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THE MAMMALS OF MARION ISLAND, GRAND
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Marion Island, which comprises 215 acres, is slightly oblong in shape, and is located in the western branch of Grand Traverse Bay, an arm of Lake Michigan. To the north is a small peninsula, called Bassett Island on some maps, which perhaps may be separated by water from the main part of Marion Island during heavy winter storms, as it is joined only by a low neck of land.

A high hill with a very steep bluff to the northwestward occurs on the northern portion of the island. All the exposures examined are of glacial drift. The shores in general are rocky, although sandy shores occur in a few protected places.

Although the water is mostly quite shallow near the shores there is little development of aquatic vegetation, probably owing to the heavy waves which frequently beat upon the island. In a somewhat protected bay near the northeastern

part of the island there are some patches of bulrush growing in the water a short distance from shore, and the shore here and in a few other protected situations is bordered by a growth of bulrushes and common rushes. In general, however, the beach has only a scanty growth of vegetation or none at all.

In the low depression between Marion Island proper and "Bassett Island" there is a small development of marsh, growing on wet muck mixed with gravel. A few other such marshy areas are found in protected situations on the upper beach.

The island is covered, with the exception of the narrow beaches and the marshy areas just noted, with a splendid growth of hardwood timber. The dominant species of trees in this forest vary in different parts of the island, part being dominated by Norway pine, part by white birch, part by beech, but most by hard maple. Although many of the trees in this forest are of good size, the forest itself is not mature, and the longer-lived trees are far from their maximum growth. It is probable that the present forest is not more than 100 years old; it may not be more than 75 years old. Probably the original forest was destroyed by fire or cutting in the early part of the last century.

Intensive study of the mammals of Marion Island was carried on from July 23 to July 28, 1923, the work being supported by the State Department of Conservation. For permission to study the fauna of the island we are much indebted to Mr. Henry Ford, who owns the island and has kept it in its native condition.

The personnel of the party working on mammals consisted of Josselyn Van Tyne, A. Scott Warthin, Jr., and the author. In addition T. H. Hubbell was with the party as entomologist.

Numerous traps for small mammals were set in the various types of habitats present. No trapping was done for the larger mammals, but careful search was made for evidences of the presence of the various species which might be present. It is believed that for at least the smaller forms we have learned

the fauna quite accurately and that mammal species not found by us, except the bats, must be very rare, if any such occur on the island.

As is usual with islands, the fauna of Marion Island is much more scanty than that of the mainland of the southern peninsula of Michigan. We found only five species of mammals, and have a record for one more, making a total of six species known to inhabit the island. Probably a few other species of the larger mammals will occasionally, under natural conditions, visit the island across the ice in winter, for the island is only a little over a mile from the mainland. Several species of bats must occasionally occur, but we saw none during our stay.

This scanty fauna is evidently due in part to the relatively few types of habitats present on the island. However, some species of mammals normally associated with the hardwood type of forest are apparently not found on the island. Most conspicuous of these are the squirrels, which we did not find there, although they are common in similar forests on the mainland.

It seems certain that numerous species of mammals, which might find a congenial home on the island, have so far failed to find their way across the separating barrier of water. It may be that some of these species formerly did occur, but were killed off by or following the destructive fires which probably destroyed the original forest in the last century. It will be interesting to watch the process of events to note if additional species will in time be able to reach and establish themselves on the island.

A peculiar feature of the habitat distribution of the mammals on Marion Island is the occurrence of the meadow mouse (*Microtus p. pennsylvanicus*) commonly in the hardwood forest. It was taken in numbers in the parts of the forest dominated by Norway pine, as well as in the parts of the forest dominated by hard maple. Indeed, on this island it was as common in the forest, apparently, as in its more normal

marsh habitat. It is distinctly unusual for this species to occur in heavy forest; it is rare even in the forest edges; and usually it avoids forest entirely.

MAMMAL HABITATS

Beach. Most of the beach around Marion Island is covered by gravel and stones, in sizes up to that of a man's head. Sandy beach occurs only at a few places. The beach is usually moderately wide, averaging about 10 meters, though in some places it is 20 meters or more in width. The slope of the gravel beach is in general very gradual, and a small amount of muck is found under and around the stones. Vegetation on the beach is in general scanty: a thin growth of sedges and rushes often occurs, and along the upper border of the beach there are usually a few grasses and annuals. Along the upper border, also, especially in places where the beach does not abut against the forest, there is often a thin line of shrubs dominated by dogwood. In July, numerous sprouting hard maples were present in lines on the beach. A small amount of drift sticks and logs is found on the beach. At a number of places around the island is found a rampart of large rocks near the upper edge of the beach, the result of ice action. In protected places the growth of rushes on the beach is heavier and forms the reed marsh habitat, which is described in the next section.

Reed marsh. In protected bays on the island a growth of the bulrush (*Scirpus validus*) and common rush (*Scirpus americanus*) dominates the lower beach, extending out into the shallow water for some distance. In a protected area on the northeastern side of the island a thick growth of the reeds is found on the beach over a distance of at least 300 meters, being in places 25 meters or more wide. Growths of these reeds also cover some shoals a short distance off shore. In the water the bulrush is dominant, while on the drier part of the beach the common rush is found almost solely, but there is a considerable width of beach in which the two species occur mixed together.

On the low ground between Marion Island proper and the so-called Bassett Island to the north is found a rather extensive development of marsh, growing on a gravel and muck substratum. The twig-rush (*Cladium mariscoides*) is a prominent plant here, although other kinds of rushes and sedges also occur. Toward the drier edges of the marsh, grasses and other herbs appear, and finally the rushes and sedges drop out.

Pine forest. On sandy soil on the northeastern side of Marion Island there is an area about 150 meters across where pines are dominant over the hardwoods found on most of the rest of the island. Norway pine (*Pinus resinosa*) is the common pine in this area, with trunks measuring up to about .38 meter in diameter. A few white pine (*Pinus strobus*) occur also, some of these having trunk diameters of about .45 meter. There are numerous old white birches (*Betula alba papyrifera*), indicating that the pines are following a birch stage in succession. Arbor vitae (*Thuja occidentalis*), elm (*Ulmus* sp.), and red oak (*Quercus rubra*) occur rarely. Seedlings and saplings of balsam fir (*Abies balsamea*) are numerous. The underbrush mostly is scanty and formed largely of yew (*Taxus canadensis*), but in a few places the undergrowth is rather heavy, being composed mostly of young forest trees. There are numerous small shrubs of cherry (*Prunus* sp.). Only a few small seedlings of hard maple occur, indicating that it will be a long time before this pine forest is succeeded by the hardwood type of forest. On the ground is a thick carpet of dry pine needles.

Immature hardwood forest. Most of Marion Island is dominated by the hardwood type of forest, which is the climax type of the region. However, as previously noted, this type of forest on the island is not fully mature, and is probably less than 100 years old, having apparently been destroyed by fire, perhaps accompanied by other causes, in the early part of the nineteenth century.

In the greater part of the area covered by hardwood, the hard maple (*Acer saccharum*) is dominant. These maples

are all young trees having trunk circumferences of 2.0 meters or less. A few white pines, with trunk circumferences up to 2.33 m., occur, while Norway pine is rare, reaching trunk circumferences up to 1.45 m. There are numerous small balsam firs and elms and a few beeches (*Fagus grandifolia*) of various sizes. There are a few red oaks, reaching trunk circumferences up to 2.15 m., and also a few white birches, with trunk circumferences up to 1.34 m. The underbrush is scanty in this forest, many areas being covered only by dead leaves, though numerous young hard maples occur, and extensive areas are covered by mats of yew.

On the eastward slope of the high hill on the north end of the island is a small tract dominated by beech, here growing in nearly a pure stand. One trunk reaching a circumference of 2.35 meters was measured. The undergrowth in the beech forest is almost entirely low seedling beeches, only a few seedlings of hard maple occurring.

On some of the lower, wetter ground around the edges of the island, particularly at the northern end, the white birch is still the dominant tree, most of the trees being very old. Mixed with the birches are arbor vitae and balsam fir, but only a few of the trees have trunks with a diameter greater than about .3 meter. There are many dead logs on the ground. The underbrush is largely of yew and dogwood.

LIST OF MAMMALS

Blarina brevicauda talpoides. Bob-tailed Shrew. Common. July 25-27, 4 were taken on the beach, 4 in pine forest, 17 in hardwood forest dominated by hard maple, and 2 in old white birch forest.

Mustela noveboracensis noveboracensis. New York Weasel. An adult male was trapped July 25 in a runway along a high bank at the upper edge of the beach adjacent to the immature hardwood forest. This was on the northeastern side of the island.

Mustela vison mink. Mink. Joe Nelson, a resident on the mainland near Marion Island, reports that a few mink are found on the island.

Peromyscus maniculatus gracilis. Michigan Deer-mouse. This is the most abundant mammal on the island, 69 in all being taken between July 24 and July 27. Of these, 20 were taken on the beach, 3 in the marsh, 5 in pine forest, 16 in old white birch forest, 22 in the immature hardwood forest, and 2 in the old dance pavilion on "Bassett Island." They are thus shown to be generally distributed, but most common in the deciduous types of forest.

One immature young was taken in a nest under a drift board on a sandy beach. On the wide beams under the rafters of the old dance pavilion were three large nests composed of hair, feathers, chewed-up paper, some dry leaves, and a little dry grass. These nests were occupied at this time. The hair had apparently come largely from the dried-up carcass of some cottontail rabbit, and the feathers largely from the nest of a duck. A merganser was nesting at this time under one of the buildings. Some excreta was in the nests. Around the nests were numerous eaten acorns of red oak, evidently from the previous winter.

No embryos were found in any of the ten adult females taken.

Microtus pennsylvanicus pennsylvanicus. Pennsylvania Vole. Common and generally distributed over the island. Between July 24 and 27, forty-seven individuals were taken. Of these, 9 were taken on the beach, 7 in marshy places, 5 in pine forest, 17 in hardwood forest, and 9 in the grassy clearing around the old dance pavilion. The abundance of this form in the heavy forest is quite remarkable. Runways were common in the marshes also, and individuals were seen in the evenings among the rushes on the beach down almost to the water's edge. One nest containing an immature young was found under a log on a gravelly beach having a light growth of rushes. In the clearing around the old dance pavilion

runways were frequent in the grass and low raspberry bushes, and on July 24, a cloudy day, adults and young of various sizes were seen running about throughout the day. Runways were present under nearly every log or board lying on the ground, and several nests were found.

One nest, made of dried grasses and some shredded roots, was placed against the side of a long pole, about 3 inches in diameter. A runway ran partly under the pole and partly alongside the pole, under the grass. The small nest, consisting of about a handful of nest material, was placed over a slight enlargement at a fork in the runway, which here opened directly to the outside world. The pole lay under an apple tree and numerous small green apples had been blown to the ground by the wind. The runway and nest were well sprinkled with partly eaten bits of these green apples.

Another nest was found under a board. The nest was just a small amount of dry grass over a slight enlargement of the runway, which ran lengthways under the board. Numerous freshly cut lengths of grass lay scattered along the runway. Excreta was scattered thinly along the runways and in the nests of both of these mice.

Openings to burrows under the roots of trees were observed in at least three cases to belong to *Microtus*, which were either seen to enter the burrows or were trapped at their mouths. These burrows were under the roots of apple, linden, and cherry trees, respectively.

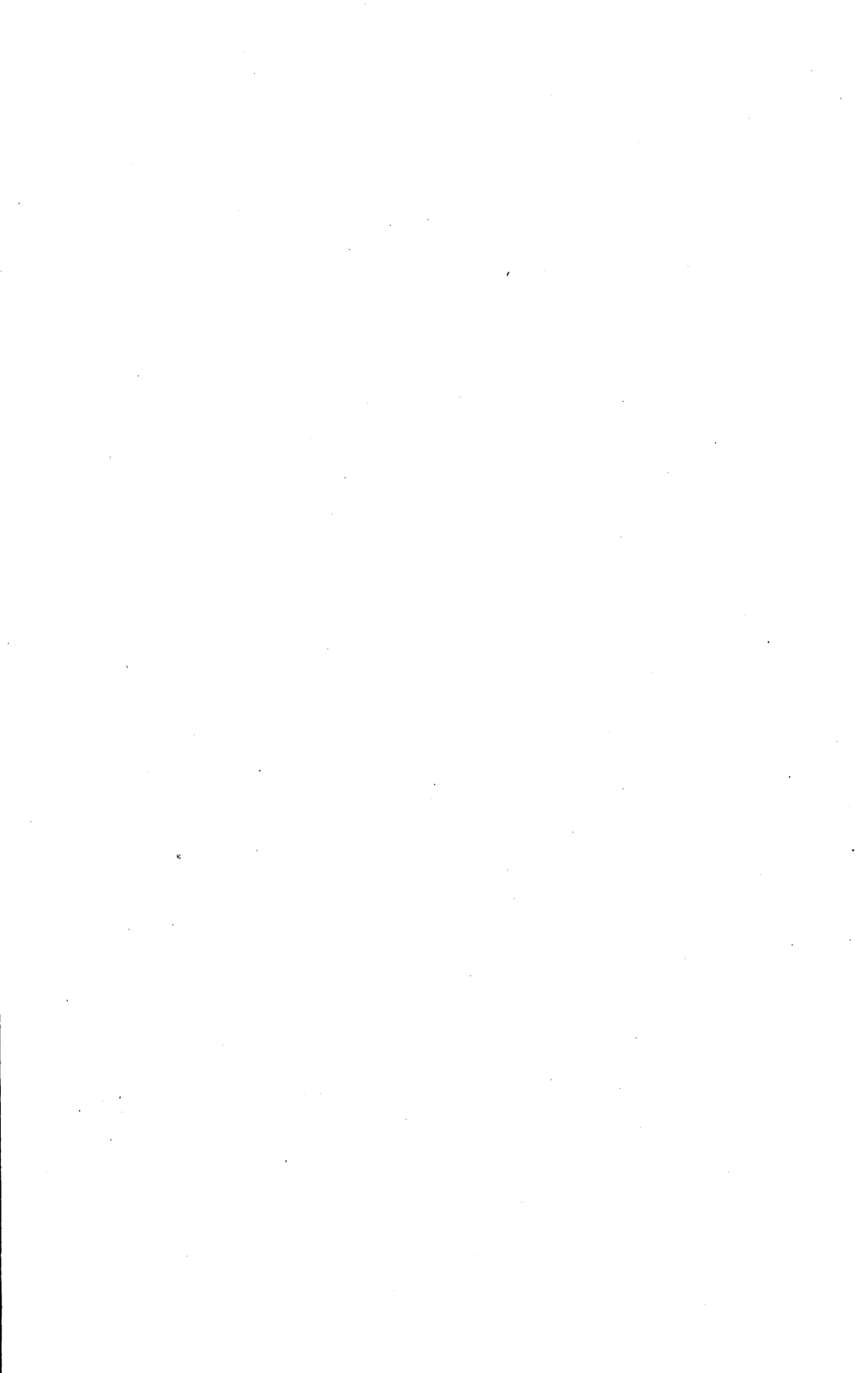
Embryos were found as follows:

July 24: 4 embryos, very small.

July 25: 4 embryos, very small; 5 embryos, very small.

July 26: 4 embryos, 21 mm. in length.

Sylvilagus floridanus mearnsii. Mearns Cottontail Rabbit. Several were seen around and under the buildings at the old dance pavilion, in the marshes, and among the rushes on the beach. An immature female shot on the evening of July 26 had a short piece of the stem of common rush (*Scirpus americanus*) in its mouth, and had evidently been feeding on this plant.



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PLATE I

FIG. 1. The north-eastern part of Marion Island. In the foreground is a gravel beach, with fringing vegetation on the right. Along the beach in the distance is a growth of rushes. In the background is the hardwood forest of the main part of the island. July 26, 1923.

FIG. 2. Immature hardwood forest on Marion Island. The trees here are mostly hard maple, associated with a few red oak, beech, elm, and balsam fir. In the middle of the picture is a patch of yew. July 27, 1923.

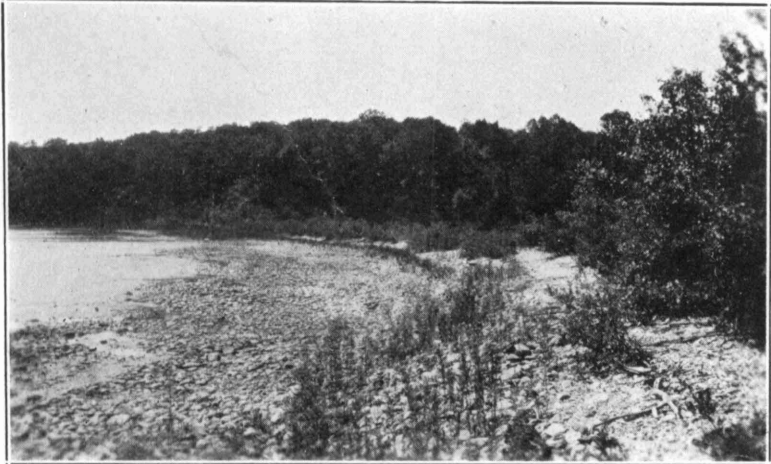


FIG. 1



FIG. 2



