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A Mid-Continent Irruption of Canada Lynx, 1962-63

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Abstract: There was a mid-continent irruption of the Canada lynx (*Felis lynx*) population and subsequent extensive movement into non-lynx habitats during the years 1962-1963. Lynx were found in the prairie provinces of Canada and the prairie areas of Minnesota, and North and South Dakota. They were also found in urban areas such as Minneapolis and St. Paul, Minnesota; Winnipeg, Manitoba; and Calgary, Saskatchewan, Canada. Causes for the irruption remain unknown but speculations include primarily a change in snowshoe hare population, disease, extensive forest fires and extensive spraying. Unusual behavior seemed to be most often reflected by a lack of fear.

An irruptive population curve has been described as one which exhibits severe but irregular fluctuations of no fixed duration or amplitude and occurs infrequently (Leopold 1933). They occur most often in populations in unstable environments, and can be characteristic of disease epidemics. A mid-continent irruption of Canada lynx (*Felis lynx*) which occurred in 1962-1963 presented a dramatic example of an irruptive population curve, whose focus was centered on northeastern Minnesota. Until 1962 there were only three Canada lynx specimen records for Minnesota in the James Ford Bell Museum mammal collection at the University of Minnesota. That fall, October, 1962, Mr. Alan B. Sargeant, now of the Northern Prairie Wildlife Research Center, Jamestown, North Dakota, alerted me to the possibility of a lynx "invasion." He collected, in northwestern Minnesota, a lynx which was at the edge of a road watching a ruffed grouse perched in a tree. That fall and winter several more unusual reports and observations of Canada lynx were received at the museum, including those of individuals killed at population centers such as one in Golden Valley, a suburb of Minneapolis, Minnesota, and another in St. Paul, Minnesota. Both localities were far south of the lynx's normal range. These unusual reports prompted me to gather as much information as possible on Canada lynx movements for the years 1962-1963. a summary of this accumulated information forms the basis of this paper.

Mr. F.W. Johnson, then Chief Warden, Section of Warden Service of the Minnesota Department of Game and Fish (now the Department of Natural Resources) sent a letter for me, on January 28, 1963, requesting information on all bobcats (*Felis rufus*) and Canada lynx bountied during the winter of 1962-63. In the letter I also asked for data on weight, age and sex, when these were available. In most returns no distinction was made between the two species. Until very recently, the two species have not been distinguished in the annual fur harvest reports. Several trips were taken by myself to gather more data, to verify data and to obtain specimens. One trip was across northern Minnesota on February 4 to 8, 1963. Several shorter trips were made during the same season. Additional information was received from Robert Hines (deceased) a well-known trapper in northern Minnesota and William Jensen, a fur-buyer at Roseau, Minnesota. The following Minnesota wardens responded to our request for information: Ted

Abrahamson, Wenzel Anderson, Wallace R. Beyer, Lyoyd C. Billiar, Carl Burrell, Lawrence J. Downey, Burton Ellig, Don Fultz, Bert Getty, Philip Ham, W.E. Heineman, Milton M. Hockel, Alvin L. Hoger, Robert Jacobsen, Millard A. Jensen, Ray Jensen, Arthur Johnson, Carl J. Johnson, F.W. Johnson, Bernard Manthei, James T. Marcum, Orville Meyer, Mathey Minenich, James Myers, Ray C. Neumann, Warren O'Brien, Louis J. Peloquin, Harland C. Pickett, Don Polovina, J.C. Richards, William C. Richards, Marvin Smith, Francis Teske, and Fred Venning.

Dr. A.E. Allin (deceased), then Director and Pathologist, Regional Laboratory, Ontario Department of Health, Ft. William, Ontario and well-known naturalist of the "Lakehead" area, coordinated the gathering of the Canadian material, which came from officials, naturalists, hunters and trappers. Allin enlisted the help of R.A. Bilkwill, District Forester, Ontario Department of Lands and Forests, A.S. Bray, Regional Director, Ontario Department of Lands and Forests, W.J. Cleaveley, G.E. MacKinnon, W.L. Sleeman, and G.F. Coyne, District Foresters, Ontario Department of Lands and Forests, W.L. Newman, Predator Control Officer, Game Branch, Manitoba Department of Mines and Natural Resources, and J.D. Robertson, Game Administrator, Game Branch, Manitoba Department of Mines and Natural Resources. Canadian information was furnished by Dr. Charles H. Buckner, then Mammalogist, Winnipeg Forest Entomology Laboratory Canadian Department of Forestry.

Lyle Schoonover, then refuge Manager, Sand Lake National Wildlife Refuge, Columbia, South Dakota, was helpful with information from South Dakota.

MAGNITUDE OF POPULATION CHANGES AND EXTENT OF MOVEMENT

The "population explosion" of Canada lynx described in this study was reflected most dramatically in the bounty payments made on this species at Grand Marais, Cook County, in the northeastern corner of Minnesota. From March 1962 until February 1963, 147 individuals were bountied. State Warden Arthur Johnson, one of three wardens stationed there, believed they had not bountied more than half a dozen in the previous 35 years. From February 1, 1963 to January 1, 1964, 137 were bountied. Johnson (pers. comm.) wrote, "From my observation, I would say they are about the same as 1962." From 1963 until another influx began in 1971-1972, no lynx were reported. In 1971-1972 another influx started but apparently did not reach anywhere near the same magnitude as that of 1962-1963 (Mech 1973). In North Dakota the 1962-1963 irruption was also dramatic, as reported by Adams (1963). A trapper there caught 39 lynx in northeastern North Dakota in the winter of 1962, but had taken none in the previous 45 years of continuous trapping. For the state there was a total of 164 reported for 1962-63.

Population changes in the coniferous forest areas of the Canadian provinces bordering Minnesota and North Dakota were not as dramatic. In Canada trappers had to report their pelts to government officials. In the Sioux Lookout District of northern Ontario, figures forwarded by W.J. Barnes, District Forester for the Ontario Department of Lands and Forests, are shown in Table I.

Table I. Lynx Reported Taken by Years in Ontario*

Years	Sioux Lookout District (122,825 acres)	Geraldton District
1953-54	1079	125
1954-55	576	100
1955-56	280	40
1956-57	284	25
1957-58	537	39
1958-59	1360	47
1959-60**	2751	57
1961-62	3376	70
1962-63	3125	72
1963-64		70

*Ontario's figures for Sioux Lookout District were furnished by W.D. Barnes, District Forester for the Ontario Department of Lands and Forests; for the Geraldton District by G.E. MacKinnon, also District Forester for the Ontario Department of Lands and Forests.

**For 1957-60, the areas of Sioux Lookout, Hudson and Lac Seul were grouped together.

For the Geraldton District, Ontario, which is about 50 miles north and slightly to the east of a north-south line through the middle of Lake Superior, Mr. G.E. MacKinnon (per. comm.), District Forester for the Ontario Department of Lands and Forests, furnished the figures shown on Table I.

Mr. W.L. Newman, Predator Control Office, Game Branch, Manitoba Department of Mines and Resources, furnished figures for all of Manitoba (pers. comm.) shown in Table II.

J.D. Robertson, Game Administrator, Game Branch Manitoba Department of Mines and Natural Resources wrote (pers. comm. February 28, 1963), "There were very few lynx taken in Manitoba in recent years until the winter of 1959-60, when the values of lynx reached a point where it was profitable for the trappers to take pelts. The take during this season (1963) was three times greater than the previous year. This was not necessarily due to a greater lynx population during 1959-60, but as I have pointed out earlier, statistics in this regard, in that the values influenced the take in recent years."

It would seem that the increase in population was greatest in the Manitoba area, although the area covered is not known. For the Kenora, Fort Francis, and Port Arthur, Ontario districts, all close to Minnesota, the information was furnished by A.F. Coyne, District Forester at Kenora, R.A. Balkwill, District Forester at Port Arthur, Ontario and is summarized in Table III.

Both Dr. A.E. Allin (pers. comm.) and Sleeman mentioned that very few lynx were taken by trappers directly along the Ontario-Minnesota border. This prompted Allin to wonder ". . .whether the lynx taken in the general vicinity of

Table II. Lynx Reported Taken by Years in Manitoba*

Years	Manitoba
1952-53	1204
1953-54	911
1954-55	748
1955-56	645
1956-57	539
1957-58	1547
1958-59	2867
1959-60	7798
1960-61	6613
1961-62	5219
1962-63	----

*Figures for Manitoba were furnished by Mr. W.L. Newman, Predator Control officer, Game Branch, Manitoba Department of Mines and Resources.

Table III. Lynx Reported Taken by Years near Kenora, Ft. Francis and Port Arthur, Ontario*

Year	Kenora	Ft. Francis	Port Arthur
1953-54	12	0	3
1954-55	15	7	9
1955-56	16	12	32
1956-57	24	8	10
1957-58	29	9	18
1958-59	22	13	27
1959-60	56	16	44
1960-61	89	8	99
1961-62	76	32	121
1962-63	117	62	239

*Figures from areas bordering on Minnesota were provided by A.F. Cayne, District Forester at Kenora, R.A. Balkwell, District Forester at Ft. Francis; W.L. Sleeman, District Forester at Port Arthur.

the border and east of Quetico Park were being smuggled across into Minnesota to be sold and the bounty collected there. There is no bounty on lynx in Ontario. . . .''. There was and had been a bounty on lynx in Minnesota but they could just as easily have been smuggled across in years of low as well as high populations. I feel that the results were not greatly skewed by bounty payments, and the increase is good evidence of a population irruption.

In Canada it was reported that ''...a large number were taken alive in the city of Calgary, Alberta'' (Editors, Blue Jay, 1964). For Manitoba, Buckner (pers. comm.) reported, ''Starting in 1959, records and specimens of lynx (and a few bobcats as well) were taken in Winnipeg. . .'' and, ''Last summer, 1962, a record number of wildcats (most lynx from what I can gather) were taken in the city and suburbs of Winnipeg. . .''. He also noticed that lynx were reported as quite common in the Duck Mountain area along the Manitoba-Saskatchewan border in 1960-62. Several lynx were reported north of Beechey, Saskatchewan for 1963 (Santy 1964).

In Minnesota, lynx numbers were high for all northern border counties which were in the coniferous forest, although not as high as at Grand Marais, Cook County. South and west from here the numbers gradually dwindled, until the edge of the coniferous forest was reached. Beyond the deciduous forest and into the prairie areas, reports were scattered. These scattered records from non-lynx habitats emphasize the extent of the movement which took place during this irruption. Nellis and Wetmore (1969) reported one as having moved 102 miles in 163 days. Mech has reported one taken in northern Minnesota in 1974 was taken three years later nearly 300 miles away in Western Ontario. Lynx have the capability of moving great distances. Lynx were reported from Clay, Norman and Polk Counties in the western prairie areas and as far south as Goodhue County in the deciduous forest area. Specimens have been received at the James Ford Bell Museum at the University of Minnesota from both St. Paul and Minneapolis, Minnesota.

In North Dakota, the highest populations occurred in the Pembina Hills and Turtle Mountains in the northeastern part of the state. They were recorded for all the counties in the northern tier, as far south as Ransom County and in the three northern-most counties bordering Montana (Adams 1963).

For Montana, Hoffman et al. (1969) wrote, ''It is evident that lynx reached peak populations in all parts of the state except the southeast in 1963-64.''

In South Dakota, one was taken in Yankton County in 1961, one near Britton, Chamberlain County, in a clump of cottonwoods in 1962, and one near Chamberlain, Brule County in 1963 (Lyle Schoonover, pers. comm.).

In Iowa a lynx was taken in July 1963 in Shelby County and is in the possession of Jerry Rasmussen (1969). This is the first documented record for Iowa. There are undocumented records of three in 1869, one in 1875 and one in 1906.

The least dramatic increases were those of Wisconsin and Michigan where the Great Lakes may have impeded the southward movement of the moderate population increase directly north of Lake Superior, if the Geraldton figures in Table I are an indication.

Table IV. Lynx Trapped in Montana, 1959-1967*

Season	Montana
1959-60	43
1960-61	44
1961-62	36
1962-63	76
1963-64	376
1964-65	149
1965-66	167
1966-67	99

*Figures from Hoffman et al. (1969).

BEHAVIOR

Unusual and erratic behavior has been recorded for several species of mammals during movements presumably caused by irruptive or cyclic population fluctuations. Curry-Lindahl (1962) discussing a Norway or brown lemming (*Lemmus lemmus*) irruption in Sweden in 1960 wrote "The vicious temper was common to both sexes. . ." and when we examined screaming females we found no signs of pregnancy." The lemmings were on the move throughout that entire summer, but evidently not for lack of food for Curry-Lindahl (1962) wrote, "There is much evidence to suggest that the eliciting factors of mass migration are mental in character, a kind of psychosis, possibly due to the competition with other rodents for sheltering holes and territory, but primarily not for food, which, even when lemmings are most numerous, is available in the vicinity, both on the mountain hearths and lower down."

The behavior of gray squirrels (*Sciurus carolinensis*) during a 1968 "migration" was reported as unusual by many observers and summarized by Flyger (1969). They appeared in areas where they were not usually seen. But more unusual were the reports of the "dancing" of squirrels on a highway. Flyger (1969) wrote, "As cars approached, squirrels on the road would sometimes jump into the air, zigzag back and forth, and behave erratically. I also observed this." Flyger (1962) thought that squirrels caught in an unfamiliar area behaved erratically because they were confused and terrified.

Reports of erratic behavior observations in Canada lynx during the 1962-63 irruption were abundant. From near Beechy, in the prairie province of Saskatchewan, two reports were recorded (Santy 1964). In one instance a Canada lynx preyed on a flock of chickens in a farmyard during daylight hours and was finally caught in a snare. In another instance a young man plowing with a tractor was confronted by a lynx sitting directly in his path. When the operator stopped the tractor's movement the lynx came around and leaped at the operator, but could not reach him. The operator hit the lynx on the side of the neck with a hammer from the tool box. The lynx dropped to the ground and braced itself for another spring. The young man grabbed a coat which he had been using for a seat cushion and shook it vigorously in front of the lynx. This deterred the lynx and it walked

away! In North Dakota lynx ". . . were seen in plowed fields and pastures miles from trees," and "a few lynx were run down by cars on roads far from likely lynx habitat" (Adams 1963). In Ontario, too, there were reports of lynx entering agricultural areas during daylight hours and taking chickens from farmyards.

Three reports of unusual behavior in northwestern Minnesota were recorded: one of a lynx being shot at the edge of a road as it was watching a ruffed grouse perched in a tree, another of a lynx sitting at the edge of an aspen "island" several yards from a farmhouse. The farm wife drove into the yard, saw the cat, started the car, and went to get her husband. When they came back, the husband went into the house, got his gun and shot what turned out to be a lynx. It had remained there through all the noise and commotion. The third was a lynx which came in daylight and snatched a duck from out of a flock that the farmer was feeding.

Still another unusual observation was reported by Marvin Smith (pers. comm.). He reported that a resident on one of the many islands on Rainy Lake, which forms a part of the boundary between Minnesota and Ontario, shot a lynx which had killed and was eating a red fox near his cabin. When disturbed the lynx left the area, but returned about four hours later, at which time it was shot.

The Conservation Warden for Kanabec County, Central Minnesota, Bernard Manthei, (pers. comm.) reported on four lynx hunted in 1962 and wrote, "An odd thing about all four kills was that they were killed during the middle of the day and each one was walking along a road and seemingly paid little or no attention to the person who killed them." In Clay County, western Minnesota, one was shot in an open field, and in Polk County, also in western Minnesota, one was run over by a car (Jensen, pers. comm.).

Unusual behavior was also reported for the lynx taken in Iowa (Rasmussen 1969). The lynx was first seen when some cattle flushed it from among trees near a creek. It stood motionless within 50 feet (45 m) of a tractor and stared at Rasmussen for several moments and walked back into the trees. Rasmussen returned 20 minutes later and shot the lynx.

All of these observations seem to indicate a lack of fear and also confusion. These may stem in part from a lack of familiarity with the area, but there may also be other "psychotic" factors, which in turn influence the physiology of the individuals.

SPECULATION ON CAUSES OF POPULATION IRRUPTION AND MOVEMENT

Many reasons for the population irruption and extensive dispersals have been postulated, but strong evidence for any single reason is lacking.

Food. The snowshoe hare (*Lepus americanus*) is generally conceded to be a major food of the Canada lynx, and it is widely believed that peaks of abundance, and decline of the lynx are directly related to hare populations (Elton and Nicholson 1942). However, conflicting reports on snowshoe hare abundance were received. In Minnesota harvest statistics issued by the Division of Game and Fish for the snowshoe hare populations as indicated in Table V show prior to 1963 the first marked decrease in 1962-63.

Table V. Snowshoe Hares Taken in Minnesota 1956-1964*

Years	Number
1956-57	61,152
1957-58	48,150
1958-59	60,135
1959-60	60,000
1960-61	69,580
1961-62	63,300
1962-63	43,500
1963-64	28,000

*Figures furnished by William H. Longley, Minnesota Department of Natural Resources.

R.A. Balkwill, District Forester for the Ontario Department of Lands and Forest (pers. comm.) wrote, "Snowshoe hare (sic) not as abundant as usual." Buckner (pers. comm.), a mammalogist with the Canadian Department of Forestry, judged populations of snowshoe hare near Rennie, southeastern Manitoba to be high in 1952, 1953, moderate in 1954, 1955, 1956, low in 1957, 1958, moderate in 1959, and high in 1960, 1961, 1962. He further commented on the high number of lynx taken in Winnipeg, Manitoba especially along the rivers, and throughout the entire Red River Valley, and wrote, "Now there are virtually no *L. americanus* (snowshoe rabbits) in the valley, but don't forget the rather high numbers of cottontails here, that in my opinion could provide quite a good food source for lynx." J.D. Robertson, Game Administrator, Game Branch, Manitoba Department of Mines and Natural Resources wrote (pers. comm.), "I have no answers or suggestions for this last movement and expansion of the lynx population. It is certainly not tied in with any great population increase or die-off of the snowshoe rabbit." Manthei (pers. comm.) reporting from central Minnesota in February, 1963 wrote, ". . . but I think the great shortage of rabbits this year . . . has something to do with it." Adams (1962) wrote, "The large number of lynx in North Dakota during the past year or so were victims of a snowshoe hare die-off in Canada. In talking with some of the game biologists from Manitoba and Saskatchewan I found they experienced a decline in snowshoes starting in 1961." In North Dakota snowshoe hare were especially abundant in the Turtle Mountains and Pembina Hills areas in 1961 and 1962. These were the areas where most lynx were taken in 1962-1963.

Disease. Charles Buckner (pers. comm.), mammalogist with the Canadian Department of Forestry, wrote, "The provincial pathologist, Dr. R. Kirk, could give me no information on disease in either rabbits or lynx."

Fire. Bray (pers. comm.), Regional Director, Ontario Department of Lands and Forest, wrote in response to a suggestion that extensive forest fires in northwestern Ontario in 1961 were the cause: "For your information, I am enclosing, herewith, a map which shows the major areas burnt over in that year. We

had a total of about 700 fires, some of which, . . ., escaped control and did serious damage. Approximately 1,180,000 acres were burned and the fire areas, . . ., are a considerable distance from the Ontario-Minnesota boundary. I personally have doubts as to whether or not they were a factor.'' Doubt was also cast on this hypothesis because there were no recognizable movements of larger mammals such as deer or moose. Robertson (pers. comm.), Game Administrator of the Game Branch of the Manitoba Department of Mines and Natural Resources, wrote, ''I cannot agree that the serious fire situation in 1961 would have any major effect on the movement of lynx, no more so than any of our other mammals.''

Herbicides and Insecticides. Another hypothesis was that the animals had been driven out of their natural range by the lack of food caused by spray programs. This idea was soon discarded because of the obvious necessity of spraying vast areas to cause such a massive movement. No such spray program was in effect.

Habitat. J.D. Robertson (pers. comm.), Game Administrator of Game Branch of the Manitoba Department of Mines and Natural Resources, believed habitat changes might be one reason for the increase and dispersal of lynx. It was his ''strong belief'' that the lynx were practically exterminated from their normal range in Manitoba during the 1930s and 1940s because of high prices of pelts. Following these years of depressed populations habitat conditions became very favorable, and the harvest was minimal because fur prices were very low. It was not until 1959-60 that the value of lynx fur again made it profitable to take their pelts. Robertson (pers. comm.) added, ''However, (during) this past two years, 1961-62 and 1962-63, they have extended their range beyond what we considered normal range 40 to 50 years ago and seem to have adapted themselves to come out of the woods and live in populated areas.''

DISCUSSION

The center or beginning of this mid-continent lynx population irruption appeared to be in the coniferous forest region of Manitoba and Sioux Lookout District of Ontario. The bounty payments of pelt reports reflected enormous population changes in some areas, such as portions of Ontario, northern Minnesota and North Dakota, especially for the years 1962-1963. The Canada lynx is usually identified with coniferous forests, deep snow and snowshoe hares. During this irruption lynx were frequently observed on the open prairies, away from the parklands and gallery forests of the rivers. What was more dramatic was their appearance in population centers, such as Minneapolis and St. Paul, Minnesota, Winnipeg, Manitoba and Calgary, Alberta.

The evidence presented here is intended to show that the population peak of 1962-1963 was greater than a cyclic oscillation. Neither can this irruption be explained by the lynx-snowshoe hare interaction alone. The complexity of this problem has been well reviewed by Weinstein (1977) and others.

Reasons for their behavior were the source of much comment and speculation. Most of their behavior could probably be attributed to their unfamiliarity with the area, i.e. confusion. Those taken outside of their normal geographic range were mobile individuals, also outside of any home range.

Speculations as to the cause of this irruption were many, but no strong evidence appeared for any one of them. Even the Canada lynx snowshoe hare population fluctuation does not seem to offer much help in explaining this irruption.

Although such an irruption and movement as described here would seem to result in mass destruction, the destruction is probably not great in terms of the total population. The irruption and resulting movement does have survival value. One result is that suitable but unoccupied habitats may again become occupied. Another, and more indirect result, might be the maintenance of a greater gene plasticity by producing a flow of genes between lynx populations which had become isolated.

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