LIVE-TRAPPING MARTEN IN BTITISH COLUMBIA

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Introduction

Marten fur is still an important harvest from the forests of British Columbia. This province and the Yukon are the only such areas in Canada that have maintained marten production in this century, and the annual harvest in British Columbia is consistently from three to ten times greater than that of Quebec, second largest producer of the Canadian political areas (Yeager, 1950). In the trapping season 1947-8 the Canadian harvest of marten totalled 15,090 pelts of which British Columbia produced 11,971 or 71%. This continued high marten production in British Columbia is often attributed to the success of the registered trap line system. This may be a factor of importance, but it is also probable that mountainous terrain favours the species when under heavy exploitation. Such topography renders parts of trap lines relatively inaccessible. In areas where marten population have been generally reduced, pockets of well stocked habitat in adjacent valleys and at higher altitudes can aid in rapid reinvasion of lost range.

The Marten has Considerable monetary value as a natural resource in addition to unusual aesthetic, ecological and historic values, yet our knowledge of marten populations is still fragmentary. Wildlife studies in Wells Gray Park, have included a two year live trapping and tagging study of this species to gain information for local management as well as to add to the greater knowledge of the species. The study could not be intensive except for short periods. Duties with higher priority interfered from time to time. The objective was simply to tag as many marten as possible so that fur trappers would take them later. This plan was largely defeated by the low price of fur. Few owners of trap lines bothered to trap during the years of the study. Fur prices were too low to make the effort worthwhile when other jobs were easily obtained. Thus most recaptured data is from live traps which were placed with respect to the ease with which they would be tended and not with respect to any plan of trap location which was especially designed to give spatial data on the species.

Two previous studies involving live trapping were reported by deVos and Guenther (1952). This appears to be the pioneer work in the field and is used for comparison with this study. We also acknowledge the help of Dr. deVos, who demonstrated his trapping technique to one of us in Ontario in 1950. Newby and Hawley (1954) have given a preliminary report on a live trapping study in Montana which appears to be the most intensive yet undertaken.

The topography and vegetation of Wells Gray Park have been briefly described in a previous paper (Edwards, 1954). All trapping reported here was done at or near Murtle Lake, a large lake surrounded by the most extensive lowland forest of mature conifers left unburned in the

park. The lake lies at an altitude of 3750 feet. The altitudinal distribution of forest about the lake varies with the slope and aspect of surrounding mountains, but can be generalized as follows. A forest composed of varying amounts of western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), Engelmann spruce (*Pices engelmanni*), and sub-alpine fir (*Abies lasiocarpa*) extents to more than 4000 feet. A deep belt of sub-alpine forest, composed mainly of Engelmann spruce and sub-alpine fir, extends to timber line, becoming progressively more open with a corresponding denser understudy of shrubbery as elevations increases. The composition of understudy in these forests varies with elevation and other site factors, but is dominated by five species of shrub, false azalea (*Mensiesia ferruginea*), mountain rhododendron *(Rhododendron albiflorum*), devil's club (*Oplopanax horridus*), and two huckleberries *(Vaccinium membranaceum*) and *(V. ovalfolium*).

About 7000 feet the forest opens in alpine meadows.

Most trapping was done below the 4000 foot level. Several special trapping trips into sub-alpine forests were successful, but were not repeated and hence gave little recapture data.

Trapping periods were from October 2nd to November 24th, 1952; February 10th to 13th, and November 2nd to December 7th , 1953. Limited steel trapping was carried out in February, 1954. Most trapping was done by R.G. Miller who has a registered trap line covering much of the area

The traps used were the collapsible wire box type employed by deVos and Guenther (op. cit.). Both the 6"x 6"x19" and the 6"x 6"x24" models were used. Tags used were standard metal fish tags of the strap type (National Band and Tag Co., Style No. 1005; Size No. 1) (Calhoun, 1953). In the first year of study similar tags from another company proved much less satisfactory because of poor workmanship. Most animals were tagged in both ears while held in a wire cone.

TABLE 1

Marten Trapping Success in Three Time Periods of study

Period	No. Trap Units	First Captures	Recaptures	Total Captures	Trap Units/ Capture
Oct.2-Nov.23, 1952	428	13	11	24	17.8
Nov.2-Dec.7, 1953	186	6	11	17	10.9
Feb. 10-13, 1953	11	2	1	3	3.75*
	6.25	21	23	44	14.2

**Data too few to be reliable*

TABLE II

Marten Trapping Success by Months

Month	No. Trap Units	No. Captures	Trap Unit Captures
October	164	8	20.5
November	378	25	15.1
December	72	8	9.0
February	11	3	3.7*

*Data too few to be reliable

TABLE III

Marten Recapture Data

	Code No. Of Animals	No. Days Between Successive Captures	3 Distance in Miles Between Successive Captures	Remarks
Males	3	1	1/2	
	4	17	3 1/2	Dead in trap
	5	17	1 1/2*	
	5	457	2	In steel trap
	6	15	2	
	6	365	1*	
	6	78	1*	In steel trap
	10	1	3/4	
	10	7	1/4	
	15	2	0	
	16	9	0	
	16	1	4 1/2	
	16	1	0	
	16	1	1/4	
	16	1	0	
	16	1	1/5	
	16	6	4 1/2	
	16	4	0	
	18	6	0	
	18	80	2	In steel trap
Females	2	7	1/10	
	2	1	1 1/4	
	2	2	1 1/3	
	2	21	1 1/3	
	12	2	0	
	17	22	1	

*Point of capture on a measured trail

Trapping Method

Experienced trappers often maintain that the marten is the easiest fur mammal to trap. This may account for the ease with which the species is live trapped.

Bait may be an important factor, both as to its effective distance and its general attractiveness. Our data is not of value in revealing bait effectiveness. Choice of bait was left to the whims of the trapper and the result was a varied list of successful items. These were often used in combination, and occasionally as many as four baits were used in a single success trap. Successful baits included fresh and smoked trout, feathers, duck wings, sardine cans, beaver castor, skunk scent, goat cheese, and various parts of snipe, ducks, grouse, moose, red squirrel and varying hare. Perhaps some kind of trapping success results from using any bait of animal origin.

Traps were set covered with bark, rotten wood, brush or other debris so that bait was approached through the door of the trap rather than through the wire mesh elsewhere.

Trapping Results

Twenty-one marten were live trapped, and recaptures of these in live traps totalled twenty-three (Table 1 and Figure 1). Animals were released were captured on forty-three occasions, and one was found dead in the trap. In addition, steel trapping in February, 1954, took four marten, three previously tagged and one not tagged. Steel trapping data is not included in Tables 1 or 2, but is included in sex ratio figures and Table 3 summarizing recapture data.

Eleven, or 53% of tagged animals were recaptured. Eight animals not recaptured were tagged on short trips which were not repeated. Recapture of these was not expected. Recapturing success of animals tagged in more frequently trapped areas was 85%.

Both tables 1 and 2 evaluate trapping success by using “trapping units.” One trap unit constituted one trap in operation for twenty-four hours. The number of trap units through a period of time is meant to be for a measure of the intensity of effort to take marten during that period. It is only an approximation, however, for there are a number of factors which can affect the efficiency of traps set for any animal. Most of these are related to the experience of the trapper himself, but animals becoming conditioned to traps may also seriously influence trap unit success. Thus the trap unit is only the best available measure of effort in a study of this kind.

Table 1 shows that the efforts to take one marten were not comparable in both years. This difference is not marked when marten No. 16 is omitted from the 1953 data. The data for February are too small to be reliable, but there is a suggestion of higher success in that period. Table 2 shows effort per marten captured by months. Here that is indication of greater success with the onset of winter. There are two possible causes of this condition. First, marten tracks recorded in snow are a valuable guide to the selection of good trap locations. In snowless seasons traps must be set where experience can only suggest that marten are present. Second, with colder weather and appearance of snow, marten are faced with a decreasing food supply as prey species pass their peak of fall abundance and some, such as mice,

have almost continuous protective cover beneath the snow. The result may be an increase in the attractiveness of bait, perhaps accompanied by more travelling by marten in search of food. Both would result in a greater probability of traps being encountered and entered.

Of the twenty-one marten tagged, two died as a result of being trapped. One was found dead in a trap in November. The trap had been rolled into wet snow from under a large spruce by a cougar The marten was wet and probably died of exposure; A second was found dead, two days after tagged, only a few feet from where released. It had apparently been injured while being tagged.

INSERT FIGURE 1

Tagged animals were recaptured on twenty-six occasions. Three of these in steel traps. Table 3 summarizes that data. Distances appearing in this table are mainly straight line distances, and are only approximate. The only available map of Murtle Lake and vicinity is not strictly accurate. Those distances marked with an asterisk, on the other hand, are measured distances along a well engineered trail. They are not straight line measurements, but are close approaches to them. All figures are distances between successive captures only.

Several animals provided data of special interest. Marten No. 6 was first trapped November 6th, 1952. It was tagged on both ears, and the trapper noted that it was peculiarly marked. I was named “Whitefoot” as a result. Fifteen days later it was recaptured two miles away. The tags were in place. The following year on November 21,st, 1953, this animal, with torn ears and no tags, was taken one mile from the point of last previous capture. In February, 1954, it was caught in a steel trap. The distance between any of these four points is two miles.

Marten No. 5 was captured twice in November, 1952, then steel trapped in February, 1954, two miles from the point of last capture.

Marten No. 16 was captured nine times and had become conditioned to the traps. It twice moved the greatest distance recorded between points of successive capture, 4.5 miles, covering this distance once within twenty-four hours.

The sex ratio of all marten is fifteen males to seven female, or males 2.1:1 female. No attempt was made to age the animals.

A number of other species were taken in live traps. These totalled red squirrel thirteen, mink eight, weasel *(Mustela frenata*) 1. Smaller weasels, probably *Musteal erminea*, frequently sprung traps and escaped through the wire mesh. Such activity could be proven only when snow recorded tracks. Moose, cougar and black bears disturbed traps occasionally.

From observing trails in the snow, and noting times of capture relative to times of new falls of snow, it is evident that not all marten using the area trapped were taken in traps. There is the suggestion from these 0bservations that some animals repeatedly passed traps which others entered with little hesitation.

There is data for one transported animal. It was flown twenty-four miles west, then taken by truck eighteen miles south. On October 25th, 1953 , it was released, in a large area of shrubby, deciduous vegetation having no native marten population. Thirty-four days later it was killed by hunters six miles further south and still in the deciduous area.

Discussion

The main interest of capture and recapture studies is the size of area used by the animals trapped as suggested by the distances between points of capture. Prior to live trapping studies by deVos and Guenther (op.cit.) such information for marten was available from both Europe and North America as a result of tracking studies. Marshall (1951) concluded from Idaho studies that marten move over an area of ten to fifteen square miles in winter. Grinnell et al (1937) concluded that marten in the Sierras of California travel about one mile a day, and that the population density there varies from a marten to a square mile to one-third that density. DeVos and Guenther (op.cit.) cite the Russian authors Dulkeit (1929) and Kozhantchikov (1930). The former reports a hunting plot of two to nine square miles, the latter in individual range of from three-quarter to over four square miles. Malaise (1929) estimated home range of the marten of between nine and eleven square miles. These figured are not consistent, possibly a reflection of differences in habitual suitability, or in some cases the habits of genetically different animals.

The live trapping figures of deVos and Guenther are of special value for comparison with the present study. Their data on distances between successive captures contains nineteen figures, but only one of the Ontario animals (No. 10) was released where first captured. The remaining eight Ontario figures are better regarded as data on homing than as information on undisturbed travelling. Of the eleven remaining figures (10 Washington, 1 Ontario) all but two show movement under a mile in length over periods of time ranging from a day to three months (the latter period is for Ontario marten No. 10; table in error; see text). The two

remaining recaptures show in one case movement of one mile in four days, in the other case movement of three miles in almost a year. This study suggests that marten are more sedentary than previous studies indicated, since few recaptures are more than a mile from previous capture. Most of these data are for the months of March and April.

Newby and Hawley (1954), in a preliminary report on a long term study in Montana, show that males are more wide ranging than females. Male minimum foraging areas average 0.56 square miles, but one male is known to have moved 1.3 miles in a day.

Distances between points of recapture in the present study are greater than those from Washington distances average about 7 miles, the British Columbia figures about 1.1 miles, despite many more zero distances in the latter resulting from recapture in the same traps. Since recapture distances are almost certainly not distances of maximum movement, the highest figures are probably the most useful in estimating areas used, with the exception that especially large figure may not be typical. Ten British Columbia figures show distances from one to two miles (Table 3). Washington distances, with one exception, are one miles or less. The differences could be real and due to differences in habitat, or again, due to differences in season, for Washington figures data are from spring trapping while British Columbia figures were obtained in late fall and early winter. On the other hand, the differences could be the result of different trapping techniques.

In Montana, the most widely separated captures averaged 1.6 miles for males, 0.7 for females. In British Columbia, distances of a mile or more between points of successive recapture averaged 2.3 miles for males and 1.2 miles for females (see table 3).

When converting linear distances obtained from limited trapping to approximations of the areas used by animals concerned, the simplest procedure in the absence of data on the factors affecting the shape of such areas is to treat the linear distances as diameters of circles. Area so obtained must be regarded a approximate, and must be used with the full realization that more accurate information is needed Thus ‘treated, the Washington and Montana data suggest that individual marten range over less than a square mile. British Columbia data suggests an area between one and three square miles.

These areas are all smaller than most indicated by previous studies, with the exception of Kozhantschikov (op.cit.) who is in a fairly close agreement. Figures from Grinnell et. al. (op.cit.) suggest a similar conclusion.

In addition to trapping data, marten tracks were twice followed along a trail which had been measured with distances marked along its length. On one occasion a marten trail was followed for a third of a mile. Again on October 31, 1952, in light snow, a martin trail was followed for one and one-third miles. For the whole distance it appeared that the marten had been following a hare. The marten was progressing with jumps averaging about five feet in length, with occasional leaps up to seven feet. It is worth emphasizing that a single chase apparently persisted for one and one-third miles along a fairly straight trail.

DeVos and Guenther (op.cit.) note that no marten released in Ontario climbed trees, and that in Washington only one did so. This habit was more common in our experience. The marten describe in their

paper as taken six time in Algonquin Park, Ontario, (trapped by Edwards) climbed trees upon at least three occasions when released, and moved from tree to tree with little difficulty. In British Columbia information on tree climbing is available for 1952 only. Three animals treed upon release. In both Ontario and at Murtle Lake it seemed that they usually treed when frightened on release.

The question of permanence of tags used is important. Accuracy in this kind of study depends largely upon tags remaining in place. We have no evidence of tag failure within any single trapping period when tags were properly applied. However, the trapping history of "Whitefoot," tagged in both ears in 1952, and having neither tag a year later, has already been given. In addition marten No. 5, tagged in both ears in November, 1952, had no tags and torn ears in February, 1954. Again pelage colour made identity certain. Marten No. 18 was steel trapped after eighty days. Both tags were holding well but evidence of irritation was marked. As Newby and Hawley (op.cit.) pointed out a better marten tagging method is needed. There is more evidence from a mink study conducted in Wells Gray Park that this type of tag may last only a few weeks on this species. As a result, trapping studies of both marten and mink have been terminated until better tags are available. It is suspected that a type fixed centrally in the ear may prove better than a loop enclosing the edge of the ear. A satisfactory marking method must be clearly visible to commercial trappers, and if mutilation is used rather than a tag, it must neither affect pelt value nor be liable to duplication by other means.

Marten Management

The martin is a climax or near climax species. Its disappearance from large areas of its former range is at least partly the result of destructive forest practices which denude forest land and hence destroy marten habitat. Many lands so logged or burned are now supporting forests approaching maturity. At the same time, forests cropping is entering a new era. Former logging philosophies created vast areas of denuded lands. Modern methods work with land units in which forest areas of different ages remain constant. Provided that the older forests in such cutting units are old enough to be good marten habitat, this new era in forestry promises to provide and perpetuate constant areas of marten habitat.

The marten appears to be a less wide ranging species, at least in some areas, than was formerly generally believed. This has implications in management. Habitat destruction, as by fire or logging, can eliminate more individuals per unit area destroyed than was once apparent. In addition, the effect of trapping may be more local than early studies indicated.

The ease with which marten can be captured alive opens new horizons to marten management. Marten have been eliminated over large areas of their former range. Restocking of suitable forests is now possible. It may not be too much to hope for recovery in marten populations similar in some respects to the beaver recovery which has recently occurred throughout Canada and the northern United States with the aid of vigorous restocking programmes.

It may be possible to carry on commercial trapping in winter using the light, collapsible traps now used for study purposes. This would enable a choice from animals captured of those required for pelting and sale on one hand, and of those to be released on the other hand because immature or for other reasons beneficial to the wild population, The result would be a more efficient harvest having the least possible

detrimental effect upon the marten population. It is not implied that commercial live trapping would be universally successful. Live trapping has a number of disadvantages when compared with the usual methods employed, perhaps the most serious of which is the frequency with which the trap must be tended. Live traps are also expensive. Under some conditions, however, the method could have distinct advantages. On small trap lines close to civilization, or on the more accessible parts of large trap lines, this trapping method could bring maximum production by taking only adults yielding large pelts, and at the same time there could be some control over the genetic quality of pelts left in the forest. The method is a least worthy of experimental trial. The efficiency of live traps appears to be a least equal to that off steel traps, both from experience with both trapping methods, and from a short trial of the two traps in the same area at the same time.

Summary

Live trapping studies of marten in Wells Gray Park, British Columbia, resulted in 21 animals tagged and 23 recaptures. Steel trapping took three tagged animals. Recaptures suggest that marten may not be so wide ranging as some earlier studies indicated. Most animals moved short distances and appeared to be confining activities within one to three square miles. Some long and rapid travelling was detected, however, for one animal moved 4.5 miles within 24 hours, and another apparently ran one and a third miles in a single chase after a hare.

The tags used were not satisfactory. There is need for a better marking method.

Several recent studies of marten have increased our knowledge of the species. Management possibilities are similarly increased. As improved forestry methods perpetuate suitable habitat, restocking and perhaps commercial trapping with live traps promise to give increased production of marten fur.

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