

THE UNIVERSITY OF MANITOBA

The Biology, Mythology, Distribution, and  
Management of the Wolverine (*Gulo gulo*)  
In Western Canada

by

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A dissertation submitted to the Faculty of Graduate Studies of  
the University of Manitoba in partial fulfillment of the requirements  
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## ABSTRACT

A study was undertaken of the wolverine in western Canada, which included the provinces of Manitoba, Saskatchewan, Alberta, and British Columbia and the Yukon and Northwest Territories, from May 1974 to September 1975. Data on its habits and biology, historical derivation of the name, folklore, trapping techniques, habitat utilization, abundance, distribution, and legal status were gathered by use of questionnaires to biologists and trappers; personal interviews; scrutinization of available fur records; a thorough review of the literature; advertising the need for information and sightings; and by contacting people familiar with the animal.

The wolverine has a large home range, uses territorial marking, and only associates with others during the mating season (May to July) or when the young (born after prolonged gestation between February and April) are dependent upon the female. The wolverine has a varied diet with special reliance on carrion. Man is the foremost predator of this mammal.

The folklore surrounding the wolverine is deeply embedded in history and tradition. Much of it, of course, is exaggerated with no factual data to substantiate it.

Although no one set is guaranteed to capture the animal, trappers feel confident in catching it; it is harder to hold than catch. Like many other animals, once "educated", it is much more difficult to trap.

The animal has both positive and negative values, but it is difficult to assign a definite dollar value to any one of them. The earnings from wolverine trapping are certainly not overwhelming, and any predator can cause hardship to the trapper. Surprisingly, the majority indicated losses of fur and traps of only \$250, and the wolverine was not the chief cause.

The animal is ranked rare to common across the study area. Only the Yukon Territory and British Columbia report constant high yields or increases over the years. The rest of the study area show declines in harvest but an upsurge in the last ten years with the high price of the pelt on the market.

Among the recommendations, it is suggested that the wolverine be removed from the "game" list in the Yukon and British Columbia and from "carnivore" status in Alberta. As well, various areas are advised to be closed to harvesting, and the majority of trapping localities in Alberta, Saskatchewan, and Manitoba should only be utilized when wolverine trapping is of

economic importance to local inhabitants or when the animals are a nuisance and special permits are issued. Finally, the feasibilities and problems of the management proposals are noted.

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Thanks are due to my major advisor, Dr. R. Riewe of the Department of Zoology and my Committee members Dr. T. Carney of the Department of History, Mr. M. Shosmith, Chief of Wildlife Research, and Mr. R. Stardom, Fur Research Specialist of the Manitoba Department of Renewable Resources and Transportation, Research Branch for their cooperation and suggestions which made this practicum both an interesting and learning experience.

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The provincial and territorial governments were most cooperative in furnishing names and addresses for the questionnaire and later kindly supplied additional data as well as taking the time out to be interviewed.

The Calgary Zoo of Calgary, Alberta and the Alberta Game Farm of Edmonton, Alberta were most helpful and kindly permitted me to photograph and observe the animal in captivity. The Manitoba Museum of Man and Nature generously supplied specimens of wolverine for examination.

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With the permission of the reader, I wish to dedicate this practicum to one very near to me. My only regret is that her recent passing does not allow her to witness the completion of this project.



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## INTRODUCTION

The Canadian Wildlife Service, a branch of Environment Canada, is responsible for initiating the required interest and financial assistance to permit this study of the status of the wolverine *Gulo gulo* in western Canada. A project proposal entitled "The status and ecology of the wolverine *Gulo gulo* in Canada" was first submitted by Dr. R. Riewe, Department of Zoology of the University of Manitoba, on 7 January 1974. When the proposal was favourably received, I was fortunate to be accepted as a Master's Candidate whose practicum would deal with the wolverine. Rather than attempt to deal with the wolverine on the broad, Canada-wide scene, the decision was taken to confine the scope of this study to a more intensive examination of the subject in western Canada, encompassing the provinces of Manitoba, Saskatchewan, Alberta, and British Columbia, the Northwest Territories, and the Yukon Territory. Later, cooperation and funding were solicited from the Northern Studies Committee at the University of Manitoba and from the then Manitoba Department of Mines, Resources, and Environmental Management, Research Branch, currently called the Manitoba Department of Renewable Resources and Transportation Services, Research Branch.

This project was initiated between the Canadian Wildlife Service, the Manitoba Department of Mines, Resources and Environmental Management, and Dr. R. Riewe, based on the absolute and relative lack of information available on the wolverine. This void in knowledge is phenomenal, especially in North America, and consequently the questions of status, range, and their associated implications were asked. The overall effect on the fur trade and trappers was of the greatest significance.

The basic focus of this practicum, then, is to study the status of the wolverine, to prepare management criteria, and to examine their possible consequent effects upon the trappers of western Canada. The study has five main objectives: (1) to propose management criteria for and/or policies to ensure species preservation, (2) to determine the economic and sociological impact of management practices upon trappers, (3) to determine the past and present distribution of the wolverine in western Canada, (4) to document human-wolverine interactions in Canada, and (5) to compile the wolverine myths of Canada.

The data were collected essentially by five methods:

(1) Questionnaires: questionnaires were distributed to biologists and conservation officers in every jurisdiction of the study area excepting the Yukon

from May 1974 to November 1974. All quantitative responses were tabulated and placed on computer for analysis; qualitative replies were noted as well. Other questionnaires were mailed to trappers over the whole study area from June 1974 through August 1975. As was the case above, the responses were tabulated.

(2) Personal interviews: Over 50 trappers, biologists, government officials, and other informants were contacted and personally interviewed from May to September 1975. The majority of these conversations were recorded on tape, and transcripts have been compiled.

(3) Literature: a thorough review of the literature was undertaken, searching for scientific data, distribution, habits, and for stories from native and non-native persons.

(4) Fur records: examination of available provincial and territorial fur records, supplemented by fur auction sales, Statistics Canada, the Hudson's Bay Company, and biological and geological surveys, were made.

(5) Other: letters were sent to many scholars, zoos, and taxidermists, as well as requests for information from subscribers to wildlife magazines and northern residents for sightings and other additional data.

## METHODOLOGY

### Questionnaires

The systematics of the questionnaires (Appendix B and C) are as follows. Two basic formats were distributed throughout the study area. During May 1974, both the biologist and trapper questionnaires were set up and reviewed by the members of my Committee. The Departments of Statistics, Computer Science, and Sociology were contacted for suggestions and revisions to the format. After the approval of the format, lists were obtained with permission of each of the provinces and territories. The questionnaires were printed with a map and general letter of introduction. Self-addressed stamped envelopes were coded and placed in the addressed envelopes to indicate a name and region if the respondent did not indicate this.

Questionnaires to biologists were sent to all names supplied by the governments of Manitoba, Saskatchewan, Alberta, and the Northwest Territories. In the case of British Columbia, the list supplied was so long that only those persons specifically noted as biologists or conservation officers were contacted. At this time, no biologists were employed in the Yukon, and no questionnaires were issued for this area. All but two national parks in the study area (Long Beach and Pacific Rim) were also contacted for information. Generally,

the questionnaires were distributed between 30 May and 31 October 1974. Of the 241 sent, 154 were tabulated on computer, (a 64% return rate, Table 1). The majority of replies came from persons with less than 10 years experience (Appendix B, question 1).

Questionnaires to trappers were designed in three parts: the first (Appendix C, questions 1 through 7) to obtain basic information on the trapper, his chief fur bearers, and two questions of interest on the importance of market demand; the second (questions 8 to 11) geared to see which predator, if any, caused the most damage to fur on the trapline, the extent of the damage, and the method used to capture the animals; and the last, specifically about the wolverine, to obtain sightings, methods of capture, numbers trapped, status of the animal, and any incidents that might be relevant. Compared to the trapper questionnaire, the biologist questionnaire was not as quantitative and was seeking general and/or specific information.

Lists used for the trapper questionnaire were supplied by all provincial and territorial governments except Alberta and the Northwest Territories (where no effective trapper organization exists). The method of contacting trappers varied. In Manitoba and Saskatchewan, the questionnaire was circulated by sending 11 copies to



TABLE I

Number of questionnaires distributed  
to provincial biologists and national park personnel  
and the respective returns

Area	Number Sent	Number of Replies	Percent Returned
Province or territory			
Manitoba	50	35	70%
Saskatchewan	7	5	71%
Alberta	16	13	81%
British Columbia	125	71	57%
Northwest Territories	28	17	61%
Yukon Territories	0	0	0
National parks			
Manitoba	1	1	100%
Saskatchewan	1	1	100%
Alberta	6	6	100%
British Columbia	5	4	80%
Northwest Territories*	1	1	100%
Yukon Territory	1	0	0%
Total	241	154	64%

\*For the sake of coding convenience in the computer programme, Nahanni National Park of the Northwest Territories was included in this table only under the calculations of that territory.



local fur council presidents and secretary-treasurers, and requesting them to distribute ten copies to trappers within their district and encouraging them to complete one themselves. In British Columbia and the Yukon, trappers were contacted directly by mail since full addresses were supplied. In Alberta, a misunderstanding between myself and the president of the Alberta Central Trappers' Association resulted with no questionnaires being distributed by mail. The situation was rectified, fortunately, when I attended the Alberta Trappers' Convention in June 1975 and circulated questionnaires. Essentially the trapper questionnaires were distributed between July 1974 and August 1975. Of 3,300 questionnaires circulated, 13% were returned (Table 2). The majority of respondents operate registered traplines (Appendix C, question 1). However, some questionnaires were returned unclaimed, some were returned because the respondent was deceased, and some were returned incompleted due to lack of information on wolverines; these returns were not tabulated in the computer.

As each questionnaire was returned, the respondent's name was checked off the list, and new contacts or sources of information were noted and later reached by mail. The questionnaires were coded for S.P.S.S. (Statistical Package for the Social Sciences) at the University of Manitoba, and final compilations were completed in November 1975. At

TABLE 2

Number of questionnaires distributed to trappers and the respective returns throughout the study area

Area	Number Sent	Number of Replies	Number Used in Analysis	Percent Returned
Manitoba	911	91	80	10%
Saskatchewan	1,104	103	70	9%
Alberta	62	20	20	32%
British Columbia				
Guides	213	30	178	14%
Trappers	671	148		22%
Northwest Territories	2	1	1	50%
Yukon Territory	337	45	45	13%
Total	3,300	438	394	13%

the same time, sightings were pinned on colour-coded maps. The qualitative responses to the questionnaires were later thoroughly examined and appear on the following pages. Those people who were interviewed will be indicated by name, location of the interview, and the date. Reports and comments from the questionnaires will remain anonymous.

A mail survey is by no means the most satisfactory technique to sample public opinion and gather data. However, it does possess the following advantages: (1) the cost is considerably lower than personal interview surveys, (2) individuals dispersed over a wide geographic area can be contacted much more easily relative to personal interviewing, and (3) mail surveys have less chance of biasing the results. According to Benson (1945), it is conceivable that written answers on certain subjects might be more reliable than face-to-face contact.

Among the disadvantages, Benson (1945) notes that it is difficult to get returns from an accurate cross-section of the people; those with less formal education tend not to respond, while those more interested in and more conversant with the subject are more apt to return a survey. Franzen and Lazarsfeld (1945) add that mail questionnaires are answered by people who, due to their educational and occupational background, most easily express themselves in writing and are more interested in the topic.

### Personal Interviews

The questionnaires were reviewed in the spring of 1975 for conducting personal interviews. The criteria ranged from amount of exposure to the wolverine, experience, diversity of viewpoints, willingness to be interviewed, and distance from conventional means of transportation. Eighty letters were then sent asking if a personal interview would be possible. The response was overwhelming, and trappers and biologists as well as government officials and other informed people were interviewed through the study area.

Over the months of May, June, August, and September 1975, more than 13,000 miles in the study area were driven or flown to interview trappers, biologists, and government officials as well as to observe wolverines in captivity (Fig. 1). Unfortunately, arrangements could not be made to fly to the Northwest and Yukon Territories, and instead blank tapes were sent, accompanied by questions with the permission of government officials and trappers concerned. The majority of people interviewed were most helpful and informative and agreed to be taped. As a result, close to 40 hours of cassette tape recordings now exist and have been edited and compiled in transcripts.

### Fur Statistics

With the cooperation of provincial and territorial governments, information on the number of pelts taken per season, the average value, and total value was obtained.

Fig. 1. Map of the study area of Western Canada. The stars indicate where personal interviews took place during the late spring, summer, and early fall of 1975. In total, some 13,000 miles were travelled.



Unfortunately, some of the earlier years (*circa* 1919 to 1935) in the provincial records were confusing or not available, and Statistics Canada kindly furnished supplementary data. The Hudson's Bay Company provided wolverine production figures for 1940 to 1972.

All statistics are presented in graphic form. The total value figures are weighted to a base year using the Consumer Price Index. The years 1935 to 1939 were relatively stable in terms of number of pelts taken and prices. Using 1935 to 1939 as a base year, the real monetary value of the wolverine yield from the 1919-1920 season to the present was calculated by dividing the nominal value (number of pelts/year x average value of the pelts) by the Consumer Price Index and then multiplying by 100.

## DESCRIPTION AND BIOLOGY

External Appearance

The wolverine's head is broad and rounded on each side. It tapers to a prominent, elongate, black muzzle with a few straggling whiskers protruding from around the mouth. Similar bristles are about the head. Its ears are short and rounded obtusely; its eyes are remarkably small, set far apart, black, and beady. (Coues, 1877; Shufeldt, 1922). The legs are very stout and sturdy (Fig. 2), with five toes on both the front and hind feet, although Linnaeus (1788) notes that the anterior feet are four-toed and the posterior are five-toed. The feet are semi-plantigrade (Thomas, 1952) with large, curved, extremely sharp claws about 24 mm in length, semi-retractile, and palmated. Coues (1877) notes that the palms and soles of the feet are densely furred, but the balls of the digits are naked, especially the one beneath the carpus (Fig. 3). Hall and Kelson (1959) remark that the soles are densely haired in winter but naked in summer. Some wolverines apparently have a stub of bone at the base of the "thumb" which projects outward on the side of each front foot and gives added support (Seward, 1973). Finally, wolverines possess short, heavy, bushy tails (Fig. 4).



Fig. 2. Captive *Gulo gulo* at the Calgary Zoo, Calgary, Alberta. Note the dark pelage, short, stubby legs, and the stance. The wet appearance is atypical and a result of a recent drenching by a zookeeper.

Fig. 3. Rear paw of *Gulo gulo*. Note the naked paws, dense, bristly hair, and general size of the paw. Supplied by Bruce Campbell.





Fig. 4. Captive *Gulo gulo* at the Alberta Game Farm.  
Note the bushy tail, the lateral stripes,  
and the general body conformation.



### Pelage

The pelage consists of a short underfur of coarse, kinky wool less than 3 cm long, interspersed with long, stiff, straight guard hairs about 10 cm long on the sides, flanks, and hips. The hair is much shorter and more dense on the head and neck. The tail is covered with longer hair, some 15 to 20 cm in length.

During the course of the interview, I often questioned the old theory that the sexes reportedly brought different prices, based on the quality of the hair. It was found that neither the female nor the male possess finer hair as does the fisher (Appendix A).

Undoubtedly, the most publicized item about the wolverine has to be the frost-resistant qualities of its hair when utilized as trimming on human parkas (Banfield, 1974; Hardy, 1948; Jackson, 1961; Krott, 1960; Quick, 1953a; Weedle, 1968). Hardy (1948) sampled hair cut from the dorsal portion of three pelts (wolverine, wolf, and coyote) and from an alpaca pile fabric. The samples were cooled, sprayed with cold water by an atomizer, and placed in a refrigerator at 0°C until the water droplets froze. The pile fabric was always badly caked with ice; the wolf and coyote furs were matted down and contained chunks of ice. In the wolverine fur, the ice crystals formed on the underfur, but the guard hairs were always free from ice. Hardy

microscopically examined the guard hairs of each of the materials and found that those of the wolverine are straight in comparison with the kinky wolf and coyote ones; that the underfur of the wolverine is uniformly about 2.5 cm and the guard hairs over 5 cm long as opposed to the irregularity of the wolf and coyote guard hairs, and that the angle of insertion of the fibers of the wolverine skin is much greater than the others.

Riewe (1975) remarks that the wolverine fur from the strip across the shoulders is the best fur available for a parka ruff. However, he once related to me (Riewe, pers. comm.) that, on a hunting trip with the Inuit of Ellesmere Island in February 1971, he found that, even though he had wolverine fur parka trim, by the end of the day a mass of ice had formed from the parka trim to his beard. Why should this be? Didn't he have the best fur available, and didn't it reputedly repel frost? Upon further examination, Riewe found that the Inuit had the habit of knocking the ice off the ruff every ten minutes or so, and, even though they were wearing the inferior fur of the domestic dog, shaking the fur inhibited the build up of hoar frost. The guard hairs of wolverine are tapered rather than cylindrical, and the frost is consequently easier to brush off.



## Colour

Banfield (1974) notes the general colour as a rich, glossy, dark brown, darkest on the mid-dorsal saddle, the feet, and the tail. There is a light-coloured grayish area on the forehead and tips of the ears, often with a dark muzzle. Two pale buff stripes originate at the nape of the neck and sweep along the flanks to merge at the base of the tail. The underparts are dark brown except where irregular creamy-white spots are found on the chest and the throat. The claws are whitish or horn-coloured.

The wolverine's colour scheme varies considerably from the "typical" form described above to other specimens that vary from a totally pale brown or buff (almost albino -- Jackson, 1961) to a glossy brown with no lateral stripes to orange patches on the throat or rump. Some have no patches under the throat (Peters, pers. comm., -- Fig. 5).

Geographical differences may account for variations in pelt quality, size, and colour (Dagg and Campbell, 1974; Elliott, 1903, 1905 a + b ; Goldman, 1935). According to Ross (*in*: Coues, 1877), the colour of the fur varies according to the age of the animal. The younger animals are invariably darker than the old which exhibit more of the grey markings. In some personal observations, I found that younger animals appear darker in colour. There is no seasonal variation in colour (Green, 1956).

Fig. 5. Two distinctive pelts of *Gulo gulo*. The specimen on the left demonstrates the more-typical colour of dark, glossy brown with the buff-coloured stripes and white patches under the throat. The specimen on the right is rare, being almost albino. Note the dark-coloured legs and the orange colour near the underparts close to the rear legs.

### Molting

Geptner, et al. (1967) remark that the summer fur is shorter and lighter than the winter, but the relative difference in the hair length on the various parts of the body essentially remain the same. Green (1956) remarks that there appears to be no difference between the density of summer and winter pelage. Geptner, et al. (1967) state that spring shedding is believed to be complete, while the autumn shedding is probably not complete. However, Novikov (1956) indicates that molting occurs twice a year. A spring molt begins on the flanks and withers, extending gradually posteriorly.

No trappers, biologists, or zoo-keepers knew of molting on the wolverine, although they all indicated that its pelt is prime from the latter part of November to early March, perhaps longer where the climate is colder. Sam Clifton (pers. comm.) related that beyond March they seem to be losing hair, what most trappers call "rubbing", where the flanks appear scruffy. Bruce Campbell (pers. comm.) mentioned that when the snow becomes soft and the sun begins to become more intense in late winter and spring, the pelt can become singed.

### Size and Weight

The wolverine is one of the largest members of the mustelid family. Jackson (1961) notes that it is second only in size to the sea otter among the North American mustelids. In size it has been likened to a fat spaniel or a bear cub (Banfield, 1974). The male adult is slightly larger than the female (Thomas, 1952; Weedle, 1968), some 10% in linear length and 30% in weight (Hall and Kelson, 1959). The male usually weighs about 15 kg, although Weedle (1968) notes Alaskan wolverines weighting about 23 kg. Krott (1960) indicates that the weight can be as much as 35 kg, but the average weight in Europe is approximately 25 kg. The European relative thus appears heavier than the North American version (Weedle, 1968).

The average measurements of American adult males are: total length - 1,000 mm (904 to 1,070); tail length - 231 mm (218 to 260); length of hind foot - 184 mm (178 to 190); length of ear - 55 mm, and weight - 14.8 kg (11.3 to 16.2) (Banfield, 1974). The height at the shoulder is approximately 430 mm (Krott, 1960). Average measurements of adult females are: total length-901 mm (865 to 932); tail length-223 mm (210 to 250); length of hind foot - 160 mm (155 to 165); length of ear - 48 mm (38 to 56); and weight - 10.6 kg (6.6 to 14.8) (Banfield, 1974).

### Anal Glands

By far the most active glandular organs are the pair of anal pouches about the size of a walnut (Coues, 1877) that secrete a malodorous, yellowish-brown-greenish fluid of a honey consistency. Coues (1877) notes that the discharge is by the usual lateral papillae within the verge of the anus. According to Krott (1960) the wolverine is able to spray this fluid up to a distance of nine feet. Krott also mentions a yellowish spot on the abdomen which suggests a second gland in front of the genitals.

### Home Range and Territory

Burt's (1943) concept of home range is the area, usually around a home site, which the animal travels in search of food, and a territory as the protected portion of the home range, be it the whole range or the den site.

The wolverine appears to require large ranges and some form of territorialism, the sizes of which are almost totally linked to the availability of food. Abundance of food, however, is not one of the characteristics of the taiga and tundra biomes. Novikov (1956) feels that wolverines migrate extensively, especially in the tundra, on a seasonal basis with a southward movement in the winter to follow the caribou. Krott (1960) found that the wolverine in Scandinavia is not nomadic. It does not wander aimlessly but sticks to certain trails. The trails

are not narrow paths but strips of terrain about a half-mile in width. These trails are in wide, serpentine lines and frequently change direction. Quick (1953a) discovered that on traplines in British Columbia the wolverines used favoured travel routes, perhaps indicative of family groups. In fact, one experienced trapper, Sam Clifton (pers. comm.), feels that a wolverine family occupies a home range that centres around a river. Quick (1953a) also followed wolverine tracks and found them to meander back and forth across the trapline for distances of eight to ten miles. This may be indicative of the animal following the "line of least resistance" as do other carnivores.

Cockerton and Herrero (1973) uncovered two general types of movement in their study of wolverine in Mt. Assiniboine Provincial Park in British Columbia. The first is a meandering and investigative pattern, while the second is more-directed in line, either away from a situation (for example, hikers or skiers) or toward a particular place (for example, a food cache). The authors note that they were impressed with the wolverine's familiarity with the terrain, and they discovered that repeated use is made of certain areas or routes in a back-and-forth movement rather than a regular "circuit-type" passage. The wolverine may have a general home range and make extensive use of it, but they feel the animal is a general opportunist who shifts its centre of activity as it wanders and finds food.

In Scandinavia, a male wolverine was found to occupy 2,250 km<sup>2</sup> (Krott, 1960) in the shape of large irregular circles with the same diameters and the peripheries flattened when touched (Krott, 1959). The territories are of a peculiar nature with one male to two or three bitches. No other males are allowed, and, because a male only associates with a female for possibly two or three weeks during the breeding season, each bitch occupies a smaller territory within the male domain. Quick (1953a) estimates densities of one wolverine per approximately 210 km<sup>2</sup> in British Columbia, using catch records and tracks recorded on traplines to base his calculations. Teplov (*in*: Dagg and Campbell, 1974) notes one wolverine per 1,000 km<sup>2</sup> of woodland in Russia; Krott (*in*: Dagg and Campbell, 1974) records one wolverine per 780 to 5,200 km<sup>2</sup> in northern Europe; and Edwards and Cowan (1957) note the density anywhere from 610 to 24,000 km<sup>2</sup>.

Apparently, individual wolverines show strict, mutual respect for the territorial boundaries marked by an individual's feces, scent of the animal's spoor, scent marks left regularly by the animal rubbing its ventral side, as well as by urinating (Krott, 1960). Haglund (1966) also mentions that bite signs on coniferous trees are used to indicate a territory. The author believes that the bites bring out the smell of the ethereal oils of the trees. Scratching and stripping off bark are also

suggested as territorial markers (Cockerton and Herrero, 1973). In addition, Hall (1926), in his investigation of the abdominal skin gland of both sexes of various species of mustelids, found the gland present in the wolverine and suggests that the secretions from the gland may be smeared on objects to serve as a source of information for other members of the species.

Wolverines are capable of travelling long distances in relatively short times. Nowak (1973) reports movements of up to about 50 km in one day. Seton (1953) has many references to the wolverine's vast range; one reports following a wolverine for a couple of days at 65 km a day, and another mentions a wolverine travelling some 50 km away from where it had stepped into a trap. Seton (1953) mentions that the wolverine ranges widely, covering an area at least 80 km across in winter but considerably less in summer when food is more available and the animal must stay in the neighbourhood of its family. Cockerton and Herrero (1973) calculate a distance of 25 km traversed in several hours, 25 to 30 km in another case, and 120 km in a third "... with no obvious signs of rests or pauses". Comments similar to those expressed by Seton (1953) were heard during the course of questionnaires and personal interviews. Trappers recounted chasing wolverines caught in traps and dragging the toggles for days before succeeding in catching them. Others were never to see their traps or the animals again.



The vast extent of the wolverine's range makes it impossible to accurately predict when the animal will appear at a certain point. Some trappers indicate that they may see evidence of one wolverine during one year and none the next; others expect to see wolverine every year, and some at least two or three times a season.

#### Use of Musk and Urination

Several trappers remarked that wolverine often urinate on caches. Frequent urination and sometimes scats have been observed to have been left prior to feeding on kills or claimed kills (Cockerton and Herrero, 1973). Trappers also noticed that often wolverine kills will not be touched by other carnivores, although Haglund (1966) notes a lynx coming across a recent reindeer killed by a wolverine and eating it. Even when they break into cabins, wolverines have a tendency to urinate and defecate freely.

George Kofoed (pers. comm.) of Terrace, British Columbia described an incident when he visited Stanley Park Zoo in Vancouver. Upon passing a wolverine cage, he noticed that the animal went into the water trough and urinated. Later, when fed, it proceeded to carry a beef lung with its teeth into the trough, urinate on it, and then devour it.

Among trappers and outdoorsmen, the smell emitted from the stink glands is described as ranging from reeking and putrid to characteristically mustelid or little odor. Krott (1960) considers the odor to be far-less unpleasant than that of a skunk. Oeming (pers. comm.) of the Alberta Game Farm remarks that the much-talked-about strong scent simply does not exist. He feels the scent of the fox, fisher, or mink is far-more offensive.

The musk appears to be emitted during fighting and under excitable conditions (Seton, 1910). Krott (1960) remarks that one pair of young would, when alarmed, roll on their backs and claw the air furiously and expel the contents of the stink glands. Care must be taken when an animal is skinned not to cut these anal glands.

### Solitary Nature

*Gulo gulo* appears to be a solitary animal (Anonymous, 1974a; Banfield, 1974; Fry, 1923; Krott, 1959, 1960; Quick, 1953a; Thomas, 1952) and associates with the opposite sex only during the mating season and when the young are dependent on the female (Cockerton and Herrero, 1973).

In a response to my appeal for sightings of the wolverine, one gentleman reported seeing two wolverines on the upper canyon of the Peace River, four miles below the Bennett Dam in July 1974. A lady wrote that she saw four

wolverines, apparently all adults, on the north slope of Deception Pass, 12 miles east of Lake Louise in August 1974. Sid Avery (pers. comm.), a long-time trapper who has live-captured wolverines for zoos, told me that he has seen families, four or five of them in a group, travelling together in July and August. All instances of more than one travelling together occurred during the breeding season or during the young-rearing period.

#### Food Habits

Considering the severity of the wolverine's taiga and tundra habitat, it cannot afford to specialize in its food habits. Although it is largely carnivorous, autopsies have revealed that it is omnivorous, especially during the snow-free months. In the spring, the eggs and young of birds occur in the diet, as well as on the larvae of wasps, bees, insects, and berries (Haglund, 1966; Krott, 1960). They also pursue fish and frogs. Novikov (1956) mentions that they eat small quantities of bilberries, cranberries, cedar nuts, and occasionally bracket fungus. Rausch and Pearson (1972) note that the summer foods are not well known, but microtines, ground squirrels, and marmots are utilized. They also mention that a wolverine shot in September contained five microtines, weighting 153 g, plus 190 g of blueberries with the dark blue stainings of the digestive tract,

testifying to the regular sustenance on the berries. Rausch (1959) reports from autopsies the following items in 20 stomachs: moose or caribou, 12 (60%) -- probably carrion; porcupine, 3 (15%); snowshoe hare; red-backed vole; magpie; unidentified hawk; unidentified bird; remains of a fish; a vole; and a ground squirrel. To this list, individual trappers add marten, woodchuck, and beaver.

In winter the wolverine feeds primarily on muskox, deer, moose, caribou, elk, and reindeer as well as hares, ptarmigan, and fur-bearers in or out of traps. Incidences of killing mountain goats have been reported (Guiguet, 1951), and Norm Mackenzie (pers. comm.) feels they also take bighorn sheep in the mountains. Whether these animals have died of disease, parasites, old age, natural predators, or man is unknown. However, predators such as wolves, lynx, fox, coyotes, and bears undoubtedly contribute to the welfare of the wolverine.

Haglund (1974) found wolverine attacks on moose to be "infrequent", and Rausch and Pearson (1972) feel that predation occurs only under "unusual environmental stress". Cockerton and Herrero (1973) report no instances of wolverines preying on large animals. However, documented cases prove that wolverine do in fact kill adult moose and reindeer (Cowan, 1944 *in*: Haglund, 1974; Pulliainen, 1963). Teplov (*in*: Knorre, 1959) studied wolverine predation on European

elk and found it to be the elk's main enemy. He confirms 16 instances of destruction of elk by wolverines over a 12-year period as opposed to 5 kills by bears. In the majority of cases, the young pregnant heifers, the yearlings, and the wounded or sick were the focus of attack. In Sweden, of 50 cases of remains of reindeer, only 15 could be substantiated as caused by wolverine (Haglund, 1966).

Studies reveal, however, that wolverines are primarily carrion feeders (Banfield, 1974; Haglund, 1966, 1974; Novikov, 1956; Pruitt, 1970; Rausch and Pearson, 1972; Richardson, 1829), and, in fact, Buffon (*in*: Richardson, 1829) declares it to be the "quadruped vulture", and Krott (1959, *in*: Haglund, 1974) calls it the "hyena of the north". Rausch and Pearson (1972) also state that carrion in coastal Alaska (unidentified whales, walrus, and seals that are washed ashore) are used extensively by wolverines.

In summer, wolverines have more difficulty in capturing prey. Unlike cats, they do not lie in wait or stalk victims, and they do not possess the fleetness that wolves have to pursue game. Their method of hunting is characterized by endurance and perseverance; to Francis Seaton (pers. comm.) of Terrace, British Columbia the wolverine is the "epitomy of perseverance". Wolverines cannot move with stealth; in fact they make no effort at all to suppress noise. Compared to them, bears almost move inaudibly (Krott, 1960).

Consequently, their fleet-footed, larger prey almost invariably succeed in evading them. If this carnivore is to feed at all on larger prey, it will be through the efforts of other animals or some natural occurrence.

In the winter, the wolverine appears to be aided by the presence of snow. The snow cover not only permits a more-silent approach, but it also slows down the prey in its escape attempts. Knorre (1959) found that, of 22 large north Siberian predators, the wolverine exerted the least pressure ( $22 \text{ g/cm}^2$ ) due to its widespread digits.

Petri (1930, *in*: Formozov, 1946) mentions that in Pechora-Ylynchski National Park when the snow reaches a depth of 130 to 150 cm, wolverines caught reindeer after two or three short jumps. The reindeer sank in the fluffy snow, clearly giving the advantage to the predator. Two of the trappers interviewed in Saskatchewan feel that the wolverine's short, stubby legs hamper its movement in deep snow, and in these circumstances it seems to patrol the shoreline where the snow is more compacted (Theriau and Darbyshire, pers. comm.). In fact, Andy Horne (pers. comm.) of Little Fort, British Columbia indicates that wolverine do not seem to travel with a heavy snowfall; they wait until a crust forms on the snow to permit easier locomotion.

### Supplementary Feeding Habits

A case has been documented of cannibalism by Flook and Rimmer (1965). In this instance, five wolverines and two marten were found in a wooden water tank near Lake Louise Junction in Banff National Park, Alberta. One or more of the wolverines possibly followed the marten into the tank to prey or scavenge on them. In the end a female out-lived the others, and cannibalism was evidenced in the feces. I was informed by the Boråssparken Zoo in Sweden that they have not heard of wolverines born in captivity that turn cannibalistic (Ljungbergh, pers. comm.).

Sid Avery (pers. comm.) narrated to me an interesting story of when he was in a mining camp years ago in the Northwest Territories. The night watchman saw some animal in the camp and shot it. The animal was a wolverine. Satisfied with his marksmanship, the watchman made his rounds. When he returned to the site two hours later, the animal was gone. Sid was curious as to what had happened, so he followed the trail. The tracks appeared to be those of a second wolverine dragging the one shot. After a mile or so, he came across some hair and bones. After three miles, the wolverine walked away leaving the carcass behind.

It is generally known that wolverine establish food caches, despite Seton's (1953) claim that the animal faces "King Jack Frost" dependent on its own resourcefulness.

These caches consist of whole or portions of carrion or prey and are usually buried in the ground or snow. If the ground is unsuitable for digging, a tree may provide a site, with the meat skillfully angled in a branch or trunk (Krott, 1960), or perhaps hidden under rocks (Liewelyn, 1854), or on heaps or rocks or crevices (Haglund, 1966).

#### Reproduction and Den Sites

From the most recent accounts (Banfield, 1974; Danilov, 1965; Pulliainen, 1968; Rausch and Pearson, 1972; Wright and Rausch, 1955), the wolverine mates during the late spring and summer months of May, June, and July, although Wright and Rausch (1955) indicate April through October, likely midsummer, and Krott (1960) mentions April through August. Seton (1953) and Danilov (1965), however, place the breeding season in the middle or end of March and September, respectively. Prell (1932) believes that the wolverine has a double mating season, a primary one perhaps in May or June and a secondary one in January. Apparently the secondary breeding season is without significance for reproduction. Rausch and Pearson (1972) found no evidence of winter breeding since male wolverines are not in breeding condition during the late fall and early winter.



Some of the trappers interviewed indicated that they had seen wolverine travelling in pairs in January (Seaton, pers. comm.) and February (Warner, pers. comm.). It was suggested that perhaps the wolverine breeds every two years and may be dependent on food supply to trigger mating and reproduction (Mackenzie, pers. comm. and Horne, pers. comm.). Krott (1960) mentions that a bitch is in heat only every two or three years. From all accounts, especially Rausch and Pearson (1972), this does not seem conceivable. From the information available, the female is monoestrous and the male polygamous.

Delayed implantation occurs, with the blastocyst being implanted in January or February. The pups are reportedly born during the last half of February through the first half of April, although Rausch and Pearson (1972) note parturition is spread over at least two-and-a-half months, and Pulliainen (1968) indicates February or March. The period from implantation to parturition is believed to be between 30 or 40 days. The total gestation period then is seven to nine months. Rausch and Pearson (1972) report that the litter size averages 3.5, varying from 2 to 5, while Pulliainen (1963, 1968) indicates 2.5 and 2.6 in Fennoscandia. Litters as high as six have been reported (Shufeldt, 1922). Krott (1960) mentions a factor that may have a bearing on the breeding season and birth; these dates may be related to the latitude and altitude, the more northerly the animal, the later the young are brought forth.

No indication of the amount of abortion or the survivorship rate of the young was found in the literature other than Wright and Rausch (1955) noting that there may be a loss of potential young prior to implantation or after implantation, and Rausch and Pearson (1972) mentioning that the stress of being trapped could induce parturition in near-term females. One female caught in February had ingested one newborn. A British Columbia guide writes:

"A friend of mine caught five wolverine and took four alive. I raised three of them for a while, before selling them to the Alberta Game Farm. One female had two young, one was stillborn, the other alive. A few days later my hounds started baying; she got scared and ate the young. The young that was stillborn she threw out of the cage."

Another B.C. trapper wrote to say one female that he caught and kept alive gave birth to two pups in the latter part of January; one was stillborn, and the other was nursed for three or four days until it fell out of the cage and froze.

Two cases of perodactylus in the same litter have been noted by Pulliainen and Alfthan (1967). Genetic factors are considered to be the most likely explanation, although radioactive fallout accumulation in the lichen → reindeer → wolverine food chain is suspected.

Unfortunately, the limited success of zoos in rearing young has not advanced our understanding of reproduction in this mustelid. Mohr (1938, *in*: Rausch and Pearson, 1972) notes that in the Copenhagen Zoo a pair was bred between

17 and 22 July, 1916, and the female gave birth on 17 February 1917. Davis (1967) reports that a female wolverine gave birth to two pups on 16 February. Al Oeming of the Alberta Game Farm (pers. comm.) reports that one female was received in February of 1959 in a pregnant condition. The female produced two young which she nursed for four days but then abandoned to perish. Few zoos contacted actually have wolverines, and even fewer report any success of reproduction. Success has been reported at the Boråssparken Zoo in Sweeden. Frank Velte, zoologist for the Seneca Park Zoo of New York, writes that attempted breeding was noted in late January of 1974 and continued through February. The female became very aggressive, and the male was forced to stay outdoors. Whenever the male approached the den, a battle would result. Velte had his hopes that some young might be produced in late April and early May. Unfortunately, this was not the case (Velte, pers. comm.).

In a telephone conversation with Helge Neilsen of the Calgary Zoo (pers. comm.), it was mentioned that, since wolverine are so secretive in their ways especially in the enclosed portion of the cage and since they are largely nocturnal, copulation could be taking place unobserved. It is conceivable that, since the wolverine is a carnivorous mammal, the stress of zoo life may cause the female to cannibalize or abort her young although no indication of either has been found in the feces.

The pups are reported by Krott (1960) to weigh approximately .10 kg and to remain blind for four weeks. The first natal coat is fuzzy and a creamy-white colour with darker paws and mask. The tail is stubby (Banfield, 1974). Later, the colour turns to a light brown or buff colour, and by three or four weeks the colouration is usually similar to the adult. The young are reportedly suckled for up to ten weeks (Krott, 1960). Their first solid foods are pieces of carrion from caches set up by the mother. She carries these pieces, well-mixed with saliva, to the den and regurgitates so that the cubs can digest the food (Krott, 1960). Interestingly enough, the female aids their digestion by licking the pups' abdomens (Krott, 1959).

Pulliainen (1968) reports that a majority (81%) of the dens discovered in Finland were found in valleys. Zetterberg (1945) and Haglund (1966, both *in*: Pulliainen, 1968) state that the dens are mainly found above the timberline in the Scandinavian mountains, while in Norway they are situated 200 to 1,500 m above sea level, most of them between the 500 and 1,000 m contour line (Myrberget, 1968). It may be surmised then that in Fennoscandia the cubs are born in dens located in valleys, although dens have been found on spruce and pine peat bogs (Pulliainen, 1968) and even on branches, in the snow, or on the bare ground (Myrberget, 1968).

Fry (1923) notes that he has discovered dens at altitudes of 3,300 and 3,350 m; curiously no bones of prey could be found. Sites have been discovered in beaver lodges (Seton, 1953), old bear dens, and creek beds under fallen logs and roots of upturned trees, or among boulders and rock ledges (Cockerton and Herrero, 1973).

Snow appears to play an important part in the breeding biology, (Cockerton and Herrero, 1973; Pulliainen, 1968). The importance of snow cover and its insulative capacities are well known (Formozov, 1946; Pruitt, 1965). The female is apt to leave the young alone in the den to search for food or to visit a cache, and consequently the combination of snow cover, dense pelage of the animal, and huddling behaviour all afford good protection. Hence, the temperature of the wolverine's den is high enough from the standpoint of thermoregulation and low enough from the standpoint of the development of cold resistance (Pulliainen, 1968).

It is conceivable, that, if a pregnant female is pursued when parturition is near, she may wander from possible site to site and then give birth in exceptional places (for example, in the snow), although Jackson

(1961), believes the female makes little provision for a den and is content to find shelter in a shallow cave, under a rock, or fallen tree. Some sites have been found scantily lined with leaves, grass, moss, and bits of fur, although others have no material collected for lining (Pulliainen, 1968). The cubs are seldom found on stones or rocks in the den. They usually lie on snow, branches, or the bare ground (Cockerton and Herrero, 1973). Pulliainen (1968) found the dens to be 1 to 40 m in total length and are usually long holes dug under the snow. Myrberget (1968) found the dens to consist of one or two main tunnels 5 to 60 m long, usually 12 to 30 m. The pups were almost always found in a shallow pit of 5 to 15 cm deep on the ground. The Fennoscandia dens had one or more openings, and Krott (1960) also notes that the wolverine seems to have several access routes to the den. Camouflage dens have been known to exist (Krott, 1960). Pulliainen (1968) and Myrberget (1968) comment that food and excrement appear to lie in definite places.

Krott (1960) discovered that a female wolverine will not defend her pups unless they are very small. He discovered a den occupied by three pups, a male and two females, and took them from the den and placed them carefully in his knapsack for transport home. He soon realized that he was being watched by the mother. She

followed for a while, but "not even her fear for her children was sufficient to make her discard her usual prudence". However, some naturalists defend this desertion by the female as an attempt to lure danger away from the den (Weedle, 1968).

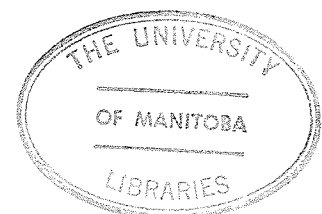
Data suggest that the pups leave the den in April and May. At the Colorado Zoo the pups first emerged from the den during the latter part of April but could only be seen at night. They are reported to have come out during daylight by mid-May (Davis, 1967). Myrberget (1968) feels that the young leave the den forever after 10 May.

It is believed that by the fifth month the young are acquainted with the ways of marking a territory, caching, and catching small prey. How long the pups remain with the female is still a matter of dispute. Banfield (1974) contends the first winter; Krott (1960) maintains up to two years. Rausch and Pearson (1972) found most male wolverines to be sexually mature when 14 or 15 months old, although some do not produce sperm until 26 or 27 months. Some females mature at 12 to 15 months and produce their first litters when two years old. They found 50% of the females 16 to 28 months to be pregnant, and 91% of those 29 months and older were pregnant. Asdel (1964, *in*: Van Zyll de Jong, 1972) maintains that

the first sexual reproduction is in the third year. In any event, the young females may be pushed out by the bitch anywhere from their first to second year and the males likewise by the father, unless of course a vacancy exists in the territory.

### Sex Ratio

Little information exists on the sex composition of wolverine populations. Pulliainen (1968) found the secondary sex ratio of 37 pups to be 15 females and 22 males which is not statistically different from a 1:1 ratio ( $\chi^2 = 1.324$ ). Based on kill statistics, Pulliainen (1963) found the sex ratio to be 42% males, 58% females. However, ratios derived from catch statistics do not necessarily reflect the ratio in existing populations as demonstrated by Yeager (1950, *in*: Rausch and Pearson, 1972) where he postulated that the disparity in pine marten, normally biased towards males, results in the tendency of males to roam over larger areas than females. Rausch and Pearson (1972) found the ratio of 14 fetuses was six males to eight females, whereas of 554 animals trapped or snared a male:female ratio of 164:100 was recorded.





### Natural Enemies

Literature abounds with instance after instance of the wolverine scaring off bears, wolves, foxes, lynx, and mountain lions from kills, although Banfield (1974) notes an instance of a wolverine falling to a pack of wolves. Fry (1923) even goes so far as to call him the "King Beast of the Sierras". According to Krott (1960) its main enemy is the hedgehog in Europe and in North American the porcupine:

"The tupu is well able to kill either of them, but sometimes he eats them, and then woe betide him! Slowly but surely the spines bore their way through the stomach walls and sooner or later the unfortunate tupu dies."

The Detroit Zoo has reported several wolverines dying shortly after arrival due to porcupine quills (Anonymous, 1947). Adolf Grewatsch (pers. comm.), an experienced outdoorsman, stated in an interview that he has found them loaded with quills between the hide and the underlying muscle tissue, but they have not penetrated any further. Sam Clifton (pers. comm.) related that he too has found quills under the hide. Others have found quills in the hides of wolf, coyote, and bears also. No trapper had found a wolverine's death attributable to ingesting porcupine. Quick (1953b) found no porcupine remains in 15 animals examined.

Sam Bennett (pers. comm.) related an interesting idea that he had been told by Indians that wolverines live on wolf pups; one draws the female off while the other wolverine kills the pups. Eventually the female returns to find the cubs dead, leaves, and the wolverine family feeds on the carcasses.

It is my belief that man is the only important "enemy" of the wolverine. For centuries, man has despised this creature, largely due to ignorance and largely because it competes with man for the same resources (small and large game and fur-bearers). Naturally, when man invaded land that was previously the domain of such creatures as the wolverine, interactions were bound to occur, especially with a mammal of whom, to this day, so much remains to be learned and understood. Extermination attempts, not always purposefully set for wolverines, have often taken their toll. For example, Manitoba reports four wolverine poisoned in the wolf campaign of 1953-54 (Anonymous, 1953-54).

Pruitt (1967), in his vivid portrayal of the Animals of the North, writes of a case where poison is set in the carcass of a caribou. The poison claims not only the intended wolves, but also the raven and the fox:

"A wolverine loped over the lake surface, ate of the poisoned caribou, and jerked through the snow into the forest. The wolverine's amazing resistance to strychnine enabled him to travel for two miles, struggling and snapping at the fire in his stomach, before he too died."

As Pruitt mentions, wolverines do show amazing resistance to poison. One Manitoba trapper wrote that the old-timers used to tell him that poison will not kill the wolverine. Another mentions that, while trapping one winter with a friend who used poison, they came across a wolverine track and followed it. They saw evidence of vomiting but found no carcass. This apparent resistance to poison is perhaps based on intuition to its effects, or the animal may have experienced a small piece of poison before. However, Oeming (pers. comm.) notes that wolverines are addicted to poison, and considerably more are destroyed by this technique at poison sites than wolves.

HISTORICAL DERIVATION OF THE COMMON AND  
SCIENTIFIC NAMES OF THE WOLVERINE

In the 10th and the subsequent 13th editions of *Systema Naturae* (Linnaeus, 1758-1759, 1788) two separate names for the wolverine are listed; *Mustela gulo* refers to the European or Old World animal, while *Ursus luscus* is for an animal from the Hudson Bay region of the New World. Linnaeus includes the species name *luscus* under *Ursus* (bear) and under the rubric *Mustela* (weasel), the species name *gulo* is utilized. *Gulo* in Latin means gullet or throat and implies gluttonous or greedy (Simpson, 1959). *Luscus* translates as one-eyed (Simpson, 1959), but it is conceivable that *luscus* is a corrupted form of the latter-day Latin *lusciosus* half-blind (Carney, pers. comm.).

Edwards (*in*: Beebe, 1940) states an animal fitting the wolverine's description was brought from Hudson Bay and lived at the house of the founder of the British Museum.

"... in its progression it formed a circular flourish, turning quite around every few paces it made: I believe this motion was not natural, but owing to its having lost an eye, for it turned off always on the side where the eye was wanting."  
(Edwards, quoted *in*: Beebe, 1940).

Beebe believes this specimen was undoubtedly the same one named *luscus* by Linnaeus.

*Gulo* later replaced the other generic names (Beebe, 1940). I will not differentiate between subspecies or species of the wolverine found in Canada, and, for the sake of conformity, this animal will henceforth be labelled *Gulo gulo* as named in the most current and complete Canadian authority, Banfield (1974).

Table 3 lists some of the various names under which the wolverine is known. From personal interviews I discovered that the Cree word for wolverine sounds like *omay-datch-eese*, which seems very close to Richardson's (1829) *ommeethatsees* which apparently means "one who likes to steal". *Magatose* is the old Cree word for wolverine, and, interestingly enough, *ogaymotatowagu* or "one who steals fur" is a derivative of wolverine and was applied to the fur dealers and buyers of days past. Richardson (1829) attributes the names of quickehatch from the English residents of Hudson Bay and *carcajou* of French Canada as derivatives of the Cree name *okee-coo-haw-gees*.

Most current literature lists the common names of skunk-bear, glutton, Indian devil, and *carcajou* (Annabel, 1950; Carroll, 1968-69; Manville, 1950; Murphy, 1949; Odum, 1975; Rathert, 1972; Ritter, 1942; Shufeldt, 1922; Sprunt,

TABLE 3

Various names under which the wolverine is known\*

Continent and Common Name	Geographic Location and Linguistic or Ethnic Group	Reference
North America		
<i>le carcajou</i>	French Canadian	Seton (1953)
quickehatch	Hudson Bay English residents	Richardson (1829)
<i>kin-kwa-har-gay-o</i>	Cree	Seton (1953)
<i>ommeethatsees</i>	Cree	Richardson (1829)
<i>ckeecoohagew</i>	Cree	Richardson (1829)
<i>ckeecoohawgees</i>	Cree	Richardson (1829)
<i>kween-go-ar-gay</i>	Ojibwa	Seton (1953)
<i>no-gy-ay</i>	Chipewyan	Seton (1953)
<i>nag-hai-eh</i>	Chipewyan	Richardson (1829)
<i>skay-cha tung-ka</i>	Yankton Sioux	Seton (1953)
<i>ka-e-week</i>	Boothia Felix Eskimo	Ross In: Seton (1953)
<i>kab-le-a-rioo</i>	Melville Peninsula Eskimo	Seton (1953)
<i>kablee-arioo</i>	Melville Peninsula Eskimo	Seton (1953)
<i>kap-rik</i>	Northwest Alaska Eskimo	Anderson In: Seton (1953)
<i>kap-vik</i>	Mackenzie Eskimo	Anderson In: Seton (1953)
<i>kal-vik</i>	Coronation Gulf Eskimo	Anderson In: Seton (1953)
<i>nanabozho, manabozho,</i> <i>nanabush</i>	Ojibwa, Potawatomi, Fox, Sauk, Menomini	Leach (1972)
<i>wisakedjak</i>	Plains Cree, Ojibwa	Leach (1972)
<i>wee-sa-kay-jac</i>	Sandy Lake Cree	Stevens (1971)
<i>geen-go-hongay</i>	Sandy Lake Cree	Stevens (1971)
wolverine	local Canadian use	Beebe (1940)
skunk-bear	local Canadian use	Beebe (1940)
Indian-devil	local Canadian use	Beebe (1940)
glutton	local Canadian use	Beebe (1940)

Table 3 cont'd on page 49

TABLE 3 cont'd

Continent and Common Name	Geographic Location and Linguistic or Ethnic Group	Reference
<b>Europe</b>		
<i>glouton</i>	France	Knight (1833-1843)
<i>rossomak</i>	USSR	Knight (1833-1843)
<i>rossomaka</i>	USSR	Richardson (1829)
<i>rossomakal</i>	USSR	Beebe (1940)
<i>jerf</i>	Sweden, Norway	Richardson (1829) and Coues (1877)
<i>jaerv</i>	Norway	Coues (1877)
<i>filfras</i>	Norway	Coues (1877)
<i>cerff</i>	Sweden	Beebe (1940)
<i>filtrass</i>	Sweden	Coues (1877)
<i>ahma</i>	Finland	Pulliainen (1974)
<i>vielfrass</i>	Germany	Van Martens <u>In:</u> Coues (1877)
<i>vilfruss</i>	Germany	Beebe (1940)
<i>wilfras</i>	Germany	Richardson (1829)
<i>veelvraat</i>	Holland	Houtt <u>In:</u> Coues (1877)
<i>gleddk</i>	Laplanders	Coues (1877)
<i>tupu</i>	Scandinavia	Krott (1959)

\*This table includes only those common names encountered in the available literature. It is not complete in its present form.

1944; White, 1946). The name skunk-bear is derived from the wolverine's bear-like appearance and gait, from what some consider to be a vile odor secreted from the anal glands, and from the stripes running laterally down to the posterior end. Glutton refers to the wolverine's reputation for having a voracious appetite. Indian devil indicates the veil of superstition surrounding this animal from the Indians, some of whose stories have often been incorporated by non-natives into their literature and folklore.



## FOLKLORE

Early European Folklore

The written history of the wolverine dates from the 16th century, and even then the description of the animal is filled with extravagance. In 1517 Maciej z Miechowza (*in*: Beebe, 1940) stated that the wolverine was known by the "ancients" and has since been discovered in the northern parts of the world. Because of its voracity "... it is called Gulo, that is a deuourer in imitation of the Germans, who call such deuouring creatures *Vilfruss* ...". Olaus Magnus (1562, English translation *in*: Beebe, 1940) is often credited by most writers as the source of their accounts of the wolverine, from its destructive powers to its voracity to the means by which it fills itself to the point of bursting and ridding this ponderous load by squeezing between two trees (Coues, 1877; Knight, 1833-1843; Leiwelyn, 1854; Richardson, 1829).

"Wherefore this Creature is the most voracious: For he finds a carcasse, he deuours so much, that his body by over-much heat is stretched like a drum, and finding a streight passage between Trees, he presseth between them, that he may rid his body of flatulance and being thus emptied, he returns to the carcasse till he hath deuoured it all: and then he hunts eagerly for another."

Bishop Magnus continues that the inhabitants, especially the nobles, prize the wolverine skin "... because it quickly breeds heat, and holds it long; ...". Amusingly, those that are reported to have slept on the skins have dreams about the creature, have an insatiable stomach, lay snares for other creatures, and are not captured themselves. "There seems to be another secret of Nature in it, that those who are clothed in these skins, seem never to be satisfied." The guts of the wolverine are reportedly made into strings which produce a harsh sound, but when tempered with sweet-sounding strings they produce an enjoyable sound. The hunters drink the blood mixed with hot water and honey, and are besotted at marriage ceremonies revealing a form of animistic worship. Finally, recently amputated paws drive cats and dogs off (Magnus, *in*: Beebe, 1940).

One of the earliest drawings of a wolverine depicts the animal squeezing itself between two trees with an anxious expression on its face and a distended posterior and rapidly augmenting a large pile of feces (Beebe, 1940). A German-born trapper from northern British Columbia (Grewatsch, pers. comm.) remarked on a Viking saga that he had heard in his youth wherein a wolverine finds an animal, eats as much as he can, then squeezes himself between two trees to relieve himself.

Buffon (*in*: Richardson, 1829) described how wolverines attack larger quadrupeds or even man without hesitation. Wolverines ascend trees and lie in wait for reindeer and elk to pass in order to pounce upon their backs (Billings, 1856). According to Buffon, wolverines even go so far as to entice the prey by throwing down moss on the ground. Also, the arctic fox may drive game towards the wolverine with only the wolverine's leavings to feed on.

Liewelyn (1854) commenting on the folklore of Scandinavia relates that the glutton is believed to be the bear's third cub. Quoting Pontoppidan, he adds:

"If this creature finds a carcass six times as big as himself, he does not leave off eating as long as there is a mouthful left; he must therefore be tormented with such insatiable hunger, that even a crammed belly does not abate it."  
(Pontoppidan, *in*: Liewelyn, 1854).

Pontoppidan is assured by a friend, that when a glutton is caught alive and chained to a stone wall, his appetite does not decline since he eats into the wall.

These are just a few of the most common gross exaggerations of this species, and they have been brought

to the reader's attention because they are part of the history of the wolverine. Coues (1877) comments on the fact that these earlier writers appealed to the popular love of the marvellous; the fables took hold, only to choke out the sober accounts. The authors were treated with respect according to their years, and Coues wonders how many conceptions of the wolverine

"... were uncolored with romance; the general picture impressed upon the susceptible mind of that period being that of a ravenous monster of insatiate voracity, matchless strength, and supernatural cunning, a terror to all other beasts, the bloodthirsty master of the forest."

Canadians pride themselves on being a multi-cultural nation, one composed of nationalities from all over the world but primarily from continental Europe. Consequently, this "romantic frame of mind" was carried with the conquerors of the American continent, and their folklore, literature, and convictions were engraved into the mentality of those encountering this mammal once again.

Before examining the more contemporary Euro-Canadian tales, we shall first explore the folklore of Canadian native peoples.

### North American Native Folklore

One of the striking features of the mythology and tales of the North American Indian is the importance and stress placed upon animals. The relative importance of animals varies within the group. Sometimes emphasis is placed on one, other times on a few or many different creatures. Almost always, though, they are seen to be near-human (Kroeber, 1899). In contrast, the Eskimos lack this animal focal point, with their mythology being strongly human (Boas, 1904). Naturally, then, it is in the Indian tales that we find more reference to animals such as the wolverine.

The Eskimos and Indians regard the wolverine as a link between their world and the spirit world (Helmericks, 1957). Ferguson (1969) writes that when a wolverine is captured its body is left for at least five days, a mile from the village. Treatment of this nature is believed to allow the spirit to leave the body and not inflict itself upon a family or upon human spirit. Montgomery (1966), in his book *Carcajou*, notes the dilemma an Indian faces when he catches a wolverine in a deadfall. To him the wolverine is evil, a devil, a spirit from beyond the sun.

"If he killed the wolverine he might offend the great powers that held the fate of the wild under their control. Tradition from as far back as the oldest brave could remember,

made carcajou a being charmed, a body of fur and musk peopled by a departed soul. So the hunter was worried. If he let carcajou go, the Unawep would become a ruined hunting ground. The wolverine would dog his sets and destroy his caches." (Montgomery, 1966).

Krott (1959) writes that the Indians will not kill a wolverine if one is caught in a trap. Instead, they cruelly mutilate it by putting out its eyes and then set it free. The *carcajou*, as the wolverine is often referred to, will not bring misfortune if it is allowed to live.

The wolverine appears under a variety of names in Indian mythology and tales. Overall he is regarded as a trickster-hero. Among the Montagnais-Naskapi, Cree, Algonquin, Potawatomi, Fox, Sauk, Ojibwa, and in some Menomini tales, the wolverine is identified with the cultural hero Nanabozho, also called Manabozho, Nanabush, or Wisakedjak (Leach, 1972). Nanabozho has reportedly been confused with Gluskabe, another culture hero. In the early 19th century, Ojibwa Manabozho stories were recorded and published by Henry-Rowe Schoolcraft but were confused with the historic Iroquois state-man Hiawatha of the eastern or Abnaki Algonquin because of superficial resemblances and because so little Gluskabe material has been published.

Nanabozho is a contradictory character. On one hand, he is the most powerful of supernatural beings, creator of the earth, and founder of the Midewiwin (Skinner, 1916, 1919), yet he is a buffoon, the butt of gross jokes (Teit, 1919), and a dupe and victim of his own stupidity and greed (Leach, 1972). Some of the tribes identify him with the Great Hare, others with the wolverine.

A recent analysis of the bulk and body of Nanabozho myths (Leach, 1972) shows a Cree type of cycle, an Ojibwa type, and a Potawatomi type. Under the Potawatomi type, Nanabozho is the eldest of quadruplets and, like the second brother, has human form. The third brother goes north to become a hare and a great magician. The fourth brother, who kills the mother at birth, is later killed by Nanabozho who then proceeds to live with the second brother. The supernaturals become jealous and claim the second brother in a drowning. However, to appease Nanabozho's actions, the brother returns to preside over the souls of the dead. Nanabozho is initiated into the Midewiwin or sacred medicine society. In the Ojibwa and Cree types, Nanabozho is in search of his brother (Skinner, 1919). He finds him as a wolf and stays with the pack and has a series of trickster-type adventures. As a result of his episodes, Nanabozho is dismissed, but one wolf remains as a companion. The

wolf is seized by powerful undercurrents in a lake, but Nanabozho rescues him. A deluge ensues, but Nanabozho escapes on a raft. Muskrat dives to secure a bit of earth so that Nanabozho can recreate the world.

Stevens (1971) in *Sacred Legends of the Sandy Lake Cree*, relates two interesting tales of the wolverine. Apparently Wee-sa-kay-jac found the wolverine had violated his eating habits (by eating Neglected Child). As a result, white hair was caused to grow in the outline of a small child on the back of the wolverine (geen-go-hongay). This white outline is a reminder of the evil deed carried out by the wolverine many, many years ago. Another legend has it that the people were hunted by a giant black skunk that had the power to kill by emitting his fumes (Skinner, 1916). Finally, an Indian went to the home of the wolverine to see if he could help them destroy the skunk. The wolverine agreed. The people heard Big Skunk approaching, and all fled except the wolverine. The skunk applied his usual tactics of fumigation, but the wolverine clamped his teeth on the rectum. The skunk tried so hard to rid himself of the wolverine, but the wolverine would not let go. The Indians had since returned and managed to club the skunk to death. When the wolverine was certain the beast was dead, he let go slowly but, as luck would have it, a whiff of fume covered the wolverine. The wolverine finally



succeeded in locating a lake to rid himself of this odor. This, according to legend, causes the salt water of oceans today.

According to Leach (1972), another folktale motif popular among the North American Indians of the plains, plateau, southwest, central, and northeast woodlands, and among the Hudson Bay Eskimos is the story of Offended Rolling Rock. As the legend holds, the trickster gives his coat or blanket to a rock to warm it, only later to return and take it back. The rock is offended at having the gift taken away and rolls after him. The trickster runs before it, begging help from various animals, each of which in turn is killed by the rolling rock. However, the trickster succeeds in escaping one way or another. In the Hudson Bay Eskimo story the wolverine, again as the trickster, taunts the rock until it is provoked into chasing him. The rock rolls onto him and will not budge because of the taunting. The wolverine calls upon the wolves and foxes to help him, but they refuse since they feel it serves him right. Finally the wolverine calls upon thunder and lightning, and they comply, only to split the rock and strip the skin off the wolverine's back.

The Kaska and Tahltan tribes of northern British Columbia reveal several stories about the wolverine. According to Tahltan legend, it is held that, because

of the people's practice of cannibalism, they are transformed into wolverines. Because these people were cannibals, wolverines to this day eat corpses (Teit, 1919). In the story of the "Wolverine and His Brothers", it is claimed that the animal's penalty for thievery and for fouling of food and traps by urinating and defecating is a broken rump bone which gives him his halting gait, and a reddish colour of the loins from hot fat being thrown on his privates (Teit, 1919). In Kaska legend the wolverine carried snares on his back, and this explains why he now has peculiar marks on his back like a snare (Teit, 1917). In the story of the "Wolverine and the Wolf", these two animals came across a cache. The wolverine attempted to jump and dislodge it but fell short and broke his arms and legs. The people came along and knew the wolverine had attempted to steal the cache and clubbed him to death. As the wolverine died, he said to the people, "No matter if you kill me, I shall steal your caches just the same. There are many of us." (Teit, 1917). This is why the wolverine is now such a thief and explains his propensity to break into people's caches and steal their meat. Finally, another Kaska legend holds that the wolverine, while trapping for all the family, became upset when questioned as to how he trapped. As a result, he refused them food. Later he was caught at a hill and clubbed, with grease poured on his privates. As a result, he proclaims that he shall break into people's caches and steal all their marten traps (Teit, 1917).

Unfortunately, much of the Indian and Eskimo mythology and tales remains unwritten. History has been passed from generation to generation, but oral history is extremely hard to document. Those knowing these stories are becoming scarce. The young encompassed in a white man's anglicized world scoff at spiritualism and are confronted with a new set of morals and values. None of the native Canadians interviewed showed any fear of trapping and killing wolverines. Only one man from northern Manitoba knew any old legends (Bird, pers. comm.), that of the Big Skunk where the wolverine (in this case, Omeethatsees) was regarded as a big brother to all animals and was second only to the skunk in strength. The details were sketchy since translation from Cree into English was necessary, but in my opinion the legend is probably of the same context as that mentioned by Stevens (1971).

#### Canadian Folklore and Literature

Winkley and Fallon (1974) summarize the popular conception of the wolverine when they write,

"He is a vicious, solitary, meat-eating member of the weasel family, the strongest animal for his size in the northern forests. He scavenges traplines but rarely gets caught. He's a devoted pet when raised from infancy, but a dangerous killer otherwise. A fearless, aggressive fighter, he will drive bears away from their kills. He leaps on men from trees."

Part of the image appears in focus, but the negative is overemphasized.

Is he vicious? This is probably the most common attribute of this mammal. The word vicious is the first word that comes into the mouth of urban inhabitants.

"Picture a Weasel -- and most of us can do that, for we have met that little demon of destruction, that small atom of insensate courage, that symbol of slaughter, sleeplessness, and tireless, incredible activity -- picture that scrap of demoniac fury, multiply that mite some fifty times, and you have the likeness of a Wolverine." (Seton, 1953).

Described as "the fiercest creature on earth" (Ferguson, 1969) or "King Beast of the Sierras" (Fry, 1923) with reckless abandon, he will take on any animal at a kill, regardless of the odds, for the wolverine, as reputation has it, will invariably win or die (Cahalane, 1947; Millard, 1956; Montgomery, 1966; Murphy, 1949; Stevens, 1954; White, 1958; White, 1946). Seton (1911), in *The Legend of the White Reindeer*, describes the attacking wolverine as a "whirling, shaggy mass, with gleaming teeth and eyes, hot breathed and ferocious", and, according to Hearne (1971):

"With respect to the fierceness of these animals which some assert, I can say little, but I know them to be beasts of great courage and resolution, for I **once** saw one of them take possession of a Deer that an Indian had killed, and, though the Indian advanced within 20 yards, he would not relinquish his claim to it, but suffered himself to be shot standing on the Deer. I once saw a similar instance of a Lynx or Wild-cat, which also suffered itself to be killed before it would relinquish the prize. The Wolverines have also frequently been seen to take a Deer from a Wolf before the latter had time to begin his repast after killing it. Indeed, their amazing strength, and the length and sharpness of their claws, render them capable of making a strong resistance against any other animal in those parts, the Bear not excepted."

Seton (1953) notes incidences of the wolverine scaring away coyotes, wolves, mountain lions, grizzly and black bears. A trapper of Dorintosh, Saskatchewan (Bennett, pers. comm.) told me that he had personally seen wolves feeding on a kill in the Northwest Territories who were actually scared off by wolverines. Sid Avery (pers. comm.) reported seeing two grizzlies scared away by a wolverine. Two trappers of northern Manitoba reported seeing one wolverine chase a lynx out of a tree and another scaring a fox away from a carcass. Incidences, in contrast, have been noted by respondents, of dogs chasing wolverines up trees. Bruce Campbell (pers. comm.) related a case where his dog actually grabbed the wolverine by the back of the neck. On the other hand, a trapper of northern British Columbia described an example where he once met a wolverine unexpectedly on the trail:

"I was still packing the dogs; that means each dog was loaded with a pack saddle and carrying 30-odd pounds. Now these dogs were anxious and willing to tackle any bear, grizzly or otherwise, and would have made short shift of that wolverine could they have got a hold of it. But that animal went up a big pine with enough racket to equal a bear. I first debated with myself to shoot it or not. The hide would not be prime yet, being the end of October. So I decided to pass it up and catch it later in a trap. Then it occurred to me, that the little devil might destroy a lynx or two on me before I caught it and I would be short changed that way. But while I was exchanging the shell in my rifle, the wolverine let go all holds and jumped right into the middle of those yapping dogs each weighing between 80 and 120 pounds. Now that

wolverine might have weighted 35, it was a large one. Well the dogs were badly handicapped in the dense underbrush by their pack saddles and bumped into each other too, but by the time the dust settled and the noise died down, the dogs stood there with surprised faces and the wolverine was safely away, while I lifted my hat in respect for that brave little animal."

Some authors and outdoorsmen are beginning to challenge the notion that the wolverine will take on any and all comers at carcass sites. As one trapper said, "because the wolf is far superior in armament and can manoeuvre far faster than a wolverine, but on the other hand unless very hungry for meat killed, it might not mean a matter of a fight" (Grewatsch, pers. comm.). Another northern British Columbia resident claims that a grizzly bear may just be agreeable and amble away from a carcass if he is not hungry or not in a mood for a scrap. Yet, one national park warden writes:

"I have seen at the garbage dump in Lake Louise, a wolverine that was extremely aggressive and establish himself higher in the pecking order than some of the younger and more submissive grizzlies and blacks."

However, another biologist mentions that he has seen wolverine using less favourable portions of garbage dumps when occupied by grizzly bears.

Burkholder (1962) notes a kill of a wolverine by wolves, Russell (1966) reports a cougar killing a wolverine, and Annabel (1950) reports coyotes defeating wolverines. Art Lorency (pers. comm.) in an interview related how he found both a wolverine and bear killed in a battle. Russell (1970) reports on two occasions of personally observing grizzlies and a wolverine using the same kill as a food source. Both times the wolverine exhibited signs of being wary and nervous, and it made for cover upon the slightest hint of approach by the bear. "Being a highly intelligent animal, the wolverine knows that it would have absolutely no chance in a mix-up with a bear. To suggest anything else is foolish" (Russell, 1970). Cesar (1964), in fact, believes that a scuffle with wolves or bears would be its last earthly scuffle. Russell (1966) also mentions a case where a wolverine was observed near a horse carcass also being fed on by eight grizzlies. The wolverine appeared to be slipping in for snacks when the chance was there. The grizzlies, according to Russell, did not seem to mind as long as they did not catch him at it.

Wolverines have been reported thwarting attacks of other predators in search of possessing a carcass as well as those already present at a site when a wolverine comes along. According to some trappers, they claim a wolverine

is a master at bluffing; he challenges animals to a certain extent but can easily retreat if need be. Often by lying on top of the carcass or actually lying in the rib cage, he places himself in a strategic location to repel attacks. However, if a large carnivore such as a bear or wolf is hungry, it is doubtful and rare for mature ones to be defeated by a wolverine.

The reports are rare of wolverines attacking man (Ysbrandt, *in*: Knight, k833-1843). Sam Bennett (pers. comm.) told me that he knew of a story where one man had a wolverine jump on the back of his neck. He managed to unsheath his knife and knock the animal off by ripping his knife into it. At first Bennett doubted the story until a friend remarked on the scratches on the victim's clothing and skin and soon thereafter returned near the site to find a dead wolverine slashed by knife marks. A source on Canada's west coast reported a story of a man who encountered a female wolverine with her pups. The female attacked the man but was killed by the man.

Any examples of attacks on humans usually occur when the animal is trapped (Millard, 1956) or when a family is encountered. Several trappers and biologists wrote to say that they had come to within 25 to 50 m of the animal, but no attack was encountered. Cahalane (1947)



mentions a face-to-face encounter with a wolverine, resulting with only a long stare, a snarl, and retreat of the animal. As one trapper said humourously, "I've never heard a man talk about the time he was eaten by a wolverine" (Avery, pers. comm.).

Is he bloodthirsty and a glutton? The wolverine's reputation of being murderous stems largely from his being a member of the weasel tribe, known for its premeditated, methodical, and wanton destruction. References are found as "*carcajou* the killer" or "the storm was still raging, and *carcajou* felt restless. His belly was full, but he could not lie down to sleep. He wanted action", and, somewhat later, "He had forgotten his hunger. What he wanted was to kill for revenge" (Montgomery, 1966). Krott (1959) strongly objects to this label of being bloodthirsty. To him the tupu kills everything that comes his way just like that, and with no malice or even any particular intent.

It is due to his reputation as having a voracious appetite that the nickname glutton is applied (Bellomy, 1954; Cahalane, 1947; Macmillan, 1925). No other animal, we are told, can devour so much in a meal. Tradition holds that the wolverine consumes more than its own weight in food at one time. According to Woods (1946) one in captivity for two years received daily a 2.2 kg of meat scraps and, once in a while, an egg.

"In terms of energy units this thirty-eight pound captive wolverine consumed on the average about 1200 calories per day in winter and about 900 calories per day in summer, approximately the amount needed to maintain life and growth of an average two-year-old child." (Woods, 1946).

Seton (1953) records that he has proof to show that a wolverine kept for 12 years had a daily ration of 0.25 kg of meat. The Seneca Park Zoo reports that the diet consists of horsemeat, a few mackerel heads, and a cooked egg. Once or twice a week, chicken backs and heads are given in their place (Velte, pers. comm.). The Milwaukee County Zoo feeds 1.4 kg of chunk horsemeat, 0.9 kg of horse fat, two salt-water herring, and four hard-boiled eggs daily (Speidel, pers. comm.). The Calgary Zoo announced that the wolverines are fed the rations described above, but only five days a week because the public, of course, enjoys seeing them fed as well. If they were fed the ration seven days a week, they would become fat and lazy. By keeping them hungry, the animals are kept active (Neilsen, pers. comm.).

Crandall (1964) remarks that the reputation hardly seems justified since a daily diet of an adult male consisted of 0.9 kg of a standard mixture of ground horsemeat, dog meal, bone meal, and cod-liver oil with one pound of raw horsemeat. Krott (1960) comments that the diet seems modest. There is no doubt, though,

that because of its activity and the variation in mealtimes, the wolverine's appetite will certainly be large. However, there is no significant difference from other healthy eaters (Seton, 1953; Sprunt, 1944).

The strength of the wolverine almost appears quite unbelievable for its size.

"As a proof of their amazing strength, there was one at Churchill some years since, that over set the greatest part of a pile of wood (containing a whole winter's firing, that measured upwards of seventy yards round) to get at some provisions that had been hid there by the Company's servants, when going to the Factory to spend the Christmas holidays ... The people, knowing the mischievous disposition of those animals, took (as they thought) the most effectual method to secure the remains of their provisions, which they did not choose to carry home, and accordingly tied it up in bundles and placed it on the top of the woodpile (about two miles from their tent), little thinking the Wolverine would find it out; but to their great surprise, when they returned to their tent after the holidays, they found the pile of wood in the state already mentioned though some of the trees that composed it were as much as two men could carry. The only reason the people could give for the animal doing so much mischief was that, in his attempting to carry off the booty, some of the small parcels of provisions had fallen down into the heart of the pile, and, sooner than lose half his prize, he pursued the above method till he had accomplished his ends." (Hearne, 1971).

Anderson (*in*: Seton, 1953) adds that the wolverine can move a rock as heavy as a man can roll and logs that man can scarcely lift.

Trappers' comments also testify to the strength of the wolverine and, in most cases, are a little more believable. One respondent remarked on seeing a wolverine carrying a good-size portion of a moose carcass or even caribou heads some 400 or 500 m without stopping. Obviously it must possess strength to take down prey, however irregular that may be. Sam Clifton (*pers. comm.*) related an experience where one of his friends had a wolverine around the cabin and set a #4-1/2 trap and caught the animal. He took an axe handle and poked it at the wolverine; the wolverine proceeded to bite it in half. Another British Columbia trapper remarked that he has traps with grooves in the jaws from wolverine; many others have noted that some traps have been damaged beyond repair. A northern resident wrote to say that in December of 1962 or 1963, one of the operators of Contwoyto Lake in the Northwest Territories had placed a box of fish out in readiness for the following morning flight. Later that night he went outside to empty the garbage and almost tripped over a wolverine. The animal had gnawed into the corner of the box of fish in the interim. A Manitoba biologist relates,

"On August 21, 1960 when tagging caribou on Nejanilini Lake, a large wolverine was seen swimming from a small reef some quarter mile offshore. As he was near shore the writer directed the canoe man to get between the wolverine and shore some 100 yards in order to turn the animal away from shore so that a meter reading and pictures could be taken.

When the canoe came between the wolverine and shore it did not alter course but swam directly to the canoe and tried to climb over it. When a paddle was used to push it away it seemed to fly into a rage, chomping its jaws it bit and split the paddle blade in half. A more determined effort was made to turn the animal by cracking it sharply on the head but this seemed only to infuriate the animal more. We then allowed it to proceed to shore".

Then again there is the story from Split Lake, Manitoba of how an airplane was forced down, and the pilot left to get help. A wolverine came along and dragged that plane into the bush! (Burns, pers. comm.).

The wolverine's uncanny knack of escaping from traps, taking bait and furs, carrying toggles and traps off even when they are still attached has given rise to almost incredible stories of cunning. Breaking into cabins or caches has done the animal no favours in enhancing its public image (Cahalane, 1974; Carroll, 1968-69; Odum, 1975; Rathert, 1972; Rearden, 1954; White, 1958; White, 1946). In conversations with trappers and biologists, it was learned that the

upheaval after a visit from the wolverine is something to behold, from the mess of upturned supplies and gear mixed with appointments of feces, urine, and musk. One trapper even noted that the legs of his table had been chewed and the stove turned over (Warner, pers. comm.). Another mentioned how one had broken into his cabin, stolen the fish, and mysteriously left everything else as it was. The tactic varies from clawing through the cedar shakes or dirt or log roof to chewing the door or digging underneath or even entering through the window. A Yukon trapper writes of one that broke into his cabin on the trapline and slept in his bed. He proceeded to break the oven door off the stove and then tried to take it through the window. Then he emptied the flour bin and scattered it and household goods throughout the cabin. In all, he broke two windows (one coming and one going out), opened 0.9 kg of peanut butter, 11 kg of tallow, and consumed half a moose quarter. A British Columbia trapper writes of a case where the occupant had just left his cabin (probably little over an hour) when a wolverine pushed in a loosely

nailed window by pressing on the sash, after first having pressed cautiously on the glass with one paw leaving a dusty print. In any event, he managed to get inside. He reached into the kitchen cabinet and took a covered aluminum pot out, leaving tooth marks on the lid and rim. Taking this back outside, the animal evidently dropped it, and the lid came loose and rolled away. "Apparently our burglar seeing that the pot was empty on his way without taking a chance on going back into the cabin. Perhaps he heard the owner returning".

Several northern Manitoba Indians noted that wolverines had broken into their cabins through the plastic windows and, in one case, had taken \$70 worth of groceries. One finally set a #330 Connibear trap in the window and caught the animal which he later joked about, saying it was easier to catch them coming to you than waiting for them on the trapline.

The case documented by Ross (*in*: Coues, 1877) is probably the best known example of the wolverine's propensity to steal and hide items:

"The desire for accumulating property seems so deeply implanted in this animal, that like tame ravens, it does not appear to care much what it steals so that it can exercise its favourite propensity to committ mischief. An instance occurred within my own knowledge in which a hunter and his family having left their lodge unguarded during their absence, on their return found it completely gutted -- the walls were there but nothing else.

Blankets, guns, axes, kettles, cans, knives and all the other paraphernalia of a trapper's tents had vanished, and the tracks left by the beast showed who had been the thief. The family set to work and by carefully following up all his paths recovered, with some trifling exceptions, the whole of the property."

Caches are usually built on four trees growing close together in the form of a natural square. A small log type cabin is usually constructed, fastened to the trees. Such a tree house is far enough from the ground to be out of reach of most creatures except agile black bears and wolverines. To foil them, smooth tin, fish hooks, or noisy bells are fastened to trees, and even the bark is peeled in the hopes of permitting no grip. However, every so often the wolverine manages to circumvent the detours and capture his prize. Sometimes though, trappers have only time to hang meat in a tree. Ed. Theriau's (pers. comm.) case was one such example. He tied meat to a pole attached to a tree. In all, the cache was about 5m above the ground. A wolverine proceeded to climb up the tree and pole and chew the meat so that it fell to the ground. Bruce Campbell (pers. comm.) feels he has solved the problem by running a wire between two trees and hanging the cache midway. There is no way, he claims, that a wolverine can go across the wire.

Sets to capture wolverine that have repeatedly avoided traps are noted, but none is more interesting than the baited gun set described by Lockhart (*in*: Seton,



1910). The gun was concealed in some low bushes, and the bait was clearly placed on an embankment. On the wolverine's first visit he had apparently smelled the set but left. The next time he had pulled up the pine tree blocking the path, gone around the gun, and cut the line connecting the bait and the gun and taken the bait. Lockhart reportedly rearranged the set. The result was the same for three successive visits. Two trappers had known a wolverine to kick snow on the trap until it shut or use twigs to snap the spring. My favourite story was narrated by a young trapper at the Alberta Trappers' Convention. When the gentleman knew a student was looking for material on the wolverine, he located me and mentioned that he had heard a story from an old-timer of a wolverine using his paws to pull in a fish net, then consumed the squirming delights. Asked if he believed the story, with all sincerity he said "yes".

Russell (1966) is quick to place the blame on trappers as responsible for the development and cultivation of the real master thieves among the wolverine. Most cabins either have garbage outside or carcasses or pelts or the aroma of food to prod the curiosity of the wolverine.

Rearden (1954), commenting on cabin break-ins and robbed traplines, claims they are rare, but so many stories have been told of the destructiveness that most people

assume wolverines rob traplines and wreck cabins.

"It's not true most stay clear of man" (Rearden, 1954).

It is, of course, cabins that draw our attention to the wolverine, but more and more garbage dumps of mining camps, exploration crews, and hunting, fishing, and holiday lodges are attracting the wolverine to the haunts of man. Oeming, (pers. comm.) in fact, feels that the wolverine is even more addicted to garbage than bears. One experienced trapper at Sherridon, Manitoba told me that he feels wolverines are coming into the country, drawn by the fish camp dump near by. Another northern respondent, writing in reply of a sighting at Port Radium on Great Bear Lake during the period of late winter to early spring, mentioned that he has had numerous visits by wolverines to garbage barrels in the camp. Sightings of wolverine were also reported near the garbage by campers at Marble Canyon Campground in Kootenay National Park, British Columbia.

Finally, Coues (1877) notes:

"... he has a singular habit -- one not shared, so far as I am aware, by any other beast whatever. He sits on his haunches and shades his eyes with one of his fore paws, just as a human being would do in scrutinizing a dim or distant object."

Lockhart (*in*: Seton, 1953) also has been witness to this twice. Skip Warner (pers. comm.) was the only trapper interviewed who had personally seen the animal sit on his haunches and do this. Oeming (pers. comm.), too, has seen the wolverine perform this in captivity. Bachman (*in*: Seton, 1953) and Abbott (1946), Rathert (1972), and White (1958) remark that the eyes were adverse to the sun and kept half closed when exposed to it. However, at least one author exploits the habit to the extreme. "When the sun wakened him, he rubbed his weak eyes and sat up" (Montgomery, 1966).

Wherever and whenever stories abound about an event, a person, or a creature, comic situations are likely to emerge. The wolverine is no exception. We can all laugh because we are not the subject of laughter in this case. Two incidences stand out in particular; a Yukon trapper writes:

"There is this story of a live wolverine being transported in a wooden cage by a pickup truck to Whitehorse from a distance of a hundred miles or so away. This animal was to be handled by the game department for transfer to an animal farm somewhere to the south.

Somewhere along the highway, the driver of the pickup stopped to pick up a native hitch hiker who was allowed to ride behind the pickup box. After riding back there several miles he discovered that the wolverine was loose in the box with him. The hitch hiker was too scared to even move. But the wolverine's main concern was to escape and when the truck slowed for a corner he went over the side of the box leaving behind one very relieved hitch hiker."

Another Yukon gentleman relates the story of Mt. Nansin area in 1965 while checking the mining camp buildings:

"A wolverine had made his home there for his toilet and the warehouse for his bedroom and he used ... the kitchen for his entrance -- but on checking the out buildings we came to a small metal shed used for cool storage in summer and there had been 250 lbs. of Ontario round cheese stored in 25 lb. blocks -- well a small hole in the floor and under the sills showed the route of where 200 lbs. of the cheese had gone ... a day later the remainder was gone -- so we knew that this had to be the most constipated wolverine in the Yukon."

#### Dispelling the Myths

The wolverine does fight other animals when fighting over a carcass, but most likely he attempts this only under favourable conditions or in dire stress. The wolverine rarely attacks man; if he does, it is when cornered, trapped, or with young. He cannot be regarded as any more bloodthirsty than any other carnivore, unless capturing all the food he can take at once counter-balanced by periods of no yield is being bloodthirsty. He does not appear to be gluttonous. He is strong for his size, but many of his feats are exaggerated. He does raid cabins, caches, and traplines (but he can be caught), although the number of times he does this is blown out of proportion. He does appear to shield his eyes.

In most of the popular literature, the wolverine's prowess has been exaggerated to the point of almost casting the animal in the role of the villain. Unfortunately, reliable information, until recently, has been lacking, and writers tend to rely on folklore, quite often unsubstantiated. As Annabel (1950) puts it:

"Although the fact seems to have been carefully overlooked, the hair-raising mythology of the wolverine goes back straight as a gun barrel to the brave old days when the buckskin pioneers, for amusement, convinced a lot of tenderfeet that mountain rams made a practice of jumping off cliffs and landing safely on their horns, that grizzly bears hugged human victims to death, that hoop snakes rolled eerily about among the sunburnt hills of the West, and that porcupines threw their quills out with the accuracy of Sioux arrows. Our fun-loving, trail-blazing forebears decided the wolverine was a sinister and malevolent little brute, a sort of wildlife outlaw, and consequently set about glamourizing him .... When they went their way, they left today's sportsmen and nature writers such a legacy of wild and wonderful legend about the animal that it is small wonder the wolverine of fact and the wolverine of storybooks have only a vague resemblance."

Russell (1966) carries the point further by stressing how poor losers we are. If an animal makes us look like fools, we patch up our egos either by stretching a point or by telling outright untruths. Eventually, if we tell them long enough, we believe it, and the untruths become established facts. Undoubtedly, some of the stories still told today happened years ago when cabins were poorly constructed, when a marten was worth a small fortune and

the wolverine only misery, when provisions were hard to replace once destroyed or stolen, and when sensationalistic writers sought stories, not facts. Like a snowball that rolls down a hill to become an avalanche, the wolverine remained enshrouded in the veils of superstition, fear, legend, and hatred, and these legends continue to be passed onto young people unchecked. Consult an encyclopedia or book in a school library and you will see it. As one trapper stated, "Son, if you think fishermen tell great stores, wait until you get some of the trappers going".

Of the responses to questions 7 and 19 (Appendices B and C) of the biologist and trapper questionnaires, respectively, the biologists feel that the wolverine does live up to its reputation of being fierce and cunning (Table 4) even though the majority (73% question 3 Appendix B) have not had an encounter with one, while the trappers do not (Table 5).

TABLE 4

Response of biologists to question 7 recognizing  
*Gulo gulo*'s reputation as fierce and cunning

Area	Fierce and Cunning		No Response
	No	Yes	
Province or territory			
Manitoba	11	10	15
Saskatchewan	0	2	4
Alberta	4	5	10
British Columbia	22	33	20
Northwest Territories	5	9	3
Total	42	59	52

TABLE 5

Response of trappers to question 19 recognizing  
*Gulo gulo*'s reputation as fierce and cunning

Area	Fierce and Cunning		No Response
	No	Yes	
Manitoba	52	22	6
Saskatchewan	50	11	9
Alberta	13	5	2
British Columbia	67	89	22
Northwest Territories	1	0	0
Yukon Territory	14	29	2
Total	197	156	41



## TRAPPING TECHNIQUES

Several techniques are employed to successfully trap wolverines. Most publications on trapping indicate that taking this animal is a problem since they are difficult to trap and equally difficult to hold. Kreps (1944) feels that the trap should be well-concealed and geared to taking the animal off guard and that a trap with heavy springs, say a #4, is best since the wolverine can put up a powerful struggle. Nelson (1973) mentions setting traps along natural corridors, near ends of traplines to protect against possible raids, and at big game carcass sites. Often, though, the traps are not specifically set for wolverines alone and may also be set for wolves, foxes, or lynx. Among the most effective methods for capturing wolverines, according to Nelson, is the post set where a small tree is cut about a metre off the ground and a piece of moose skin is nailed or wired on the top of the stump. A trap is toggled onto the tree and set at the base closest to the trapper's trail and is well-concealed. When a wolverine attempts to steal the moose skin bait, it steps in the trap. Snares (#1 and 2) are also efficient sets and are generally placed on a trapper's trail, a well-used animal trail, or near a bait or kill site

(Nelson, 1973). The wolverine may twist and chew the snare until it snaps. Care must be taken, not to use a stiff and stout tree as a toggle but a limber one because the former will snap when an animal becomes snared.

One of the oldest and most effective techniques of trapping wolverines is the deadfall. Briefly, a small cubby, roofed over with sticks, is built with a log perhaps 3 m long and 15 to 25 cm in diameter placed on the ground crosswise in front of it. Long stakes are driven into the ground on both sides of the log, and another log of about the same size is placed on top of the first. It is held by these same stakes and raised at one end, making a space 13 to 15 cm wide between the two logs at the cubby entrance. The trigger consists of a slender stick that rests horizontally on the lower log and extends into the cubby with a piece of bait (a piece of meat serves as bait for the wolverine; it does not seem addicted to any one "dish") placed on the cubby end of the stick. Another stick, 13 cm long, sits vertically at the end of the horizontal stick bait and props the top log up. If anything disturbs the bait, the precariously balanced vertical stick is dislodged, and the top log crashes down (Anonymous, 1972; Nelson, 1973). Horace McCallum (pers. comm), a noted Manitoba trapper, can testify to its success with his relatively

high number of wolverine caught over the years. Few trappers continue to use this technique because of the time consumption in constructing and repairing and because of its immobility. However, Pierre Bird (pers. comm.) of Granville Lake, Manitoba has found wolverines not to be as suspicious of deadfalls as steel traps.

The majority of trappers personally interviewed indicated that they used the blind set around zones of activity, merely dropping traps in their trails, utilizing the leaning pole, post sets, or the cubby. If a kill is encountered, sets are often placed around the site in the hopes of capturing some large carnivore. Skip Warner (pers. comm.) told me that he sinks a Connibear #330 in the base of a tree and spikes the trap and the bait above it. The wolverine jumps for the bait and becomes careless enough to step in the trap. A variation of the set is found in the summer 1975 issue of The Alberta Trapper where a bait is nailed to a tree with two buried traps below anchored securely to stumps or trees. Joseph Carty (pers. comm.) relates that he uses a leaning pole set utilizing a Connibear trap again. He cuts a limby spruce about 16 cm in diameter, trims it, leans it on a slant against a tree, and then the only way to the bait is up the pole and through the trap nailed to the pole. One trapper writes:

"You cannot cover the trap as the wolverine will spring them as this animal is a glutton you wire your bait usually under the snow and have the bait approximately two feet above the ground. He tries to pull the bait loose and forgets about the trap and usually gets caught."

Trappers also indicated that they had some success burying the trap under the bait.

Although heavy traps (say, #3 and 4 Victors, #14 jump, and #330 Connibears) are recommended for large carnivores such as wolverines, this animal has been known to drag them off. A Yukon trapper wrote that he trailed for about 10 km one who was caught in a #4 trap with a 10 cm x 5 m toggle. After getting badly tangled at first, the wolverine reportedly found that he could make good headway by dragging the toggle length-ways under his body. The trapper never did manage to catch up to him. Bruce Campbell (pers. comm.) reported a wolverine caught in a #14 jump trap who dragged a toggle 10 cm x 5 m for a distance. Campbell noticed that suddenly there was no sign of dragging; a short space later it reappeared and so on. After 5 km he caught up to the animal to find the toggle now only 35 cm long.

The fact that the animal is perhaps harder to hold than to entice into the trap is evidenced by the number of wolverines that bite off their paws or toes once they are

frozen in an effort to escape. Norn Mackenzie (pers. comm.) believes he has solved this problem of holding the wolverine in a trap by not allowing his legs to stay on the ground. By keeping at least one leg off the ground, the wolverine cannot get a straight lunge at the trap as well as bite its paws. "If you can keep one foot off the ground, you're pretty near sure to hold him".

Of course, the unanchored toggle is designed to slow down the animal in the bush and eventually to become entangled in the brush. If the trap is anchored, the scene later is of the vegetation obliterated, so strongly does the wolverine attempt to pull himself out of a trap.

The animal has occasionally been caught in small traps; however, the trappers must be present or the wolverine will escape. All of the trappers interviewed felt confident in the ability to trap the wolverine. However, it is a different matter if the animal has escaped from a trap and is now educated. As a questionnaire respondent writes,

"I believe they are easy to catch if the first trap they step in is large enough to hold them. But in most times its a smaller trap set for a mink, marten, etc. and they pull out or lose a toe and become trap wise ... then it's hard to get them near a trap or to catch them."

There is always a danger in generalizing, a point that must not be overlooked when discussing wildlife. The wolverine is reported to be cunning or smart, and his success in avoiding the capture and stealing bait certainly strengthens that conviction. However, other members of the same species may not be as clever.

"Through all these observations I have formed a strong belief that the wolverine is not an overly smart animal in fact I have several times had a wolverine get caught in a small trap, tear out and come back in a few nights later to get caught in the same trap, tear out again only to come back again and get caught and held in the same set because I changed to a larger trap."

Popular literature has made the ability of the wolverine to steal bait and fur from traps legendary (Cesar, 1964; Ferguson, 1969; Fry, 1923; Hambleton, 1954; Helmericks, 1957; McBride, 1961; Russell, 1966, 1972; Seton, 1910, 1953). In fact, the old-timers maintain that once a wolverine is on your line, a trapper must catch it or leave his line. Responding to this line of reasoning, Joe Carty (pers. comm.) responded that if a trapper believes this, "then he is not a trapper; there is no wolverine smart enough that cannot be caught". Perhaps this is a very personal feeling of one man, but only the occasional wolverine seems to have evaded a trapper specifically after it. "Any wolverine I've wanted, I've got him". (Carty, pers. comm.).

Reports of the wolverine following marten sets and other smaller fur-bearers are well known in trapping circles. Naturally, a wolverine can cause a lot of damage if the trapper is using mostly small traps and a large quantity of fish or meat for bait. Baited sets and trapped animals provide "easy pickings" for any scavenger. What animal or human being would turn down an easy meal? A study into the correlation of the productivity of the area, time of the trapping season, and associated problems with wolverines might prove interesting.

"I believe that in the heavy snow and late winter conditions he will probably feed on any animals caught in traps or anywhere as they become quite hungry during this period of time and would get at food wherever it was which I think would be quite normal for a hungry animal."

In defence of trappers setting out small sets, the wolverine may be an infrequent visitor and naturally there is no way of determining when one might appear again, if ever. Trappers fortunate enough to be visited by them set up traps designed for larger animals every four or five sets.

From personal observations, *Gulo gulo* appears to be a curious, temperamental but somewhat wary animal as opposed to the more cautious coyote or wolf. Sid Avery (pers. comm.) has successfully live-captured wolverines for zoos. His method is simple. He uses a 45-gallon drum, with a thin

mesh screening, a trip trap door, and bacon for bait. He has found that, by placing the screen over the entrance, the wolverine's curiosity forces it to rip the screen and gobble the bacon, thereby setting off the trip door. If the door were left open and no screening, the animal would not go in. Ed Cesar, a noted live-trapper, has found the best method for capturing the wolverine is to make it believe that good fortune has guided it into a feast, a prize too much to resist (Cesar, 1964). Cesar utilizes a heavy box-type log structure with a hinged lid held up by a prop connected to a triggering platform inside. Bait is piled into the trap. A wolverine may spend several hours examining the place, but, if the bait is large enough, it will return. Cesar mentions that it first ignores the open doorway and tries to break in through the walls or roof. Failing this, it steps on the main entrance and triggers the roof mechanism. Green (1956) describes the trap utilized for capturing animals for Walt Disney as a familiar box-type with a frame of iron, steel wire sides, and a drop gate. He notes that the trap is not entered immediately, being approached with caution and circled many times, followed by close inspection before a decision is made.



"However, as far as could be learned, all wolverines investigating traps were ultimately captured. A new trap caused greater suspicion than one which had previously contained a wolverine. No precautions were necessary to eliminate human odor from the trap and no scent was used." (Green, 1956).

Table 6 summarizes the number of wolverine trapped in the study area. Most respondents did not clarify the number or simply had never trapped one, although the majority of trappers and biologists indicated they had seen the animal in the wild (Tables 7 and 8).

The majority of trappers said they set traps for wolverine (Table 9) but used a variety of types of traps, demonstrated by the high number of "other" in Table 10. Others usually indicated #4 and #14 Victors and Newhouse traps.

TABLE 6

Summary of the number of *Gulo gulo* trapped in the study area  
(question 18 of the trapper questionnaire)

Area	Number Trapped/Trapper												O.M.*
	1-2	3-5	6-10	11-15	16-20	21-25	26-30	31-35	36-50	51-75	76-100	100+	
Manitoba	15	2	2	0	1	0	0	0	0	0	1	1	58
Saskatchewan	6	3	1	1	0	0	0	0	0	0	0	2	57
Alberta	7	0	0	0	0	0	0	0	1	0	0	0	12
British Columbia	21	23	19	10	6	3	3	3	3	2	1	1	83
Northwest Territories	0	0	0	0	0	0	0	0	0	0	0	1	0
Yukon Territory	6	8	7	5	2	1	3	0	1	0	0	2	10
Total	55	36	29	16	9	4	6	3	5	2	2	7	220

\*O.M. = observations missing or questions not completed by the respondents.

TABLE 7

Response of trappers to question 12 indicating that the wolverine had been seen in the study area

Area	Observed	
	No	Yes
Manitoba	42	38
Saskatchewan	49	21
Alberta	7	13
British Columbia	40	138
Northwest Territories	0	1
Yukon Territory	4	41
Total	142	252

TABLE 8

Summary of responses to question 2 of the biologist questionnaire indicating the number of biologists who have observed *Gulo gulo* in the study area

Area	Observed	
	No	Yes
Province or territory		
Manitoba	21	15
Saskatchewan	2	4
Alberta	3	16
British Columbia	9	66
Northwest Territories	3	14
Total	38	115

TABLE 9)

Summary of responses to question 14 of the trapper questionnaire indicating those trappers that specifically set traps for *Gulo gulo*

Area	Set Traps		O.M.*
	No	Yes	
Manitoba	48	28	4
Saskatchewan	41	11	18
Alberta	10	7	3
British Columbia	52	104	22
Northwest Territories	0	1	0
Yukon Territory	11	31	3
Total	162	182	50

\*O.M. = observations missing or questions not completed by the respondents.

TABLE 10

Summary of trap types used to catch *Gulo gulo*  
(question 15 of the trapper questionnaire)

Area	Number of trappers using specific trap types						
	Conibear	Bigelow	Deadfall	Snare	Victor stop-loss	Other	O.M.*
Manitoba	4	0	18	4	2	6	46
Saskatchewan	6	0	1	4	0	8	51
Alberta	1	0	0	3	0	3	13
British Columbia	45	1	3	8	9	40	72
Northwest Territories	0	0	0	0	1	0	0
Yukon Territory	9	1	2	4	7	12	10
Total	65	2	24	23	19	69	192

\*O.M. = observations missing or questions not completed by the respondents.

## HABITAT, HISTORICAL DISTRIBUTION, AND NUMBERS

It is believed that the wolverine evolved in the Old World and emigrated to America from Asia across the Bering Strait during the second-last (Riss) glaciation (mid-Pleistocene), and consequently is a relative newcomer (Irving, 1972; Kurtén, 1968, 1972a; Kurtén and Rausch, 1959; Scott, 1929). Hibbard, et al. (1965) reveal that the earliest known North American record is from the Irvington period near the Potomac River, although Kurtén (1972b) notes cave deposits from the Riss age from Port Kennedy Cave in Pennsylvania and Cumberland Cave in Maryland.

The original home of *Gulo gulo* in North America remains unknown, varying from the boreal taiga (Banfield, 1974; Carroll, 1968-69; Cleland, 1966; Harper, 1956; Quick, 1953a; Seton, 1910), of the tundra (Preble, 1908; Soper, 1944), or of the transition between the two (Coues, 1877; Hearne, 1971; Ross, 1835). Banfield (1974) indicates the wolverine occupied all of western Canada except the prairie grain belt, the Queen Charlotte Islands, the Vancouver vicinity, and all of the north except the islands of Prince Patrick, Brock, Mackenzie King, Ellef Rignes, and Axel Heiberg.

### The Yukon and Northwest Territories

Banfield (1974) and Hall and Kelson (1959) indicate the wolverine to be distributed throughout Canada's north. Seton's (1910) distribution map shows the mainland and only Melville Island and Boothia Peninsula, but he verbally adds to this map in a subsequent discussion (1953). Rand (1945 a + b) found it to be common along the Macmillan River and the Olgivie Mountains as well as along the southern half of the Alaska Highway. Osgood (1900, 1909) also notes its presence in the Macmillan River and Olgivie Mountains as well as along the Yukon River region. Murray and Murray (1969) indicate it as common in the St. Elias Mountains. No sightings were reported by Donaldson (1971) in the Nisutlin River region. Reports of its occurrence are found in the Perry River district (Aleksiuk, 1964; Gavin, 1945), around Contwoyto Lake (Tremblay, 1967), along the Canol Road by construction crews (Rand, 1944), being common as far as the Coppermine River (Jenness, 1922) and perhaps further north (Hearne, 1971), found from Dubawnt Lake to Reindeer Lake (Harper, 1956), to inhabit all of the Thelon Game Sanctuary (Clarke, 1940) and various points along the Thelon River (Critchell-Bullock, 1930), and scarce in the Mackenzie River area but more common in the British Mountains west of Aklavik (Clarke, 1948).



Preble (1908) writes that it occurs throughout the Mackenzie-Athabasca region, but is nowhere common. More trapped wolverines were observed by Preble in the region between Fort Rae and Great Bear Lake than anywhere else, although he mentions Fort Norman, Fort Good Hope, and Fort McPherson to be collecting points. Pike (1899, *in*: Preble, 1908) reports that wolverine were common in the country between the eastern part of Great Slave Lake and the source of the Coppermine River; Russell (1894, *in*: Preble, 1908) notes it in the Mackenzie Delta; Tyrrell (1900, *in*: Preble, 1908) mentions it at Artillery Lake. It was seen along the Dease River by Hanbury (1902, *in*: Preble, 1908) and by Darrell (1902, *in*: Preble, 1908) in the barren grounds. The warden of Nahanni National Park reports sighting one (pers. comm.). MacFarlane (1908) remarks at its presence all along the shores of the Arctic Ocean, and Ross (1835) notes its occurrence north of the 70° latitude.

Although abundance seems to be centred on the mainland, wolverines have also been reported on the northern islands. It has been reported on Banks Island by Manning and Macpherson (1958) and Usher (1970), who lists it as an "exotic and occasional visitor", on Victoria Island (Hall and Kelson, 1959), and on King William Island (Anderson, *in*: Seton, 1953). A skull minus the lower jaw has been reported

on Melville Island (Parry, 1824, *in*: Seton, 1953), and Sverdrup (*in*: Seton, 1953) notes its tracks east of the Prince Gustaf Adolf Sea. Wolverines were killed in midwinter near Felix Harbour and Victoria Harbour on Boothia Peninsula during Ross' (1835) second voyage. As well, it has been reported on Ellesmere Island (Anderson, 1946), although not found on the Fosheim Peninsula (Tener, 1954). The wolverine has also been found on Little Cornwallis Island (Tener, 1963), and Baffin Island by Anderson (1937, *in*: Van Zyll de Jong, 1975) and Manning (1943). Soper (1944), however, found no authentic records of wolverine on Foxe Peninsula and discovered the animal to be in the more northern and eastern portions of the Island. In addition, Burwash (1924, *in*: Seton, 1953) writes of a wolverine caught at Cumberland Sound. Stragglers of wolverine are believed to have reached Baffin Island by crossing from Melville Peninsula using the Fury and Hecla Straits (Manning, 1943; Soper, 1944). Preble (1908) notes that the skins of wolverines could be obtained from Marble Island, and Lyon (1824, *in*: Seton, 1953) reports them on Winter Island off Melville Peninsula. Sutton and Hamilton (1932), however, doubt its presence on Southampton Island, although I believe it is conceivable that the animal can cross from Melville Peninsula via the Frozen Strait or from the mainland by way of Roes Welcome Sound. In my view, the wolverine may have visited or have been stranded on other arctic islands, but any evidence of this has yet to be discovered.

Figs. 6 and 7 indicate sightings reported by trappers and biologists of the Yukon and Northwest Territories. Fig. 6 shows that the wolverine appears to be distributed throughout most of the Yukon except the northern corner and east-central portion. Records from the National Museum of Canada further emphasize its concentration in the west-central segment of the territory (Dagg and Campbell, 1974). Of the sightings from the Northwest Territories (Fig. 7), the wolverine ranges as far south as the Saskatchewan border and as far north as Spence Bay, as well as the records noted by Dagg and Campbell (1974). Again, National Museum of Canada records emphasize the centre of the territory for wolverine (Dagg and Campbell, 1974). In the Yukon (Table 6) only three trappers had captured in excess of 30 wolverine over their years of experience. One was located northwest of Carmacks, while the remaining two gentlemen had both captured in excess of 100 wolverine and trapped in the Big Salmon River and Gravel Lake-Dawson area. Interestingly, most of the reports east of the Mackenzie River date from 1960 to 1969.

Fig. 6. Biologist and trapper sightings combined with material from Dagg and Campbell (1974) in the Yukon Territory.

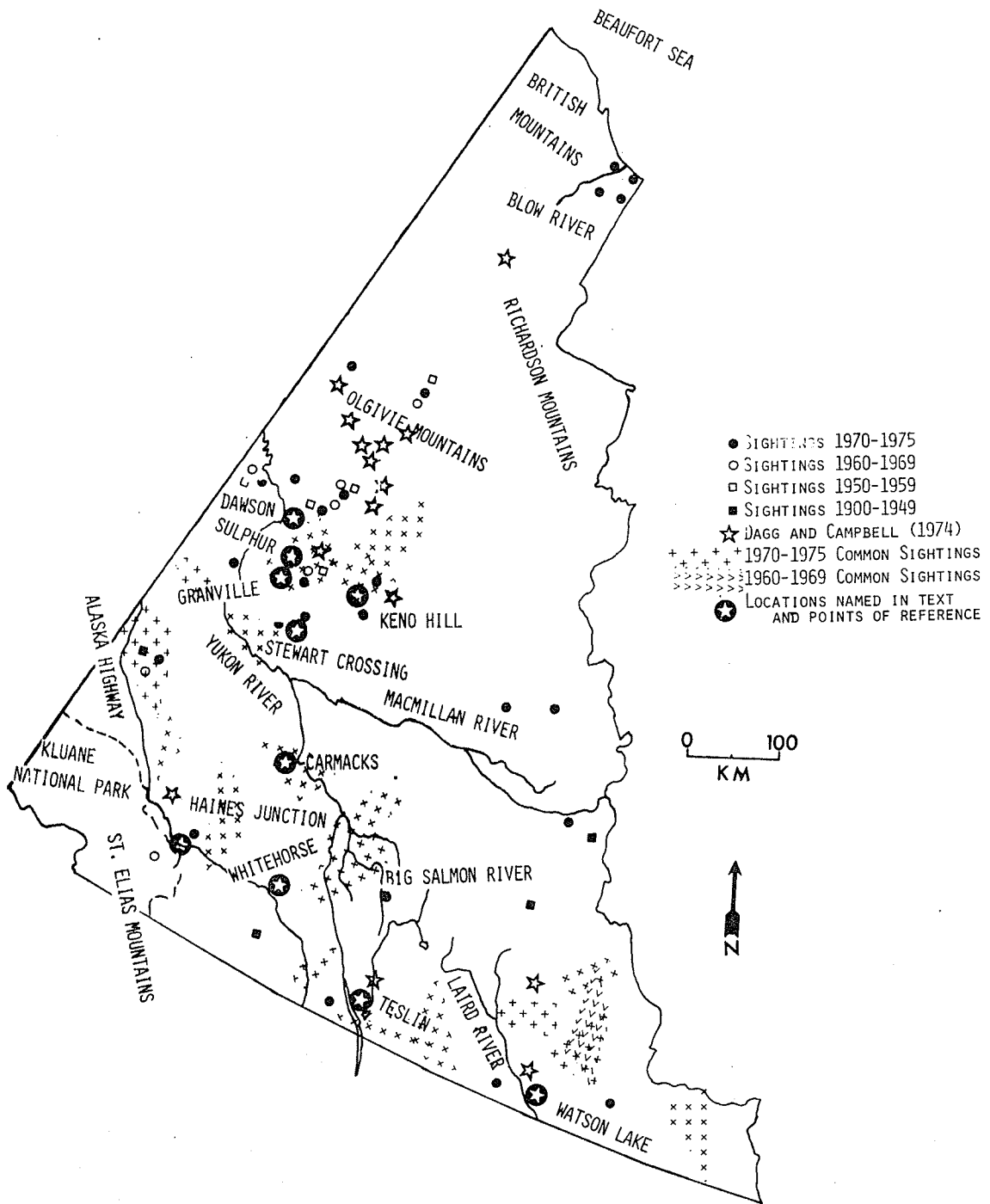
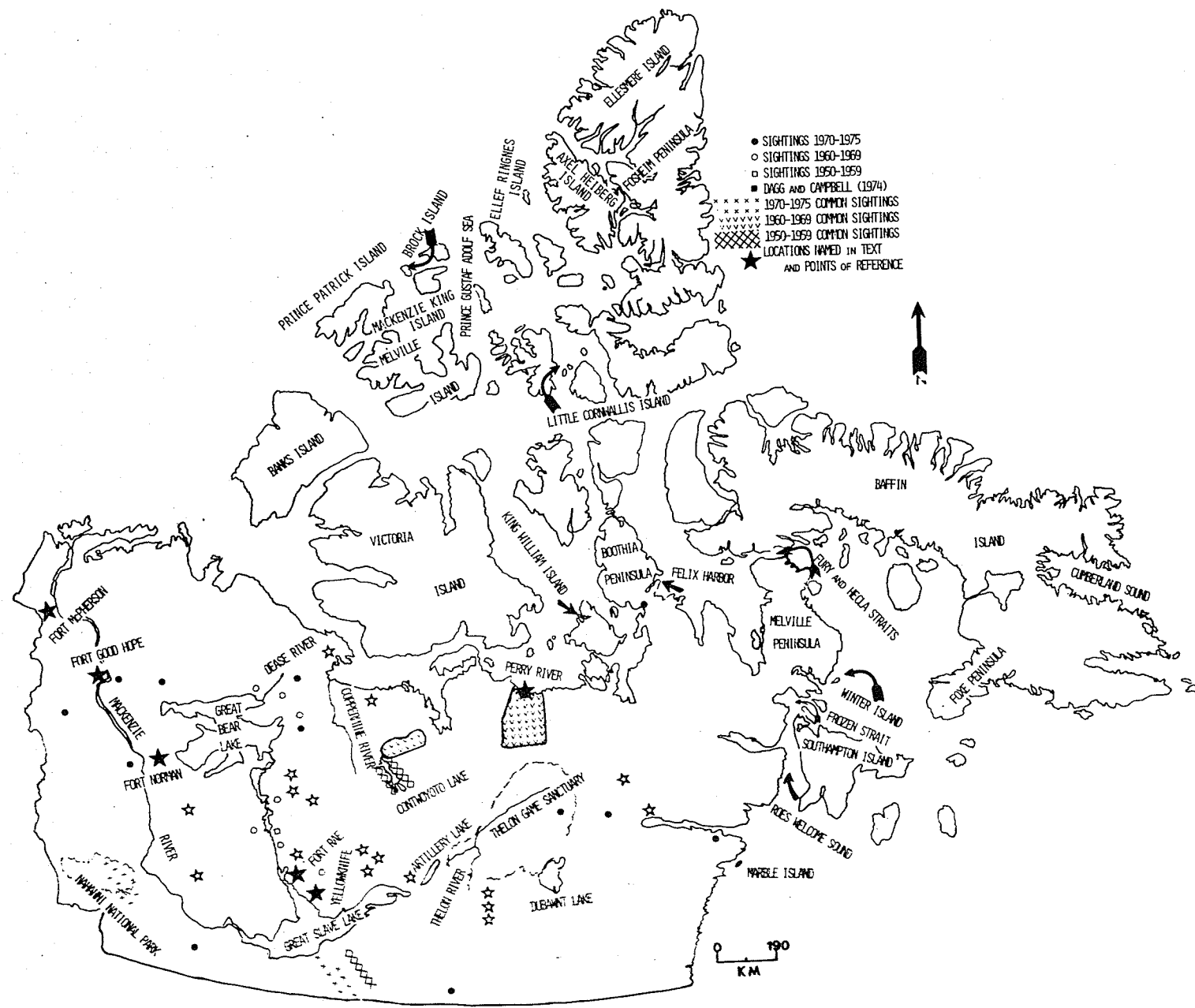


Fig. 7. Biologist and trapper sightings combined with material from Dagg and Campbell (1974) in the Northwest Territories.



In the Territories, a decline in the fur harvest is evident, although the Northwest Territories do not fluctuate as much as the Yukon (Figs. 8 and 9). Recently, however, a slight upward trend is noticeable in the former and is more pronounced in the latter. Overall, the average yield of pelts/year is 105.2 in the Northwest Territories, with 328 in 1919-20 the best yield and 27 in 1946-47 the lowest, while the Yukon average is 220.2 pelts/year, with a high of 610 in 1928-29 and a low of 50 in 1970-71. A review of the Northwest Territories fur records from 1953-54 to 1972-73 demonstrated the vast majority of the pelts came from the Mackenzie district (recently regrouped into the Fort Smith and Inuvik regions) including the communities of Aklavik, Arctic Red River, Bathurst Inlet, Coppermine, Contwoyto Lake, Fort Good Hope, Fort Laird, Fort McPherson, Fort Norman, Fort Providence, Fort Rae, Fort Resolution, Fort Simpson, Fort Wrigley, Fort Smith, Hay River, Inuvik, Paulatuk, Reliance, Snowdrift, Stony Rapids (Saskatchewan), Tuktoyoktuk, Uranium City (Saskatchewan), and Yellowknife. The Keewatin region periodically demonstrated substantial yields of wolverine.

MacFarlane (1908), notes that the Hudson's Bay Company received and sold in London 32,975 skins between 1853 and 1877 (an average of 1,319 pelts/year, with the lowest yields being 923 in 1857, 909 in 1866, and 768 in 1867 and the best of 1,848 in 1871, 2,095 in 1873, and 1,763 in 1874). As



Fig. 8. Harvest of wolverine pelts in the Yukon from 1919/20 to 1973/74.

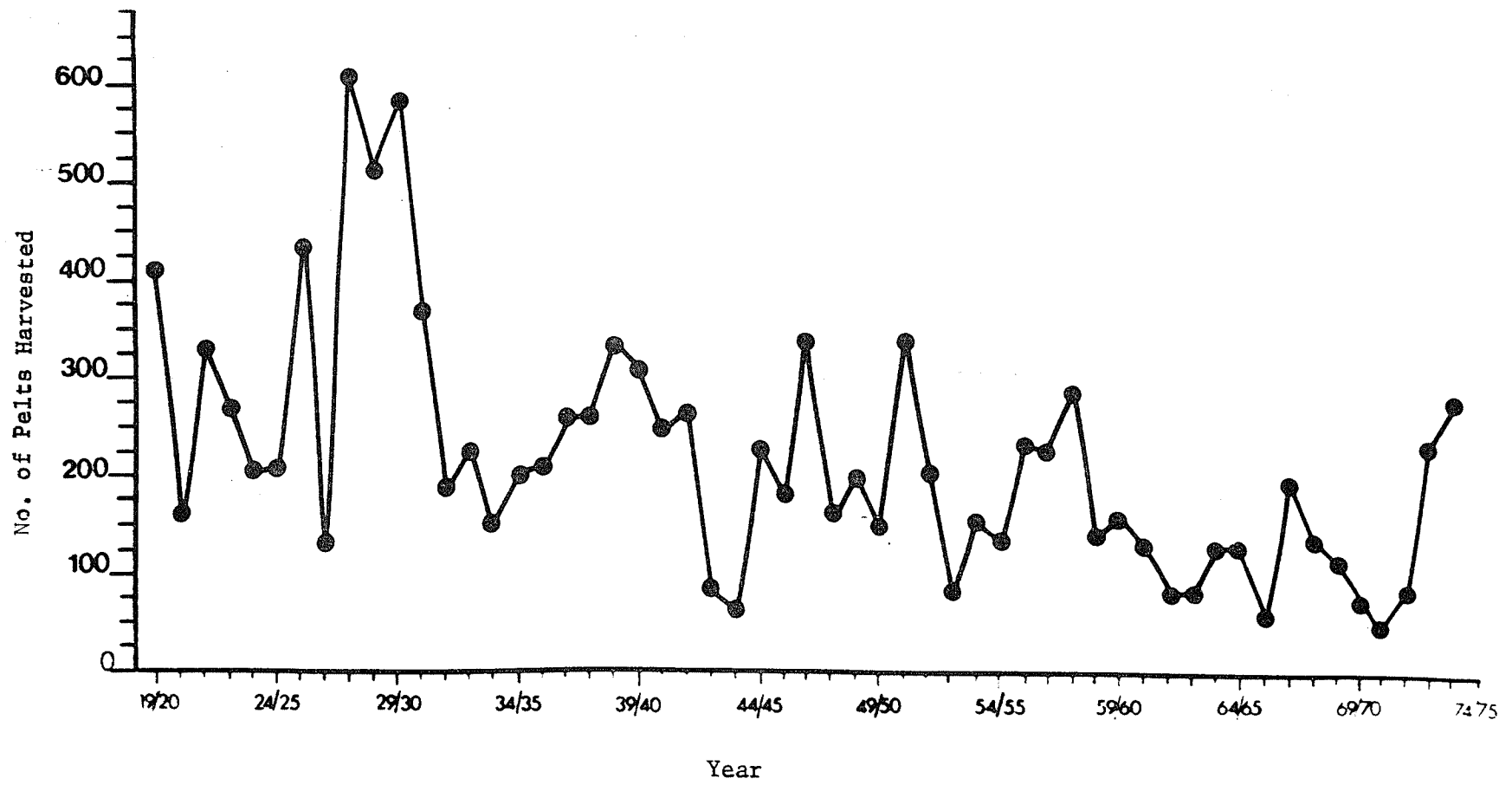


Fig. 9. Harvest of wolverine pelts in the Northwest Territories from 1919/20 to 1973/74.

well, in 1902, 635 skins were received and in 1903, 695 skins were purchased by the Company.

Of course, the Hudson's Bay Company incorporated a large section of Canada under its trading sphere, but apparently 2/5 of the pelts came from the Mackenzie-Athabasca region.

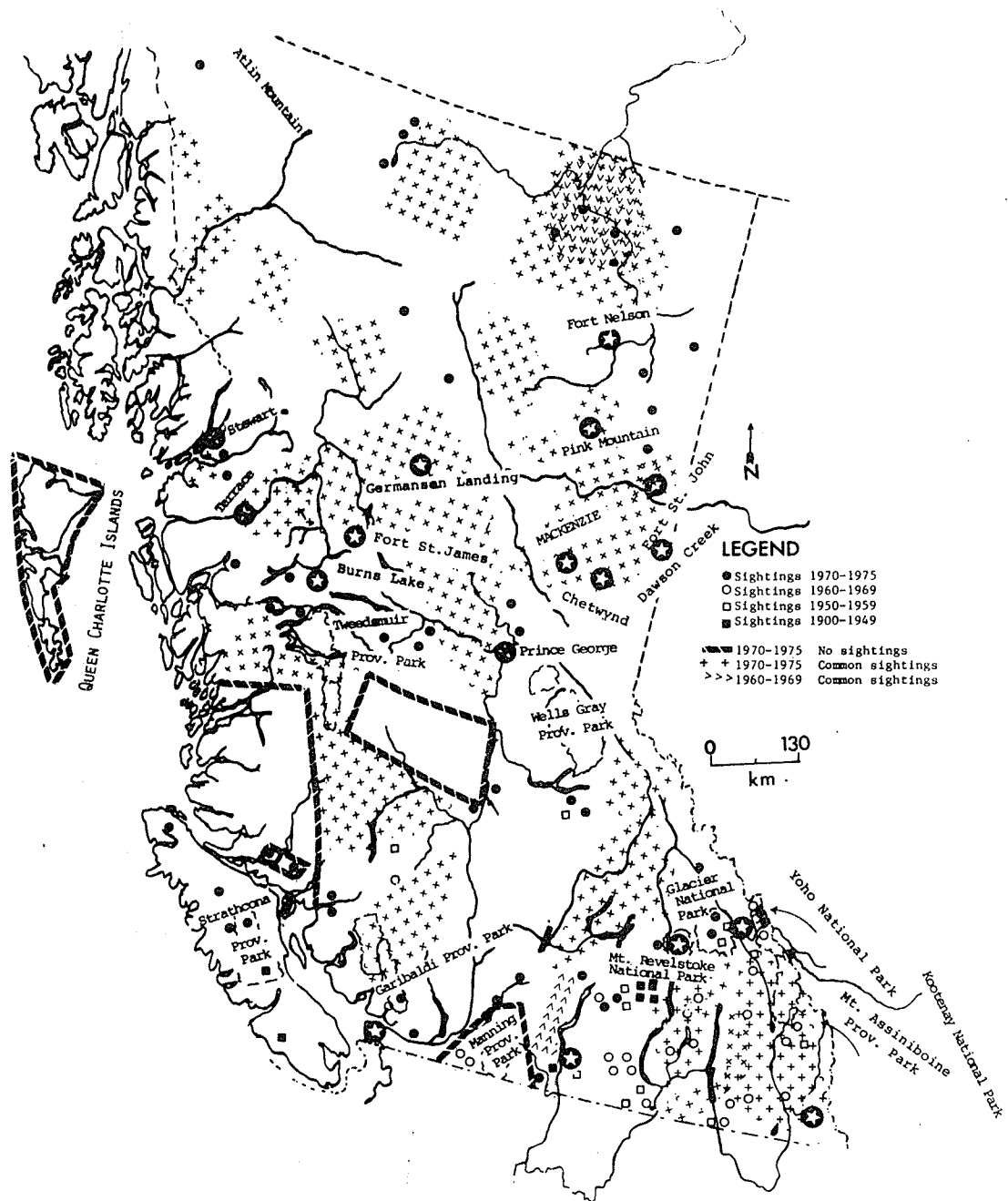
### British Columbia

Quick (1953) records that the Fort Nelson district of northern British Columbia appears to be the centre of wolverine population in western Canada. Swarth (1936) mentions that, although they appeared rare in the Atlin Mountain region of northwest British Columbia, they were probably of a general distribution. Cowan (1939) terms them "rare" in the Peace River district but more abundant in the Rockies. Osgood (1901) found no evidence of the wolverine on the Queen Charlotte Islands. Edwards and Cowan (1957), in their study of fur production of the boreal forest of British Columbia, discovered that the wolverine showed "... an almost constant decrease from northwest to southeast". The authors found the highest production to be on the high, cold plateau in the northwest, lower production in the mountain area of the Laird forest, and still lower production on the forested plains east of the mountains. Cowan and Guiguet (1973) generalize that

the wolverine is a creature of the northern wilderness, frequenting wooded and mountainous areas and in the summer months moving into the subalpine forest.

Fig. 10 indicates the wide and dispersed area of the province where the wolverine has been trapped or sighted. For the years 1974-75 and 1975-76, only one area had trapped in excess of 20 wolverine and that was Prince George (Joe Carty, pers. comm.). Eight areas had caught an equivalent of 14 or more, including Terrace, Hazelton, Germansen Landing, Fort St. John, Stewart, Mackenzie, and Dawson Creek. Several other centres had less than 14 and were, in order of declining numerical importance, Chetwynd, Smithers, Burns Lake, Vanderhoof, Fort St. James, and Pink Mountain. Nine trappers indicated in British Columbia that they had captured in excess of 30 wolverine (Table 6) and that they generally were found dispersed in the province. One trapper indicated he had caught more than 100 in the region west of Jasper and another in the area east of Juneau on the Alaska-British Columbia border. These statistics emphasize the general distribution of the wolverine throughout the province, although several negative sighting areas were reported, including the Queen Charlotte Islands which agrees with Osgood (1901), the central coast region, several points on Vancouver Island and the adjacent small islands, the

Fig. 10. Biologist and trapper sightings in British Columbia.

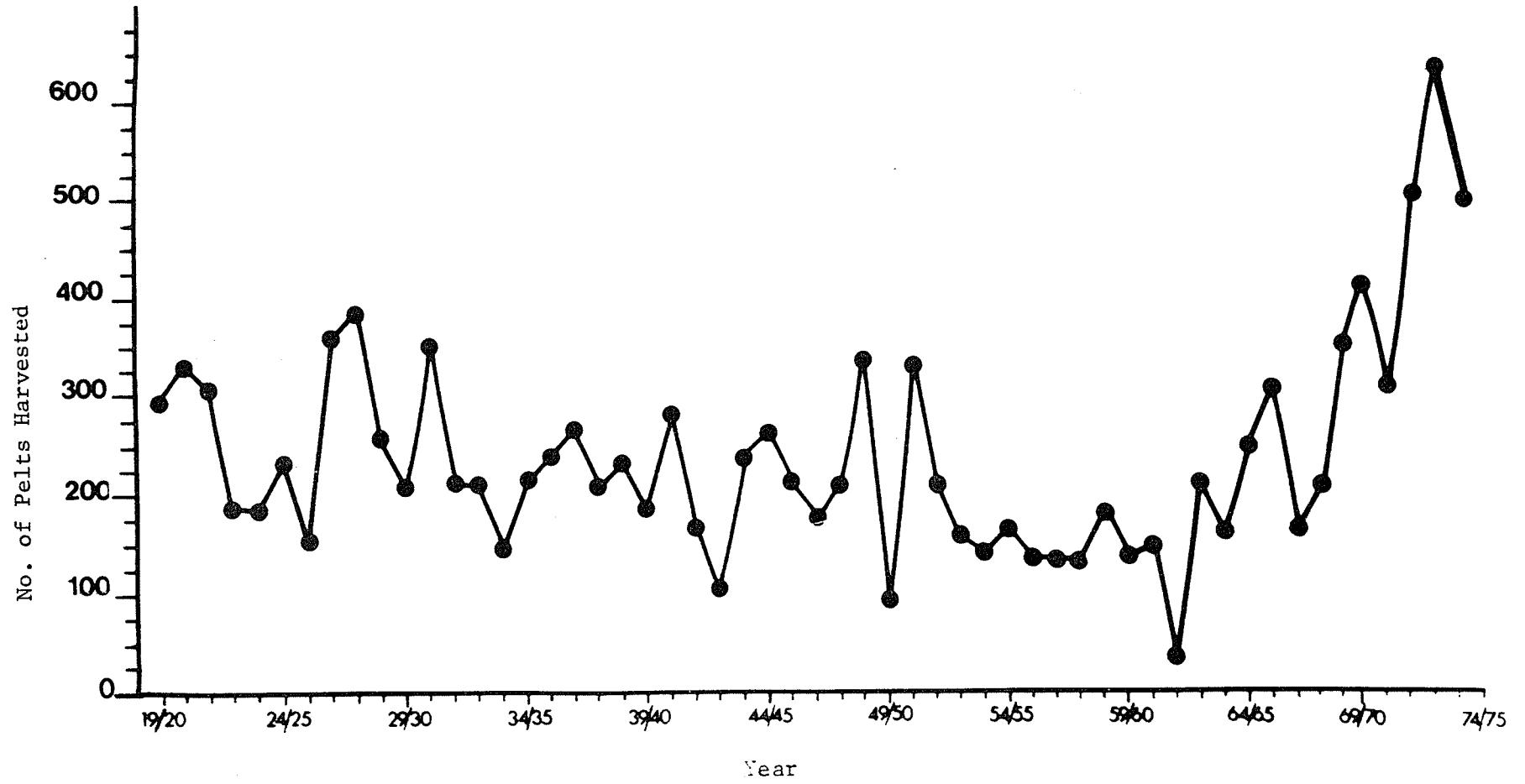


Chiliotin area of interior British Columbia also noted by Toner (1946), the Similkameen region, and several other areas towards the southeastern portion of the province. The warden of Mount Revelstoke National Park reports sighting wolverine throughout the Park as have several national park personnel in Glacier National Park. In fact, Munro (1945) states, "It seems probable that the wolverine is more plentiful in the park than in the surrounding areas". Indications of being spotted in Mt. Assiniboine Provincial Park (Cockerton and Herrero, 1973) and Yoho and Kootenay national parks are reported by their respective wardens, by Francis (1960), Munro and Cowan (1944), and Ulke (1923), as well as by the subscribers of wildlife newsletters, newspapers, and journals where the study was publicized.

I am in agreement with Van Zyll de Jong's (1975) remarks that the changes in abundance of wolverines as revealed in Fig. 11 are much less pronounced than any other province or territory in the study area. Over the 55-year span (1919-20 to 1973-74), the average yield/year is 235.02, with 1973-74 season yielding the highest number, 634 pelts, and 1962-63 only 40 pelts. There is a gentle downward slope with progressively lower peaks, but overall a high production rate has been maintained with an upsurge evident since 1965-66.



Fig. 11. Harvest of wolverine pelts in British Columbia  
from 1919/20 to 1974/75.



Alberta

Soper (1964) feels that the wolverine occur, or did occur, in all the coniferous forest of the province, from the far north to the parkland of the Rockies in the south. However, it has now, in his estimation, been exterminated over much of its primitive range. In the north, Soper (1964) claims they can still be found. Reports that it occurs sparingly in the Wood Buffalo National Park area are encountered (Soper, 1942), but some sightings have been reported in the Caribou Mountains (Soper, 1964). More recently, however, national park personnel and a fellow Natural Resource Institute student have sighted wolverines within the Park. Soper (1948) notes that the wolverine was once generally distributed throughout the Grand Prairie-Peace River region, but the last survivors disappeared between 1900 and 1910 (Soper, 1964). August Peters, (pers. comm.), a trapper of the Worsley area, however, has proven that a wolverine population does exist in the region since he has trapped in excess of 40 wolverine (Table 6) although he is quick to point out that their presence is not found on his trapline consistently year by year. The last survivors around Lesser Slave Lake were said to have been killed in 1933-34 (Soper, 1964).

Accounts noted by Soper (1964) show the wolverine present at the headwaters of the Narraway, Torrens, and Smoky rivers, but since the 1850's few have remained in the country immediately north, west, and southwest of Edmonton. No reports of sightings in Elk Island National Park were indicated by park personnel. The Rocky Mountain areas are noted for sightings of wolverine (Francis, 1960; Soper, 1947, 1970), especially in the national parks of Banff and Jasper and Willmore Wilderness Provincial Park and many reports were received by me of sightings by park personnel and tourists in this region. Recent observations from Waterton Lakes National Park including the park warden and staff (pers. comm.) as well as Soper (1973) indicate that wolverines inhabit the area. In addition, wolverine has been reported by Lechleitner (1955, *in*: Scotter, 1964) for Glacier National Park, Montana. The incidence of a roadkill near Cardston, Alberta (Scotter, 1964) is extremely interesting since this may support the argument that the animal has extended its range into the prairies. Van Zyll de Jong (1975) warns that extralimital occurrences and sightings sometimes represent dispersal of the young, and consequently heavy weighting on the part of expansion should be moderated by this factor.

Fig. 12 demonstrates that the wolverine primarily inhabits the Rocky Mountain area as well as some portion of the Peace River district, the Clear Hills, and some other isolated spots in Alberta. The large number of tourists and naturalists travelling to the popular resort areas in Banff and Jasper national parks significantly increase the potential number of possible sightings of the wolverine. The Indian reserve near Assumption was the only significant negative sighting area reported.

The graph in Fig. 13 reveals a steep downward trend from 1928-29 to an almost equally steep rise in 1973-74. An average of 52.1 pelts/year is obtained with a low of 6 pelts in 1931-32 and a high of 282 pelts in 1928-29.

### Saskatchewan

Of the provinces in the study area, Saskatchewan possesses the dubious honour of having the least amount of studies undertaken on mammals. Harper (1956) mentions that the wolverine is found in the District of Keewatin from Dubawnt to Reindeer Lake. Beck (1958) remarks that it is common in the area north and east of Stony Rapids to Fond du Lac. The range extends south to Wollaston Lake and east to Lake Athabasca. Richards and Fung (1969)

Fig. 12. Biologist and trapper sightings in Alberta.

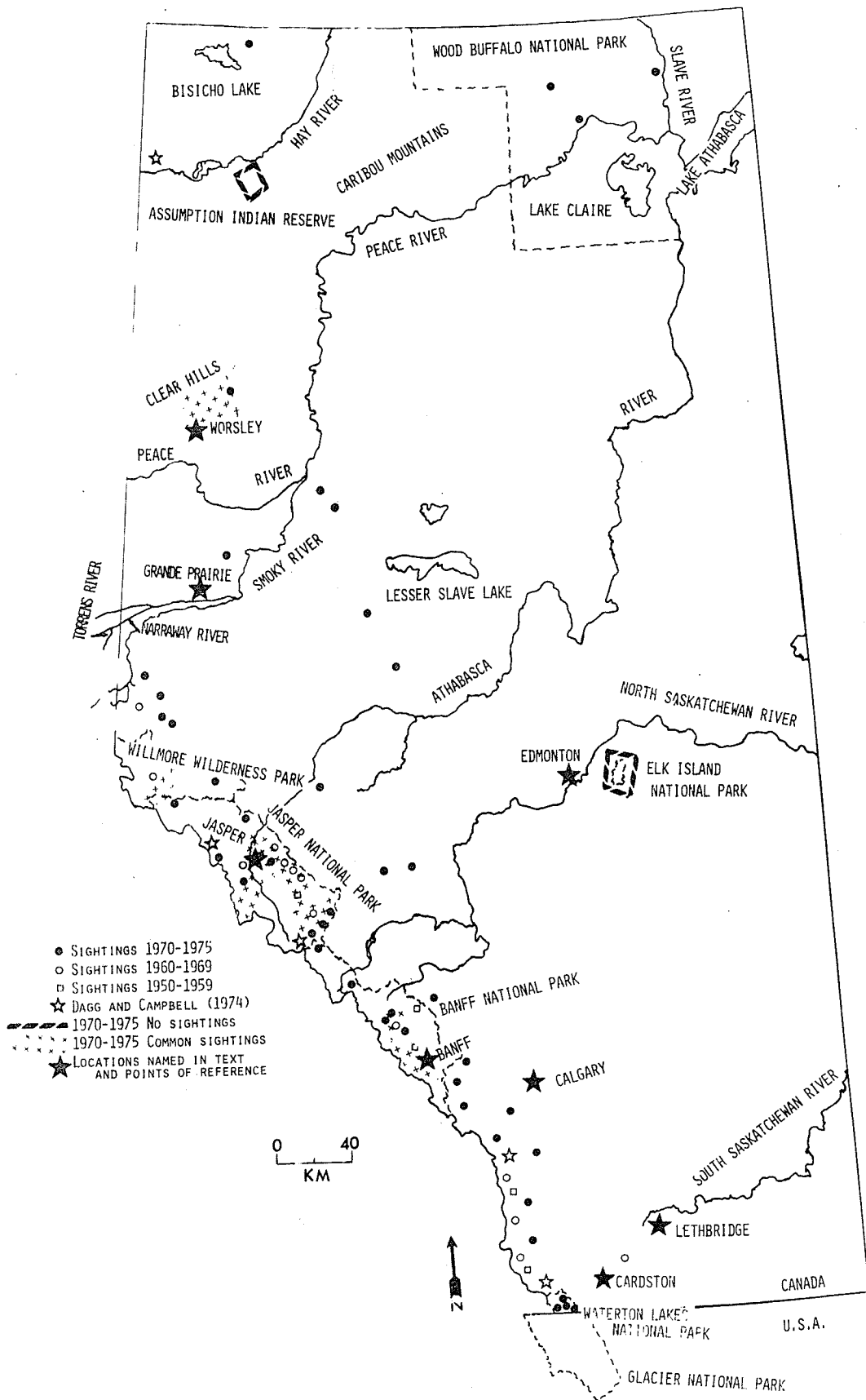
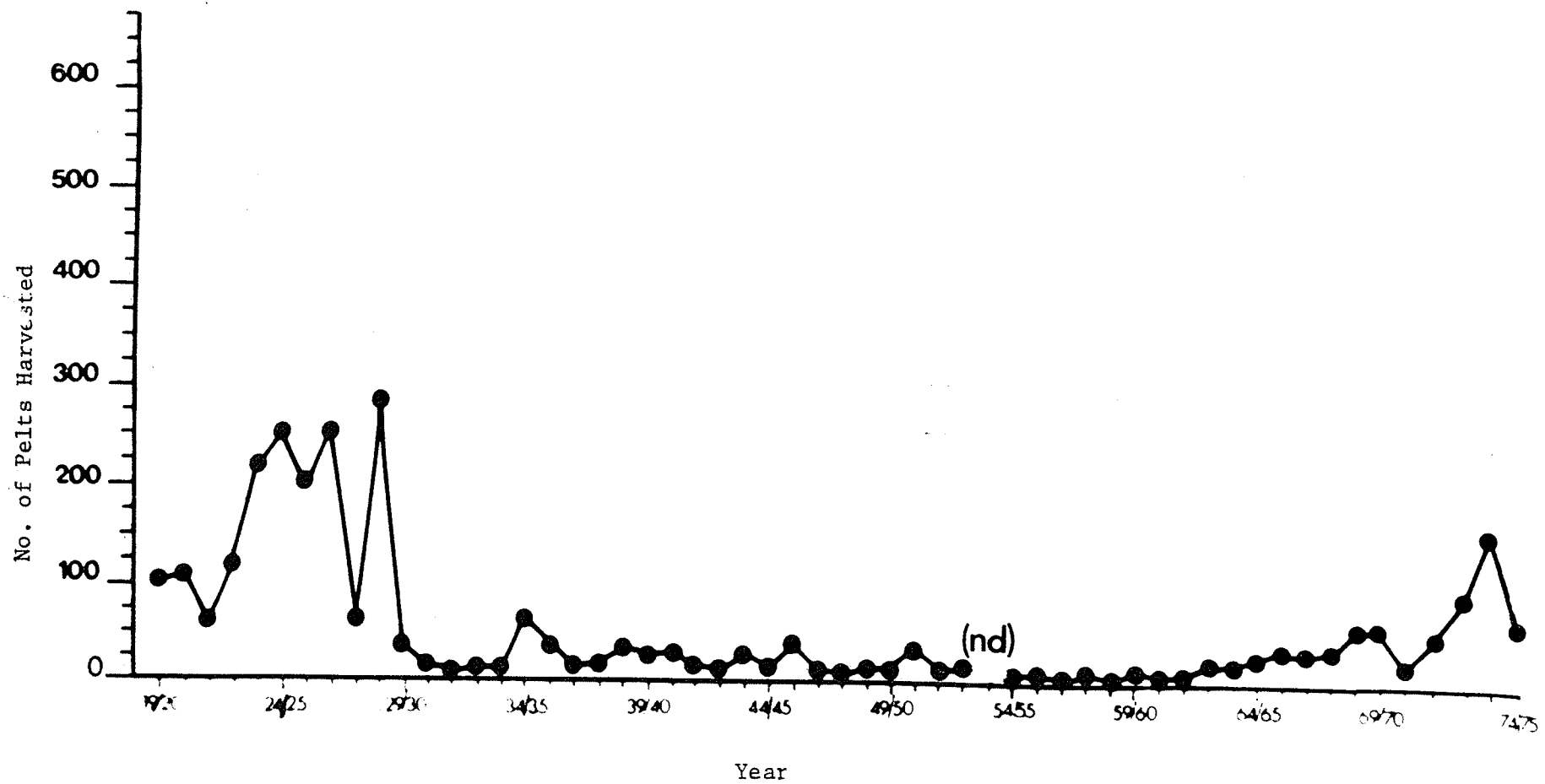


Fig. 13. Harvest of wolverine pelts in Alberta from  
1919/20 to 1974/75.





agree with this generalization but mention its former range to have been the entire province, which seems highly unlikely, although Beck (1958) reports a specimen in the Saskatchewan Museum of Natural History from Prince Albert . Sid Avery (pers. comm.) reported seeing one south of Regina.

Fig. 14 reveals dispersed sightings in the south, with the majority of reports from around Lake Athabasca. One trapper caught more than 100 wolverine in an area north of Lake Athabasca (Table 6), while another reports a heavy take in the Meadow Lake area which is surprising and unlikely. Of those animals trapped the majority came from the registered traplines (RTL's) of Camsell North, Fond du Lac, Caribou, Sunrise, and Stony Rapids. The reader is asked to focus on the overwhelming negative sighting areas, including Prince Albert National Park (pers. comm.).

White's (1971) report on the Pasquia Hills sheds light on the occurrence of wolverine there. Dagg and Campbell (1974) show wolverine records for Lake Athabasca as well as Reindeer Lake and Lac la Ronge Provincial Park.

The graph of Saskatchewan yields of wolverine shows a constant decline from 1927-28 on (Fig. 15). In some years the reader will notice it drops to 1 (1940-41 and 1960-61) and 2 (1945-46). The overall average is 23.5 pelts/year.

Fig. 14. Biologist and trapper sightings in Saskatchewan.

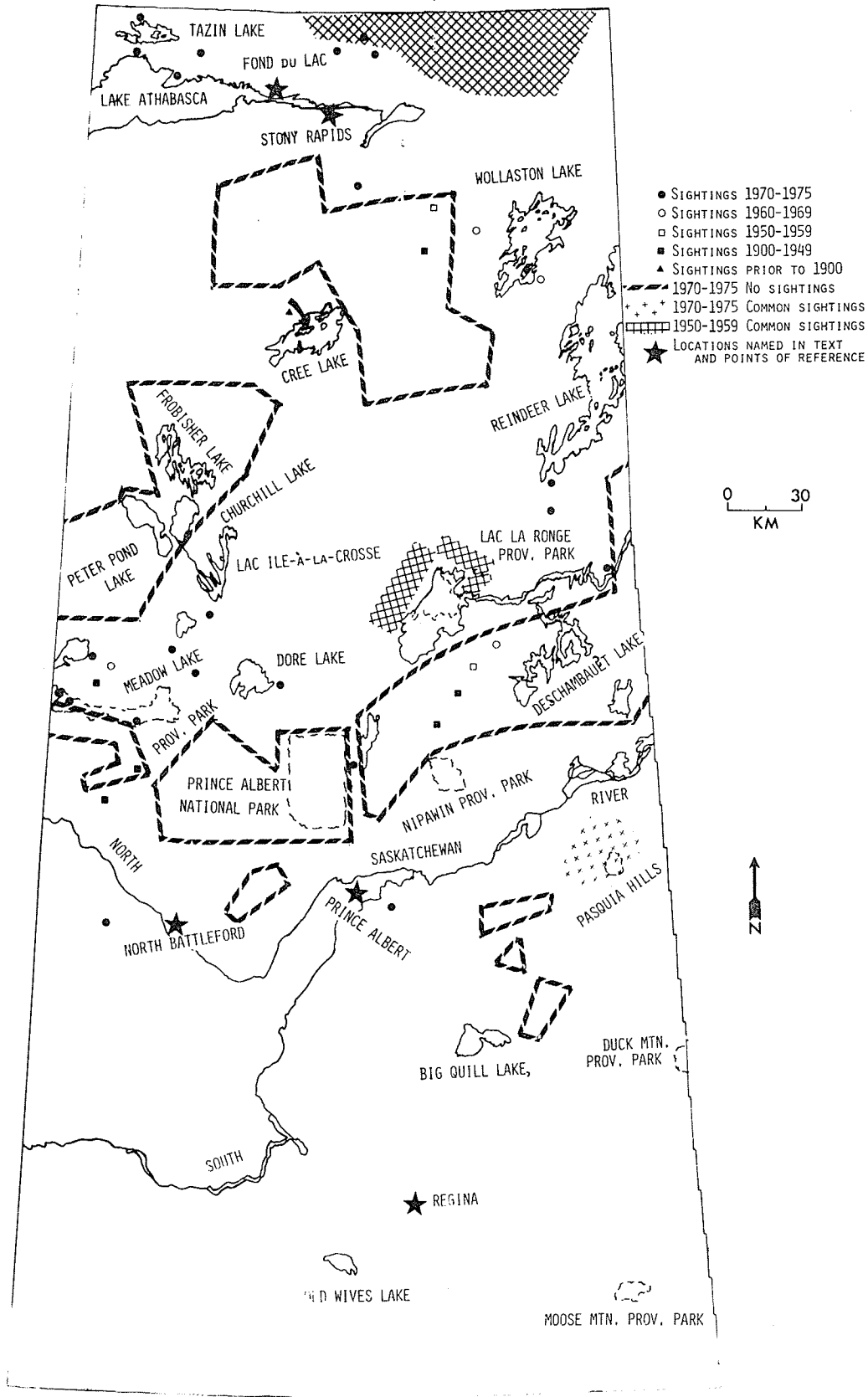
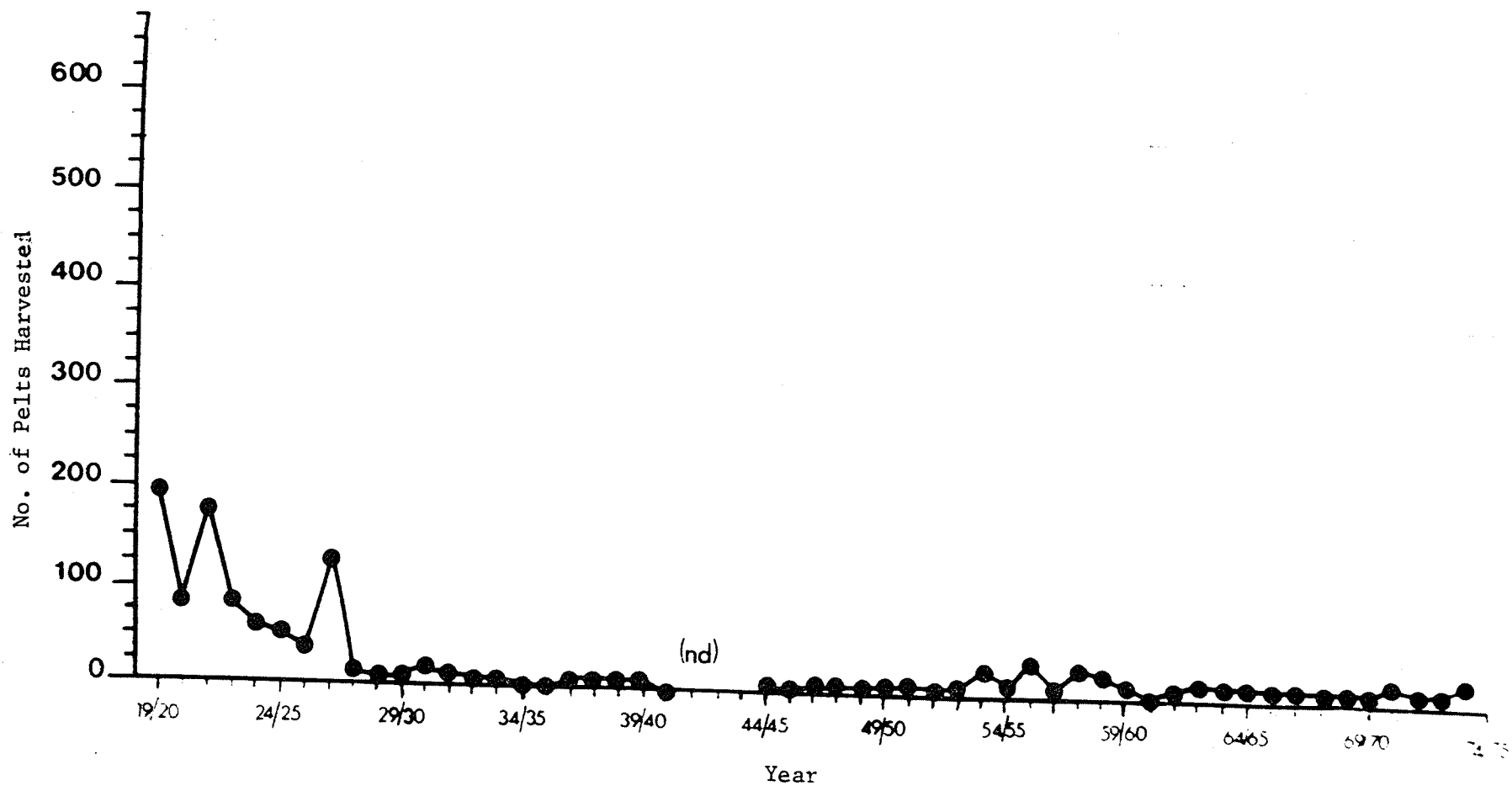


Fig. 15. Harvest of wolverine pelts in Saskatchewan from 1919/20 to 1973/74. (nd) denotes no data available.



Manitoba

In Hearne's day (according to Preble, 1902), the natives to the north of Fort Churchill apparently killed many wolverine. Seton (1910) remarks that it was unknown in southwestern Manitoba, although Hine (1885 *in*: Seton, 1910) reports one from the Brokenhead River and very scarce in the northeastern half of the province. Soper (1961) indicates that it was distributed in the boreal forest north to the arctic tundra but by the latter half of the 19th century was virtually rare except in the higher latitudes. In the 1940's, Soper (1961) reports sightings around Lake Winnipeg and north of the Nelson River. Van Zyll de Jong (1972) notes the wolverine confined to areas north of the 57° latitude but occasionally occurs irregularly to the south of the Nelson River (Van Zyll de Jong and Nero, 1971). No mention is made of their appearance in the Bloodvein River region (Carbyn, 1967). Van Zyll de Jong (1972, 1975) remarks that the centre of abundance is in the extreme northwest corner, north of the settlement of Brochet. In the Brochet Registered Trapline section, the frequency of occurrence in the catch in 16 seasons from 1955-56 to 1970-71 was 100%, with an average catch of 11.1 animals. Horace McCallum, a man previously noted for his success with deadfalls,

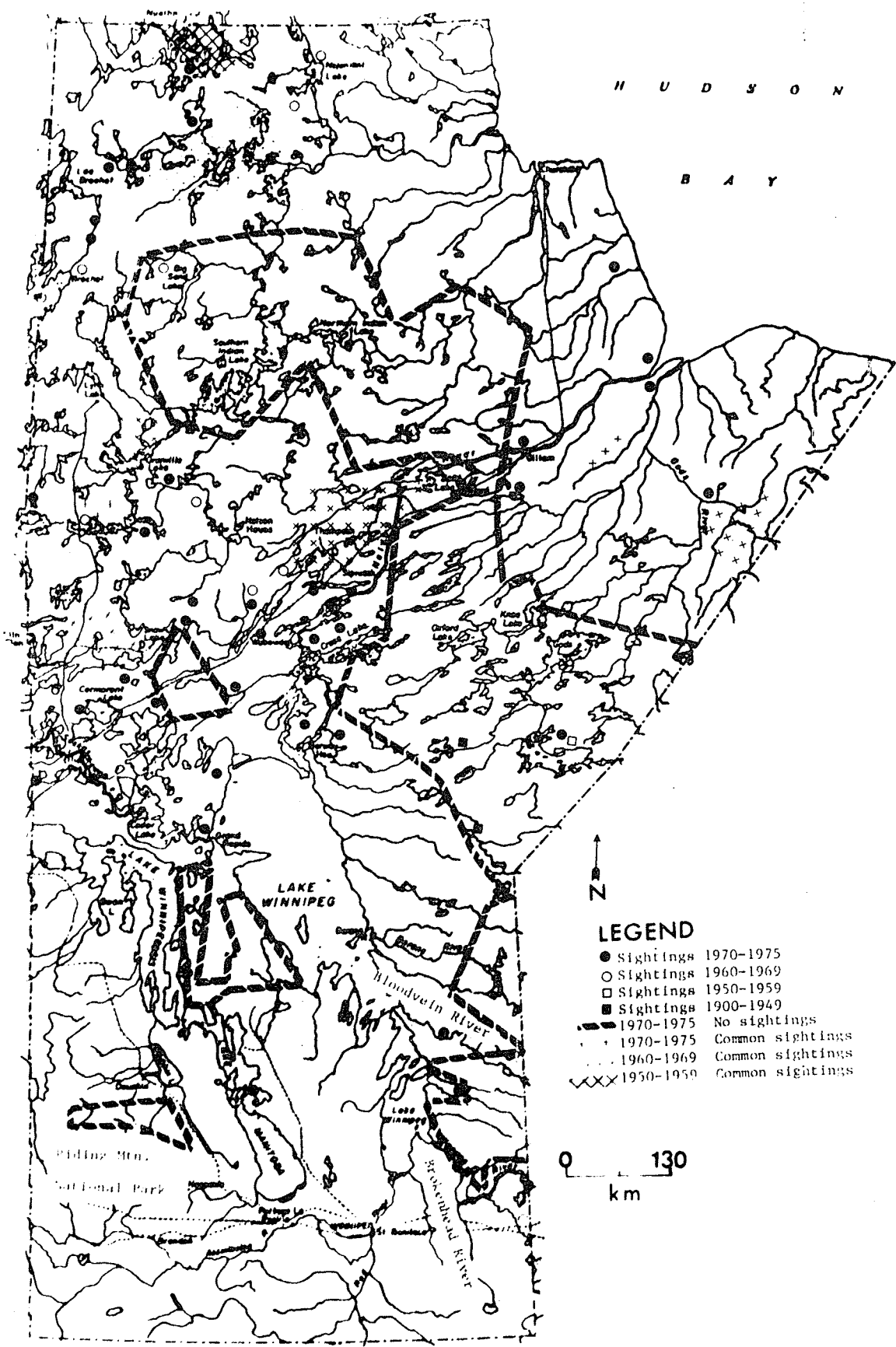
lays claim to a majority of these animals. Reviewing the annual catch of each of the R.T.L.'s in the province since their inception in 1940, six sections show consistency of catching wolverine. These are: Chipewyan (formerly Duck Lake, although it is only in the period 1953-54 to 1956-57 when 44 were reported taken that this R.T.L. really shows a substantial harvest), South Indian Lake, Brochet, Nelson House, Pukatawagan, and Churchill. In the 1972-73 and 1973-74 seasons, Wabowden, Pikwitonei, Herb Lake, and Split Lake show an upswing in the wolverine pelts. Ironically the R.T.L.'s of South Indian Lake and Split Lake are reported as negative sighting areas on the map.

Only two trappers indicated catches in excess of 30 (Table 6), being Horace McCallum with 76 or more and a gentleman sometimes residing at Nueltin Lake who claims to have caught in excess of 100.

The map in Fig. 16 yields some expected and at the same time unexpected results. The negative R.T.L. areas in the south of the province were expected (including Riding Mountain National Park), but recent reports of the wolverine in the south as well as reported



Fig. 16. Biologist and trapper sightings in Manitoba.



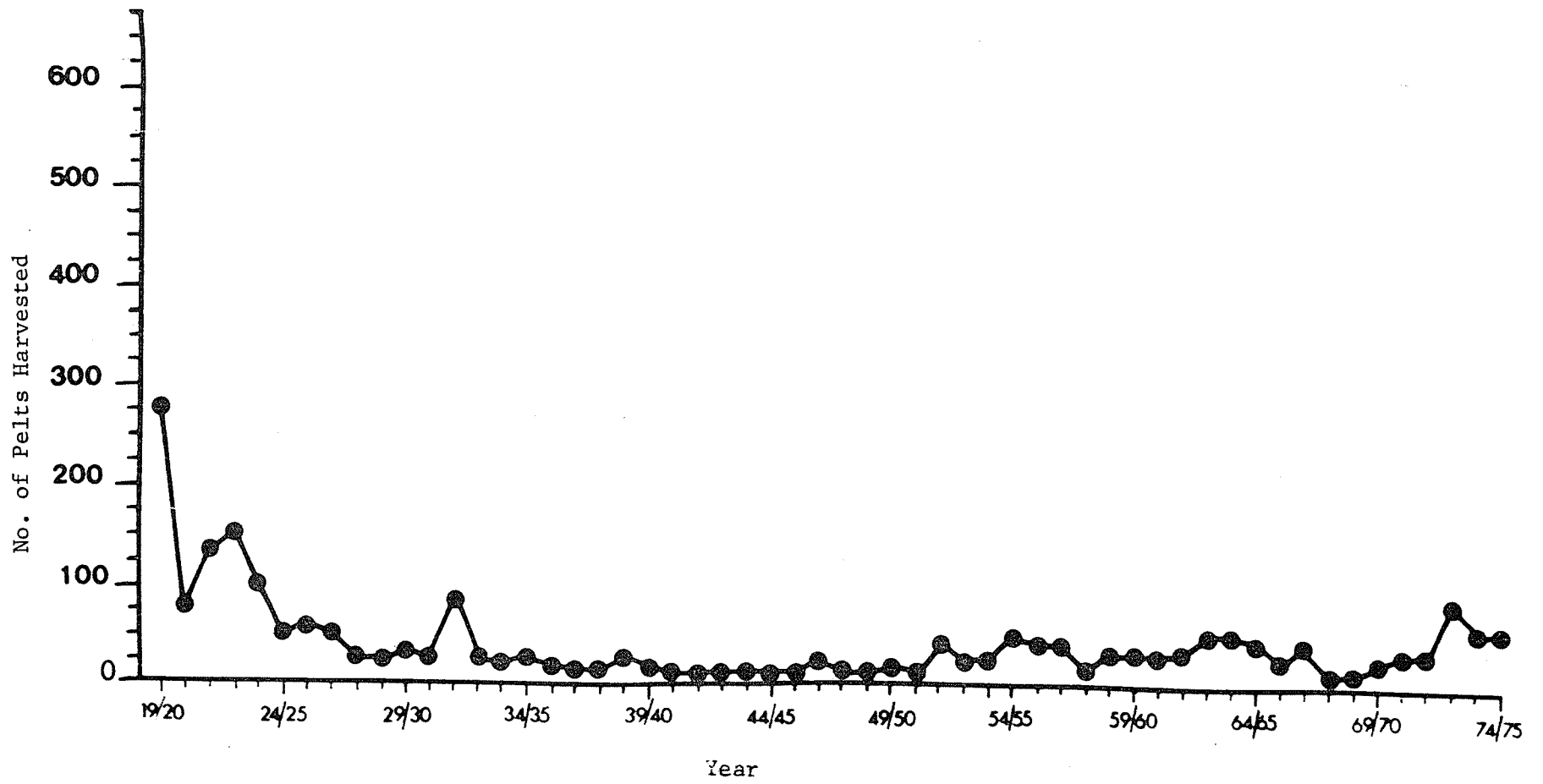
negative sighting areas in the north, (areas such as Split Lake and South Indian Lake previously reported as sources of annual wolverine harvest) were unexpected. The rate of return from these areas was poor, and this may explain why the voice of one or two respondents with no wolverine in their area may speak for the whole R.T.L. The reader will undoubtedly notice the heavy concentration of sightings along the rail line from The Pas area to Thompson. The concentration of humans in this area as well as the drawing power of waste may serve to explain this apparent congregation. I was informed, however, by the natives of the Pukatawagan and Granville Lake communities that the wolverine population is moving southward and the fisher northward.

Fig. 17 demonstrates a decline in the harvest from 1922-23 to 1950-51, with a constancy until 1971-72 and an apparent upward swing recently. Manitoba yields 42.5 pelts/year, with a low of 9 in 1944-45 and a high of 277 in 1919-20.

#### Other Statistics

The Hudson's Bay Company has and still does retain many fur posts throughout Canada. Their records for wolverine production from the years 1940-41 to 1972-73 show the central arctic (the area from the west side of

Fig. 17 Harvest of wolverine pelts in Manitoba from  
1919/20 to 1974/75.



Hudson Bay to Baffin Island) producing a total of 183 pelts; the western arctic (Coppermine River area), 60; Athabasca, 307; Mackenzie, 11; British Columbia and the Yukon, 256; Saskatchewan, 211; and Manitoba, 101.

Unfortunately, the statistics represent totals of administration areas of all collecting posts within the area, and consequently no real centres of abundance can be drawn from the data. They do show, nonetheless, that as represented in my figures of the maps and graphs that the Territories and British Columbia appear to show the heaviest concentrations of the animal in the study area.

#### Summary and Discussion

The changes in distribution and abundance in the study area can be summarized as follows. There never really appeared to be an abundance of wolverine in the prairie provinces, and despite recent sightings in the southern portion of Manitoba and Alberta, the species appears to be concentrated north of 54<sup>o</sup> latitude in Manitoba, and excepting some occurrences in southern Saskatchewan, it is centred around Lake Athabasca. In Alberta, a concentration appears down through the Rocky Mountains to Waterton Lakes with some occurrences in the Peace River district. The distribution in British Columbia and the

Territories appears to have changed little, although the fur statistics reveal a slight downward trend in these areas as well. Recently there are indications of an increase in wolverine in British Columbia and the Yukon. The maps of distribution in these areas demonstrate its incidence throughout British Columbia, especially the Kootenay region, the lower Fraser River, the coastal district from Terrace through to Prince George, the area around Fort St. John and Finlay River, and the Skeena Mountains. In the Yukon it is noted throughout, notably in the western segment and its concentration in the central portion of the Northwest Territories.

From the maps and all reports, the wolverine appears to confine itself to no one particular type of habitat. It is found in the boreal forest region, sub-alpine forest, mountain forest region, Columbia forest region, deciduous forest region, as well as the tundra. A greater abundance and concentration of the animal however does seem to favour the forested regions.

The question remains, though, how can my maps of distribution be explained from those drawn earlier by Seton (1910), as well as why the decline in harvests? I have collected a series of explanations in defence of the wolverine's change in distribution and abundance, factors that perhaps have affected this mammal's chances of surviving to multiply.

(1) Climate and habitat: although Van Zyll de Jong (1975) dismisses these two factors as having remained unchanged or changed so slightly that they have a negligible impact, I am in agreement with Dagg and Campbell (1974) and feel that the changes in habitat are often so subtle that they may account for changes. Items such as fire, logging, mining, and oil exploration may be important in forcing movement into less suitable habitats or even extirpation. Climate has not altered dramatically enough to affect the species.

(2) Natural predation: incidences of kills by wolves, bears, and porcupines are low, and consequently are a negligible effect on distribution and status.

(3) Availability of food: I have indicated that the wolverine functions as a predator in the food chain of the taiga and tundra ecosystems. However, it is not an efficient hunter and seems to rely on carrion to support it. Consequently, in periods of poor ungulate productivity or the shift of prey and predator, the wolverine population may be adversely affected.

(4) Imbalanced sex ratio: Rausch and Pearson (1972), as mentioned earlier, discovered a 1:1 sex ratio. However, more male wolverines are trapped, primarily because of their tendency to wander more widely.



This may not jeopardize the populations since the males are polygamous. One trapper from the Stewart area of British Columbia noted that, after January, he takes no female wolverine, and so did Pierre Bird (pers. comm.) of Granville Lake, Manitoba. If numbers of both sexes drop to a low level, the probability of meeting to mate depreciates considerably.

(5) Human predation: the impact of man is probably the most important factor influencing distribution and abundance.

(a) Increased accessibility: new modes of transportation as well as the exploration and opening of the country have led to an influx of man who have consequently invaded territory previously the domain of such creatures as the wolverine. Coupled with increased accessibility is the never-ending search for resources. The camps of the exploration crews and actual extractors often draw in wolverines and conflict is about to arise.

(b) Hunting: breaking into make-shift camps and caches as well as appearing at the site of a hunter-kill often cause antagonism with the wolverine being sought and killed. As well, the wolverine is listed for example as a small

game animal in British Columbia, and I was told of cases where the hunter had spent considerable amounts of money to hunt bear to no avail but to happen on a wolverine and kill this animal instead.

(c) Poison: as has been indicated earlier, the wolverine is believed to be susceptible to bait set, especially for wolves and coyotes, by predator control agents and ranchers. Consequently, the wolverine, being a scavenger, is drawn to the bait. Campaigns of eradication by bounty hunters and government agencies, or in the past by trappers are not as prevalent today but their impact could have had unlimited damage.

(d) Trapping: the appeal of the pelt, its element of prestige and status and its qualities of easily shedding ice, make the wolverine still a much sought-after animal. The very nature of trapping brings carnivores into conflict with man by stealing bait and fur-bearers. As well, by stepping into traps, the set is spoiled for the potential victim. Van Zyll de Jong (1972) believes over-exploitation and persecution are a main cause of the wolverine's decline in Manitoba.

## MANAGEMENT CRITERIA AND PROPOSALS

Whether we want to accept it or not, man is everywhere intertwined with wild animals. The relationships are biological, because we too are animals; ecological, because we are just one of many other creatures sharing this planet; and economical, because we are affected by them and they by us, for better or worse (King, 1966). Since his beginning, man has been associated with wildlife; then and now he was and is still making use of them. The beneficial uses and services provide the positive values possessed by wildlife such as the wolverine.

### Positive Values

King (1966) lists the positive values possessed by wildlife: commercial; recreational; esthetic; educational, scientific; social; and biological.

#### Commercial

Obviously the sale of fur-bearing pelts and other wild animal products is of commercial importance. The significance of the fur industry is clearly demonstrated

by reviewing Canadian history; it is our second-oldest industry and still ranks as an important source of income, albeit to a smaller and smaller portion of the labour force. Until recently, the wolverine pelt has been of little economic importance in the market, and its meat is not considered palatable despite Liewelyn's (1854) comments. The average value of the pelt in the study area has dropped as low as \$2.00 in Alberta (1933/34). Combined with a low harvest that is demonstrated, particularly by Saskatchewan, in the graphs of the last chapter, the wolverine has had a low relative nominal and real dollar value (Figs. 18-23). Interestingly enough, with the current popularity in long or coarse hair, the average value of the wolverine has jumped during the late 1960's and now exceeds \$90.00.

However, the wolverine definitely is not one of the top fur-bearers in western Canada (see question 5 and 6, Appendix C), as Table 11 demonstrates), nor has the ranking significantly altered. Nonetheless, the real dollar value of wolverine pelts harvested in western Canada in 1973-74 was \$22,939.71. Added to this is the royalty charged per pelt as well as hunting licences, guide fees, and other spin-offs (transportation costs, machinery, traps, ammunition) associated with trapping and hunting the animal.

Fig. 18. The real dollar value of wolverine pelts  
in the Yukon from 1919/20 to 1973/74.

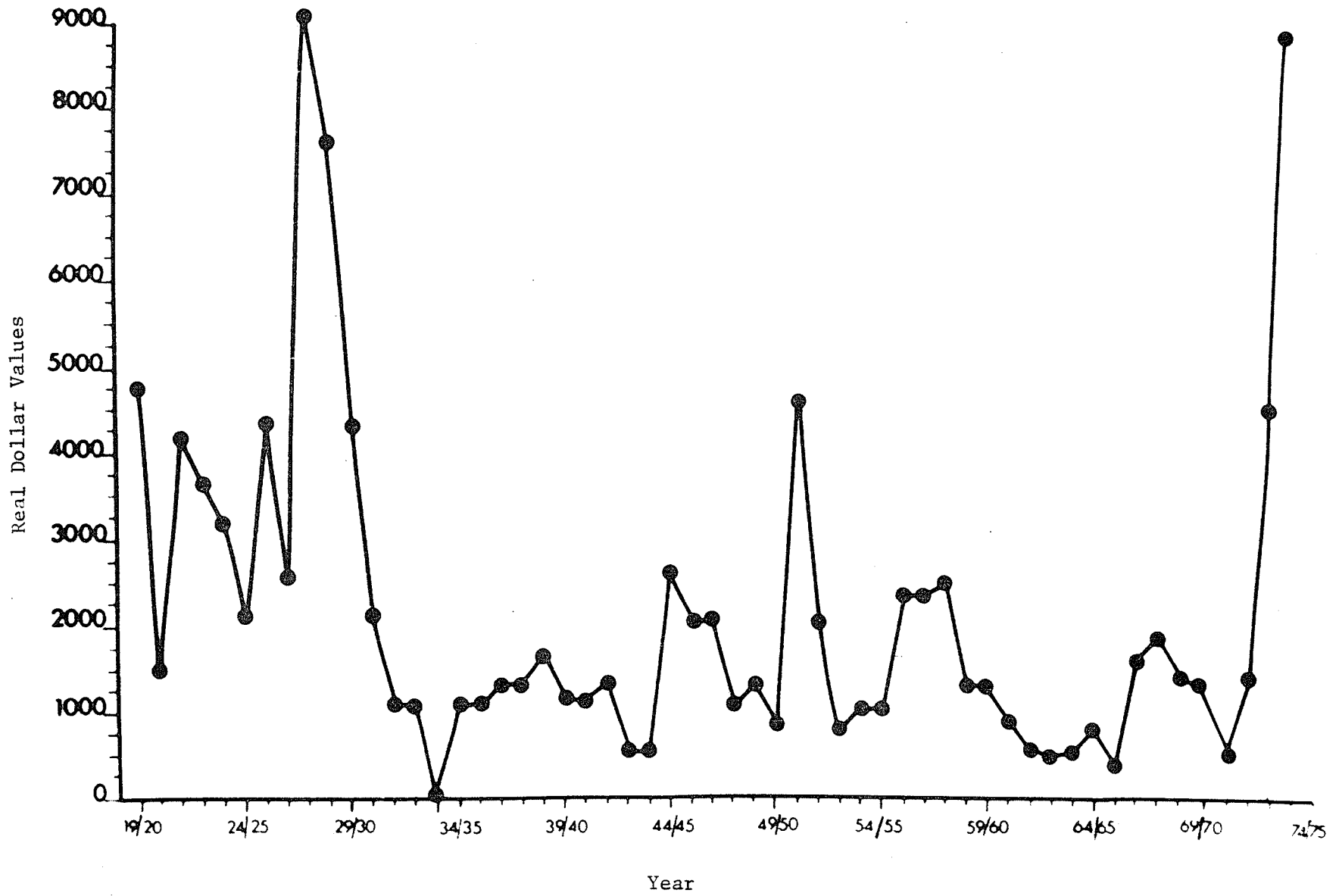


Fig. 19. The real dollar value of wolverine pelts in the Northwest Territories from 1919/20 to 1973/74.

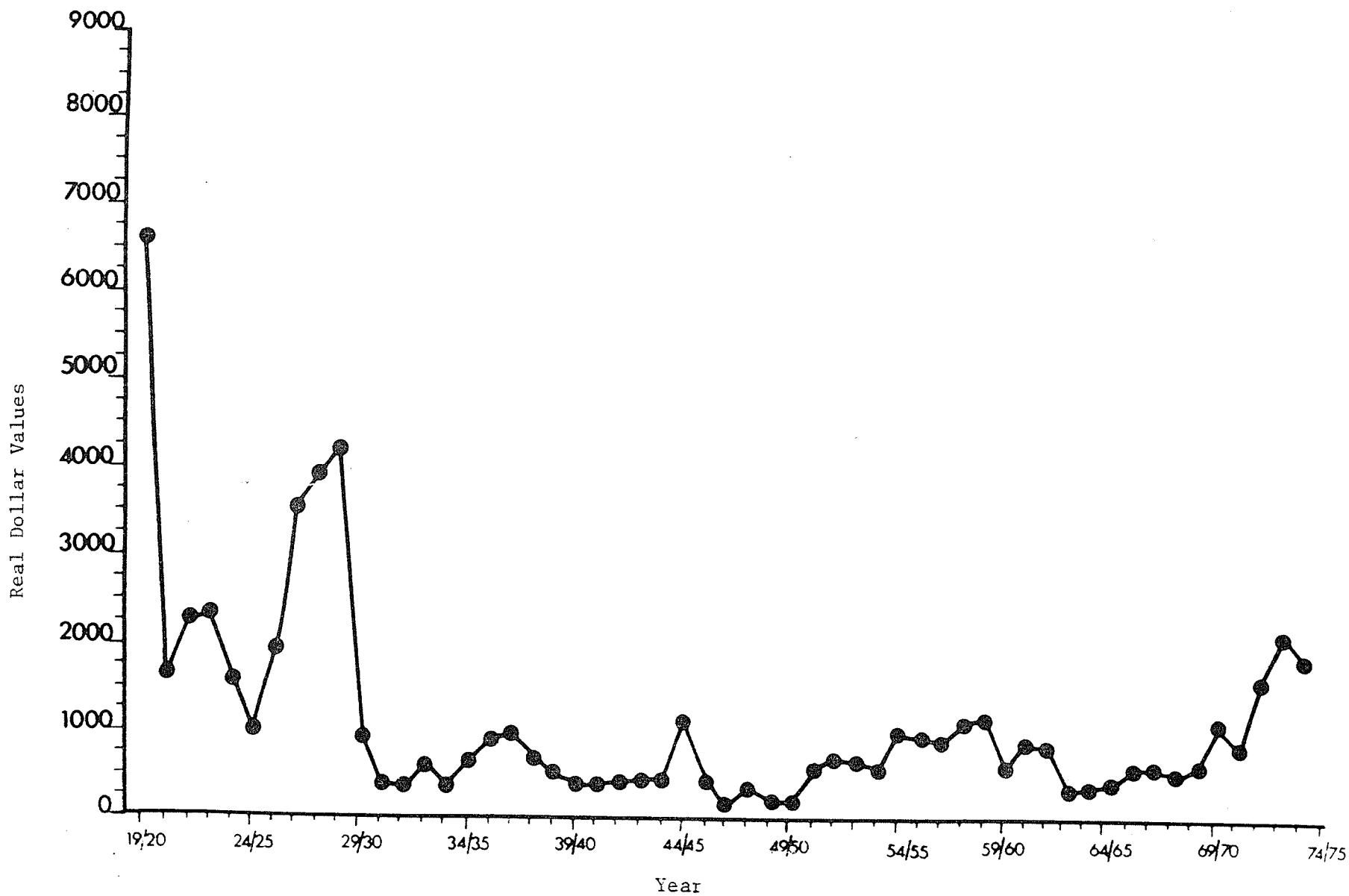




Fig. 20. The real dollar value of wolverine pelts in British Columbia from 1919/20 to 1974/75.

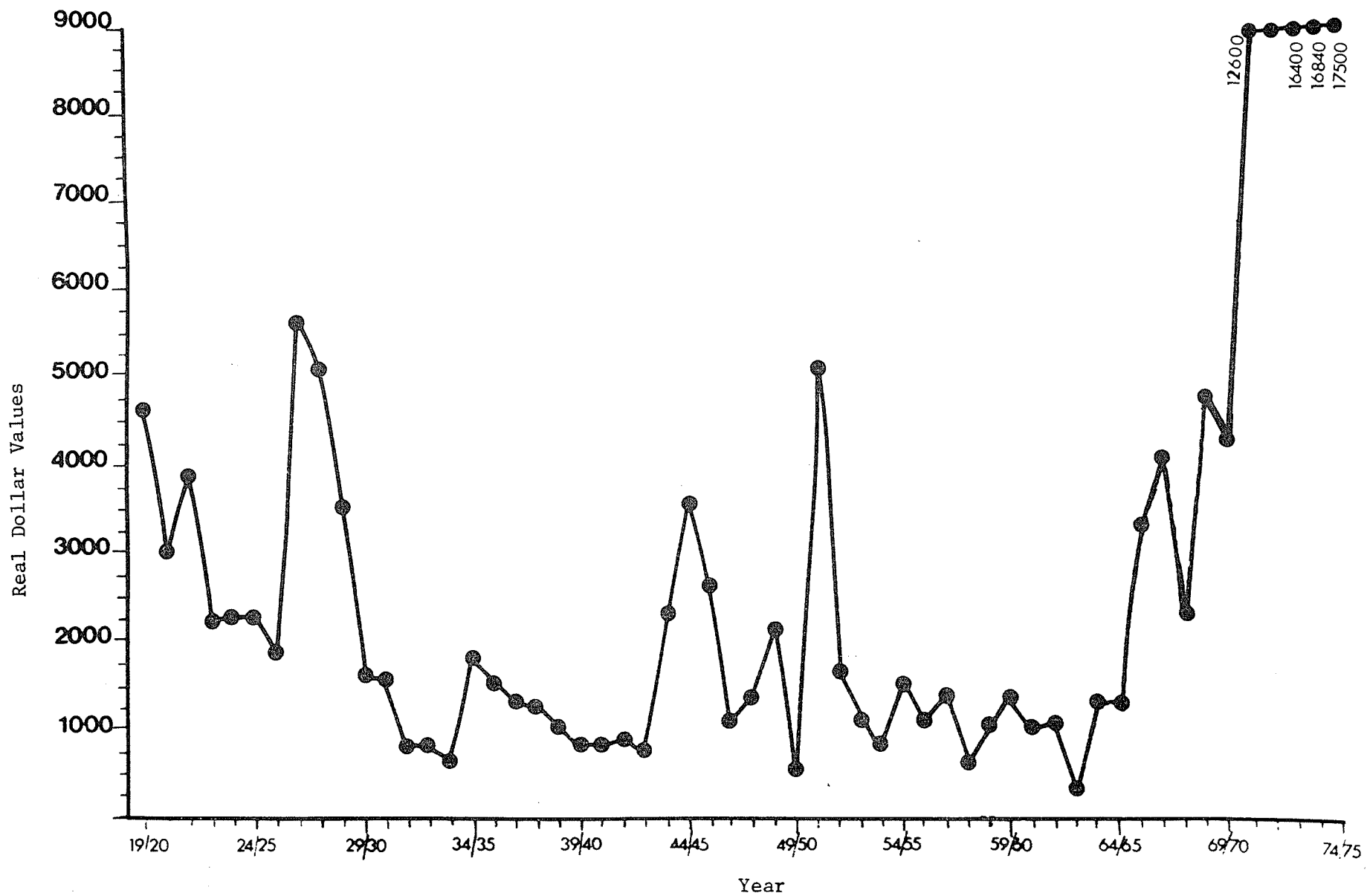


Fig. 21. The real dollar value of wolverine pelts in Alberta from 1919/20 to 1974/75.  
(nd) denotes no data available.

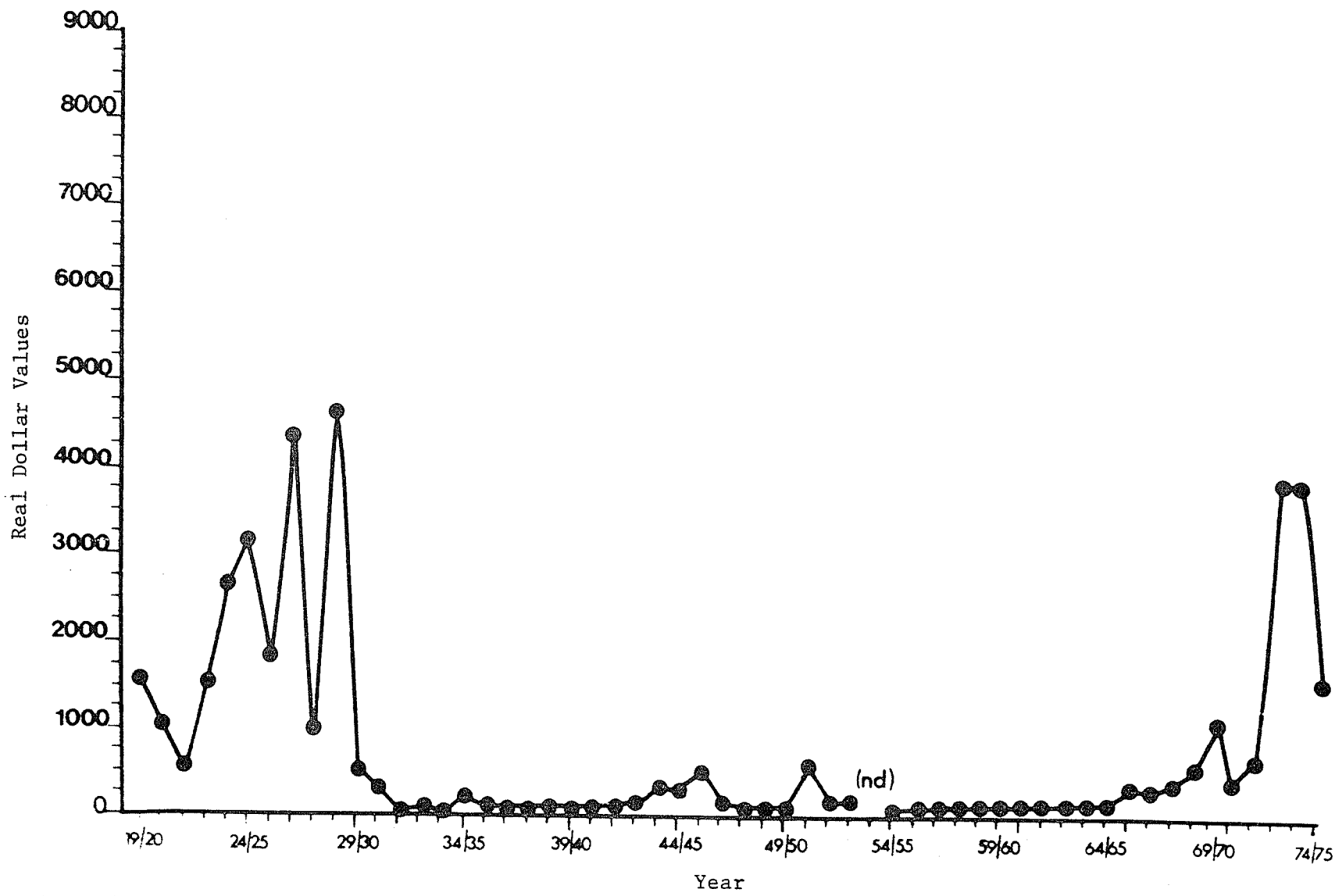


Fig. 22. The real dollar value of wolverine pelts in Saskatchewan from 1919/20 to 1973/74.  
(nd) denotes no data available.

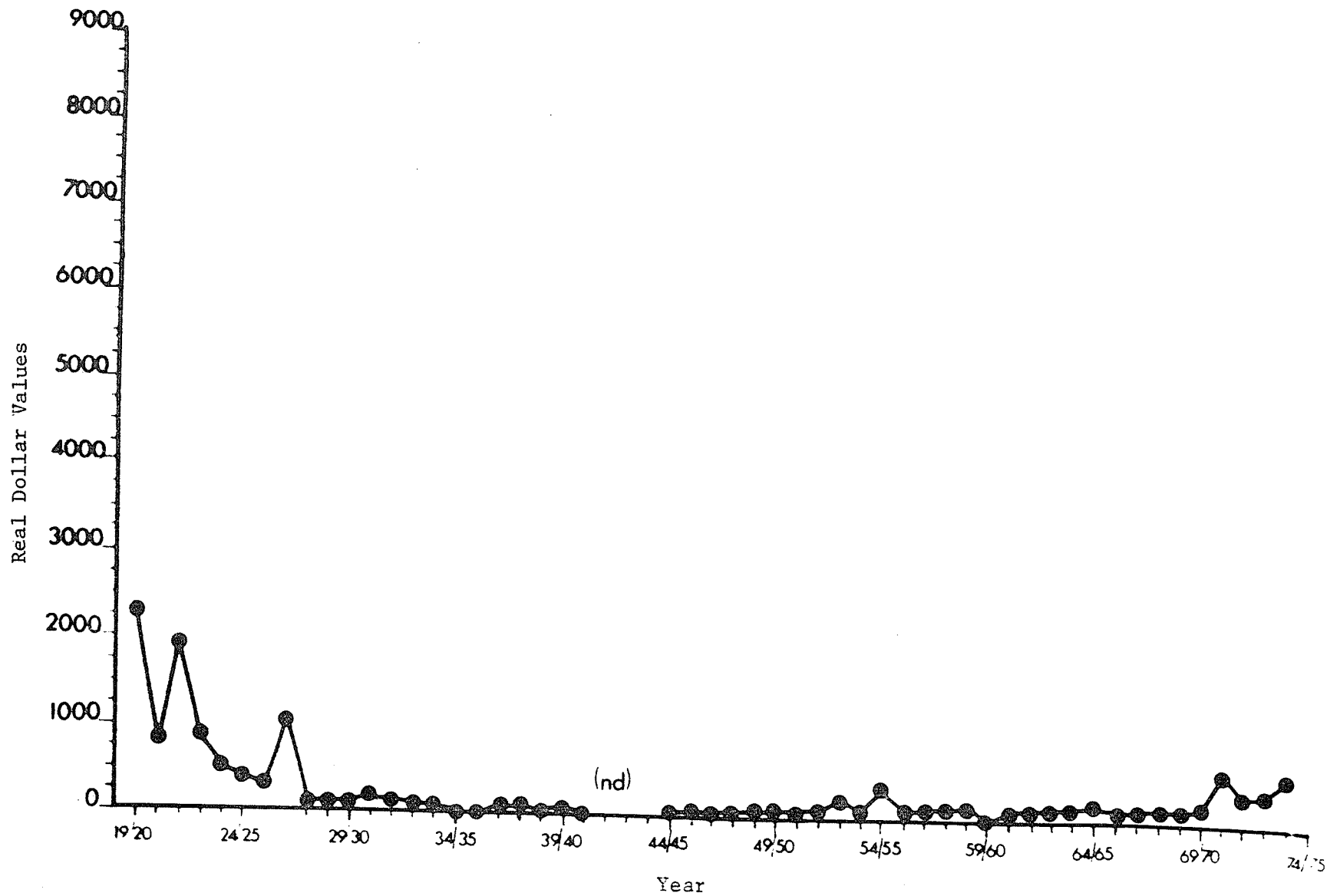


Fig. 23. The real dollar value of wolverine pelts in  
Manitoba from 1919/20 to 1974/75.

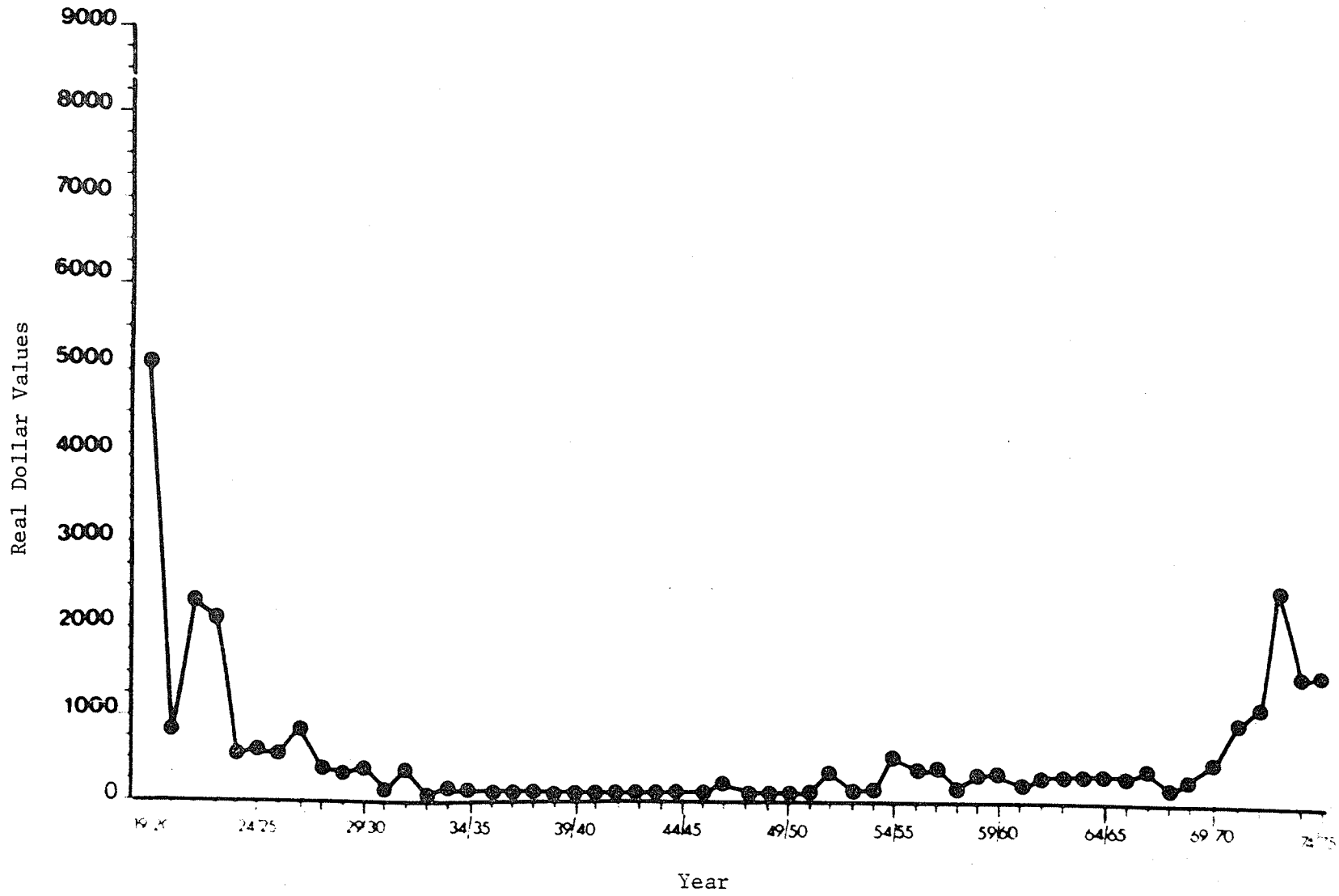




TABLE 11

The most important fur-bearers in the study area  
(responses to question 5 of the trapper questionnaire)

Area	Fur - Bearers											
	Squirrel	Muskrat	Beaver	Weasel	Mink	Otter	Fisher	Marten	Wolverine	Fox	Lynx	O.M.*
Manitoba	5	17	41	0	12	0	0	0	2	1	1	1
Saskatchewan	14	7	34	1	1	1	0	0	0	1	9	2
Alberta	6	3	5	0	0	0	1	0	0	0	4	1
British Columbia	17	6	63	2	6	4	2	38	2	0	24	14
Northwest Territories	0	0	0	0	0	0	0	0	0	1	0	0
Yukon Territory	7	0	4	0	1	0	0	4	4	2	22	1
Total	49	33	147	3	20	5	3	42	8	5	60	19

\*O.M. = observations missing or answers not completed by the respondents.

Edwards and Cowan (1957) found the wolverine production to be "clinal" in British Columbia, and Bulmer (1974) indicates a ten-year cycle for the wolverine. In production graphs of the last chapter (Figs. 8-9, 11, 13, 15, 17), a regular cyclical nature to the harvests was not found although the Yukon (Fig. 8) and British Columbia (Fig. 11) do demonstrate frequent ups-and-downs. Most trappers indicated that the animal did not appear to be cyclic, although its appearance on the trapline one year and not the next gave others second thoughts. Edwards and Cowan (1957) note that long or coarse fur harvest is high where the trapline size is small. Comparing the small trapline perimeters listed (question 2, Appendix C) with fur-bearers harvested, I could not find any correlation.

There are several factors to consider in harvests of pelts, average values, and other commodities important in discussing commercial value:

- (1) The number of pelts sold is determined by those purchased by fur dealers, subject to royalty. With a valuable commodity and the element of prestige involved with wolverine pelts, it is extremely likely that many of the pelts are used by the local inhabitants.

Russ Hall (pers. comm.), Supervisor of Trapline Management in the Northwest Territories, informed me that in the case of the wolverine it is believed that less than 50% taken are annually sold and exported. Dick Stardom (pers. comm.) believes, in contrast, that in Manitoba with the recent high prices for wolverine, the majority of pelts are now being declared. However, in the past as well as conceivably the present, fur statistics must be viewed and used with caution.

(2) In both territories and all provinces except Saskatchewan, the average value is used to calculate the worth of the pelts harvested each prescribed season. The average value is the sum total of all the pelts sold during a season declared by market value, divided by the number of pelts sold. In Saskatchewan, the average value is the actual value, or value of the pelt when shipping costs and percentage fees from the fur auction are subtracted, to the trapper. A move to have both actual and average values computed for each fur-bearer is planned in the next few years.

(3) The British Columbia Registered Trappers' Association and the Yukon Trapper's Association both offer to collect furs and ship them to fur auction houses, especially the trapper-owned one at North Bay, Ontario.

All other trapper organizations do not actively encourage a particular auction house but do prefer auction sales over fur buyers since the latter's prices are usually much lower than could be obtained on the markets.

Native Canadians, especially, succumb to the temptation of obtaining cash or credit immediately and hence sell their furs as soon as possible and often receive a lower price.

(4) A higher harvest in early years does not necessarily indicate a higher population per unit area but rather larger wolverine range and more trapper effort in the taking of fur (Strom, pers. comm.). It is quite conceivable that the recent prices for such coarse fur animals could serve to stimulate interest on the part of the trapper to trap a wolverine. The response to question 7 (Appendix C) demonstrated that trappers gear their efforts to the current demand for particular animals with 99% indicating "yes". The majority of trappers indicated to me that if the value of the wolverine was to drop very low on the market, they certainly would make no special effort to catch the animal unless, of course, it was causing havoc on the trapline. Nevertheless, the northern trappers of Manitoba show a preference for trapping either long- or short-haired furs and maintain their efforts regardless of the price, while in the south, harvest is a

function of price (Anonymous, 1970, 1974b). In the past, the wolverine's low value and its reputation as a varmint would only "drive" the trapper to capture one to rid himself of the pest, not even caring for its market value. I believe that the Indians and Eskimos do not always gear their trapping to a market system they neither understand or have an impact on, but as our Euro-Canadian norms are incorporated into their culture, they will become more keenly aware of the money involved in certain animals.

Very few trappers can argue that they can depend on the wolverine harvest as the mainstay of their trapping income. As one trapper colourfully put it, "If a guy had to depend on a living for all the wolverine he caught, he'd be one hungry S.O.B. ... because an average trapper hasn't ever caught one or seen one" (Kohse, pers. comm.). All of the government officials interviewed agreed that the number of trappers is not declining (in fact, in some areas, there are waiting lists to purchase a registered trapline), but trapper effort is fluctuating, in some cases declining. There are many components to trapper input or effort to be considered, but these components are strongly influenced, especially among the native peoples, by what other sources of income exist (Usher, 1970). Many programmes are now concentrated in the north, such as housing projects and hydro-electric schemes, as well as the education of the young,

dilute the appeal of traditional pursuits as trapping. The greatest deterrent is welfare and family allowance payments. On some reserves, welfare is paid only while the trapper is away and at others, only if the trapper is not working. Obviously, there is no incentive for the latter when a trapper can stay at home and earn an income rather than facing the harsh weather for perhaps less money (Ramsay, 1975). Family allowance is often paid only if the mother is present in the community but the father is away. The additional problem is encountered because the young men have lost interest in trapping and the older men cannot take their families to the trapline because of education for the children and the need for family allowance cheques. As a result, perhaps a 50 km radius outside a community is intensively trapped, but, beyond that, little effort is placed on trapping the area.

#### Recreational

Recreational values are usually measured in terms of money expended in the pursuit of wildlife in connection with sports and hobbies such as hiking and photography. For a mammal such as the wolverine, seldom seen either in its natural habitat or captive enclosure, it is extremely difficult to assess the value in recreation. Few people actually set out with the chief aim of hunting a wolverine or snapping pictures of this animal; when it is shot or

spotted, it is more a piece of luck or a chance meeting than a customary occurrence. Nonetheless, sums of money are spent for equipment, supplies, licence fees, transportation, provisions, board and lodging, guide services, and so on, all secondary benefits.

### Esthetic

Esthetic values are values of objects and places possessing beauty. Some have written to me to say how thrilled they were to see a wolverine loping along in its natural surroundings. The animal not only possesses a value in these terms but also what is called in economic circles an "option demand". This simply means the premium paid to protect uncertainty. There is no guarantee that any creature will survive forever. Extinction at the hands of man is another matter. Some people may wish to pay a price for an object or a place, thus creating a demand even though these same people may never see or visit that place or object. Hence, the uncertainty of demand creates a value for the animal, even for the wolverine that exists in some remote areas; but there is the satisfaction in the knowledge that this remarkable creature still lives.

It is only recently that values have been placed on such intangibles as recreation and esthetic values. Using the willingness-to-pay principle, economists can now begin to more accurately calculate the value people place on such items as wilderness and its components. Perhaps some day, willingness-to-pay for wildlife such as the wolverine will be computed.

Unfortunately, very few of the people personally interviewed could place a value on the wolverine. Some mentioned the commercial value of its pelt. What about its stealing bait and taking fur-bearers? Should that be separated or subtracted from the pelt value? The notion of the element of challenge to the trapper was often indicated, but still I could not produce a figure of what the animal is worth to Canadians.

#### Educational, Scientific, and Social

All of these values are inter-related to one another. Scientific because the study of animals, predatory and being a scavenger in this case, benefits the ecologist, the mammalogist, and the parasitologist. All of these items require the expenditure of money and the creation of jobs in the economy. The results of these scientific studies have already produced many conceptions of educational and



social value. The notion of the parasite, the scavenger, and the predator have considerable educational value and are not wholly useless in their implications and applications to social relations. As well, there is the interest shown by people in zoos, game farms, and films, all giving value.

With the shorter work week, higher wages, new and fast modes of transportation, environmental awareness, and the increasing agglomeration of man into stress-filled urban jungles, the value of recreation, especially outdoor, the tonic of wilderness, is becoming more and more popular and essential. With wilderness is the associated wildlife so necessary to provide that dream whip of magnitude and wonder and so biologically essential to the ecosystem. As we are painfully discovering, this planet is not a random assortment of parts; it is a finely tuned, inter-related ecosystem. We are not the owners of the earth, even though we dominate; we are merely the tenants. Every creature contributes to the wholesome variety of organisms on earth. It may be hard to prove that the demise of the wolverine in eastern Manitoba has made a whit of practical difference to the fauna. How important that change may be is so subtle, perhaps we can never predict.

### Biological

Biological values can be considered the benefits of all the services rendered to man by wild animals. The scavenging activity of the wolverine has important esthetic and sanitary implications. As a carrion feeder, the wolverine serves to break down elements so vital for replenishing the earth. As well, the wolverine is a predator which has implications for natural selection of the gene pool as well as population control (although I do not intend to enter the arena on the importance of predator-prey relationships). Unfortunately, the very word "predator" arouses distain, hatred, and condemnation on moral grounds (Errington, 1969).

"It seems unfair that the predator is so efficient and merciless, and some people may develop strong sympathy for the defenseless prey and share its physical and mental suffering, real or exaggerated. We are encouraged to categorize situations in terms of good guys and bad guys, with the result that few people empathize with a hungry predator." (Harvey, 1971).

Predation is, in fact, a natural form of exploitation, of one living form by another. As Errington (1969) states,

"As a way of life it reflects adaptations of animals for living and it is the only way that countless species of animals can live. It is a resultant of adaptations and opportunities, of physiology and psychology, of experience, and of heredity and racial history."

Still, if a robin pulls an earthworm in two, most of us think nothing of it; but, when something big is killed, there is more blood and guts to impress our consciousness (Errington, 1969). How can we morally judge when we use radar, most vehicles, high-power firearms, and mechanical gadgets to exploit animal life, and butcher livestock when we please?

As a point of interest, some of the trappers interviewed do not consider the wolverine a predatory animal, but only a fur-bearer. It does, however, take animals for its existence, and I would have to see it as a predator, although not on the same scale as the wolf. The wolverine would never win a popularity contest among animals since few urbanites know of the animal or what it looks like. It cannot be photographed by tourists, grazing like the magnificent moose in a meadow or creek, surrounded by the grandeur of the mountains as the shadow of the sun sets. It does not evoke in most people a sense of pride or beauty. It does, however, cause damage to trappers and hunters which brings us to its negative side.

### Negative Values

Obviously, the wolverine possesses negative values. Question 8 and 9 of the trapper questionnaire (Appendix C)

ask if a predator problem indeed exists and, if so, which of the predators listed cause the most damage. The results when tabulated indicated an almost 50-50 split over predator problems while Table 12 indicates 110 missing observations, but, of the 284 remaining, 97 indicated the wolverine as the chief predator problem, followed by the timber wolf. The wolverine is not the biggest problem in all portions of the study area, with Saskatchewan and Alberta indicating the timber wolf, which may indicate scarcity in these provinces. Question 10 (Appendix C) deals with how much income, if any, is lost on the trapline, and the data are presented in Table 13.

Setting special traps dominates as a method of capturing predators (Table 14). The majority of respondents indicated either no specific amount or no response at all on questions of loss of income. Of those that did indicate a value, the majority feel between \$1 and \$250 was what they lost to predation. Perhaps \$250 may seem like a small amount; the average trapper in northern Alberta earns \$750 (Anonymous, 1974b) per season, while in Manitoba the figures varies from \$332 to \$1,000 (Sandell and Framingham, *in*: Ramsay, 1975). Another fellow graduate student at the Natural Resource Institute found the average value of trapping to be \$2,016

TABLE 12

Summary of responses to question 9 of the trapper questionnaire showing which animal causes the most damage to the trapline

Area	P R E D A T O R S									
	Fisher	Wolverine	Red fox	Coyote	Timber wolf	Black bear	Lynx	Birds	Other*	O.M.**
Manitoba	16	22	2	2	15	5	1	4	2	11
Saskatchewan	4	4	1	3	24	8	0	1	4	21
Alberta	3	0	0	1	7	4	0	0	1	4
British Columbia	1	49	1	17	20	8	2	1	15	64
Northwest Territories	0	1	0	0	0	0	0	0	0	0
Yukon Territory	0	21	1	1	11	0	0	0	1	10
Total	24	97	5	24	77	25	3	6	23	110

\*Other includes mice and man.

\*\*O.M. = observations missing or answers not completed by respondents.

TABLE 13

Summary of responses to question 10 of the trapper questionnaire  
indicating loss of income on the trapline from predators

Area	Income Lost					No amount or no answer
	\$0	\$1-250	\$250-500	\$500-1,000	\$1,000-2,000	
Manitoba	9	35	13	1	2	20
Saskatchewan	1	8	8	5	1	47
Alberta	3	4	3	1	0	9
British Columbia	16	28	7	3	3	121
Northwest Territories	0	1	0	0	0	0
Yukon Territory	10	9	5	3	1	17
Total	39	85	36	13	7	214

TABLE 14

Summary of responses to question 11 of the trapper questionnaire demonstrating by what means a predator is removed from a trapline

Area	Special Traps	Predator Control Methods			
		Shoot	Poison	Other	O.M.*
Manitoba	42	19	3	7	9
Saskatchewan	28	7	12	4	19
Alberta	7	5	0	3	5
British Columbia	70	23	0	9	76
Northwest Territories	0	0	0	1	0
Yukon Territory	27	6	0	4	8
Total	174	60	15	28	117

\*O.M. = observations missing or answers not completed by respondents.

including income-in-kind (which includes value of dressed meat) or 26% of the total income (Cable, 1976). If these values are utilized, obviously predation can be of significant negative impact to the trapper. As well, the value of processed and manufactured goods, damage to buildings, game meat eaten, ruined pelts, traps, time in resetting traps, and feeding on hunter kills all add to the wolverine's negative value. Surprisingly, since the wolverine is indicated as the chief predator problem, Table 15 shows that the majority of trappers have not had problems with the wolverine destroying traplines.

Naturally, humans engaged in an activity such as trapping expect losses to natural elements or predators, a so-called "tolerable loss level". This loss level would tend to vary per person. Unfortunately though, the negative values of the resource (furs) fall on the private individual while the positive values largely accrue to the general public; this makes the management of such a resource difficult to handle.

When the biologists were asked of the effect of the wolverine on the fur-bearing industry, the results as indicated in Table 16 show the majority to be neutral due to its value of the fur but isolated negative problems.



TABLE 15

Summary of responses to question 13 of the trapper questionnaire indicating those that have had problems with *Gulo gulo* destroying traplines

Area	<u>Wolverine damage to traplines</u>	
	No	Yes
Manitoba	56	24
Saskatchewan	57	13
Alberta	14	6
British Columbia	115	63
Northwest Territories	0	1
Yukon Territory	24	21
Total	266	128

TABLE 16

Summary of responses to question 4 of the biologist questionnaire indicating the effect of *Gulo gulo* on the fur-bearing industry in the study area

Area	Effect on Fur Industry		
	Positive	Negative	Neutral
Province or Territory			
Manitoba	7	10	19
Saskatchewan	0	3	3
Alberta	9	0	10
British Columbia	30	13	31
Northwest Territories	7	5	6
Total	53	31	69

Legal StatusYukon

In the Yukon, the wolverine is classified both as a fur-bearer under An Ordinance Respecting the Conservation of Game in the Yukon Territory, Game Ordinance, R.O.Y.T. 1958, c. 50, S 2(1)(a) as am. by Ords. Y.T. 1975(3rd sess.), c. 7, S 1(d) and as a big game animal, Regulations to the Game Ordinance, Yukon Reg. 1975/166, schedule A, part 1. The wolverine can be legally trapped from 1 November to 31 March and hunted from 1 August to 31 October with a bag limit of one for either sex. Hunting is administered under 11 management zones, but as of yet no trapping zones exist but individual registered traplines are in effect and will be more closely monitored in the future (Jack, pers. comm.).

Northwest Territories

Until 1974 the wolverine was classified as a predatory animal and could be trapped or shot. However, its status was revised and it is now a fur-bearer under An Ordinance Respecting the Preservation of Game, Game Ordinance, O.N.W.T. 1960, c. 2, S. 2(1) as am. by Ords. N.W.T. 1974, c. G-1, S. 2(d). The present season is 1 November to 28 February. Russ Hall (pers. comm.) indicated to me the reason

for this change in status was the fair number of wolverine being shot, especially by non-residents, people that had no dependence on this resource. As well, the animal was being taken at the time that the pelts were unprime. Registered traplines do exist in the Northwest Territories, but are small in number compared to the large number of community traplines.

#### British Columbia

In British Columbia the wolverine is listed both as a small game animal and a fur-bearer under An Act to Provide for the Conservation of Wildlife, Wildlife Act, S.B.C. 1966, c. 55, S(78), S(2). British Columbia is divided into administrative regions and further sub-divided into units for the purposes of hunting. Each of these regions has prescribed seasons for the wolverine varying from no hunting and starting in September or November and terminating in December or February, depending on its location. For the purposes of trapping, the province is also divided into zones and registered traplines and once again the trapping seasons vary from 1 November or 1 December to 28 February or 31 March.

Alberta

The wolverine is administered under An Act for the Protection of Wildlife, Wildlife Act, S.A. 1970, c. 113, S2,11 and is referred to as a "fur-bearing carnivore" and consequently may be hunted and/or trapped from 1 September to 30 April. No effective zone system exists in Alberta for administering wildlife although registered traplines are in effect.

Saskatchewan

In this province, the wolverine's legal status is somewhat confusing. Its status is not defined in either An Act for the Protection of Game, Game Act, R.S.S. 1965, c. 356 or An Act for the Protection, Preservation, and Production of Fur Animals, Fur Act, R.S.S. 1965, c, 357 where a "fur animal" includes all animals wild by nature whose skins or pelts are commonly used for the manufacture of clothing or rugs and are of marketable value and also includes parts of such animals. It is, however, under the Regulations to the Fur Act, Sask. Reg. 175/73, S.4a,b, where it can be legally killed from 1 November to 31 September. Its legal status will be altered in the near future with the revision of the Fur Act including the imposition of a season probably running from 1 November to

28 February (Strom, pers. comm.). Why the wolverine was classified as predator remains unknown. It is to be placed on the fur-bearer status not so much because of its present high value as much as it was felt its harvest should be protected. The area north of Prince Albert is termed the Northern Fur Conservation Block with locally administered registered traplines and to the south of Prince Albert an open area requiring permits.

#### Manitoba

The wolverine is administered under An Act Respecting the Administration and Conservation of Wildlife in the Province, Wildlife Act, S.M. 1963, c. 94 and is classified as a fur-bearing animal S.2(1) (g) and the season lasts from 1 November to 31 March. The province is divided into an open area essentially south of Lake Winnipeg on private, agricultural land, and a registered trapline area locally administered as zones.

Discussion and Recommendations for Wolverine Management In  
Western Canada

General Recommendations

In the light of the decline in apparent numbers, especially in the prairies and the Northwest Territories, I should like to propose the following general recommendations for management.

(1) More specific information is required on *Gulo gulo* such as methods of determining density, population structure, feeding habits, and habitat utilization. Maurice Hornocker (pers. comm.) is currently studying the wolverine in Montana using radio-telemetric equipment in the hopes of uncovering ecological information. I suggest that if indeed a study area were to be set up, logical locations would be in the central-western portion of the Yukon where the trappers were most cooperative, the Terrace, Prince George, and Fort St. John regions of British Columbia where I met some of the warmest and most cooperative people, or perhaps within the confines of Banff National Park especially the Lake Louise vicinity. As well the numbers present in the Brochet region of Manitoba or Lake Athabasca-Stony Rapids-Fond du Lac area of Saskatchewan warrant attention but language problems and transportation costs may place these areas on a lower priority than the others noted.

(2) The restocking or maintaining of wolverine stock in areas of wilderness or national parks found to be suitable to the wolverine as suggested by Dagg and Campbell (1974) is worth considering. Suggested areas in Manitoba include the Whiteshell Provincial Park, the new provincial park proposed north of the Whiteshell, and Grass River, Clear Water and Duck Mountain provincial parks. Riding Mountain National Park deserves consideration since it is Manitoba's only national park but the heavy land-use and popularity it has to bear could make this a futile attempt since no real reports of wolverine have ever been found for this area (Green, 1932). In Saskatchewan, close observation of the Pasquia Hills should provide interesting prospects for that area and closer examination of Lac la Ronge and Nipawin provincial parks may provide suitable tracts. As well, trapping and tourist pressure should be closely studied in the Meadow Lake Park region. As in the case of Riding Mountain Park, Prince Albert National Park should be carefully scrutinized before wolverine are stocked here.

I acknowledge that planting wolverine in these areas may meet trapper, hunter, and local resident opposition, and that it is difficult to try and set up a preserve for a mammal that ranges as widely as the wolverine. An area where it can perhaps mate and rear its young as well provide sites of future scientific work and educational and social values should be of high priority.



(3) Education with the provision of more factual material should be encouraged especially for the younger generation. This material could be disseminated by popular magazines, the Canadian Wildlife Service's "Who's Who" feature, nature films, and hopefully in encyclopedias and books. As well the limited success in breeding in captivity could be encouraged by more natural surroundings as well as removal from people at the time of copulation and parturition. I do not recommend that areas be restocked by animals bred in captivity since this would alter the gene pool and may well have harmful biological implications. Instead I urge that wild animals be transplanted to areas of depletion.

(4) Examination of harvest yields is a popular management tool for fur-bearers. However, the statistics are not always accurate and serious drop in numbers or even gradual decline may be noticed too late to try and alter the situation. The governments of each of the provinces and territories in Western Canada know where the wolverine concentrations are located and could closely observe the harvests in these areas to decide whether seasons should be altered.

Generally I agree with the notions of the trappers, biologists, and government officials that the wolverine's status does not appear to be endangered in western Canada.

The lack of records prior to 1900 makes it very difficult to discern its past distribution and abundance, but it does appear to be found throughout the study area. This does not mean that our concern or regard for this mammal can be relaxed. Few wolverine exist in the United States or eastern Canada for that matter and Banfield's (1974) line of extinction around Vancouver and the lower prairie area demonstrates that we cannot afford to allow its status to depreciate.

Manitoba is the only province to have undertaken any in-depth studies on the wolverine. It is classified as rare (Van Zyll de Jong and Nero, 1971) and endangered (Van Zyll de Jong, 1970), but many wondered in my personal interviews if the wolverine ever was that abundant particularly in Manitoba and Saskatchewan.

The terms rare and endangered in all fairness should be defined and for this purpose I should like to utilize Novakowski's (1970) concept.

" "Rare" species either occupy an extremely restricted habitat or are low in numbers. "Endangered" species, on the other hand, were once either abundant or generally well distributed throughout Canada and are now being threatened by destruction of the habitat or by deliberate attempts to eliminate them."

The overriding rationale for not being considered rare in the study area was the notion of under-utilization, the decline

in trapper effort, and the feeling that the wolverine had survived this long, so undoubtedly can survive longer. As one gentleman (Collingwood, pers. comm.) told me, "It will be last to die from a change of environment".

#### Specific Recommendations

(1) I am not in agreement with the wolverine's "double standard" in British Columbia and the Yukon where it is listed as both a game animal and a fur-bearer. As well I oppose the status of "fur-bearing carnivore" in Alberta. The response of government officials to these labels was that the government is responsible to all people whether they be hunter, trapper, naturalist, and so on. The feeling was that hunters have a negligible effect upon the wolverine population. I was informed in British Columbia that pressure to have the animal removed from the game status by the trappers was coincidental with the high price of the pelts (McKay, pers. comm.). The trappers all voiced their opposition to the hunter taking the unprime pelt as well as quite often the young. If the hunter has a negligible impact, why should he be allowed to take the wolverine at all? As one trapper of northern British Columbia put it, "How can a department knowledgeably

administer an area not knowing the number of wolverine or for that fact a trapper, when he does not know how many hunters have taken?" (Watmough, pers. comm.).

(2) I do not possess the facts on how many trappers or hunters are found north of the Olgivie Mountains, in the British and Richardson mountains (Game Zone 1) but from my information I would suggest removing the wolverine from the big game list in this area (assuming the Yukon government does not move in favour of proposal 1). As well I believe the wolverine should not be trapped in this region unless it can be demonstrated that it is abundant or of significant economic importance. A permit system for the purpose of taking nuisance animals may be a worthwhile management tool in this area.

(3) Rausch and Pearson (1972) report that the wolverine is sought in the Yukon not only as a trophy animal but also for zoos and research institutes. I might suggest then that this be policed as well as possible with high licence costs and stiff penalties should a person fail to go through the legal channels.

(4) Assuming British Columbia does not choose to follow my first recommendation I propose that hunting the wolverine be stopped in the following areas: north of the Stikine River in the Atlin-Stikine district (management area 26);

the islands close to the mainland (management area 23), the central coast district (management area 17), the Chilcotin and Horsefly district (management area 18 and 19), the Upper Fraser (management area 20), the Nicola district (management area 15), and the extreme eastern portion of the West Kootenay district around West Kootenay Lake (management area 10). I further propose that the closed season be maintained in the southern portion of Vancouver Island, the islands in the Strait of Georgia (management area 1), and the Okanogan and Similkameen districts (management area 15).

In addition I also suggest that trapping be closed in these districts except for the permit system for nuisance animals.

(5) For the province of Alberta I suggest that the animal be protected and closed to trapping in all areas excepting those of the Peace River district and those registered traplines bordering the Rocky Mountains. Permits could still be issued for nuisance animals. I also urge the creation of trapping zones to monitor the yield of all fur-bearers. I presume that with a change of status to fur-bearer, the season will not begin until November when the pelt is prime.

(6) In Saskatchewan I strongly urge the government to place the animal on the fur-bearer list. The whole province could also be closed to wolverine trapping unless it can be demonstrated that the wolverine is of economic importance or a great nuisance on the trapline.

(7) In Manitoba I suggest that the season on wolverine be closed in all zones excepting Brochet, Pukatawagen, South Indian Lake, Nelson House, Wabowden, and Split Lake unless it can be demonstrated that it is of economic importance and/or a nuisance.

The following tables (17 and 18) demonstrate that the trappers appear to be satisfied with no open season or bounty and that the governments should not protect the animal. In other words, no change in its present status is wanted.

Not surprisingly, none of the biologists favour a bounty (Table 19). Such descriptions as outdated, inefficient, and inadequate were popular. "Bounties are band-aids for sick people". In question 6 (Appendix B) the majority of biologists (Table 20) believe the animal should be protected. The number of neutral replies was primarily based on the feeling that more information was needed on the animal's status as well as the problems associated with enforcing a closed season.

TABLE 17

Summary of responses to question 20 of the trapper questionnaire indicating whether a bounty or open season should be placed on *Gulo gulo* in the study area

Area	Placement of a bounty or open season		
	No	Yes	O.M.*
Manitoba	44	17	19
Saskatchewan	46	9	15
Alberta	11	3	6
British Columbia	95	45	38
Northwest Territories	1	0	0
Yukon Territory	23	18	4
Total	220	92	82

\*O.M. = observations missing or answers not completed by respondents.

TABLE 18

Summary of responses to question 21 of the trapper questionnaire indicating whether *Gulo gulo* should be protected in the study area

Area	<u>Protection</u>		O.M.*
	No	Yes	
Manitoba	45	21	14
Saskatchewan	37	15	18
Alberta	13	2	5
British Columbia	82	51	45
Northwest Territories	1	0	0
Yukon Territory	29	10	6
Total	207	99	88

\*O.M. = observations missing or answers not completed by respondents.



TABLE 19

Summary of responses to question 5 of the biologist questionnaire indicating whether a bounty should be placed on *Gulo gulo*

Area	<u>Placement of bounty</u>		
	No	Yes	O.M.*
Province or territory			
Manitoba	31	0	5
Saskatchewan	5	0	1
Alberta	19	0	0
British Columbia	74	0	1
Northwest Territories	17	0	0
Total	146	0	7

\*O.M. = observations missing or answers not completed by respondents.

TABLE 20

Summary of responses to question 6 of the biologist questionnaire revealing whether *Gulo gulo* should be protected in the study area

Area	Protection		
	No	Yes	Neutral
Province or territory			
Manitoba	14	12	10
Saskatchewan	2	2	2
Alberta	10	5	4
British Columbia	52	17	6
Northwest Territories	9	5	3
Total	87	41	25

All of those interviewed were willing to have a closed season on the wolverine. In the conservative words of George Simpson, President of the Manitoba Registered Trappers' Association, "If it can be proven to us in any way that the wolverine is in danger of extinction, we would certainly ask for a closed season" (pers. comm.). The words "if it could be proven necessary" were echoed throughout the study area.

As a point of interest, there was a diversity of opinion on the role the wolverine plays in nature. Some saw its role as a scavenger; others such as Sam Clifton (pers. comm.) saw it as "damn misery for the trappers", while Louis Kohse (pers. comm.) really did not know its purpose other than "to give us old bushmen headaches".

#### Problems and Feasibility of Management Proposals

It is all very well to propose management for the wolverine and then to remove myself from the realities of the world. I do want to mention the following feasibilities as well as some of the problems that will be encountered if the proposals are implemented.

### Ecological Feasibility

Considerably more information is needed to base management decision on; however, the wolverine's status does not appear to be endangered or facing extinction. The pressures of trapping, the influx of men and equipment, and its low reproductive potential should cause us to carefully monitor the wolverine's position. It is a predator but primarily a carrion feeder and this gives the wolverine a role in the scheme of things. It is extremely difficult to assess its impact in the food chain, but undoubtedly it serves a purpose or it would not have survived to the present day. By proposing the termination of game status and the closing of certain districts throughout the area it is hoped that this may allow the animal to come back in some areas and to replenish stocks. I believe that the wolverine never was abundant in western Canada but I am concerned about the lack of data concerning a maximum sustainable yield.

Pruitt (1970) warns,

"Protection of "range" as such as no guarantee of species survival. For example, species such as the barren-ground grizzly or the wolverine are extremely susceptible to overutilization. Being top carnivores in the food-web they exist in small numbers, with individuals widely spaced and with relatively weak reproductive potential. Thus the loss of only a few individuals can have a severe effect on species survival."

### Technical Feasibility

Many technical problems will be encountered, the biggest being how to stop wolverines from entering traps set for other animals (Tables 21 and 22). You cannot put white flags to warn the animal nor is there any one set that can be removed from the trapline. No matter what, wolverines will be captured, immature or sexually mature. Trying to stop the harvest of these animals especially at their currently high prices is going to be very difficult to enforce. As well the problems associated with accurate harvest yields will present difficulties in determining the animal's distribution, abundance, and status. I suspect that a higher yield of male wolverines is harvested relative to females, largely because of its tendency to roam wider. Consequently, at the older ages of six to ten, as demonstrated by Rausch and Pearson (1972), the sex ratio favours the female. No conceivable way exists to select age grouping or even sexes in trapping.

### Economic Feasibility

Removing the animal from the game or fur-bearer list for the time being may cause an economic set-back. However, I firmly believe it is better to have a viable

TABLE 21

Number of trappers that report capturing *Gulo gulo* in sets not intended for it (question 16 of the trapper questionnaire)

Area	Those trappers that accidentally capture	
	No	Yes
Manitoba	56	24
Saskatchewan	61	9
Alberta	15	5
British Columbia	116	62
Northwest Territories	0	1
Yukon Territory	21	24
Total	269	125

TABLE 22

Type of trap in which wolverine are accidentally captured  
(question 17 of the trapper questionnaire)

Area	Trap type				O.M.*
	Conibear	Bigelow	Victor stoploss	Other	
Manitoba	2	0	4	19	55
Saskatchewan	2	0	1	8	59
Alberta	1	0	2	4	13
British Columbia	17	0	7	47	107
Northwest Territories	0	0	1	0	0
Yukon Territory	1	0	4	20	20
Total	23	0	19	98	254

\*O.M. = observations missing or answers not completed by respondents.

population rather than economic gain over a short run. By placing the permit system as the only method of legally capturing the animal if it is a nuisance allows the trapper and the biologist to only remove those detrimental to a person's occupation and/or income.

#### Political Feasibility

If the governments concerned were to invoke any or all of the proposals suggested in this practicum, considerable pressure will be encountered from trapper organizations and sporting groups. I believe that the government could put management proposals into effect if it is shown the overall importance the wolverine plays in the long run for the trapper, hunter, as well as the urbanite out to enjoy nature. A government should try to consider its responsibility to all factors of society.

#### Administrative Feasibility

Here is perhaps where the greatest problems may be encountered trying to inform hunters and trappers of the changes in regulations and actually enforcing the programme. Specific recommendations say for such a vast area as the Northwest Territories are hampered by the fact that no one exactly knows the annual harvest of wolverine with perhaps



up to 50% of the yield kept by the trapper. As well proposing a closed season for what length of time is a major problem. Admittedly, the proposals will not be popular, but if the trappers are as intelligent and conservation-oriented as the ones I was fortunate to meet, education and gentle persuasion should be adequate strategy.

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## Appendix A

List of the common and scientific names of plants, insects, birds, and mammals mentioned in the text.

Plants

Bilberries	<i>Vaccinum sp.</i>
Blueberries	<i>Vaccinum uliginosum</i>
Bracket Fungus	<i>Basadiomycete</i>
Cedar Nuts	<i>Pinus pumilia</i>
Cranberries	<i>Vaccinum sp.</i>

Insects

Wasps	Hymenoptera
Bees	Hymenoptera

Birds

Magpie	<i>Pica pica</i>
Ptarmigan	<i>Lagopus spp.</i>

Mammals

Bears	<i>Ursus spp.</i>
Beaver	<i>Castor canadensis</i>
Caribou	<i>Rangifer tarandus</i>
Coyote	<i>Canis latrans</i>
Deer	<i>Odocoileus spp.</i>

Mammals cont'd

Dog	<i>Canis familiaris</i>
Elk (American)	<i>Cervus elaphus</i>
Fisher	<i>Martes pennanti</i>
Fox (Arctic)	<i>Alopex lagopus</i>
Fox (Red)	<i>Vulpes vulpes</i>
Ground Squirrel	<i>Spermophilus parryii</i>
Lynx	<i>Lynx lynx</i>
Marmots	<i>Marmota caligata</i>
Marten	<i>Martes americana</i>
Mink	<i>Mustela vison</i>
Mountain Goats	<i>Oreamnos americanus</i>
Mountain Lion	<i>Felis concolor</i>
Moose (European Elk)	<i>Alces alces</i>
Muskox	<i>Ovibos moschatus</i>
Porcupine	<i>Erethizon dorsatum</i>
Reindeer	<i>Rangifer tarandus</i>
River Otter	<i>Lontra canadensis</i>
Sea Otter	<i>Enhydra lutris</i>
Seals	Pinnipedia
Sheep	<i>Ovis sp.</i>
Skunk	<i>Mephitis mephitis</i>
Snowshoe Hare	<i>Lepus americanus</i>
Voles	Microtinae
-red-backed	<i>Clethrionomys rutilus</i>
Walrus	<i>Odobenus rosmarus</i>
Weasel	<i>Mustela spp.</i>
Whales	Cetacea



Mammals cont'd

Wolf

*Canis lupus*

Wolverine

*Gulo gulo*

Woodchuck

*Marmota monax*

## Appendix B

UNIVERSITY OF MANITOBA  
Natural Resource Institute  
Naturalist-Biologist Questionnaire

1. How long have you been a naturalist or wildlife biologist in your province or territory?  
 0-1 yrs. \_\_\_\_\_ 5-10 yrs. \_\_\_\_\_ 15-20 yrs. \_\_\_\_\_  
 2-4 yrs. \_\_\_\_\_ 11-14 yrs. \_\_\_\_\_ more than 20 yrs. \_\_\_\_\_
2. Have you ever seen a wolverine or its sign in the wild? Yes  No
3. Have you ever had an encounter with a wolverine?  
 Yes  No
4. Do you think this animal has a positive or negative effect on the fur-bearing industry in your province or territory? Positive  Negative
5. Do you feel that a bounty should be placed on the wolverine? Yes  No  Why?
6. Do you feel that this animal should be placed on the protected species list? Yes  No  Why?
7. There are many stories about the wolverine's ferocity and cunning qualities. Do you think that these stories are true? Yes  No   
 If yes, can you describe your experiences with this animal.

## Appendix C

UNIVERSITY OF MANITOBA  
Natural Resource Institute  
Trapper Questionnaire

1. Do you own a registered trapline in your territory or province? Yes  No
  
2. If you do, what is the size of your trapping area?  
 10-20 sq.mi. \_\_\_ 41-50 sq.mi. \_\_\_ 71-80 sq.mi. \_\_\_  
 21-30 sq.mi. \_\_\_ 51-60 sq.mi. \_\_\_ 81-90 sq.mi. \_\_\_  
 31-40 sq.mi. \_\_\_ 61-70 sq.mi. \_\_\_ 91-100 sq.mi. \_\_\_  
 More than 100 square miles \_\_\_  
 What is your trapline number? \_\_\_\_\_
  
3. Is there more than one person trapping on your trapline? Yes  No
  
4. If yes, how many? \_\_\_\_\_
  
5. Please number the four (4) most important animals that you trap from the following list (#1 for the most important, #2 for the next most important, etc.).  
 squirrel \_\_\_ mink \_\_\_ wolverine \_\_\_  
 muskrat \_\_\_ otter \_\_\_ wolf \_\_\_  
 beaver \_\_\_ fisher \_\_\_ fox \_\_\_  
 weasel \_\_\_ marten \_\_\_ lynx \_\_\_

6. In the past few years, has the above order changed?  
Yes  No  If yes, please state how.
7. Are most of the animals trapped because many people want that pelt? Yes  No
8. Is there a predator problem in your area? Yes  No
9. Which of the following predators, if any, cause the most damage to your traplines?  
fisher \_\_\_\_\_ coyote \_\_\_\_\_ lynx \_\_\_\_\_  
wolverine \_\_\_\_\_ timber wolf \_\_\_\_\_ other \_\_\_\_\_  
red fox \_\_\_\_\_ black bear \_\_\_\_\_
10. How much money do you lose each year because of predators? \_\_\_\_\_
11. How if by any means do you try to get rid of predators causing damage to your traplines?  
set special traps for the predators \_\_\_\_\_  
shoot the animal \_\_\_\_\_  
use of poisons \_\_\_\_\_  
other \_\_\_\_\_
12. Have you ever seen a wolverine? Yes  No   
If you have please mark where on the accompanying map and fill out the chart below.

<u>Approximate</u> <u>Date</u>	<u>Place</u>	<u>Number</u>
-----------------------------------	--------------	---------------

13. Have you ever had problems with the wolverine destroying your traplines? Yes  No
14. Do you try to trap or catch the wolverine on purpose? Yes  No
15. If yes, what type of trap do you use to catch this animal?
- Conibear \_\_\_\_\_ Victor stop-loss \_\_\_\_\_
- Bigelow \_\_\_\_\_ Other \_\_\_\_\_
- Deadfall \_\_\_\_\_
- Snare \_\_\_\_\_
16. If you don't go after this animal, do you ever find him caught in your traps? Yes  No
17. If yes, in what type of trap does this happen?
- Conibear \_\_\_\_\_ Other \_\_\_\_\_
- Bigelow \_\_\_\_\_
- Victor stop-loss \_\_\_\_\_
18. If you have trapped wolverines in your territory or province, how many have you caught?
- |             |             |                     |
|-------------|-------------|---------------------|
| 1-2 _____   | 16-20 _____ | 36-50 _____         |
| 3-5 _____   | 21-25 _____ | 51-75 _____         |
| 6-10 _____  | 26-30 _____ | 76-100 _____        |
| 11-15 _____ | 31-35 _____ | More than 100 _____ |
19. There are many stories about the cunning and ferocity of the wolverine. Have you ever seen any examples of this? Yes  No

20. Do you think a bounty or open season on the  
wolverine **would** have an effect on your trapping?

Yes  No

21. Do you think the wolverine should be protected by  
the government? Yes  No

## Appendix D

A Discussion of the mail survey involved in this practicum

From this study, I have noticed other disadvantages with questionnaires, including:

(1) Only a limited number of questions can be asked because length often scares or provides an impromptu excuse for not replying.

(2) The value of question sequence is destroyed since the respondent can glance over the survey.

(3) Mailings often do not permit full and complete opinions since the researcher cannot probe more fully a hazy answer.

(4) Vital statistics are very difficult to obtain. People feel that even loss of income due to predation, for example, is confidential information.

(5) Often personal opinion is not recorded on a survey, especially in remote or rural areas where certain members of community can influence decisions.

(6) Often one mailing does not stimulate immediate response, and follow-up letters may be necessary; this can impinge on time and financial constraints.

(7) In these modern times, people receive considerable mail from advertisements to personal surveys. The immediate reaction may be to toss the survey into the garbage.

For the benefit of the reader and future practicum students of the Natural Resource Institute, I wish to note the problems encountered in circulating and analyzing the trapper and guide questionnaire: (refer to Appendix C).

(1) The addresses kindly supplied by governments were found to be outdated. This caused delay, wasted time and postage, and, in cases of respondents being deceased several years, embarrassment.

(2) Group mailings such as those used for Manitoba and Saskatchewan trappers are not as effective as direct mailings (the method of contact I used for British Columbia trappers). The rate of return certainly supports this claim: British Columbia's returns out-pollled those of the prairie provinces by 22% to 10% and 9%, respectively,

(3) Obtaining concise detailed maps of the area in which the respondent lives was difficult. Photocopies of an atlas reproduced poorly because of the colour to black-and-white factor. Consequently, areas of sightings were not always marked.

(4) The questionnaire was set up for as easy an answering response as possible, for example, through the use of "yes" and "no" boxes and numbering the questions. Undoubtedly, though, those with minimal formal education or those whose mother tongue is not English tended not to reply. Added to this was the problem with suitable maps noted above. Often a trapper reported sightings or indicated captures but neglected to mark their locations on the map. Sometimes indications of sightings were no where near the actual sighting site.



(5) The stigma of being associated with the government often prevented a fluent interview, and it is presumed this may have influenced response.

(6) Postal disruptions caused problems with circulating the questionnaires. How many were misplaced or delayed by respondents due to strikes and then forgotten cannot be "guesstimated".

(7) The amount of time necessary to design, circulate, and compile results from the surveys could hamper a student with a small budget or minimum time due to course or field work.

(8) Follow-up reminders and cards to forewarn a respondent of the survey perhaps may have improved the rate of return. However, a study covering a vast area requires unlimited finances.

(9) Some of the quantitative answers were found to be vague, a reflection, perhaps, of the design of the questionnaire:

Question 5 -- often the respondent would not number the important fur-bearers but would merely check or number several number 1's, 2's, and so on. Consequently, starting in the first column, the importance was ranked arbitrarily, which can influence the results.

Question 9 -- here the question should have asked for numerical ranking. The problems encountered with question 5 could have conceivably been encountered again though.

Question 10 -- responses such as "lots" or "1/3 of my income" are difficult to quantify. Hence, a value of 6, indicating no answer, no amount, or unquantifiable answer, was used.

Questions 11, 15, and 17 -- asking for one trap was often answered by one or more traps. The first one indicated was coded for computer, and the other methods were later noted. Consequently, additional time was needed to compile these questions.

Question 18 -- vague answers of "2 or 3 every year" caused problems with the actual number a trapper had captured.

(10) The respondent should have been asked to indicate a negative sighting area on the map if he had not seen wolverines there over a period of years.

(11) Separate questionnaires should have been made for guides.

(12) A mail survey dependent upon response from people often far removed from communication is difficult. The potential respondent may pick up mail very irregularly, and his reply may be even more indefinite. Consequently, the researcher has to expect a high potential loss of returns due to this factor.

Few trappers voiced complaints about the format of the survey, even those met in personal interviews. One or two respondents of the biologist questionnaire criticized the fact that not enough specific detail was asked. However, the overall consensus was that few had any specific knowledge of the wolverine, and hence a more specific format may not have been utilized to the utmost. One question (6) had to be altered after the questionnaires had been distributed in Manitoba since the initial "yes" and "no" answers proved to be too vague.

I have a few suggestions for future questionnaires:

(1) The general letter of introduction was found to be useful. It is suggested that the use of a prestigious name and/or the letterhead of a prestigious organization be used (Erdos, 1957) and that the respondent be convinced that his reply is most important. It is also important that the letter be easy to read, personal, flattering to the reader, and provide as much information about the study as possible.

(2) A stamped, self-addressed envelope should be supplied.

(3) Coding the return envelope is helpful if the region is needed and the name is not indicated.

(4) Direct mailings, where possible, provide the fastest and highest rates of return.

(5) If interviews are requested, ask the respondent to leave his/her name and address.

(6) A space for additional contacts can prove beneficial.

(7) Ask only the necessary questions. Naturally this sounds like an absurd academic statement, but often time and money are lost on questions that are of no use at the termination of the study. For example, questions 3 and 4 of the trapper questionnaire (Appendix C) were asked but later found to be of no use.

(8) If time and money permit, try a sample area for the questionnaire.

(9) Any questions regarding income or personal matters can cause problems. Be very careful when utilizing these questions.

(10) Follow-up mailings, if possible, may prove to be beneficial. This, of course, depends on the scope of the study as well as time and financial constraints.

(11) If the mail survey is the chief means of deriving data, employing people from Statistics Canada or people in local communities may be of benefit.

(12) Formality is usually an effective means of getting to first base. However, considerable delay can be experienced waiting for approval, often for nought. In my case, I sent sample questionnaires to each president of the trapper organizations. Trappers, though, are individualists in every sense of the word, and approval from a man they

either do not know or disagree with does not always carry much weight. If contacting the rank and file is important, allow some time for response from the leader, then to to the individuals.