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**NOTES ON THE MAMMALS OF GOGEBIC
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ONTONAGON COUNTIES, MICHIGAN, 1920**

BY L. R. DICE AND H. B. SHERMAN

The authors of this paper spent the summer of 1920 in western Michigan studying the mammals of the region for the Michigan Geological and Biological Survey. From June 25 to August 4 was spent in the Cisco Lake Region with headquarters on Lindsley Lake; August 6 to August 20 a camp was maintained in the woods four miles southeast of Little Girl's Point; and from August 20 to September 6 was spent working from a camp on the western shore of Lake Gogebic, about three miles south of Lake Gogebic Station. The first two camps were in Gogebic County, the third in Ontonagon County.

The field work was performed jointly by the two authors, under the direction of the senior author, who is responsible for the identification of the species, the descriptions of the general areas and of the habitats, and is jointly concerned in writing the annotated list.

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In addition to our own records, we have secured many valuable notes on the distribution of the larger species from J. E. Fischer, of Merriweather, Ontonagon County, a trapper of many years' experience; and from Benjamin J. Twombly, of Bent's Resort, Wisconsin, who has made many observations on the mammals of the Cisco Lake Region. We have also added a number of records from J. E. Marshall, who trapped for many years, beginning 1884, in Ontonagon and Gogebic counties, and from Ole Petersen, at one time a trapper at Gogebic Lake.

The habitats in which records of occurrence have been obtained for the region under consideration are listed under each species; and the number of individuals taken, or seen and positively identified, in each habitat are given. From the figures a rough estimate of the relative abundance of the various species in the different habitats can be obtained, but the various habitats were not trapped or studied equally intensively, and for the larger and the rarer forms the numbers give little dependable data on relative abundance.

DESCRIPTIONS OF THE REGIONS STUDIED

Cisco Lake Region. In the Cisco Lake Region there are many lakes, mostly small, but several of a length of one to three miles. The water-level in the Cisco Lake chain has been raised six or ten feet by a dam across the outlet, and this change in water-level has killed the trees along the lake borders, so that the lakes are fringed by a narrow line of dead trees. The habitats of emerging vegetation and of aquatic vegetation have been much altered by the change in water-level, and these habitats cannot be well studied in these lakes. However, the neighboring lakes in which the water-level has not been changed show that the forests of the region originally came down to the water's edge, and that there was little normal development of marsh or swamp.

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The ridges between the lakes rise in general to heights of twenty-five feet or more, though bluffs are not formed. These ridges are mostly covered by mixed hardwood forest in which the hard maple, yellow birch, hemlock, and linden are the dominant trees. There are numerous small wet depressions, some of them containing small black spruce bogs, while others include a few arbor-vitae mixed with linden and other typical trees of the wet hardwood forest. Small areas of nearly pure hemlock occur on some slopes near the lake shores. A few large tamarack bogs are present.

Though the pines formerly occurring have been taken out, the region otherwise is in nearly its native condition. A few former clearings along the lake shores have grown up to brush or to white birch saplings or small trees.

Little Girl's Point Region. Much of the region in the near vicinity of Little Girl's Point has been cleared or burned, but a few miles to the east and southeast there are still considerable areas of native forest. The high ridge running through the region bears a splendid forest of maple, yellow birch, and linden, with little if any hemlock. However, on the steeper lower slopes hemlock occurs in nearly a pure stand. At one place was found a nice grove of large white pines, mixed, on the lower edge of the slope, with a few hemlocks. Black spruce-tamarack bogs are extensive and arbor-vitae swamps occur commonly. The extensive burned areas south of the point have grown up to a thicket of aspen, birch, and various shrubs and saplings. A few small areas are under cultivation.

Region at the north end of Gogebic Lake. Most of the region about the north end of Gogebic Lake is low and wet. A number of small black ash swamps occur near the lake, and further back there are extensive black spruce bogs. The main forest is of a much mixed wet hardwood type, sugar maple, linden, yellow birch, elm, and hemlock, being the dominant species. The forest in most places reaches the edge of the lake, though a few sandy beaches occur. However, the level of the water in the lake has been raised a few feet by a dam across the outlet, and beaches were probably more abundant before this occurred. The lake is so large, about 13 miles long by 1 to 2 miles broad, that wave action is quite pronounced.

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One beaver meadow was studied, this meadow including areas of grasses and of sedges, traversed by ditches, small mud-flats covered with low rushes, and alder thickets.

Just north of Lake Gogebic Station there are some high hills having bluffs on the southern exposures. These hills were visited, but they had been extensively logged and burned over and no attempt was made to trap for mammals on them.

Some large burned areas have grown up to sapling forests of aspens. Near the towns of Lake Gogebic and Merriweather nearly all the forests have been cleared away, but farther south on the sides of the lake the woods are still in their natural condition.

HABITATS

The habitats studied in Gogebic and Ontonagon counties may be listed as follows:

Exposed shores:

- Open-water
- Beach
- Dirt-bluff
- Forest—shore

Protected shores:

- Water lily
- Pondweed
- Rush
- Submerged-sedge
- Cat-tail
- Willow-thicket
- Mud-flat

Meadow:

Ditch-border
Tall-sedge
Grassy-meadow
Alder-thicket

Swamps:

Black ash swamp
Arbor-vitae swamp

Bogs:

Leather leaf bog
Sphagnum bog
Black spruce—tamarack bog

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Forests:

Hemlock forest
White pine forest
Wet hardwood forest
Dry hardwood forest

Mountains:

Rock-bluff
Mountain-heath

Air:

Aerial

Burns and clearings:

Herbaceous stage
Shrub stage
Paper birch—aspens stage
Young hardwood forest stage

Artificial conditions:

Overflow swamp
Cultivated-field
Edificarian

This list of habitats is admittedly not complete for the regions visited, but is intended to include those which we studied. We had no opportunity of studying either the shores of a large river or jack pine ridges, both of which situations will undoubtedly have habitats not here recognized.

The habitats studied in Gogebic and Ontonagon counties but every habitat has been listed which seems to form a distinct type of mammal environment. We are firmly convinced that it is better to describe a great number of habitats rather than to lump different kinds of environments together. It is infinitely easier for a later worker to combine several habitats, which have been split too finely, than it is to separate the component habitats which may have been lumped together under one name.

No attempt is made to give complete lists of the plants found in each habitat, but only the more conspicuous plants or those of special importance to the mammals are mentioned. The plant names used are mostly taken from Darlington's list of Gogebic County plants.^[1]

Exposed Shores

Open-water habitat: This habitat includes the areas of open water with no rooted vegetation in the deeper parts of the lakes and rivers. On Lake Superior at Little Girl's Point this habitat comes directly to the beach, for the wave action on this exposed point is sufficient to prevent the growth of plants along the shore. In Gogebic Lake and in the smaller lakes of the Cisco Lake Region there are also many parts where there is no rooted vegetation along shore. This habitat, therefore, covers by far the larger part of the aquatic conditions of northwestern Michigan. We secured no records of mammals for this habitat, and, though some aquatic species must occasionally occur in the open water along lake shores, they are rare there, and are practically absent from the areas of open water farther out in the lakes.

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Beach habitat: The shore of Lake Superior at Little Girl's Point is subjected to heavy pounding by the lake waves, leading to the formation of a well-developed beach. To the east of the point the beach for some distance is five to ten yards wide, mostly of small gravel, with sand on the upper part; it ends abruptly against a steep dirt bluff. On the beach no vegetation grows and only a few scattered drift logs occur. To the west of Little Girl's Point undetached masses of solid rock are more prominent, though small patches of gravel occur in partially protected places. The beach here in general is narrow and rises steeply, so that the different beach zones, lower, middle, and upper, are not well marked. On the shores of Lake Gogebic are a few small sand beaches; but around this lake, as well as around the smaller lakes of the region, the forest comes, in general,

directly to the edge of the water. There was no opportunity to trap for mammals on a beach, and no records for the habitat were obtained.

Dirt-bluff habitat: To the east of Little Girl's Point the beach of Lake Superior runs along the base of a dirt bluff about 35 feet high. The storm waves of winter evidently wash against this bluff, eroding it away and destroying the forest, which is of the hemlock type, growing on the level above. The bluff is quite steep, and along with small exposures of bare clay bears a number of scattered herbs and a few shrubs and small trees, such as alder, willow, arbor-vitae, yellow birch, paper birch, and red maple. No collecting was done in this habitat and no records of mammals were obtained from it.

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Forest—shore habitat: Along all the lakes of the region, except Lake Superior, the forests in general come down to the water's edge. The marginal forests are frequently dominated by hemlock, though often a wet hardwood forest occurs along the shores, and in a number of places along Gogebic Lake black ash swamps border the water. Red maple (*Acer rubrum*) and mountain ash (*Sorbus americana*) frequently occur along the exposed shores of Gogebic Lake. Frequently young forests of paper birch or quaking aspen have replaced the original forests in the clearings and burned areas along the lake borders. The shore beside a forest commonly rises abruptly a few inches to a foot or more in a firm bank, and in most cases the trees overhang the water to some extent. These shores are the favorite promenade of the porcupine; and the mink, muskrat, and otter are typical of the habitat.

Protected Shores

Water lily habitat: In shallow, protected parts of the lakes and channels of the Cisco Lake chain there are extensive growths of white and yellow water lilies (*Castalia tuberosa* and *Nymphaea advena*). Water lilies also occur in many places as a narrow border at the edge of deep water. Muskrats were the only mammals noted in this habitat, but mink and otter probably occur also.

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Pondweed habitat: A thick growth of pondweeds (*Potamogeton* spp.) occurs in protected places along the shores in many parts of the lakes of the Cisco Lake chain. Muskrats were noted in this habitat. In Gogebic Lake the exposure to wave action is in most places too great for a good development of pondweeds, though in the northern end of the lake there are a number of widely scattered plants of this type, but not forming a very well marked habitat.

Rush habitat: On somewhat protected shoals, both in the lakes of the Cisco Lake Region and in Gogebic Lake, there is sometimes a growth of rushes (*Juncus* sp.). Along the lower course of the Merriweather River, just before it enters Gogebic Lake, rushes thickly cover numerous small areas. The plants in both cases grow partly submerged in the water. No records for mammals were obtained from this type of habitat, though doubtless some of the amphibious forms frequently occur here.

Submerged-sedge habitat: Sedges in general do not occur as a definite belt about the margins of the lakes in the region studied. The only place where any considerable growth of sedges was noted at the edge of the water was along the lower course of Merriweather River, just before it enters Gogebic Lake. Here there are considerable areas of sedges partially submerged by the water. No records of mammals were obtained from this habitat.

Cat-tail habitat: Under native conditions cat-tails (*Typha latifolia*) apparently do not often form extensive habitats in the region. Along the marshy borders of the lower Merriweather River at Gogebic Lake a few small patches were seen. Small patches were seen in other places along railroad tracks where embankments had produced small areas of marshy ground.

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In the Cisco Lake Region a few of the areas of timber killed by the raising of the water-level have grown up to cat-tail swamps. In these swamps there are many standing dead trees and fallen logs as well as some areas of open water. The cat-tails seem to occur mostly in those swamps having only a small connection with the main body of the lake. In these places the cat-tail is dominant, though numerous sedges occur, and there is some sphagnum growing on the fallen logs and along the shore. A few small black spruces are starting. Along the edge of such a swamp a few deer-mice were taken, but these were evidently stragglers from the adjacent forest.

Willow-thicket habitat: Willows do not occur commonly along the water margins of the lakes of the region. The only place, except in clearings, where willows were noted as a definite growth is along the lower course of the Merriweather River at Gogebic Lake. Along this part of the river there are extensive growths of shrubby willows, growing (in early September) in a foot or more of water. The indications were that earlier in the summer the water about these plants must have been at least a foot higher. Signs of muskrat were noted at the edge of these willows.

Mud-flat habitat: Around the margin of a pond formed by an old deserted beaver dam near Gogebic Lake, two miles southwest of Merriweather, is a narrow strip of mud, very wet and sparsely covered with a growth of low rushes. The strip of muddy ground varies from about 1 to 4 meters in width and extends a short distance up along the edge of the small ditch draining into the pond. At the upper border of the strip of muddy shore is a thick growth of sedges, meeting the muddy shore at a fairly sharp line.

In this habitat meadow mice are common and four jumping mice (*Zapus hudsonius*) were taken.

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Meadows

Ditch-border habitat: A number of small ditches run through an old beaver meadow of considerable size near Gogebic Lake, about two miles southwest of Merriweather. The borders of the ditches are muddy and the banks are from 6 to 18 inches high; in places the ditch borders are closely encroached upon by the tall sedges of the adjacent meadow. A small amount of water was present (in early September) in most of the ditches. In mouse traps set at the edges of these ditches, partly in the water, star-nosed moles and navigator shrews were taken. In a larger trap a skunk was taken.

Tall-sedge habitat: In the beaver meadow studied near Gogebic Lake, an area about 200 meters by 100 meters or more is occupied by a heavy growth of high, coarse sedges, reaching a height of about .75 to 1.00 meter. A few grasses and some low herbs occur sparingly among the sedges. The habitat had not been burned over and the ground is covered with a thick mat of the decaying leaves and stems of the sedges and grasses. In most places the ground is quite wet, sometimes soggy to walk upon, and in a few places low hummocks are numerous. A similar habitat was found in rather a narrow strip at the edge of Mud Lake, one-fourth mile southwest of Thousand Island Lake, Gogebic County. Here a small area of meadow occurs along the inlet of a tiny stream. This area apparently had been artificially cleared of its forest, but the level of the lake had not been raised.

The habitat differs from the submerged-sedge habitat of protected lake shores in being higher above the water and in not being covered with water from July to September; probably water does not stand to any depth on it at any time. The Richardson shrew is apparently a characteristic mammal of this habitat, though other shrews and mice were taken here also.

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Grassy-meadow habitat: Part of the beaver meadow studied near Gogebic Lake is covered by a thick growth of grasses and sedges of a number of species. The ground of the habitat was rather dry and had been burned over the previous year. Grasses are also dominant over a few small areas near Mud Lake in Gogebic County. On a small area of the clearing near this lake a thick stand of bluegrass (*Poa*) is almost the only plant present. This occurs on an area of fairly moist mud. On the drier slope near the forest *Poa* also is abundant, forming the dominant species over a strip about 5 to 10 meters wide. Jumping mice are common in this habitat.

Alder-thicket habitat: On very wet ground just below an old beaver dam near Gogebic Lake there is a heavy growth of alder (*Alnus incana*) about 20 feet high. No other shrubs were noted in the thicket. The ground under the alders is mostly bare, there being only a few ferns, grasses, and other herbs. On the ground are many dead sticks fallen from the alders. This situation contained few mammals, only one *Blarina* being taken in four days' trapping with 25 traps. At the south end of the beaver meadow willows and alders are invading the sedges in very wet ground. No trapping was done in this situation.

Swamps

Black ash swamp habitat: A number of black ash swamps occur along the shores of Gogebic Lake, being apparently partially flooded during periods of heavy rains and during stages of high water. In a swamp of this type near the north end of Gogebic Lake on the west side, black ash (*Fraxinus nigra*) is the dominant tree, the trunks reaching diameters up to 2 feet. Elms (*Ulmus americana*) sometimes reaching a trunk diameter of 3 feet are common, and yellow birches and hard maples are common also. Black maples are rare, and lindens are few. The trees are high and the forest crown nearly closed. Underbrush is common in the more open places, this being mostly mountain maple (*Acer spicatum*) with a few young firs, young arbor-vitae, and Virginia creepers (*Parthenocissus quinquefolia*). There are numerous ferns, and herbs are abundant. Under the more closed parts of the forest canopy the ground is mostly bare, underbrush and herbs being scanty. Smaller black ash swamps occur in the Cisco Lake Region, and in the vicinity of Little Girl's Point a number of small black ashes were noted in a swamp of mixed arbor-vitae and black spruce.

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Arbor-vitae swamp habitat: In the Cisco Lake Region arbor-vitae (*Thuja occidentalis*) occurs commonly near the edges of the lakes and in the wet depressions in the forest. Near Gogebic Lake also the arbor-vitae grows commonly near the shores of the lake and in wet places in the woods, especially at the edges of swamps. But the trees in both these areas, so far as seen, were small, and the arbor-vitae did not form a dominant species, but occurred in a small percentage mixed with the other types of forest. However, in part of the region near Gogebic Lake extensive arbor-vitae swamps are reported to occur. In the vicinity of Little Girl's Point arbor-vitae swamps are common, occupying the wet lower northern slopes of the high ridge.

In a swamp of this type three miles southeast of the point arbor-vitae is the dominant tree, reaching trunk diameters of two feet and more. Under the dense shade of the high forest crown there are many young trees of the same species, and the forest has evidently reached a temporary climax. Of other trees, a few small yellow birch, a few young firs and hemlocks, and one fallen white spruce (*Picea canadensis*) were noted. The ground is very wet and there are numerous tiny streams, which frequently disappear under the ground. Fallen trees and decaying logs on the ground make a thick tangle, very difficult to penetrate. The underbrush is scanty; mountain maple is rather common, and there are a few young black ashes. Much moss grows on the ground and on the decaying logs.

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In a depression two miles south of Little Girl's Point is a mixed growth of arbor-vitae, black spruce, with a few black ashes. The trees are mostly small, none of them exceeding about eight

inches in trunk diameter. In August the ground was very wet, there being standing water in some places, and the ground was heavily covered with sphagnum. This situation may be considered transitional between the black spruce bog and the arbor-vitae swamp. No traps for mammals were set in this situation.

Bogs

Leather leaf bog habitat: In the northwestern corner of Fish-hawk Lake and at several places along the channel connecting Lindsley and Cisco lakes a heavy growth of leather leaf (*Chamaedaphne calyculata*) adjoins and overhangs the water, a considerable portion of the growth actually floating on the water. With the leather leaf is associated much sweet gale (*Myrica gale*) and alders, and these plants form almost the entire mat in some of the wetter areas. At other places sphagnum becomes abundant and the conditions approach those of a sphagnum bog. Other plants commonly found in the leather leaf bog in the Cisco Lake Region are the Labrador tea (*Ledum groenlandicum*), swamp laurel (*Kalmia potifolia*), wild rosemary (*Andromeda glaucophylla*), small cranberry (*Oxycoccus oxycoccus*), pitcher-plant (*Sarracenia purpurea*), and small trees of black spruce and tamarack. In a typical leather leaf bog on the Ontonagon River near the outlet from Thousand Island Lake a large beaver house is located.

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Sphagnum bog habitat: In a restricted sense the name is here applied to the part of a bog which is free from trees. It differs from the leather leaf bog in having a greater amount of sphagnum, for while the leather leaf bog when first developed over the water has little or no sphagnum, the sphagnum bog, as here considered, is almost entirely covered by sphagnum. The shrubs found in the two situations are apparently identical, except that the leather leaf is less abundant. A small bog of this type borders the edge of Mud Lake in the Cisco Lake Region, and small parts of many bogs are free from trees. So far as was determined, the mammal fauna is the same as that for the black spruce—tamarack bog, from which the only difference is the absence of trees.

Black Spruce—Tamarack Bog habitat: The dominant bog tree in this region is the black spruce (*Picea mariana*), which is usually small and stunted. With the black spruces are a lesser number of small tamaracks (*Larix laricina*), which in places may be dominant. The ground is heavily covered with sphagnum, which is normally soaked with water. Shrubs are abundant, though usually not forming a closed mat. Of the shrubs the leather leaf is the most abundant, though *Kalmia*, *Andromeda*, *Ledum*, and blueberries are common. A few young white pines and red maples were noted. Sedges occur frequently, and the pitcher plant is very characteristic.

Forests

Hemlock forest habitat: In the Cisco Lake Region groves of hemlock (*Tsuga canadensis*) frequently occupy the lower parts of steep slopes adjoining the lakes. One such area studied is made up of practically a pure stand of hemlocks, the trunks being from about 6 to 18 inches in diameter. A few very old yellow birches are present, and also a few young sugar maples and arbor-vitae, the latter chiefly near the water's edge. Shrubs and herbs are nearly absent, and the forest floor is covered by a thick carpet of dead needles. There are many decaying logs, usually covered by a thin coat of moss. In the Little Girl's Point Region nearly pure stands of large hemlocks cover many of the lower parts of steep slopes and also occur commonly on well-drained soil elsewhere. In the vicinity of the north end of Gogebic Lake a few small groves of hemlocks were noted, but the ground in general is so low and swampy that the species mostly occurs as a part of the mixed forest of the region. Animals are rare in the habitat.

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White pine forest habitat: White pine (*Pinus strobus*), which formerly was a common forest tree in northern Michigan, has now been mostly removed for lumber. Near Little Girl's Point a small natural grove of this species was studied, occupying a moderate southerly slope above a black spruce bog. The area is about 50 by 150 meters in size. White pines are by far the most numerous and dominant tree, the trunks measuring up to about five feet in diameter. In the grove yellow birch, some of large size, are common; toward the bottom of the slope hemlocks are also common; and near the edge of the bog there are a few arbor-vitae. Shrubs are almost absent, there being merely a few small seedlings of arbor-vitae, hemlock, and fir, mostly toward the bottom of the slope. A few scattered clumps of grass appear, but the forest floor is mostly covered only by a thick carpet of dry pine needles. Numerous dead limbs and sticks have fallen from the pines.

Wet hardwood forest habitat: The land adjoining much of Gogebic Lake is low and poorly drained. Here is found a mixed forest dominated by sugar maple (*Acer saccharum*), black maple, hemlock, yellow birch (*Betula lutea*), linden, elm (*Ulmus americana*), ash (not black ash), and ironwood (*Ostrya virginiana*). The hardwoods are decidedly dominant over the conifers. The forest crown is high and closed, and the trees are large. The underbrush in general is scanty, though in some places there is a thick growth of mountain maple (*Acer spicatum*) and of sugar maple seedlings. Leatherwood (*Dirca palustris*), hazel, ferns, and a few young firs (*Abies balsamea*) also occur.

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Some of the lower forests in the Cisco Lake Region approach the wet hardwood forest type, though none are extensive in area, and they are usually surrounded and dominated by the dry forest condition.

Dry hardwood forest habitat: The highest development of the dry hardwood type of forest was found on the upper parts of the moderately high ridge near Little Girl's Point. The slopes in

general are very gentle, but well drained. The forest here is dominated by the sugar maple (*Acer saccharum*), yellow birch (*Betula lutea*), and linden (*Tilia americana*). Hemlocks are rare, and only one elm was seen. The trees are large, the trunks frequently reaching diameters of two feet or more. The forest crown is high and heavy. Underbrush is scanty and low, being mostly young seedlings of sugar maple, though seedlings of linden are numerous. Other shrubs and herbs noted were the leatherwood (*Dirca palustris*), hazel (*Corylus rostrata*), yew (*Taxus canadensis*), gooseberry, ferns, false Solomon's seal, and grass. On the ground are many decaying leaves, these usually forming a heavy carpet; decaying logs and freshly fallen sticks are common.

In the Cisco Lake Region the drainage is not so good as in the vicinity of Little Girl's Point, and the forests of that district are of a type somewhat intermediate between the wet hardwood forest and the dry hardwood forest. In the Cisco Lake Region the topography is much broken, there being many small hills and ridges, and many small depressions, often poorly drained. In the damp depressions, if not wet enough for a bog, arbor-vitae and hemlock are common, while on the ridges sugar maple and linden are characteristic, though hemlock occurs here sparingly also. There is accordingly much local variation in tree forms, but the whole forest is decidedly of a hardwood type.

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The dry hardwood forests of the Little Girl's Point Region are inhabited by many deer-mice, while only a few of this species are found in the wet hardwood forests near Gogebic Lake, bob-tailed shrews being there the most abundant mammal and red-backed voles being common, both of which are rare in the other districts. In the dry hardwood forest near Little Girl's Point four woodland jumping mice (*Napaeozapus*) were taken, while in the Cisco Lake Region only two were taken in a period twice as long, and at Gogebic Lake none were secured. These observations indicate that moisture conditions in hardwood forests have an important influence on the mammal fauna.

Mountains

Rock-bluff habitat: Rock exposures are rare in the region studied. However there are several high hills with steep exposures of rock a short distance north of Ironwood and Bessemer. These hills could not be studied in the time available, and the only cliff examined was on a small range of hills northeast of the station of Lake Gogebic. On one of these hills is a nearly perpendicular rock cliff about 200 feet high and facing to the southward. The small talus slope at the bottom is overgrown with shrubs and trees, and on the small ledges and gullies of the face of the cliff a few small trees, shrubs, and herbs are also growing. The most conspicuous plants of the rock habitat are scrub oaks, aspens, and heaths. No trapping was done in the habitat, and no notes on mammals were secured. Probably the mammal fauna is not very large.

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Mountain-heath habitat: A narrow, poorly developed belt of heath fringes the upper edge of the rock cliff examined north of Lake Gogebic. Characteristic plants are the blueberry and bearberry, mixed with creeping juniper and a few scattered grasses. The habitat is very narrow and is closely encroached upon by shrubs and trees, such as sumac, cherry, white pine, jack pine, oaks, aspens, and paper birch. Signs of fox were noted at the edge of the cliff, but no trapping was carried on here.

Air

Aerial habitat: The only aerial mammals are the bats, of which four species were taken during the summer. The flying squirrel is not considered to be a true aerial form.

Burns and Clearings

Fires have been numerous throughout northern Michigan and a large part of the region is covered by various stages in the succession following fires or clearings. The areas studied were selected as representative of the natural conditions of the peninsula, but even in these districts there are many burned areas.

Many large areas have been heavily logged over, sometimes followed by fire, with a result similar to that of a fire. In the region studied there are numerous small clearings, some of which are in use as the residences of settlers, but most have been allowed to revert to a wild condition. The stages in succession on an abandoned clearing seem to be similar to those following a fire, and they are here considered together.

Herbaceous stage: After a fire in a forest in this region the first vegetation to spring up seems to be the herbs, of which the fireweed (*Chamaenerion angustifolium*) is most prominent. A number of areas dominated by this type of vegetation were seen, but the type seems to be short-lived, and is probably quickly replaced by shrubs and tree seedlings. The stages in succession following a fire in swampy areas may be somewhat different from that in a hardwood region, but no data was obtained. No opportunity presented itself to study the mammals of the herbaceous stage, and I have no records for the species found there.

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Shrub stage: Following a fire or clearing in a hardwood area the herbaceous stage is apparently quickly followed by a thick growth of shrubs and young trees. The characters of the shrub growth vary considerably with the texture of the soil, amount of soil moisture, slope, and completeness of burning. The growth is usually quite thick, though in some clearings where the growth has been

kept down for some time there may be open grassy patches. In small clearings near Fish-hawk Lake the raspberry (*Rubus strigosus*) is a characteristic species, but near Little Girl's Point it is much less common. A large area of shrub studied near Little Girl's Point is on a rather steep slope facing to the north, though part is at the bottom of the hill on a very gentle slope. There are no large trees, but saplings up to 2-1/2-inch trunks occur; most, however, are smaller. The quaking and large-toothed aspens (*Populus tremuloides* and *P. grandidentata*), paper and yellow birches (*Betula papyrifera* and *B. lutea*), sugar maple, and linden are common seedlings. Shrubs, such as the sumac (*Rhus hirta*), wild cherry (*Prunus pennsylvanica*), raspberry, willows (*Salix* spp.), mountain maple, red-berried elder (*Sambucus racemosa*), and hazel are common. A few herbs, like the fireweed, golden-rod, and pearly everlasting, occur in open places.

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A number of mammals are found in the shrub stage, but they are far less abundant than in mature hardwood forest.

Paper birch—aspens stage: The continued growth of the young trees in the shrub stage leads to the production of a sapling forest of the more quickly growing species, the paper birches and aspens. Often one or other of these species becomes dominant to the practical exclusion of the other, but sometimes both occur together. On the slopes near the lakes of the Cisco Lake chain aspens are rare, and the sapling forests on the clearings and burns are almost a pure stand of paper birch. Near Watersmeet, however, the aspen seems to be the dominant form, and few paper birches were seen. Near Gogebic Lake, also, the quaking aspen is the dominant form, though paper birches are common in the sapling forests. The growth in these sapling forests is very thick, and the ground is nearly bare of vegetation, though it is heavily covered with dead sticks and small logs. In a thick growth of quaking aspens, on wet ground studied near Gogebic Lake, a number of alders and paper birches, a few young trees of sugar maple and arbor-vitae, and a rare elm occur. A scanty undergrowth of mountain maple and numerous sugar maple seedlings is present. Few mammals are found in this stage of the forest.

On the western slope of Birch Point on Cisco Lake there is a good stand of paper birches, growing in an open stand with much grass in the spaces between the trees. This place has been much used for camping and it may be that the development of the grass is the result of opening the forest by clearing out some of the trees. Among the birches are numerous young firs and white pines, with a few young sugar maples, and a rare arbor-vitae. The birches show many signs of age, and would evidently, if undisturbed, soon give way to a forest dominated by the pines and firs. In the grass among these trees deer-mice, red-backed voles, and jumping mice (*Zapus*) were taken. Signs of snowshoe hare were seen.

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Young hardwood forest stage: On the eastern slope of a low ridge at Birch Point, Cisco Lake, a young hardwood forest is rapidly replacing a former growth of paper birches which has followed a fire. In this growth numerous old paper birches still persist, but they are being strongly crowded by a thick growth of vigorous young sugar maples, some of which have trunk diameters up to about eight inches, and which form a dense shade. Among the maples are numerous young firs and a few young hemlocks and arbor-vitae. The ground is mostly bare, being scantily covered by leaves. The soil is moist, but there is no grass and little brush. In this habitat deer-mice were taken, and one red squirrel was seen.

Artificial Conditions

Overflow swamp habitat: Due to the rise in water-level of the lakes of the Cisco Lake chain many low areas of forest have been flooded and killed. Many of the dead trunks of these trees still remain standing, mixed with fallen and decaying logs in the water. Locally these habitats are called "overflow swamps," a name here adopted for the habitat. There is little living vegetation in these swamps, an occasional water lily being almost the only plant present. Porcupines commonly walk out on the logs of the swamp to secure the water lily leaves, and probably the mink occasionally runs over the logs in its movements along the waterways.

Cultivated-field habitat: Cleared fields occur only sparingly in the regions visited, and these fields are small in size. No study of their inhabitants was made, though silver-haired bats were collected while they were flying over a small clearing in the Little Girl's Point Region.

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Edificarian habitat: Towns and buildings are not very common in northern Michigan. In and around a cabin on Lindsley Lake a number of deer-mice were trapped, and signs that porcupines had invaded the cabin were noted.

ANNOTATED LIST OF MAMMALS

Condylura cristata. Star-nosed Mole.

Tall-sedge, 2.

Two were trapped September 3 and 5, 1920, in a short, open runway in very moist soil at the edge of a small ditch running through tall sedges in a beaver meadow near Gogebic Lake, Ontonagon County.

Sorex personatus personatus. Masked Shrew.

- Grassy-meadow, 2.
- Black spruce—tamarack bog, 2.
- Wet hardwood forest, 3.
- Dry hardwood forest, 3.
- Shrub stage, 2.

In the Cisco Lake Region in July, one was taken in a small black spruce bog, two in a narrow tongue of grass between tall sedges and sphagnum bordering Mud Lake, three in the wetter parts of the hardwood forest, and three in the upland, well-drained hardwood forest. Near Little Girl's Point in August, two were taken in a growth of shrubs in a burn. Near Gogebic Lake, Ontonagon County, one was taken September 4 in a black spruce bog.

Sorex richardsonii. Richardson Shrew.

- Tall-sedge, 15.
- Grassy-meadow, 1.
- Sphagnum bog, 1.

This species was found only in or near tall sedges growing in moist or marshy situations. In the Cisco Lake Region six were taken near Mud Lake in July. Four of these were taken in tall sedges, one in grass alongside the sedges, and one in sphagnum between the sedges and the lake. August 30 to September 5, eleven were taken in tall sedges in a beaver meadow near Gogebic Lake, Ontonagon County. [Pg 23]

An adult female trapped at Mud Lake, July 30, contained five large embryos. There were two pairs of inguinal and one pair of abdominal mammae. Another adult female trapped in the same place, July 22, had two pairs of inguinal mammae, but no abdominal mammae were found.

The latter individual was moulting, patches of new fur having replaced the old on the top of the head midway between the ears and eyes, between the shoulders, and on the rump. The other female mentioned above, taken July 30, had nearly completed her moult.

Only two specimens have been previously recorded from Michigan, one from Alger County and the other from Chippewa County.^[2]

Neosorex palustris palustris. Marsh Shrew, Water Shrew.

- Tall-sedge, 1.
- Ditch-border, 3.

September 1 a marsh shrew was trapped in the tall sedges of a beaver meadow near Gogebic Lake, Ontonagon County. Most of the body had been eaten by some carnivore. Other specimens were taken on each of the two succeeding days, and a fourth on September 5.

The first specimen taken was trapped eight feet from a tiny stream which flowed through the marshy sedges. Two of the others were taken on the muddy bank of the stream near the water's edge, and the fourth about 35 feet from the water. All were secured within a radius of 35 feet.

This species has been recorded but once previously from Michigan, from Chippewa County.^[3] [Pg 24]

Microsorex hoyi. Hoy Shrew.

- Black spruce-tamarack bog, 1.
- Wet hardwood forest, 1.

One specimen was taken July 17 at Fish-hawk Lake in a moderately wet part of the hardwood forest. Another was taken July 29 at the edge of a small black spruce bog.

Blarina brevicauda talpoides. Bob-tailed Shrew.

- Tall-sedge, 8.
- Grassy-meadow, 6.
- Alder-thicket, 1.
- Black ash swamp, 6.
- Arbor-vitae swamp, 4.
- Black spruce—tamarack bog, 1.
- Wet hardwood forest, 32.
- Dry hardwood forest, 8.
- Shrub stage, 1.
- Paper birch—aspens stage, 6.

The species is rather generally distributed, but is by far the most common in moist woods. In the Cisco Lake Region 11 were secured; in the Little Girl's Point district, 10; and near Gogebic Lake in Ontonagon County, 52. In the latter district it was the most abundant mammal species, even exceeding *Peromyscus* in numbers; indeed, *Peromyscus* was relatively uncommon in the partly swampy woods of the region, and it might be that the abundance of the bob-tailed shrews accounts for the scarcity of the deer-mice, for the shrews undoubtedly at times prey upon the mice. The specimen recorded above from the black spruce-tamarack bog was taken near Gogebic Lake in a boggy swamp, which, while dominated by black spruces, yet contained a considerable

number of arbor-vitae and hemlocks.

In the wet hardwood forest near Gogebic Lake Blarina runways are exceedingly abundant, usually running along or under sticks or logs. Commonly they are just under the leaves, but sometimes for a short distance are without covering. One old log examined was found to be honey-combed with these tunnels. The deeper runways nearly always follow down just under a tree root.

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The uterus of a female taken July 10, at Fish-hawk Lake, showed a few small swellings which were identified in the field as embryos. Unfortunately, the uterus was not preserved. No embryos were found in 26 other females taken between July 15 and September 4. In the latter part of the season fewer immature specimens were taken than earlier in the summer. These facts show that in this region the species breeds in the spring or early summer and does not usually breed again during July and August.

Myotis lucifugus lucifugus. Little Brown Bat.

Aerial, 15.

Nine individuals were shot while they were flying over the lakes in the Cisco Lake Region. These were taken between 8:00 and 9:00 p. m. from July 1 to August 2; but on moonlight nights bats, believed to be of this species, were seen flying as late as 10:00 p. m. At the camp near Little Girl's Point one was shot at 7:55 p. m., August 11, as it flew about over the road through the dry hardwood forest. Five others were shot at the Gogebic Lake camp as they flitted through an opening in the wet hardwood forest. These were taken between 7:30 and 7:55 p. m., August 23 to September 2; but bats almost certainly of this species appeared regularly in the evenings about 7:10 p. m.

Lasionycteris noctivagans. Silver-haired Bat.

Aerial, 3.

Near the Little Girl's Point camp one was shot at 7:50 p. m., August 9, and two more in the same region about 7:45 p. m., August 17. One was flying along a road through the dry hardwood forest at a height about equal to that of the tree-tops, and the others were taken in a small clearing in the same forest.

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Nycteris borealis borealis. Red Bat.

Aerial, 2.

Two were secured near the Little Girl's Point camp at about 7:45 p. m., one August 9 and the other August 14, as they flew about over the road through the dry hardwood forest.

Nycteris cinerea. Hoary Bat.

Aerial, 1.

The only specimen secured was shot at 7:55 p. m., August 9, while it was flying over the road through the dry hardwood forest near Little Girl's Point.

Ursus americanus americanus. Black Bear.

Wet hardwood forest, 1.

Dry hardwood forest, 1.

Reported by residents as being rather common. July 10 a large black bear was seen to cross the railroad track and enter the hardwood forest not over a quarter-mile from Cisco Lake Station. Tracks of a large individual were seen in the mud bordering a small brook in maple-birch-hemlock forest about three miles southeast of the station July 17 and August 15. At dusk, August 28, while Mr. Sherman was setting up a camera and flashgun along a deer trail about 100 yards from the camp on Gogebic Lake, a small bear passed within twenty-five paces of him, apparently but little concerned with his presence or that of the nearby camp and fire, except that it sniffed the air occasionally.

Canis lycaon. Timber Wolf.

Mud-flat, signs.

Tall-sedge, tracks.

Dry hardwood forest, reported.

Residents reported it common in all the districts visited by us. We saw signs and tracks in several habitats; and residents saw a wolf in the dry hardwood forest near our camp in the Little Girl's Point district.

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Canis latrans. Coyote.

J. E. Fischer reported in 1920 that coyotes had appeared and become numerous in the region at the north end of Lake Gogebic within the last few years. We have secured several skulls and skeletons taken by him in 1920-21.

Vulpes fulva. Red Fox.

Mountain-heath, signs.

Signs of fox were found in late August in a narrow growth of heath at the top of a cliff about a mile north of Lake Gogebic Station. J. E. Fischer has sent us a fox taken in January, 1921, in Gogebic County near Gogebic Lake. Benjamin J. Twombly reports that a few occur in the Cisco Lake Region. J. E. Marshall, in 1911, reported that a few occurred around Gogebic Lake.

Urocyon cinereoargenteus. Gray Fox.

J. E. Marshall reported in 1911 that it was rare, but that he had trapped two near Gogebic Lake.

Martes americanus americanus. Marten.

J. E. Marshall reported in 1911 that it was getting scarce in Gogebic and Ontonagon counties. He trapped a number near Gogebic Lake in the winter of 1884-1885, and took 15 in the winter of 1889-90. In 1920 J. E. Fischer reported marten rare near Gogebic Lake.

Martes pennantii pennantii. Fisher.

In 1911 J. E. Marshall reported that it was getting scarce near Gogebic Lake; he trapped four in the winter of 1889-90 and two in 1890-91. J. E. Fischer took one in Ontonagon County near Gogebic Lake in the winter of 1919-20. Ole Petersen in 1911 reported it rare near Gogebic Lake. [Pg 28]

Mustela cicognanii cicognanii. Bonaparte Weasel.

Black spruce—tamarack bog, 1.

Dry hardwood forest, 4.

Trappers report it common throughout the areas visited. We took five specimens near Little Girl's Point. Several specimens taken in the Cisco Lake Region during the winter of 1920-21 were presented to us by Benjamin J. Twombly, and J. E. Fischer sent us a specimen taken in December, 1920, near Gogebic Lake.

Mustela vison letifera. Mink.

Forest—shore, 6.

Wet hardwood forest, den.

Reported by trappers as common throughout the area studied. In the Cisco Lake Region two were trapped at the water's edge beside a growth of paper birch saplings; and another was shot as it was running along the bank of the Ontonagon River at the edge of a stand of hemlocks. Three others were seen swimming near the latter locality July 29. Upon the approach of the canoe they swam rapidly to an old hollow log in wet hardwood forest on shore. Around and through the log well-worn runways showed evidence of the presence of a den.

Mephitis hudsonica. Skunk.

Ditch-border, 1.

Dry hardwood forest, 5.

Four skunks were taken in the dry hardwood forest of the Cisco Lake Region, one in the same type of habitat near the Little Girl's Point camp, and another in a trap set in the bottom of a muddy ditch in the beaver meadow near Gogebic Lake.

An adult male, trapped July 14 in the Cisco Lake Region, was badly infested with tapeworms in the middle part of the small intestine. An adult female, taken July 19, was found to have many tapeworms in the intestine, many nematodes in the lung tissue, an infested liver, and a large number of nematodes in a cavity in the top of the skull. [Pg 29]

While we were photographing a captive juvenile August 2 at Lindsley Lake a horsefly (identified as *Tabanus atratus* by J. S. Rogers) burrowed into the fur on the rump of the skunk and began sucking blood.

Taxidea taxus taxus. Badger.

J. E. Marshall reports that he trapped one in the winter of 1889-90 between Gogebic Lake and Lake Superior.

Lutra canadensis canadensis. Otter.

In 1911 J. E. Marshall reported that quite a few remained around Gogebic Lake; he took quite a number in the winter of 1884 and several in the winters of 1889 to 1891. J. E. Fischer took two in Ontonagon County in January, 1921.

Lynx canadensis. Canada Lynx.

J. E. Marshall reports that it was not very plentiful near Gogebic Lake in 1884. He took one in the winter of 1890-91; in 1911 it had almost or entirely disappeared.

Lynx ruffus ruffus. Bob-cat.

J. E. Marshall reports that he took three or four near Gogebic Lake in the winter of 1890-91; in 1891-92 it had become quite numerous; and it continued to increase until 1911 at least. In 1920 residents reported that a few occurred in all the regions visited by us.

Peromyscus maniculatus gracilis. Deer-mouse.

Tall-sedge, 4.
Black ash swamp, 5.
Arbor-vitae swamp, 11.
Black spruce—tamarack bog, 4.
Hemlock forest, 16.
White pine forest, 5.
Wet hardwood forest, 78.
Dry hardwood forest, 143.
Shrub stage, 19.
Paper birch—aspens, 15.
Young hardwood forest stage, 2.
Edificarian, 6.

In the Cisco Lake Region and in the vicinity of Little Girl's Point this species is the most abundant mammal, but in the wet woods at the Gogebic Lake camp it is much less abundant, being exceeded in numbers by the bob-tailed shrew. A total of 308 deer-mice were taken during the summer. It was found in a variety of forest habitats, but it is most abundant in the dry upland woods of the Little Girl's Point Region. The individuals taken in the tall sedges at Mud Lake were probably stragglers from the nearby shrubs and forest, for no deer-mice were taken in the extensive sedges of the large beaver meadow studied near Gogebic Lake. Probably most of those taken in the black spruce bogs were stragglers also, though one individual taken in a large black spruce bog was 50 yards from the nearest deciduous woods. [Pg 30]

When we arrived in the Cisco Lake Region in late June young and subadults were abundant, many of the female subadults, as well as the adults, carrying embryos. Embryos were found throughout the summer up to August 25. Of females containing embryos, five had 4 embryos each, ten females 5 embryos each, nine females 6 embryos each, and one female 8 embryos.

Synaptomys cooperi fatuus. Lemming-vole.

Tall-sedge, 1.
Black spruce—tamarack bog, 2.
Wet hardwood forest, 1.
Dry hardwood forest, 1.

In the Cisco Lake Region an adult female was taken in dry hardwood forest near Fish-hawk Lake June 28, 1920. It contained 6 embryos each 21 mm. long. A juvenile was trapped July 26 on top a log in the tall sedges at Mud Lake. The log bridged over a particularly wet part of the marshy sedges and was at the edge of the hardwood forest. Two other juveniles were taken the next day, one in a small black spruce log, and the other in wet hardwood forest at the edge of the same bog. In Ontonagon County near Gogebic Lake a subadult male was taken September 5 in a large black spruce bog. [Pg 31]

Evotomys gapperi gapperi. Red-backed vole.

Black ash swamp, 2.
Black spruce—tamarack bog, 6.
Arbor-vitae swamp, 2.
Hemlock forest, 5.
White pine forest, 2.
Wet hardwood forest, 18.
Dry hardwood forest, 17.
Shrub stage, 5.
Paper birch—aspens stage, 3.

Thirty were taken in the Cisco Lake Region, 10 at the Little Girl's Point camp, and 20 near Gogebic Lake in Ontonagon County. It was most common in the forests. Two individuals recorded from the arbor-vitae swamp were taken in a mixed swamp of small arbor-vitae, black spruce, and hemlock with many alders, this situation probably forming a stage in the succession following a beaver meadow. Also, one of the specimens recorded from the paper birch—aspens stage was taken in an open stand of old paper birches with a forest floor of grass, conditions not typical of the stage.

Of 13 females examined from June to August, two contained 4 embryos each, two 5 embryos each, and two 6 embryos each. August 14, at Little Girl's Point, was the last date on which embryos were found.

The species is somewhat diurnal. Several times one was seen in daylight about the camp in the Cisco Lake Region, and several were trapped during daylight hours.

A captive was fond of tender grass blades, but refused the harder stems. In eating he sat up on the hind feet and handled the food with the fore feet.

An immature male taken August 8 near Little Girl's Point had a considerable infestation of seed ticks on the posterior lobes of both ears. [Pg 32]

Microtus pennsylvanicus pennsylvanicus. Meadow vole.

Mud-flat, 6.
Tall-sedge, 28.
Grassy-meadow, 6.
Black ash swamp, 1.
Arbor-vitae swamp, 1.
Leather leaf bog, 15.
Sphagnum bog, 9.
Black spruce—tamarack bog, 1.
Shrub stage, 17.

Sixty-five were taken in the Cisco Lake Region and 19 in Ontonagon County, near Gogebic Lake. It is most abundant in grassy and sedgy meadows and in open bogs, though it is found rarely in swamps and tree-covered bogs. The individual listed from the arbor-vitae swamp was taken in a young growth of arbor-vitae, black spruce, hemlock, and many alders, and not in typical arbor-vitae swamp habitat. Of the 17 listed from the shrub stage, one was taken in a wet, sedgy part of a shrub-covered burn at Poor Lake, and the others were secured in the shrub and grass clearing around the camp house on Lindsley Lake.

Of ten females examined, July 10 to September 5, one contained 3 embryos, one 4 embryos, and two 5 embryos each. September 5 was the last date on which embryos were found. The three embryos found on the last date were each 23 mm. in length and together they weighed 8.5 grams, which was 26 per cent of the weight of the mother with the embryos removed.

Both adults and immature young were seen moving about, and were also trapped in broad daylight, but it is more active in the evening just before sunset.

A captive juvenile was placed July 19 in a large tub with an adult female, which might have been its mother, for both were taken on succeeding days in the same trap. The young one immediately tried to nurse, but was severely bitten and driven away, though it made numerous unsuccessful attempts later. When approaching the old female the baby frequently gave a high-pitched squeak, and the old female replied by a hoarse squeak, evidently of warning, for the young one was bitten when it approached in defiance of the warning note and threatening attitude of the adult. The baby evidently had been weaned, and the old female was found to contain five large embryos.

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Ondatra zibethica zibethica. Muskrat.

Forest—shore, 5.
Water lily, 1.
Pondweed, 2.
Willow-thicket, signs.

Muskrats are numerous in the Cisco Lake Region, and five specimens were taken. Near Little Girl's Point one was seen swimming in a small stream. At the mouth of Merriweather Creek on Gogebic Lake signs were noted in a willow thicket, and muskrats were reported numerous in the region.

An adult female trapped July 6 at Fish-hawk Lake contained six large embryos; another female taken July 10 contained no embryos, but the mammae were filled with milk; and two females taken July 26 contained no embryos.

In the Cisco Lake Region broken mussel shells were abundant in the muskrat runways along the shores. Remains of pondweeds were also frequently found in the runways, and a quantity of leaves with a few heads containing flowers and seeds collected July 8 were identified by E. A. Bessey as *Potamogeton richardsonii*.

Zapus hudsonius hudsonius. Jumping-mouse.

Mud-flat, 4.
Tall-sedge, 12.
Grassy-meadow, 8,
Arbor-vitae swamp, 1.
Sphagnum bog, 1.
Black spruce—tamarack bog, 1.
Wet hardwood forest, 2.
Dry hardwood forest, 1.
Shrub stage, 10.
Paper birch—aspens stage, 2.

Numerous in suitable habitats in the Cisco Lake Region, at Little Girl's Point, and at Gogebic Lake. Most common in open grasses and sedges. Five of those recorded above from the shrub stage were taken in open shrubs and grass in the clearing around the camp house on Lindsley Lake; and the two recorded from the paper birch—aspens stage were taken at Cisco Lake in an open stand of old paper birch with a forest floor of grass.

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Juveniles were taken throughout the summer, but no one of seven adult or nearly adult females examined between July 7 and September 4 contained embryos.

A captive taken July 18, after feeding ravenously on a cookie, retired to a corner and went to sleep. The position taken in this case was a sitting one, the animal resting on the widely spread feet as far as the heels, and on the tail. The head was bent far over, the nose extending between

the hind legs. The long tail was curled around the body, it resting on the ground for its whole length. The operation of cleaning the tail was observed two days later. The animal worked from the base of the tail toward the tip, using the fore feet to present the tail to the mouth, where it was licked off. During the process the head was held over on one side, nearly touching the ground.

Napaeozapus insignis fructectanus. Woodland Jumping Mouse.

Wet hardwood forest, 1.
Dry hardwood forest, 6.

Three were taken in the Cisco Lake Region and four in the Little Girl's Point Region, all in heavy forest.

Neither of two adult females taken August 8 and 10 contained embryos.

Erethizon dorsatum dorsatum. Porcupine.

Forest—shore, 13.
Wet hardwood forest, 10.
Dry hardwood forest, 17.
Shrub stage, 5.
Paper birch—aspens stage, 10.
Overflow swamp, 5.
Edificarian, 1.

Common at all camps. Many were taken in traps set for carnivores. Well-marked trails at the edges of lakes and streams through the forests are evidently made mostly by these animals. It is detested by the inhabitants of the region, chiefly for the damage done to any woodwork which contains the least amount of salt.

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Porcupines spend a considerable amount of time inside hollow linden, yellow birch, and hemlock trees, as shown by the large piles of droppings noted at the lower openings of numerous such hollow trees.

June 30, and again on July 2, young individuals were closely observed while feeding on the leaves of the yellow water lily. These individuals were on the logs in an overflow swamp, and they reached down with a fore foot into the water to secure the food, which was then presented to the mouth with the same foot. One of these porcupines seemed to be very disinclined to wet his feet, except the fore feet in reaching for food; the other individual waded out on a log which was submerged several inches, but he showed a ludicrous determination to hold the tail up out of the water.

A juvenile weighing only 914 grams was taken as late as July 21 at Fish-hawk Lake, but no embryos were found in the period between June 29 and September 3. It is often active throughout the day as well as in the night.

A young individual taken in a trap July 3 was found surrounded by a swarm of mosquitoes, which seemed to annoy him considerably, for he shook his skin frequently to dislodge them. One mosquito settled on a lower eyelid as we watched, and others kept alighting on his nose. When he raised his quills on our approach many mosquitoes attacked the skin exposed on the back.

Marmota monax canadensis. Canada Woodchuck.

Hemlock forest, 5.
Shrub stage, 9.

A few occur in the Cisco Lake Region, where they are most common in the shrubby clearings. Several adults fed commonly on the refuse from the camp. The stomach of a captured individual contained a considerable quantity of cooked corn, spaghetti, and boiled ham. Three woodchucks were noted at different times in hemlock forest along the lake shores.

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A half-grown juvenile was seen to swim the Ontonagon River near its entrance to Cisco Lake. This was on July 10, near noon, with bright sunshine. The river here is at least 75 yards in width, but has no perceptible current.

Juveniles taken in traps were observed to extrude scent glands from the anus when approached. These glands are three in number, one on each side of the anus and one beneath. They are small, whitish, and cup-shaped. Normally they lie just inside the anus, but on excitement they are everted and the fold of skin forming the edge of the anus is rolled outward so that the glands lie outside. We detected a faint musky odor which might have come from these glands.

In the Little Girl's Point district several inhabited a woodpile in hemlock forest at the edge of a wide road. None were found near Gogebic Lake.

Eutamias borealis neglectus. Lake Superior Chipmunk.

Tall-sedge, 1.
Grassy-meadow, 3.
Black spruce—tamarack bog, 1.
Hemlock forest, 1.
Wet hardwood forest, 1.

Shrub stage, 20.
Paper birch—aspens stage, 2.

Common in shrubby clearings and burns in the Cisco Lake and Little Girl's Point regions. A few were taken in tall sedges and grass not far from shrubs; one was taken in a small black spruce bog, about five yards from the surrounding wet hardwood forest; one was taken in hemlock forest near the lake shore; and one was seen in wet hardwood forest near the lake shore. Not seen near Gogebic Lake.

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These chipmunks were several times observed feeding on ripe raspberries. August 5, near Watersmeet, one was seen sitting on a rail fence beside a pasture, eating a grasshopper, the remains of which have been identified by T. H. Hubbell as *Melanoplus* sp. probably *bivittatus*.

Tamias striatus griseus. Gray Chipmunk.

Black ash swamp, 1.
Hemlock forest, 1.
Wet hardwood forest, 10.
Dry hardwood forest, 8.
Shrub stage, 2.

Five records were obtained in the Cisco Lake Region; 9 near Little Girl's Point, and 8 near Gogebic Lake. It is most numerous in hardwood forest.

An adult male taken July 5 had in its cheek-pouches numerous seeds of *Carex* and a fruit capsule of *Viola*, the identification being by E. A. Bessey. Of eight adult or nearly adult females examined between July 5 and September 1, one taken July 15 in the Cisco Lake Region contained eight large embryos.

Sciurus hudsonicus loquax. Southeastern Red-squirrel.

Black ash swamp, 1.
Arbor-vitae swamp, 3.
Black spruce—tamarack bog, 2.
Hemlock forest, 1.
White pine forest, 1.
Wet hardwood forest, 9.
Dry hardwood forest, 7.
Shrub stage, 1.
Paper birch—aspens stage, 3.
Early hardwood forest stage, 1.
Edificarian, 1.

Seventeen records from the Cisco Lake Region; 6 from Little Girl's Point; and 7 from Gogebic Lake. None were noted more than a few yards from the protection of a forest.

In a grove of white pines near Little Girl's Point cut pine scales were numerous August 13 on the ground and on logs, and one red-squirrel taken had much pitch on the fur around the mouth. August 24, cut-open fir cones were numerous around the small fir trees in a paper birch—aspens growth near Gogebic Lake, and were certainly the work of this species. July 2 a young red-squirrel which had frequently been seen around the camp in the Cisco Lake Region was found ravenously feeding on the kidney of a recently skinned woodchuck. After feeding it showed no fear, and allowed itself to be picked up; it seemed very sleepy and slept for about a half-hour before running away. This individual was badly infested with fleas. Another juvenile taken July 1 in the same region was infested with small patches of red seed ticks around the anus, anterior to the genital opening, on the belly, on the thigh, and at the base of one ear.

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Six small embryos were found in an adult female taken in the Cisco Lake Region July 16.

Sciurus carolinensis leucotis. Gray-squirrel.

In 1911, J. E. Marshall reported that a few occurred near Gogebic Lake.

Glaucomys sabrinus macrotis. Mearns Flying-squirrel.

Black ash swamp, 1.
Hemlock forest, 1.
Wet hardwood forest, 2.
Dry hardwood forest, 1.

Two were taken in the Cisco Lake Region and three near Gogebic Lake in Ontonagon County. A female taken July 4 near Fish-hawk Lake was still suckling young, and contained no embryos, but a female taken July 6 in the same region contained five small embryos. An immature female taken August 27 near Gogebic Lake was without embryos.

Castor canadensis michiganensis. Woods Beaver.

Leather leaf bog, house.

Two houses were found in the Cisco Lake Region, both being in leather leaf bogs near deep water. Around the house studied there was an incomplete moat connected with a channel leading to deep water, and canals and tunnels radiated out through the bog. No beavers were observed

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nor secured, but fresh cuttings were noted at the edges of some of the "forms" in the bog.

A few beaver are reported to occur near Little Girl's Point and near Gogebic Lake. E. E. Brewster in 1895 wrote Dr. Gibbs that it was not uncommon in Gogebic County and in probably all the counties of the Upper Peninsula where trapping and lumbering had been discontinued; he stated that beaver were appearing again even in localities where formerly most sought. In 1911, J. E. Marshall reported it scarce near Gogebic Lake.

Lepus americanus phænotus. Snowshoe Hare.

Forest—shore, 1.
Arbor-vitae swamp, signs.
Leather leaf bog, signs.
Black spruce—tamarack bog, 1.
Wet hardwood forest, signs.
Dry hardwood forest, 1.
Shrub stage, 7.
Paper birch—aspens stage, 1.
Cultivated-field, 1.
Edificarian, 1.

Rare during the season of 1920 in the areas visited. In the Cisco Lake Region an adult female was taken in a trap set for muskrat under water on a brushy point. Other hares were occasionally seen in the evenings in the shrubby clearing around the camp house; and one was even seen on the porch. Droppings were found in a leather leaf bog, and a hare was seen at the edge of a black spruce—tamarack bog. Near Little Girl's Point a juvenile was taken August 13 in the upland hardwood forest, but was partly eaten in the trap by some carnivore; several were seen in shrubby clearings; and a young one was reported captured in an oat field by a farmer. Droppings were found in an arbor-vitae swamp. Near Gogebic Lake in Ontonagon County droppings were found in wet hardwood forest, in a thick growth of aspen and white birch saplings, and in an extensive tamarack bog.

An adult female taken July 4 at Fish-hawk Lake had much milk in the mammae. At the camp on Lindsley Lake June 27 one was seen to eat some wood ashes; and June 30 one was seen to feed on the blades of quack grass (*Agropyron repens*), which was identified by E. A. Bessey. [Pg 40]

Odocoileus virginianus borealis. Northern White-tailed Deer.

Forest—shore, 1.
Mud-flat, signs.
Tall-sedge, 1.
Grassy-meadow, 1.
Alder-thicket, signs.
Black ash swamp, signs.
Arbor-vitae swamp, signs.
Black spruce—tamarack bog, signs.
Hemlock forest, signs.
Wet hardwood forest, 10.
Dry hardwood forest, 7.
Shrub stage, 8.
Paper birch—aspens stage, 1.

Deer are abundant in the Cisco Lake Region; they are less common near Lake Gogebic; and only a few were seen near Little Girl's Point. Most of those seen were in the hardwood forest and in the brushy clearings, but trails and signs were common in many habitats.

Wolves were reported to prey extensively on deer in the region, and wolf dung examined August 7 near Little Girl's Point contained much deer hair and some deer bones.

Alces americanus. Moose.

J. E. Marshall reports that a moose was seen near Gogebic Lake in the winter of 1885, and an individual, perhaps the same one, was killed on Flambeau Reservation that year.



Fig. 1. Beach of Lake Superior just east of Little Girl's Point. A dirt bluff at the right of the picture. August 10, 1920.

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Fig. 2. Tall-sedge habitat in a beaver meadow on the west side of Gogebic Lake, Ontonagon County. September 1, 1920.



Fig. 1. Leather leaf bog invaded by tamaracks, Ontonagon River near Cisco Lake. August 3, 1920.



Fig. 2. Arbor-vitae swamp four miles southeast of Little Girl's Point. The ground is very moist. August 16, 1920.

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Fig. 1. Dry hardwood on a ridge four miles southeast of Little Girl's Point. Sugar maple, yellow birch, and linden are dominant. Undergrowth low. August 16, 1920.



Fig. 2. Virgin white pine grove, Gogebic County. Trunks up to four feet in diameter. Little undergrowth. August 17, 1920.

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FOOTNOTES:

- [1] H. T. Darlington, *Mich. Acad. Sci.*, 22nd Ann. Rept., 1921.
- [2] 1914. N. A. Wood, *Occ. Pap. Mus. Zool.*, No. 6.
- [3] N. A. Wood, *op. cit.*

Transcriber's Notes

Page [35](#): Changed "porcippines" to "porcupines".
Originally: One of these porcippines seemed to be very disinclined

Pages [42-47](#): Combined figure captions and images.
Originally: Images were on pages following their captions.

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