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A REPORT ON SOIL ASSOCIATION SUITABILITIES TO THE STATE PLANNING OFFICE, WISCONSIN DEPARTMENT OF ADMINSTRATION

by

F.D. Hole

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SOIL ASSOCIATION PRODUCTIVITY ANALYSIS

(General Ratings with Respect to
Crop, Livestock and Forest Yields
on Soil Associations of Wisconsin)

A Report on Soil Association Suitabilities to the
State Planning Office, Wisconsin Department of Administration

from

The Geological and Natural History Survey,
University of Wisconsin-Extension

by

Francis D. Hole
Soil Survey Division

June, 1974

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ABSTRACT

The 190 soil associations (specific landscapes) of Wisconsin, that are shown on the general soil map (scale 1:250,000), are rated on a four-part scale with respect to a number of agricultural and silvicultural yields. These include yields by soils of field crops, canning crops, truck crops, cranberries, livestock (cattle in particular), hardwood forests and pine forests. These are useful soil ratings for overall land use planning for the state, but make no attempt to provide the detailed information required for actual planning of management of a particular parcel of land. Explanations are given of the methods used in the study.

A comparison is made between a soil productivity score card and crop yield tables in developing the ratings. The crop yield tables are found to be preferable.

Average yields of all kinds of vegetation per unit area are approximated for the ten major soil regions shown on the color soil map of the state. Estimates of annual yields of harvestable vegetation are converted into energy units theoretically recoverable by burning, to indicate quantities of energy being produced by photosynthesis on soils of the state.

The many different kinds of soils in Wisconsin lie on the landscapes in a variety of groupings. The present analysis shows on a broad scale which soil areas are most productive of the field crops, bog crop, livestock, and forest crops mentioned.

PROJECT PROPOSAL: A SOIL ASSOCIATION SUITABILITIES ANALYSIS WITH RESPECT TO PRODUCTIVITY OF FIELD CROPS, SPECIALTY CROPS, LIVESTOCK, AND FORESTRY.

Introduction

A proposal was submitted by M. E. Ostrom and F. D. Hole of the Geological and Natural History Survey to the State Planning Office on December 21, 1973 in response to a request from that Office for an agricultural and silvicultural soil suitability analysis based on the Overlay Soil Map of Wisconsin (Hole *et al.*, 1968).

Purpose

The purpose of the project has been to interpret the soil associations of the state in terms of their inherent capacities under good management to produce agricultural and silvicultural crops. The geographic distribution of soil landscapes (soil associations or soilscapes) of different productivities may serve as a guide to land development by Wisconsin citizens and state agencies.

Project task

The task has been to evaluate and classify the soil associations depicted on the Overlay Soil Map in terms of severity of hazard and limitations, expressed as soil productivity on a four-part scale:

1 = Most productive, with fewest hazardous areas.

2 = Moderately productive, with some hazardous areas.

3 = Somewhat productive, with many hazardous areas.

4 = Unproductive, with most areas hazardous.

In addition to these four ratings, a "not suitable" category was proposed for soils on which a crop (cranberries, for example) is never grown.

The interpretations were to be developed for field crops, canning crops, truck crops, cranberries, livestock, hardwood forest and coniferous forest.

Consideration was to be given to other interpretations, and a bibliography was to be provided.

Special considerations

Completion of the assignment included special consideration of the soil series within each soil association, and interpretations with respect to the response of the soils to various uses and management practices, as has been reported by the Soil Conservation Service and University of Wisconsin agencies. Mapping and graphics will be the responsibility of the Department of Administration. The Survey developed a working relationship with the state development planners who supplied information and guidance.

Project timing, consultant and financial requirements.

The project was scheduled to be completed by April 1, 1974. A prefinal draft was to be submitted to the State Planning Office by February 20, 1974. These dates were later advanced to June 1 and July 15, 1974, respectively.

Francis D. Hole, Head of the Soil Survey Division of the Wisconsin Geological and Natural History Survey, and a member of the Soil Science Department, was designated as project chief. He was released from his regular Survey responsibilities to undertake this project. The budget agreed upon is on file.

Products

The products of the project are (1) a set of ratings of the soil associations listed in the legend of the Overlay Soil Map of Wisconsin in terms of field crops, canning crops, truck crops, cranberries, livestock, hardwoods and conifers; (2) other interpretations of the soil associations and other pertinent information; and (3) a bibliography.

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SCOPE OF THIS STUDY

This study relates to soil associations which are generalized landscape groupings of soil series such as the Antigo[1], and miscellaneous land units such as Steep Stony Land. One hundred and ninety soil associations are listed in the legend of the state soil maps (scales: verlay ap, 1:250,000; and color map, 1:710,000). Information presented in this report is to provide basic guides needed in development of regional land use planning, but is not detailed enough for conservation planning, highway right-of-way characterization, or other predictions of behavior of small parcels of land. This is illustrated by the first three figures (Hole, 1973), along with a discussion of them.

Figure one is a sketch of a soil profile (about 5 feet deep) which is a vertical face of a soil "pedon". The pedon is a term for a representative column of soil selected for study in an individual soil body[2]. The soil body itself, represented by a Downs silt loam in southwestern Wisconsin, is about seven tenths of a mile long. Behavior of this natural unit of land can be predicted from past studies and experience of farmers, engineers and researchers with Downs soils. Detailed soil maps showing particular bodies of soil like this can be

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1 Soil type designations, giving texture of the surface soil (i.e., Antigo silt loam), and slope phase designations based on a general characterization of slope (i.e., nearly level) are subdivisions of the series.

2 "Soil body" is a synonym for the technical term, polypedon, used by the U.S. Cooperative Soil Survey for the individual soil unit on the landscape.

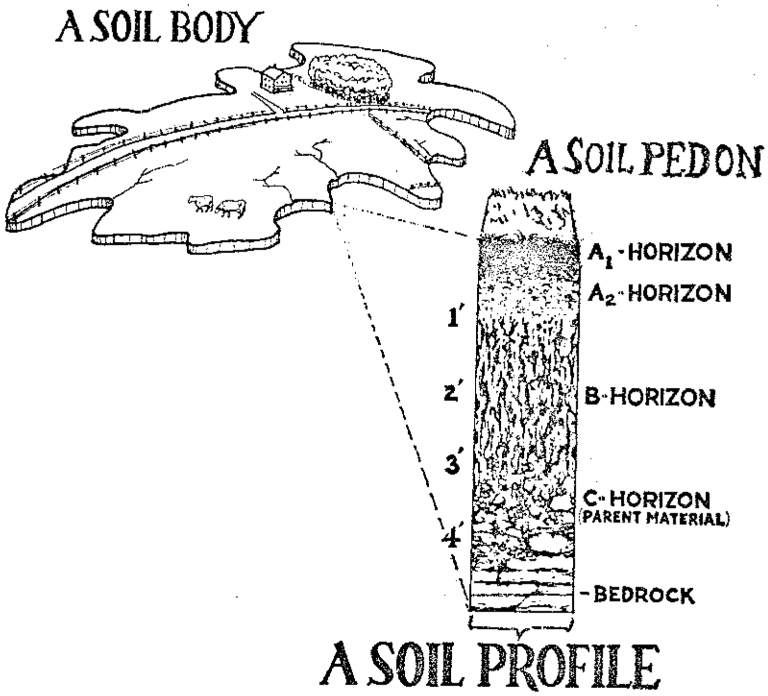

Fig. 1. Diagram showing relationships between a soil body (the three-dimensional, complete soil individual on the landscape), a soil pedon (an arbitrarily chosen columnar column, 1 square meter in surface area, selected for study), and a soil profile (a two-dimensional exposure on one face of a pedon).

obtained from the U.S. Soil Conservation Service, the Geological and Natural History Survey and the Department of Soil Science, University of Wisconsin.

A view of a particular slope in western Lafayette County, Wisconsin is sketched in Figure 2. The strip of land depicted is so narrow (about 1/4 mile wide) that no individual soil body is shown complete. Portions of eight soils are intersected by the strip, of which five are labeled. At this particular site, the soils become shallower downslope. In fact, limestone outcrops may be common in bodies of Sogn silt loam. This information is important in planning use of the landscape. The complete soil map of this area, showing all soil boundaries in relation to roads, streams, fields, woodlands and farmsteads, has been published by the U.S.D.A. (Watson, 1966).

The generalized state soil map of Wisconsin groups the soils shown in Figure 2 under the first soil association unit in the legend: "Al. Tama, Downs, and Muscatine silt loam, on undulating and rolling limestone ridges." Figure 3 is a tracing of a body of that soil association located in western Grant County. This individual soil association body is about ten miles across, from east to west and contains about 1,200 individual soil bodies. Only general predictions can be made about behavior of such an entire soil association landscape under specified management regimes, because of the variability of soil and slope within it. Nevertheless, each such landscape has land use characteristics that can be stated in general terms, such as suitability and productivity ratings. The scope of this study is to present interpretive information about soils at the soil association or soil landscape level only.

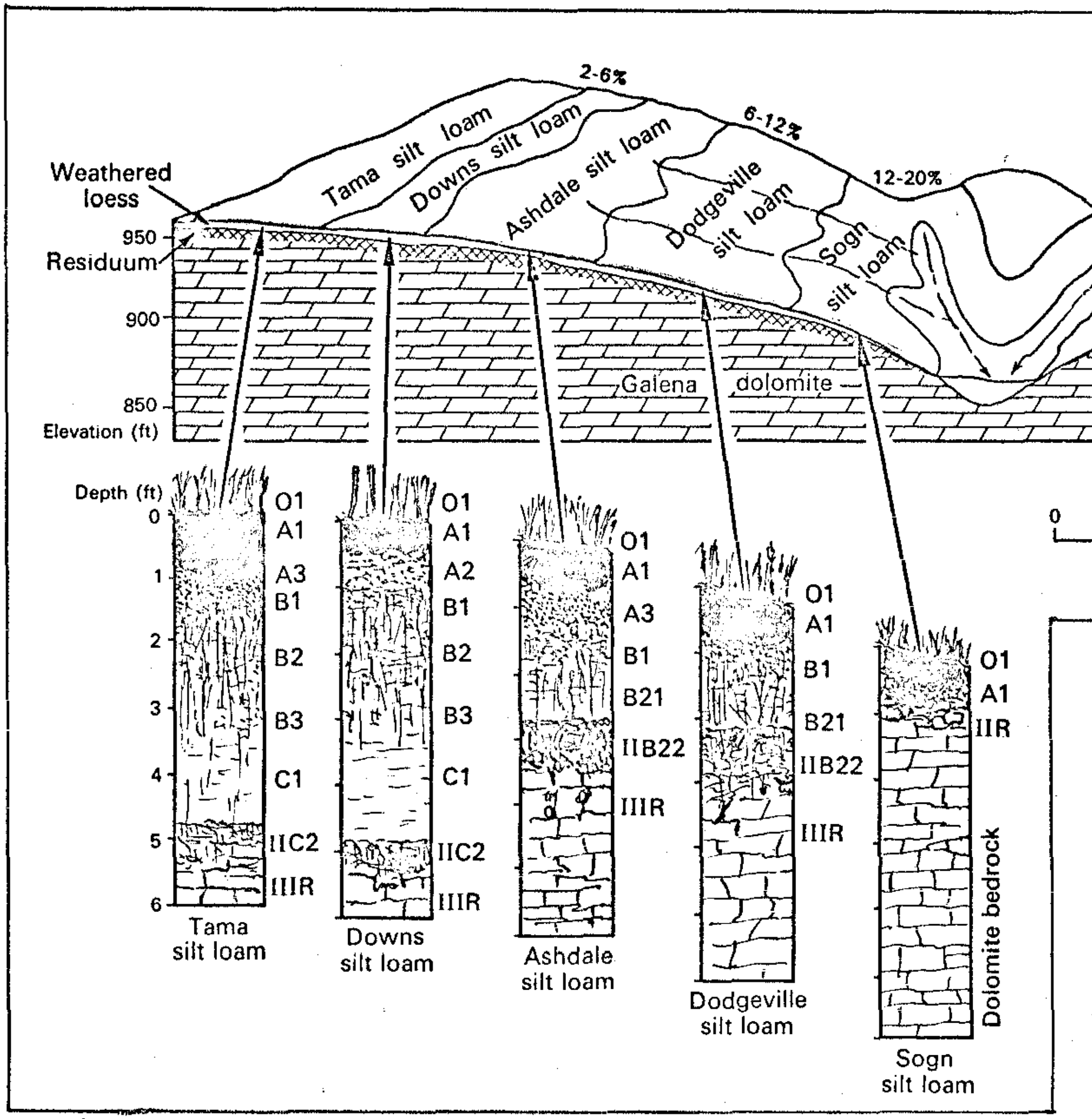

Fig. 2. Block diagram showing representative soils of soil association A1. This landscape occurs in section 35, T.1 N., R.5 E., Lafayette County, Wisconsin (Hole, 1975). Parts of soil bodies are shown on the land surface.

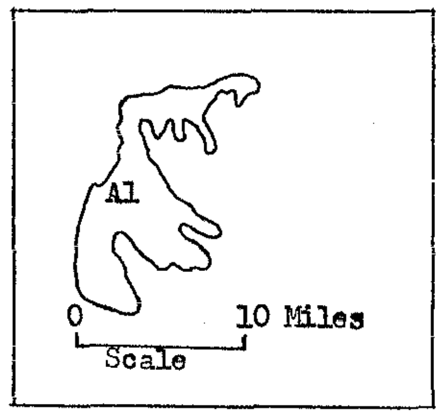

Fig. 3. A body of soil association A1 in Grant County, Wisconsin.

The Geological and Natural History Survey, working with the national cooperative soil survey, completed the new soil map of the state of Wisconsin in 1968 (Hole et al.). The map consists of black lines and symbols on transparent plastic sheets to be used as overlays on the U.S. Army Map Service topographic quadrangle maps of the same scale. In the same year a color map at a smaller scale (1:710,000) was issued listing the legend of 190 units to the left of the map. The soil boundaries on this color map are occasionally interrupted by lettering, so that the researcher must have recourse to the overlay map for the missing boundary segments. Appended to this report is a list of errata in both maps.

A soil map is an encyclopedia of information, much of which is not immediately evident to the viewer. The bulletin explaining the state soil map is now in press (Hole, 1975). The names in each soil association of the map legend (such as Tama, Ashdale, Downs and Muscatine silt loam) represent systematic variations in many physical, chemical, biological and landscape properties. The shades on the color map are chosen to make the ten major soil regions and four additional prairie soil subregions immediately distinguishable to the eye. But these colors do not bring out the geography of soils with respect to any single factor, such as productivity for corn or oats. Single factor maps may be derived from the original map by assigning to each unit in the legend a rating for a particular purpose. This has been done in this study with respect to several agricultural and silvicultural product categories.

SOME CONSIDERATIONS WITH RESPECT TO SOIL PRODUCTIVITY RATINGS

The general term "prime agricultural land" is difficult to define. Soils are used to produce so many agricultural and silvicultural units, both vegetable and animal, that it is necessary to rate each soil with respect to each product unit. Furthermore irrigation and fertilization can convert an unproductive sandy soil into a first rate one, as indicated in Table 3 for several soil associations of soil region C. Therefore, in this report (Table 3), ratings are given for a number of product units: field crops (represented by field corn and oats), canning crops (such as peas, sweet corn, snap beans, beets), truck crops (carrots, lettuce, potatoes, onions, cabbage, mint), cranberries, livestock (cattle in particular), hardwoods (with emphasis on oak, *Quercus* sp.) and pines (white and red; *Pinus resinosa* and *Pinus strobus*).

After issuing a soil map and report for the North Central Region (Aandhal *et al.*, 1960), the N.C. Regional Technical Committee number 3 on Soil Surveys published a bulletin (Bender *et al.*, 1965) giving tables of estimated average annual crop yields under two levels of management for important soils of the region. Effects of climate, management, slope, surface soil thickness and subsoil characteristics were discussed. Regional yield estimates for selected soils were up-dated by Fenton *et al.* in 1970. Bartelli *et al.* (1966) presented a summary of the relation between soil surveys and land use planning. Klingelhoets *et al.* (1966) issued a bulletin containing tables of agricultural and silvicultural crop yields for Wisconsin. These are heavily used in the present report. Even though crop yields have increased since 1965 (see Table 1), relative positions of soils in rating systems have remained about the same with respect to the uses considered here. Representative of bulletins reporting soil productivity information for other states in the North Central Region are those by Fenton et al. (1971) (on page 23 of which guidelines are given for establishing corn suitability soil ratings:Table 8, this report) and by Fehrenbacher et al. (1967, 1970), Odell and Oschwald (1971) and Runge et al. (1967, 1969). Influences of slope, degree of erosion, degree of wetness, depth of soil, kinds of soil parent material and variations in precipitation were considered. Moss (1972) in Saskatchewan has reviewed the rating soils. It is presumed by many workers that the more actual field trial data is available and the more sophisticated the computerized statistical treatments of the data (including computerized map print-outs, as illustrated by Anderson et al., 1973), the more firm are the resulting ratings. However, less complicated studies like the present one have the advantages of speed, simplicity, and reliance on the judgement of experienced specialists.

Riecken (1963) presented a discussion of some aspects of soil classification and soil interpretation for agricultural purposes. Figure 4 shows how the most specific and detailed categories of soil classification provide the surest basis for making soil productivity estimates. Therefore, in the present study, estimates for individual soil series and types were used as a basis for developing the ratings presented in Tables 3 and 4.

The Soil Conservation Service has developed a system of land capability classes and subdivisions thereof (Soil Conservation Service, 1969; 1973). Representative capability designations are given in the right

Table 1. Increase between 1965 and 1970[1] of average yields for corn for representative soils in the North Central Region, U.S.A.

Soil	Year 1965	1970
	bu/acre	bu/acre
Blount silt loam (1-5% slopes)	84	98
Fayette silt loam (2-6% slopes)	92	111
Milaca loam (4-6% slopes)	65	75
Muscatine silt loam (1-4% slopes)	106[2]	140
Onaway loam (6-12% slopes)	78	91
Plainfield sand (1-5% slopes)	49	54

[1] Average yields for high level management are quoted from Bender <u>et al</u>. (1965) and Fenton <u>et al</u>. (1970).

[2] Note that Fig. 4 gives 90 bushels as average yield under low level management in Iowa as of about 1963.

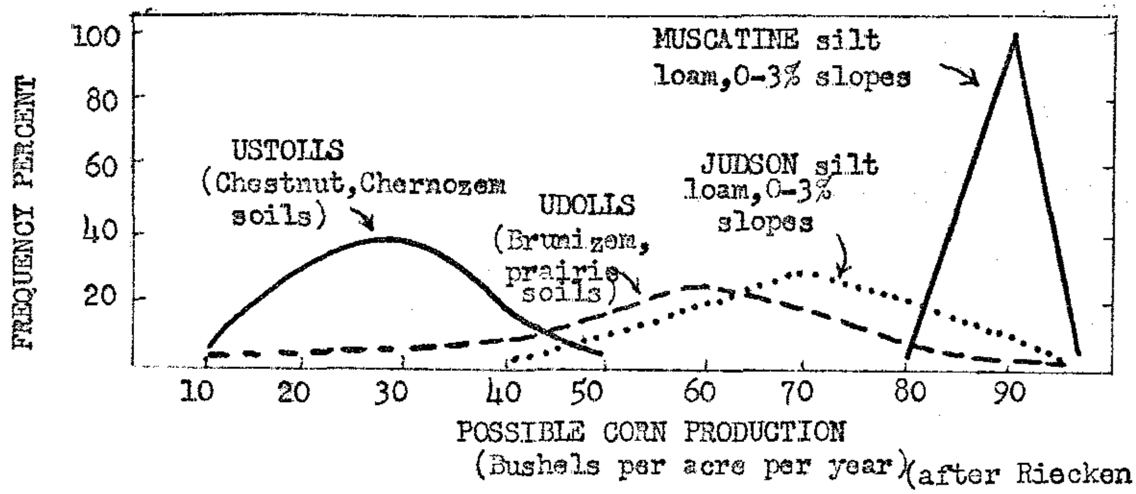

Fig.4 . Examples from Riecken (1963) of ranges of corn yields on soil units of different degrees of generalization from an hierarchical soil classification (Soil Conservation Service, 1967), from most specific (Muscatine silt loam, a somewhat poorly drained Brunizem; Aquic Argiudoll) to the most general (Udolls and Ustolls). Judson silt loam is a colluvial or local alluvial Brunizem (Cumulic Hapludoll), and is therefore more variable in performance than Muscatine silt loam.

column of Table 3 for each major soil in each association. They reflect the range of degree of hazard or limitation of each soil for agriculture. Muck soils (soil associations J12 through J15) are commonly placed in Class III although these soils may be the most productive of truck crops in the state (soil association J15). Areas of soils of Class I and Class II closely approximate best lands for field crops.

Westin in South Dakota has developed a system for evaluating soils in terms of dollar value per acre, and has published a state map in these terms (Remote Sensing Institute, South Dakota State University, 1973).

Ratings presented in this report will surely be complemented or even superceded in decades to come as a result of new land management systems. For example, Stahmann (1968) and co-workers (Gerloff, Lima and Stahmann, 1965) present evidence that concentration of protein from alfalfa by mechanical methods could raise the protein yield of an acre of soil several-fold. Since alfalfa may be grown without soil erosion hazard on steeper slopes than can grain crops, the effect of adopting protein production methods suggested by Stahmann would raise the ratings for many hilly and rolling soil associations. In some areas chemical and certain biological improvements of land management have surpassed physical aspects. For example, some soils are highly fertile and amply deep, but have limited productivity because of reduced infiltration caused by compaction by machinery, surface soil crusting through rain drop impact on soil exposed early in the growing season, and restricted populations and activity of soil fauna like earthworms that create macropores in the soil. If in the future the physical condition of soils, particularly as it affects soil aeration and hydrology, are dramatically improved, soil productivity ratings will rise accordingly.

To stimulate thought about possible unconventional soil rating systems two additional tables have been proposed. Table 4 indicates productivity by all kinds of vegetation in terms of energy yield. Table 5 gives a general estimate for each of the ten major soil regions of annual production of organic matter by all kinds of vegetation.

METHOD USED TO RATE SOILS OF WISCONSIN WITH RESPECT TO THEIR PRODUCTIVITY FOR SELECTED AGRICULTURAL AND SILVICULTURAL CATEGORIES

The ratings given in this report are approximations which are useful guidelines for state-wide land use planning, until such time as further research findings will support precise evaluations. The following steps were taken to arrive at the generalized ratings presented in Table 3, as explained in more detail later.

1. The proportionate extent of each major soil and land type in each soil association was determined.
2. A relative yield rating for each item (field crop, conifers, etc.) was assigned to each soil type (or phase) listed by Klingelhoets et al. (1966). The yield rating was on a scale of 0 to 100.
3. A rating on a scale of 0 to 100 was obtained for each soil association for each product category, by multiplying proportionate extents times yield ratings and summing.
4. Each rating on a scale of 0 to 100 was converted into a rating on a scale of 4 to 1 by a method of quartering the larger scale.
5. Ratings arrived at were raised or lowered intuitively by F. D. Hole and A. J. Klingelhoets, on the basis of long experience in the state.

Determination of proportionate extents of soil and land types in soil associations.

Two methods can be used to obtain areal data on composition of soil associations. They are: (1) actual measurement of areas component soil and land type bodies; and (2) estimation of proportionate extents of soil components.

The second method was used in this study because actual measurement, which is a laborious process, has been confined to a small part of the state. Detailed soil maps do not exist yet for much of northern Wisconsin making such measurement impossible for those areas. Frazier (1974) has reported results of some of this work in southeastern counties. Estimates of proportionate extents were made by F. D. Hole in consultation with A. J. Klingelhoets on the basis of experience in the field over many years, and in the light of acreage estimates obtained from sample field plots by the Soil Conservation Service (1971). Table 7 presents some of this information. Estimates of proportionate extents of soil association components are given in the first column of Table 3.

Assignment of relative yield ratings for each product unit.

Use of the Soil Productivity Score Card (Berger, Hole and Beardsley, 1952) was studied in the course of this project. Results are reported in Figure 7 and are discussed toward the back of the report (p.118). Ratings obtained by use of the card are similar to but probably not as valid as those based on yield estimates.

Ratings given in Tables 3 and 4 were determined by the yield estimate method, that is they were based on estimates of long time average yields of principal field and pasture crops and of well-stocked forests, both hardwood and coniferous, as reported by Klingelhoets *et al*. (1966).

Frequency percent curves, like that in Figure 8, were constructed for various products. Annual yields per acre in bushels (Figs. 8, 9), tons (Figs. 10, 11, 12), and board feet (Figs. 13, 14, 15, 16) were converted to a scale of 0 to 100 as indicated on the upper margin of each of the figures mentioned. Increments along the scale were not uniform in length because widths of the two central divisions were based on the mean and standard deviation of the mean, as listed in Table 2. In Figures 8 through 16 positions of means and deviation values are shown graphically, and ratings on a four-part scale are indicated.

A sample calculation is given below for soil productivity rating of soil association A1 for field crops (corn, oats).

Table A.

Soil #	Estimated % of area	Rating for corn yield*	Product of multiplication of last two columns	
Tama silt loam	60	95	57.0	
Ashdale silt loam	20	75	15.0	
Downs silt loam	15	83	12.5	
Muscatine silt loam	5	100	5.0	
			89.5	Rating = 1

Common slope phases are listed by Klingelhoets et al. (1960).

* The corn yield spectrum (see Figure 8) was scaled to 0 to 100%, with the yield of Muscatine silt loam, the highest (130 bushels), reported as 100.

Field crop ratings were made for each soil type and each soil association by determining relative yields (on an 0 to 100 scale) for corn and for oats. The higher of the two ratings was used in each instance. By this procedure soils of southern counties were rated by their corn yields and soils of northern counties by their oats yields. Eighty three percent of these final ratings seemed reasonable and were therefore

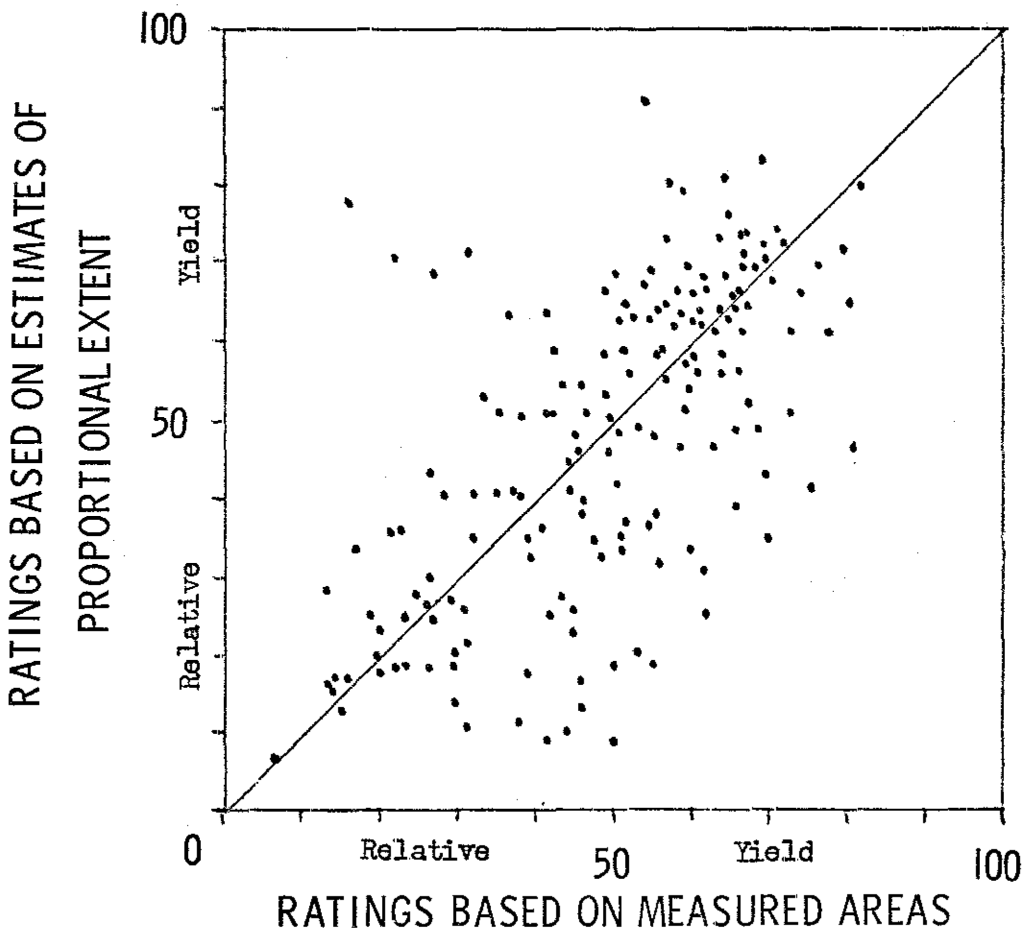

Fig. 5, A comparison of ratings of soil associations obtained by the field crop (oats and corn) yield estimate method (using an adjusted yield scale of 0 to 100) for measured (Frazier, 1974) and unmeasured soil component areas.

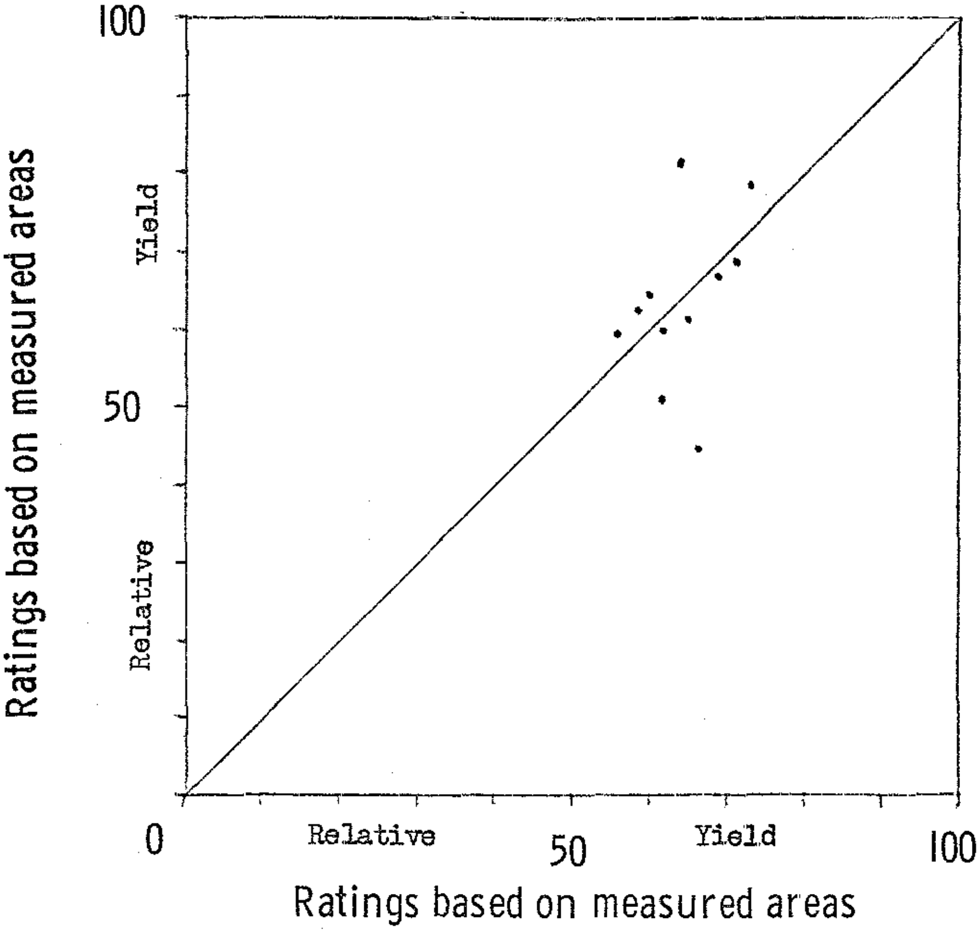

Fig. 6. A comparison of ratings of soil associations for field crops (oats and corn) for eleven pairs of measured soil component areas (Frazier, 1974).

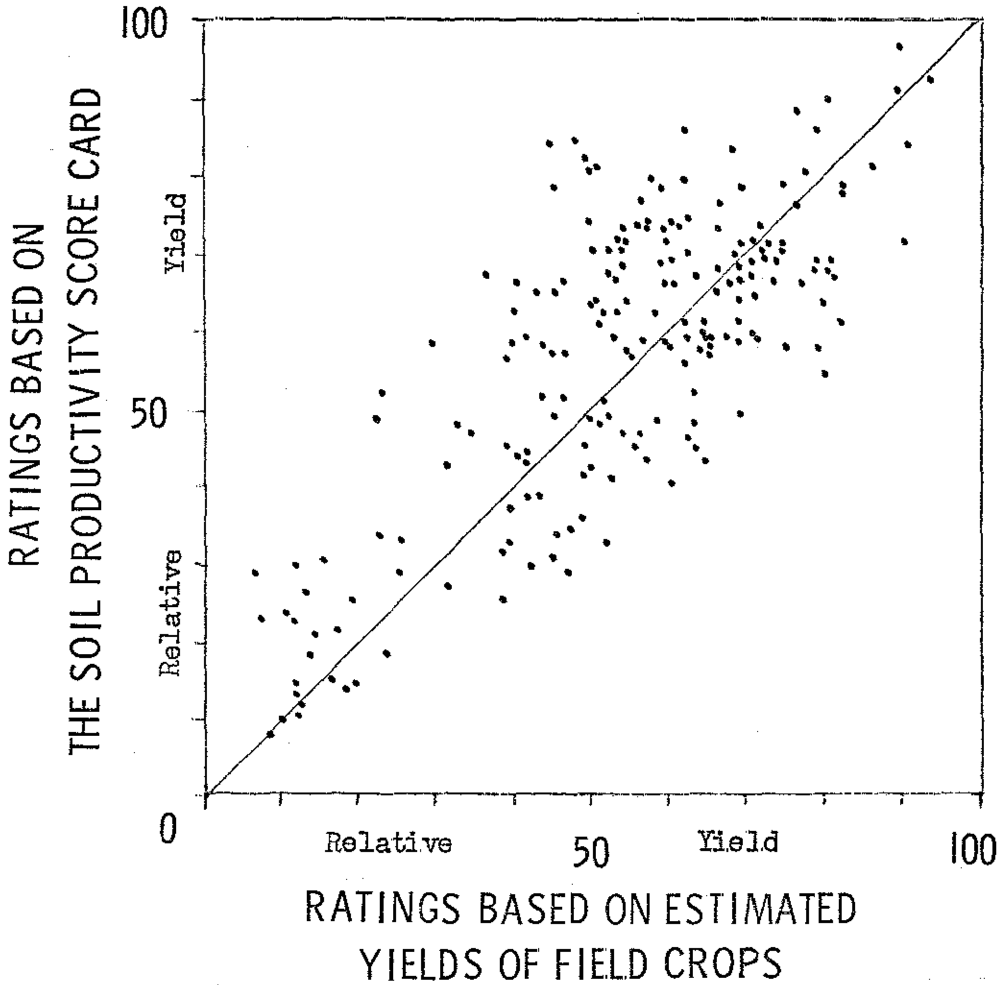

Fig. 7. A comparison of soil productivity ratings for field crops (corn and oats) determined by two methods: (1) the soil productivity score card method (Berger, Hole and Beardsley, 1952), and (2) the crop yield estimate method (Klingelhoets *et al.*, 1966; and this report). Ratings are for soil associations.

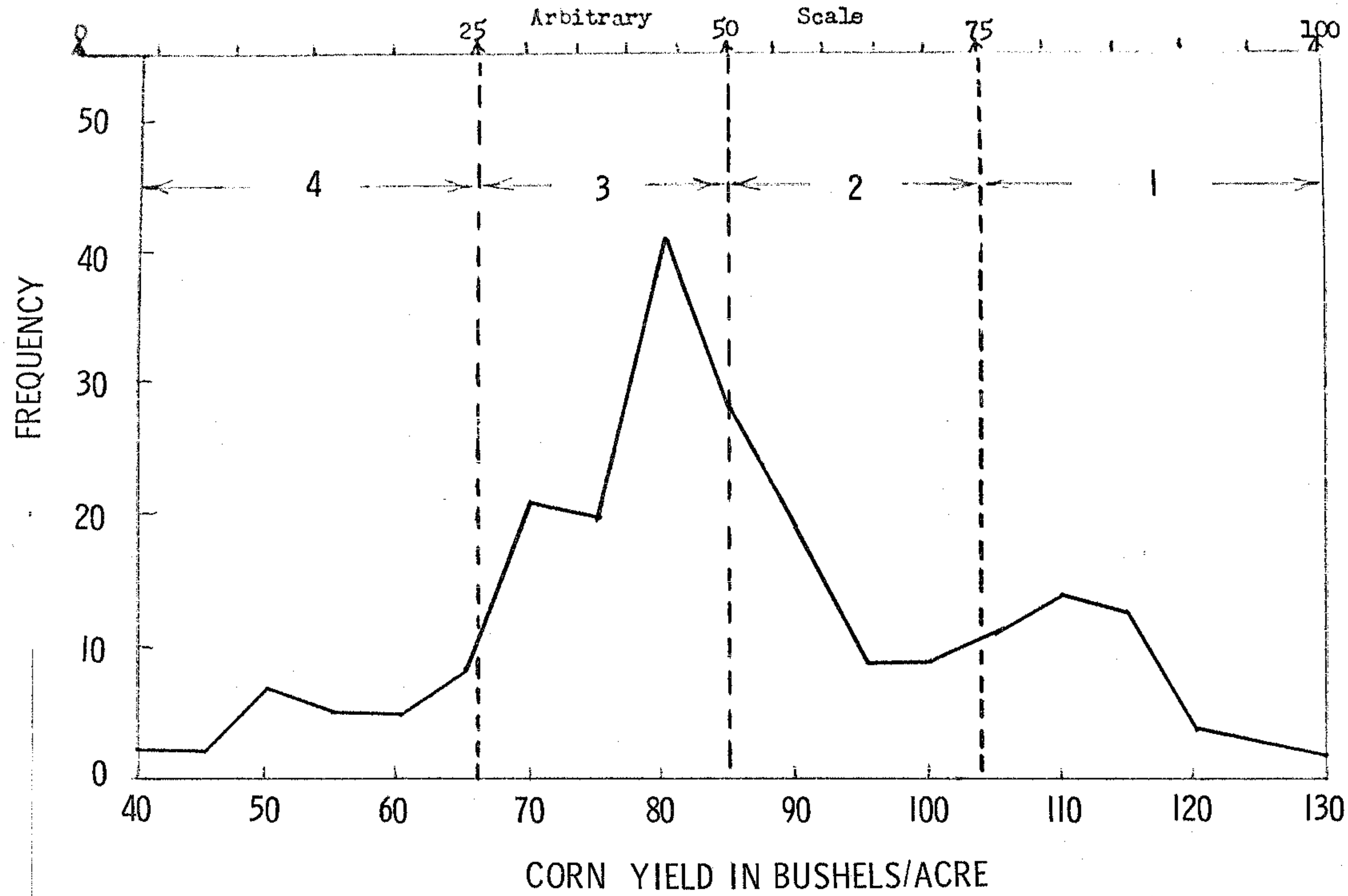

Fig. 8. A sample corn yield-frequency curve for all soils listed by Klingelhoets et al. (1966). Mean yield is 85.1 bushels and standard deviation is 18.6 bushels. Boundaries between the four soil productivity ratings are therefore set at 66.5, 85.1 and 103.7 bushels.

Table 2. Values derived from soil productivity tables (Klingelhoets et al., 1966) to determine boundaries between the four soil productivity ratings used in this report for rating soil associations of Wisconsin.

Crop[1]	Mean yield/acre	Standard Deviation
Corn	85.1 bu	18.6 bu
Oats	63.5 bu	10.3 bu
Corn silage	13.4 T (65% moisture)	3.0 T
Alfalfa-brome hay	3.54 T	0.73 T
Red clover-timothy hay	2.69 T	0.55 T
Bluegrass pasture	1.15 T	0.45 T
White pine	467.8 BF	62.2 BF
Red pine	445.9 BF	59.5 BF
Oak	158.7 BF	55.6 BF
Mixed hardwoods	175.6 BF	49.0 BF

[1] Crops underlined were emphasized in estimating soil association productivity ratings in this study.

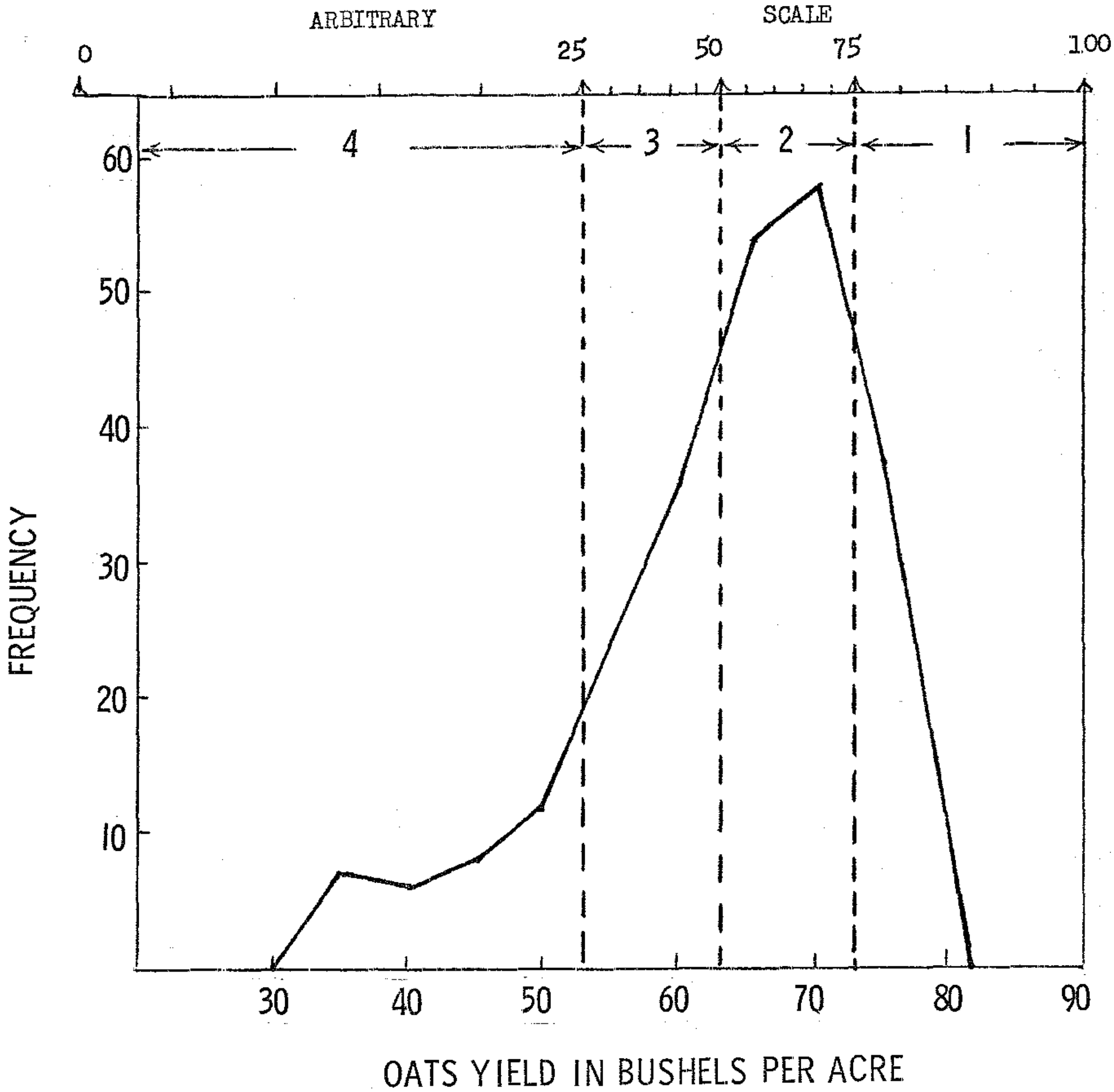

Figure 9. Oats annual yield-frequency curve (high level of management) for soils listed by Klingelhoets _et al_ (1966).

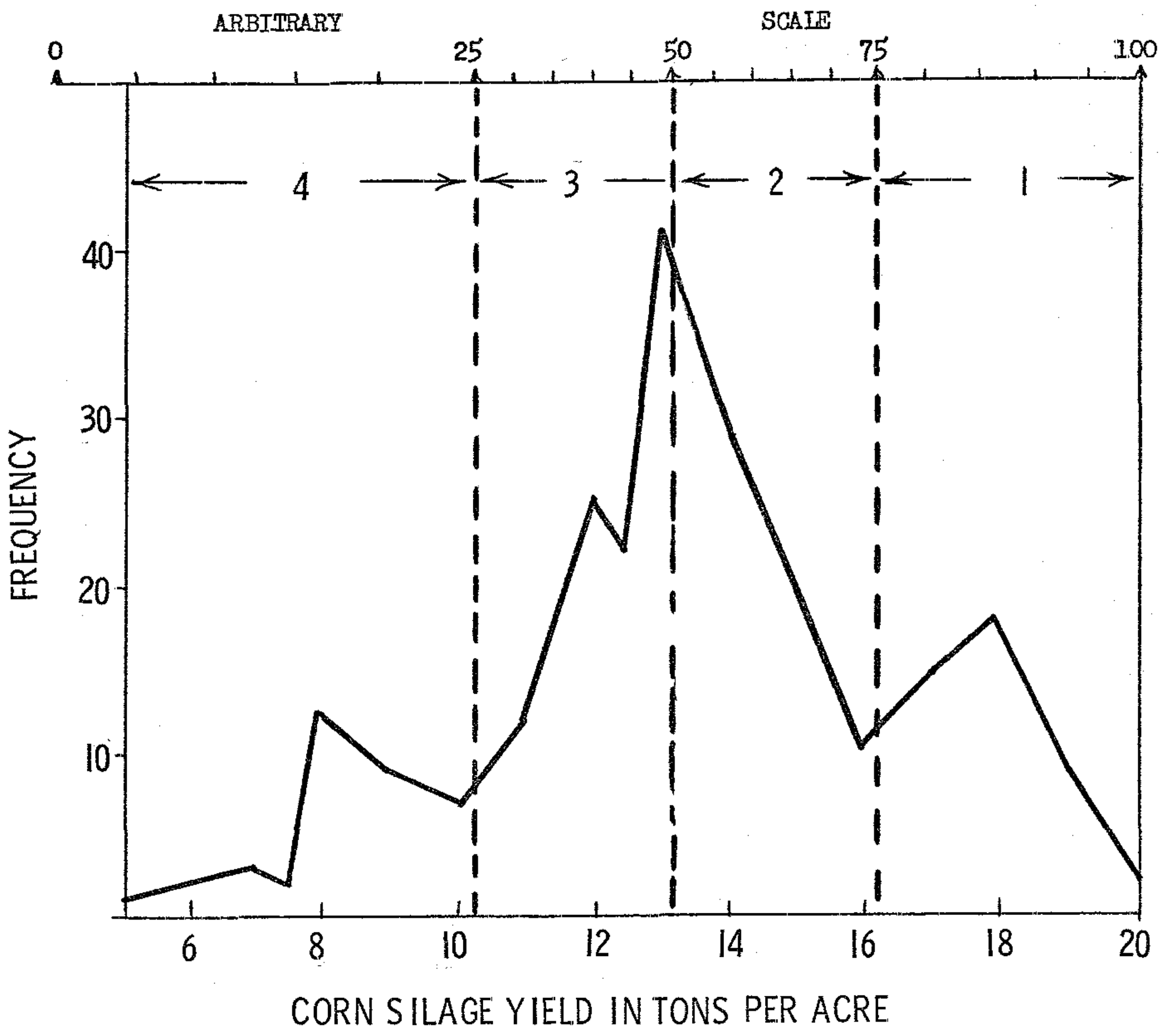

Figure 10. Corn silage annual yield-frequency curve (high level of management) for soils listed by Klingelhoets *et al* (1966).

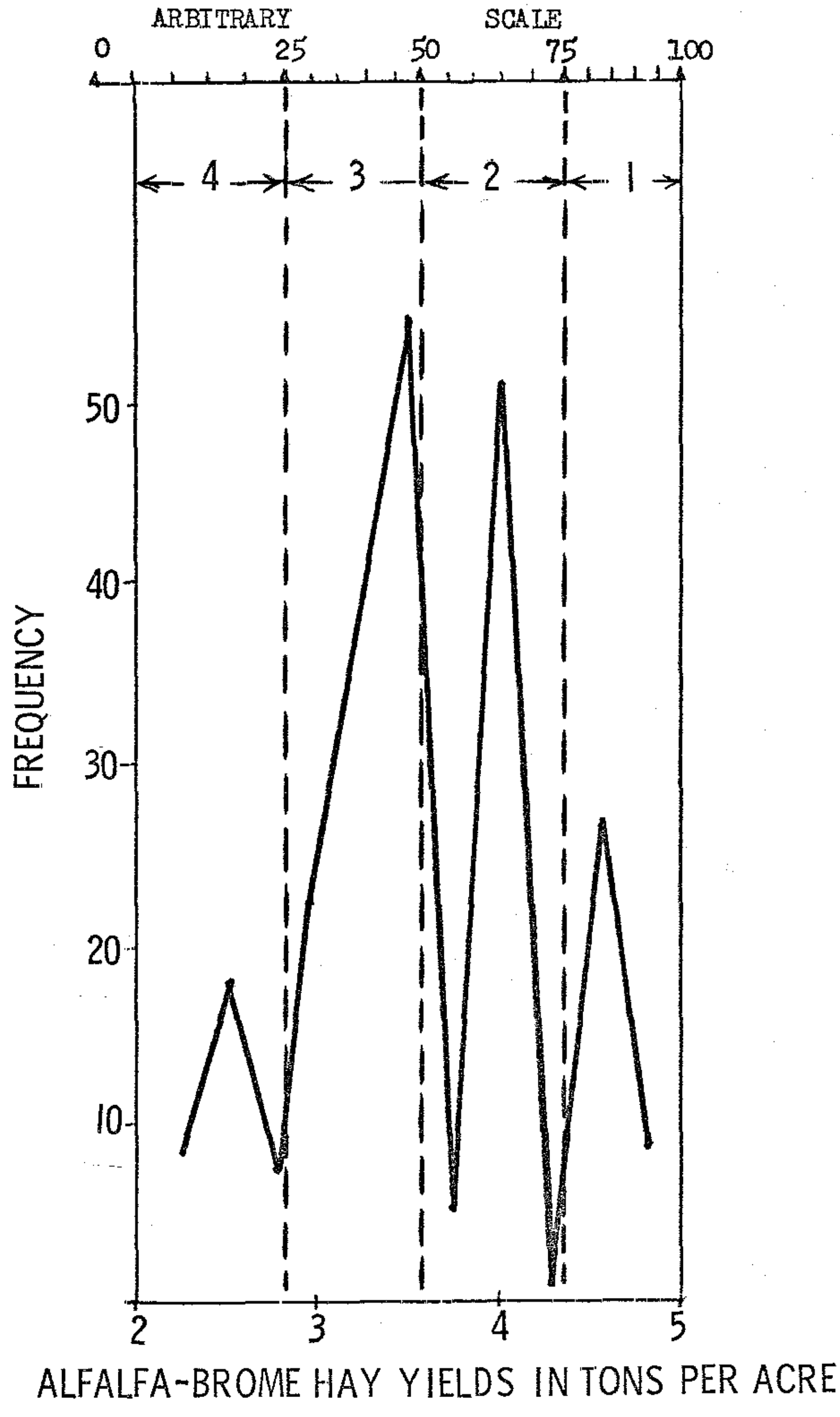

Figure 11. Alfalfa-brome hay annual yield-frequency curve for soils listed by Klingelhoets *et al.*

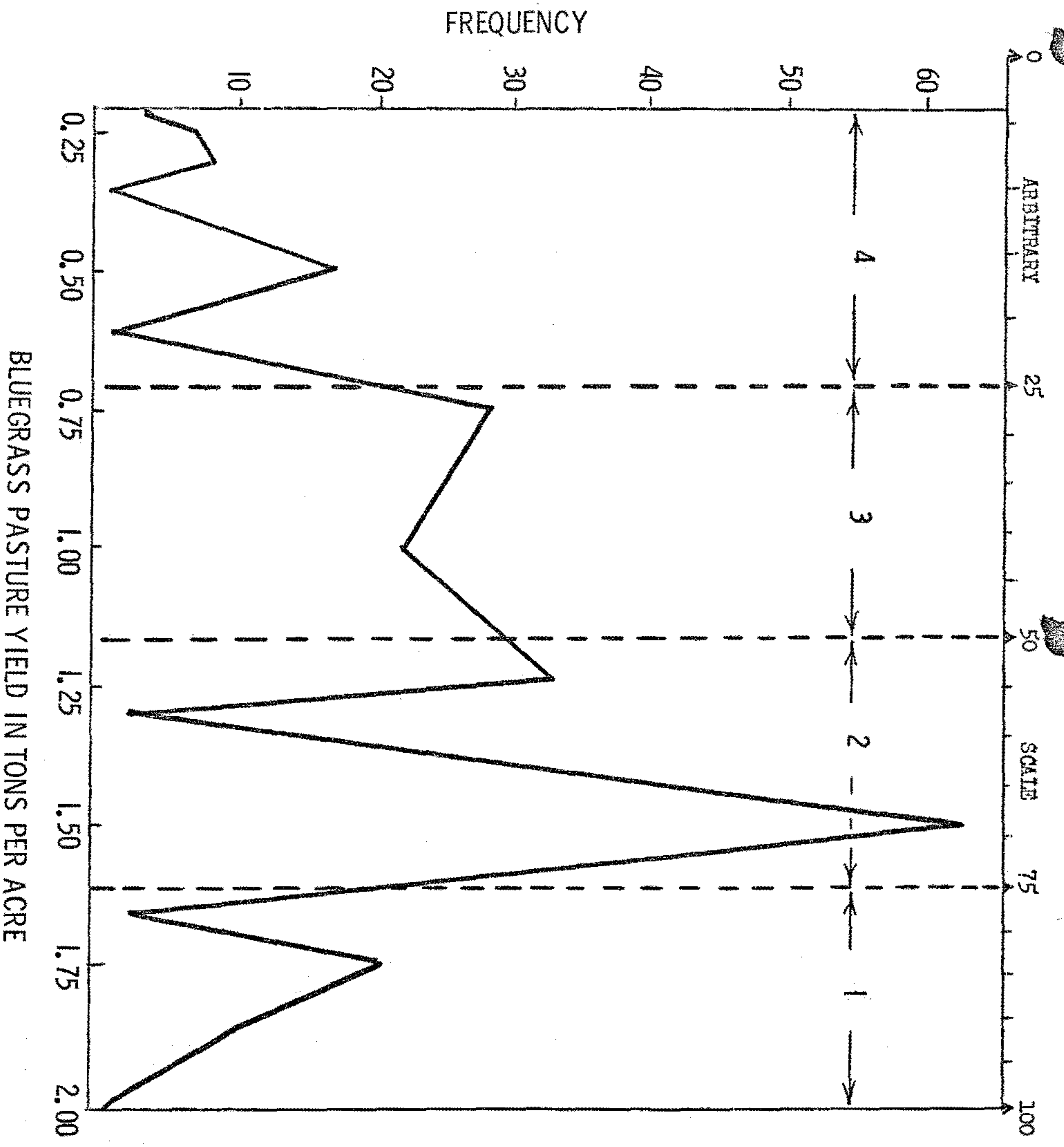

Figure 12. Bluegrass pasture annual yield-frequency curve for soils listed by Klingelhoets et al (1966).

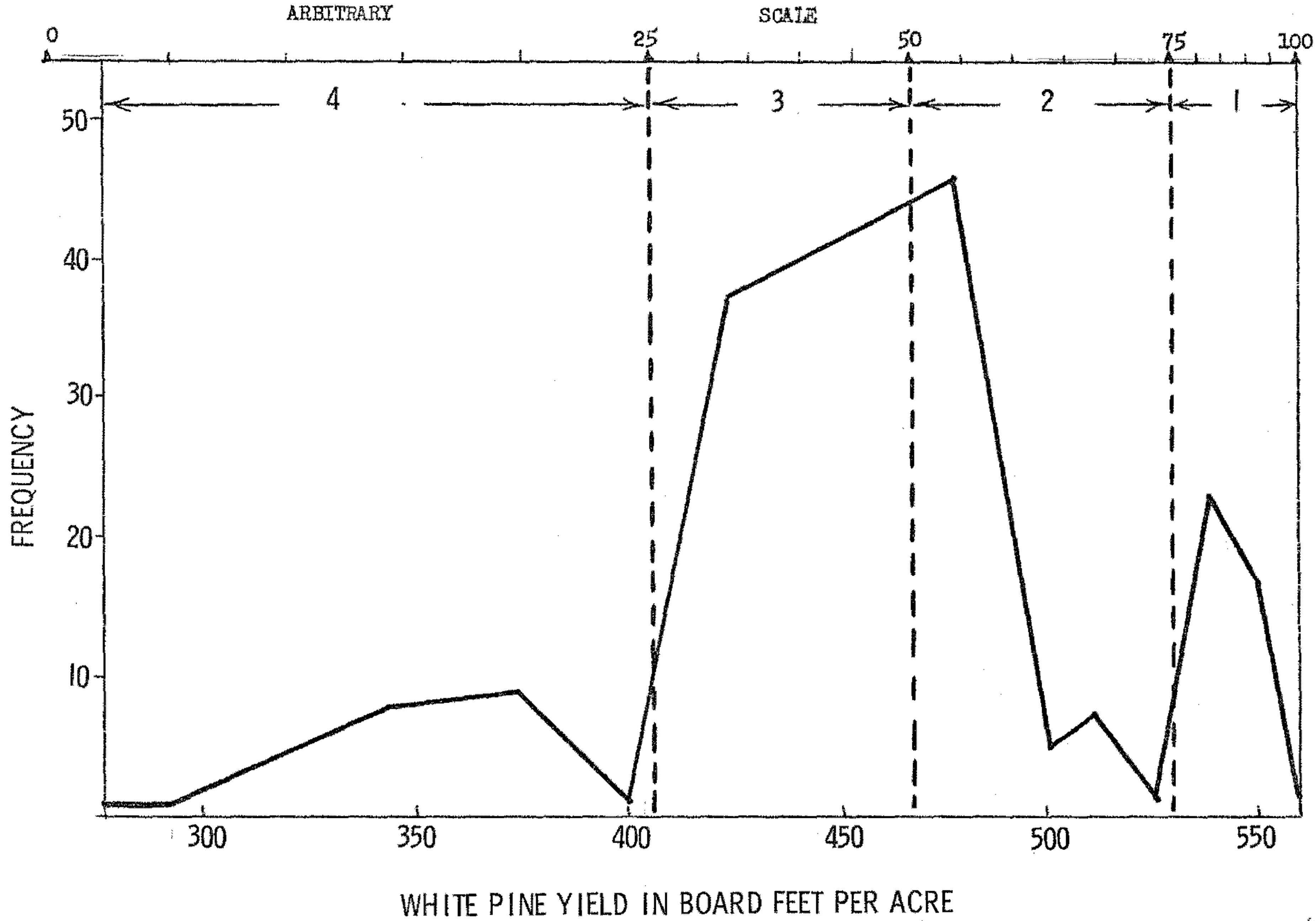

Figure 13. White pine annual harvestable growth yield-frequency curve for soils listed by Klingelhoets *et al* (1966).

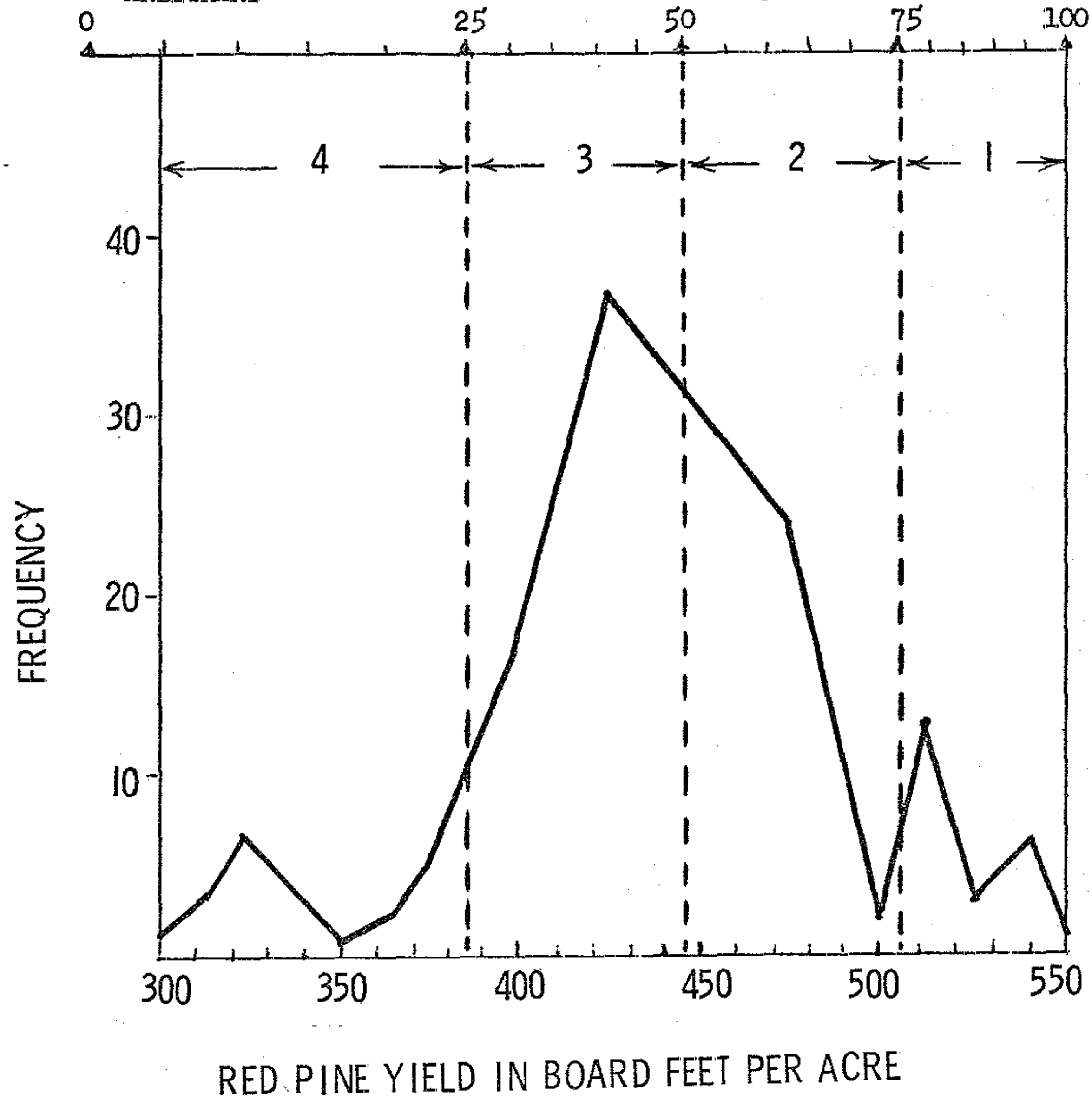

Figure 14. Red pine annual harvestable growth yield-frequency curve for soils listed by Klingelhoets et al (1966).

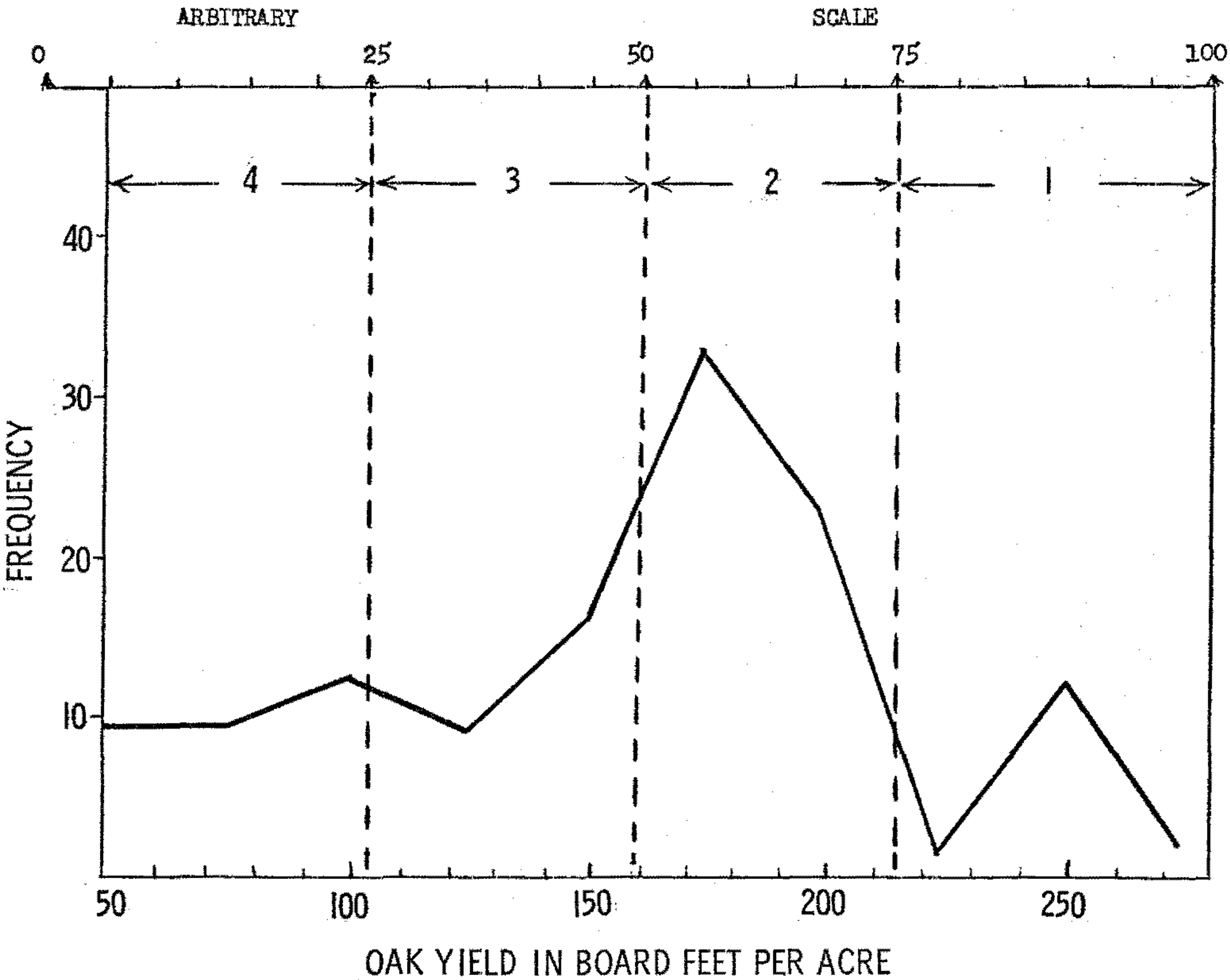

Figure 15. Oak annual harvestable growth yield-frequency curve for soils listed by Klingelhoets _et al_ (1966).

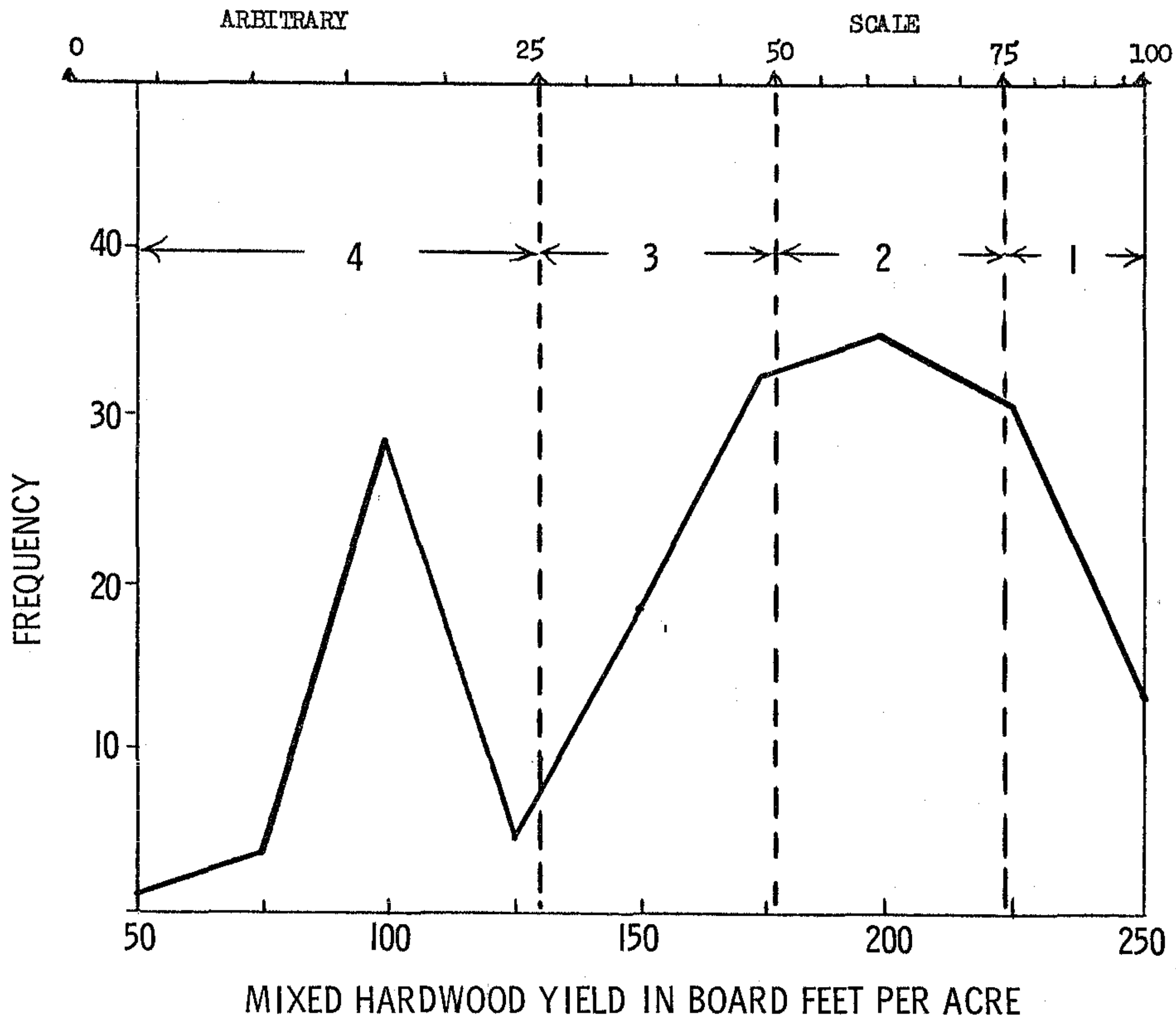

Figure 16. Mixed hardwood annual harvestable growth yield-frequency curve for soils listed by Klingelhoets *et al* (1966).

recorded in Table 3 as calculated. Ratings for thirty-three soil associations were shifted by the writer, 20 of them upward one step and 13 down one step. It can be seen from Table 6 (column CYEM-b) that many ratings were on the borderline between two classes.

It is assumed that moderately high levels of management are widespread. This entails addition of ammendments as needed, and reasonable control of weeds, pests, and of soil erosion, and drainage of wetlands. It does not include irrigation of level fields nor drainage of the large bogs (mucks and peats) of soil region J. In Table 3 additional ratings for irrigated and drained fields are given at appropriate places.

The curves of Figures 8 through 16 were not used in rating the soil associations for canning and truck crops. These ratings were set intuitively in relation to the field crop ratings. It is assumed that production of canning crops (listed previously) requires more inputs than ordinary field crops, and production of truck crops is even more demanding. It is further assumed that these extra inputs are regularly made. Even so, ratings of soil associations for these two special agricultural uses are not always as high as for field crops. In some instances soil associations with small wetlands that are difficult to drain may interfere with efficient canning or truck crop farming. Irrigation of level lands is assumed to be a common practice for canning and truck crops, and special ratings are given in Table 3 for soils under irrigation.

Cranberry production is assumed to be confined to acid peats and mucks with some overlap onto adjacent acid black sands.

Livestock production is based on an average of relative yields of bluegrass pasture, alfalfa-brome hay and corn silage. Results of calculations of ratings, using the procedure illustrated in Table A, were found unrealistic in a number of instances by the author, who raised the ratings where this seemed necessary to express the actual potential of the lands in question.

Hardwood annual yield ratings were based on an average of oak and mixed hardwood forest yield estimates. Coniferous forest annual yield ratings were based on an average of red and white pine yield estimates. It is interesting to note that resulting ratings seemed unrealistically low in many instances. This suggests that wide experience and common sense do not agree with results of the yield estimate method of determining ratings so far as conifers are concerned. Ratings recognized as being unreasonably low were elevated by the writer.

The writer believes that it has been a sound procedure in this project to intuitively alter ratings arrived at by the laborious procedure described above and illustrated in Table A. The yield estimate method may be appropriate in many cases, but is not guaranteed to apply with equal validity under all circumstances.

ADDITIONAL INFORMATION

Minimum feasible area

In some instances, governmental units are asking what the minimum size of a body of agriculturally productive soils should be to warrant protection from drastic changes in land use, such as from agricultural to urban uses. To designate a 1,000 acre parcel on a 250 acre parcel as the minimum size for feasible agricultural unit is to be arbitrary. In Table 3, the next to the last column gives an estimated maximum size of possible operational units in each soilscape (soil association). This estimate was made by the writer by visual inspection of the color soil map of the state. This estimate of sizes is a guide for planning large agricultural units, but does not meet the need for a definition of minimum sizes of operational units. Investigation of this topic is beyond the scope of this project.

Table 3. Ratings for soil productivity of soil associations of Wisconsin (shown on the state soil map, scales 1:710,000 and 1:250,000) for several crop and livestock categories.[1]

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)		PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
				1000 acres									
Soils of the southwestern ridges and valleys	Undulating, rolling and hilly	A1	Tama (60), Ashdale (20), Downs (15), and Muscatine silt loam (5)	282.3	1	1	2	--	1	2[2]	2[2]	<10,000	IIe1, IIIe1, IIW2
		A2	Dodgeville (60), Ashdale (30), and Sogn silt loam (10)	197.3	2	3	3	--	2	4	4	<10,000	IIe1, IIe2, IIIe1, IIIe2, VIs5
		A3	Dubuque (60), Palsgrove (25), Sogn (10), and Dodgeville silt loam (5)	263.4	2	3	3	--	2	2	2	<10,000	IIIe1, IIIe2, VIs5
		A4	Schapville (50), Derinda (30), Vlasaty (15), and Calamine silt loam (5)	32.0	2	3	3	--	2	4	4	<2,000	IIIe6, IIIe1, IIw1

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
				1000 acres								(acres)	
Soils of the southwestern ridges and valleys	gently rolling to very steep	A5	Fayette (55), Palsgrove (20), Dubuque silt loam (15); steep rocky land	657.5	2	2	3	--	2	2	2	<10,000	IIIel, IIIe2, VI6, VIIs6
		A6	Palsgrove (50), Dubuque (25), and Fayette silt loam (10); steep rocky land (15)	1,194.5	2	2	3	--	3	2	2	<20,000	IIIel, VIs6, VIIsl
		A7	Fayette (70), and Seaton silt loam (15); steep rocky land (15)	214.0	2	2	3	--	2	1	2	<10,000	IIel, IIIel
		A8	Seaton (60), Palsgrove (20) and Dubuque silt loam (10); steep rocky land (10)	6.6	2	2	3	--	2	2	2	<5,000	IIel, IIe2a, IIIelb, IIIe2, IVel

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
	gently rolling to very steep	A9	Dubuque (60) and Palesgrove silt loam (30); steep rocky land (10)	447.0	2	3	3	--	2	2	2	<10,000	IIe1, IIe2, IIIe1, IIIe2
	gently rolling to very steep	A10	Baraboo (75) and Skillet silt loam (10); steep rocky land (15)	34.5	2	3	3	--	2	2	2	<1,000	VIs6, IIw3
	nearly level to sloping	A11	Richwood (70), Toddville (15), and Bertrand silt loam (15)	102.9	1	1	2	--	1	2[2]	3[2]	<100	IIe1, IIIe1, IVe1
	nearly level to sloping	A12	Bertrand (65), Curran (10), and Arenzville silt loam (10); Dakota (10) and Meridian (5) loams	150.1	1	2	2	--	1	1	1	<100	II, IIIs1 IIw2, 12

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	Productivity for: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
	Nearly level to sloping	A13	Tell (60) and Curran (30) silt loam; Ettrick (10) silty clay loam	21.5	Unirrigated							<100	IIsl, IIe2, IIwl, IIw2
					2	3	3	--	2	2	2		
					Irrigated								
					1	1	1	--	--	--	--		
	Nearly level to sloping	A14	Dakota (70) and Onamia (20) loams; Waukegan (5) and Antigo (5) silt loam	177.2	Unirrigated							<100	II, IIIsl IIe2
					2	2	3	--	2	3	2		
					Irrigated								
					1	1	1	--	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil associations (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
B. Soils of the southeastern upland	Hilly to rolling	B1	Knowles (30) and Morley (55) silt loam and rocky land (15)	10.1	2	3	4[3]	--	2	2	2	<50	IIe6, IIIe6, IIIe2, IVe6, IVe2a
		B2	Hochheim (60), Theresa (30) and Brookston (10) silt loam	69.1	2	2	3	--	2	2	2	<100	IIIe1, IVe1, VIe1, IIw1
		B3	Pecatonica (60) and Flagg (30) silt loam; Baraboo (10) silt loam, stony	24.1	2	2	3	--	2	2	2	<100	IIe1, IIIe1, IVe1, IVe1, IIIe2, IVe2, Ve2
		B4	Casco (50), Rodman (50), Fox (15) and Lapeer (10) loams	143.8	3	4	4	--	3	3	3	<1000	IVe2, IVe3, IVe4, VIe3, s5

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Rolling to undulating	B5	Ringwood (50), Durand (40) and Ripon (10 silt loam	139.6	2	2	3	--	2	2	2	<5,000	IIe1, IIIe1, IVe1, IIe2, IIIe2, IVe2
		B6	Dubuque (40), Pecatonia (30), McHenry (20) and Whalan (10) silt loam	31.6	2	2	2	--	2	2	2	<1,000	IIe2, IIIe2, IVe2
		B7	Pecatonica (40), Dodge (30), McHenry (25) and Whalan (5) silt loam	151.6	2	2	3	--	2	2	2	<1,000	IIIe1, IVe, IIIe2, IVe2
		B8	Lapeer (50), McHenry (20) and Miami (30) silt loam (30) with rock outcrops	89.3	2	3	3	--	2	2	2	<1,000 100 50	IIIe1, IIIe4, VIe4

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Rolling to undulating	B9	Morley (40), Blount (30) and Varna silt loam (15), Ashkum silty clay loam (15)	31.3	2	3	3	--	2	2	2	<100	IIe6, IIIe6, IIw1, IIw2
		B10	Flagg (40), Pecatonica (50) and Mingo silt loam (10)	55.8	2	2	3	--	2	2	2	<1,000	IIe1, IVe1, IIw2
		B11	Miami (50), McHenry (20), Crosby (15), and Brookston (15) silt loam	128.8	2	2	3	--	2	2	2	<1,000	IIIe1, IIw1, IIw2
		B12	Theresa (50), Hochheim (40), and Nenno (10) silt loam	225.6	2	2	3	--	2	2	2	<1,000	IIIe1, IVe1, VIe1, IIw2
		B13	Miami (50), Dodge (25), and Pella silt loam (25)	303.6	1	2	3	--	2	2	2	<10,000	IIIe1, IIw1

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Rolling to undulating	B14	McHenry (40), Lapeer (35), Miami (20) and Brookston (5) silt loam	71.4	2	3	3	--	2	2	2	<1,000	IIIe1, IIIe4, VIe4, IIw1
		B15	Lapeer (40), Pardeeville (30), Boyer (20) and McHenry loams (10)	170.8	3	3	4	--	3	2	2	<10,000	IIIe4, IVe4, VIe4, IIIe1, IIIs4, IIIe7
		B16	Knowles (25), Ripon (35), Casco (30) and Sisson (10) loams	10.2	3	3	4	--	3	3	2	<1,000	IIe2, IVe2, VIe2, VIe3, IIe1
		B17	Theresa (40), Onaway (35), Fox (20), and Salter (5) silt loams and loams	98.8	2	2	3	--	2	2	2	<1,000	IIe1, IIIe1, IVe1, VIe1, IIe2, IIIe2, IVe2, VIe2

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
												(acres)	
	Rolling to undulating	B18	Fox (50), Casco (30) and St. Charles (20) stratified substratum) silt loam	24.9	Unirrigated								
					2	2	3	--	2	2	2	<1,000	IIIe2, IVe2, VIe2, VIe3, IIe1
					Irrigated								
					1	1	1	--	--	--	--		
	Gently undulating to rolling	B19	Morley (40), Blount (30), Ozaukee (15) silt loam; Ashkum (15) silty clay loam	313.9	2	3	3	--	2	2	2	<10,000	IIe6, IIIe6, IIs7, IIw1, IIw2
		B20	Varna (40) and Elliott (30) silt loam, Ashkum (30) silty clay loam	127.1	2	2	3	--	2	4[2]	4[2]	<1,000	IIs1, IIe2, IIw1, IIw2
		B21	Ogle (50), Durand (30), and Pella (20) silt loam	24.5	1	1	2	--	1	4[2]	4[2]	<1,000	IIe1, IIIe1, IVe1, IIw1

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
												(acres)	
	Gently undulating to rolling	B22	Plano (35), Saybrook (25), Ringwood (20), Elburn (10) and Pella (10) silt loam	353.1	1	1	2	--	1	4[2]	4[2]	<10,000	I3, IIel, IIIel, IIwl, IIw2
		B23	Miami (50), McHenry (30) and Brookston (15) silt loam, with peat (5) and muck soils	138.3	2	2	3	--	2	2	2	<1,000	IIIel, IIwl, IIIw9
		B24	Theresa (50), Hochheim (40), and Nenno (10) silt loam	489.0	2	2	3	--	2	2	2	<10,000	IIel, IIIel, IIw2
		B25	St. Charles (40), Dodge (20), Miami (30) and Pella (10) silt loam	198.6	2	2	3	--	2	2	2	<1,000	IIel, IIIel, IIwl

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
												(acres)	
	Gently undulating to rolling	B26	Metea (30), Puchyan (40), Miami (20) and Lapeer (10) loams	75.0	3	3	4	--	3	3	2	<1,000	IIe7, IIIe7, IIIe4, IVe4. IIIe1
		B27	Lomira (50), LeRoy (35) and Knowles silt loam	113.5	2	3	3	--	2	3	4	<1,000	IIIe1, IIIe2
		B28	Lapeer (50), Pardeeville (30) and McHenry (20) loams	67.8	3	3	4	--	3	2	2	<1,000	IIIe4, IVe4, IIe1, IIIe1
		B29	Dodge (50), Lomira (35) and Knowles silt loam (15)	49.1	2	2	3	--	2	2	2	<1,000	IIe1, IIIe1, IIe2, IIIe2

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area		Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
					PRODUCTIVITY FOR									
	Gently undulating to rolling	B30	Fox (40) and Casco (40) loams; Boyer (20) sandy loam	284.7	Unirrigated	3	3	3	--	3	3	2	<1,000	IIe2, IIIe2, IIIs4, IIIe7, IIIe3, IVe3
					Irrigated	1	1	1	--	--	--	--		
		B31	Fox (45), Will (25), Casco (20) and Fabius (10) silt loam	81.8	Unirrigated	3	2	2	--	2	3	3	<1,000	IIe2,IIIe2, IIw5, IIIe3, IVe3
					Irrigated	1	1	1	--	--	--	--		
	Nearly level and undulating	B32	Plano (50) and St. Charles (25) (stratified substratum), Warsaw (15) and Fox (10) silt loam	197.3	Unirrigated	1	1	2	--	2	3	3	<1,000	I-4, IIe1, IIsa1, IIe2
					Irrigated	1	1	1	--	--	--	--		
		B33	Fox (50), Hebron (30) and Del Rey loams (20)	35.4		2	2	3	--	2	2	2	<100	IIs1, IIe2, IIs7, IIe7, IIw2

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level and undulating	B34	Fox (50) silt loam; St. Charles (30) (stratified substratum) and McHenry loams (20)	55.3	2	2	3	--	2	2	2	<100	IIs1, IIe2, I-4, IIe1, I-4, IIe1

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	Productivity for: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
					Unirrigated							(acres)	
Soils of the central sandy uplands and plains	Rolling, hilly, undulating and nearly level	C1	Oshtemo (40) and Gotham (30) loamy sand; Plainfield (30) loamy sand and sand	49.7	4	4	4	--	4	4	2	<100	IVs3, VIIs3, VIIs9, VIIe9, VIIe7, IIIs4
					Irrigated								
					2	1	1	--	--	--	--		
		C2	Mecan (40) and Wyocena (30) loamy sand and sandy loam; Plainfield (25) and Gotham (5) loamy sand and sand	216.2	4	3	4	--	4	3	2	<1,000	IIIe4, VIIe4, Vs6, VIIs6, IVs3, IVs3, VIIs3, VIIe9
		C3	Plainfield (60), Gotham (20) and Wyocena (20) loamy sand	186.4	4	4	4	--	4	4	2	<1,000	VIIs3, IVs3, VIIe9, IVs3, VIIs6, VIs6

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level and undulating with hilly to steep outliers	C4	Boone (40) and Plainfield (30) sand; Au Gres (10) and Nekoosa (10) loamy sand; and peat soils (10)	237.9	4	4	4	--	4	4	3	<10,000	VIIs3, VIIs9, IVs3, IVw5
	Nearly level and gently undulating	C5	Sparta (40), Plainfield (30) and Gotham (30) loamy sand and sand	261.7	Unirrigated							<1,000	IVs3, VIIs9
					4	4	4	--	4	4	2		
					Irrigated								
					2	1	1	--	2	--	--		
		C6	Plainfield (40), Sparta (30), and Gotham (30) loamy sand and sand	187.4	Unirrigated							<1,000	IVs3, IVs3, VIIs9
					4	4	4	--	4	4	2		
					Irrigated								
					2	1	1	--	2	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil Association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level and gently undulating	C7	Meridian (40) loams, Plainfield (30), Sparta (20) loamy sand and sand, Shiffer (10) loams	64.7	Unirrigated							<1,000	IIs4, IVs3, IVs3, VIIs9, IIw5
					4	3	4	--	4	4	2		
					Irrigated								
					2	1	1	--	--	--	--		
		C8	Sparta (40) loamy sand; Dakota (30) and Meridian (30) sandy loam	64.7	Unirrigated							<100	IVs3, VIIs9, IIs1, IIe2, IIIs4
					3	3	4	--	3	4	3		
					Irrigated								
					2	1	1	--	--	--	--		
		C9	Dakota (40), Onamia (40), Meridian (10) and Burkhardt loams (10)	66.3	Unirrigated							<100	IIs1, IIe2, IIIs8, IIIe3
					2	2	3	--	2	3	2		
					Irrigated								
					1	1	1	--	1	--	--		

Table 3 Continued

Region / Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	Productivity for: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
Nearly level and undulating	C10	Plainfield (40), Kellner (20) and Newton (30) sand and loamy sand; peat and muck soils (10)	212.5	Unirrigated							<10,000	IVs3, VIIs9, IVw5
				4	4	4	--	4	4	4		
				Irrigated								
				2	1	1	--	--	--	--		
	C11	Plainfield loamy sand and sand (70); Gotham loamy fine sand (30)	49.6	Unirrigated							<1,000	IVs3, VIIs9, IVs3
				4	4	4	--	4	4	2		
				Irrigated								
				2	1	1	--	--	--	--		
	C12	Nekoosa (40) and Plainfield (30) loamy sand Newton (20) loamy sand and sandy loam; shallow peat (10) and muck soils	39.9	Unirrigated							<100	IVs3, VIIs9, IVw5
				4	4	4	--	4	4	2		
				Irrigated								
				2	1	2	--	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
												(acres)	
	Nearly level and undulating	C13	Nekoosa (40) and Morocco (30) loamy sand; Granby (10) sandy loam; Plainfield (10) loamy sand and sand; peat soils (10)	68.4	4	4	4	--	3	4	2	<100	IVs3, IVw5, VIIs9
	Nearly level and undulating	C14	Plainfield (45), Nekoosa (20) and Newton (35) loamy sand and sand	54.3	Unirrigated: 4	4	4	--	4	4	2	<1,000	IVs3, VIIs9, IVw5
					Irrigated: 2	1	2	--	--	--			
	Nearly level and undulating	C15	Plainfield (65), Richford (20) and Kellner (5) loamy sand; Dakota (10) sandy loam	102.1	Unirrigated: 4	4	4	--	4	4	2	<1,000	IVs3, IIIs4, VIIs9
					Irrigated: 2	1	1	--	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
					PRODUCTIVITY FOR								
	Nearly level and undulating				Unirrigated							(acres)	
		C16	Dakota (55) and Onamia (45) sandy loam	32.1	2	2	3	--	2	2	2	<2,000	IIIs4, IIs1, IIe2
					Irrigated								
					1	1	1	--	--	--	--		
		C17	Guenther (40), Dancy (40) Nekoosa (10) and Newton (10) loamy sand and sandy loam	521.2	3	3	4	--	3	3	2	<1,000	IIIs2, IIIe4, IVw3, IVs3, IVw5
					Unirrigated								
		C18	Delton (45) loamy sand Alban (30) loams; and Wyeville (25) loamy sand	55.0	3	3	3	--	3	3	2	<1,000	IIIs2, IIIe4, I-4, IIe1, IIIw-o
					Irrigated								
					2	1	2	--	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
D. Soils of western sandstone uplands, valley slopes and plains	Steep to rolling	D1	Steep rocky land (20); Gale (20) silt loam; Norden (20) and Hixton (20) loams; Fayette (10) and Seaton (10) silt loam	1,333.7	3	--	--	--	3	2	2	<10,000	VIIe2, IIIe2, VIIel, IIIel, VIIs3
	Hilly, rolling and steep	D2	Norden (40), Gale (35) and Fayette (15) silt loam; Hixton loams (10)	360.6	3	--	--	--	3	2	2	<10,000	VIIe2, IIIe2, VIIel, IIIel
		D3	Gale (45), Norden (35) and Fayette (20) silt loam	69.5	3	--	--	--	3	2	2	<1,000	VIIe2, IIIe2, VIIel, IIIel

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Hilly, rolling and steep	D4	Norden (40), Hixton (30), and Northfield (20) loams; and Boone (10) sand	377.4	3	--	--	--	3	3	2	<10,000	VIIe2, IIIe2, VIIe3, IVe3, VIIs3, IVs3
	Hilly, rolling and steep	D5	Hixton (40) and Northfield (30) loams; Gale (20) silt loam; Boone (10) sand	195.7	3	--	--	--	3	3	2	<1,000	VIIe2, IIIe2, VIIe3, IVe3, VIIs3, IVs3
	Hilly, rolling and steep	D6	Boone (75) sand; Northfield (25) loams	109.1	4	--	--	--	4	4	3	<1,000	VIIs9, VIIe3, IIIe3
	Hilly, rolling and steep	D7	Hixton (50) and Arland (15) loam and silt loam; Gale (20) silt loam; and Norden (15) loams	149.6	3	--	--	--	3	2	2	<2,000	VIIe2, IIIe2

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Gently rolling and rolling	D8	Merrillan (40) loamy sand; Boone (25) sand; Northfield (20) loams; Elm Lake (5) loamy sand; Arland (10) loams	113.8	3	4[3]	4[3]	--	3	4	3	<1,000	IIIe8, IIw3, VIs3, IVs3, VIs6, Vs6, IVw3, IIIe2a, IIs1
		D9	Hixton (40) loams; Gale (30) silt loam; Northfield (10), Arland (10) and Milaca (10) loams	74.2	3	3	4	--	2	2	2	<1,000	IIIe2, IIs1, IVe3, IIIe1
		D10	Hixton (50), Onamia (30) and Chetek (20) loams	90.5	3	3	4	--	2	2	2	<1,000	IIIe2, IIs1, IVe3, IIIs8

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	Productivity for: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level and undulating	D11	Elm Lake (40), Merrillan (30) and Humbird loamy sand and sandy loam (15) Boone sand (14) and Northfield loams (15)	55.1	3	--	--	--	3	4	3	<1,000	IVw3, IIIs8, VIIs9
		D12	Merrillan (40), Elm Lake (30), and Humbird loamy sand (30)	116.9	3	--	--	--	4	4	3	<2,000	IVw3, IIIs8
		D13	Kert (50), Vesper (30) and Veedum (20) silt loam	223.5	3	--	--	--	2	3	2	<5,000	IIw3, IIIw3, IVw3

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
E. Soils of northern and eastern sandy and loamy reddish drift uplands and plains.	Rolling to undulating	E1	Emmet (45) loamy sand; Onaway (35) loams; and Omega loamy sand (20)	65.3	3	4	4	--	3	3	2	<1,000	IIIe2, IIs1, VIs3, IBs3
		E2	Onaway (40) and Solona (30) loams; Emmet (10) and Underhill (10) sandy loam; Angelica (10) loams	235.3	2	2	3	--	2	2	2	<1,000	IIIe2, IIs1, IIw2, IIw1
	Undulating	E3	Emmet (40) and Onaway (30) sandy loam; Solona (15) and Angelica (5) loams; Omega loamy sand (10)	92.6	2	2	3	--	2	2	2	<1,000	IIe2, IIs1, IIw2, IIw1 IVs3

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	E4	Onaway (40), Underhill (15), Emmet (25), Alban (5) and Solona loams (15)	439.8	2	2	3	--	2	2	2	<2,000	IIe2, IIs1, IIe1, I-4, IIw2
	Undulating	E5	Solona (40), Onaway (30), Hortonville (5), Shiocton (20) and Angelica loams (5)	134.4	2	2	3	--	2	2	2	<2,000	IIw2, IIw4, IIe2, IIs1, IIe1, I-4, IIw1
	Undulating	E6	Longrie (40), Summerville (15), Onaway (35) and Bonduel loams (5); rock outcrops (5)	199.6	3	3	4	--	3	3	3	<5,000	IIe2, IIs1, IIw3
	Undulating	E7	Onaway (50), Longrie (40), and Detour (10) loams and sandy loam	14.1	2	2	3	--	2	2	2	<1,000	IIe2, IIs1, IIw3

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level	E8	Shiocton (30) and Tustin (25) sandy loam; Shawano (25) loamy fine sand; Oshkosh (10) and Poygan (5) silty clay loam; peat and muck soils (5)	85.1	3	3	3	--	2	3	2	<2,000	IIw4, IIIs2, IVs3, IIs7, IIwl
	Nearly level	E9	Underhill (40), Onaway (40), Angelica (5) and Wauseon loams (15)	42.4	2	3	2	--	2	2	2	<1,000	IIsl, IIwl, IIIw6
	Nearly level	E10	Delton (60) and Wyeville (15) sandy loam; Poygan (20) silty clay loam; peat and muck soils (5)	28.9	2	3	3	--	3	3	3	<200	IIIs2, IIIw6, IIwl, IIw8, IIIw9
	Nearly level	E11	Tustin (45) Shiocton (35) and Kibble loams (20)	72.4	2	2	2	--	2	2	2	<1,000	IIIs2, IIw4, IIw2

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level	E12	Shawano (40) and Keowns (30), Granby (10), and Au Gres loamy sand (20) and sandy loam	64.1	3	4	4	--	3	4	3	<1,000	IVs3, IIIw3, IVw5
	Nearly level	E13	Shawano (40) and Granby (40) loamy sand and sandy loam; peat and muck soils (10)	111.2	3	3	3	--	3	4	3	<1,000	IVs3, IVw5, IIw8, IIIw9

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
Soils of the northern silty uplands and plains	Rolling to undulating	F1	Lafont (40), Clifford (30) and Auburndale (30) silt loam	139.1	2	3	3	--	2	2	2	<5,000	IIIe8, IIw4, IIIw3
		F2	Santiago (50),Freer (30), Milaca (15) and Cable (5) silt loam	51.4	2	2	3	--	2	2	2	<1,000	IIIel, I-4
		F3	Freeon (40), Freer (20) Almena (20), and Adolph silt loam (20)	131.5	2	2	3	--	2	2	2	<2,000	IIel, IIw4, IVw3
		F4	Norrie silt loam (30); Kennan (40), and Onamia (20) loams; and peat (10) soils (and with some soil association F15 around Rib Mt. near Wausau	142.8	2	2	3	--	2	2	1	<5,000	IIel, IIe2, IIw8, IIIw9

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Rolling to undulating	F5	Stambaugh (40) and Goodman (25) silt loam; Padus (20) and Iron River (15) loams	42.0	2	2	3	--	2	1	1	<20,000	IIe2
		F6	Antigo (40) and Norrie (15) silt loam; Onamia (25) and Kennan loams (20)	105.8	2	2	3	--	2	1	1	<1,000	IIIe2, IIe2, IIIe1, IIe1
		F7	Cushing (50), Alstad (30) and Bluffton (20) loams	68.4	2	2	3	--	2	1	2	<1,000	IIIe1, IIe1, IIw2, IIIw1
		F8	Jewett (50) and Waukegan (30) silt loam; Dakota (20) loam	47.1	2	2	2	--	2	3	2	<10,000	IIIe1, IIe1, IIIe2, IIe2

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	F9	Clifford (50) and Auburndale (40) silt loam; and peat soils (10)	175.7	2	3	3	--	3	3	3	<2,000	IIw4, IIIw3
	Undulating	F10	Santiago (30), Freeon (20), Freer (20), Milaca (10), and Cable (10) silt loam; peat soils (10)	547.9	2	2	3	--	2	2	2	<10,000	IIe1, IIw4, IIIw3
	Undulating	F11	Loyal (40), Whithee (35), Arland (15) and Marshfield (10) silt loam	295.0	2	2	3	--	2	2	2	<10,000	IIe2, IIw4, IIIw3

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	F12	Spencer (35), Almena (35), Auburndale (15) and Adolph (15) silt loam	285.0	2	2	3	--	2	2	3	<10,000 100 50	IIe1, Vw16, IIIw3, IVw3
		F13	Renova (40), Ostrander (20), Sargeant (30) and Floyd (10) silt loam	174.7	2	2	2	--	2	3	3	<10,000	IIe1, IIw1, IIw2
		F14	Fenwood (40), Marathon (30), Rozellville (20) and Cable (10) silt loam some stony areas	316.9	2	2	3	--	2	2	2	<1,000	IIe2, IIIw3
		F15	Rozellville (40), Marathon (30), Rietbrock (20) and Meade (10) stony silt loam	60.1	2	2	3	--	2	2	2	<1,000	IIe2, IIw3

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	F16	Stambaugh (40) silt loam; Padus (30) and Iron River (25) loams; and peat soils (5)	15.7	2	2	3	--	2	2	1	<1,000	IIe2
	Undulating	F17	Antigo (40) silt loam; Onamia (30) loam; Brill (15) and Poskin (15) silt loam	73.2	Unirrigated: 2	2	3	--	2	2	1	<1,000	IIe2, IIw5
					Irrigated: 1	1	1	--	--	--	--		
	Nearly level	F18	Clifford (35) and Auburndale (45) silt loam; peat soils (20); some areas are stony	393.1	2	3	4	--	2	3	3	<10,000	IIw4, IIIw3, IIw8, IIIw9

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level	F19	Clifford (30), Lafont (40) and Auburndale (30) silt loam	113.0	2	3	3	--	2	3	3	<2,000	IIw4, IIs1, IIIw3
		F20	Freer (40), Freeon (30), Almena (20) and Auburndale (10) silt loam	426.7	2	2	3	--	2	2	2	<10,000	IIw4, I-4, IIIw3
		F21	Withee (45), Marshfield (30) and Adolph (15) silt loam; peat soils (10)	595.0	2	3	3	--	2	3	3	<10,000	IIw4, IIIw3, IVw3, IIw8, IIIw9
		F22	Almena (40), Auburndale (30), Spencer (20) silt loam; peat soils (10)	351.3	2	2	3	--	2	3	3	<10,000	IIw4, IIIw3, I-3

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level	F23	Dolph (50) and Altdorf (50) silt loam; some areas are stony	80.6	3	3	4	--	3	3	3	<1,000	IIw3, IIIw3
	Nearly level	F24	Stambaugh (30) silt loam, Padus (20), Pence (25) and Iron River loams (25)	69.3								<1,000	IIs1, IIIs8
			Unirrigated		2	2	3	--	2	2	1		
			Irrigated		1	1	2	--	--	--	--		
	Nearly level	F25	Antigo (50) and Brill silt loam (10); Onamia (40) loams	338.3								<10,000	IIs1
			Unirrigated		2	2	3	--	2	2	1		
			Irrigated		1	1	2	--	--	--	--		
	Nearly level	F26	Poskin (40), Brill (20) and Antigo (25) silt loam; Onamia loams (15)	38.3	2	2	3	--	2	2	2	<1,000	IIw5, IIs1

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
G. Soils of the northern loamy uplands and plains	Hilly, rolling to undulating	G1	Gogebic (45) and Iron River loams (50), stony, with bedrock outcrops (5)	111.1	2	--	--	--	3	1	2	<10,000	IVe2, IIIe2, IIe2
		G2	Iron River (30) and Pence (20) loams; Goodman (15), Monico (5) and Stambaugh (20) silt loam; peat soils; some areas are stony (10)	239.5	2	--	--	--	3	2	2	<10,000	IVe2, IIIe2, IIe2, VIe3, IVe3, IIIe3, IIw4, IIw8, IIIw9
		G3	Iron River (40) and Pence (30) loams; Vilas (20) sand; and peat soils (10)	87.3	3	--	--	--	3	2	2	<1,000	VIe4, VIe3, IVe4, IVe3, IIIe4, IIIe3, VIIs3, VIs3, IVs3, VIIs9, IIIw9

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Hilly, rolling to undulating	G4	Milaca (40) loam; Cloquet (10) and Pence sandy loam (30); Vilas (10) sand; and peat (10) soils	206.7	3	--	--	--	3	2	2	<10,000	IVe1, IIIe1, IIe1, VIe4, IVe4, IIIe4, VIs3, IVs3, VIIs9, IIIw9
		G5	Kennan (30), Iron River (30) and Pence (20) loams; Vilas (10) sand; and peat soils (10)	116.2	3	--	--	--	3	2	2	<2,000	IVe1, IVe2, IIIe1, IIIe2, IIe1, IIe2, VIe3, IVe3, IIIe3, VIIs9, IIIw9
		G6	Kennan (40), Wyocena (40) and Onamia (20) loams; some areas are stony	49.2	2	--	--	--	3	2	1	<1,000	IVe1, IVe2, IIIe1, IIIe2, IIe1, IIe2, VIe4, IVe4, IIIe4

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Hilly, rolling to undulating	G7	Padus (30) and Pence (35) loams; Vilas (25) sand; and peat soils (10)	81.6	Unirrigated: 3	--	--	--	3	2	2	<1,000	IVe2, IIIe2, II; VIe3, IVe3 IIIe3, VIIs9
					Irrigated: 2	1	1	--	--	--	--		
	Hilly, rolling to undulating	G8	Chetek (40) and Scandia sandy loam (15); Omega (35) sand; and peat soils (10)	50.5	3	--	--	--	4	4	2	<1,000	VIe3, IVe3, IIIe3, VIe4, IVe4, IIIe4, VIIs3, VIs3, IVs3, IIIw9
	Rolling to undulating	G9	Gogebic (50) sandy loam, Marenisco (25) loamy sand; Ahmeek (15) loam; Bedrock outcrops (10)	83.1	2	--	--	--	3	2	2	<1,000	IIe2, IIe1, IVs3

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
												(acres)	
	Rolling to undulating	G10	Gogebic (50) sandy loam; Marenisco loamy sand (10); Ahmeek (10) and Cable (10) loams; and peat soils (10)	111.3	3	--	--	--	3	2	2	<1,000	IIe2, IIs1, IVs3, IIIw3, IIIw9
		G11	Iron River (40), Padus (20) and Pence (30) loams; Vilas sand (5); and peat soils (5)	584.1	2	--	--	--	2	2	2	<10,000	IIe2, IIs1, IIIe3, IIIs8, VIIs9, IIIw9,
		G12	Cloquet (30), Gogebic (30) and Pence (30) loams; and peat soils (10)	113.7	3	--	--	--	3	2	2	<10,000	IIIe4, IIIe3, IIIs2, IIIs8, IIe2, IIs1, IIIw9

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Rolling to undulating	G13	Milaca (40), Cloquet (20), Iron River (25) and Cable (10) loams; and peat soils (5)	413.4	2	--	--	--	3	2	2	<10,000	IIe1, IIe2, I-4, IIIe4, IIIs2, IIs1, IIIw3, IIIs9
		G14	Kennan (30), Iron River (30) and Pence (30) loams; and peat soils (10)	330.0	3	3	3	--	2	2	2	<10,000	IIe1, IIe2, I-4, IIs1, IIIe3, IIIs8, IIIw9
		G15	Kennan (40), Wyocena (30), Onamia (15) and Bevent (5) sandy loams; peat soils (10)	76.6	2	3	3	--	2	2	2	<1,000	IIe1, IIe2, I-4, IIIe4, IIIs2, IIs1, IIIs4, IIIw9

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Rolling to undulating	G16	Padus (40) and Pence (40) loams, Omega (10) sand; Stambaugh (5) silt loam; and peat soils (5)	135.6	Unirrigated							<10,000	IIe2, IIs1, IIIe3, IIIs8, VIIs9, IIIw9
					2	3	3	--	2	2	2		
					Irrigated								
					1	1	1	--	--	--	--		
	Rolling to undulating	G17	Pence (50) and Cloquet (20) sandy loam; Stambaugh (20) silt loam; and peat soils (10)	63.6	2	3	3	--	3	3	2	<1,000	IIIe3, IIIe4, IIIs8, IIIs2, IIe2a, IIs1, IIIw9
	Rolling to undulating	G18	Pence (55) sandy loam; Vilas (30) sand; and peat soils (15)		Unirrigated							<10,000	IIIe3, IIIs8, VIIs9, IIw9
					3	4[3]	4[3]	--	3	4	2		
					Irrigated								
					2	2	2	--	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
												(acres)	
	Rolling to undulating	G19	Onamia (50), Chetek (35) and Dakota (15) loams	91.2	Unirrigated							<10,000	IIe2, IIsl, IIIe3, IIIs8
					2	2	4	--	3	3	2		
					Irrigated								
					1	1	1	--	--	--	--		
	Undulating	G20	Geogebic (35), Iron River (35) and Cloquet (10) loams and sandy loam; Vilas (10) sand; and Cable loams (10)	473.0	2	--	--	--	2	2	2	<10,000	IIe2, IIsl, IIIe4, IIIs2, VIIs9, IIIw3
		G21	Iron River (55), Gogebic (20) and Cable (15) loams; and peat soils (10)	389.0	2	--	--	--	2	2	2	<10,000	IIe2b, IIsl, IIIw3, IIIw9

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	G22	Milaca (30) and Cloquet (10) loams; Santiago (20), Freer (10), and Cable (10) silt loam; and peat (10) soils	278.8	2	3	4[3]	--	2	2	2	<10,000	IIel, I-4, IIIe4, IIIs2, Vw16, IIIw9
		G23	Iron River (50), Gogebic (30) and Monico (5) loams; Marenisco (5) loamy sand; and peat soils (10)	332.3	2	--	--	--	2	2	2	<10,000	IIe2, IIsl, IIw4, IVs3, IIIw9
		G24	Kennan (50), Wyocena (20) and Onamia (30) loams	70.2	2	2	3[3]	--	2	2	1	<1,000	IIel, IIe2, I-4, IIsl, IIIe4

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	G25	Pence (50) and Padus (20) loams; Stambaugh (10) silt loam; Vilas (10) and Omega (10) sand	298.4	Unirrigated							<1,000	IIIe3, IIIs8, IIe2, IIsl, VIIs9
					2	3	4	--	3	3	2		
					Irrigated								
					2	2	2	--	--	--	--		
	Undulating	G26	Onamia (40) and Chetek (30) loams and sandy loam; Antigo (20) silt loam; and peat soils (10)	253.3	Unirrigated							<2,000	IIe2, IIsl, IIIe3, IIIs8, IIIw9
					2	2	3	--	2	3	2		
					Irrigated								
					1	1	1	--	--	--	--		
	Nearly level	G27	Pence (40) sandy loam; Vilas (30) sand; Stambaugh (10) and Padus (10) loams; and peat (10) soils	196.5	Unirrigated							<2,000	IIIs8, VIIs9, IIsl, IIIw9
					3	3	4	--	3	3	2		
					Irrigated								
					2	2	2	--	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR							Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
					Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	(acres)	
	Nearly level	G28	Onamia (40) and Chetek (30) sandy loam; Antigo (20) silt loam; and peat soils (10)	173.1	Unirrigated							<2,000	IIs1, IIIs8, IIIw9
					2	3	3	--	2	3	2		
					Irrigated								
					1	1	1	--	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
H. Soils of the northern sandy uplands and plains	Hilly to rolling	H1	Vilas (40), Omega (40), and Hiawatha (5) loamy sand and sand; Pence sandy loam (10); and peat soils (5)	367.3	4	4[3]	4[3]	--	4	4	2	<25,000	VIIs9, VIe3, IVe3, IIIe3, IIIw9
	Rolling	H2	Vilas (40), Omega (40) and Hiawatha (10) loamy sand and sand; and peat soils (10)	732.4	4	4[3]	4[3]	--	4	4	2	<10,000	VIIs9, IIIw9
	Undulating	H3	Vilas (40), Omega (40) and Hiawatha (5) loamy sand and sand; Pence (10) sandy loam; and peat soils (5)	574.0	Unirrigated: 4	4[3]	4[3]	--	4	4	2	<10,000	VIIs9, IIIe3, IIIw9
					Irrigated: 2	2	2	--	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area		Productivity for: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	H4	Omega (40) and Vilas (40) loamy sand and sand; Pence (10) sandy loam; and peat soils (10)	574.0	Unirrigated	4	4[3]	4[3]	--	4	4	2	<10,000	VIIs9, IIIe3, IIIw9
					Irrigated	2	2	2	--	--	--	--		
	Nearly level	H5	Vilas (40) and Omega (30) loamy sand and sand; Pence (20) sandy loam; and peat (10) soils	181.8	Unirrigated	4	4[3]	4[3]	--	4	4	2	<10,000	VIIs9, IIIs8, IIIw9
					Irrigated	2	2	2	--	--	--	--		
		H6	Omega (40) and Vilas (30) loamy sand and sand; Chetek (5) and Pence (15) sandy loam; and peat soils (10)	340.4	Unirrigated	4	4[3]	4[3]	--	4	4	2	<10,000	VIIs9, IIIs8, IIIw9
					Irrigated	2	2	2	--	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
												(acres)	
	Nearly level	H7	Pence (50) sandy loam Omega (30) and Au Gres loamy sand and sand (20)	173.0	Unirrigated							<10,000	IIIs8, VIIs9, IVw5
					3	4	4[3]	--	4	3	2		
					Irrigated								
					2	2	2	--	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
I. Soils of the northern and eastern clayey and loamy reddish drift uplands and plains.	Rolling to hilly	I1	Hibbing clay (40) loam; Leonidas (40), Superior (15) and Ogemaw (5) sandy loams	59.0	3	4[3]	4[3]	--	3	3	2	<2,000	IVe6, IIIe6, IVe7, IIIe7, IVw5
I. Soils of the northern and eastern clayey and loamy reddish drift uplands and plains.	Rolling to hilly	I2	Hibbing (30), Pickford (30) and Ontonagon (30) loams and silty clay loam; Bibon (10) sand	53.2	3	4[3]	4[3]	--	3	3	3	<2,000	IVe6, IIIe6, IIIwl, VIe9, IVs3
I. Soils of the northern and eastern clayey and loamy reddish drift uplands and plains.	Rolling to hilly	I3	Kolberg (40), Summerville (30) and Kewaunee (20) silt loam and silty clay loam, with limestone and (10) shale rockland	19.3	2	3	4[3]	--	2	3	3	<500	IVe2, IIIe2, VIe3, IVe3, IIIe3, IVe6, IIIe6, IVe7, IIIe7

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Rolling to undulating	I4	Kewaunee (40), Hortonville (30), Manawa (20) and Poygan (10) silt loam and silty clay loam	526.1	2	2	3	--	2	2	3	<20,000	IIIe7, IIe7, IIIe1, IIe1, IIw2, IIw1
		I5	Hortonville (40), Kewaunee (40), Manawa (10) and Poygan silt loam (10)	77.2	2	2	3	--	2	2	3	<1,000	IIIe1, IIe1, IIIe7, IIe7, IIw2, IIw1
		I6	Onaway (40) loam; Theresa (20), Hortonville (10), Fox (20) and Casco loams (10)	36.5	2	2	3	--	2	2	3	<500	IIIe2, IIe2, IIIe1, IIe1, IVe3, IIIe3, IIIe2, IIe2

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	I7	Hibbing (45) silty clay loam; Leonidas (25) and Gogebic (20) loams; and Bibon sand (10)	75.2	3	--	--	--	3	3	3	<1,000	IIe6, IIe2, IVs3
		I8	Hibbing (45), Rudyard (30) and Pickford (15) silty clay loam; Hiawatha (10) loamy sand	211.8	3	--	--	--	3	3	3	<10,000	IIe6, IIIw1, VIIs9
		I9	Superior (50), Orienta (20) and Pickford (10) loams; Manistee (10) and Hiawatha (10) loamy sand (10)	58.8	3	--	--	--	3	3	2	<1,000	IIe7, IVw5, IIIw1, IVs3 VIIs9

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	I10	Kewaunee (70), Manawa (20), and Poygan silty clay loam (10)	111.2	2	2	3	--	2	2	3	<1,000	IIe6, IIw2, IIw1
	Undulating	I11	Kewaunee (60), Manawa (25) and Poygan silt loam and loams (15)	99.4	2	2	3	--	2	2	3	<1,000	IIe6, IIw2, IIw1
	Undulating	I12	Kewaunee (70) and Manawa silt loam and loams (30)	54.6	2	2	3	--	2	2	3	<1,000	IIe6, IIw2
	Undulating	I13	Kewaunee (50), Manawa (20), Poygan (10) and Hortonville (10) loams and silt loam; Tustin (10) loamy sand	176.6	2	2	3	--	2	2	3	<1,000	IIe6, IIw2, IIw1, IIe1, IIIe4

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	I14	Manawa (40) and Poygan (30) silty clay loam; Rimer (20) and Tustin (10) sandy loam	33.6	2	3	3	--	2	2	3	<500	IIw2, IIw1, IIIw6, IIIe4, IIIs2
	Undulating	I15	Kewaunee (50), Kolberg (30) and Manawa (20) silt loam and loams (20)	40.8	2	3	3	--	2	2	3	<1,000	IIe6, IIe2, IIw2
	Undulating	I16	Hortonville (50), Manawa (25) and Poygan (20) loams; Shiocton (5) fine sandy loam	129.5	2	2	2	--	2	2	3	<1,000	IIe1, IIw2, IIw1, IIw4

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Undulating	I17	Briggsville (50) and Poygan (20) loam and clay loam; Tustin (20) and Lapeer (10) sandy loam	34.0	2	2	3	--	2	2	3	<1,000	IIe6, IIwl, IIIe4, IIIs2
	Nearly level	I18	Hibbing (50), Rudyard (20), Pickford (10) and Ontonagon (10) silty clay loam; Superior clay loam; Superior loams (10)	117.0	3	4[3]	4[3]	--	3	3	3	<10,000	IIs7, IIIwl
		I19	Ontonagon (60), Hibbing (20) and Rudyard (20) silty clay loam	249.0	2	--	--	--	3	3	3	<10,000	IIs7, IIIwl
		I20	Kewaunee (45), Oshkosh (25), Manawa (15) and Poygan (15) silty clay loam	206.4	2	2	3	--	2	2	3	<10,000	IIs7, IIw2, IIwl

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level	I21	Oshkosh (40), Manawa (30) and Poygan (20) silty clay loam; Tustin (10) sandy loam	174.4	2	2	3	--	2	2	3	<1,000	IIs7, IIw2, IIw1, IIIs2
		I22	Braham (50) and Blomford (45) loams; Dalbo (5) silt loam	50.9	2	3	3	--	2	3	3	<2,000	IIIs2, IIIw6, IIs7

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
J. Soils of the stream bottoms and major wetlands.	Nearly level	J1	Arenzville (50), Orion (35) and Ettrick (15) silt loam	61.9	2	2	2	--	1	2	--	<100	IIw11, IIw13, IIw1
		J2	Wet alluvial (100) soils, undifferentiated	200.0	--	--	--	--	--	3	--	<10,000	IIw13
		J3	Granby (40), Shawano (30) and Emmet (20) sand and shallow (10) peat soils	73.1	3	4	4	--	4	4	3	<10,000	IVw5, IVs3, IIs1, IVw7
		J4	Newton (40), Plainfield (30) and Morocco (20) sand and loamy sand; and shallow (10) peat soils	91.6	4	4	4	--	4	4	3	<10,000	IVw5, IVs3, IVw5

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	PRODUCTIVITY FOR: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level	J5	Newton (40), Morocco (30), and Au Gres (25) loamy sand and sand; and shallow (5) peat soils	266.4	4	4	4	--	4	4	4	<25,000	IVw5, IVw7
	Nearly level	J6	Cable (30), Monico (30), Auburndale (20) and Freer (10) loams and silt loam; and peat soils	50.1	3	3	4	--	3	3	3	<10,000	IIIw3, IIw4, IVw7
	Nearly level	J7	Wauseon (40), Keowns (25), Tustin (30) and Rimer loams and sandy loam (5)	102.7	Undrained: 4	4	4	--	4	4	4	<2,000	IIIw6, IIIw3, IIIs2
					Drained Artificially: 2	3	2	--	3	3	3		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	Productivity for: Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level	J8	Pella (60), Brookston (20) and Virgil silt loam and silty (20) clay loam	157.7	Undrained							<1,000	IIw1, IIw2
					4	4	4	--	4	4	4[2]		
					Drained Artificially								
					1	2	1	--	1	4	4[2]		
	Nearly level	J9	Matherton (50), Will (30) and Pella (20) silt loam and silty clay loam	122.1	Undrained							<1,000	IIw5, IIw1
					4	4	4	--	4	4	4		
					Drained Artificially								
					2	2	2	--	2	3	--		
	Nearly level	J10	Navan (40), Hebron (30), Aztalan (10) and Pella (20) loams and silty clay loam	63.7	Undrained							<2,000	IIw1, IIs7, IIw2
					4	4	4	--	4	4	4		
					Drained Artificially								
					2	2	2	--	2	3	4		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit (acres)	Representative Land Use Capability Classes
	Nearly level	J11	Zittau (30), Poygan (30), Poy (30) and Borth (10) loams and silty clay loam	91.7	Undrained							<2,000	IIw5, IIwl, IIs7
					4	4	4	--	4	4	4		
					Drained Artificially								
					2	3	3	--	3	3	4		
	Nearly level	J12	Moss (50) peat over acid sedge and woody peat soils; Au Gres (40) sand; and Cable loams (10)	307.4	Undrained							<10,000	IIIw9, IVw7
					--	--	--	4	--	4	4		
					Drained Artificially								
					2	2	2	1	--	--	--		
	Nearly level	J13	Raw acid sedge (50) and woody peat soils with thin moss covering; Cable (20) and Freer (30) silt loam	296.0	Undrained							<10,000	IIIw9, IVw7
					--	--	--	4	--	4	3		
					Drained Artificially								
					3	2	2	1	--	--	--		

Table 3 Continued

Region	Topography	Map Symbol	Soil association (with estimated areal percentages)	Area	Field Crops	Canning Crops	Truck Crops	Cranberries	Livestock	Forestry: Hardwoods	Forestry: Conifers	Probable maximum size of an operational landscape unit	Representative Land Use Capability Classes
					← PRODUCTIVITY FOR →							(acres)	
	Nearly level	J14	Acid sedge peat (50) and muck soils; Au Gres (30), Newton (10) and Morocco (10) sand and loamy sand	448.4	Undrained							<10,000	IIIw9, IVw7
					4	4	4	4	4	4	3		
					Drained Artificially								
					2	2	2	1	--	--	--		
		J15	Slightly acid (50) to alkaline sedgey and woody peat and muck soils; Pella (35), Poygan (10) and Brookston (5) silt loam and silty clay loam	523.9	Undrained							<20,000	IIIw9, IVw7
					--	--	--	--	4	3	3		
					Drained Artificially								
					2	2	1	--	3	--	--		

[1] Ratings are on a 1 to 4 scale, from soils best suited (1) to the use indicated to soils least suited (4). Dashes (--) indicate that the soil is usually not adapted for production of the crop or animal unit in question. For example, cranberries are not grown on mineral (non-organic) soils; canning and truck crops are not usually grown on undrained sandy wetlands; livestock are not grazed and trees not grown on most irrigated soils which are more profitably used for field crops. Soils are assumed to be unirrigated unless otherwise indicated, because irrigation is not usually practiced on soils for which such designation is not given. Most wetlands of soil region J are considered in both undrained and artificially undrained conditions. In other soil regions, component wetland

Footnotes for Table 3 (Continued)

mineral soils, such as Pella silt loam (soil association B13), are assumed to be artificially drained to permit production of field crops. High level management is assumed for field crops, canning crops, truck crops, cranberries and livestock. Truck crops include sweet corn, peas, snap beans, beets. Truck crops include carrots, lettuce, onions, potatoes, cabbage, mint.

Ratings for field crops (corn, oats) are by the crop yield estimate method, modified by intuitive judgement by F. D. Hole and A. J. Klingelhoets, in the light of field experience. Unmodified ratings for field crops obtained by this method are listed in Table 5.

2 Trees are not usually planted on these prairie soils because field crop production and other activities connected with dairying are considered more profitable. If conifers are planted on these soils, prior innoculation of the soil with mycorrhizal-rich forest soil is important.

3 These crops are usually not grown on these soils because of slope hazard, shallowness to bedrock, droughtiness, or difficulty of artificial drainage.

OTHER INTERPRETATIONS REGARDING SOIL PRODUCTIVITY FOR VEGETATION

Conversion of Annual Production of Vegetation by Soil Association To Energy Units.

As Cottam et al. (1973) have emphasized, food, fiber and energy are critical resources. This report emphasizes productivity of soil associations of Wisconsin for agricultural and silvicultural product units, but has not considered energy yet. Pimentel et al (1973) discuss energy-food problems.

The purpose of this section of the report is to make preliminary estimates of energy content of harvestable vegetation, less the energy required to plant, manage and harvest the usable part of the vegetation, such as above-ground parts of silage corn, and cord-wood or saw logs of pine (*Pinus strobus*) and oak (*Quercus alba*, *Q. borealis*, *Q. macrocarpa*). Yield figures for best management were taken from Klingelhoets et al. (1966). Corn silage was assumed to be 65% moisture as harvested (Jorgensen and Crowley, 1972). A 35% figure for dry silage was used in the calculations. Density of woods were taken from Cunningham (1974), U.S. Forest Products Laboratory and U.S.D.A. (1955) and Stefferud (1949). Cottam et al. (1973) give 4414 cal/g of dry tissue as corn energy content, and they cite amounts of energy used in planting, cultivating and harvesting the corn, and in harvesting wood.

The energy content of the vegetation is given in terms of kilocalories (K Cal), both per hectare and per acre. These preliminary estimates can be converted into equivalent units of gasoline, coal and other fuels.

A sample of the procedure used in estimating energy contents is presented for soil association A3 in the following tables.

For corn silage

Table B.

Soil Series	Estimated % of area	Annual production Tons/acre Field wt. #	Dry wt. *	Metric tons** per hectare dry weight*	Metric tons/Ha by proportionate area
Dubuque	60	13	4.6	10.3	6.2
Palsgrove	20	15	5.3	11.9	2.4
Sogn	15	--	--	--	--
Dodgeville	5	13	4.6	10.3	0.5
					9.1

9.1×4414 cal/g $\times 10^6$ =

40.167×10^6 K Cal/Ha**−2.2#=37.9

\# 65% moisture

\# harvesting energy is 5.5% of yield energy

* 0% moisture

** Conversion factor from yield per hectare to yield per acre is 0.446, (0.5 was used in Table 4), and vice versa is 2.24.

For eastern white pine*

Table C.

Soil Series	Estimated % of area	Annual growth 1,000 board feet /A	/Ha	1,000 board feet values by proportionate areas /A	/Ha
Dubuque	60	0.475	1.06	0.285	0.636
Palsgrove	20	0.512	1.15	0.102	0.230
Sogn	15	--	--	--	--
Dodgeville	5	0.475	1.06	0.024	0.053
				0.411	0.919×10^3 =

12.7×10^6 Bt = 3.2×10^6 K Cal − harvesting energy = 3.0×10^6 K Cal/Ha

* Cunningham (1974) reported that 1,000 BF or 2,120 lbs. of eastern white pine wood (15% moisture) contains 13.9 million Btu.

For oak*

Table D.

Soil Series	Estimated % of area	Annual growth 1,000 board feet		1,000 board feet values by proportionate area	
		/A	/Ha	/A	/Ha
Dubuque	60	0.175	0.392	0.105	0.235
Palsgrove	20	0.225	0.504	0.045	0.101
Sogn	15	--	--	--	--
Dodgeville	5	0.175	0.392	0.009	0.020
				0.159	0.356 BF x 10^3 = 8.2×10^6 Btu = 2.1×10^6 K Cal/Ha - energy used in harvesting = 1.9 K Cal/Ha.

* Cunningham (1974) reported that 1,000 BF or 3,960 lbs. of oak contain 23.1 million Btu. 1 Btu = 0.252 K Cal.

Table 4. Estimated annual production of energy in terms of net productivity of harvestable vegetation, less energy used in harvest, in millions of kilogram calories (K Cal) per unit area, by soil associations.[1]

Map Symbol	Corn silage		Eastern white pine		Oak	
	/Ha	/A	/Ha	/A	/Ha	/A
A1	64	32	3.5	1.5	2.5	1.1
A2	44	22	3.0	1.3	0.8	0.3
A3	38	19	3.0	1.3	1.9	0.8
A4	49	25	--	--	0.3	0.1
A5	49	25	3.5	1.5	2.5	1.1
A6	44	22	3.0	1.3	1.9	0.8
A7	44	22	3.5	1.5	2.5	1.1
A8	49	25	3.5	1.5	2.5	1.1
A9	38	19	3.0	1.3	1.9	0.8
A10	38	19	1.9	0.8	1.9	0.8
A11	64	32	4.1	1.9	3.0	1.3
A12	57	29	3.0	1.5	2.5	1.1
A13	49	25	2.5	1.1	1.9	0.8
A14	44	22	3.1	1.5	1.9	0.8
B1	38	19	0.8	0.3	1.4	0.6
B2	54	27	2.5	1.1	1.9	0.8
B3	57	29	3.5	1.5	2.5	1.1
B4	35	28	1.9	0.8	1.4	0.6
B5	54	27	3.0	1.3	2.5	1.1
B6	38	19	3.0	1.3	1.9	0.8
B7	49	25	3.0	1.3	1.9	0.8
B8	49	25	3.0	1.3	2.5	1.1
B9	49	25	--	--	1.4	0.6
B10	57	29	3.0	1.3	1.9	0.8
B11	54	27	1.9	0.8	2.5	1.1
B12	49	25	2.5	1.1	1.9	0.8
B13	54	27	1.9	0.8	2.5	1.1
B14	49	25	2.5	1.1	2.5	1.1
B15	44	22	3.5	1.5	1.4	0.6
B16	49	25	1.9	0.8	1.4	0.6
B17	49	25	2.5	1.1	1.9	0.8
B18	44	22	3.0	1.3	1.9	0.8
B19	49	25	0.3	0.1	1.9	0.8
B20	49	25	1.9	0.8	1.4	0.6
B21	57	29	3.0	1.3	2.5	1.1
B22	38	19	2.5	1.1	1.9	0.8
B23	54	27	1.9	0.8	2.5	1.1

Table 4 Continued

Map Symbol	Corn silage /Ha	Corn silage /A	Eastern white pine /Ha	Eastern white pine /A	Oak /Ha	Oak /A	Map Symbol	Corn silage /Ha	Corn silage /A	Eastern white pine /Ha	Eastern white pine /A	Oak /Ha	Oak /A
B24	49	25	2.5	1.1	1.9	0.8	C10	25	13	3.0	1.3	0.3	0.1
B25	49	25	3.0	1.3	1.9	0.8	C11	28	14	3.5	1.5	0.8	0.3
B26	44	22	3.0	1.3	1.4	0.6	C12	25	13	1.9	0.8	0.8	0.3
B27	49	25	2.5	1.1	1.9	0.8	C13	25	13	1.9	0.8	0.8	0.3
B28	44	22	3.0	1.3	1.9	0.8	C14	28	14	3.5	1.1	0.8	0.3
B29	44	22	3.0	1.3	2.5	1.1	C15	28	14	3.5	1.5	0.8	0.3
B30	44	22	3.0	1.3	1.4	0.6	C16	44	22	3.5	1.5	1.9	0.8
B31	49	25	1.4	0.5	1.9	0.8	C17	35	28	1.9	0.8	2.5	1.1
B32	57	29	3.0	1.3	1.9	0.8	C18	38	19	2.5	1.1	1.4	0.6
B33	49	25	2.5	1.1	1.9	0.8							
B34	49	25	2.5	1.1	1.9	0.8	D1	14	7	1.4	0.5	0.8	0.3
							D2	28	14	3.5	1.5	1.9	0.8
C1	28	14	3.5	1.5	1.4	0.6	D3	44	22	3.5	1.5	2.5	1.1
C2	25	13	3.5	1.5	1.4	0.6	D4	35	28	3.5	1.5	1.4	0.6
C3	28	14	3.5	1.5	1.4	0.6	D5	14	7	3.0	1.3	0.8	0.3
C4	25	13	1.9	0.8	0.8	0.3	D6	28	14	2.5	1.1	0.8	0.3
C5	28	14	3.5	1.5	0.8	0.3	D7	28	14	3.0	1.3	0.8	0.3
C6	28	14	3.5	1.5	0.8	0.3	D8	28	14	2.5	1.1	0.8	0.3
C7	35	28	3.5	1.5	0.8	0.3	D9	44	22	3.5	1.5	1.9	0.8
C8	38	19	2.5	1.1	1.4	0.6	D10	38	19	3.5	1.5	1.9	0.8
C9	44	22	3.5	1.5	1.9	0.8	D11	28	14	1.9	0.8	0.8	0.3

Table 4 Continued

Map Symbol	Corn silage		Eastern white pine		Oak	
	/Ha	/A	/Ha	/A	/Ha	/A
D12	28	14	1.9	0.8	0.8	0.3
D13	44	22	--	--	1.4	0.6
E1	35	28	3.0	1.3	1.9	0.8
E2	38	19	3.0	1.3	1.9	0.8
E3	38	19	3.0	1.3	1.9	0.8
E4	38	19	3.0	1.3	2.5	1.1
E5	44	22	3.0	1.3	1.9	0.8
E6	25	13	2.5	1.1	1.4	0.6
E7	35	28	3.0	1.3	1.4	0.6
E8	44	22	1.9	0.8	1.4	0.6
E9	44	22	3.0	1.3	1.9	0.8
E10	38	19	3.0	1.3	1.4	0.6
E11	49	25	2.5	1.1	1.9	0.8
E12	38	19	3.0	1.3	1.4	0.6
E13	25	13	2.5	1.1	1.4	0.6
F1	38	19	3.0	1.3	1.9	0.8
F2	38	19	3.0	1.3	1.9	0.8
F3	38	19	3.0	1.3	1.9	0.8
F4	38	19	3.5	1.5	1.9	0.8
F5	38	19	3.5	1.5	2.5	1.1
F6	44	22	3.5	1.5	2.5	1.1
F7	44	22	3.0	1.3	1.9	0.8
F8	49	25	2.5	1.1	1.9	0.8
F9	28	14	1.9	0.8	1.4	0.6
F10	35	28	2.5	1.1	1.9	0.8
F11	44	22	3.5	1.5	1.9	0.8
F12	44	22	2.5	1.1	1.4	0.6
F13	44	22	3.0	1.3	1.9	0.8
F14	38	19	3.0	1.2	1.9	0.8
F15	44	22	3.5	1.5	2.5	1.1
F16	38	19	3.0	1.2	1.9	0.8
F17	44	22	3.5	1.5	1.9	0.8
F18	28	14	1.9	0.8	1.4	0.6
F19	35	28	3.0	1.3	1.4	0.6
F20	38	19	3.0	1.3	1.4	0.6
F21	38	19	2.5	1.1	1.4	0.6
F22	38	19	2.7	1.3	1.4	0.6
F23	38	19	1.9	0.8	1.4	0.6
F24	38	19	3.5	1.5	1.9	0.8
F25	44	22	3.0	1.3	1.9	0.8
F26	44	22	2.0	1.3	2.5	1.1
G1	19	10	3.5	1.5	1.9	0.8
G2	19	10	3.0	1.3	1.9	0.8

Table 4 Continued

Map Symbol	Corn silage /Ha	Corn silage /A	Eastern white pine /Ha	Eastern white pine /A	Oak /Ha	Oak /A
G3	14	7	3.0	1.3	1.4	0.6
G4	14	7	3.0	1.3	1.4	0.6
G5	19	10	3.0	1.3	1.9	0.8
G6	25	13	3.5	1.5	2.5	1.1
G7	25	13	3.0	1.3	1.9	0.8
G8	19	10	3.0	1.3	0.8	0.3
G9	35	28	3.5	1.5	1.9	0.8
G10	28	14	3.0	1.3	1.4	0.6
G11	28	14	3.0	1.3	1.9	0.8
G12	28	14	3.0	1.3	1.4	0.6
G13	28	14	3.5	1.5	1.9	0.8
G14	35	28	3.5	1.5	1.9	0.8
G15	35	28	3.0	1.2	1.9	0.8
G16	35	28	3.0	1.2	1.4	0.6
G17	28	14	3.0	1.2	1.9	0.8
G18	14	7	2.5	1.1	1.4	0.6
G19	38	19	3.5	1.5	1.4	0.6
G20	28	14	3.0	1.3	1.9	0.8
G21	28	14	2.5	1.1	1.9	0.8
G22	28	14	3.0	1.2	1.9	0.8
G23	35	28	3.0	1.3	1.9	0.8
G24	38	19	3.0	1.3	2.5	1.1
G25	28	14	3.5	1.5	1.9	0.8
G26	38	19	3.0	1.3	1.4	0.6
G27	19	10	3.0	1.3	1.4	0.6
G28	35	28	3.0	1.3	1.4	0.6
H1	10	5	3.0	1.3	0.8	0.3
H2	10	5	3.0	1.3	0.8	0.3
H3	10	5	3.0	1.3	0.8	0.3
H4	14	7	3.0	1.3	0.8	0.3
H5	14	7	3.0	1.3	0.8	0.3
H6	14	7	3.0	1.3	0.8	0.3
H7	25	13	2.5	1.1	1.4	0.6
I1	28	14	3.5	1.5	1.9	0.8
I2	28	14	1.9	0.8	1.4	0.6
I3	28	14	1.4	0.6	1.4	0.6
I4	49	25	1.9	0.8	2.5	1.1
I5	38	19	1.9	0.8	2.5	1.1
I6	44	22	3.0	1.3	1.9	0.8
I7	28	14	3.5	1.5	1.9	0.8
I8	28	14	1.4	0.6	1.9	0.8
I9	28	14	1.9	0.8	1.4	0.6
I10	49	25	1.4	0.6	1.9	0.8
I11	49	25	1.4	0.6	1.9	0.8

Table 4 Continued

Map Symbol	Corn silage /Ha	Corn silage /A	Eastern white pine /Ha	Eastern white pine /A	Oak /Ha	Oak /A
I12	49	25	1.9	0.8	2.5	1.1
I13	49	25	1.9	0.8	2.5	1.1
I14	49	25	0.3	0.1	1.4	0.6
I15	44	22	2.5	0.1	2.5	1.1
I16	49	25	1.4	0.6	2.5	1.1
I17	38	19	1.9	0.8	2.5	1.1
I18	28	14	1.9	0.8	1.9	0.8
I19	28	14	2.5	1.1	1.4	0.6
I20	49	25	2.5	1.1	2.5	1.1
I21	49	25	1.4	0.6	2.5	1.1
I22	44	22	3.0	1.3	1.4	0.6
J1	57	29	--	--	2.5	1.1
J2	--	--	--	--	0.3	0.1
J3	28	14	1.4	0.6	0.8	0.3
J4	28	14	1.4	0.6	0.3	0.1
J5	28	14	1.4	0.6	0.8	0.3
J6	19	10	1.4	0.6	1.4	0.6
J7	49	25	1.3	0.6	1.4	0.6
J8	57	29	0.3	0.1	1.4	0.6
J9	57	29	--	--	1.4	0.6
J10	54	27	0.8	0.3	1.9	0.8
J11	49	25	--	--	1.9	0.8
J12	10	5	0.3	0.1	0.3	0.1
J13	10	5	0.3	0.1	0.3	0.1
J14	14	7	--	--	0.3	0.1
J15	35	28	--	--	0.3	0.1

[1] Dashes indicate that the crop is usually not grown on the soil association in question. Compare with Table 3. /Ha = per hectare, /A = per acre.

ESTIMATE OF ANNUAL PRODUCTION OF ORGANIC MATTER (DRY WEIGHT) OF EACH OF THE TEN MAJOR SOIL REGIONS

Estimates have been published of the annual production of all categories of vegetation by counties (except Menominee County) in metric tons per hectare (Tm/Ha). These estimates are presented in Table 8 of the Deciduous Forest Biome Memo Report No. 72-142 by Cottam *et al.* (1973).

On the basis of this information, the writer has estimated the annual production of organic matter by soil regions. Results are presented in Table 4. The method used to obtain these approximations is illustrated by the following estimates for Adams County.

Table E.

Townships		Soil region		% of area x	
Number	% of county	Symbol	Productivity (Tm/Ha)	prod. rating	
0.8	4.0	I	5.2	20.8	Rating = 4.14
2.5	12.5	J	8	100.0	compared with
0.1	0.5	D	4.7	2.4	county rating of
15.6	83.0	C*	3.5	290.5	4.15 by Cottam *et al.*
19.0				413.7	

* Intergrading to Cp in places

Ratings in the fourth column from the left were derived from values for entire counties in which the soil region in question is predominant. Note that the ratings vary with intensity of agricultural management, on the one hand, and degree of urbanization on the other. Mineral wetlands are extremely productive of vegetative material, as Cottam *et al.* assert.

This method of approximating estimates of total annual vegetative productivity does not reveal differences, if such exist, with changes in latitude. To convert Tm/Ha to English tons per acre, multiply above values by 0.446.

These estimates are preliminary and are subject to improvement as research data make this possible. For example, the productivity figure for soil region J may be a little high. Cottam et al. suggest 10 Tm/Ha as a reasonable figure for marshes. The soils involved are probably those of soil associations J3 through J11. However undrained peats and mucks (J12 through J15) are much less productive, possibly in the neighborhood of 3 Tm/Ha. Further work is obviously needed to firm the average production figure for soil region J in particular.

Table 5. Estimated total annual production of organic matter from all categories of vegetation per hectare in the ten major soil regions of Wisconsin

Soil region map symbol[1]	Tm/Ha[2]
A	5.7
Ap	5.9
B	6.2
Bp	7.3
C	3.3
Cp	3.6
D	4.7
E	5.2
F	5.0
Fp	6.0

Table 5 Continued

Soil region map symbol[1]	Tm/Ha[2]
G	4.0
H	2.9
I	5.2
J	8.0

[1] These symbols are found on the color soil map of Wisconsin by Hole *et al.*, 1968.

[2] These preliminary estimates were derived from estimates of total productivity (Tm/Ha) given by counties by Cottam *et al.* (1973) in Table 8. The method used to derive the productivity by soil regions is illustrated by the preceding estimates for Adams County (p.111).

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APPENDIX

A Discussion of the Use of the Soil Productivity Score Card in Rating Soils.

The Soil Productivity Score Card of Berger, Hole and Beardsley (1952) was designed for use by field men of canning companies in selecting best fields for rental. Hole used it (1953) in calculating productivity ratings for all Towns in Wisconsin. Cottam et al. (1973) displayed the Town ratings in a computer print-out map (their Figure 2). The Soil Productivity Score Card Method is much more laborious than the Yield Estimate Method, because the latter method relies on the crop yield to integrate a multitude of productivity factors.

The score card was used in this study to calculate ratings on a 1 to 4 scale for the soil associations of Wisconsin (see legend, color map by Hole et al., 1968). The results are generally comparable to those obtained by the Yield Estimate Method (see Fig. 7). Specifically, ratings were the same for 142 out of the 190 soil associations. Of the 48 instances of difference between the ratings obtained by the Yield Estimate Method as reported in Table 3, and ratings obtained by the Soil Productivity Score Card Method, about half of the ratings obtained by the Soil Productivity Score Card Method were one step higher and one half were one step lower than ratings obtained by the Yield Estimate Method.

The writer concludes that the Soil Productivity Score Card would need to be improved to make it more useful in evaluating soil productivity on a state-wide basis. Some examples of inadequacies of performance of the score card in this study are as follows:

a) The score card is not sensitive enough to degree of droughtiness of sandy loam soils and medium textured soils underlain by sand and gravel. The sandy loam soils are not penalized enough for their droughtiness, and soils of the north, such as Stambaugh silt loam and Padus loam are penalized too much.

b) Somewhat poorly drained soils are penalized too much by the score card for restricted drainage conditions. Actually, somewhat poorly drained soils may be more productive than either better or more poorly drained soils.

c) The reduction of oats yields resulting from the short growing season on the Ontonagon soils of the Lake Superior Basin is not adequately taken into account by the score card.

d) The high productivity of peats and mucks after artificial drainage and institution of good crop, soil and water management practices is not sufficiently recognized by the score card.

e) The score card does not take frost pocket phenomena (as in bogs of the central sandy plain of Wisconsin) into account.

f) The score card does not penalize sloping soils enough for steeper slopes.

Table 6. Ratings for soil productivity of soil associations of Wisconsin for field crops as determined by the Soil Productivity Score Card Method, and the unmodified Crop Yield Estimate Method.

Map Symbol	Ratings determined by the SPSCM[1]	CYEM[2] a	CYEM[2] b
A1	1	1	90
A2	1	2	52
A3	2	3	43
A4	2	2	60
A5	2	2	71
A6	2	2	62
A7	2	2	73
A8	2	2	69
A9	2	2	53
A10	2	2	55
A11	1	1	93
A12	1	1	78
A13	1	2	59
A14	1	2	62
B1	2	3	40
B2	2	2	64
B3	2	2	70
B4	3	4	22
B5	1	2	56
B6	2	2	54
B7	2	2	69
B8	2	2	53
B9	1	2	66
B10	2	2	74
B11	2	2	72
B12	2	2	65
B13	1	1	80
B14	2	2	59
B15	2	3	40
B16	2	3	46
B17	2	2	52
B18	1	3	45
B19	2	2	61
B20	1	2	68
B21	1	1	86
B22	1	1	82
B23	2	2	71
B24	2	2	65
B25	1	1	77
B26	3	3	42
B27	2	2	60
B28	2	3	44
B29	2	2	69
B30	2	3	37
B31	2	3	49
B32	1	1	77
B33	1	2	73
B34	1	2	57
C1	4	4	17
C2	4	4	24
C3	4	4	18
C4	4	4	14

Table 6 Continued

Map Symbol	Ratings determined by the SPSCM	CYEM a	CYEM b	Map Symbol	Ratings determined by the SPSCM	CYEM a	CYEM b
C5	4	4	13	E1	3	3	33
C6	4	4	12	E2	2	2	54
C7	2	4	22	E3	2	3	40
C8	2	3	29	E4	2	2	57
C9	1	3	45	E5	2	2	59
C10	4	4	14	E6	2	3	40
C11	4	4	12	E7	2	2	56
C12	3	4	15	E8	2	3	47
C13	3	4	16	E9	2	2	60
C14	4	4	10	E10	3	2	51
C15	3	4	13	E11	2	2	51
C16	1	3	48	E12	3	3	31
C17	2	2	51	E13	3	4	24
C18	3	3	48				
				F1	2	2	63
D1	2	3	43	F2	2	2	63
D2	2	3	46	F3	2	2	70
D3	2	3	47	F4	2	1	76
D4	2	3	44	F5	2	1	80
D5	3	3	39	F6	2	1	80
D6	4	4	12	F7	1	2	74
D7	2	3	44	F8	2	2	66
D8	4	4	12	F9	2	2	59
D9	2	3	47	F10	2	2	65
D10	2	3	48	F11	2	2	68
D11	4	4	7	F12	2	2	71
D12	3	4	6	F13	2	2	64
D13	3	3	48	F14	2	2	68

Table 6 Continued

Map Symbol	Ratings determined by the SPSCM	CYEM		Map Symbol	Ratings determined by the SPSCM	CYEM	
		a	b			a	b
F15	2	2	73	G19	2	3	45
F16	2	1	78	G20	3	3	48
F17	1	1	76	G21	3	2	56
F18	2	2	59	G22	3	2	57
F19	3	2	63	G23	3	2	63
F20	2	2	69	G24	3	2	56
F21	2	2	55	G25	3	3	42
F22	2	2	65	G26	2	2	54
F23	2	3	48	G27	3	3	32
F24	3	2	69	G28	2	2	54
F25	1	1	82				
F26	2	1	78	H1	4	4	11
				H2	4	4	9
G1	3	2	60	H3	4	4	11
G2	3	2	65	H4	4	4	13
G3	3	3	45	H5	4	4	13
G4	3	3	47	H6	4	4	16
G5	3	3	40	H7	4	4	19
G6	3	2	56				
G7	3	3	45	I1	3	3	41
G8	3	3	26	I2	3	3	31
G9	3	2	52	I3	3	3	43
G10	3	3	38	I4	2	2	72
G11	3	2	64	I5	2	1	81
G12	3	3	36	I6	2	2	59
G13	3	2	53	I7	3	3	41
G14	3	2	63	I8	2	3	41
G15	3	2	55	I9	3	3	34
G16	3	2	53	I10	2	2	71
G17	3	3	38	I11	2	2	71
G18	4	4	14	I12	2	2	69

Table 6 Continued

Map Symbol	Ratings determined by the SPSCM	CYEM a	CYEM b
I13	2	2	71
I14	2	2	66
I15	2	2	65
I16	2	2	70
I17	2	2	63
I18	2	3	48
I19	2	2	53
I20	2	1	81
I21	2	1	79
I22	2	2	58
J1	1	2	68
J2	-	-	0
J3	3	3	25
J4	3	4	17
J5	3	4	23
J6	2	3	38
J7	2	2	51
J8	1	1	91
J9	1	1	79
J10	2	1	90
J11	2	2	75
J12	4	4	9
J13	3	4	14
J14	4	4	12
J15	2	3	49

[1]SPSCM = Soil productivity score card method. Ratings are on a 1-best to 4-worst scale.

[2]CYEM = Crop yield estimate method.

a = Ratings on a 1-best to 4- worst scale.

b = Ratings are on a 100-best to 0 relative yield scale for corn or oats.

Table 7. ESTIMATED ACREAGES (IN THOUSANDS OF ACRES) OF SOME MAJOR SOIL SERIES AND TYPES AND LAND TYPES IN WISCONSIN[1]

>800	600-800	500-600	400-500	300-400	200-300	100-200	50-100
Iron River (G-800; l-630; sl-170)	Fayette (A-660; sil-530; stony sil-l; sil valley phase-130)	Alluvial lands (J-560; wet, 335; not wet, 225)	Amery (Milaca) (G, F-437; l-335; stony l-2; l in complex with peat-100)	Boone (D-379; ls-146; s-233)	Almena (F-202; sil-198; stony sil-4)	Adolph (F, J-176; sil-113; stony sil-63)	Ahmeek (G-sil-86)
Dubuque (A,B-814; sil-523; stony sil-291)	Hixton (D-556; l-240; stony l-12; sl-304)		Kewaunee (I-434; cl-19; stony l-5; sil-367; sl-43)	Gale (D-sil-328)	Antigo (F-287; sil-205; deep sil-12; shallow sil-70)	Adrian (J-muck-136)	Alcona (I-fsl-61)
	Pence (G,H, F-sl-636)		Miami (B-475; l-405; stony l-61; sl-9)	Gogebic (G-l-291)	Carbondale (J-muck-215)	Arland (D-100; l-30; sl-70)	Ashdale (A-sil-82)
	Plainfield (C-658; ls-478; s-180)		Omega (H,G-481; ls-416; s-65)	Onamia (G,F-335; l-259; sl-76)	Casco (B-285; l-138; sil-107; in complex with Rodman-25; in complex with Sisson-15)	Auburndale (F-sil-133)	Bertrand (A-sil-62)
	Rocky and stony land (A,D-616)		Palsgrove (A-sil-425)	Santiago (F-337; sil-333; stony sil-4)	Crivitz (G-ls-235)	AuGres (H, J-ls-187)	Brill (F-sil-51)
				Vilas (H,G-347; ls-343; s-4)	Dunbarton (A-sil-227)	Bergland (I,J-sil-105)	Burkhardt (A-sl-64)
					Elderon (A-l-222)	Billett (A-sl-111)	Coloma (C-95; ls-43; s-52)
					Fox (B-243; wil-201; sl-42)	Brems (C-ls-197)	Comstock (F-sil-62)
						Carlisle (J-muck-121)	Conover (B-sil-76)
						Cathro (J-peat-194)	Dakota (A-60; l-33; sl-27)
							Dawson (J-peat-79)
							Elkmound (D-sl-55)
							Emmet (E-76; fsl-57; ls-19)
							Ettrick (A,J-sil-75)

Table 5 Continued

	200-300	100-200	50-100
	Freeon (F-sil-214)	Chaseburg (A,J-sil-127)	Gotham (C-ls-93)
	Freer (F-136; sil-124; stony sil-12)	Chetek (G, D-l-192)	Hiawatha (H,G-ls-92)
	Greenwood-Spalding (J-peat-180)	Cloquet (G-131; ls-13; sl-118)	Hochheim (B-sil-68)
	Kennan (G-243; sil-186; stony sil-31; sl-26)	Dodge (B-sil-106)	Humbird (D-sl-63)
	Norden (D-sil-279)	Dodgeville (A-sil-140)	Keowns (D-l-76)
	Onaway (B-l-203)	Fenwood (F-sil-117)	Kert (D-sil-85)
	Ontonagon (I-sicl-255)	Goodman (F-sil-138)	Lafont (F-sil-72)
	Oshkosh (I-250; sil-198; scl-40; sl-12)	Houghton (J-muck-122)	Lamartine (B-sil-87)
	St. Charles (B-sil-246)	Kokomo (B, J-119; sil-110; stony sil-9)	Longrie (E-92; l-11; shallow l-81)
	Stambaugh (F-sil-230)	Lapeer (B-107; l-63; sl-44)	Loyal (F-sil-67)
		Manawa (I-sil-145)	Marathon (F-88; l-80; stony l-8)
			Maumee (C,J-sl-53)
			Mead (F-sil-86)
			Monico (F-l-55)
			Morley (B-sil-88)
			Newton (C,J-94; ls-59; sl-35)
			Norrie (F-sil-74)

Table 7 Continued

	200-300	100-200	50-100
	Withee (F-sil-234)	Markey (J-muck-141)	Northfield (D-sil-66)
	Warsaw (B-115; l-55; sl-60)	Merrillan (D-sl-134)	Ogden (J-muck-67)
		Otterholt (F-sil-165)	Pecatonica (B-sil-60)
		Padus (G-l-154)	Pella (B,J-sil-94)
		Plano (G-sil-196)	Poskin (F-sil-69)
		Parr (B-sil-159)	Rietbrock (F-67; sil-64; stony sil-3)
		Solona (E-l-138)	Rifle (J-peat-60)
		Sparta (C-109; ls-102; s-7)	Rock Land (A-55)
		Tama (A-sil-193)	Rough Broken Land (A-84)
		Terrace escarpments (A,C,H,G-151)	Rozellville (F-66; sil-59; sl-7)
		Washtenaw (B-sil-121)	Seaton (A-sil-82)
		Wyocena (C-174; ls-93; sl-72; stony sl-9)	Shawano (E-lfs-89)
			Shiocton (B-l-80)
			Sisson (B-72; l-50; in complex with Casco-22)
			Spencer (F-sil-98)

Table 7 Continued

	50-100
	Tawas (J-muck-56)
	Tilleda (E-sil-60)
	Trenary (E-l-53)
	Tustin (B-85; ls-53; sl-32)
	Underhill (E-sil-57)
	Urne (D-l-68)
	Vesper (D-sil-76)
	Warman (F,J-l-68)
	Wauseon (B-sl-67)
	Willette (J-muck-67)
	Worthen (A-sil-83)

[1] Compiled from the Conservation Needs Inventory data of the Soil Conservation Service, USDA, February, 1971. Textural abbreviations are translated as follows: cl = clay loam; l = loam; ls = loamy sand; s = sand; sil = silt loam; sicl = silty clay loam; sl = sandy loam. Capital letter symbols in the table refer to the soil region in which the soil or land type is most common. The first entry in the table is interpreted as follows:

Iron River..... Soil series
(G .... common in soil region G
- 800; .... occupies an estimated 800,000 acres in Wisconsin
l-630; .... Iron River loam occupies about 630,000 acres
sl-170) .... Iron River sandy loam occupies about 170,000 acres

The many soils with acreages less than 50,000 have been omitted from this table. Note that slope phases are not reported here.

For classification of soil series not defined in this publication, consult state soil keys of the Soil Conservation Service and the Geological and Natural History Survey.

ERRATA IN THE COLOR WALL SOIL MAP OF WISCONSIN

1. For A1, read A12, Trempealeau County, T.20 N., R.7 W.
2. For B, read B28, in Green Lake County, T.16 N., R.11 E.
3. For a blank strip, in Waukesha County, T.6 N., R.20 E, southward the soil boundaries interrupted.
4. For a missing label in a soil body in Menominee County, T.29 N., R.14 E., insert G14.
5. For 4, read I 4, in Ozaukee County, T.12 N., R.22 E.
6. For I0 read I10 in Brown County, T.21 N., R.19 E.
7. For I1 read I 11, in Calumet County, T.19 N., R.19 E.

Note: For clarification of soil boundaries interrupted by map lettering or crossed by streams, see the overlay soil map referred to in the lower left-hand corner of the map sheet.

ERRATA* ON THE 1:220,000 OVERLAY SOIL MAP OF WISCONSIN, 2/22/74

Name of Map Quadrangle	Map Correction made	Location
Ashland	A number of missing soil boundaries are added	T.46 and 47 N. R.2, 3, and 4 W.
Dubuque	--	--
Duluth	--	--
Eau Claire	I 10 changed to F 10	T.29 N., R.8 W.
	H 6 changed to C 6	T.28, 29 N., R.7, 8 W.
	F23 changed to F22	T.29 N., R.6 W.
	F25 and G28 changed to G19	T.29 N., R.8, 9.W.
	D7 changed to D4	T.29 N., R.11 W.
	E11 added	T.27 N., R.12 W.
	E9 changed to E11	T.28, 29 N., R.13 W.
Escanaba	--	--
Green Bay	B30 changed to E1	T.28 N., R.19 E.
	D11 changed to I22	T.25 N., R.14, 15 E.
	E2 changed to E4	T.29 N., R.15, 16 E.
	G24 changed to C2	T.23 N., R.9 E.
Iron Mountain	J2 changed to G2	T.37, 38 N., R.12 E.
	E2 changed to E4	T.29, 30, 31 N., R.16 E.
Iron River	G3 added	T.43 N., R.9, 10 E.
LaCrosse	E9 changed to E11	T.37, 38 N., R.12 E.
	C6 changed to C5	T.8, 9 N., R.2, 3 E.
Madison	B11 changed to B12	T.18 N., R.21 E.
	J15 added	T.17 N., R.12 E.
	J11 changed to J15	T.12 N., R.21 E.
	B9 changed to B29	T.10 N., R.15 E.
	I17 changed to I21	T.12, 13 N., R.5 E.
Manitowoc	B32 changed to B31	T.21, 22, 23 N., R.24 E.
Milwaukee	--	--
Racine	--	--

Name of Map Quadrangle	Map Correction made	Location
Rice Lake	H7 changed to H6	T.33, 34 N., R.11 W.
	D7 added	T.29, 30 N., R.10, 11 W.
	D7 added in two places	T.33 N., R.11 W.
	G28 changed to G19	T.29 N., R.9 W.
	H6 changed to C6	T. 29 N., R.7, 8 W.
	F25 changed to F26	T.33, 34 N., R.10 W.
	G2 added	T.33, 34 N., R.2, 3 E.
Rockford	B21 changed to B22	T.1 N., R.14 E.
	Boundary removed between B22/B22	T.6 N., R.12 E.
St. Paul	C6 changed to C5	T.24 N., R.17, 18 W.
	G16 changed to G19	T.29 N., R.18, 19 W.
Stillwater	A14 added	T.29 N., R.19 W.

*Note that the colored wall map, Soils of Wisconsin (1968), is taken as standard.

Numerical Expression of the Depressing Affects of Slope Erosion and Some Other Factors on Corn Yields

In estimating yields of crops on entire landscapes (soil associations), many factors must be taken into account. The variety and arrangement of soil bodies is different on each parcel of land. Each combination has its particular limitations. Slopes are of great importance. The steeper the slope, the more depressed the yield. Fenton et al. (1971) calculated corn suitability ratings (CSR) on a scale of 0-100 for each soil in Iowa. Corn suitability ratings ranged from 5 for Steep Rocky Land to 100 for level Tama silty clay loam. The following guidelines were used by these workers in reducing the CSR on slopes and in the event of other hazardous conditions. For example, Tama silty clay loam on a D slope, moderately eroded is 65.

Table 8. Guidelines used by Fenton et al. (1971) in establishing Corn Suitability Ratings for soils of Iowa.[1]

A. Slopes (Values listed are subtracted from CSR of same soil on A slope.)

Soil Group I

	Slope group						
	A	B	C	D	E	F	G
Well, moderately well, or somewhat poorly drained; uneroded; < 45% clay; friable or firm; > 48" solum.	Index soil	-5	-20	-30	-40	-60	-70

Soil Group II

	Slope group						
	A	B	C	D	E	F	G
Well, moderately well, or somewhat poorly drained; uneroded; > 45% clay with > 48" solum; firm; very firm < 45% clay; or 20 to 40" to bedrock, sands, or gravels.	Index soil	-5	-25	-40	-55	-75	-85

B. Erosion

	Erosion groups		
	1	2	3
1. AC profiles < 35% clay and loamy sand or sand	Index soil	Index soil	-5 < index
2. Solum > 48", < 35% clay in B	"	-2	-5
3. Solum > 48", 35-42% clay in B or very firm soils < 35% clay	"	-5	-10
4. Solum > 48", >42% clay in B	"	-5	-15
5. Solum 20 to 40", 18-45% clay in B	"	-5	-15
6. Solum < 20", 18-45% clay in B	"	-10	-20

C. Biosequence (Prairie soils have higher CSR's than Gray-Brown Podzolic soils. Values listed are subtracted from P index soil for P/F and for F soils.)

	P (prairie)	P/F	F (forest)
1. Medium and moderately fine textured soils	Index soil	-5	-10
2. Fine textured soils	Index soil	-10	-20
3. Sandy loam soils	Index soil	-4	-8
4. Loamy sand soils	Index soil	-2	-4

D. Wetness (Landscapes that contribute to wetness conditions and wet, poorly drained soils have lower CSR ratings than do somewhat poorly drained soils in a hydrosequence.)

Soils	Drainage	CSR
1. Moderately permeable; solum > 48"; < 35% clay in B	Poor < somewhat poor by	-5
2. Slowly permeable; solum > 48"; 35-42% clay in B	Poor < somewhat poor by	-7
3. Very slowly permeable; solum > 48"; > 42% clay in B except Edina is -5 < Seymour	Poor < somewhat poor by	-10
4. All depressions and Planosols except Edina, Belinda, and Beckwith soils	Depressions < poor by	-25
5. a. All concave positions vs. associated upland soils (concave level uplands)	Well and moderately well by	-3
	Somewhat poor by	-5
	Poor by	-10
b. Somewhat poor; very firm B with 30-35% clay in B and > 42% clay in B	Poor < somewhat poor by	-10
6. Moderately well or well vs. somewhat poorly drained for moderately well or well < somewhat poor		
a. Sharpsburg < Macksburg Marshall < Minden Clarion < Nicollet	Add for somewhat poor	+3
b. Galva < Primghar	Add for somewhat poor	+5
c. All other moderately well or well vs. somewhat poor	Somewhat poor - moderately well or well	0

7. Upland drainageway areas: CSR av. of soils in complex minus approximately 15 CSR's.

E. Calcareous soils (Calcareous soils have a lower CSR than associated noncalcareous soils.)

1. Poorly drained noncalcareous soils vs. poorly drained calcareous	-5 for calc.
2. Highly calcareous poorly drained vs. noncalcareous poorly drained	-20 for highly calc.

3. Calcareous upland vs. noncalcareous upland
   a. Calcareous soils: deduct 5 CSR's from comparable upland that is not calcareous
   b. Loamy sand, sand, or gravels: calcareous vs. noncalcareous, subtract 10 CSR's for calcareous soil

F. Depth phases (Soils with thin solums have a lower CSR than comparable soils with thick solums.)

1. Well or moderately well drained (medium and moderately fine textured)

Soil depth	CSR
> 48" thick	Index (upland soil)
Deep	-16 less than index soil
Moderately deep	-16 less than deep
< 20" to sand, gravel or bedrock	-25 less than moderately deep

2. Somewhat poorly drained (medium and moderately fine textured)

Soil depth	CSR
> 48" thick	Index (upland soil)
Deep	-12 less than index soil
Moderately deep	-12 less than deep
< 20" to sand, gravel or bedrock	-16 less than moderately deep

3. Poorly drained

Soil depth	CSR
> 48" thick	Index (upland soil)
Deep	-8 less than index soil
Moderately deep	-8 less than deep
< 20" to sand, gravel or bedrock	-16 less than moderately deep

4. Sandy loam over sand, gravel, or bedrock (well or moderately well drained)

Solum	CSR
> 48" thick	Index soil
Deep	-5 less than index soil
Moderately deep	-5 less than deep
< 20"	-15 less than moderately deep

5. Loamy sands over gravels or bedrock

Solum	CSR
> 48" thick	Index soil
Deep	-5 less than index soil
Moderately deep	-5 less than deep
< 20"	-10 less than moderately deep

G. Sandy or gravelly soils

1. Sandy loam profiles vs. loamy uplands > 48" thick — -35 for sandy loam

2. Loamy sand and sand profiles vs. loamy uplands > 48" thick — -50 for loamy sand and sand

H. Precipitation factors for Iowa (Index soil is Tama; well-drained soils in northwestern and western Iowa have lower CSR's than Tama soils.)

1. Southern Iowa loess soils vs. Tama soils (CSR's less than Tama)

-15	-10	-8	Index
Monona	Marshall	Sharpsburg	Tama

2. Galva vs. Tama — Galva = 0.75 x Tams

3. Tama vs. Moody — Moody = 0.70 x Tama

4. Loamy sand and sandy loam - eastern Iowa vs. western Iowa
   western Iowa 0.70 x eastern Iowa soil

5. Well and moderately well drained bottom lands
   - western Iowa 0.96 x eastern Iowa soil

I. Deposition and special soil modifiers

1. Deposition on units 133, 53, 134, 248, and 172, add 5 CSR's for deposition.

2. All overscore (i.e., $\overline{133}$), channeled (133c), or gullied (5 erosion) are rated at 25 CSR's.

3. T units are the same as uplands except that alluvial benches are 2 CSR's less than uplands.

J. Parent materials

1. Deoxidized loess: 3 CSR's less than oxidized

2.

loess	loess/till	till
Index soil	5 less than loess	10 less than loess

3. Loamy vs. silty bottom lands

   loamy: 3 CSR's less than silty

K. Muck and peaty soils

1. Muck

< 20" over mineral soil	15 CSR's less than poorly drained landscape associate
20 to 40" over mineral soil	30 CSR's less than poorly drained landscape associate
> 40:	25 CSR's less than 20- to 40-" depth

2. Peat

Peaty muck and peat	10 CSR's less than comparable depth phase of much (< 20" 10 CSR's less than poorly drained associate)

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[1] The information concerning factors affecting corn suitability ratings represents an initial effort in establishing criteria applicable on a statewide basis.