

SOILS OF THE MENOMINEE INDIAN RESERVATION
AND THEIR SUITABILITY FOR AGRICULTURE

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This inventory of the soil resources of the Menominee Indian reservation was made in an attempt to determine the potential for agriculture. The accompanying soil association map is not detailed enough for farm planning purposes but should prove helpful in area-wide planning.

Description of Area

The Menominee reservation consists of three townships in Oconto County and seven townships in Shawano County in the northeastern part of Wisconsin. It comprises about 233,902 acres or about 365 square miles. The topography is characteristic of a glaciated region with nearly level outwash plains, undulating ground moraine and moderately steep terminal and recessional moraines. Surface drainage is provided by the Wolf River and its tributaries in the central and western parts of the reservation and by the Oconto River in the northeast corner. Many swamps and small lakes, especially in the eastern part, provide local collection basins for runoff waters. The 1949 Geologic Map of Wisconsin shows the entire area in the reservation as being underlain by Huronian and Laurentian bedrock of pre-Cambrium age. They consist chiefly of granites, gneisses, gabbros, porphyries, and some areas of Huronian sedimentary rocks.

F. T. Thwaites Pleistocene Geology Map of Northeastern Wisconsin shows that all of the reservation has been glaciated. Evidence of two separate substages of the Wisconsin glaciation, namely Cary and Valders, exists today. See glacial geology map, figure 2. Movement of the ice sheet in a westerly

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Figure 1

MAP OF WISCONSIN SHOWING
LOCATION OF MENOMINEE RESERVATION

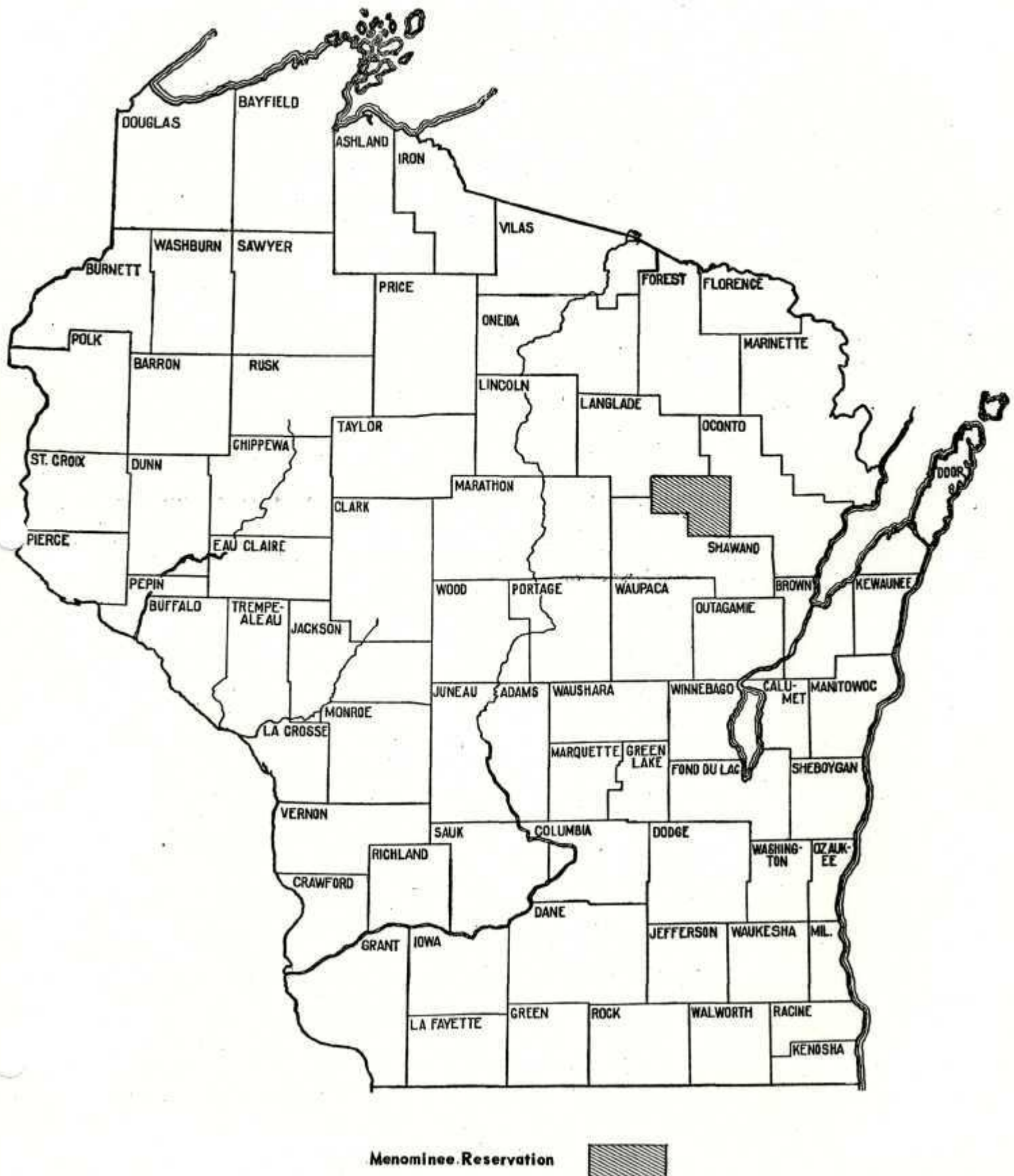
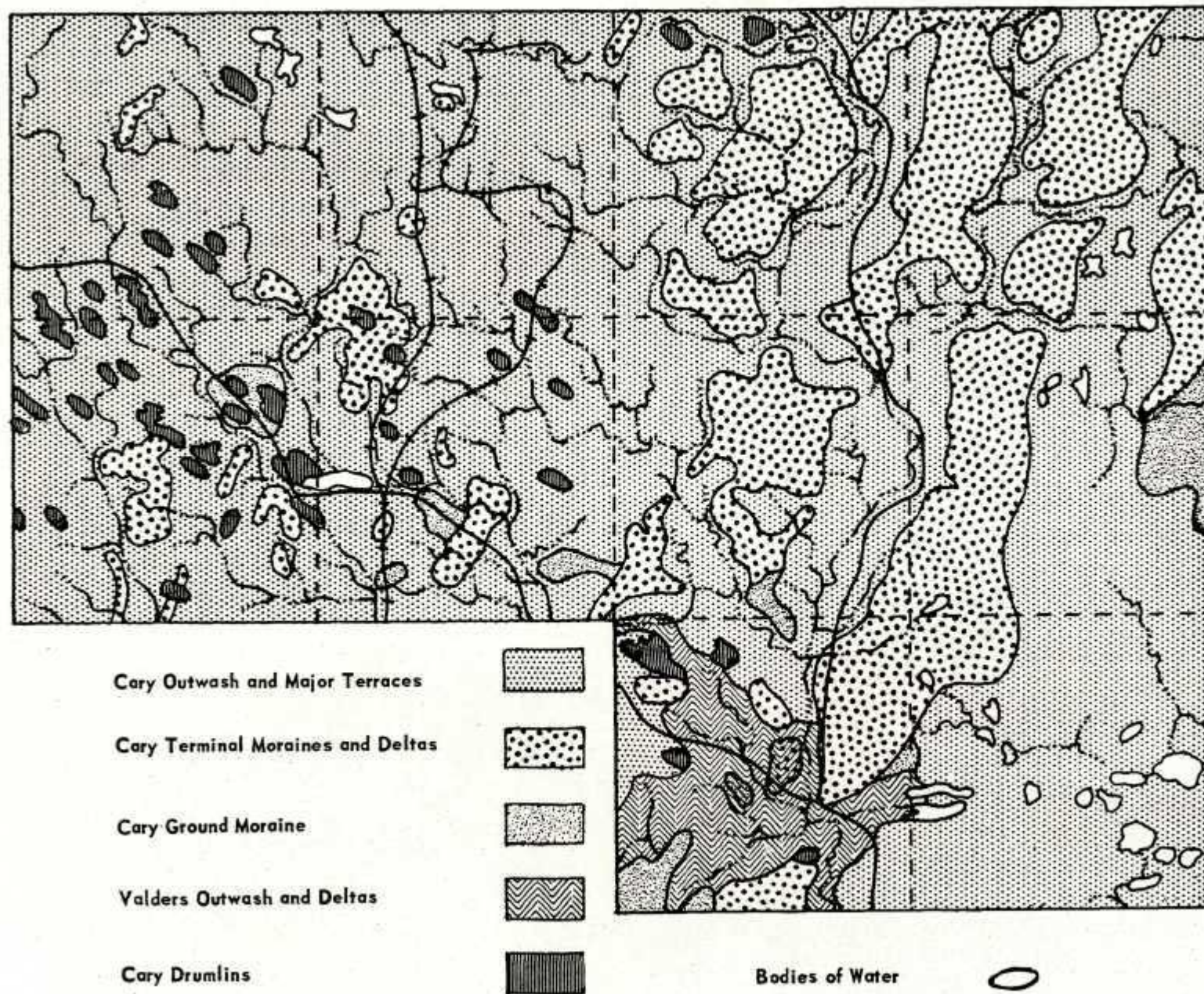


Figure 2 PLEISTOCENE GEOLOGY OF MENOMINEE INDIAN RESERVATION - F. T. Thwaites, 1941



direction over the reservation caused some of the granitic areas to be covered with a sandy drift. The source for most of the sandy drift came from Cambrium sandstone bedrock (Dresbach and Franconia members) which lies directly east of the reservation boundary. Many of the sandy outwash soils along the eastern edge of the reservation and west of Keshena are directly related to this sandstone parent material. Evidence of glacial action is very apparent on the rest of the area also. In some places all of the weathered material covering the granitic bedrock has been swept away leaving the bare rock exposed. Many of the undulating to rolling uplands have stony soils with gravelly or cobbly substrata.

The reservation has a continental type of climate with wide extremes in temperature between summer and winter. Proximity to the Great Lakes modifies this to some extent and gives this area a somewhat higher humidity than occurs in central and western Wisconsin. The average frost-free period ranges from 130 to 140 days. Mean annual precipitation is approximately 28 inches with 58 percent falling during the growing season of May to September inclusive.

History of Agriculture

Agriculture has been carried on by the Menominee Indians since the establishment of the reservation in 1854. The many abandoned farm sites and clearings scattered throughout the reservation indicate that farming has often been unsuccessful. Early land policies may have had a great deal to do with the decline of agricultural pursuits in the reservation. Also, it was much easier to clear the poorer sandy soils on nearly level topography as compared to the stony, fine-textured, but better soils on undulating to rolling topography.

In 1914, a forestry survey was made of the reservation. This survey, unfortunately, classified some 82,348 acres of land in the reservation which did not support a good forest cover as suitable for agriculture. As a result of

this survey settlement was encouraged largely on sandy soils of low moisture-holding content and low natural fertility, or the poorer soils as far as agriculture is concerned. Fine and Terman (see bibliography) indicated in their study that a resurvey of the area designated as suitable for agriculture in 1914 would reduce the acreage suitable for agriculture by 75 percent or more.

Old records indicate that the maximum acreage in cultivated land was reached in the period from 1920 to 1925 when some 3,600 acres were cropped. Since that time agriculture has declined on the reservation until at the present time, of the approximately 8,350 acres of cleared land, over 5,000 acres are idle, and much of the remainder is grazed or used for cutting wild hay.

How Soil Survey Was Made

The soil association map accompanying this report is the end product of combining all available published and unpublished information on the soils of the area plus a field check of major soil delineations. Aerial photographs with stereoscopic coverage were used to project the major topographic and soil conditions on to a base map. The delineations on the base map were then checked against all available maps of the same area including bedrock geology, glacial geology, and older soil maps. Checking the soil delineations in the field for series, types, and phases followed. This was carried out by transecting each township along major roads and trails, examining road cuts, observing topography, rock outcrops, stoniness, degree of wetness, type of vegetation, and other features of the landscape. Numerous profiles were also examined in detail in the course of these transects. Changes were made on the base map whenever the need arose.

Due to the complexity of soils and slopes and the small scale of the finished map (1 inch equals 1 mile) only the dominant soils and slopes are indicated on the map. This means that many small areas of other soils and slopes are often included in the delineations on the map. For example,

several small areas of Antigo silt loam on nearly level topography may be included in with a much larger area of Kennan loam on rolling topography. If the purpose of this map is kept in mind, which is to facilitate land use planning, these small inclusions will not essentially alter the use that can be made of this map.

Grouping Soils for Land Use Planning
Land Use Capability Units

Land may be classified in many ways to meet individual needs such as limitations for certain crops, lime requirements, suitability for irrigation or drainage, erosion control, tax assessment, productivity, etc. The Soil Conservation Service classifies land according to permanent limitations or degree of hazard for permanent use. Under this type of classification soils may be grouped according to limitations or erosion hazard into eight classes. These classes may then be subdivided into subclasses based on kind of limitations such as erosion, excess water, climatic, and soil factors. The subclasses may be subdivided again into land capability units based on physical characteristics of the soil types and phases. Land capability units are the final step in classifying land for use in applying soil and water conservation measures. A land capability unit may consist of one or more soil types and phases. Each unit consists of land which is sufficiently uniform as to soil, slope, erosion, and other permanent land characteristics to permit the use of the same crops and cropping systems with the same treatment. In terms of a farm, a land capability unit is all the land on a farm which has similar physical characteristics, needs, adaptations, and responses. Each soil phase included in a particular unit has about the same susceptibility to wind or water erosion under the same kind and condition of cover.

This type of a classification system simplifies the problem of classifying land according to agricultural potential by grouping soil types and phases

which respond the same to identical treatment. Table 1 below classifies the major soils found on the reservation into broad capability units.

Table 1. Land Capability Units, Menominee Indian Reservation

Soil names	:Mapping : 0 - 3% : 4 - 8% : 9 - 16% : 17 - 30%				
	:number	:Nearly level:	Gently sloping:	Sloping:	Steep
Norrie silt loam	1	I	IIel	IIIel	VIel
Goodman silt loam		I	IIel	IIIel	VIel
Kennan stony loams	2	IIel	IIIel	IVel	VIe
Iron River stony loams		IIel	IIIel	IVel	VIe
Elderon stony sandy loams		IIIIs2	IVs2	VIIs	VIIIs
Adolph loams	3	Vw	--	--	--
Deep peat and muck		IIIw9	--	--	--
Antigo silt loam	4	I	IIel	--	--
Stambough silt loam		I	IIel	--	--
Onamia loams		IIIs1	IIIIs1	--	--
Ottawa sandy loams	5	IIe7	IIIe7	IVe7	VIe
Ottawa loamy sands		IIIe7	IVe7	VIe7	VIIe
Berrien sandy loams		IIIw6	--	--	--
Omega loamy sands	6	IVs3	VIIs3	VIIIs	VIIIs
Coloma loamy sands		IVs3	VIIs3	VIIIs	VIIIs
Plainfield loamy sands		IVs3	VIIs3	VIIIs	VIIIs
Vilas loamy sands		IVs3	VIIs3	VIIIs	VIIIs
Shallow peat and muck over sand	7	Vw	--	--	--
Nekoosa loamy sands		IVs3	--	--	--
Morocco loamy sands		IVw	--	--	--
Newton loamy sands		Vw	--	--	--

NOTE: Most of the soils in the reservation have not been subjected to man-induced or accelerated erosion but only to normal geologic erosion.

Those areas which fall into Capability Classes I and II in Table 1 have the highest potential for agriculture in the reservation. They include such soils as Antigo, Stambough, Norrie, and Goodman on nearly level and gently sloping topography, and Kennan, Iron River, Onamia, and Ottawa loams on nearly level topography. These soils are all medium textured, have good water holding capacity for normal crop production, and are well drained. If cleared, there would be no serious limitations to cultivation and crop production on these soils. It must be emphasized, however, that suitability for agriculture may not justify clearing because of costs, loss of forest income, or damage to recreational values. This is especially true because land with high agricultural potential usually has a high productivity in forest uses.

Areas with moderate potential for agriculture fall into Class III. They include deep peat and muck, Elderon sandy loams, Ottawa loamy sands, and Berrian sandy loams on nearly level topography, Onamia, Kennan, Iron River loams, and Ottawa sandy loams on gently sloping topography, and Norrie and Goodman soils on sloping topography. The soils in this class rate somewhat lower than those with a high potential because of drouthiness, stoniness, steeper topography, or some other limiting factor that would reduce crop yields or limit their suitability for agriculture. This land with its present forest cover may have greater value to the tribe than it would have, if cleared. The best land use depends on factors other than suitability for agriculture alone.

All Class IV soils have a low potential for agriculture. Included in this class are Omega, Coloma, Plainfield, Morocco, Nekoosa, and Vilas loamy sands on nearly level, Elderon sandy loams on gently sloping, and Kennan, Ottawa, and Iron River loams on sloping topography. These soils, when cleared, are extremely drouthy, subject to severe erosion, or have other severe limitations for cultivation. Improvement of these soils for tillage is seldom economical. Average crop yields to be expected are relatively low or the soils

deteriorate rapidly when cultivated intensively. Large acreages and good managerial abilities are needed to make economical agricultural units on these soils.

Those areas which fall into Capability Classes V, VI, and VII are not suited for cultivation because of excessive wetness, drouthiness, stoniness, steep topography or erosion hazard. While some of them are suitable for limited forage production for livestock, they are best suited for timber production, wildlife refuges, and recreational areas.

The reader must bear in mind the definition of agriculture as used in this report is concerned only with the production of cultivated crops for sale, such as grains or forage, or for feed for livestock. It is recognized that timber or the growing of trees is as much a farm crop as corn or hay. Due to the wider range of soil conditions under which trees will make favorable growth and different limiting factors for tree production, the capability classes used for rating soils for cultivation cannot be used entirely for forestry. A few general statements, however, can be made concerning suitability of the above capability classes for forestry. Generally speaking the better agricultural soils are usually the highest producing soils for forestry. Then too, serious limitations for agriculture such as stoniness or wetness in a soil may not affect potential for forest production. While steepness of slope is a definite factor in determining potential of a soil for agriculture it does not have such an important bearing on forest. Sandy soils are often quite drouthy for cultivated crops with relatively shallow root systems, but if there is a water table within reach of tree roots they are often able to make excellent growth. It can readily be seen then that a soil which is not suitable for agriculture may be highly desirable for forestry production and, on the other hand, a good agricultural soil may be equally as good for forestry.

Potential Agricultural Areas

The generalized map on the following page indicates where the highest potential for agriculture exists in the reservation. Several factors were considered in the delineation of these areas. A favorable soil for agriculture of sufficient area was the primary factor. Nearness to other agricultural areas, availability of good markets and transportation systems, proximity to hydro-electric and telephone circuits, amount of land which had already been cleared in the area, and buildings available for farm families were other considerations used. It was believed that type of markets, crops that could be raised, climate, and nature of soils in this area would restrict the type of farming to be carried on to a livestock enterprise in most cases. This does not exclude the cash crop type of farming entirely, but in order for the latter to be carried on successfully a good fertility and management program will have to be maintained.

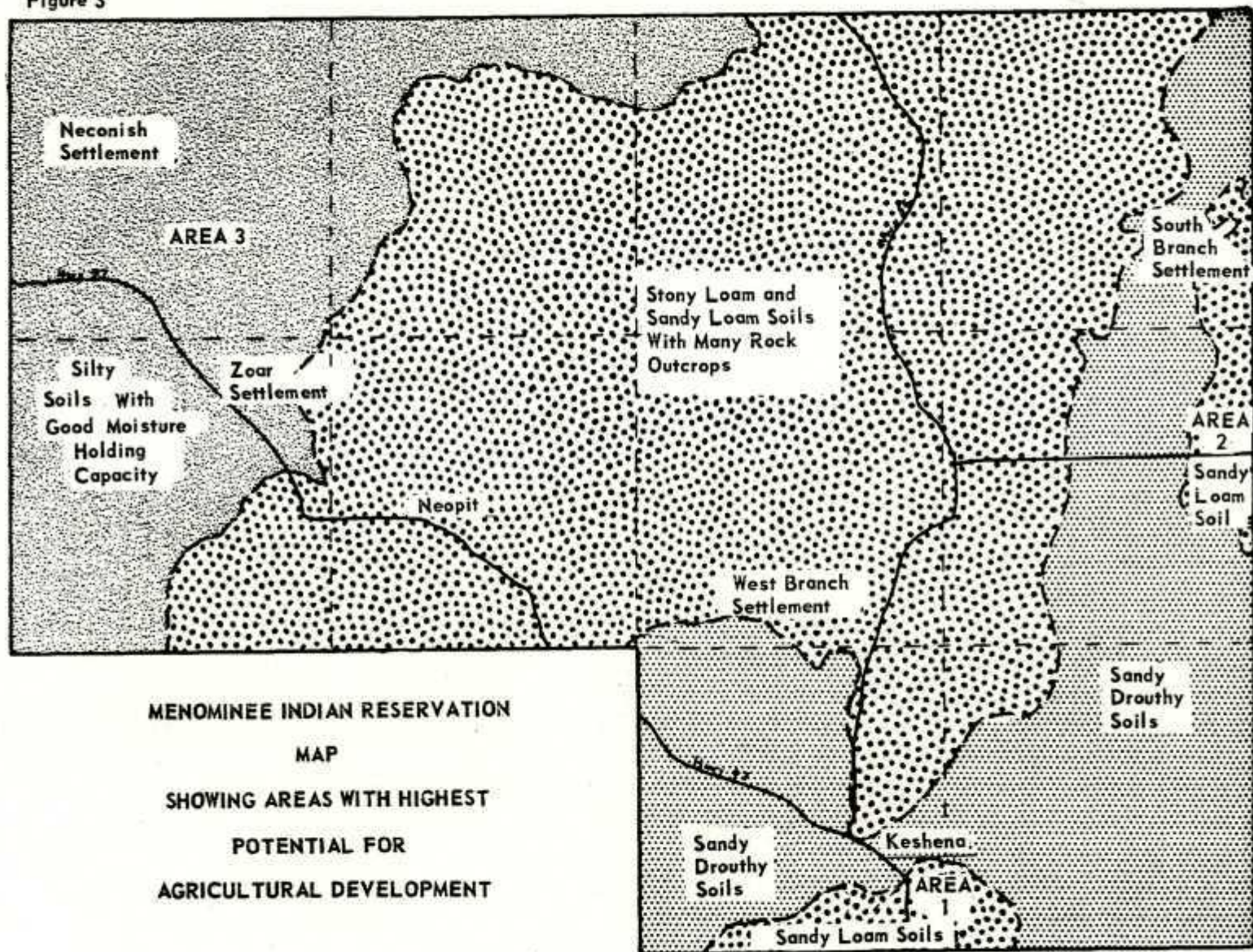
Area No. 1 along the southern edge of the reservation near Keshena and Area No. 2 along the eastern edge where Highway M enters Oconto County would seem to have some potential for agriculture development. The soils in these areas are essentially Class II and III land.

Area No. 3, comprising the western part of the reservation and including the Zoar and Neconish settlements, is composed of dominantly Class I and II land. Particularly if the demand for farm land should increase in the future, this area would have a relatively high potential for agriculture, both because of its soil characteristics and because of its proximity to other agricultural areas off the reservation.

Summary

While agriculture is not of primary importance in the reservation to date as a source of income, the potential for more extensive agriculture exists.

Figure 3



The estimated acreages of suitable soils for this purpose show there are approximately 30,855 acres of Class I and II land, and 28,765 acres of Class III land in the reservation. See Table 2 on the next page. The soils map accompanying this report shows the location and distribution of the major soil associations on the reservation.^{2/} In general the siltier soils in the northwestern and western parts of the reservation with their deciduous forest cover constitute most of the better land. The eastern edge of the reservation and the area west of Keshena is essentially a sandy outwash plain best suited for recreation and coniferous forests with the exception of a small area of better agricultural soils along the Oconto County line south of the Little Oconto River. An extensive belt running through the central portion of the reservation from north to south consists of mixed coniferous and deciduous forests on glacial drift. This area contains many bedrock outcrops and in general the soils are quite stony. Lower moisture holding capacity, stony nature of the soils, and topography on which they occur offer serious limitations for development of agriculture at the present time.

^{2/} A soil association map of the reservation, at the scale of one inch per mile, is available on request to the Department of Agricultural Economics, College of Agriculture, University of Wisconsin.

Table 2. Estimated Acreages of Soil Association Phases
on Menominee Indian Reservation

Mapping symbol	Soil association phase	Acres	Percent of area
1-B	Norrie and Goodman silt loams, gently sloping	8,180	3.5
1-C	Norrie and Goodman silt loams, sloping	6,310	2.7
2-B	Kennan, Iron River, and Elderon stony loams, gently sloping	18,230	7.8
2-C	Kennan, Iron River, and Elderon stony loams, sloping	78,677	33.8
2-D	Kennan, Iron River, and Elderon stony loams, steep	6,800	2.9
3-A	Adolph loams and deep muck and peat, nearly level	14,500	6.2
4-A	Antigo, Stambaugh, and Onamia loams, nearly level	4,900	2.1
4-B	Antigo, Stambaugh, and Onamia loams, gently sloping	23,800	10.2
5-A	Ottawa and Berrien sandy loams and loamy sands, nearly level	3,275	1.4
5-B	Ottawa and Berrien sandy loams and loamy sands, gently sloping	4,225	1.8
6-A	Omega, Coloma, Vilas, and Plainfield loamy sands, nearly level	29,400	12.6
6-B	Omega, Coloma, Vilas, and Plainfield loamy sands, gently sloping	19,620	8.4
6-C	Omega, Coloma, Vilas, and Plainfield loamy sands, sloping	2,110	0.9
6-D	Omega, Coloma, Vilas, and Plainfield loamy sands, steep	1,865	0.8
7-A	Shallow peat and muck over sand, and Nekoosa, Morocco and Newton loamy sands, nearly level	11,920	5.1

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