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FOREST COMMUNITIES OF THE QUETICO PROVINCIAL PARK OF ONTARIO*

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The observations outlined in this paper are the result of trips in the Quetico during the summers of 1934, 1938 and 1939. A study of the vascular vegetation was not the primary purpose of these trips, but it was necessary to form some opinion concerning the forest communities. Numerous studies have been published concerning the Coniferous Forest, but none of these papers apply particularly to the forest communities of the Quetico.

Location

The Quetico Park lies in the southern part of northwestern Ontario, north of the Vermilion Iron Range in Minnesota. It is approximately bounded by longititudes 91° and 92° 30′, and by 48° and 48° 45′ north latitude. Map 52-B (Quetico) of the Topographical Survey of Canada includes all but the western part of its 1800 square miles of area.

Physiography

The whole area is a succession of low hills and irregular valleys. The deeper valleys are occupied by lakes and their connecting streams. Most streams are not navigable, but there are few, if any, landlocked lakes. This area is drained by the Rainy River whose waters are ultimately carried to Hudson's Bay by the Nelson River. The maximum elevation is approximately 1500 feet above sea level, the lowest 1200 feet.

Most of the numerous rock outcrops are of Laurentian granites. Some outcrops of the older metamorphosed Keewatin lavas are to be seen. Apparently there are no calcareous rocks in the park.

Soils of this area are diverse and failing other classifications might be grouped into mineral and organic soils. There are gradations between the two groups. On the upland occur rocky clays, loams and occasionally sand soils. A fine textured, highly organic soil develops on rocks primarily through the activity of lichens and bryophytes. In valleys containing streams of small gradient, a fine semi-organic soil is formed. Various types of peat are formed in poorly drained valleys. One extensive deposit of silty loam is found along the lower reaches of the Wawiag River. Pleistocene ice completely and repeatedly covered this area.

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CLIMATE

The climate of this area might be characterized as a sub-humid, cool temperate, continental type. Although Lake Superior is less than one hundred miles south, it apparently does not influence climatic conditions of the Quetico. There is closer agreement in the forms of the temperature curves of Belle Plaine, Iowa, and Virginia, Minnesota. Virginia, Minnesota, is the only long-time weather station near the Quetico. The average annual temperature of Virginia (through 1930 over a period of 37 years) is 37.9° Fahrenheit. The highest temperature recorded is 101° Fahrenheit, but the mean maxima for the months of June, July and August respectively are 74.9°, 79.6° and 76.3° Fahrenheit. The lowest temperature recorded is —45°, and the mean minima for December, January and February are 1.7°, —5.6° and —2.6° There is a growing season of about 100 days, which on the average begins May 29 and ends September 14 at Virginia. At this station killing frosts have been recorded as late as June 23 and as early as August 16.

Approximately one half of the annual precipitation of 27.6 inches at Virginia falls during the growing season. Generally speaking, there are few hard rains in the Quetico, and there is some precipitation on an average of once in every three day period during the summer.

VEGETATION

Smith (1892) in his report of the geology of the Hunter's Island, which approximately coincides with the Quetico, was of the opinion that this area was originally covered by a forest of white and red pine. He states, moreover, that at the time of his travels, in 1888, there had been three periods of fires. One period was in 1870, another in 1879, and another in 1885 or 1886. The first fires were apparently started by troops traveling along the Dawson canoe route. He gives a long list of lakes whose shores showed evidence of fire. Subsequent fires have pretty effectively removed the original vegetation. There are remnants of the original vegetation still to be found in moist valleys, small islands and on points of land. The present vegetation is a patchwork of light and dark green color. In general the light patches are stands of aspen or birch or aspen-birch. The dark patches are jack pine stands, or black spruce bogs. Jack pine is frequently found in pure stands or in combination with black spruce.

Jack Pine

Jack pine (*Pinus Banksiana Lamb.*) stands are most frequently found on dry, sterile, rocky, clay soil. Jack pine communities are even aged, and in the older stands, red and white pine seedlings are found. These pure stands of jack pine are probably not permanent, but are replaced by white pine-red pine. Mixed jack pine and black spruce (*Picea mariana* (Mill.) B. S. P.) are also found on rocky clay soil and this type of stand is best developed on north-facing slopes. In all stands of this type, black spruce seedlings were the only ones found. Perhaps this is a permanent community.

Aspen-Birch

Stands of aspen, (*Populus tremuloides* Michx.) birch, (*Betula papyrifera* Marsh.), or of aspen-birch develop on relatively deep loam soils that are found in valleys. While these deciduous trees may not always be found on the fewer but better sites, aspen and birch form the post fire tree community on the better soil areas. Seedlings of balsam fir (*Abies balsamea* (L.) Miller) and white spruce (*Picea canadensis* (Miller) B. S. P.) frequent in these stands, and spruce-fir-birch probably replaces them.

Black Spruce Bogs

The general characteristics of spruce bog forests are well known and little need be said about them except that they are frequent in the Quetico. Perhaps it might be well to mention that the conventional succession of tamarack (*Larix laricina* (Du Roi.) Koch) by black spruce is not apparent in the Quetico. Black spruce bogs are sometimes found on the slope of a hill. It is believed that these develop in small local depressions. Earlier stages of bogs are frequent. Bogs sometimes develop in water-logged clay with only a thin layer of peat. Such a bog is to be seen at Savanne, Ontario. White pine and balsam fir are sometimes present in bogs but they are so rare that little successional significance can be attached to their presence. Black spruce reproduces itself after fire in bogs.

White Spruce-Balsam Fir-Paper Birch

Spruce-fir-birch, which by some is considered the climax community for this area, is found mainly in moist valleys on loam. It seems to be permanent for it reproduces itself. These stands are not numerous, nor are they large, but from the various aged trees present, the suggestion is made that they are probably not

after-fire-stands, at least recent fires. Balsam fir does not attain a great age, but it maintains itself as a codominant by its ability to reproduce in its own shade. Balsam fir sometimes appears with aspen and birch as an after-fire tree. On the lower reaches of the Wawiag River there is a large stand of spruce-fir-birch growing on a silty loam.

WHITE PINE-RED PINE

Fire scarred remnants of white (*Pinus Strobus* L.) and red pine (*Pinus resinosa* Ait.) stands are seen all over the park, but there are few stands of any considerable size. Red pine may form pure stands on dry soil such as a sand hill. Frequently it is found growing in rock crevices where it can mature. One all-aged red pine stand growing on sand showed evidence of burning, but most of these trees are healing the scars.

White pine is usually not found with red pine in the dry habitats, but red pine grows with white pine on the better sites. The trees are codominant in these habitats, and sometimes attain large size. Trees of a diameter of three and one-half feet have been measured although they are the exception, rather than the rule in these remnants of former more extensive stands. Perhaps white pine-red pine is a climax community.

DECIDUOUS FOREST TREES

American elm (*Ulmus americana L.*) is found with river maple (*Acer saccharinum* L.) along the Wawiag River as scattered specimens, but in some habitats it forms a community with black ash (*Fraxinus nigra* Marsh.) These stands are found in wet valleys that were at one time beaver ponds. Perhaps these may be considered outposts of the deciduous forest. Seedlings of balsam fir are found in the driest of these stands, and perhaps this community is replaced by spruce-fir-birch.

Basswood (*Tilia americana* L.), northern red oak (*Quercus borealis* Michx.), and bur oak (*Quercus macrocarpa* Michx.), are other deciduous forest trees found as more or less isolated specimens.

NORTHERN WHITE CEDAR

Northern white cedar (*Thuja occidentalis* L.) is a frequent tree on lake shores, but cedar swamps are few. Cedar is sometimes found as a codominant with black spruce. Stands of cedar appear to be replaced by spruce-fir-birch.

Succession

It seems that in the area considered there are two climax communities, white pine-red pine, and spruce-fir-birch. Smith, *loc. cit.*, was of the opinion that white pine-red pine was the climax community. No doubt it was the most extensive forest community. Halliday (1939) suggests that in recent geologic time there has been a cooling of the climate of southern Canada and that this has permitted the more northern spruce-fir-birch to invade territory formerly dominated by pine. This invasion of more northern species has been facilitated by man disturbing the original vegetation.

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