

A happy-go-lucky fellow he is not

WINTER HABITS OF THE RIVER OTTER (*LUTRA CANADENSIS*) IN MICHIGAN*

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INTRODUCTION

Much popular literature anthropomorphically depicts the river otter (*Lutra canadensis*) as a carefree denizen of the wild, spending a great deal of its time playing aimlessly or catching trout. The view seems somewhat inconsistent with at least some findings about this animal in the scientific literature and is markedly at odds with the normal disposition of mustelids in general.

This inconsistency stimulates a question concerning the accuracy of popular beliefs about the otter's behavior. When both the esthetic and fur values of this animal are considered, it becomes evident that a more thorough knowledge of its habits is important to its proper management. However, literature concerning the ecology of the river otter is sparse. Most published accounts have to do with the otter as a possible predator of sport fishes. The

results of examinations of contents of its digestive tracts and/or scats have been published for otters in North Carolina (Wilson, 1954), Montana (Greer, 1955), Massachusetts (Sheldon and Toll, 1964), Michigan (Lagler and Ostenson, 1942; Ryder, 1955), New York (Hamilton, 1961), and in the western Great Lakes states (Knudson and Hale, 1968). These investigations disclosed that otter generally eat the most available and easily-caught fish, lesser amounts of invertebrates (crayfish and insects), some amphibians, and an occasional mammal.

This immediately raises the question concerning the consequences of the severe north temperate winters during which most bodies of water freeze solidly. Is the otter forced to live beneath the frozen surface and relegated to a diet of fish, or is he trapped above the ice and required to turn scavenger or to hunt terrestrial mammals and birds? The available information infers that the otter is not exceptionally adept in traveling long distances in the snowy conditions of a severe winter. If true, this would necessarily restrict its ability to hunt for food on land, or to travel between water courses. Such limited mobility would severely hamper a carnivore which is primarily a resident of north temperate or boreal climates.

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In designing this field study on the river otter in Michigan, it was at once obvious that an investigation of winter movements would be appropriate. Brief comments on this matter by Seton (1926) and Liers (1951) plus some information on the Eurasian species (*Lutra lutra*) from Formozov (1946) and Novikov (1956) provided a starting place. Field research was conducted between December 1968 and March 1969. Specific emphasis was directed toward studying the ability of otters to travel in snow, and identifying the activities engaged in during these periods of travel. Further, an attempt was made to correlate the types of winter food consumed in two areas of differing habitat types.

STUDY AREA

The study area was located in the north-central part of Michigan's Upper Peninsula, within portions of Alger and Schoolcraft counties. It was bounded on the north by the Mosquito River, approximately one-half mile south of Lake Superior; on the south by a small nameless creek just outside of the village of Steuben; on the west by the west branch of Prairie Creek, slightly over one mile west of Shingleton; and on the east by the M-77 state highway.

This overall area (approximately 40 square miles) was subdivided into two sectors of dissimilar habitats. Sector A consisted of several shallow pools, mostly bordered or partly covered with cattails (*Typha* sp.) and sedges (*Carex* sp.). These pools, all artificially fashioned through the construction of earthen dykes to block the natural flow of drainage, were more than 15 years

old and had become a part of the ecosystem. This sector was also interspersed with marshy areas containing clumps of red-osier dogwood (*Cornus stolonifera*), bog birch (*Betula pumila*), and tag alder (*Alnus rugosa*). Sector A can be generally associated with Units I and II of the Seney National Wildlife Refuge.

Sector B had no specific boundaries, but was restricted chiefly to streams and adjacent wooded or cut-over land. It contained practically no open marshy areas or standing water. Dominant vegetation consisted of jack pine (*Pinus Banksiana*) and red pine (*Pinus resinosa*).

This part of Michigan commonly has rather heavy snow falls, often as much as 64 inches per month from December through March. The temperature frequently drops to less than -10°F during this period.

METHODS

Direct observation of otters is difficult because of their secretive habits and relative inaccessibility. The bulk of this study, consequently, was based upon the study of trails left in the snow. The actions of the otters were then interpreted, following the methods used for other carnivores by Murie (1936), Arnold (1956), and Ozoga and Phillips (1964).

All scats found along trails were collected for analysis of content. The locations of these collections were recorded, and special effort was made to interpret (from tracks, habitat, weather conditions, and other signs) the activities of the animal responsible for each scat.

The daily temperature and amount of snowfall were obtained from the weather station maintained at the headquarters of the Seney National Wildlife Refuge. Since no accurate information was available for any other part of the study area, the data from Seney were generalized to include the entire area. It is certain that some discrepancies exist since some of the more northern streams of sector B were forty miles from the weather station.

RESULTS

Locomotion of Otters in Snow

A snowmobile was used to gain general access to the study areas, but the actual following of otter trails was done on snowshoes. Each trail was initially followed the same direction the otter was traveling, to its end. This terminal point usually was at a place where the animal entered some water course, but occasionally was merely the place where the wind and snow had covered the tracks. The trail was then retraced, and backtraced to its point of origin. The distance was measured with a manual event counter which recorded the number of paces. In total, trails were followed for 73.7 miles, of which 31.0 miles were in sector A, and 42.7 miles in sector B.

The extensive trailing of these animals, coupled with four visual observations, resulted in my recognizing a characteristic gait they utilized a majority of the time. Normally, while traveling on land, otters bound for two to four steps (15 to 28 inches), then slide for 5 to 15 feet with the belly dragging and the legs trailing backward. Their pace is rather slow in snow

because of the short legs and low, dragging body, but when frightened, they are capable of outrunning a man on showshoes, at least for short distances.

There are at least two modifications of this gait, the most common of which occurs in group play. Here the otters simply fold their front legs back beneath their bodies and propel themselves by pushing with their hind legs. They are capable of pushing themselves up a 20 to 25 degree grade for at least 15 yards.

The second modification occurs during the deliberate hunting of small mammals. On two occasions, tracks showed that an otter switched from the bounding and sliding gait to a stalking gait as it approached a clump of grass. The feet were moved in five inch steps, either one at a time, or else one hind and one fore leg worked simultaneously. From a distance of about two feet the otter jumped on the clump of grass. In at least one case a mouse was captured, as evidenced by the blood stains remaining on the snow.

One playful movement popularly attributed to these animals was encountered only once. This was an otter "slide" and involved two otters which slid down a 20 foot bank into water at least three times each. In contrast, on four other occasions, groups of from one to five animals chose to walk down steep banks rather than slide recklessly into open water. Tracks indicated that otter occasionally slide down slopes while engaged in overland travel, but apparently this action is associated with traveling and is not really play behavior.

There was also evidence that otter will follow packed trails in the snow

made by other animals, especially deer and snowshoe hares. These findings complement the observations of Formozov (1946). Hampered by their short legs, otter undoubtedly are able to travel more easily on packed snow than on the fluffy powder. They also move single file when several are traveling together. The first animal "breaks trail" with the others simply following in his tracks. The trails indicate that they switch positions occasionally, so that each takes his turn at going first.

Most frequently otters on land travel alone, but occasionally they travel in groups of two to five (see Table I).

TABLE I
RELATIONSHIP OF OTTER
GROUP SIZE TO
STUDY SECTOR

Group Size	Occurrences	
	Sector A	Sector B
1	11	5
2	6	8
3	0	2
4	2	2
5	0	2
TOTAL	19	19
MEAN	1.6	2.4

There does appear to be a significant difference in group size between sectors A and B (t is significant at the .05 level). The animals in sector A, which was covered primarily with cattail marshes, seemed more prone to travel singly while in sector B (the stream area) otters appeared more prone to travel in pairs. Most overland traveling was done either singly or in pairs. In 38

observations there were 16 single and 14 pairs of animals trailed. These animals traveled from 0.13 miles to 3.20 miles overland. The average distance was 0.83 miles for single animals, 1.14 miles for pairs, 1.30 for trios, 1.03 for groups of four, and 0.97 for groups of five animals. These are, however, not significantly different statistically.

Activities—Sector A

During their normal movements, the otters in sector A tended to travel at random from pool to pool, usually passing through cattail marshes between the pools. In most cases they kept within 400 yards of a pool, even though during the colder stages of winter, these were usually frozen over.

The cattail marshes were nearly always open to some extent and held 2 to 15 inches of water. They were kept open both by spring action, and apparently, by the otters themselves. Dozens of places were found, both in the marshes and on the pool surfaces, where otters had dug and chewed through as much as six inches of ice, probably in search of food.

Activities—Sector B

The animals in sector B, on the other hand, ventured further from water. There was an instance when one pair traveled overland through hardwoods, pine, and frozen sedge marshes for 3.2 miles. Another pair went primarily through spruce and pine stands for some 2 miles, and a third instance when five animals moved for one mile through a white-cedar (*Thuja occidentalis*) swamp. On still another occasion, five animals followed a large circular path through red pine and spruce stands for 0.9 miles.

In following a stream, however, otters almost invariably either swam in the open water or under the ice, or else walked on the ice. By far the most common occurrence was for the animals to swim beneath the ice and come up at breathing holes spaced 50 to 300 yards apart along the stream course. I found only two cases where otters had followed the bank parallel to the stream; both of these were for less than 200 yards, during which time they never strayed more than 20 yards from the stream bank.

Effects of Temperature and Snowfall

The temperature and amount of snow seemed to have no effect upon either the frequency of overland movements or the distances traveled by the otters. One animal going diagonally into a 15 mile per hour wind was followed between two pools for 0.9 miles during the height of a snowstorm which deposited 15 1/2 inches of snow in 24 hours. The temperature at the time was about 15°F and there was at least one foot of fresh snow, but this otter completely disregarded the shelter of dense pine and spruce stands, merely crossing through them as they were encountered. He continued on his way across completely unsheltered sedge and cattail marshes which were almost buried beneath the snow. The time of this journey was between 11:00 A.M. and 1:00 P.M. On two other occasions nearly identical movements were recorded during similar storms. One of these was in mid-morning, the other occurred at night. It would seem that neither weather nor time of day has a significant effect upon the movements of this

species. A trend toward decrease in the average distance traveled may be indicated when compared with the increase in snowfall (Figure 1 and Table I), but an insufficient number of observations was recorded to demonstrate any significant difference.

This ability to travel in snow, which somewhat contradicts the reports of Seton (1926), Ognev (1931), and Novikov (1956), is probably of survival value to otters. It especially enables those living in wooded stream areas to travel between separated water courses in search of food.

Interactions with Coyotes

Occasionally in their travels, otters have interactions with coyotes (*Canis latrans*). For example, on one occasion three coyotes followed the trail of three otters as the latter went overland, and again as they traveled on the ice. The coyotes trailed the otters for about 0.75 miles during which time they chewed up a scat pile deposited by the otters. From the evidence left in tracks, the two groups never came within sight of each other.

Hunting

Deliberate foraging behavior was observed several times from the tracks followed within sector A. Several areas were found in cattail marshes where otters had dug through the snow and ice, then down into the bottom sediments. The animals obviously rooted around in the mud, probably digging out and devouring crayfish, frogs, and an occasional large aquatic beetle or belostomatid. (The identity of these foods was later verified by scat analysis.)

On one occasion a lone female otter

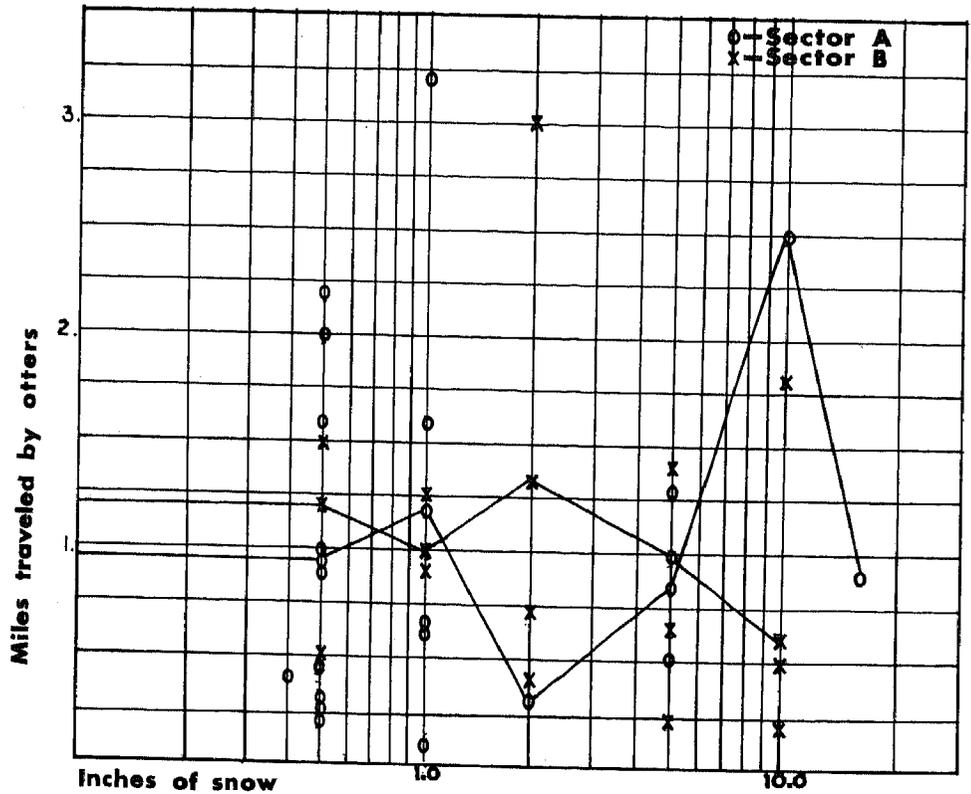


FIG. 1. Traveling distances of otters as correlated with fresh snow accumulations.

was observed fishing through a hole in the ice on one of the pools in sector A. She dived several times (for periods ranging from 68 to 263 seconds) and re-emerged with small fishes which were promptly swallowed whole. She then entered an adjacent cattail marsh where, digging in the mud, she caught a crayfish which she chewed and swallowed with much loud smacking and crunching.

On several other occasions there was evidence to demonstrate that otters had dug into the grass tunnels of the meadow vole, *Microtus pennsylvanicus*, and on at least two of these occa-

sions, one or two drops of blood remained to verify that a capture had resulted.

The trail of one pair of otters was followed into a marshy area which contained several small clumps of red-osier dogwood and bog birch. (This marsh, which encompasses approximately three acres, was marked by the trails of at least a dozen otters, and along each trail a series of holes was dug in the snow.) The pair dug into the snow at the bases of birch and dogwood clumps 25 times within a distance of 300 yards. Scats collected in that area later revealed skeletal parts of both

Microtus and *Clethrionomys*, plus the exoskeletons of some insects.

Temperature and snowfall fluctuations seem to have no more limiting effect upon hunting than upon travel. Almost every day fresh diggings were found in the marshes. In early December an otter was trailed while stalking mice during a three inch snowfall. On a number of occasions throughout the winter, holes were found extending through at least two feet of snow to intercept rodent tunnels in subsnow grass.

The otters in sector B showed different movement patterns. Since their tracks were not often seen in marshes, they were never observed to dig for frogs or stalk small rodents. Scat analysis showed crayfish present only 60 percent of the time (as opposed to 84 percent of the time in scats taken in sector A), and frog remains. The significant difference in diet of otters in these areas, almost certainly results from the greater availability of both crayfish and rodents in sector A (see Table II).

Perhaps in place of *Microtus* in sector B, the otters tracked snowshoe hares (*Lepus americanus*). On nearly all of the overland travels by either single animals or groups, the trails would lead beneath brush piles, windfalls, snowcovered lower branches of spruce and pine trees, and similar places frequented by snowshoe hares and usually containing their tracks. On two occasions track evidence showed that otters gave chase to hares which they came upon suddenly. Conclusive evidence in the form of tracks, blood stains, and hair was once found to substantiate the capture of a hare by a pair of otters. The carcass was completely

devoured, and nothing remained but tufts of hair.

Scavenging by Otters

It has been hypothesized (Elsworth Harger and John Ozoga, personal communication) that otters may act as scavengers on deer carcasses. In order to determine the extent to which this might occur, two road-killed white-tailed deer (*Odocoileus virginianus*), autopsied previously and opened up to afford a maximum amount of scent from the fresh venison, were utilized.

One carcass was deposited in sector A beside an open water ditch which was frequented by otters. It was not molested by otters during a three week span although fresh tracks showed that once two otters had passed within 25 feet but had not detoured either toward or away from the carcass.

The second deer carcass was placed on a creek bank in sector B. After a week during which otters were not attracted, the carcass was discovered and devoured by ravens.

Incentives for Overland Travel

There are several possible reasons for overland travel by otters, but this study has shown only one to be important. This is for the purpose of hunting terrestrial foods—chiefly small mammals. A great deal of the overland travel which is recorded here was in the form of short trips (a few hundred yards), presumably in search of food. Increased movements resulting from the mating urge in late winter and early spring, as stated by Liers (1951), was not in evidence in the present study. There was no significant increase in length of trails or frequency of move-

ments in late winter, at least through March 3.

Scat Analysis

Each scat collected was examined to determine the content and relative undigestible proportions of each species of animal remains. The scats collected in sector A (Table II) contained primarily forage fish, with the mud minnow (*Umbra limi*) being dominant in quantity as well as frequency. Several small game fish, mostly *Lepomis* sp., were also present. The scats also contained a high frequency of crayfish. Frog and mammal remains appeared several times, thus offering evidence that otter diggings in marshes were not without success.

In contrast, the scats taken from sector B had a similar incidence of forage and game fish, but a much lower rate of crayfish, amphibians, and mammals (Table II). The fish taken were similar to those for sector A.

Of the 47 scats obtained, only 10 (21 percent) were taken along the 42.7 miles of trackways followed in sector B, or one for every 4.3 miles, whereas, 37 (79 percent) were picked up along the 31 miles in sector A, or one for every 0.8 miles. The reason for this difference in scat finds in the two sectors is unclear; in fact, more trails in sector B were made by two or more otters than in sector A. Even so, more droppings were deposited in sector A and these also averaged larger (7.6 ± 3.6 grams as compared with 4.2 ± 1.6 grams with 66 percent confidence limits for those taken in sector B).

These data indicate that otters in sector B, traveled in larger groups and produced fewer and smaller scats. This

may suggest that the type of food ingested in stream habitats had a higher coefficient of digestibility than that captured in marshes. This is exemplified by comparing the residue left after the digestion of a fish with that remaining after digesting a crayfish.

CONCLUSIONS

The river otter is not accurately described when he is regarded as a "carefree clown" of the northland. The majority of his time, at least in winter, is spent in searching for food. Very little evidence was found to indicate that time is spent in repetitive sliding or other playful antics.

Otters are mobile in winter, even in fresh, deep snow. Although their movements may be slow, they do not hesitate to strike out overland, even under extremely adverse conditions. If given the choice they travel by the easiest route available, swimming under the ice or in open water in preference to walking along stream banks in deep snow. When traveling overland they take advantage of deer trails, snowshoe hare runs, or the packed-down tracks of their cohorts in the traveling troupe.

Otters living in the wooded stream area probably had less food available to them than did those in the open marsh area; in any event, they traveled more frequently and for greater distances hunting for food. They also occasionally hunted in pairs or small groups, while the otters in the open marsh area tended to hunt and travel alone.

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