VEGETATION OF THE McCORMICK RESEARCH NATURAL AREA

FREDERICK T. METZGER*

THE 17,000-ACRE MCCORMICK TRACT, nestled in the Michigamme Highlands of Michigan's Upper Peninsula, has rested quietly since the white pine loggers broke camp 70 years ago. The few occasional visitors have been hikers, fishermen, hunters, and trappers, who left little imprint on the land. The roads that eventually dissected the surrounding area never penetrated here. This untrammeled and undeveloped condition makes the McCormick tract, willed to the U. S. Forest Service by Gordon McCormick in 1969, an especially valuable experimental forest.

It was quickly decided that a portion of the area should remain undisturbed. Because of its unique land features and northern hardwood forests, the northeastern portion was designated a Research Natural Area of the National Forest System in 1971. Encompassing 3,675 acres, it is the largest such area in the northern hardwoods region.

A Natural Area, because it remains undisturbed and undeveloped, serves an important scientific purpose. It provides a bench mark with which we can compare forests that have been altered by man's activities, and so assess man's impact on them. We also can learn much simply by observing how a natural, dynamic forest functions and changes over time.

Research was begun in this area in 1970. Plant communities—from the smallest mosses to the tallest trees—were inventoried, and will be reinventoried at regular intervals in the future. By comparing these measurements with similar ones made in experimentally logged areas, we can determine how northern hardwood forests respond to such use.

The story of the vegetation on the Natural Area begins over 12,000 years ago, when Pleistocene glaciers covered the area. The bulldozing effect of the ice wrought major changes in the landscape and vegetation. All plant communities in the path of the ice perished, their members surviving only in refuges beyond the advance of the glaciers. New communities formed in the wake of the glaciers, changing constantly through time as new species appeared and as the environment changed. New plants appeared continuously, coming from many directions, each at its own pace.

Glaciers advancing southward from Lake Superior's basin encountered the hilly remnants of an ancient Precambrian mountain system here. There highlands diverted the ice's major thrusts to the east and west over lower ground. The blanket of till that these glaciers deposited failed to completely obliterate the older landscape, as evidenced by the rock-cored Crow's Nest and Pinnacle Rock still protruding through the till. Other hills composed of till were left when the western flank of the Silver Lake Moraine reached into the Natural Area.

The waning of the glaciers did not lessen their impact. Torrents of meltwater followed, carving new waterways and deepening old channels. As the flows quieted, their tremendous loads of sand were deposited in outwash plains on the western part of the area and the Yellow Dog plains to the northeast, and as sand terraces along the Yellow Dog River. Finally, as the freshly exposed, unprotected soils dried out they were blown about by strong winds accompanying the glaciers. Deposits of loess covered much of the Natural Area as a result.

Plant communities have over time deposited a convenient record of their development. Pollen and plant detritus collected in layers of sediment and was preserved at the bottom of ponds and lakes. Linda Brubaker, a graduate student at the University of Michigan, recently sampled such sediments from Lost Lake, Camp 11 Lake, and Yellow Dog Pond. Based on radio-carbon dating of the pollen contained in these sediments, she has determined the Natural Area's vegetative history.

According to the pollen record, the early landscape was dominated by forests of jack and/or red pine.[1] Interspersed were patches of spruce and balsam fir, probably occupying the moister sites. Birch, and surprisingly, oaks and elms were also present around 9,000 to 10,000 years ago.

Frederick T. Metzger is Associate Silviculturist at the North Central Forest Experiment Station, Northern Hardwoods Laboratory, Marquette, Michigan.

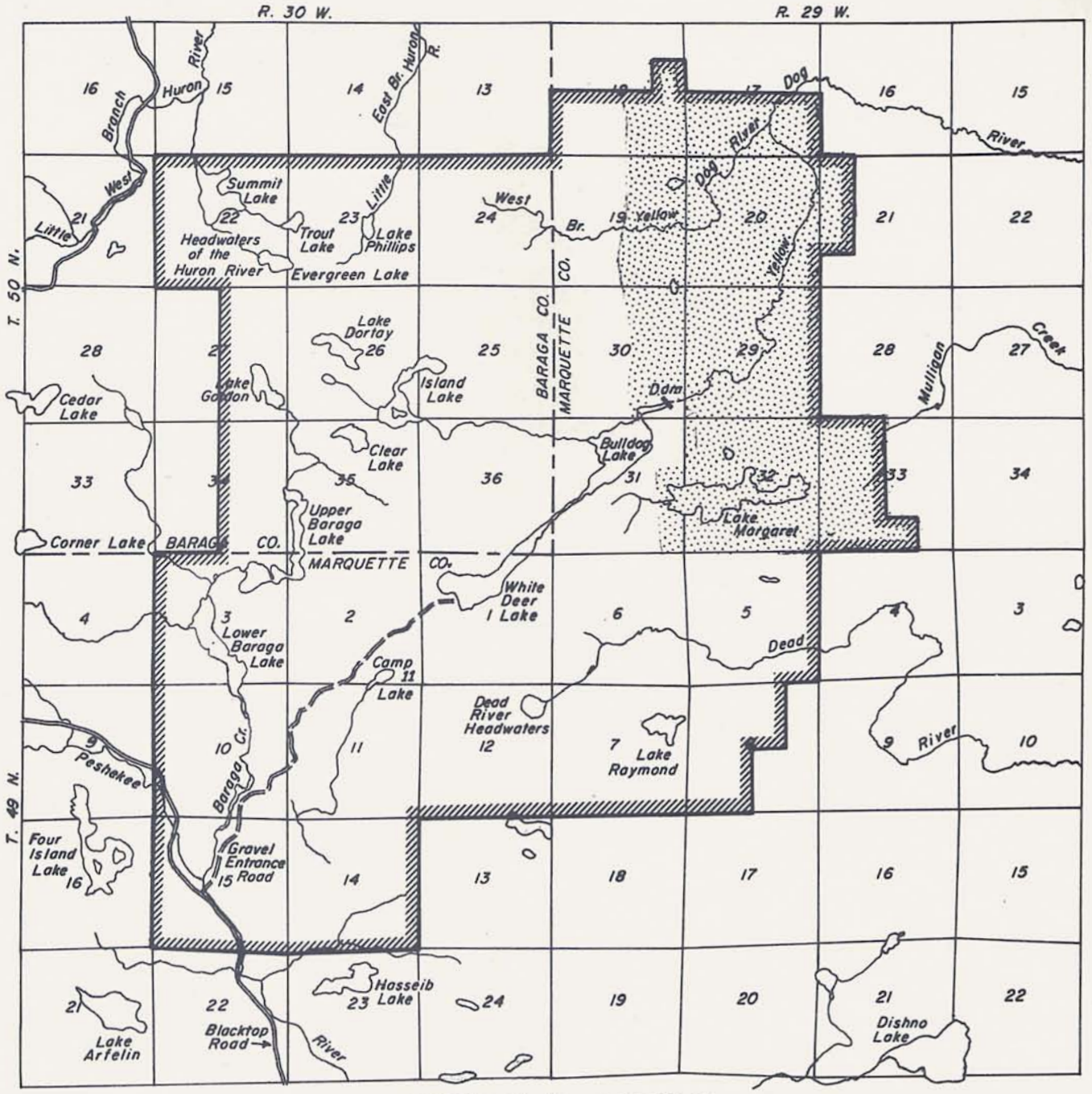
Vegetation Inventory begins with the Forest Floor.
Agfachrome by Ron Winch.

Barage Lakes.
USFS photo.

A period of warming followed glaciation, reaching its peak 6,000 to 8,000 years ago. Spruce, fir, and larch were fatalities of this change, their pollen almost disappearing from the sediments. White pine flourished under these conditions, reaching its greatest numbers ever. At Lost Lake white pine pollen jumped from 10 to 70 percent of the total in a period of 1,000 years. There also were significant amounts of pollen from deciduous trees, which do not produce pollen as copiously as pine. Pine undoubtedly dominated the forest during this period, but oak, birch, ironwood, and alder were important components also. These ancient forests were probably more like the present-day forests of southern Michigan than those occurring on the Natural Area now. Hemlock, which first appeared about 6,000 years ago, rapidly became an important member of the forest, even more so than today.

About 4,000 years ago the weather became cooler and more humid, causing major changes in the plant communities. White pine numbers declined while birch increased; in fact, about 40 percent of the pollen at that time came from the birches. Spruce and balsam fir also reappeared. The presence of either yellow or paper birch suggests that these forests were not stable

[1] *Unfortunately, the fossil pollens of closely related species as jack and red pine are not distinguishable.*



CYRUS H. Mc CORMICK EXPERIMENTAL FOREST
OTTAWA NATIONAL FOREST

SCALE

0 1/2 1 2 3 Miles

MICHIGAN MERIDIAN
1968

National Forest Boundary

McCormick Research Natural Area

Vanishing evidence of logging done long ago.

—that fire or wind periodically set back succession. Less drastic disturbances probably favored yellow birch, other associated hardwoods, and hemlock, whereas fire more likely created the conditions best suited for paper birch, aspen, and perhaps even white pine.

Plant communities in and near the Natural Area have differed throughout their history, reflecting the influence of local conditions on the vegetation. This suggests that the region has always been a mosaic of communities, each responding in its own way to disturbance, climate, and the introduction of new plants.

The importance of local site conditions is best displayed in the communities on the sand plains around Yellow Dog Pond and the till soils around Lost Lake, only 4 miles apart. Although both of their contemporaneous, early forests were dominated by jack-red pine and spruce, there was also a tundra-like community on the sand plains containing sage, Hudsonia, sedge, and ragweed. Later the openness of the sand plains continued as grass-sedge communities replaced the tundra. About 6,500 years ago the sand plain communities stabilized, their jack-red pine forests becoming much like those of today. At Lost Lake, however, communities kept on changing continuously.

The latest chapter in this history begins about 100 years ago, when man became an important ecological factor in these forests. About the turn of the century, the white pine was logged. The loggers were limited to taking conifers because the remoteness of the area required river drives to get the logs to the sawmills. Operations centered at a camp on Bulldog Lake, where a splash dam was built to provide the extra surge the Yellow Dog River needed for the spring log drives. The camp generated a large appetite for firewood, which was sated by nearby hardwoods. A sugar maple along an old tote road a mile north of camp testifies to this need. An undercut was noted in the tree but it was never felled by making the back cut. It stands today, axe marks still evident but obscured by the closing of the wound. With logging also came man-caused fires, as evidenced by charcoal on many old stumps.

Little cutting has been done on the Natural Area since the white pine logging. The McCormicks cut only firewood for the White Deer Camp, and that need was more easily filled away from the Natural Area. They were deeply concerned about the white pine and may have altered the area's ecology in yet another way. They attempted to control blister rust disease by eradicating gooseberries and currants, the alternate hosts of the disease.

Today sugar maple dominates the Natural Area's vegetation. In most stands it is by far the most abundant species, in both the understory of seedlings and saplings and the overstory of mature trees. If forest fire protection continues, maple's future is secure. It is the species best adapted to the deeply shaded

White Pines left by loggers are immense.
USFS photo.

Measuring girth and height of big trees.

forest environment typical of the Natural Area, enabling it to outcompete the others. Its competitors either need more sunlight to grow or find a forest floor littered with maple leaves an unsuitable place for their seeds to germinate.

Many features of the maple-dominated stands were not altered greatly by logging. Evidence suggests that out of the 80 to 100 large trees normally found on an acre, only a few were white or red pine. One change that was striking was in the forest's appearance, for the pines towered over their neighboring hardwoods by 50 feet or more.

The other species occurring in the sugar maple stands include red maple, yellow birch, red oak, black cherry, basswood, American elm, and white spruce. An occasional white pine still graces these forests, perhaps too small or poorly formed at the time the others were cut. The largest individual pines remaining are 4½ feet in diameter at breast height. Balsam fir and ironwood are present but seldom become tall enough to penetrate the forest canopy. Shrubs are not common in the understory, for sugar maple seedlings dominate this layer. But those occurring here are raspberry, beaked hazel, mountain maple, alternate-leaved dogwood, fly honeysuckle, bush honeysuckle, and juneberry.

At places where the present-day forest is a mixture of hardwoods, containing many red maple, yellow birch, and red oak, logging had a more pronounced impact. Originally white pine was abundant in these forests; probably from a quarter to half of the larger trees were pines. Removal of this many pines caused much disturbance to the site, giving new seedlings of several species a better chance of survival.

At the north end of the Natural Area there is an 11-acre stand that perhaps resembles the predecessors of these mixed forests. Of the 90 large trees per acre, 37 are white pine. They are not yet fully grown but already they tower over the red and sugar maple in the stand and are twice as large in girth.

Some portions of the Natural Area were so disrupted by logging or perhaps by a severe slash fire that the previous stand was destroyed. To warrant this much activity, these forests must have contained large numbers of pines. But under the open, well-lit conditions following disturbance, paper birch prospered; only now is it yielding to more shade-enduring hardwoods. These stands also contain an occasional bigtooth aspen or red pine. The shrub layer is more prominent in these forests. Beaked hazel, blueberry, mountain ash, honeysuckle, trailing arbutus, juneberry, gooseberry, and mountain maple are common. The seedlings vary from few to many, but when plentiful they are a mixture of species. On these sites sugar maple domination is even further away.

White pine may still appear abundant to a casual visitor. It frequently lines the shores of rivers and lakes, and its distinctive crown is prominent on the skyline above rocky ridges. But usually these stands are only a narrow margin of the more extensive hardwood forests beyond.

By the end of May there may still be snow lingering in the deeply shaded spots, but the warmth of the sun in the open has brought a variety of herbs to life. Drab, leaf-littered forest floors are colorfully converted by the foliage and blooms of spring beauty, dwarf ginseng, dog's-tooth-violet, false lily-of-the-valley, corn lily, star flower, and bunchberry. Pale corydalis dots the rockier spots while marsh marigolds splash yellow across the lower reaches. Their moment of glory is short, however, for in 2 weeks the canopy of leaves forming above returns the forest floor to darkness.

Summer brings a change in appearance as the flowers fade. Spinulose wood fern, shining and tree clubmosses, mountain rice, wood reedgrass, millet, bluegrass, sedge, and partridgeberry combine with the persisting leaves of the spring flowers to carpet the forest floor with green. Under the mixed hardwoods and pines there is also apt to be bracken fern, rattlesnake plantain, goldthread, wild sarsaparilla, and twinflower.

In fall the hardwood forests of the Natural Area become a kaleidoscope of color. Brilliant yellows, oranges, and reds of the birches and maples are offset by more subdued greens of the remaining pines. Then, as if embarrassed by their display of colorful exuberance, the hardwood forests retire meekly to leafless browns and greys for northern Michigan's long and snow-cloaked winter.

The McCormick Research Natural Area will serve the public in many ways in the future—esthetically, scientifically, and educationally. As research unlocks the secrets of its plant communities, new information will become available to aid in wise management of all our northern hardwood forests.

Measuring shrubs.
USFS photos.