WINTER WILDLIFE REPORT, WELLS GRAY PARK 1952 - 1953

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INTRODUCTION

The following report deals with winter studies carried out in Wells Gray Park from December 1952 to April 1953. Winter work was concentrated on moose and, of necessity, much of this work was of a general nature. Following winters can be expected to yield more specific data on moose and other animals now that one winter's experience has shown traveling conditions and time involved in carrying out specific tasks.

Field work was carried out by the writer under the direction of R. Y. Edwards until March, when a spring moose census was carried out with the assistance of J.C. Norman, C. E. Gaglardi, and R.G. Miller. Data collected by these men and incorporated into this report is acknowledged by the initials of the person collecting the data immediately following the data itself. The field notes of all men on spring census are on file and contain more detailed information than is given in the present report.

The writer wishes to express his appreciation to all who assisted him in various aspects of the winter's work. Special thanks are due Ted and Roy Helset who assisted in autopsy work and accompanied me on several trips. Thanks are also due to Park Ranger L. E. Cook who supplied transportation and was at all times helpful in bringing supplies from Clearwater.

ABSTRACT
Studies carried out in Wells Gray Park from December 1952 to April 1953 dealt with moose distribution, winter conditions, some aspects of behaviour, and an estimate of the huntable population determined from a spring track count. Most moose wintered south of the Murtle River despite light winter snow. Winter physical condition was very good and seven moose shot for autopsy during the winter showed no signs of malnutrition. Parasite infestation consisted mainly of winter ticks which reached the adult stage in late February, leg worms, cysticerci, and hydatid cysts. The internal parasites apparently have little or no effect on the condition of the animals.

Spring track counts gave a total of 914 northbound moose into the fall hunting grounds. Additional moose wintering north of the line, or summering south of it, or which did not cross during the track counting period, give a minimum figure of 1350 moose in the general hunting area. It is estimated that 325 moose should be removed by fall hunting to prevent the huntable herd from increasing.

Winter ranges have improved during the past year due to late arrival of moose on winter ranger, local reduction of moose populations by fall hunting, and possibly because of the longer period during which ground vegetation was available to moose. This improvement is believed to be only temporary.

Mule deer wintered south of the main areas under winter study but all observations show very successful wintering for deer as well as moose.

Caribou reconnaissance yielded largely negative results. The only caribou sign noted in the Park was in the vicinity of Murtle Lake in late fall.

Wolves are believed to be increasing although winter predation was light.

The first successful live trapping for marten was carried out at Murtle Lake by Mr. R. Miller.

Increased populations of fur bearers have been noted. Most remarkable is the recent increase of lynx in the southern Park area. Habitat preferences of some fur bearers as determined by track observations are recorded.

A list of birds seen in the Park during the winter months is given. Approximately thirty are considered winter residents.

MOOSE (*Alces alces americana)*

Fall Migration and Winter Distribution

The fall migration this year was unusually late, but by early December moose had arrived on three of the four study areas chosen as representative example of moose winter range (Fig I). For map showing location of study areas, see report on summer's work 1952.

FIGURE I: Snow Depth on Moose Winter Range, Study Areas A, B, C, D
X marks date the depth of snow measurement.
Red indicates presence of moose as determined by fresh tracks.
Green indicates absence of moose or sign.
Broken line of appropriate colour indicates suspected presence or absence of moose.

Moose remained on winter ranges exemplified by study area D till some time in early February or late January, after which time they left for areas of lighter snow. There was an abundance of food remaining on northern ranges at the time when the moose left (Fig. II). At Stillwater on February

14th snow depth averaged 10” and most moose had left this region also. Browse here was more than sufficient for wintering moose. Moose remained on study area C through all winter months where snow depth was only about a foot less than on area D. Greatest concentrations of moose occurred on study areas A and B in February and March. Sufficient information should be available from track counts to allow calculation of moose densities from pellet group counts. Heretofore the length of time spent by moose on each area was not known with any degree of accuracy. More observations are necessary on areas A and D in following winters so time of arrival and departure of moose on these areas will be more exactly known.

A factor which may prevent wintering on the French Meadow and Stillwater ranges is palatability of browse. The soil of these regions contains less organic matter than soils of the more southern burns. Cover does not appear to be a factor for moose wintered throughout February and March on the open east facing slopes of Green Mountain (Fig. III).

The carrying capacity of the winter range could be increased considerably if moose spent more time on the northerly ranges where food is abundant and spent less time on southern ranges where food tends to be scarce.

Fig. II: Unbrowsed willows remaining at French Meadow, February 1953

Fig. III: East slopes of Green Mountain where moose wintered. Note lack of cover.

Fig. IV: Fat meat from rump of cow moose shot February 16, 1953

Fig. V: Fat deposits in omentum of moose shot February 16, 1953

It was difficult to distinguish individual moose on winter range, but observations tend to show that individuals had definite wintering territories in which they remained for a short time. Nowhere was there evidence that moose yarded in one place for the entire winter. A concentration of animals would move from a given area in the apparent absence of external disturbance. Possibly the unusually shallow snow depth was in some measure responsible for masking the yarding phenomenon. Marking of individual animals is needed to determine whether individuals tend to congregate in the same region each winter. Such problems have definite implications in regard to management. For instance, will a winter range restored by management be neglected by moose for a time if they are not accustomed to using it as a winter range? Will parts of the winter range be neglected because portions of the population have been overshot and other parts of the population are not in the habit of wintering there? A means of managing parts of the moose range may be to rather severely shoot off parts of the wintering population to allow browse to recover in local areas.

Feeding Habits and Activity Periods

Winter food habits were most readily determined by examination of browsed species left on the winter range.

In the late fall and early winter, stomach contents of moose were chiefly *Pachystima* and willow. They continued to eat *Pachystima* as a large part of their diet until well into December when snow covered this food source. In the winter months, upland willow was found in all stomachs examined and made up more than 75% of the contents in all cases save one. Other foods included red osier

dogwood, black birch, paper birch, trembling aspen, and lowland willow. When melting snows made *Pachystima* available to moose in the spring, the moose again browsed this species extensively. It is possible that *Pachystima* acts as a buffer food for the willow. That is, willow is not browsed severely when a large amount of *Pachystima* is available in the same area. Carrying capacity may be materially increased by the presence of this species. The longer period during which *Pachystima* was available this year due to light snowfall may be a factor contributing to the light browsing of willow. The snow depth above which moose cease to feed extensively on *Pachystima* seems to be about 12".

The most obvious need with regard to study of winter food habits is a qualitative study of the food intake of the moose on winter range. Such a study could be carried on by university students with the resident biologist cooperating in collecting material.

A number of observations of moose on Green Mountain showed that, on good winter range, moose have to devote little time to getting enough food to maintain them in good health. One moose observed on January 31st was first sighted lying down at 0927 hours. It remained in this position until 11:15 when it arose to feed. From 11:15 to 12:08 it fed rather leisurely then lay down again. It remained lying down until 16:35, and fed until it was no longer visible at 17:45. Of the 492 minutes it was under observation, it was lying down for 369 minutes or 75% of the time. This animal was observed again on the following day for a total of 575 minutes, during which it fed only eighty minutes. It was lying down for a total of 495 minutes, or 84% of the time that it was under observation. On both days, it had a feeding period of 53 minutes near mid-day, suggesting a definite feeding rhythm for this animal.

Observations throughout the winter showed that there were peaks of feeding activity in the early morning and again in the late afternoon. There is insufficient data to make more than this general statement.

Health of the Herd and Winter Survival

As stated in the report of the fall hunting season, the moose herd was in excellent physical condition to enter the period of winter stress. This statement was verified by observation of moose on the winter range and by autopsy of seven animals shot on winter range in the period from January to April inclusive. The results of the autopsies are recorded on autopsy sheets but a summary of most salient facts found from the autopsies are included in this report. Autopsy results are in some slight extent biased, for in trying to take only females, a female with calf at heel would be more easily identified as a female than one without a calf. The most productive and healthy females would be more likely to be shot because of this.

Parasites

All moose autopsied had a light to moderate infestation of leg worm (probably *Wehrdickmansia cervipedis).* These were usually found in the connective tissue under the skin of the briskey and of the lower legs.

Cysticerci (probably *Cystercercus tenuicollis)* were present in all but one of the moose examined. Sites of infestation included the liver, omentum, and pericardium.

Hydatid cysts were present in the five specimens over 2.5 years old. All recognized cysts were found in the lungs but a section of liver was also suspected of having cysts and has been preserved. The number of cysts varied from one to eight. Much study is needed to complete knowledge of the life history of this parasite and this is another opportunity for a cooperative study with the university.

A single nose bot (probably *Cephenymia jellisoni)* was found in two of the animals examined.

Ticked were present in the seed stage only in moose until late February. The first evident of tick attacks was noted when some blood was found in a moose bed on February 25th. Two moose taken after that date were the only ones having adult ticks on them. On these two moose, infestations ranged from one per square inch in lightly infested areas, to 20 per square inch in more heavily infested regions.

Field notes of J.C.N. and G.E.C. indicate that tick infestation was about the same during this spring and the previous spring. This year an attempt was made to obtain a tick per bed index for comparison with following years. Ninety-five engorged ticks were found in sixty-six beds examined by R. G. Miller and the writer. The tick index was 1.4 engorged ticks per bed. Presumably the value of the index could be nullified if the population of tick-eating birds was radically changed between any two different years. The most spectacular record of tick incidence was recorded from a bull at MacLeod Hill on April 4th. This animal ridded itself of 240 engorged and six flat ticks in a distance of about 300 yards. It had lain in two beds during this time so the time involved was several hours at least. (R.G.M.)

Of the moose autopsied, the five females over 22 months were all pregnant. Two sets of twins and three single embryos were present. This is 1.4 embryos per pregnant cow, or approximately the same ratio of embryos as found in uteri collected during the fall hunting season. No abnormalities or sign of weakness was noted in the embryos.

Fat reserves in the subcutaneous layers and around internal organs showed no depletion until March. A female taken on February 16th had a layer of fat 1.5” deep over the rump (Fig. IV). The omentum of this animal also had abundant fat (Fig. V) as did the omenta of all animals shot to that date. The female shot on March 4th showed some depletion of fat from subcutaneous layers and from around internal organs but still had up to a quarter inch of fat on the kidneys. A 20 month old female shot on April 23rd also had up to a quarter inch of fat on the kidneys and marrow in the femur was fat and pinkish white, showing a high fat content.

Throughout the winter, a close watch was kept for orphaned calves from the fall hunt to see how they fared though the winter. It became apparent early in the winter that orphaned calves quickly attached themselves to another moose or group of moose, and were scarcely recognizable as orphans. Three lone calves seen by C. E. Gaglardi on April 2nd, 9th, and 17th were all in good health. A lone calf seen by R. Miller on April 13th was apparently unsteady and weak on its feet. This calf made its way out of the territory shortly afterwards and was not seen again.

Four carcasses of winter killed moose were found during the spring months. One of these, a calf, was apparently killed by wolves. (J.C.N.) A second carcass was found on MacDiarmid’s trail to the Clearwater River. The cause of death was undetermined, the marrow was yellow - gelatinous. The third carcass was found near Hemp Creek in late April. This was the remains of a bull calf which had died only a few weeks previously. Tick infestation was very heavy, and the marrow was red-gelatinous. A combination of malnutrition and ticks were probably responsible for its death. The fourth carcass, that of a young moose, was found on the north bank of the Murtle River at the Pyramid. The remains looked as if they had been pulled from the river itself. Ravens and coyotes fed on something in this vicinity during the early winter, and it is possibly that this animal met death by drowning after being trapped in the broken ice. Marrow in the femur was white and fat.

Fig. IV: Fat meat from rump of cow moose shot February 16, 1953

Fig. V: Fat deposits in omentum of moose shot February 16, 1953

Pellet Group Factor

An attempt was made to determine whether or not the pellet group factor of 12.7 groups per day is valid when applied to moose. This factor has been widely used in mule deer studies.

Observations on 85 hours and 22 minutes of moose time were carried out by tracking and by direct observation. Pellet groups found were 46. Factor obtained from this data (46/85.3 x 24) is 12.72 or, for all practical purposes, 12.7.

Total time involved in this study is small and more work must be done to confirm these results. Since the larger part of these observations involved daytime periods when moose can be expected to be more active than at night, and therefore probably defecating more often, the observed figure of 12.7 will be high. Calculations of moose density base on this factor will therefore tend to give results which are on the conservative (low) side.

Spring Census

This year effort was concentrated on obtaining an accurate estimation of the number of moose which would be available to hunters in the fall of 1953 rather that attempting to census the entire wintering population. The figures obtained from the aerial census of the previous year (R.Y. Edwards 1952 "An Aerial Moose Census") are to a large degree still valid. The survival to yearling stage is known, the hunting take is known, and other mortality factors appear to be low, so a fairly accurate estimation of the wintering population can be made from theoretical calculations. In any event, crusted snow conditions and wary animals preclude the possibility of obtaining a reliable population figure from a ground strip census.

The most suitable means of obtaining a count of huntable moose was deemed to be a repetition of last year's track count. (L. E. Cook, J. C. Norman, G. E. Gaglardi 1951 unpub. report). As in the spring of 1952, a line was run in an east-west direction at right angles to the migration route of the moose. It was necessary to move the line about four miles to the north of last year's location for a considerable portion of the population wintered north of this line. It was also obvious that snow would be gone from the original location long before the moose migration was over. The track counting line was broken up into three parts: A - from Helmcken Falls to Majerus ranch on the Murtle River. B - from the Majerus ranch up the Murtle River and then eastward to the Murtle Lake trail at the foot of MacLeod Hill. C - east from the end of B, across Hemp Creek, to the first ridge above the valley floor (Fig. VI).

Deep snow in the early part of the counting period made outdoor camping unattractive so counters returned to Hemp Creek each night when on the east end of the line. On the west end, the Majerus place made a very suitable headquarters. The return nightly to Hemp Creek on the east end added considerable time to the trip, and could be eliminated if a suitable shelter were erected on this end of the the trail.

Tracks crossing the line were either obliterated or marked with brush so that moose traveling in the same track would have to disturb the brush and would not escape being counted.

Mild weather in the early part of March led one to believe that the moose would start migrating early. Many patches bare of snow were beginning to show on south slopes at this time. The count was therefore commenced on March 10th after courses had been broken out on snowshoes. The track counting was actually started prematurely. It was not until the first day of April that the first noticeable northward drift occurred. The northward migration was thus begun about the same date as in the previous year. On March 27th of last year, the first moose began to cross the line northward but this line was located some four miles to the south of this spring's line. Records kept of morning (8:00 AM) temperatures show this year's average (27.2°F) to be about four degrees milder than March temperatures of the previous year (23.0°F). No exactly comparable data on snow depth is available, but at the end of March 1952, snow depth on the east trail was 25". This year at the nearest comparable measurement place, snow depth was 17" at the same date.

It seems that, regardless of weather conditions, little northward movement will occur until the first of April. Therefore, if track counting is carried on in succeeding years, it will be advisable to delay counting until this date.

Track counting was discontinued on section A and C on April 18th and on trail B on April 22nd. Moose were still going northward at this time, but large amounts of bare ground began to show in many places and, on trail B. many parts of the line were under water.

Fig. VII shows that a total of 914 northbound moose crossed track counting lines in the first twenty-two days of April. This is a minimum figure and indicates that there definitely is a population of this size which summers largely within Wells Gray Park. The following discussion is direction at arriving at a figure that will represent the population available to hunters. This population figure is based on the assumption that all moose in Wells Gray Park south of Azure Lake are available to hunters at some time during the hunting season. The assumption is not entirely valid but, with a large percentage of moose being in the low country by December, it is probably not seriously in error.

The only error which would tend to make results of the track count too high is caused if tracks are counted twice. This occurs sometimes when melting of an old track makes it appear fresh. The error involved here is very small, as care in marking tracks was exercised by all observers.

Fig. VII: Numbers of Moose Crossing Track Counting Lines from March 10 to April 22 inclusive

March	Trail A			Trail B			Trail C			Total
	N	S	Drift N	N	S	Drift N	N	S	Drift N	Drift N
10	10	8	2	3	8	-5	0	1	-1	-4
11	-	-	-	8	6	2	0	1	-1	1
12	0	1	-1	0	2	-2	3	4	-1	-4
13	-	-	-	0	3	-3	0	0	0	-3
14	-	-	-	0	11	-11	0	0	0	-11
15	0	1	-1	3	5	-2	0	0	0	-3
16	0	0	0	5	8	-3	0	1	-1	-4
17	-	-	-	0	4	-4	0	1	-1	-5
18	-	-	-	0	2	-2	0	0	0	-2
19	-	-	-	0	1	-1	0	0	0	-1
20	3	1	2	1	1	0	0	0	0	2
21	0	3	-3	0	0	0	1	0	1	-2
22	0	0	0	5	11	-6	-	-	-	-6
23	0	0	0	0	0	0	0	0	0	0
24	0	0	0	7	18	-11	-	-	-	-11

25	0	0	0	6	2	4	0	2	-2	2
26	2	1	1	-	-	-	0	0	0	1
27	1	1	0	0	0	0	0	0	0	0
28	0	0	0	5	4	1	0	0	0	1
29	0	0	0	1	0	1	0	0	0	1
30	0	0	0	0	1	-1	0	0	0	-1
31	0	0	0	4	7	-3	3	0	3	0
1	0	0	0	6	0	6	2	0	2	8
2	0	0	0	18	0	18	5	0	5	23
3	0	0	0	13	4	9	5	0	5	14
4	5	2	3	44	6	38	3	1	2	43
5	0	0	0	81	41	40	-	-	-	40
6	0	1	-1	61	24	37	30	10	20	56
7	16	10	6	33	5	28	0	0	0	34
8	0	0	0	49	7	42	44	2	42	84
9	0	0	0	51	11	50	4	0	4	54
10	0	0	0	88	11	77	10	3	7	84
11	2	2	0	57	16	41	-	-	-	41
12	3	0	3	39	25	14	21	6	15	32
13	2	0	2	30	23	7	3	0	3	12
14	-	-	-	26	6	20	10	7	3	23
15	-	-	-	39	11	28	4	1	3	31
16	0	1	-1	56	3	53	8	0	8	60
17	---	---	---	97	21	76	25	16	9	85
18	Total N:		13	50	10	40	21	11	10	50
19				44	9	35	---	---	---	35
20				89	27	62	Total N:		141	62
21				19	2	17				17
22				39	13	26				26
				Total N:		764				Total N: 914

Totals are added from date of northward movement in each case.

Factors which make results of the track count lower than the actual huntable population are:

1. Drift around ends of lines. The error involved here is probably small. The east end of the trail terminated on the slopes below Battle Mountain where snow depths were considerably greater than in the valley below. The moose did not attempt to push through this deep snow belt. On April 10th to 13th a reconnaissance was made above the east end of the line, and no moose tracks had crossed above this end of the line. Some drift may occur around the west end of the line, but these moose would be largely unavailable for the fall hunt. The moose going north and west across the Clearwater in the spring would be most likely to return along the same route in the fall. This is an area that is practically unhunted by Wells Gray hunters.
2. Moose stepping in the tracks of others often make several tracks appear as one. This is most likely to occur where animals sink in deep snow. Last year, observers estimated that the error from this source may have been as high as 25%. The shallow snow with hard crust this year allowed the animals to roam at will. The error due to this source for this year's count is believed to be small. The fact that the line was located far enough north to allow the animals to spread out and not be constricted to certain crossings also tended to minimize the error.
3. Tracks are sometimes missed when moose travel on frozen ground or on heavily crusted snow. The size of error here is also hard to determine. Undoubtably some tracks were missed but the error from this source is not believed to be greater than 5%.

4. Some moose remain south of the line for the summer months. Sign seen on reconnaissance in previous summers indicates there there would be about fifty moose south of the line during the summer which would be available to hunters in the fall.
5. Some moose remain north of the line during the winter. Reconnaissance to MacLeod Hill, Stillwater, French Meadows, Deer Creek, Clearwater and Murtle Lakes showed moose wintering in small numbers throughout burns on both sides of the Murtle River and on both sides of the Clearwater River. Seventy-five would be a conservative estimate of their numbers. Archer Creek burn would probably winter about 300 animals, allowing for a slight increase over the spring of 1952 with Edwards (op cit) estimated this population at 280.
6. Moose continue to move north after track counting is discontinued. The size of this error is not known but can probably be lessened if track counting is continued for a longer period in succeeding years.

Fig.VIII shows the results of sex and data gathered by four observers on the winter range in the same period of time. There is a wide variance between the figures given for the four individuals. The discrepancies are too great to be the result of change alone. Different sex and age classes of animals may have tended to concentrate in different areas, thus the observers may have been observing different sections of the population. This scarcely seems plausible for the observers with the widest discrepancy between results were working the same region. The alternative explanation is that observers were not able to judge accurately the age groups in the herd. Errors involved from inaccurate figures on survival will probably be unimportant from a management standpoint until hunting can remove the calculated allowable harvest. At that time, errors in survival figures must be minimized.

Adding the animals which do not cross the track counting line (435) to the total northbound moose (914), we arrive at a total huntable population of 1349 moose. Taking the percentage of yearlings as 25% as observed in the spring census (average of four observers) and using 1300 for simplified calculations, 325 moose (1300 x .25) should be removed by next spring to maintain the population at its present level. Approximately sixty of these should be taken in the Clearwater Lake area.

Fig. VIII: Summary of Moose Sighting Records of Four Observers on Winter Range from March 6th to April 18th, 1953

Observer	Bulls	Cows	Calves	Adults not sexed	Unclassified Moose	Totals
A	7	11	10 (18.5%)	26	12	66
B	15	32	28 (20.1%)	64	48	187
C	8	21	24 (26.9%)	36	--	89
D	28	37	40 (30.7%)	25	14	144
	58	101	102 (24.8%)	151	74	486

Winter Ranges

As noted previously under distribution, winter range in the northland and at higher elevation are, as a general rule, under-utilized. Throughout this general region, moose leave for more southerly areas before browse is exhausted. Snow depth seems to be the chief reason for this movement, although it may not be the only one. The concentration upon southern ranges in late winter

causes over-utilization of browse. Even in such a winter as the one just past, many regions were locally over-browsed (as judged by visual estimation). It is on the southern parts of the range that the greatest proportion of losses due to inadequacy of high quality browse will occur in winters of deep snow.

Fix. IX: Moose winter range at Hemp Creek; note dominance of aspen and conifers

Efforts to rehabilitate winter range must be centered upon the heavily used southern part of the wintering grounds. Much of this winter range, with the exception of a small part of the Blackwater Canyon and Green Mountain, lies outside of the Park. It is desirable that the Battle Mountain extension recommended in 1951 be brought into effect in order that these southern wintering grounds be under Park jurisdiction.

Aspen domination and conifer encroachment present the main problem in the southern part of the moose range (Fig. IX). Methods of eliminating these willow competitors should be studied.

Studies should be carried out to determine how succession is affecting the quality as well as the quantity of browse. Qualitative studies could be carried on most efficiently by persons at the University of British Columbia under the Parks and Recreation Division biologist, and with the assistance of the resident biologist at Wells Gray. Quantitative studies now being carried out in the park in the form of twig measurements and counts should be continued and extended to sample other areas beside the one under study at present.

Fig. X: Foot of mule deer swollen by abscesses believed to be caused by Pseudo-tuberculosis

Fig. XI: Neck lesion on same animal showing accumulation of pus

MULE DEER *(Odocoileus hemionus hemionus)*
Few mule deer were seen during the winter months after the southward migration had ceased. The southward movement ended with most deer remaining outside the park boundaries except for local areas on Green Mountain and White Horse Bluffs. In late December and in early January, deer were seen almost daily moving southward along Green Mountain and in the vicinity of Hemp Creek. The last appearance of deer in the vicinity of Hemp Creek was on January 20th, when fresh tracks were seen on the ridges to the east of the homesteads. No deer were seen in the vicinity of Hemp Creek until the first appearance of the northbound migrants which were first sighted on Green Mountain on April 3rd.
One deer shot on December 25th on the Helset homestead displayed symptoms of pseudo-tuberculoses *(Caseous lymphadenitis)* as described by Cowan ("The Diseases and Parasites of Big Game Mammals of Western Canada" 1951) Figs. X and XI).

Winter survival was apparently very good. J.C. Norman classified 202 deer in late April and in early May as follows: bucks 14, does 29, fawns 71, unsexed adults 66, unclassified 22. These deer were seen south of the park boundaries and on the south end of Green Mountain.

Reports of most local residents who observed deer on winter range and on the northward migration indicate that the deer wintered very well.

CARIBOU *(Rangifer arcticus montanus)*
Few trappers were afield this winter and the writer was unable to make extensive trips into caribou country, so notes on winter caribou distribution are necessarily spotty. The following is a record of trips into what might be considered as possibly caribou winter range. The writer believes that this information, although largely negative, may be of value in future investigations if only for sake of comparison with data gathered in succeeding years.

Mr. Miller reports the Mobely Mountain trail as being hard packed by caribou on November 7th at about the 4000' level. The caribou were browsing "very low evergreen shrubs" which were obtained by pawing under the snow which was less than eight inches deep. At the same period, the writer saw caribou sign on the Murtle Lake trail above MacDougall Falls on November 4th and again in the same locality on November 8th. There were no more than a half a dozen animals in this group.

At Strait Lake, and between Strait Lake and Murtle Lake, tracks of at least three different bands of caribou were seen from November 10th to November 18th. There was a definite southward drift to the bands. Each band contained about six or less animals. Evidence of pawing for bracken ferns was noted. (R.G.M.)

On November 20th and again on the 30th caribou tracks were seen on the Murtle Lake - Blue River trail at a point about half a mile east of the park boundary. The animals were heading southward. (R.G.M.)

No fresh caribou sign was seen on the Blue River trail from December 6th to the 13th. (R.G.M.)

From February 8th to the 13th the writer was in the Murtle Lake district with Roy Helset. All the country at the west end of the lake and the flats of coniferous timber between Murtle Lake and Stillwater were sampled for evidence of wintering caribou. Fresh snow and lack of trails make a quick trip to the high country impossible so elevations below 4500' were visited. No caribou sign was seen in any of the flats. Snow conditions were such that ungulate sign of ten days or less would have been evident but there were tracks of only one moose in the entire area visited. In the open meadows around the shore of Murtle Lake, caribou food was almost non-existent. The willows and other deciduous browse species were covered with snow up to 58" deep. Generally the trees had a scanty supply of lichen. In a few locations however, either in stands of dense cedars or in certain swamps of spruce and balsam, lichen was abundant. In no place was the writer able to find evidence of caribou having fed on the lichen.

In mid-February Mr. Miller found sign of caribou fairly abundant in the region about Fish Lakes. The writer is not familiar with the region, but apparently it lies above the 5500' level between the southeast corner of the park boundary and the village of Wolfenden. This is roughly the direction in which caribou tracks on the Blue River were heading in November. The caribou at Fish Lakes were living on Spanish beard moss in the evergreen trees. Both fresh and old black lichen were being eaten.

On March 18th, Patrolman J. C. Norman and the writer made a trip though mature coniferous timber between Five Finger Lake and Deer Creek. No caribou sign was noted here. Lichen was present in moderate abundance. Snow depth was about three feet here.

From April 10th to 12th Patrolman C. Gaglardi and the writer made a trip to Battle Mountain and the flats towards Stevens Lakes. No caribou or caribou sign was noted on this trip. In the open stands of alpine fir and spruce at around 6500' and above, lichen was very scarce. Snow depth of

76” covered the meadows, and ground feeding would have been impossible. Around 6000’ and lower, good stands of tree lichen were found in the spruce-balsam type. The most abundant tree lichen was found in diseased stands in which most of the trees were dead or dying (Fig. XII).

Summary

Sign of caribou was seen throughout November both at the east and west ends of Murtle Lake. Evidence tends to show that the caribou from the east travelled south and east of the park boundaries to the region of the Fish Lakes. They probably spend the latter part of the winter there. There is no evidence to indicate where the caribou of the west end spend the late winter.

Caribou were able to paw for food in the late fall and in early winter. Snow depths prevailing on winter range precludes the possibility that the caribou feed on ground vegetation during the later winter. Tree lichen is the only reasonable alternative as the winter food of the caribou.

Fig. XII: Lichen in spruce-balsam stand at about 6000’ Battle Mountain

FUR BEARERS

A general decline in fur prices in recent years has made it unprofitable for trappers of the region to intensively trap their traplines. It is the belief of trappers in the region that fur bearer populations have increased because of the present lack of trapping activity. As mentioned elsewhere, the writer believes this is an opportune time to carry out line trapping studies. Mortality of live trapped animals through trapping will be eliminated and live trapping will be more successful due to the presence of higher populations.

The following account of fur bearers deals mostly with live trapping results and with winter track observations made by the writer and by Patrolmen Norman, Gaglardi, and Miller while on spring moose census.

Fig. XIII: Tracks of marten (left), mouse and short tailed weasel. (Ski pole foreground).

RED FOX *(Vulpes fulva)*

Tracks of red fox were observed occasionally throughout the winter in the burn of 1926 near the Murtle River. Tracks were also seen on the park road on the flats south of Dawson Falls and near the outlet of Clearwater Lake. During the spring mating season, their tracks were scattered over much of the low country. They were, however, much less numerous than coyote tracks and the red fox cannot be considered numerous even in local areas.

Like the coyote, the fox covers a fairly extensive territory when hunting, and data is too meagre to make any statement on habitat preference. They did, however, seem to be absent from elevations over 3500’. Unbroken stands of coniferous timber also seemed to be avoided.

Food of the fox is probably chiefly rabbit and such carrion that it can find. Mr. Helset tells of at least one instance where a red fox followed wolves, to feed on their kill after it had been abandoned.

MARTEN (*Martes americana)*

The ground work for a large scale marten study was carried out by Mr. Miller at Murtle Lake this fall. His trapping activity took place mainly around the shores of the lake itself, on the Blue River trail, and in the Strait Lake country. An outline of the results obtained, along with result of live trapping by the writer, are given in Fig. XIV.

Results from both fall and winter trapping thus far indicate that we have a very excellent opportunity to study marten in Wells Gray Park. In other study areas, Washington and Ontario, de Vos and Guenther (1952) report the lowest number of trapping day units required to trap one marten as fourteen, and the highest ninety-six. By comparison, lowest number of trapline day units required to trap a marten in Wells Gray park was five, the highest was sixty-one.

Fig. XIV: Summary of Live Trapping Results, Fall - Winter 1952 - 1953

Date October	Number of traps	Catch and ear-tag numbers
3	4	nil
4	8	nil
5	16	nil
6	16	male mink juv, Left FS 197, Right FS 200
7	5	nil
8	12	nil
9	16	male adult marten, Left FS 190, Right FS 186
20	16	red squirrel
21	16	female marten, Left 496, Right 497 (Ont. tags)
22	7	male adult mink, Right 481 (Ont.)
23	15	FS 197-200 recaptured; one red squirrel
24	15	one red squirrel
25	15	nil
26	15	male adult mink, Left 495 (Ont.) male adult marten, Left 484 (Ont.)
27	15	female adult mink, Left FS 175, Right FS 170 recaptured marten 484; one red squirrel
28	1	recaptured marten 496-497
29	16	recaptured marten 496-497 male adult marten, Right FS 183, Left FS 159
31	16	nil
31	16	recaptured marten 496-497 juvenile female mink, Right FS 164, Left FS 160

Marten tracks were found at all elevations through the park during the winter months. Mature coniferous forest above 3500' seemed to be most favoured. Edges of low altitude burns had marten sign but the marten rarely ventured out into burns from surrounding mature forests. The burn of 1895 east of the Clearwater River appears to have reached a stage of succession where marten have successfully invaded it. The 1926 burn in Hemp Creek and vicinity has not yet regenerated to an extent where marten find suitable living conditions. Mr. F. Ludtke reports seeing tracks at irregular intervals in the burn but he believes that these are animals merely passing through the region.

Marten scats were collected by Mr. Miller during live trapping operations and during his winter steel trapping. These scats have not yet been analyzed. Tracks in winter would indicate that rabbits tend to be the chief winter food of the park marten. In marten territory, rabbits seemed to be hunted very extensively. At Murtle Lake, rabbits were driven across ice-covered bays in many places. Tracks led from coniferous thickets into the open where the rabbits escaped. They were not always successful for Mr. Miller's field notes tell of a chase where a marten was able to capture a rabbit in open terrain. He believe that the marten was able to overtake its quarry because the latter was sinking in loose snow and the former was taking advantage of the trail broken.

A more detailed report on marten and marten live trapping will be made when a new map of the park is available. It is recommended that marten studies be continued and intensified in the future. The marten studies will be able to be carried out in conjunction with caribou investigations for both animals inhabit similar territory. Efficient work on such a program depends on:

1. A new and accurate map of the district involved.
2. Clearing of trails in the following localities: a) From Murtle Lake to Mobely Mountain. A small amount of time spent on this trail would allow easier access to caribou range as well as enabling live trapping operations to be extended. b) Centre Mountain from Murtle Lake - this trail would be of use as a fire lookout trail as well as for live trapping. c) Murtle Lake to Strait Lake - a five mile stretch of trail which is in urgent need of clearing. Marten and caribou are in this area in the late fall months and would be easily reached with a little work on the trail. d) Murtle Lake from Hemp Creek - work on this trail is long overdue. Either improving the present trail or constructing a new trail should be started immediately. Travel over this route in either winter or summer is most difficult.
3. Traverse of trails used in marten trapping so present trap sets can be plotted accurately when a map is available.
4. Purchase of additional live traps.

Fig. XV: Marten treed at Stillwater

Fig. XVI: Otter tracks on Shadow Lake

Fig. XVII: Otter at open spring hole on Anderson Lake

Fig. XVIII: Mink winter habitat on Anderson Creek

FISHER *(Martes pennanti)*

Fisher tracks were found in all timber types from the valley floor at Hemp Creek to Murtle Lake (3500'). The fisher appears to be as abundant as marten in the southern part of the park. Its density in favourable habitat is not as great at that of the marten but it ranges through a wider variety of habitats. Greatest densities seemed to be in burns regenerating to aspen with some coniferous interspersion. Older burns were more preferred than younger types. Tracks were most abundant in the 1895 burn in the flat country between Horseshoe and Shadow Lakes. Tracks were also fairly abundant around MacLeod Hill where aspen regeneration of the 1926 burn occurs. Fisher sign in the vicinity of Hemp Creek was noted on several occasions during the winter. The fisher population can be expected to increase here as the burn becomes older.

Rabbit appears to be the chief diet of the fisher as it is of the lynx. The fisher hunts in more open country than does the cat however. The cat probably hunts with short, quick bursts of speed, depending on thick cover to allow a close approach, which the fisher often chases its quarry over considerable distances. At MacLeod Hill, tracks of a fisher hunting rabbit were seen. The fisher had been running the rabbit and cut across many corners which the rabbit had circled, and was apparently following the rabbit by sight. At Murtle Lake, a fisher track was followed for four miles. During this time it remained on the ground, hunting edges of meadows or second growth coniferous cover. It caught no prey on the hunt but dug up a rabbit carcass which presumably it had killed previously. (R.G.M.)

No fisher were taken in live traps for the traps used at present are rather small for these animals. At least two traps were sprung and dragged from their pens by fisher. Purchase of a few larger traps for these animals is recommended.

SHORT-TAILED WEASEL *(Mustela eriminea)*
LONG-TAILED WEASEL *(Mustela frenta)*
It is sometimes difficult to differentiate between the tracks of these two animals. However, the difference in size is usually sufficient to permit reasonably positive identification. During the winter, the tracks of short-tailed weasel were seen more frequently than those of any other small mammal in the park. They were most abundant in brushy thickets of low altitude burns. Trapper cabins were frequently visited by short-tailed weasels and they helped to keep mice from becoming too abundant.

Tracks of long-tailed weasels were frequently seen during travels, but were not nearly as abundant as those of the smaller short-tailed weasel. Their tracks were seen mostly at higher elevations and in mature coniferous timber. However, at swamp edges near French Meadows, the tracks of the long-tailed weasel were fairly numerous.

Neither of the above weasels is usually sought after by trappers. During live trapping operations, Mr. Miller found them to be a serious nuisance as they sprang traps and escaped, leaving the trap closed to marten or mink.

WOLVERINE *(Gulo luscus)*
Wolverine appeared to be scarce by well-distributed over the southern part of the park. Track records include:
February 6th - one in lodgepole pine meadows two mile southwest of Stillwater
February 10th - one of west shore of Anderson Lake
February 13th - two sets at Stillwater, along the river bank and in lodgepole pine meadows
February 21st - two or three at French Meadows, in the burn and in swamp
March 17th - two sets on road to Clearwater Lake near the Horseshoe
March 19th - “several” between Deer Creek and Murtle River via French Meadows

No habitat preference could be clearly shown from track records, but there did seem to be a tendency for the wolverine to frequent lodgepole pine - spruce meadow type.

OTTER *(Lutra canadensis)*
Otter sign was well-distributed throughout the park, and tracks were seen on Blackwater, Hemp, Anderson, and File Creeks; Murtle, Anderson, Shadow, and Clearwater Lakes; Murtle and Clearwater Rivers.

The otter are largely restricted to fish-inhabited streams and lakes which have open spring holes. Overland travel is not unusual, and one otter had travelled from File Creek to Anderson Creek, a distance of about two miles. The journey was made in deep February snow.

MINK *(Mustela vison)*
Mink and mink sign were seen on open fish-inhabited creeks and rivers throughout the winter months. One of the greatest concentrations of wintering mink was seen on Anderson Creek in early February. Here, after a fresh snow, tracks of at least five mink were seen on a five-mile stretch of creek. Several places were noted where they had taken fish up onto the ice, and one mink was seen with a freshly-caught trout in its mouth. Mink were not entirely confined to the creeks themselves but often foraged into the edges of the timber, although usually not more than a few hundred yards from water. Tracks were seen in small swamps in French Meadow country in February. There are no fish in this region and Mr. Helset believes they are seeking frogs in open spring holes.

Trappers restricted their mink trapping to areas near home. Three mink were taken on Hemp Creek in the region where live trapping was carried out in the summer. Two of these had mutilated ears which looked as if they had been previously ear-marked. Seven mink were taken on a branch of Hemp Creek some three to six creek miles from the place where live trapping was carried out. Of these, one was a previously tagged mink, a female tagged in early July. The place of recapture was roughly four creek miles from the place of original capture. Mr. Ludtke carefully examind the other six mink but they showed no sign of having been previously tagged. A mink tagged on October 22nd by Mr. Miller was recaptured by the writer on February 11th at a point roughly two miles from where it was originally tagged. This animal was tagged with an “Ontario type” ear tag and it was still securely in place when the animal was released. This type of tag should replace the tags being used at present.

LYNX *(Lynx canadensis)*
The lynx is probably enjoying a peak of population in the park area at the present time. Previously reported as scarce by Martin in 1950, they have now become extremely numerous throughout the park. Track records are so numerous that it would be difficult to cite they all. Tracks were seen from the valley floor at Hemp Creek to Murtle Lake and in all types of forests and burns. They were most abundant below the 3500’ level. Lynx were seen on two occasions by Ranger Les Cook on the road outside the park.

Preferred habitat seemed to be burns with dense coniferous regeneration interspersed with deciduous stands. Alder thickets were another preferred habitat type. Rabbits are abundant in these situations and are the prime reason for the presence of lynx here.

BOBCAT *(Lynx rufus)*
Bobcat are much less abundant than lynx in most of the park and are confined to lower altitudes. Their tracks were seen south of the Murtle River and south of MacLeod Hill only. Two were shot by Mr. Dave Archibald in the spring months.

BEAVER *(Castor canadensis)*
The writer has noticed a steady increase in beaver through the last three years in almost all beaver habitat in the southern part of the park. There appears to be little danger that they will “eat out” large portions of their habitat at the present time. Abundance of predators will probably keep beaver numbers within reasonable limits in most places. Tracks of wolves, coyotes, wolverine,

and lynx are frequently seen around beaver lodges, and while there is no evidence of these animals being successful in catching the occupants, it is most likely that they do so on occasion.

Trappers confined their beaver trapping activities to the most accessible portions of their lines this season. Holders of more northerly lines did not find it profitable to trap at all due to present poor demand for beaver.

Largest beaver catch came from the Helset line which yielded thirty beaver from what is roughly the southern half of the line. Records kept by Roy Helset of twenty beaver taken on this line show fourteen males and six females. Of the six females, five were pregnant, all had three embryos except for one, which had two. The non-pregnant female was judged to be too young to breed.

It is recommended no studies be carried out on the park beaver which would be chiefly directed at finding out how to manage the beaver as a fur resource. At the present time, it is not economically feasible for trappers to trap their entire lines on a sustained-yield basis.

BIRDS

A list of wintering birds is given below. This list includes all birds recorded during the period from the end of November to the beginning of March, when the first northbound migrants began to appear. A few birds which are not properly winter residents are included as they have not appeared in previous bird lists for the park.

ARCTIC LOON *(Gavia arctica)*

A specimen of this species was examined by the writer at Murtle Lake in November. According to Mr. Miller, it apparently migrates through the Murtle Lake district in small numbers during October.

BARROW'S GOLDEN-EYE *(Glaucionetta islandica)*

At least five golden-eyes were observed on the Murtle River above Stillwater on February 8th and again on February 13th. This stretch of river remained open practically all winter and there is little doubt that a small number of golden-eyes spent the winter within the park.

AMERICAN MERGANSER *(Mergus merganser)*

A small number of mergansers spent the winter on the open waters of the Clearwater and Murtle Rivers. They were observed flying up and down the canyons of the Clearwater below the lake outlet in late December and on the lower reaches of the Clearwater River in early March. A single merganser was seen on the Murtle River in February.

GOSHAWK *(Accipiter gentilis)*

In early January, a goshawk was seen in the vicinity of Hemp Creek. According to Roy Helset, it killed a rabbit near the roadside which it only partially devoured.

BALD EAGLE *(Haliaetus leucocephalus)*

One record only, a single bird was seen on top of Green Mountain on February 25th. It is possible that this bird was an early spring migrant rather than a winter resident.

BLUE GROUSE *(Dendragapus obscurus)*

Sparsely distributed at lower elevations during the winter months. A few blue grouse winter along snow free south and west slopes of Green Mountain where they were observed in March.

FRANKLIN GROUSE *(Canachites franklini)*

Franklin grouse were seen in older aged burns having abundant coniferous regeneration and at the edges of mature coniferous forest at Murtle Lake. These birds feed chiefly in conifers and sometimes at considerable height from the ground so their presence is often overlooked.

RUFFED GROUSE *(Bonasa umbellus)*

Ruffed grouse were widely scattered throughout the low altitude burns during the winter months. they occurred in small numbers to elevations as high as Murtle Lake (3500'). Mr. Miller reports seeing one on the trial from Murtle Lake to Blue River in November. This is the first time he has ever seen a willow grouse on the Blue River trail.

WHITE-TAILED PTARMIGAN *(Lagopus leucurus)*

These birds make extensive downward movements from alpine summer grounds to wintering habitat at lower elevations. At Murtle Lake in early February a ptarmigan was seen on the lake shore and tracks of others were seen nearby. They are able to find some food in tips of swamp willows which protrude above the snow (Fig. XIX).

Mr. D. Archibald reports seeing a pair on his homestead (el. 2100') in early March. J.C. Norman reports a pair on Pyramids on March 11th. The Pyramids lie roughly 14 miles distant and about 4000' lower than the nearest ptarmigan summering grounds. This marks a rather long migration for grouse.

HORNED OWL *(Bubo virginianus)*

Heard frequently throughout the winter in the vicinity of Hemp Creek. In March their calls were voiced more often and it is believed that a pair nested in or near the spruce-cedar swamp east of the old Ranger Station.

PYGMY OWL *Glaucidium gnoma)*

Heard once on March 18th in the Deer Creek burn.

BELTED KINGFISHER *(megacoryle alcyon)*

Although not properly considered a winter resident, at least one bird of this species remained around Hemp Creek until December 11th.

PILEATED WOODPECKER *(Ceophlosus pileatus)*

Probably the most conspicuous winter resident although by no means the most abundant. This woodpecker was seen or heard daily in December and January in the burn around Hemp Creek. It was also seen occasionally in February and March although not so regularly as in the earlier winter months.

HAIRY WOODPECKER *(Dryobates villosus)*

Frequented feeding stations at Hemp Creek throughout the winter months.

DOWNY WOODPECKER *(Dryobates pubescens)*

This species was more common that the above woodpecker throughout the winter. It too preferred handouts at Hemp Creek to the task of finding winter food for itself.

AMERICAN THREE-TOED WOODPECKER *(Piccides tridactylus)*

A concentration of these birds was seen in an insect-infested stand of spruce and balsam at Murtle Lake on February 9th. Along with jays and chickadees, they were enjoying a seeming abundance of insect food from under the bark of spruce and balsam.

Fig. XIX: Ptarmigan habitat at Murtle Lake. Note tracks in foreground.

CANADA JAY *(Perisoreus canadensis)*
Observed throughout all winter months and in almost every type of habitat from open burn to mature coniferous forest.

STELLAR JAY *(Cyanocitta stelleri)*
This year-round resident seems more widely distributed in winter than in summer. It is common through burnt over areas in winter months while it rarely strays far from dense coniferous growth in the summer.

BLACK-BILLED MAGPIE *(Pica pica)*
As noted by Webb (1950), the magpie migrates north into the park in early fall. They remain fairly common in the vicinity of Hemp Creek until December, which their numbers decline, probably because of their migration elsewhere. The last record of magpie was a single bird heard on March 2nd.

RAVEN *(Corvus corvax)*
The raven was seen almost daily throughout lower elevations in the park. Their numbers seemed to decline at elevations over 3500'. The larger amounts of carrion available at lower levels is probably the reason for their greater abundance here.

BLACK-CAPPED CHICKADEE *(Parus atricapillus)*
Undoubtedly the most abundant wintering bird in the park. It was found at all elevations and in all forest types below 4000' during the winter months. Several were trapped and banded by Roy Helset at his feeding station at Hemp Creek.

MOUNTAIN CHICKADEE *(Parus gambeli)*
Seen only once in the low country during the winter, on the trail to Clearwater Lake on March 17th. It is probably more common in the low country than this would indicate. It was abundant on Battle Mountain on April 11th and 12th, where it mingled with groups of brown-headed chickadees.

BROWN-HEADED CHICKADEE *(Parus hudsonicus)*
Observed only at elevations between 6000' and 7000' on Battle Mountain on April 11th and 12th. It seemed to be most abundant at roughly the same altitudes in which it was found in July of 1952.

CHESTNUT-BACKED CHICKADEE *(Parus refescens)*
In late January, a single bird of this species was observed on two different occasions feeding with black-capped chickadees at the Hogue residence.

BROWN CREEPER *(Certhia familiaris)*
A single bird seen in a creek bottom of mature coniferous growth north of Stillwater on February 8th is the only winter record for this species.

DIPPER *(Cinclus mexicanus)*
This bird becomes locally abundant on open stretches of river in late winter. On February 7th, six individuals were seen on a two-mile length of open water above Stillwater. They were present on Hemp Creek though the winter whenever the creek was open (Fig. XX).

Fig. XX: Open water on Hemp Creek is dipper habitat in mid-winter

WINTER WREN *(Troglodytes troglodytes)*
The only winter record of this bird is of one heard in the burn of 1895 east of Shadow Lake on December 19th. It is probably more plentiful than this data suggests.

NORTHERN SHRIKE *(Lanius borealis)*
This bird was seen at Hemp Creek in late November, on several occasions in December, and one in late January. Evidently prey species do not occur in large enough numbers to induce this predator to spend the entire winter in the park.

PINE GROSBEAK *(Pinicola enucleator)*
This bird seems to find suitable year-round habitat at Murtle Lake where it was observed in mid-February. The writer has seen it there in all summer and fall months from May to November inclusive. At lower elevations it occurs rather sporadically.

ENGLISH SPARROW *(Passer domesticus)*
A flock of four were seen at the Ranger Station on October 20th. This is the first record of their appearance in the park. Their habit of frequenting dwellings makes it unlikely that they were merely overlooked in the past.

REDPOLL *(Acanthis* sp.)
Redpolls were first seen on November 21st by Roy Helset and were seen at irregular intervals thereafter throughout the winter. In late March and in early April they became extremely numerous along the roadside at Hemp Creek. Seeds from waste hay was their chief food.

LAPLAND LONGSPUR *(Calcarius lapponicus)*
Cannot be considered a regular winter resident but it was seen on at least two occasions in early February.

SNOW BUNTING *(Plectrophenax nivalis)*
Snow buntings were seen in all winter months at or near Hemp Creek. They were most commonly seen near barns and haystacks where they fed on waste seeds scattered when livestock was fed.

TIMBER WOLF *(Canis lupus)*
Wolves are apparently increasing in the park. J.C. Norman reports about the same number of animals and sign as seen the previous spring, while C. Gaglardi reports a definite increase. Most residents feel that there is a slight increase in numbers. Food supply in the form of high ungulate and rabbit populations should be adequate and no wolves were taken during the winter by trappers so there is little reason to suspect that wolves are not increasing.

The writer kept notes on all wolf sign seen during the winter and on data given by local residents. No definite hunting circles could be ascertained from these reports, nor could an accurate estimate of the population be made. The writer concurs with J.C. Norman, who states in field notes that there were twelve or more wolves on the moose winter range.

Sign indicates that wolf bands tend to descend from the moose sub-alpine summer range at the same time or a little later than the moose themselves. The wolves winter slightly higher and a bit more northerly than the bulk of the wintering moose population. Most wolves seem to spend the winter north of Pyramids and north of MacLeod Hill. The Murtle River above the Pyramids is the most frequently used wolf runway, and in mid-winter the wolves travel the ice frequently to avoid

long trips through soft deep snow (Fig. XXI). Mild winter weather made travel on the river difficult and dangerous for cold spells were seldom long enough to freeze solid the slush which formed as the river flooded. For this reason, it was difficult to travel the long distances necessary to learn the winter habits of the wolf.

Fig. XXI: Wolf trail on the Murtle River in January

In spite of seemingly abundant food supply, there was ample evidence through the winter that the wolves were hungry. In February and March, at least three different moose remains from the fall hunting season had been uncovered by wolves and the remaining bits of hide devoured. Scats collected in this region were made up almost entirely of moose hair. There were no undigested portions of meat and very little bone. This would indicate that the wolves were living almost entirely on scraps of carrion at this time.

Only one moose was found that had been killed by wolves. This was a calf found on top of MacLeod Hill on March 14th. The animal had been dead for about a week. Examination of the marrow, which was fat and white, indicated that the animal had been in good health at the time at which it was killed. (J.C.N.)

It is impossible to estimate how many moose were removed from the herd by wolves. All evidence tends to show that it would be a small fraction of the yearly increase. As the herd is fast-growing, and there is no proof as yet that we can check the increase by hunting, it would be unwise to expend money or effort on intensive wolf control. When hunting is able to crop the herd surplus, the wolf population should be reduced so that it does not take animals which would otherwise end up in the hunter's deep freeze.

The effect of wolf population on caribou is not known. It is quite possible that wolf populations which have built up largely because of high rabbit and moose populations would be capable of keeping caribou densities at a low level. Unless the wolves are forcing the caribou population below a critical population density, they may be directly benefiting the caribou by keeping numbers down and allowing winter ranges to rehabilitate themselves. While the foregoing is pure speculation, it seems unwise to remove a possible check on caribou when there is no hunting to take its place.

If hydatid disease could be eliminated from the moose herd by the eradication of the wolf, it would be advisable to remove the wolf for that reason alone. The author is of the opinion that coyotes must be the most important vector of the tapeworm *Echinococcus granulosus.* The successful elimination of the coyote from Wells Gray Park would involve more than intensive local control.

COYOTE *(Canis latrans)*

Coyote tracks were abundant and coyotes could be heard daily throughout the winter months. Like the wolves, they leave the sub-alpine and alpine summer ranges to winter with the moose and deer at lower elevations. Rabbits and carrion moose or deer apparently comprise most of their winter food. Coyote sign indicated that several coyotes spent a large part of the winter in the country north of the Pyramid. This region is several miles from the nearest deer winter range. This tends to show that the coyote is not always dependent on deer for winter food supply.

The coyote cannot be considered a serious predator of moose. No reports have reached the writer of coyotes killing of attempting to kill moose. J.C. Norman states that he has seen coyotes

worry a moose, as if playing with it. On April 14th, five moose were observed on Foot Lake, two coyotes were racing between them in what appeared to be mating play. At times the coyotes were within a few feet of the moose, which paid them no attention.

Undoubtedly the coyote takes some deer on the winter ranges which lie chiefly outside of the park. Until the Game Department shows some intention in adequately cropping the herds which winter to the south of the park, there is no reason for coyote control within the park itself.

COUGAR *(Felis concolor)*

The writer saw no sign of cougar during the winter's investigations. The only report of wintering cougar comes from J.C. Norman's field notes where he reports fining old cougar tracks on three different occasions in March. These tracks were found in the country surrounding the canyon of the lower Murtle River and the Blackwater Canyon.

MISCELLANEOUS

The past winter brought to the fore the need of a wildlife cabin at Hemp Creek. The uses of this cabin would be many and varied, a few of which will be discussed:

1. Storage of equipment used in wildlife work, storage of food used on field trips. This is a pressing necessity, at present all equipment and food is being stored in private quarters which makes for convenience but space is rapidly being exhausted.

2. Preparation, examination, and storage of biological specimens. Which many specimens such as parasites can be best identified by experts in specialized laboratories, there is a need for a small working space where certain specimens may be examined in the park. The examination of scats, skulls, and stomach contents could be examined here with the aid of a microscope. The mere storage of such specimens presents a problem.

3. Accommodation for the chief biologist and/or a summer assistant should be available. Savings accrued by having year-round accommodation available would defray a large part of the expense involved in building the unit.

The main requirements of such a building would be that it be sufficiently insulated and heated, so it would be suitable for year-round work. It should have a sink with running water for preparation of certain biological material. A small amount of storage space and room for two bunks should be allowed.

Winter work also showed the need of maintenance work on park trails. Snow-laden brush which covers trails makes snowshoeing difficult and skiing next to impossible for much of the winter. Economic conditions and park regulations deter trappers and guides from keeping trails in good condition. The writer hope that maintenance work which has been constantly recommended will be effected in the near future.

RECOMMENDATIONS

It is recommended that:

1. Fall hunting should remove in the vicinity of 325 moose from the huntable herd. An any moose season extending from September 20th to December 15th would help this harvest to be realized.
2. Studies on qualitative aspects of winter moose browse and moose nutrition be instituted with the aid of the University of British Columbia.

3. Spring census be carried out in accordance with yearly weather conditions. Track counts should be carried out in April.

4. Studies on marten should be continued and expanded. Trail clearing and purchase of additional live traps are necessary for the expansion of the marten study.

5. Caribou studies be continued in conjunction with marten studies.

6. Moose winter range improvement projects be centered on the area to the south of the Murtle River and MacLeod Hill, and on Green Mountain. The Battle Mountain extension is necessary to bring some of the key winter range under park jurisdiction.

7. A wildlife building be erected at Hemp Creek.