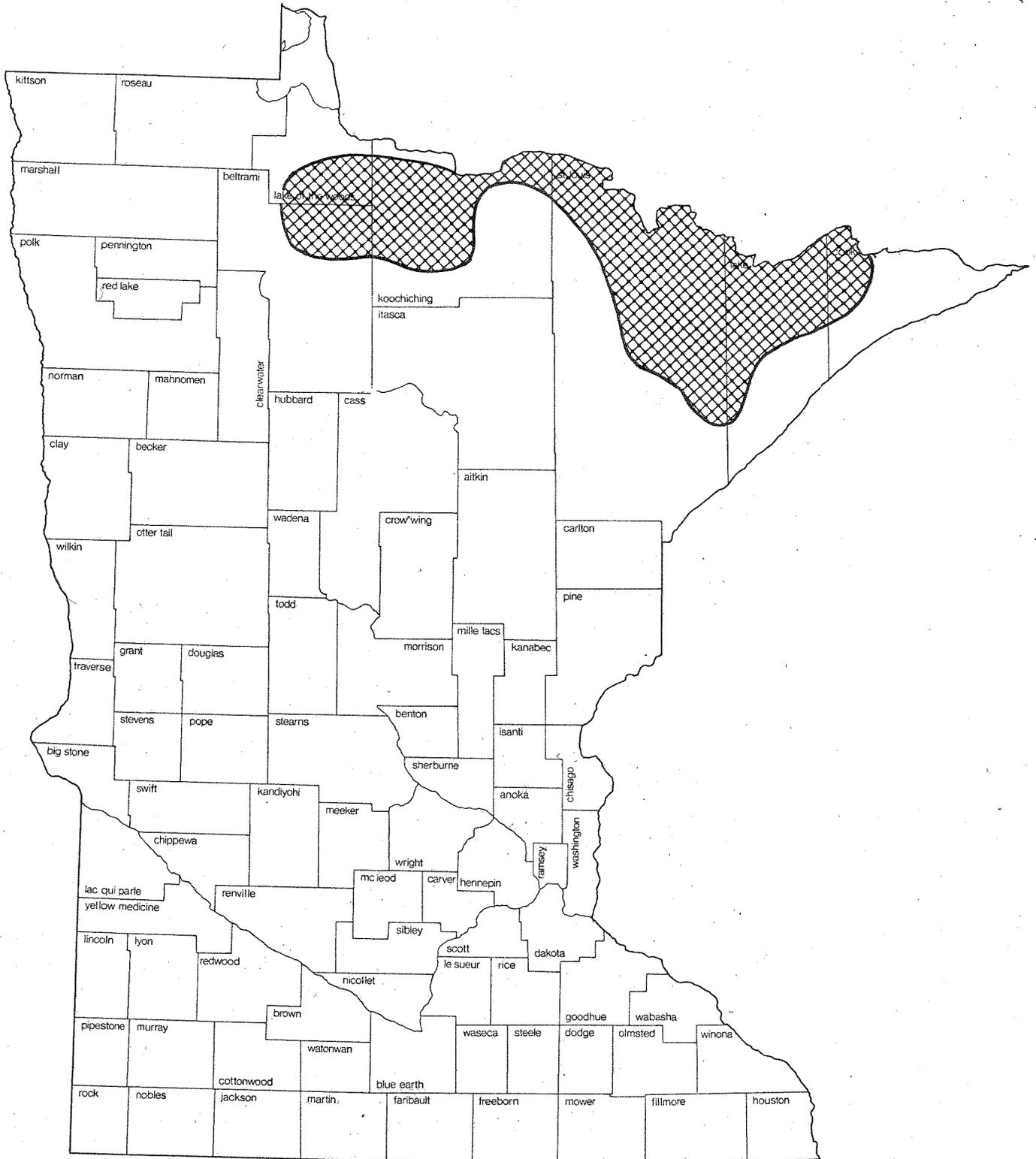


Figure 3. Possible range of Canada lynx in Minnesota (suggested by L. David Mech).

Snowshoe Hare Harvest by Hunting (Thousands)

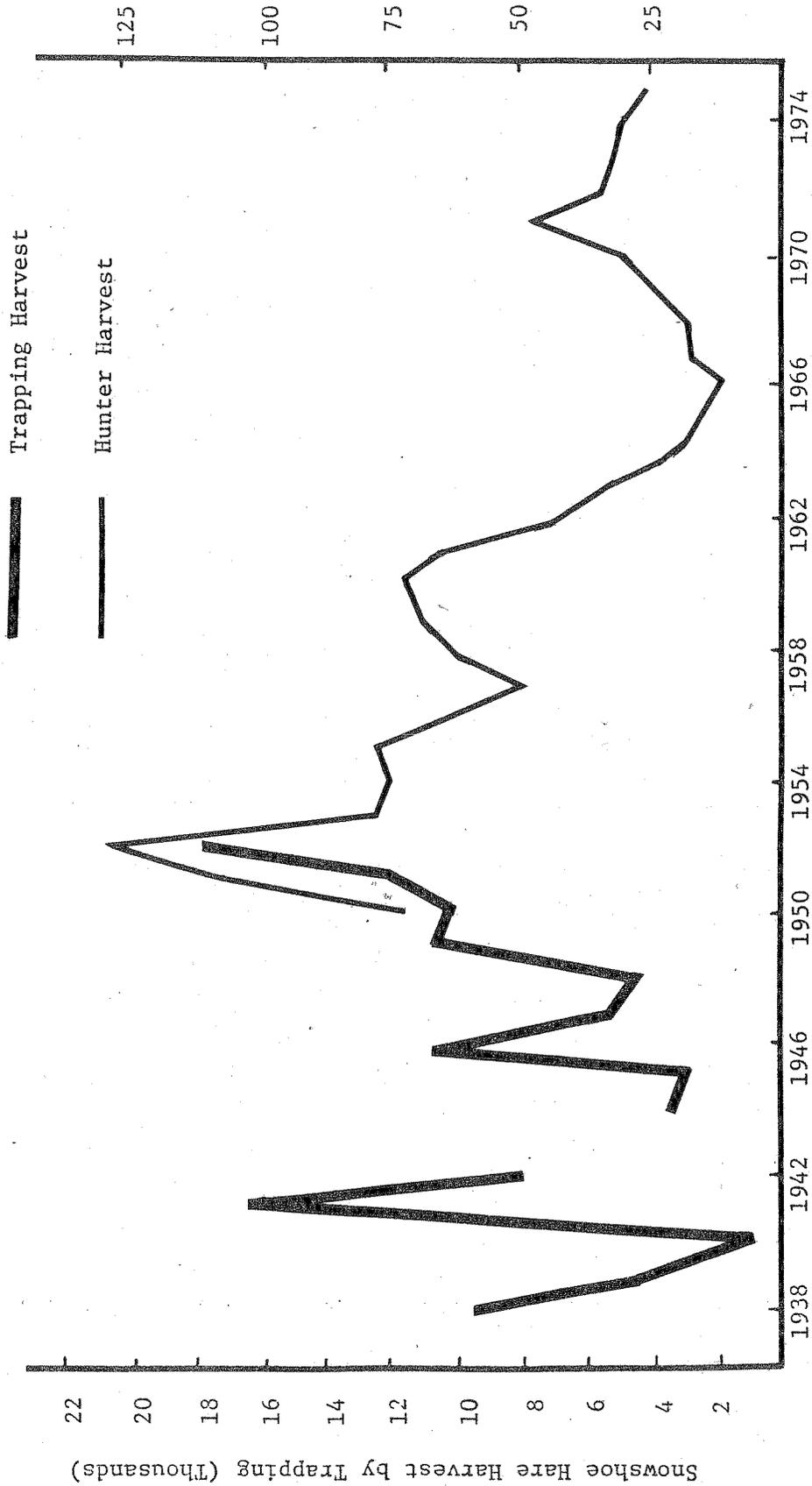
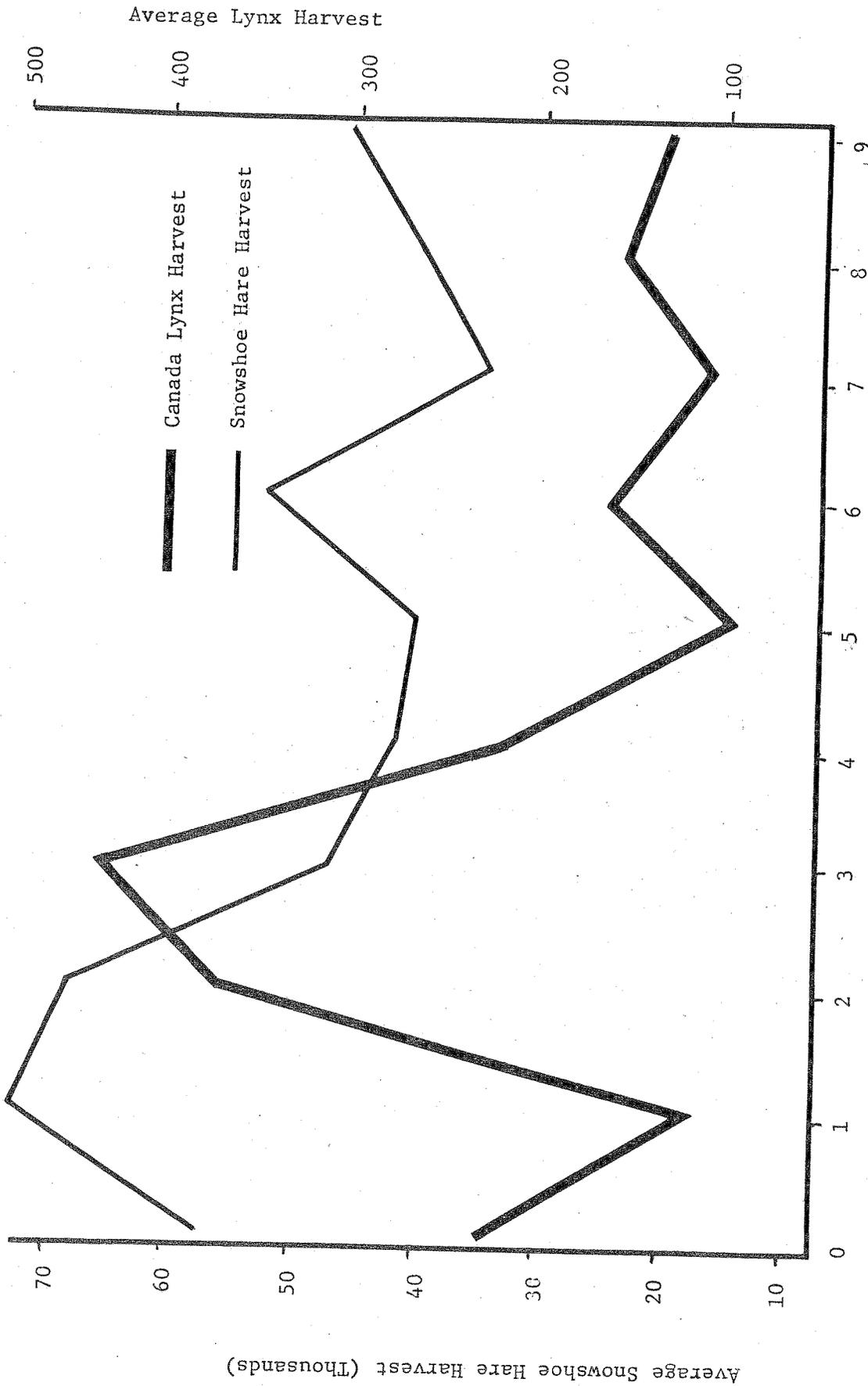


Figure 4. Snowshoe hare harvest in Minnesota, 1938 - 1975.



CONSTRUCTED DECADE

(Example: 1 represents 1931, 1941, 1951, and 1961 averaged.)

Figure 5. Model of the ten-year snowshoe hare and Canada lynx cycles in Minnesota, 1930-1970.

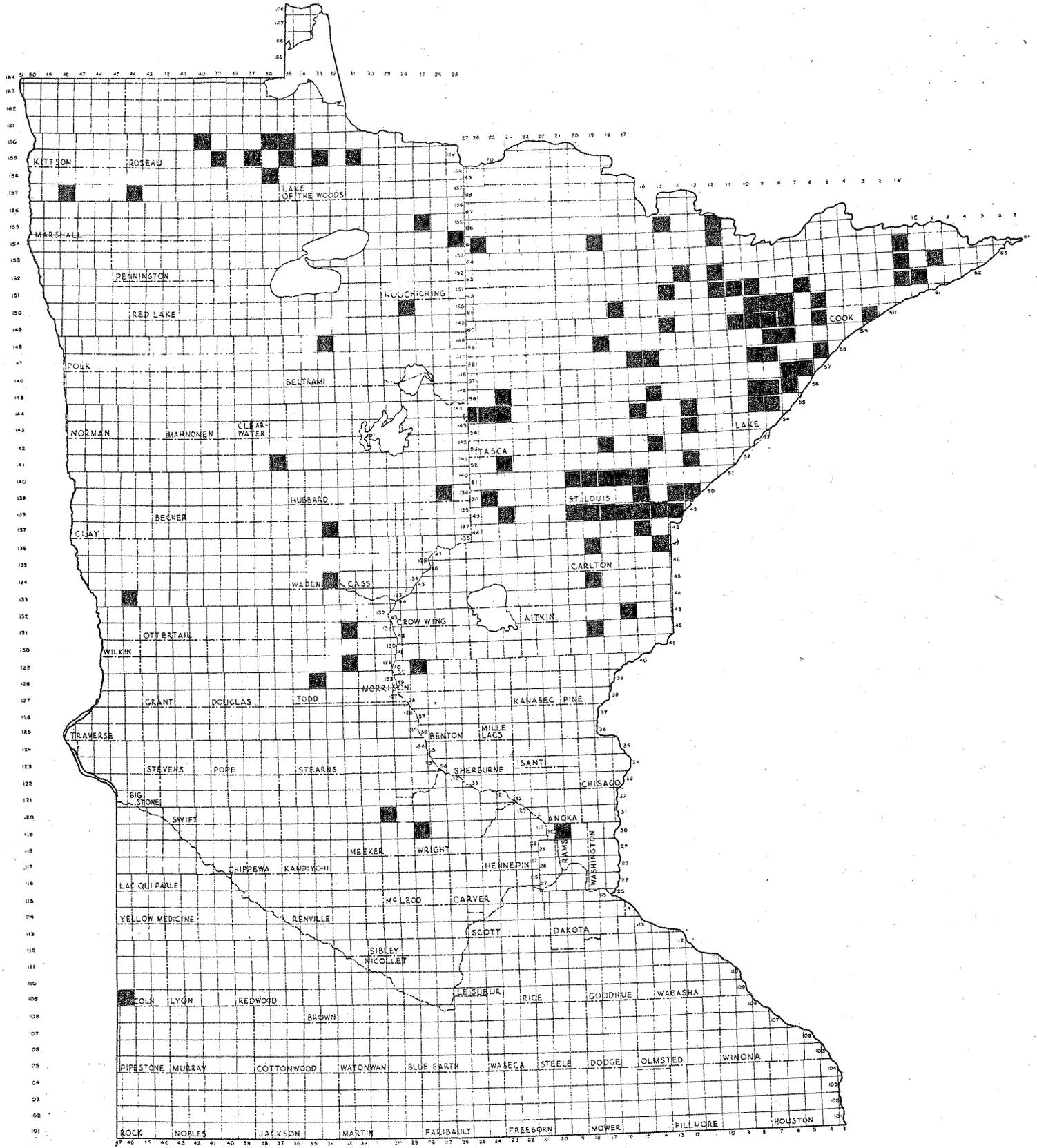


Figure 6. Distribution of Canada lynx occurrences in Minnesota from 1971-1974.

Table 1. Trapping harvest of Canada Lynx in Minnesota, 1930 to 1976.

Year	Trapping harvest	Pelt value		Bounty value
		Each	Total	
1930	224	\$ 10.33	\$ 2,300	
1931	95	8.03	800	
1932	79	2.87	200	
1933	33	6.75	200	
1934	84	5.93	500	
1935	99/1	-	-	
1936	114	5.69	600	
1937	156	5.47	900	
1938	296	2.31	700	
1939	263	.89	200	
1940	381	1.00	3,800	
1941	138	4.00	600	
1942	55	32.00	1,800	
1943	33	60.00	2,000	
1944	20	50.00	1,000	
1945	56	30.00	1,700	
1946	57	45.00	2,700	
1947	64	40.00	2,600	
1948	24	25.00	600	
1949	38	14.00	500	
1950	0	18.00	0	
1951	157	15.00	2,400	
1952	327	15.00	4,900	12.40
1953	70	15.00	1,100	7.55
1954	134	15.00	2,000	15.00
1955	135	15.00	2,000	15.00
1956	283	5.00	1,400	15.00
1957	31	5.00	200	15.00
1958	16	10.00	200	15.00
1959	1	25.00	100	15.00
1960	50	15.00	800	15.00
1961	66	10.00	700	15.00
1962	387	12.50	4,800	15.00
1963	345	17.50	6,000	15.00
1964	281	27.50	7,700	15.00

Continued

Table 1. Continued.

Year	Trapping harvest	Pelt value		Bounty value
		Each	Total	
1965	36	20.00	700	
1966	40	15.00	600	
1967	50	10.00	500	
1968	18	27.50	500	
1969	90	45.00	4,100	
1970	10	-	-	
1971	11	27.50	3,000	
1972	175	40.00	7,000	
1973	400/2	65.00	-	
1974	72	65.00	5,000	
1975	0	162.00	-	
1976	0		-	
Total	5,494			

/1 Interpolated estimate.

/2 Possibly high because of sampling error.

Table 2. Number of years in which each trapper harvest level has occurred by 50-animal increments, in Minnesota, 1930-1976.

Number of lynx trapped	Number of years	Percent of total years
0-50	18	38.3
51-100	12	25.5
101-150	4	8.5
151-200	3	6.4
201-250	1	2.1
251-300	4	8.5
301-350	2	4.3
351-400	3	6.4
Total	47	100.0

Table 3. Canada lynx and bobcat bounty and harvest estimates in Minnesota, 1952-1964.

Year	Lynx trapper harvest	Bobcat harvest trapper	Total cats trapped	Lynx trapped (% of all cats)	Total cats bountied	Lynx bountied (estimated)	Lynx trapped (% of lynx bountied)
1952	327	1519	1846	17.7	1901	336	97.3
1953/1	70	1969	2039	3.4	1980	67	100.0
1954/1	134	1400	1534	8.7	1412	123	100.0
1955	135	1080	1215	11.1	1589	176	76.7
1956	283	449	732	38.7	1248	483	58.6
1957	31	655	686	4.5	1136	51	60.8
1958	16	632	648	2.5	1067	27	59.3
1959	1	441	442	0.2	717	1	100.0
1960	50	502	552	9.1	630	57	87.7
1961	66	450	516	12.8	747	96	68.8
1962	387	264	651	59.4	867	515	75.1
1963	345	274	619	55.7	1616	900	38.3
1964	281	359	640	43.9	1287	565	49.7
Total	2126	9994	12,120	17.5 (mean)	16,197	3397	62.6 (mean)

/1 Estimated harvest derived from interpolation between trapper harvest and bounty claim estimates. All are assumed to be trapped.

Table 4. Total Canada lynx harvest estimates, derived from trapping harvest numbers in Minnesota, 1930-1976.

Year	Total lynx harvest	Year	Total lynx harvest
1930	387	1952	565
1931	117	1953	86
1932	97	1954	165
1933	41	1955	166
1934	103	1956	489
1935	122/ <u>1</u>	1957	38
1936	140	1958	20
1937	192	1959	1
1938	512	1960	61
1939	454	1961	81
1940	658	1962	668
1941	170	1963	596
1942	68	1964	485
1943	41	1965	44
1944	25	1966	49
1945	69	1967	61
1946	70	1968	22
1947	79	1969	111
1948	29	1970	12
1949	47	1971	14
1950	0	1972	215
1951	193	1973	691/ <u>2</u>
		1974	88
		1975	0
		1976	0

/1 Interpolated estimate.

/2 Possibly high because of sampling error.

Table 5. Total Canada lynx harvest estimates by decade in Minnesota, 1930-1976.

	Total harvest estimate	Estimated mean harvest per year
1930 - 1936 (7 years)	1007	144
1937 - 1946	2259	226
1947 - 1956	1819	182
1957 - 1966	2043	204
1967 - 1976	1214	121
Total	8342	177 (47 - year mean)

Table 6. Estimated Canada lynx harvests for Minnesota, Ontario and Manitoba, 1930-1976.

Year	Minnesota	Ontario	Manitoba
1930	387	799	685
1931	117	1088	749
1932	97	1400	1230
1933	41	2138	1992
1934	103	2611	2073
1935	122	2608	1299
1936	140	1925	778
1937	192	1014	651
1938	512	664	515
1939	454	481	419
1940	658	429	455
1941	170	546	623
1942	68	542	596
1943	41	687	525
1944	25	986	311
1945	69	768	149
1946	70	766	27
1947	79	616	20
1948	29	542	74
1949	47	479	209
1950	0	462	1089
1951	193	215	907
1952	565	1479	1196
1953	86	1769	903
1954	165	1400	762
1955	166	906	570
1956	489	665	549
1957	38	1103	1565
1958	20	2242	2861
1959	1	4038	7948
1960	61	4502	6613
1961	81	4578	5219
1962	668	4743	4595
1963	596	3217	3412
1964	485	1690	1120

Continued

Table 6. Continued.

Year	Minnesota	Ontario	Manitoba
1965	44	1503	1171
1966	49	1167	1102
1967	61	912	1389
1968	22	1406	4088
1969	111	1990	6695
1970	12	1903	6228
1971	14	2474	7309
1972	215	5137	4520
1973	691	3698	1476
1974	88	1918	779
1975	0	1151	761
1976	0	1133	--
Total	8342	78,490	88,207
Long-term mean	177	1,670	1,917
Last-decade mean	121	2,172	3,435