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SOIL SURVEY

Tippecanoe County Indiana

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION

How to Use THE SOIL SURVEY REPORT

THIS SURVEY of Tippecanoe County will help you plan the kind of farming that will protect your soils and provide good yields. It describes the soils, shows their location on a map, and tells what can be done with them under different kinds of management.

Find Your Farm on the Map

In using this survey, start with the soil map, which consists of the 15 sheets bound in the back of this report. These sheets, if laid together, make a large map of the county. You can find towns, rivers, roads, and many other landmarks on this map.

To find your farm on the large map, use the index to map sheets. This is a small map of the county, on which numbered rectangles have been drawn to show what area each sheet of the large map covers.

When you have found the map sheet for your farm, you will notice that boundaries of the soils have been outlined in black, and there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map.

Learn About the Soils on Your Farm

Suppose you have found on your farm an area marked with the symbol Ge. You learn the name of the soil this symbol represents by looking at the map legend. The symbol Ge identifies Genesee silt loam, 0 to 4 percent slopes.

Genesee silt loam, 0 to 4 percent slopes, and all the other soils mapped are described in the section, Descriptions of Mapping Units. Soil scientists walked over the fields and through the woodlands. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noted differences in growth of crops, weeds, brush, or trees; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming.

As they mapped the soils, they talked with farmers and studied the use and management of different soils. Then they placed each soil in a management group. A management group is a group of similar soils that need and respond to about the same kind of management.

Genesee silt loam, 0 to 4 percent slopes, is in management subgroup 11A. Turn to table 6 and read what is said about soils of subgroup 11A. You will want to study table 7 which tells you how much you can expect to harvest from Genesee silt loam, 0 to 4 percent slopes, under two levels of management. In columns A are yields to be expected under ordinary management, and in columns B are yields to be expected under improved management.

Make a Farm Plan

For the soils on your farm, compare your yields and farm practices with those given in this report. Look at your fields for signs of runoff and erosion. Then decide whether or not you need to change some of your methods. The choice, of course, must be yours. This survey will help you to plan new methods, but it is not a plan of management for your farm or any other farm in the county.

If you find that you need help in farm planning, consult the local representative of the Soil Conservation Service or the county agricultural agent. Members of the experiment station staff and others familiar with farming in your county will also be glad to help you.

Field work for this survey was completed in 1940. Unless otherwise stated, information in this report refers to conditions in the county at that time.

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Contents

Page

General nature of the area 1
Physiography, relief, and drainage 1
Climate 3
Water Supply 4
Vegetation 4
Early history 5
Organization and population 5
Industries 5
Transportation 5
Schools, churches, and other public facilities 5
Agriculture 5
Crops 5
Corn 6
Soybeans 6
Wheat 7
Oats 7
Rye 7
Other grains 7
Hay 7
Vegetables 8
Permanent pasture 8
Livestock and livestock products 8
Beef cattle 8
Dairy cattle 8
Swine 8
Sheep 8
Poultry 8
Horses and mules 9
Types and sizes of farms 9
Land use 9
Farm tenure 9
Farm equipment and expenditures 9
Soil survey methods and definitions 10
Soils 11
Topography 12
Internal drainage 12
Drought resistance 12
Erosion 12
Parent materials 12
Lime requirements 12
Nitrogen and organic-matter content 12
Productivity 19
Descriptions of mapping units 19
Abington series 19
Abington silty clay loam, 0 to 3 percent slopes 19
Brookston series 19
Brookston silty clay loam, 0 to 3 percent slopes 19
Brookston silt loam, 0 to 3 percent slopes 24
Carlisle series:
Carlisle muck 24
Chalmers series 25
Chalmers silty clay loam, 0 to 3 percent slopes 25
Chalmers silt loam, 0 to 3 percent slopes 25
Cope series 26
Cope silt loam, 0 to 3 percent slopes 26
Cope silty clay loam, 0 to 3 percent slopes 26
Corwin series:
Corwin silt loam, 0 to 2 percent slopes 26
Crane series:
Crane silt loam, 0 to 3 percent slopes 26
Crosby series:
Crosby silt loam, 0 to 3 percent slopes 27
Crosby silt loam, 3 to 5 percent slopes, eroded 27
Dana series:
Dana silt loam, 0 to 2 percent slopes 27
Delmar series:
Delmar silt loam, 0 to 3 percent slopes 28
Edwards series:
Edwards muck 28
Eel series 28
Eel silty clay loam, 0 to 3 percent slopes 29
Eel silt loam, 0 to 3 percent slopes 29
Eel loam, 0 to 3 percent slopes 29
Elston series 29
Elston loam, 0 to 3 percent slopes 29
Elston loam, 3 to 8 percent slopes 30
Elston loam, 3 to 8 percent slopes, eroded 30
Elston loam, 8 to 15 percent slopes, eroded 30
Elston silt loam, silted, 0 to 3 percent slopes 30
Elston fine sandy loam, 0 to 3 percent slopes 30
Elston fine sandy loam, 3 to 8 percent slopes 30
Fincastle series:
Fincastle silt loam, 0 to 3 percent slopes 31

Page

Fox series 31
Fox loam, 0 to 3 percent slopes 31
Fox loam, 3 to 8 percent slopes 32
Fox loam, 3 to 8 percent slopes, eroded 32
Fox loam, 8 to 12 percent slopes 32
Fox loam, 8 to 12 percent slopes, eroded 32
Fox loam and clay loam, 8 to 12 percent slopes, severely eroded 32
Fox loam, 12 to 25 percent slopes 32
Fox loam, 12 to 25 percent slopes, eroded 33
Fox silt loam, 0 to 3 percent slopes 33
Fox silt loam, 3 to 8 percent slopes 33
Fox loam and silt loam, 3 to 8 percent slopes, kame phases 33
Fox loam, 3 to 8 percent slopes, eroded kame phase 33
Fox loam, 8 to 12 percent slopes, kame phase 34
Fox loam, 8 to 12 percent slopes, eroded kame phase 34
Fox loam, 12 to 25 percent slopes, kame phase 34
Fox loam, 12 to 25 percent slopes, eroded kame phase 34
Genesee series 34
Genesee silt loam, 0 to 4 percent slopes 35
Genesee silt loam, high bottom, 0 to 4 percent slopes 35
Genesee silty clay loam, 0 to 4 percent slopes 35
Genesee silty clay loam, high bottom, 0 to 3 percent slopes 35
Genesee loam, 0 to 4 percent slopes 35
Genesee loam, high bottom, 0 to 3 percent slopes 36
Genesee fine sandy loam, 0 to 4 percent slopes 36
Genesee fine sandy loam, high bottom, 0 to 3 percent slopes 36
Glenhall series:
Glenhall silt loam, 0 to 3 percent slopes 36
Hagener series:
Hagener loamy fine sand, 2 to 12 percent slopes 36
Hennepin series:
Hennepin loam, 25 to 50 percent slopes 37
High Gap series:
High Gap silt loam, 1 to 8 percent slopes 37
Homer series:
Homer silt loam, 0 to 3 percent slopes 37
Kaskaskia series 38
Kaskaskia silt loam, 0 to 3 percent slopes 38
Kaskaskia loam, 0 to 3 percent slopes 38
Kokomo series:
Kokomo silty clay loam, 0 to 3 percent slopes 38
Linwood series:
Linwood muck 39
Longlois series 39
Longlois silt loam, 0 to 3 percent slopes 39
Longlois silt loam, 3 to 8 percent slopes 39
Longlois silt loam, 3 to 8 percent slopes, eroded 40
Longlois loam, 0 to 3 percent slopes 40
Longlois loam, 3 to 8 percent slopes 40
Longlois loam, 3 to 8 percent slopes, eroded 40
Made land 40
Martinsville series 40
Martinsville loam, 0 to 5 percent slopes 40
Martinsville silt loam, 0 to 5 percent slopes 41
Mellott series 41
Mellott silt loam, 3 to 8 percent slopes 41
Mellott silt loam, 3 to 8 percent slopes, eroded 41
Mellott silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded 42
Mellott silt loam, 0 to 3 percent slopes 42
Mellott silt loam, 8 to 12 percent slopes 42
Mellott silt loam, 8 to 12 percent slopes, eroded 42
Mellott silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded 42
Miami series 42
Miami silt loam, 3 to 8 percent slopes 43
Miami silt loam, 0 to 3 percent slopes 43
Miami silt loam, 3 to 8 percent slopes, eroded 43
Miami silt loam, 8 to 12 percent slopes 43
Miami silt loam, 8 to 12 percent slopes, eroded 43
Miami silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded 43
Miami silt loam, 12 to 25 percent slopes 44
Miami silt loam, 12 to 25 percent slopes, eroded 44
Miami loam, 3 to 8 percent slopes 44
Miami loam, 3 to 8 percent slopes, eroded 44
Miami loam, 8 to 12 percent slopes 44
Miami loam, 8 to 12 percent slopes, eroded 44
Miami loam, 12 to 25 percent slopes 44
Miami loam, 12 to 25 percent slopes, eroded 44
Millsdale series 44
Millsdale silty clay loam, 0 to 3 percent slopes 45

Contents—Continued

Page

Milton series 45
Milton silt loam, 2 to 8 percent slopes 45
Monitor series:
Monitor silt loam, 0 to 3 percent slopes 45
Montmorenci series:
Montmorenci silt loam, 0 to 3 percent slopes 46
Muskingum series:
Muskingum stony silt loam, 10 to 30 percent slopes 46
Nineveh series:
Nineveh loam, 0 to 3 percent slopes 46
Oaktown series 47
Oaktown loamy fine sand, 3 to 8 percent slopes 47
Oaktown loamy fine sand, 8 to 12 percent slopes 47
Oaktown loamy fine sand, 12 to 25 percent slopes 47
Ockley series 47
Ockley silt loam, 0 to 3 percent slopes 48
Ockley silt loam, 3 to 8 percent slopes 48
Ockley silt loam, 3 to 8 percent slopes, eroded 48
Ockley loam, 0 to 3 percent slopes 48
Ockley loam, 3 to 8 percent slopes 48
Ockley loam, 3 to 8 percent slopes, eroded 48
Octagon series 49
Octagon silt loam, 3 to 8 percent slopes 49
Octagon silt loam, 3 to 8 percent slopes, eroded 49
Odell series:
Odell silt loam, 0 to 2 percent slopes 49
Otterbein series:
Otterbein silt loam, 0 to 3 percent slopes 50
Parr series 50
Parr silt loam, 2 to 5 percent slopes 50
Parr silt loam, 0 to 2 percent slopes 50
Parr silt loam, 2 to 5 percent slopes, eroded 50
Parr silt loam, 5 to 8 percent slopes, eroded 51
Parr silt loam, 8 to 12 percent slopes, eroded 51
Parr silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded 51
Parr loam, 2 to 5 percent slopes 51
Parr loam, 2 to 10 percent slopes, eroded 51
Pettit series:
Pettit silt loam, 0 to 3 percent slopes 51
Randolph series:
Randolph silt loam, 0 to 3 percent slopes 52
Raub series:
Raub silt loam, 0 to 2 percent slopes 52
Riverwash 53
Rodman series:
Rodman gravelly loam, 25 to 35 percent slopes 53
Romney series:
Romney silty clay loam, 0 to 2 percent slopes 53
Ross series 54
Ross silty clay loam, 0 to 3 percent slopes 54
Ross silt loam, 0 to 3 percent slopes 54
Ross loam, 0 to 3 percent slopes 54
Russell series 54
Russell silt loam, 3 to 8 percent slopes 54
Russell silt loam, 3 to 8 percent slopes, eroded 55
Russell silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded 55
Russell silt loam, 0 to 3 percent slopes 55
Russell silt loam, 8 to 12 percent slopes 56
Russell silt loam, 8 to 12 percent slopes, eroded 56
Russell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded 56
Russell silt loam, 12 to 25 percent slopes 56
Russell silt loam, 12 to 25 percent slopes, eroded 56
Russell silt loam and silty clay loam, 12 to 25 percent slopes, severely eroded 56
Russell loam, 3 to 8 percent slopes 57
Russell loam, 3 to 8 percent slopes, eroded 57
Russell loam, 8 to 12 percent slopes, eroded 57
Russell loam and clay loam, 8 to 12 percent slopes, severely eroded 57
Russell loam, 12 to 25 percent slopes, eroded 57
Shadeland series:
Shadeland silt loam, 0 to 2 percent slopes 57

Page

Shoals series:
Shoals silt loam, 0 to 3 percent slopes 58
Sidell series 58
Sidell silt loam, 2 to 5 percent slopes 58
Sidell silt loam, 0 to 2 percent slopes 59
Sidell silt loam, 2 to 5 percent slopes, eroded 59
Sidell silt loam and silty clay loam, 2 to 5 percent slopes, severely eroded 59
Sidell silt loam, 5 to 8 percent slopes 60
Sidell silt loam, 5 to 8 percent slopes, eroded 60
Sidell silt loam and silty clay loam, 5 to 8 percent slopes, severely eroded 60
Sidell silt loam, 8 to 12 percent slopes 60
Sidell silt loam, 8 to 12 percent slopes, eroded 60
Sidell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded 60
Sleeth series:
Sleeth silt loam, 0 to 3 percent slopes 60
Sloan series 61
Sloan silty clay loam, 0 to 3 percent slopes 61
Sloan silt loam, 0 to 3 percent slopes 61
Tippecanoe series:
Tippecanoe silt loam, 0 to 3 percent slopes 61
Toronto series:
Toronto silt loam, 0 to 3 percent slopes 62
Warsaw series 62
Warsaw loam, 0 to 3 percent slopes 62
Warsaw loam, 3 to 8 percent slopes 63
Warsaw loam, 3 to 8 percent slopes, eroded 63
Warsaw loam, 8 to 20 percent slopes, eroded 63
Warsaw silt loam, 0 to 3 percent slopes 63
Warsaw silt loam, 3 to 8 percent slopes 63
Warsaw loam, 3 to 8 percent slopes, kame phase 63
Warsaw loam, 3 to 8 percent slopes, eroded kame phase 64
Warsaw loam, 8 to 12 percent slopes, kame phase 64
Warsaw loam, 8 to 12 percent slopes, eroded kame phase 64
Warsaw loam, 12 to 25 percent slopes, eroded kame phase 64
Warsaw silt loam, 3 to 8 percent slopes, eroded kame phase 64
Warsaw silt loam, 8 to 12 percent slopes, eroded kame phase 65
Washtenaw series:
Washtenaw silt loam, 0 to 3 percent slopes 65
Wea series 65
Wea silt loam, 0 to 3 percent slopes 65
Wea silt loam, 3 to 8 percent slopes 65
Wea silt loam, 3 to 8 percent slopes, eroded 66
Westland series 66
Westland silty clay loam, 0 to 3 percent slopes 66
Westland silt loam, 0 to 3 percent slopes 66
Westland loam, 0 to 3 percent slopes 66
Wingate series:
Wingate silt loam, 0 to 3 percent slopes 66
Management of soils 67
Crop rotation 67
Liming 67
Fertilization 76
Organic-matter content 78
Erosion 78
Drainage and moisture supply 78
Yields and productivity ratings of soils 79
Land-capability classification 79
Formation and classification of soils 91
Factors of soil formation 91
Soil formation in Tippecanoe County 91
Classification of soils 92
Gray-Brown Podzolic soils 92
Gray-Brown Podzolic soils, intergrading to Brunizems 93
Brunizem soils 94
Humic Gley soils 96
Planosols 97
Brown Forest soils 97
Rendzina soils 97
Lithosols 97
Alluvial soils 98
Organic soils 98
Literature cited 98

SOIL SURVEY OF TIPPECANOE COUNTY, INDIANA

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Correlation by J. K. ABLEITER and O. C. ROGERS, Soil Survey[1], United States Department of Agriculture

United States Department of Agriculture, Soil Conservation Service, in cooperation with Purdue University Agricultural Experiment Station

General Nature of the Area

TIPPECANOE COUNTY is located in the west-central part of Indiana. It is a rectangle 501 square miles, or 320,640 acres, in area. Lafayette, the county seat and the home of the Purdue University Agricultural Experiment Station, is the only large town. It is located in the center of the county, 60 miles northwest of Indianapolis, 90 miles southeast of Gary, and 100 miles southwest of Fort Wayne (fig. 1).

Physiography, Relief, and Drainage

Tippecanoe County is within the Tipton Till Plain physiographic region, which is part of the Central Lowland Province (*6*). Glacial drift covers the bedrock to depths ranging from a few feet to more than 300 feet. The underlying bedrock, consisting of flint, shale, sandstone, and limestone of the Mississippian period, is exposed as rock terraces in the Wabash Valley and on the upland in the western part of the county (*4*). Shale of the New Albany formation of the Devonian period is exposed as rock terraces in the northeastern part of the county.

Figure 2 shows the physiography of Tippecanoe County. Map symbols (B) show stream bottoms or flood plains; symbols beginning with (T) show the glaciofluvial outwash plains, now appearing as terraces above the river bottoms; and symbols beginning with (U) show the upland till plains. The older deposits on the terraces and uplands were more deeply leached during soil development than the more recent deposits. Deeply leached areas are shown by the letters (dl) in the map symbol; shallowly leached areas are shown by the letters (sl). The vegetation that originally covered these areas before they were brought under cultivation is shown by the last letter in each map symbol. Symbols of areas that were formerly grassland or prairie end with (P), and symbols of former forest or timber areas end with (T).

Figure 3 (p. 11) gives a general picture of how the soils are related to the major physiographic land types.

The county slopes gently southwestward, and the streams flow westward. All of the county is within the drainage basin of the Wabash River, which crosses the county from the northeastern corner to near the center of the western boundary. Two main tributaries, the

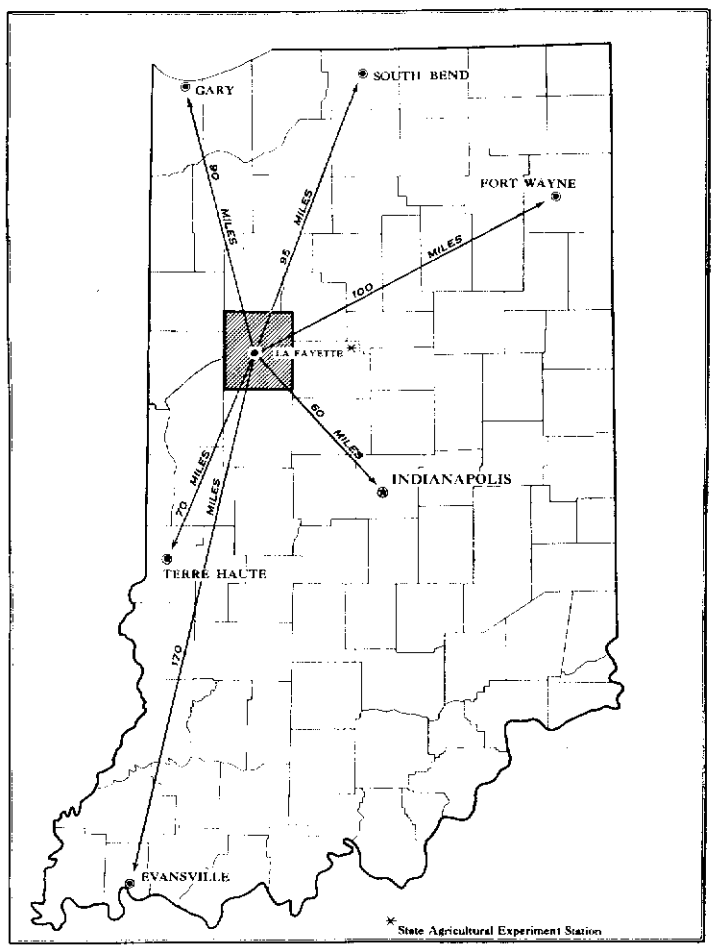
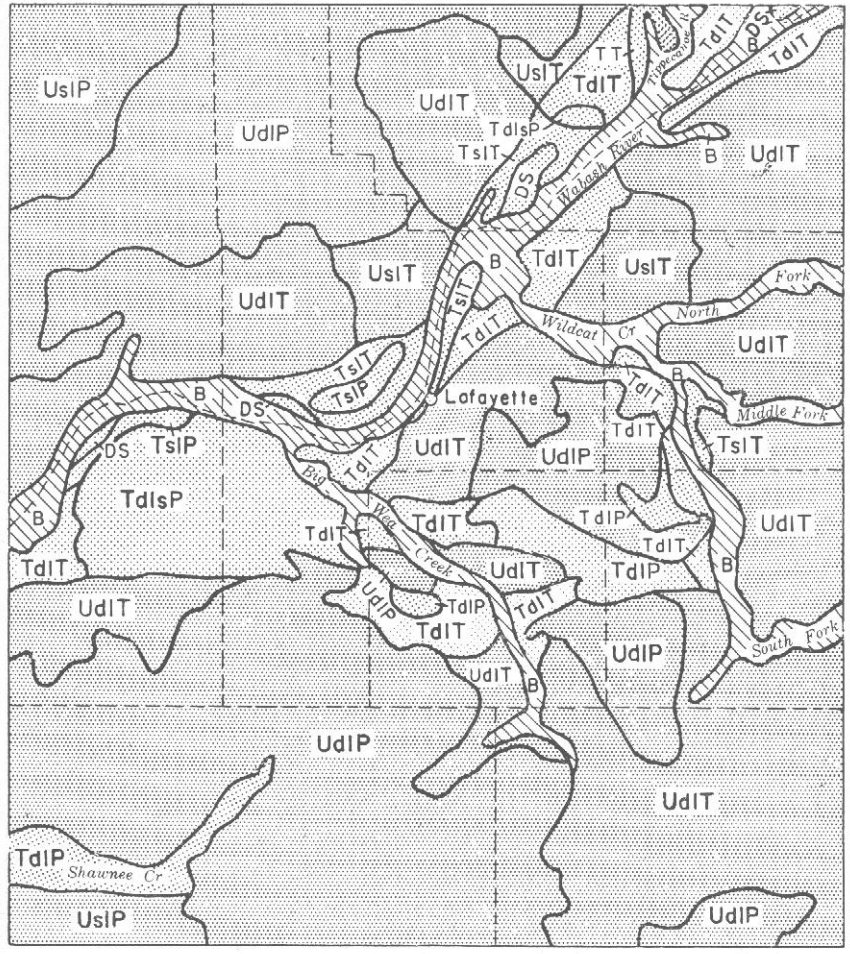


***Figure 1.*—Location of Tippecanoe County in Indiana.**

[1] Fieldwork for this survey was done while Soil Survey was part of the Bureau of Plant Industry, Soils, and Agricultural Engineering. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.



EXPLANATION

B--Bottom lands.

T--Terraces and outwash plains:

TslP--Water-assorted gravelly and sandy materials, shallowly leached, prairie vegetation.

TslT--Water-assorted gravelly and sandy materials, shallowly leached, timber.

TdlP--Stratified gravelly and sandy materials, deeply leached, prairie vegetation.

TdlT--Stratified gravelly and sandy materials, deeply leached, timber.

TdlsP--Stratified sands, deeply leached, prairie vegetation.

DS--Dune sands, wind-deposited on the terraces, timber.

U--Uplands:

UslP--Glacial till, shallowly leached, prairie vegetation.

UslT--Glacial till, shallowly leached, timber.

UdlP--Glacial till thinly mantled with silt, deeply leached, prairie vegetation.

UdlT--Glacial till thinly mantled with silt, deeply leached, timber.

Figure 2.—**Physiography, age of soil materials, and original vegetative cover in Tippecanoe County, Indiana.**

Tippecanoe River and Wild Cat Creek, enter the Wabash River in the northeastern part of the county. Little Pine Creek, Indian Creek, Burnett's Creek, and Moot's Creek are minor tributaries from the north; Sugar Creek and Buck Creek enter from the east; and Wea Creek and Flint Creek come in the from the south.

The Wabash Valley is the most striking physiographic feature of this county. This is an entrenched preglacial valley that was filled and later re-excavated. The flood plains or bottom lands cover a very small area of the county. The bottom lands of the Wabash River are a quarter of a mile to a half mile wide, which is very narrow for a stream of this size. The meandering, rapidly flowing streams, such as the Tippecanoe River and Wild Cat Creek, have very narrow, discontinuous bottom lands, which are cut off in many places because the stream cuts into the valley walls. The bottom lands have little variation in relief. Most of the higher areas are less than 10 feet above the stream level. They are subject to frequent floods, most of which occur during winter and early in spring.

Two main levels of stream terraces exist along the major streams. Most of the terraces are flat topped, and are separated from the adjoining bottom lands by short steep slopes. In a few places, higher terraces occur along abandoned glacial drainageways in the uplands. These terraces are from a few feet to 90 feet lower than the till plain, and 100 or more feet higher than the bottom lands.

The uplands of the county are on the glacial till plain. This rather smooth plain is broken by remnants of three or more rather poorly defined morainic ridges. One extends northeastward across the northwestern corner of the county; another extends eastward from the western boundary of the county, just south of the center; and a third extends southeastward through the southwestern part of the county.

This area was repeatedly glaciated during the Pleistocene epoch. Before glacial times, a giant drainageway, now known as the Teays River, flowed from the Appalachian Mountains across Ohio, and passed northwestward through the present site of Lafayette (*3*). The glaciers cut down the hills, filled in the valleys, and thus produced a gently undulating plain. As the glaciers receded, a large stream of glacial meltwater cut the present Wabash Valley. This glacial stream was much larger than the Wabash River of today. The two levels of alluvial terraces along the Wabash River are the flood plains formed by the glacial Wabash River during the Early Wisconsin and Late Wisconsin stages.

Apparently, while the glaciers were receding, the Middle Fork of Wild Cat Creek flowed southwestward and then westward to Wea Creek, and there formed extensive terraces in the Wea Plains area. The South Fork of Wild Cat Creek flowed southwestward into the headwaters of the east branch of Wea Creek. Hadley's Lake lies in an abandoned glacial drainageway which extended southwestward along the general course of present-day Indian Creek.

Except along the major drainageways, the topography of the county has not been greatly changed by stream development since glaciation. The most conspicuous topographic features of the till plain are the low knolls and ridges of gravel that rise a few feet above the nearly level areas. Some are high conical knolls or hills, and some are long winding ridges. Most of these knolls and ridges are only 10 to 20 feet high, but the higher ones range from 30 to 50 feet above the adjoining till plain. Shawnee Mound in the southwestern corner of the county rises 75 feet above the plain.

Among the morainic knolls and ridges of the till plain are depressions and swales in which water accumulates after rains. These kettle holes were formerly marshy, but most of them are now drained. Some still contain marshes or shallow lakes and ponds. Some contain beds of muck or peat.

Dissection and relief are most pronounced in the eastern and central parts of the county, where the tributaries to the Wabash River are cutting rapidly to the level of the Wabash Valley. The valleys of the tributaries are fringed by steep, highly dissected slopes. The most pronounced relief in the county occurs between the till plain and the Wabash bottoms north of West Lafayette.

Back from the main streams, the topography is slightly undulating and rolling and gradually sloping to the plains. In these level areas back from the main water courses, the streams are shallow and have slight gradients and very gentle slopes. The level surface is broken by many gravelly kames and eskers and many swales and depressions.

The till plain is about 700 feet above sea level. The high terraces are about 630 to 640 feet in elevation, and the flood plain of the Wabash River, about 520 feet. The highest point in the county, in the southeastern corner near Clarks Hills, has an elevation of about 840 feet. The lowest point, about 495 feet in elevation, is on the western boundary where the Wabash River leaves the county. Hadley's Lake is at an elevation of 659 feet; West Lafayette at Grant and State Streets is at 615 feet; Lafayette, at the Court House, is at 550 feet; and Five Points is at 690 feet.

Climate

The climate of Tippecanoe County is continental, humid, and temperate. The warm humid summers and moderately cold winters are characterized by frequent sudden changes of temperature. Although the range between the average winter temperature of 28.5° F. and the average summer temperature of 73.4° is not extreme, wide variation may occur within a season. Winter temperatures have ranged between the extremes of −33° and 70°, and summer temperatures, between the extremes of 33° and 105°.

The average annual precipitation is 38.26 inches. Nearly 60 percent of this falls during the growing season, or from April through September. Heavy rains are most likely during the spring, and they may occasionally delay spring planting. Much of the summer rainfall consists of flash rains that accompany cyclonic storms. Such rains may cause considerable soil erosion on clean-tilled sloping fields. Crops may drown out in low areas because of accumulation of water after heavy rains. Severe general droughts are not frequent, although they may occur. Local minor droughts may be

caused by uneven distribution of rainfall or by hot, drying winds.

Table 1 shows the average monthly, seasonal, and annual temperature, precipitation, and snowfall at Lafayette.

TABLE 1.—*Normal temperature and precipitation at Lafayette, Tippecanoe County, Ind.*[1]

[Elevation, 661 feet]

Month	Temperature [2]			Precipitation [3]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1914)	Wettest year (1927)	Average snowfall
	°F	°F	°F	Inches	Inches	Inches	Inches
December	30.4	69	−20	2.57	2.54	3.57	4.9
January	26.5	70	−33	2.56	2.30	1.57	6.8
February	28.7	69	−26	2.33	2.17	2.10	5.5
Winter	28.5	70	−33	7.46	7.01	7.24	17.2
March	39.2	87	− 5	3.11	1.57	3.88	3.8
April	50.9	90	10	3.49	2.82	6.28	.6
May	61.9	97	27	4.19	2.30	9.21	(4)
Spring	50.6	97	− 5	10.79	6.69	19.37	4.4
June	71.3	101	33	3.97	1.60	4.62	0
July	75.6	105	42	3.75	.28	4.71	0
August	73.4	103	39	3.45	4.87	2.49	0
Summer	73.4	105	33	11.17	6.75	11.82	0
September	66.8	101	24	3.32	1.90	5.87	0
October	54.6	92	16	2.68	1.61	4.05	.1
November	41.0	78	− 3	2.84	1.09	6.56	1.0
Fall	54.1	101	− 3	8.84	4.60	16.48	1.1
Year	51.7	105	−33	38.26	25.05	54.91	22.7

[1] In the period 1948–1952, complete records were kept at W. Lafayette (Purdue U.) Station.

[2] Average temperature based on a 70-year record, through 1950; highest on a 49-year record; and lowest on a 48-year record, through 1930.

[3] Average precipitation based on a 71-year record, through 1950; wettest and driest years based on a 73-year record, in the period 1880–1952; snowfall based on a 44-year record, through 1930.

[4] Trace.

The average frost-free season at Lafayette, as recorded by the United States Weather Bureau, is 165 days, from April 27, the average date of the last killing frost in spring, to October 9, the average date of the first killing frost in autumn. Killing frosts have occurred as late as May 27 and as early as September 14. Occasionally some crops are injured by late spring or early fall frosts. Crops in low spots are most likely to be damaged.

The average annual snowfall in Lafayette is 22.7 inches. Most of the snow falls from December through March. The snow cover usually does not persist long enough to give much winter protection to crops. Alternate freezing and thawing often severely damage alfalfa, clover, and wheat, by heaving them out of the ground. Winter grain is often damaged by crusts of ice in low spots.

Floods occur nearly every year at Lafayette. Usually they come early in spring, but they can occur in almost any month (*10*). Thunderstorms are common. Winds of hurricane velocity occasionally strike this area late in summer. Hailstorms are not common, but they do severe local damage when they occur.

Water Supply

Plenty of good drinking water is available from wells and springs. Springs are common along steep slopes where water seeps from sand and gravel overlying clay till. Streams provide water for livestock on many farms.

Water is near the surface in nearly all the bottom lands. On most of the low gravelly terraces, it is within 20 to 30 feet of the surface. Wells on higher terraces may be 75 to 100 feet deep. On the upland till plain, many wells are drilled 100 feet or more, but about half reach water at about 50 feet. Most of this water comes from gravel strata within the till, but sometimes it is necessary to drill into the underlying bedrock. Usually it is the limestone bedrock, not the shale, that yields water. Most of the well water in the county is pure, but hard. Very deep wells drilled into the bedrock may yield mineral water.

Vegetation

The original vegetation of two-thirds of Tippecanoe County consisted of mixed hardwood forests. These forests grew in the eastern part of the county and along the Wabash Valley terraces. The dominant species on the well-drained terraces and uplands were white oak, black oak, shellbark hickory, and pignut hickory. Scattered through these forests were sugar maple, beech, walnut, ash, elm, and yellow-poplar. The poorly drained forested areas contained the same species, but they had a higher proportion of beech and maple. The bottom-land forests consisted of the same species, and they also included cottonwood, willow, red birch, basswood, and sycamore. On the very dry soils of the gravelly and sandy terraces, the vegetation consisted of walnut, hackberry, cherry, and hawthorn trees, and shrubs, including blackberry, hazel, and plum.

Prairie, or grassland, vegetation covered the northwestern, central, and southwestern parts of the county. These areas supported a dense stand of big bluestem, Indiangrass, and little bluestem, and such plants as goldenrod and sunflower. On the low marshy areas grew sloughgrass, bluejoint, swamp milkweed, rushes, and cattails. Scattered clumps of trees grew in a few parklike areas on the prairie. On the border of the prairie, especially along streams, was a narrow belt of trees, chiefly bur oak and hickory.

Little of the original vegetation remains. Almost all of the prairies are now cultivated, except for a few spots along railways and highways. A little timber remains on steep slopes and in small woodlots. Selective cutting has removed the more desirable species, and grazing of woodlands has prevented regeneration of the timber stand.

Early History

Before 1700, the French explored the Wabash Valley and established a fur trading post at Ouiatenon, a large Indian village 4 miles southwest of Lafayette. In 1717 a French fort was established here to protect French traders and trappers. This fort came under the control of the English in 1763; it was captured by George Rogers Clark during the American Revolution. In 1791 both the village and the fort were destroyed, by order of President Washington, to prevent their falling into the hands of the English and becoming a base for operations against the new republic (*9*).

This area was originally the home of the Miami Indians, but at the time of white settlement, Indians of the Winnebago, Kickapoo, and Pottawatomie tribes also occupied the county (*2*). Indian resistance to white settlement ended with the Battle of Tippecanoe at Battle Ground in 1811. The Indians were moved further westward after the Treaty of 1826.

Organization and Population

The earliest permanent white settlement in the county was on the Wea Plains in 1822. The sale of government land at Crawfordsville, now in Montgomery County, beginning in 1824, brought many new settlers.

Tippecanoe County was organized in 1826 from a part of the original Northwest Territory. At first, more than half of the population was rural, but in 1950 only 36 percent of a population of 74,473 was rural.

Lafayette, the county seat, was also founded in 1826. The growth of the town has depended chiefly on its favorable position as a transportation center. It was at the head of navigation on the Wabash River. When the Wabash Canal reached this point in 1843, Lafayette was made a port of entry (*7*). It is still a railroad center and highway center. Its population in 1950 was 35,568.

West Lafayette had a population of 11,873 in 1950. Other towns in the county and their population are: Battle Ground, 634; Dayton, 503; and Clarks Hill, 493. Temporary residents of the county, mostly students at Purdue University, range from 4,000 to 14,000 in number.

Industries

Manufacturing in the county is centered mostly around Lafayette. The largest industry in the county is an aluminum plant, which employs about 1,000 persons. Other items manufactured are prefabricated houses, building materials, building blocks, tile, furnaces, stokers, electrical equipment and supplies, gears, safes, wire products, rubber products, paints, and enamels. The main car-repair shops of the Monon Railroad are in Lafayette.

Local industries depending on agricultural products are meat packing, vegetable canning, milk processing and ice cream manufacturing, soybean oil extraction, and milling. At times, industry competes with agriculture for labor.

Transportation

Four railroads, all passing through Lafayette, serve the county. They are the Chicago, Indianapolis, and Louisville (Monon) Railroad; the New York Central System; the New York, Chicago, and St. Louis Railroad (Nickel Plate Road); and the Wabash Railroad.

A network of hard-surfaced roads traverses the county. United States Highways No. 52 and No. 231, eight State highways, and many county roads provide access to trading centers. In 1950 the average farm was 7 miles from the trading center most frequently visited. Nearly all of this distance was over hard-surfaced or gravelled roads. Bus service is available throughout the county. Many of the county's products are moved to market by trucks.

Schools, Churches, and Other Public Facilities

Consolidated schools are maintained throughout the county. Churches in several towns provide for various religious groups in the rural areas and towns.

In 1954, 85.2 percent of the farms had telephones. Electricity, nearly all from power lines, was used on 98.6 percent of the farms. Most of the farm homes have labor-saving household equipment.

Agriculture

The early farmers in this county settled on the well-drained prairies near woodlands. The heavy sod of the prairie and the roots and stumps in the newly cleared forest areas made tillage very difficult at first. Corn, wheat, and potatoes were the principal crops, and hogs were the most common livestock. These products were supplemented by wild game and maple sugar. Salt had to be brought in from outside the county. At first, most of the agricultural production was for local consumption. Grain was ground in water-powered mills. There was little market for the timber obtained by clearing the forests; most of the trees were burned after being felled.

When the Wabash and Erie Canal was opened to Lafayette, availability of the new route to market encouraged rapid expansion of agriculture. Corn and wheat were shipped by boat to markets. Cattle raising developed rapidly, especially on the prairie areas. Construction of railroads through the county after 1854 opened up new markets and was followed by further expansion of commercial agriculture.

Systematic crop rotations that include legumes are now generally followed, especially on livestock farms. Three-quarters of the farms use commercial fertilizer on crops. Ground limestone is commonly used to correct soil acidity.

Crops

The acreage of the principal crops for stated years is given in table 2. The proportion of the total farm income that was derived from various farm products is given in table 3.

TABLE 2.—*Acreage of principal crops and number of bearing fruit trees in stated years*

Crop	1929	1939	1949	1954
	Acres	*Acres*	*Acres*	*Acres*
Corn:				
Harvested for grain	79,871	77,016	89,083	85,787
For silage	1,308	668	510	997
Hogged, grazed, or cut for fodder	5,839	998	1,535	901
Oats:				
Threshed	45,161	19,436	26,977	19,989
Unthreshed	655	855	227	(1)
Wheat, threshed	30,801	26,341	31,800	22,252
Rye, threshed	1,482	3,182	428	1,195
Soybeans, for all purposes	8,328	33,170	34,563	44,398
All hay	20,239	16,601	15,388	20,248
Timothy and clover alone or mixed	14,695	4,951	9,530	11,560
Alfalfa	2,086	4,394	4,709	7,584
Annual legumes cut for hay	3,321	6,289	403	336
Other tame hay	137	1,967	746	768
Irish potatoes	416	228	[2] 36	[3] 5
Sweet corn	268	46	443	340
Popcorn	2	329	699	1,886
Tomatoes	79	93	281	191
Other vegetables and small fruits	347	169	73	22
	Number [4]	*Number* [4]	*Number* [4]	*Number* [4]
Apple trees	15,459	5,348	8,285	3,853
Peach trees	4,025	1,661	2,484	1,021

[1] Not reported.
[2] Does not include acreage for farms with less than 15 bushels harvested.
[3] Does not include acreage for farms with less than 20 bushels harvested.
[4] Number in the census year, which is 1 year later than the crop year given at the head of the columns.

TABLE 3.—*Proportion of total farm income derived from various farm products sold or traded, in stated years*

Source of farm income	1939	1944	1949	1954
	Percent	*Percent*	*Percent*	*Percent*
All livestock and livestock products	52.5	63.9	58.8	53.5
Dairy products	7.9	8.1	5.2	3.4
Poultry and poultry products	12.2	8.6	8.0	4.6
Livestock sold or traded	32.0	(1)	(1)	(1)
Livestock products other than dairy or poultry	.4	47.2	45.6	45.5
All crops	47.4	36.0	41.1	46.5
Field crops other than vegetables, fruits, or nuts	45.4	34.4	39.5	45.2
Vegetables	.4	.8	.5	.2
Fruits and nuts	.3	.1	.2	.2
Horticultural specialties	1.3	.6	.9	.9
Forest products	.1	.1	.1	(2)

[1] Not reported.
[2] Less than 1/10 of 1 percent.

Corn

Corn is the most important crop of the county. It is planted on the largest acreage and brings in the most income. The soils of this county are well suited to corn, especially the flood plains and bottoms of the Wabash River, the dark-colored level prairie soils, and the "black-and-clay" lands.

Most of the corn grown is fed to livestock on the farm. In the large river bottoms and on the prairie areas where cash-grain farming is usual, much of the corn is sold as grain.

The average yield of corn has been more than doubled since 1920, through the use of hybrid seed, mechanization of tillage, liming, and more liberal use of commercial fertilizer. Variations in weather cause some differences in yields from year to year.

Land used for corn is plowed either in fall or early spring, depending on the weather and the type of soil. Fall plowing improves the tilth and structure of the gumbo soils of depressions, and it reduces the amount of tillage to be done in spring. Before the corn is planted, the ground is thoroughly disked and smoothed by a harrow or cultipacker.

On large farms, 4-row corn planters are commonly used. Corn is planted between May 10 and May 30. Planting during the latter part of this period is recommended for control of the European corn borer. Many farmers plant corn in hills; a few plant it in checked rows for better weed control. The use of commercial fertilizers on corn has steadily increased.

Hybrid seed corn has almost entirely replaced open-pollinated varieties. Double-cross hybrids are more commonly grown than single-cross hybrids. Hybrids are selected on the basis of yield, standing ability, moisture at maturity, and length of time required to mature. Tippecanoe County is one of the leading counties in the State in the production of hybrid corn for seed. The seed corn industry is concentrated mostly in the prairie area.

Where fields are large and level, most of the corn is harvested by mechanical pickers. On rolling areas, corn may be cut, shocked, and husked by hand. A little is shucked by hand from the standing stalk. Some corn is cut for silage or fodder, and some is hogged off or grazed.

Soybeans

Soybeans have recently become the second most important field crop in the county. They are grown both for hay and grain. Soybeans grow best on the same soils that are best suited to corn. The largest acreages are on the level prairie areas. Soybeans usually follow corn in the crop rotation. They are replacing oats as a crop because of their higher value per acre.

The seedbed is prepared as for corn. If wheat is to follow soybeans in the rotation, the beans should be planted early, preferably late in May or early in June. Soybeans are either drilled solid or in rows spaced 2 feet or more apart. They are cultivated with a harrow, rotary hoe, or cultivator to control weeds. On rolling ground, soybeans should be planted on the contour, preferably drilled solid, and should be followed by a winter grain crop to control erosion. Soybeans are harvested by combine and marketed as a cash crop.

Wheat

Wheat has ranked next to soybeans in both acreage and value since 1940. It is grown throughout the county, but it is best suited to the light-colored soils of the outwash plains and terraces and the glacial drift areas. It is likely to lodge if planted on the dark-colored soils of the former marshes or on the flood plains of the larger streams. Frost heaving, winterkilling, and drowning are likely on the lower lying, more poorly drained areas.

Wheat may follow corn, soybeans, oats, or special crops in the rotation, or it may be planted in meadows where legumes have failed. When wheat follows corn, the wheat is sometimes drilled between the rows of standing corn. At other times, the corn is harvested, the ground is disked and smoothed with a harrow or drag, and the wheat is planted in the stubble. When wheat follows soybeans, the land is disked, and the wheat is drilled immediately. When wheat follows other crops, the seedbed is prepared by plowing and disking.

Wheat is usually planted late in September or early in October, after the season when the hessian fly is likely to cause damage. Commercial fertilizer is drilled with the seed. Topdressing with barnyard manure in winter or early in spring is a common practice. Sometimes nitrogen fertilizer is added in early spring.

Wheat ripens early in July. It is usually harvested with combines; sometimes grain binders are used. Most of it is marketed as a cash crop. Some is ground and fed to livestock.

Oats

Oats are important as a cash crop on the grain farms and as a feed crop on the livestock farms. The acreage has declined because of diseases and poor yields and because other crops have been more profitable. Oats are best suited to the dark-colored prairie soils.

Oats usually follow corn or soybeans in the rotation. Usually the ground is disked before seeding, but yields are better if the ground is plowed to provide a better seedbed. Seeding when the ground is wet and muddy is occasionally practiced for early planting, but it results in a thin stand and lower yield. Oats are seeded in March or early in April, or as soon thereafter as the weather permits. Yields are better if planting is early; they are reduced by hot dry weather during any part of the growing season. Fertilizer is not generally used, but it will increase yields (*8*). Oats are harvested late in July or early in August.

Rye

Rye has always been a minor grain crop in this county. The acreage fluctuates considerably. It is commonly grown on the light-colored soils that are low in nitrogen.

Rye is frequently used for pasture for a few weeks in fall and spring when other pasture is not available. The grain is usually ground for livestock feed.

Seeding and harvesting methods are almost the same as for wheat, but rye is usually seeded somewhat earlier in the fall. It responds well to fertilizer, but little of it is fertilized.

Other grains

Barley and buckwheat are grown to some extent. They are not regular parts of a rotation. They are grown as emergency crops when some other crop has failed.

Barley is a cool-weather crop and is suited to neutral, well-drained soils. The winter varieties do better than the spring varieties.

Buckwheat is a good emergency crop because it will mature if seeded any time from late in May until August. It is sometimes grown on bottom land, ordinarily where another crop has been drowned out and it is too late to seed a more profitable crop.

Hay

Hay is an important crop, especially in the livestock-farming sections of the county. Most hayfields are either alfalfa or mixtures of timothy and clover. Some annual legumes are cut for hay.

Weedy meadows may result if a legume crop has failed, if a legume has died out in a meadow mixture more than a year old, or if thin volunteer stands of grasses have grown up. Such meadows usually produce little hay or pasture.

The use of alfalfa has increased steadily. It can be grown alone, but better hay or pasture and more forage are produced if bromegrass, or timothy and Ladino clover, is grown in a mixture with the alfalfa. Alfalfa can be grown on most soils of the county, but it does best on the sandy soils or those underlain by gravel or sand, which have good natural drainage. The soil must be limed enough to bring the reaction to pH 6.0 or higher before alfalfa will grow well. Alfalfa can be seeded in fall, with or without a nurse crop, or it can be seeded in wheat or with oats in the spring. When alfalfa is planted in fall, a good weed-free seedbed is prepared, and the soil is packed with a cultipacker or roller to hold moisture. To get best yields, alfalfa seed must be inoculated with nitrogen-fixing bacteria.

Sweetclover is usually grown to improve the soil, but sometimes it is grown for pasture or for seed. Most of it is planted in wheat or with oats in the spring. Sometimes it is mixed with alfalfa and timothy in a pasture mixture. It is also planted as an intercrop in a 2-year rotation of wheat or oats and corn. Like alfalfa, sweetclover does best on a neutral soil. It should be inoculated to encourage fixation and storage of nitrogen.

The amount of clover grown alone has declined, but it is usually included in mixtures with grasses. Clover can be grown on most soils of the county, but it is not suited to alluvial soils that may be flooded, to depressional soils where standing water may drown the crop, or to dry soils where the clover may be killed by drought. Clover is usually planted in March, in wheat, rye, or oats. If clover has not previously been grown on a soil, the seed must be inoculated to enable the plants to fix and store nitrogen.

Red clover will tolerate more acidity than either alfalfa or sweetclover, but for best results the soil should be limed until the pH is about 6.0. Alsike clover tolerates a little more acidity and is often grown where red clover has failed. Red clover is used both for hay and rotation pasture. It may be pastured in the early

part of the season and later cut for hay. Sometimes it is cut for seed in the fall. Mammoth clover is usually grown for pasture and as a soil-improving crop.

Timothy is usually seeded in grass-legume meadows, rarely alone. Mixed meadows that have been allowed to stand for more than a year usually consist mostly of timothy.

A few other crops that are grown to a limited extent for hay are lespedeza, soybeans, rape, millet, sudangrass, and bromegrass.

Vegetables

Vegetable crops are grown in numerous small areas, mostly for local sale or home use. The dark-colored alluvial soils are well suited to vegetable crops. Higher yields result if a crop of alfalfa or clover is plowed down and heavy applications of a complete fertilizer are added.

Sweet corn, tomatoes, and popcorn are grown commercially. Sweet corn and tomatoes are sold to canneries at Klondyke and Frankfort, both outside Tippecanoe County.

Popcorn has come to be an important commercial crop in recent years. Both price per ton and acreage planted fluctuate widely, as the market is readily glutted by overproduction. Most of the popcorn is produced under contract at a guaranteed price for sale through a few local processors.

Permanent pasture

Permanent pastures are important, especially on the light-colored soils where livestock farming is common. Most farms have a few acres of permanent pasture, but the larger areas occur on the sloping to moderately steep soils along streams and creeks.

Most of the pastures are in good condition. The best pastures are 90 percent or more Kentucky bluegrass and whiteclover; the other 10 percent or less is Canadian bluegrass, other grasses, and weeds. Lower grades of pasture contain varying amounts of povertygrass, red sorrel, cinquefoil, broomsedge, and annual weeds. Poor-quality pastures could be improved quickly by liming, fertilizing liberally, and reseeding.

Livestock and Livestock Products

Livestock and livestock products are a very important source of farm income in this county. The hay and pasture and much of the field-crop production of the county are used to support the livestock industry.

The most important types of livestock raised are cattle and swine. Table 4 shows the number of livestock on farms in the county in stated years.

TABLE 4.—*Number of livestock of all ages on farms*

Livestock	1930	1940	1950	1954
Horses and mules	8,079	[1] 4,630	1,023	465
Cattle	19,161	[1] 18,605	25,490	35,126
Swine	[2] 58,285	[2] 36,502	86,270	91,393
Sheep	13,501	[3] 9,933	9,126	10,930
Chickens	[1] 153,840	[2] 146,760	[2] 144,287	[2] 143,837
Other poultry raised	[4] 12,945	[4] 10,725	[4] 63,251	32,737

[1] Over 3 months old.
[2] Over 4 months old.
[3] Over 6 months old.
[4] Raised during the preceding year.

Beef cattle

Beef cattle are raised throughout the county, but there are more in the northwestern part of the county where a cash-grain system of farming is most common. These farms produce enough pasture and roughage for cattle and an abundance of corn for feed. Although there are some breeding herds, most of the farms are operated as feeding enterprises. Most of the cattle are bought as calves, grazed during summer, and finished on corn, hay, and commercial supplements. Some farmers buy heavy feeder cattle in the fall, fatten them on corn for a few months, and sell them early in spring. Shorthorn, Aberdeen-Angus, and Hereford are the principal breeds.

Dairy cattle

Dairying is important on some farms, especially near Lafayette and the larger towns. Local creameries collect milk from the farms. Market milk, cream, butter, and some condensed milk are processed at these creameries and sold through retail trade channels.

Holstein-Friesians, Guernseys, and Jerseys are the most common dairy breeds, but many dairy cattle are grade cattle, and a few are milking Shorthorns. Most of the corn, oats, and hay fed to these cattle are produced on the farm, but protein supplements and other concentrates are purchased.

Swine

Raising of swine has been important in this county since the time of earliest settlement. Most of the feed is raised on the farm, but most protein supplement is purchased. Hampshire, Poland China, Berkshire, Duroc-Jersey, and Chester White are the most common breeds. Swine are usually marketed through the stockyards in and around Lafayette and Indianapolis.

Sheep

Sheep raising is a minor livestock enterprise. Most of the sheep are kept in small flocks. They control weeds in pastures and are frequently grazed on the lower grade pastures. A few feeder sheep or lambs are bought from western markets for fattening on pasture. Most of the sheep and lambs are sold in Indianapolis.

Poultry

Poultry raising is a sideline on most farms. Flocks average about 100 chickens. They are kept mainly to furnish meat and eggs for home use, but the surpluses

are sold in nearby towns. Barred Rock and White Rock are the most common breeds, but some heavier breeds are raised, and mixed flocks are common.

Most of the farm flocks of 300 or more laying hens are Leghorns. Some farmers produce broilers and fryers for the local market or for shipment to large city markets. Several large commercial poultry plants in the county produce thousands of birds annually. The larger commercial producers of chickens and turkeys are located near the prairies, where corn is most plentiful.

Horses and mules

The number of horses and mules has declined so much in the last few decades that the average is now 1 horse or mule to each 4 farms. Most of the work stock is kept on partly-mechanized small farms on the rolling land along the larger streams. Few farmers raise horses or mules; replacements are usually shipped in from the west. Corn, oats, and hay to feed these animals are raised on the farm.

Types and Sizes of Farms

Farms in Tippecanoe County were grouped by type in the 1954 census as follows:

	Number
Cash-grain farms	670
Other field-crop farms, including vegetable farms	10
Dairy farms	50
Poultry farms	35
Livestock farms other than dairy and poultry farms	572
General farms, primarily crop	5
General farms, primarily livestock	15
General farms, both crop and livestock	76
Miscellaneous and unclassified farms	426

Only those farms that produced more than half of the total income from one enterprise were classified by type. The 426 miscellaneous and unclassified farms included many farms on which products were used entirely by the farm household.

Farms were classified by size in 1954 as follows:

	Number
Less than 10 acres	189
10 to 49 acres	351
50 to 99 acres	287
100 to 179 acres	372
180 to 259 acres	288
260 to 999 acres	333
1,000 or more acres	9

The large farms are more common on the prairies where cash-grain farming is usual. The small farms are more numerous around the larger towns and on the sloping land along streams.

Land Use

About 90 percent of the area of the county is in farms. In 1954 the 286,960 acres of land in farms was used as follows:

	Acres
Cropland harvested	198,811
Cropland used only for pasture	27,426
Cropland not harvested and not pastured	3,603
Woodland pastured	19,167
Woodland not pastured	6,092
Other pasture (not cropland and not woodland)	14,945
Other land (house lots, roads, wasteland, etc.)	16,916

Since there is no regeneration of the timber stand when woodland is pastured, much of the woodland now pastured will gradually be converted to pasture or cropland.

The number of farms in the county has been gradually decreasing, and the average size has been increasing. In 1954 there were 1,829 farms, and the average size was 156.9 acres. An average of 127.6 acres of each farm is improved land, that is, land that has been cleared of trees and stones and has been fenced, drained, and made suitable for crops.

Farm Tenure

In 1954, the farms and the acreage in farms were classified according to tenure of operators, as follows:

	Number of farms	*Acres*
Full owners	939	79,342
Part owners	317	79,847
Managers	26	7,639
All tenants	547	120,132
Cash tenants	34	1,250
Share-cash tenants	124	30,799
Share tenants and croppers	326	82,078
Other and unspecified tenants	63	6,005

Although over half the farms in the county are operated by the owners, these farms comprise only 27.6 percent of the farmland in the county. Another 27.8 percent of the land is owned partly by the operator and partly by others. The 30 percent of farmers who are tenants operate 41.9 percent of the land in farms. Managers operate 2.7 percent of the farmland. The reason such a high percentage of the farmland is commercially operated is that the high fertility of the soils and the few hazards involved in cash-grain farming in the prairie areas make farmland an attractive investment.

Share tenancy is the most common basis of rental. Under this system, the tenant receives one-half to one-third of the crops or livestock, and some provision is made for living quarters, garden space, and enough pasture for a cow. The tenant provides the equipment for operating the farm. Seed and fertilizer costs are divided according to agreements. Where the risks of loss are greater, the tenant may receive a larger share. Some farms are rented for a specified cash price per acre.

Farm Equipment and Expenditures

The investment in farm equipment has risen steadily as farming has become mechanized. Machinery is used for plowing, preparing seedbeds, and harvesting grain. Hay is commonly harvested by cooperatively owned equipment or by hired privately owned equipment, to avoid heavy investment in machinery.

Equipment on farms was reported in the 1954 census as follows:

	Farms reporting	*Number*
Grain combines	837	866
Cornpickers	1,013	1,076
Pickup hay balers	234	240
Tractors (wheel tractors other than garden)	1,414	2,552
Motortrucks	1,074	1,266
Automobiles	1,668	2,133
Field forage harvesters	89	94

Expenditures for labor and fertilizer depend to some extent on farm prices. When prices are low, farmers curtail expenditures, and when prices are high, they increase the amounts spent for operation and improvement of the farm. For example, in 1930, one-third of the farms hired extra labor; in 1940, two-thirds of the farms hired extra labor.

In the 1954 census the following types of expenditures were reported on farms in Tippecanoe County:

	Farms reporting expenditure	*Percentage of total number of farms*
Machine hire	871	47.6
Hired labor	749	40.9
Feed for livestock and poultry	1,609	87.9
Gasoline, other petroleum fuel, and oil	1,489	81.4
Commercial fertilizer	1,384	75.6
Lime and liming materials	480	26.2

The local supply of farm labor is usually adequate, but some transient labor is hired for harvesting certain truck crops and detasselling corn for production of hybrid seed corn. On larger farms, labor is hired by the week, month, or year; and the contract may include housing and other subsistence.

Soil Survey Methods and Definitions

The scientist who makes a soil survey examines soils in the field, classifies the soils in accordance with their characteristics, and maps their boundaries on an aerial photograph or other map.

FIELD STUDY.—The soil surveyor bores or digs many holes to see what the soils are like. The holes are not spaced in a regular pattern, but are located according to the lay of the land. Usually they are not more than a quarter of a mile apart and sometimes they are much closer. In most soils each boring or hole reveals several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from others in the profile and to learn the things about this soil that influence its capacity to support plant growth.

Color is usually related to the amount of organic matter. The darker the surface soil, as a rule, the more organic matter it contains. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration.

Texture, or the content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers, and it is later checked by laboratory analysis. Texture determines how well the soil retains moisture, plant nutrients, and fertilizer, and whether it is easy or difficult to cultivate.

Structure, which is the way the individual soil particles are arranged in larger grains and the amount of pore space between grains, gives us clues to the ease or difficulty with which the soil is penetrated by plant roots and by moisture. Structure is defined in terms of distinctness, size, and shape of the soil aggregates. For example, "moderate medium subangular blocky" means moderately distinct, medium-sized aggregates of subangular blocky shape.

Consistence, or the tendency of the soil to crumble or to stick together, indicates whether it is easy or difficult to keep the soil open and porous under cultivation.

Other characteristics observed in the course of the field study and considered in classifying the soil include the following: The depth of the soil over bedrock or compact layers; the presence of gravel or stones in amounts that will interfere with cultivation; the steepness and pattern of slopes; the degree of erosion; the nature of the underlying parent material from which the soil has developed; and acidity or alkalinity of the soil as measured by chemical tests.

CLASSIFICATION.—On the basis of the characteristics observed by the survey team or determined by laboratory tests, soils are classified into series, types, and phases. The soil type is the basic classification unit. A soil type may consist of several phases. Types that resemble each other in most of their characteristics are grouped into soil series.

As an example of soil classification, consider the Ockley series of Tippecanoe County. This series is made up of two soil types, subdivided into phases, as follows:

Series	*Type*	*Phase*
Ockley	Loam	0 to 3 percent slopes.
		3 to 8 percent slopes.
		3 to 8 percent slopes, eroded.
	Silt loam	0 to 3 percent slopes.
		3 to 8 percent slopes.
		3 to 8 percent slopes, eroded.

Soil type.—Soils similar in kind, thickness, and arrangement of layers are classified as one soil type.

Soil phase.—Because of differences other than those of kind, thickness, and arrangement of layers, some soil types are divided into two or more phases. Slope variations, number of rock outcrops, degree of erosion, depth of soil over the substratum, or natural drainage, are examples of characteristics that suggest dividing a soil type into phases.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. Use and management practices therefore can be specified more easily for a phase than for a soil series or yet broader groups that contain more variation.

Soil series.—Two or more soil types, which differ in surface texture but are otherwise similar in kind, thickness, and arrangement of soil layers, are normally designated as a soil series. In a given area, however, it frequently happens that a soil series is represented by only one soil type. Each series is named for a place near which it was first mapped.

Miscellaneous land types.—Areas that have little true soil are not classified by types and series; they are identified by descriptive names, such as Gravel pits.

Catena.—A group of soils developed from similar parent material under similar vegetation cover but under different kinds of drainage is called a catena. Catenas are sometimes referred to by naming the well-drained member. For example, Miami, Crosby, Cope, Brookston, and Kokomo soils are members of the Miami catena.

Soils

The soils of Tippecanoe County vary widely in many of the characteristics that influence productivity. One or more of these characteristics may limit the agricultural use of the various types and phases of soil.

Figure 3 is a diagram of a hypothetical cross-section of Tippecanoe County. It shows the major soil types and the position of each in the landscape, the parent material, the drainage, and the native vegetation under which each soil originally developed. Many of the important characteristics of the soils depend on the interaction of two or more of these influences. The profile sketches show on a larger scale the characteristics of the soil types. The shading of the soil profiles shows the relative amount of organic matter and the place where it occurs in the soil. The patterns within the profile diagrams show texture, as clay, silty clay, sandy clay, sand, gravel and sand, or glacial till.

The Roman numerals beneath each profile diagram indicate the drainage class, as follows: II, imperfect; III, moderately good; IV, good; V, good to excessive; VI, excessive; VII, poor; VIII, poor to very poor; and IX, very poor.

The individual soil descriptions give the characteristics of the individual soils in detail, and the soil map at the end of this report shows the location and extent of each. Information about larger areas of the county can best be presented in generalized maps that show broad relationships between groups of soils. The series of interpretive maps in this section allows the reader to compare one general area with another with respect to several important characteristics of the soils.

On these small maps, soils have been grouped into units, each made up of two or more soils that commonly occur together. The soils in a unit may be similar or very different in characteristics.

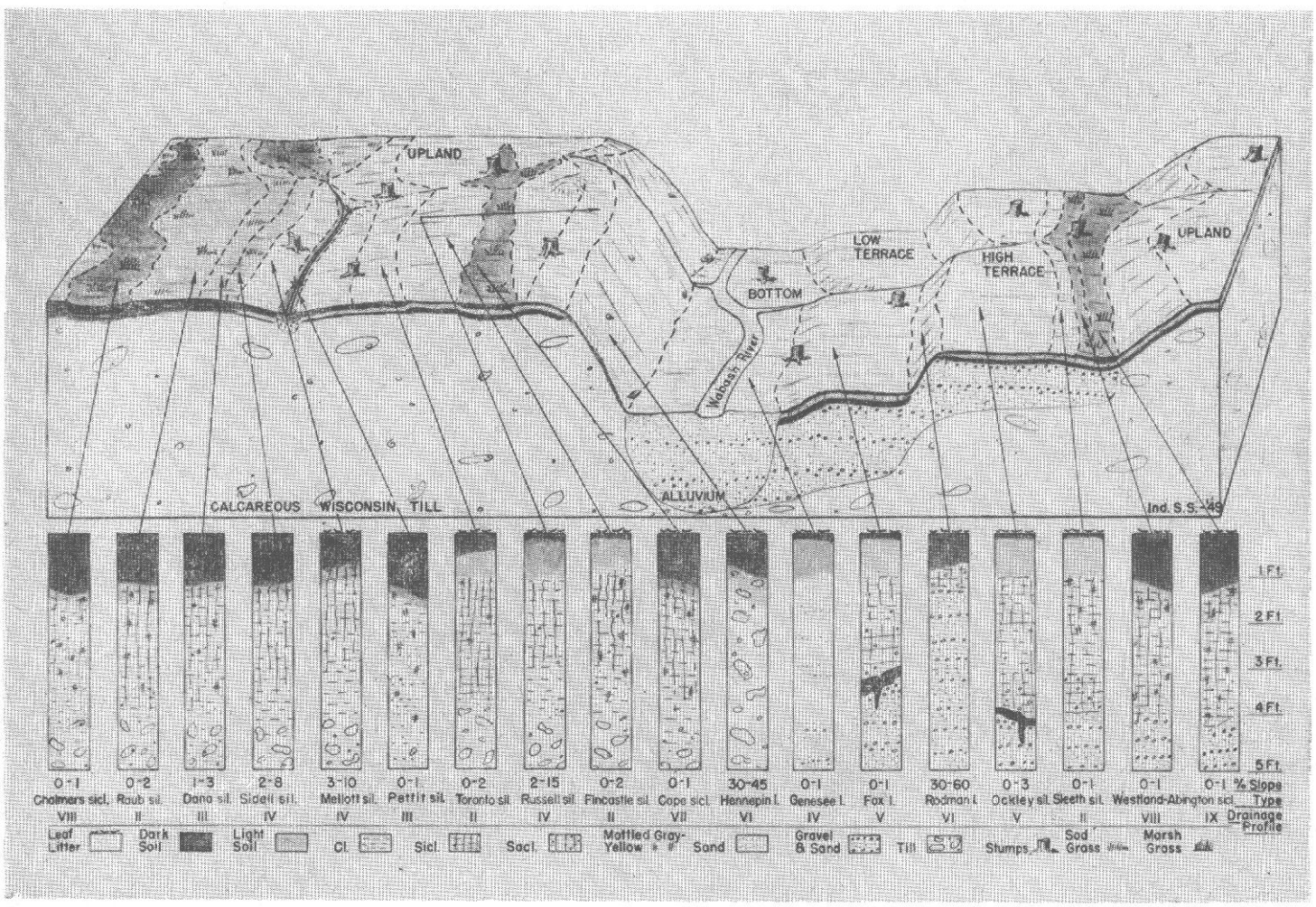


Figure 3.—**Schematic cross section through north-central Tippecanoe County, showing the topographic position, parent material, native vegetation, natural drainage, and profile characteristics of representative soil series.**

On the small maps that follow a symbol is used for each unit. Following is a list of the symbols and the predominant soils within each unit. One soil type may appear in several of the units.

Ac2	Crosby silt loam, Brookston silty clay loam.
Ac4	Miami silt loam, Crosby silt loam.
Cc4	Parr silt loam, Corwin silt loam, Chalmers silty clay loam.
Cc8	Chalmers silty clay loam, Romney silty clay loam, Odell silt loam, Corwin silt loam.
Dn5	Fox silt loam, Fox loam.
Dn8	Westland silty clay loam, Abington silty clay loam, Homer silt loam, Fox loam.
Fn5	Warsaw silt loam.
Gc5	Fox loam, kame phase; Warsaw loam, kame phase.
Gc4	Russell silt loam, Fincastle silt loam, Cope silt loam, Cope silty clay loam.
Gc2	Fincastle silt loam, Cope silt loam, Cope silty clay loam, Brookston silt loam, Brookston silty clay loam.
Gc8	Brookston silty clay loam, Brookston silt loam, Cope silty clay loam, Cope silt loam, Fincastle silt loam, Kokomo silty clay loam.
Jc4	Sidell silt loam, Dana silt loam, Chalmers silty clay loam.
Jc8	Chalmers silty clay loam, Romney silty clay loam, Raub silt loam, Dana silt loam.
Kn5	Ockley silt loam, Ockley loam.
Kn8	Westland silty clay loam, Abington silty clay loam, Sleeth silt loam, Ockley silt loam.
Mn5	Wea silt loam, Longlois silt loam, Longlois loam.
Mt5	Elston loam, Elston silt loam, Elston fine sandy loam, Hagener loamy fine sand.
Kt5	Oaktown loamy fine sand.
Uc4	Genesee loam, Genesee silt loam, Genesee silty clay loam, Genesee fine sandy loam, Eel silt loam, Eel silty clay loam, Eel loam, Ross silt loam, Ross silty clay loam.
IM	Carlisle muck, Edwards muck.

Topography

The topography, or lay of the land, is important in the use and management of the soils. The slopes affect the rate of runoff and the amount of erosion. The slopes in Tippecanoe County range from nearly level to steep. More than three-fourths of the county is level or nearly level; about one-fifth is rolling or moderately sloping; a very little of the county is steep. Figure 4 shows the topographic positions of the several units of soils and their dominant slope.

Internal Drainage

Internal drainage, or rate of movement of water through the soil, is shown in figure 5. Internal drainage is very rapid in the gravelly and sandy materials deposited in stream valleys and outwash areas. Internal drainage is slow through the glacial till that underlies the uplands of this county. The swales and depressions were ponded until the drainage was improved artificially.

Two-thirds of Tippecanoe County originally had inadequate drainage. In 1950, drainage enterprises covered 147,584 acres, or nearly half of the farmland in that year.

Soils underlain by sandy and gravelly materials are commonly drained by widely spaced open ditches. There were 132 miles of such open ditches in the county in 1950. Soils underlain by the more compact and impermeable glacial till of the uplands are usually drained by tile systems. The county had 369 miles of tile drains in 1950.

Drought Resistance

The drought resistance of a soil, or its capacity to supply moisture to crops throughout the season, depends on the depth of the soil, its texture, its organic-matter content, the type of material underlying the soil, and the height of the water table. Figure 6 shows the drought resistance of the soils in this county. More than 60 percent of the soils have high or very high drought resistance, and only about 16 percent of them have low or very low resistance to drought.

Erosion

Figure 7 shows the amount of erosion that has occurred on the soils of this county. The erosion that has already occurred is a guide to the susceptibility of the soil to further erosion if cultivation is continued. Most of the soils of this county are level or nearly level and are in little danger of erosion. A few rolling areas and long slopes need special management to prevent erosion.

Parent Materials

Figure 8 shows the soil units according to parent materials. Some of the units are further subdivided by the stage of soil development, as shown by the depth to which carbonates of lime have been leached from the soil.

Most of the soils of this county developed from glacial till, some unassorted and some wind- and water-sorted. A few soils have developed from decomposed organic materials. Soils developed from the underlying bedrock are so few and so small in extent that they cannot be shown on figure 8.

Lime Requirements

The lime requirements of soils are determined by their reaction, or acidity, and to some extent by the crops which will be planted. Legumes do not tolerate so strongly acid a soil as do most common crops.

There are no very strongly acid soils in this county. About 40 percent of the soils are neutral to slightly alkaline in reaction and need no lime. The other 60 percent are medium acid; these soils should be limed, especially if legumes are to be grown. Figure 9 shows approximately how much lime is needed to neutralize soils in each unit. This map is generalized—the acidity of the soils within each unit varies considerably. Soil tests are the only dependable measure of how much lime a particular field needs. After the initial application, smaller amounts each year will maintain a suitable reaction for crops.

Nitrogen and Organic-Matter Content

The amount of nitrogen in a soil depends upon the amount of organic matter. About one-twentieth of the organic matter in the soil is nitrogen. As the organic matter decays, this nitrogen is slowly released for plant use. Soils that are less than 3 percent organic matter do not supply enough nitrogen for growing crops.

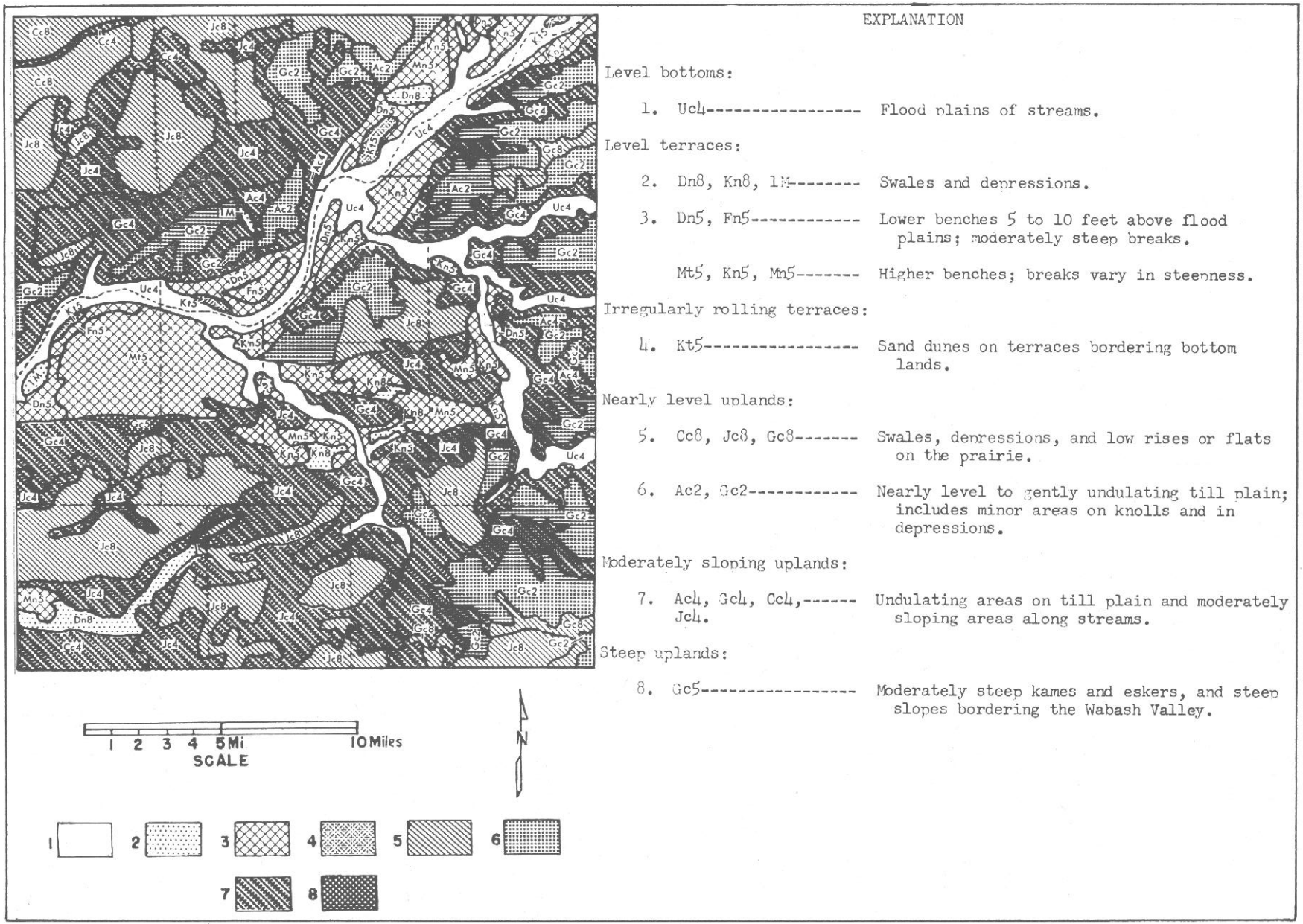


Figure 4.—**Topographic position of the soils of Tippecanoe County, Ind.**

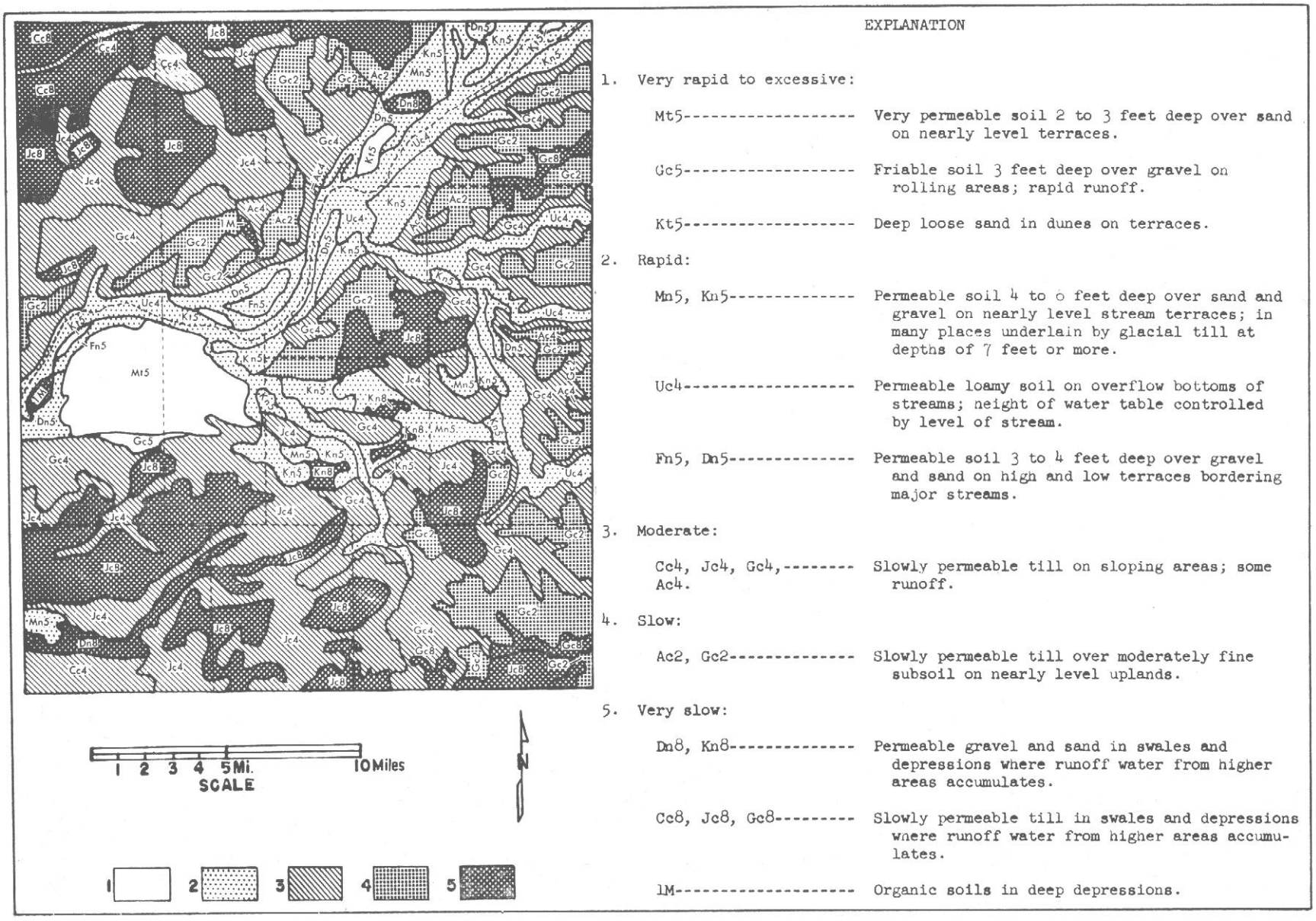
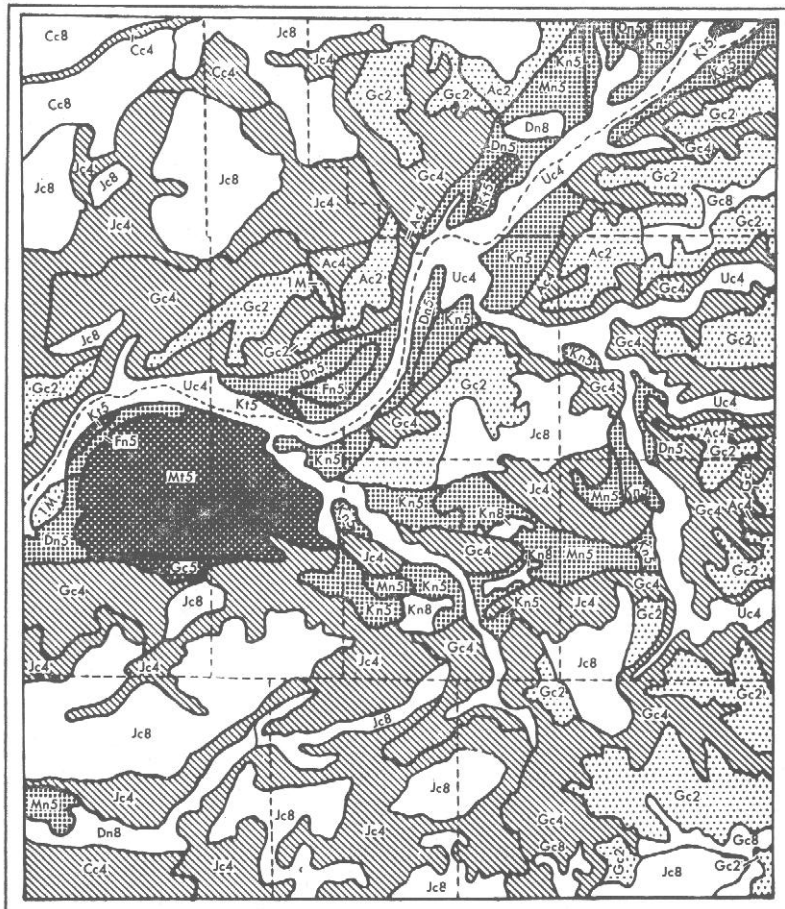


Figure 5.—**Internal drainage of soils of Tippecanoe County, Ind.**



EXPLANATION

1. Very high:

Cc8, Jc8, Gc8	Dark-colored soils in upland swales and depressions; high in organic matter; underlain by slowly permeable glacial till; receive runoff from higher areas.
Dn8, Kn8	Permeable soils in swales and depressions on stream terraces; underlying material is permeable, but drainage outlets are needed.
Uc4	Soils on overflow bottoms of streams; water table fluctuates with stream level; subsoil of swales and meander channels is clayey and slowly permeable; subsoil of higher areas is sandy and freely permeable.

2. High:

Ac2, Gc2	Predominantly dark-colored deep soils from slowly permeable till on level uplands.
1M	Organic soils in deep depressions.

3. Moderate:

Cc4, Jc4	Gently rolling soils of upland prairies.
Ac4, Gc4	Deep soils of forests on rolling uplands; rapid runoff.

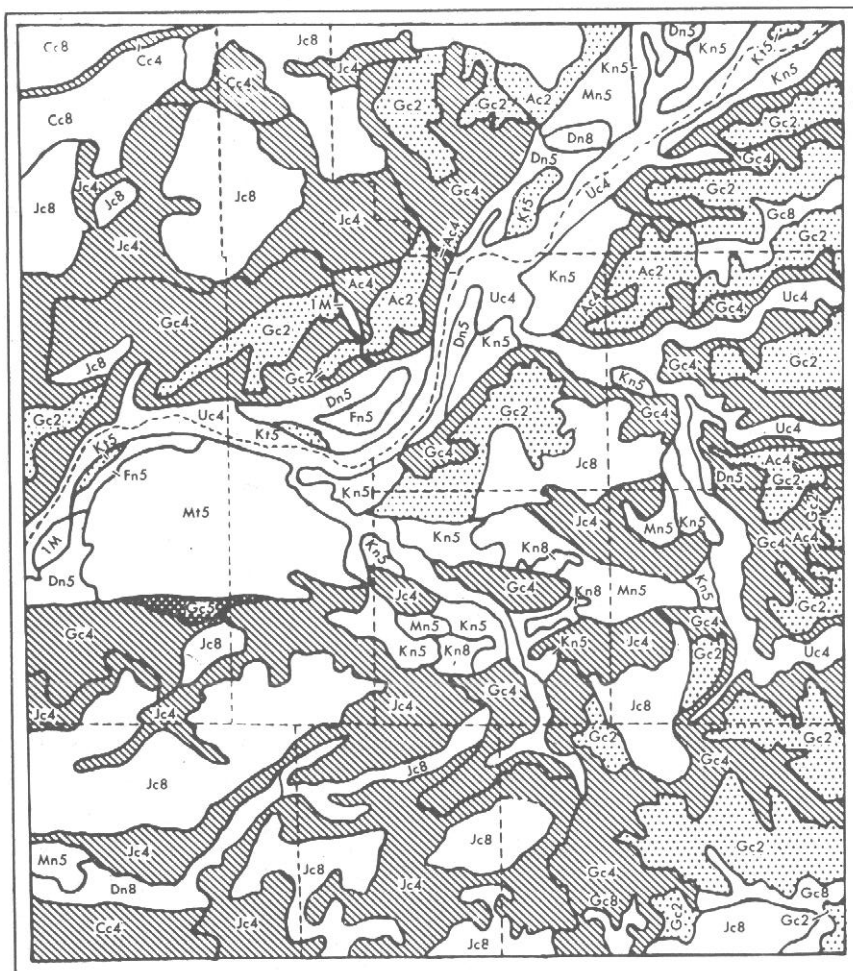
4. Low:

Mn5, Kn5	Soils 4 to 6 feet deep over gravelly sand on terraces; moisture-supplying power reduced when gravel and sand is nearer surface.
Fn5, Dn5	Soils 3 to 4 feet deep over gravel on terraces.

5. Very low:

Gc5	Gravelly knolls and ridges on rolling uplands; rapid runoff.
Mt5	Shallow dark-colored sandy soils on terraces.
Kt5	Deep loose light-colored dune sands on terraces near river bottoms.

Figure 6.—**Drought resistance of the soils of Tippecanoe County, Ind.**



EXPLANATION

1. Little or no erosion:

Uc4----------	Soils of bottom lands; some scouring may occur during overflow.
Dn8, Kn8, 1M----------	Soils in swales on terraces; may receive deposits of materials eroded from higher areas.
Cc8, Jc8, Gc8---------	Soils in swales on uplands; may receive deposits of materials eroded from higher areas.
Kn5, Mn5, Fn5,-------- Dn5, Mt5.	Soils on nearly level terraces; breaks at terrace edges may be moderately eroded.

2. Slight erosion:

Ac2, Gc2----------	Nearly level light-colored soils on uplands; gently sloping areas included may be moderately eroded.
Kt5----------	Undulating dune sands; may be slightly eroded by wind.

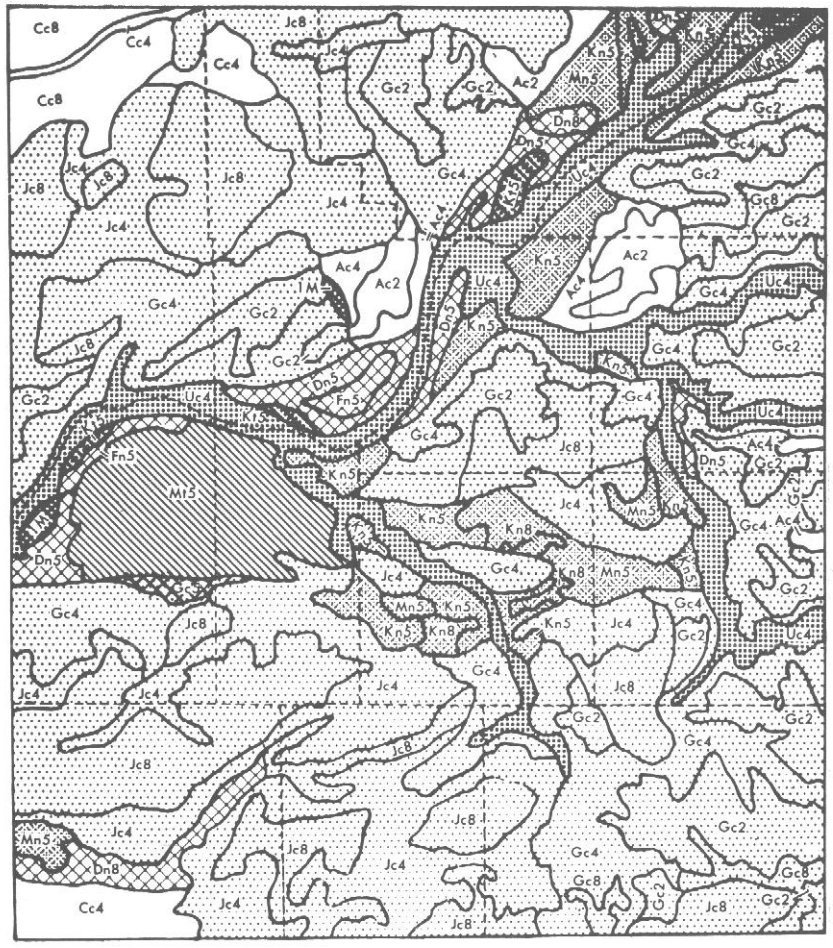
3. Moderate sheet erosion and scattered gullies:

Ac4, Gc4----------	Light-colored soils on rolling areas, on moderately steep slopes bordering larger streams, and on breaks above terraces.
Cc4, Jc4----------	Dark-colored soils on undulating prairies; long gentle slopes are erosive.

4. Severe erosion:

Gc5----------	Soils on rolling gravelly knolls and ridges; small spots among soils of other groups.

Figure 7.—**Erosion on the soils of Tippecanoe County, Ind.**



EXPLANATION

1. Glacial till:

   Ac4, Ac2, Cc4, Cc8.---------- Medium-textured, unassorted material; highly calcareous; leached of lime carbonates to depths of 30 to 40 inches; occurs in uplands of northern part of county.

2. Silt over glacial till:

   Gc4, Gc2, Gc8, Jc4, Jc8.-------- Silt mantle 18 to 40 inches deep, over unassorted, medium-textured, highly calcareous till that is leached of lime carbonates to depths of 45 to 60 inches; occurs on uplands throughout the county.

   Gc5---------- Local areas of assorted gravel and sand on knolls and ridges on the uplands.

3. Gravel and sand, shallowly leached:

   Dn5, Dn8, Fn5--------- Highly calcareous material; leached of lime carbonates to depths of 30 to 40 inches; occurs on low terraces of major streams.

4. Gravel and sand, deeply leached:

   Kn5, Kn8, Mn5--------- Highly calcareous material; leached of lime carbonates to depths of 40 to 70 inches; occurs on higher, older terraces and outwash plains.

5. Sand:

   Mt5---------- Sand that contains some gravel in places; noncalcareous to slightly calcareous; occurs on high terraces and on Wea Plains.

6. Silt and sand:

   Uc4---------- Bottom-land soils on flood plains of present-day streams.

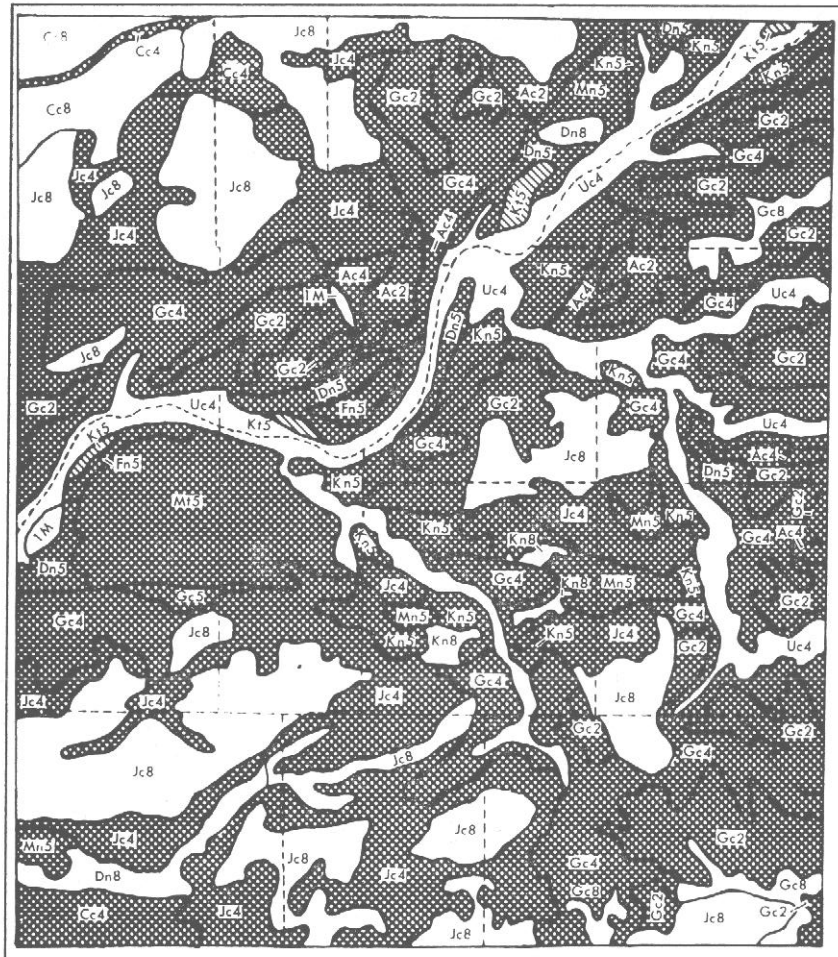
7. Fine sand:

   Kt5---------- Uniformly assorted material deposited by wind; usually noncalcareous; occurs in dunes on terraces bordering bottom lands.

8. Organic material:

   1M---------- Decomposed vegetation in former lakes and marshes.

Figure 8.—**Parent materials of soils of Tippecanoe County, Ind.**



EXPLANATION

1. No lime required:

Uc4----------	Bottom-land soils; neutral to alkaline in reaction.
1M----------	Organic soils of former ponds and deeper depressions; may be acid, but crops suited to these soils do not require lime.
Dn8, Kn8, Gc8, Cc8, Jc8.--------	Soils of depressions in terraces and uplands; included spots of high ground may require some lime.

2. Up to 1 ton of ground limestone per acre required:

Kt5----------	Dune sands; require lime before deep-rooted legumes can be grown.

3. Up to 2 tons of ground limestone per acre required:

Mt5, Dn5, Kn5, Fn5, Mn5, Gc2, Ac2, Gc4, Ac4, Cc4, Jc4, Gc5.--------	Soils of high ground on terraces and uplands; require 1 to 2 tons of lime per acre for best growth of red clover; most of the associated low-ground soils do not require lime.

Figure 9.—**Lime requirements of the soils in Tippecanoe County, Ind.**

The texture, drainage, and erosion of a soil, the vegetation under which it developed, and the climate all affect the rate of accumulation and the rate of destruction of organic matter, and therefore the amount of nitrogen.

The nitrogen content of the soils of Tippecanoe County varies from 0.05 percent in light-colored loose sandy soils to 1 percent or more in black organic soils. The organic-matter content ranges from about 1 percent to 70 percent or more. Figure 10 shows the nitrogen content in the upper 6 inches of the principal soil types of each of the units. These groupings are based on laboratory tests of soil samples.

Productivity

Figure 11 shows the relative productivity of the major soil areas in the county. This grouping is based on the productivity ratings given in table 8. The productivity ratings were based on yields obtained under the management now commonly used. Detailed figures and explanations of the productivity ratings and crop yields of the individual soils are given in the section Estimated Yields and Productivity Ratings.

Descriptions of Mapping Units

In the following pages the soils of the county, identified by the same symbols as those used on the soil map, are described in detail and their agricultural relations are shown. The series is not described if there is only one mapping unit. The soil mapped is considered representative of the series in this county. The management subgroup of each soil is shown; the details of management practices are discussed in the section Management of Soils. The approximate acreage and proportionate extent of each soil mapped are listed in table 5.

Abington Series

The Abington soil is the very poorly drained member of the catena that includes the Fox, Homer, and Westland soils. It is also in the catena that includes the Ockley, Sleeth, and Westland series; and in the catena that includes the Glenhall, Monitor, and Westland series.

Abington silty clay loam, 0 to 3 percent slopes (Aa) (Management subgroup 9B).—This soil developed in swales and old glacial drainage channels on outwash plains and terraces. It occurs in nearly level depressions where the slope is usually less than 1 percent. It is underlain by calcareous stratified gravel and sand.

The native vegetation consisted of swampgrass and water-tolerant trees, including swamp white oak, ash, and elm. In prairie areas, bluejoint and sloughgrass grew instead of trees.

Profile in a cultivated area:

0 to 8 inches, very dark gray to black silty clay loam; high in organic matter; moderate medium granular structure; firm; slightly acid to neutral.
8 to 18 inches, black to very dark brown silty clay loam; high in organic matter; moderate coarse granular to fine blocky structure; firm; slightly acid to neutral.
18 to 28 inches, gray silty clay loam; faint yellowish-brown mottlings, especially in lower part; moderate coarse blocky structure; very firm; neutral.
28 to 48 inches, mottled gray and yellowish-brown clay loam or silty clay loam; content of gravel varies but increases with depth; weak very coarse blocky structure; very firm; neutral.
48 inches +, gray and pale-brown stratified gravel and sand; calcareous.

The total thickness of the upper two layers varies from 16 to about 24 inches. Those areas associated with Wea and Longlois soils usually have darker colored and thicker surface and subsurface horizons than those associated with Fox and Ockley soils. The surface soil is a silt loam in some areas where material has washed from higher lying areas onto this soil. The depth to gravel and sand ranges from 42 to about 65 inches.

Use and management.—Most of this soil has been artificially drained by open ditches or tile. More than 80 percent is now cropped. A few small areas need additional drainage for cropping.

Corn and soybeans are the principal crops. Small grains and hay are also grown. Small grains may be winterkilled, or they may lodge. Red clover and alfalfa may be damaged by frost heave and by drowning out. Much of this soil is deficient in potassium.

Brookston Series

The Brookston are the principal dark-colored soils of the "black-and-clay" [2] area of central Indiana. The parent material is highly calcareous glacial till.

These soils developed in swales, depressions, and broad flats that were ponded because of the very poor natural drainage. Some Brookston soils developed on seepy areas on gentle lower slopes. The native vegetation was marshgrasses and water-tolerant trees, including red maple, soft maple, elm, ash, and basswood.

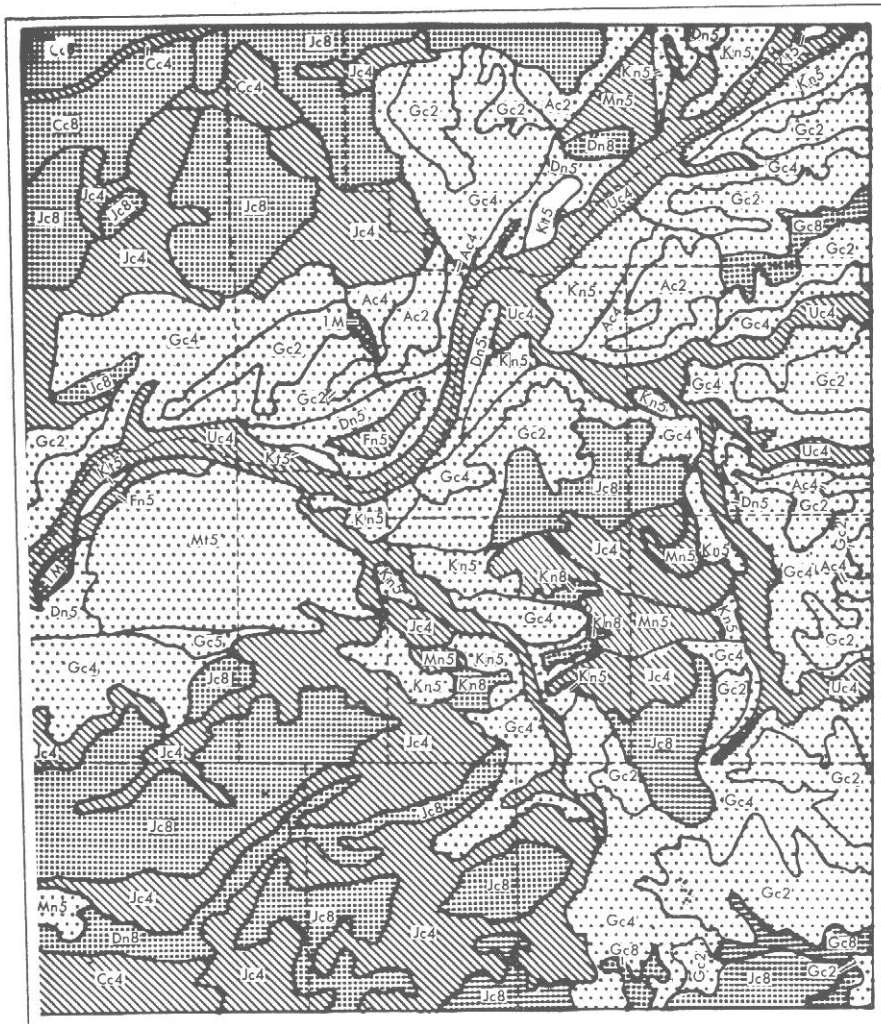
Brookston soils, together with the Cope and Kokomo soils, are the very poorly drained soils of the catena that also includes the better drained Russell, Fincastle, and Delmar soils. Brookston soils are also associated with the Miami and Crosby soils.

Brookston silty clay loam, 0 to 3 percent slopes (Bb) (Management subgroup 9A).—This soil occurs on the nearly level divides between streams throughout the eastern third of the county, and bordering the Wabash Valley. Natural drainage, both external and internal, is poor. However, most areas have been drained enough to be used for crops. This fertile dark-colored soil usually occurs in small areas and is intricately mixed with the light-colored Fincastle silt loam.

Profile of Brookston silty clay loam:

0 to 8 inches, very dark brown to very dark grayish-brown silty clay loam; organic matter content moderately high to high; weak medium granular structure; firm when moist, slightly plastic when wet, and slightly hard when dry; slightly acid to neutral.
8 to 14 inches, very dark brown silty clay loam; organic matter moderately high in upper part and decreasing with depth; weak coarse granular or fine blocky structure; firm when moist, slightly plastic when wet, and hard when dry; slightly acid to neutral..
14 to 28 inches, mottled gray and yellowish-brown silty clay loam to light silty clay; moderate coarse blocky structure;

[2] This name is commonly given to the association of Brookston and Crosby soils (Ac2), but it applies equally to the association of Fincastle, Cope, and Brookston soils (Gc2) and the association of Brookston, Cope, Fincastle, and Kokomo soils (Gc8).



EXPLANATION

1. Very low (less than 0.10 percent nitrogen):

Kt5----------	Light-colored loose sand; occurs in dunes along river; developed under forest; less than 2 percent organic matter.

2. Low (0.10 to 0.14 percent nitrogen):

Ac4, Ac2, Gc4, Gc2, Gc5.------	Light-colored medium-textured soils; occur on uplands of eastern part of county and bordering Wabash Valley in western part; developed under forest; 2 to 3 percent organic matter.
Dn5, Kn5----------	Light-colored medium-textured soils; occur on terraces and outwash plains along larger streams; developed under forest; 2 to 3 percent organic matter.
Mt5----------	Dark-colored sandy soils; occur on Wea Plains; developed under prairie vegetation; 2 to 3 percent organic matter.

3. Medium (0.14 to 0.23 percent nitrogen):

Cc4, Jc4----------	Dark-colored medium-textured soils; occur on high ground in uplands in northwestern or southwestern parts of county; developed under dry prairie vegetation; 3 to 5 percent organic matter.
Mn5, Fn5----------	Dark-colored medium-textured soils; occur on terraces and outwash plains bordering Wabash River and old glacial drainageways; developed under dry prairie vegetation; 3 to 5 percent organic matter.
Uc4----------	Light-colored neutral soils of medium and fine textures; occur on alluvial deposits along streams; developed under forest; 3 to 5 percent organic matter.

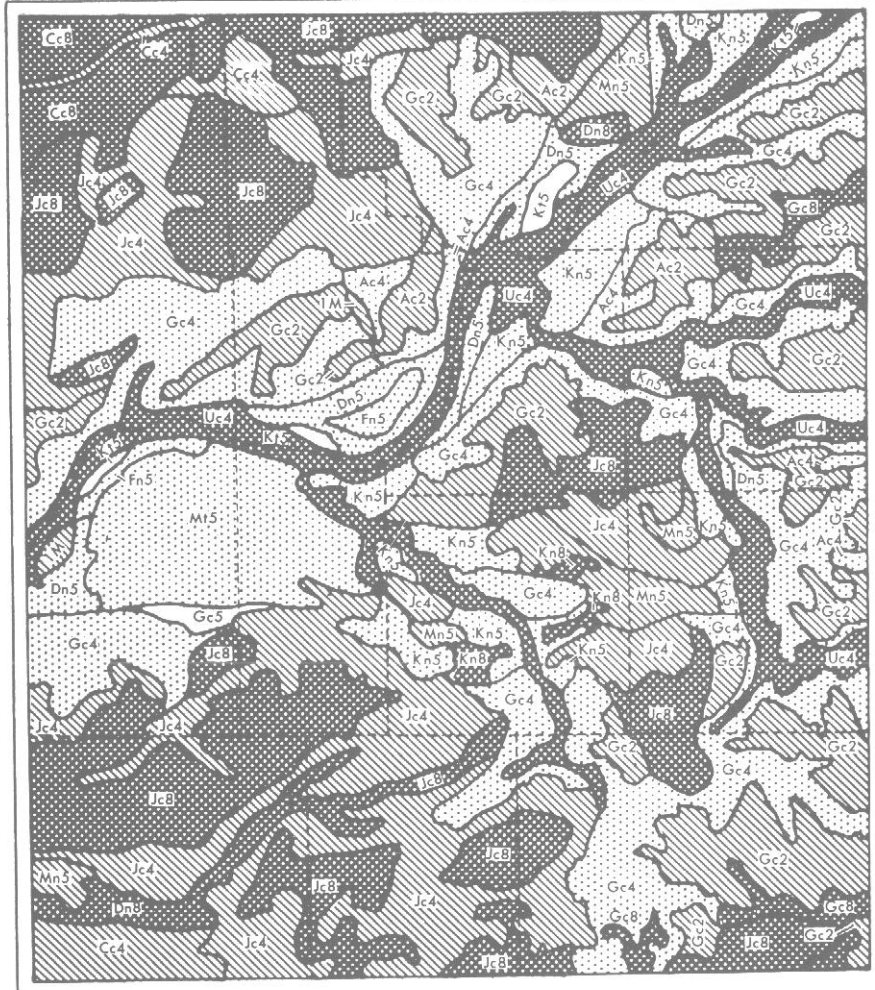
4. High (0.23 to 0.40 percent nitrogen):

Cc8, Jc8, Gc8, Kn8, Dn8.------	Dark-colored neutral soils; occur in depressions and swales on uplands and terraces; developed under ponded drainage; some developed under wet prairie vegetation, chiefly sloughgrass; some developed under swamp timber; 5 to 8 percent organic matter.

5. Very high (more than 0.40 percent nitrogen):

1M----------	Loose organic soils, usually black; occur in former ponds and permanently saturated areas on uplands, terraces, or bottom lands; 25 to 70 percent or more organic matter.

Figure 10.—**Nitrogen content of the soils of Tippecanoe County, Ind.**



EXPLANATION

1. Low (rating less than 60):

Kt5----------	Light-colored loose sandy soils; rolling; occur on sand dunes along river valley.
Gc5----------	Gravelly soils; excessively drained; occur on knolls and ridges of uplands and terrace borders.

2. Medium (rating of 60 to 80):

Ac4, Gc4----------	Light-colored well-drained soils; eroded; occur on sloping land along drainageways.
Dn5, Kn5----------	Light-colored well-drained to excessively drained soils; underlain by gravel at depths of 3 to 5 feet; occur on nearly level benches or terraces along larger streams and former glacial drainageways.
Fn5----------	Dark-colored soils; underlain by gravel at 3 to 5 feet; occur on nearly level benches or terraces along larger streams and former glacial drainageways.
Mt5----------	Dark-colored sandy soils; occur on Wea Plains.

3. High (rating of 80 to 90):

Ac2, Gc2----------	Light-colored soils; slowly permeable; occur on nearly level upland.
Cc4, Jc4----------	Dark-colored soils; well drained to imperfectly drained; occur on undulating to level prairie uplands.
Mn5----------	Dark-colored soils; well drained; underlain by sand and gravel at depths of 4 to 6 feet; occur on high terraces and outwash plains.
1M----------	Dark-colored organic soils; occur in former ponds and marshes.

4. Very high (rating more than 95):

Cc8, Jc8, Gc8--------	Dark-colored soils; poorly drained; underlain by glacial till; occur in ponded depressions and swales on uplands.
Dn8, Kn8----------	Dark-colored soils; poorly drained; underlain by sand and gravel; occur in swales and former drainage channels on outwash plains.
Uc4----------	Brown soils of bottom lands; neutral reaction; mostly well drained; occur on flood plains of all streams.

Figure 11.—**Productivity of soils of Tippecanoe County, Ind.**

TABLE 5.—*Approximate acreage and proportionate extent of the soils mapped in Tippecanoe County, Ind.*

Map symbol	Soil	Area	Extent	Map symbol	Soil	Area	Extent
		Acres	*Percent*			*Acres*	*Percent*
Aa	Abington silty clay loam, 0 to 3 percent slopes	1,895	0.6	Gc	Genesee loam, 0 to 4 percent slopes	6,117	1.9
Ba	Brookston silt loam, 0 to 3 percent slopes	1,289	.4	Gd	Genesee loam, high bottom, 0 to 3 percent slopes	2,214	.7
Bb	Brookston silty clay loam, 0 to 3 percent slopes	18,316	5.7	Ge	Genesee silt loam, 0 to 4 percent slopes	3,428	1.1
Ca	Carlisle muck	582	.2	Gf	Genesee silt loam, high bottom, 0 to 4 percent slopes	813	.3
Cb	Chalmers silt loam, 0 to 3 percent slopes	4,263	1.3	Gg	Genesee silty clay loam, 0 to 4 percent slopes	1,559	.5
Cc	Chalmers silty clay loam, 0 to 3 percent slopes	44,115	13.8	Gh	Genesee silty clay loam, high bottom, 0 to 3 percent slopes	120	(1)
Cd	Cope silt loam, 0 to 3 percent slopes	4,831	1.5	Gi	Glenhall silt loam, 0 to 3 percent slopes	391	.1
Ce	Cope silty clay loam, 0 to 3 percent slopes	1,698	.5	Ha	Hagener loamy fine sand, 2 to 12 percent slopes	364	.1
Cf	Corwin silt loam, 0 to 2 percent slopes	1,654	.5	Hb	Hennepin loam, 25 to 50 percent slopes	4,746	1.5
Cg	Crane silt loam, 0 to 3 percent slopes	516	.2	Hc	High Gap silt loam, 1 to 8 percent slopes	179	.1
Ch	Crosby silt loam, 0 to 3 percent slopes	9,410	2.9	Hd	Homer silt loam, 0 to 3 percent slopes	150	.1
Ci	Crosby silt loam, 3 to 5 percent slopes, eroded	128	(1)	Ka	Kaskaskia loam, 0 to 3 percent slopes	95	(1)
Da	Dana silt loam, 0 to 2 percent slopes	3,415	1.1	Kb	Kaskaskia silt loam, 0 to 3 percent slopes	293	.1
Db	Delmar silt loam, 0 to 3 percent slopes	311	.1	Kc	Kokomo silty clay loam, 0 to 3 percent slopes	1,241	.4
Ea	Edwards muck	92	(1)	La	Linwood muck	670	.2
Eb	Eel loam, 0 to 3 percent slopes	1,488	.5	Lb	Longlois loam, 0 to 3 percent slopes	403	.1
Ec	Eel silt loam, 0 to 3 percent slopes	5,106	1.6	Lc	Longlois loam, 3 to 8 percent slopes	133	(1)
Ed	Eel silty clay loam, 0 to 3 percent slopes	1,426	.4	Ld	Longlois loam, 3 to 8 percent slopes, eroded	144	(1)
Ee	Elston fine sandy loam, 0 to 3 percent slopes	137	(1)	Le	Longlois silt loam, 0 to 3 percent slopes	3,061	.9
Ef	Elston fine sandy loam, 3 to 8 percent slopes	331	.1	Lf	Longlois silt loam, 3 to 8 percent slopes	210	.1
Eg	Elston loam, 0 to 3 percent slopes	6,120	1.9	Lg	Longlois silt loam, 3 to 8 percent slopes, eroded	147	(1)
Eh	Elston loam, 3 to 8 percent slopes	707	.2	Ma	Made land	15	(1)
Ei	Elston loam, 3 to 8 percent slopes, eroded	123	(1)	Mb	Martinsville loam, 0 to 5 percent slopes	125	(1)
Ej	Elston loam, 8 to 15 percent slopes, eroded	87	(1)	Mc	Martinsville silt loam, 0 to 5 percent slopes	73	(1)
Ek	Elston silt loam, silted, 0 to 3 percent slopes	2,698	.8	Md	Mellott silt loam, 0 to 3 percent slopes	2,012	.6
Fa	Fincastle silt loam, 0 to 3 percent slopes	26,818	8.4	Me	Mellott silt loam, 3 to 8 percent slopes	5,797	1.8
Fb	Fox loam, 0 to 3 percent slopes	4,916	1.5	Mf	Mellott silt loam, 3 to 8 percent slopes, eroded	5,146	1.6
Fc	Fox loam, 3 to 8 percent slopes	985	.3	Mg	Mellott silt loam, 8 to 12 percent slopes	203	.1
Fd	Fox loam, 3 to 8 percent slopes, eroded	545	.2	Mh	Mellott silt loam, 8 to 12 percent slopes, eroded	322	.1
Fe	Fox loam, 3 to 8 percent slopes, eroded kame phase	112	(1)	Mi	Mellott silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded	188	.1
Ff	Fox loam, 8 to 12 percent slopes	176	.1	Mj	Mellott silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	282	.1
Fg	Fox loam, 8 to 12 percent slopes, eroded	268	.1	Mk	Miami loam, 3 to 8 percent slopes	123	(1)
Fh	Fox loam, 8 to 12 percent slopes, kame phase	83	(1)	Ml	Miami loam, 3 to 8 percent slopes, eroded	129	(1)
Fi	Fox loam, 8 to 12 percent slopes, eroded kame phase	165	.1	Mm	Miami loam, 8 to 12 percent slopes	52	(1)
Fj	Fox loam, 12 to 25 percent slopes	344	.1	Mn	Miami loam, 8 to 12 percent slopes, eroded	154	.1
Fk	Fox loam, 12 to 25 percent slopes, eroded	215	.1	Mo	Miami loam, 12 to 25 percent slopes	46	(1)
Fl	Fox loam, 12 to 25 percent slopes, kame phase	69	(1)	Mp	Miami loam, 12 to 25 percent slopes, eroded	154	.1
Fm	Fox loam, 12 to 25 percent slopes, eroded kame phase	100	(1)	Mq	Miami silt loam, 0 to 3 percent slopes	526	.2
Fn	Fox loam and clay loam, 8 to 12 percent slopes, severely eroded	173	.1	Mr	Miami silt loam, 3 to 8 percent slopes	2,736	.9
Fo	Fox loam and silt loam, 3 to 8 percent slopes, kame phases	195	.1	Ms	Miami silt loam, 3 to 8 percent slopes, eroded	3,038	.9
Fp	Fox silt loam, 0 to 3 percent slopes	981	.3	Mt	Miami silt loam, 8 to 12 percent slopes	189	.1
Fq	Fox silt loam, 3 to 8 percent slopes	249	.1	Mu	Miami silt loam, 8 to 12 percent slopes, eroded	500	.2
Ga	Genesee fine sandy loam, 0 to 4 percent slopes	962	.3				
Gb	Genesee fine sandy loam, high bottom, 0 to 3 percent slopes	210	.1				

[1] Less than 1/20 of 1 percent.

TABLE 5.—*Approximate acreage and proportionate extent of the soils mapped in Tippecanoe County, Ind.*—Continued

Map symbol	Soil	Area	Extent
		Acres	*Percent*
Mv	Miami silt loam, 12 to 25 percent slopes	295	0.1
Mw	Miami silt loam, 12 to 25 percent slopes, eroded	257	.1
Mx	Miami silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	215	.1
My	Millsdale silty clay loam, 0 to 3 percent slopes	211	.1
Mz	Milton silt loam, 2 to 8 percent slopes	194	.1
Mza	Monitor silt loam, 0 to 3 percent slopes	183	.1
Mzb	Montmorenci silt loam, 0 to 3 percent slopes	272	.1
Mzc	Muskingum stony silt loam, 10 to 30 percent slopes	141	(1)
Na	Nineveh loam, 0 to 3 percent slopes	199	.1
Oa	Oaktown loamy fine sand, 3 to 8 percent slopes	1,258	.4
Ob	Oaktown loamy fine sand, 8 to 12 percent slopes	284	.1
Oc	Oaktown loamy fine sand, 12 to 25 percent slopes	82	(1)
Od	Ockley loam, 0 to 3 percent slopes	2,444	.7
Oe	Ockley loam, 3 to 8 percent slopes	257	.1
Of	Ockley loam, 3 to 8 percent slopes, eroded	438	.1
Og	Ockley silt loam, 0 to 3 percent slopes	6,743	2.1
Oh	Ockley silt loam, 3 to 8 percent slopes	464	.1
Oi	Ockley silt loam, 3 to 8 percent slopes, eroded	894	.3
Ok	Octagon silt loam, 3 to 8 percent slopes	537	.2
Ol	Octagon silt loam, 3 to 8 percent slopes, eroded	264	.1
Om	Odell silt loam, 0 to 2 percent slopes	677	.2
On	Otterbein silt loam, 0 to 3 percent slopes	530	.2
Pa	Parr loam, 2 to 5 percent slopes	148	.1
Pb	Parr loam, 2 to 10 percent slopes, eroded	126	(1)
Pc	Parr silt loam, 0 to 2 percent slopes	220	.1
Pd	Parr silt loam, 2 to 5 percent slopes	1,053	.3
Pe	Parr silt loam, 2 to 5 percent slopes, eroded	940	.3
Pf	Parr silt loam, 5 to 8 percent slopes, eroded	241	.1
Pg	Parr silt loam, 8 to 12 percent slopes, eroded	128	(1)
Ph	Parr silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	89	(1)
Pi	Pettit silt loam, 0 to 3 percent slopes	2,318	.7
Ra	Randolph silt loam, 0 to 3 percent slopes	110	(1)
Rb	Raub silt loam, 0 to 2 percent slopes	7,718	2.4
Rc	Riverwash	88	(1)
Rd	Rodman gravelly loam, 25 to 35 percent slopes	2,679	.8
Re	Romney silty clay loam, 0 to 2 percent slopes	4,493	1.4
Rf	Ross loam, 0 to 3 percent slopes	256	.1
Rg	Ross silt loam, 0 to 3 percent slopes	436	.1
Rh	Ross silty clay loam, 0 to 3 percent slopes	633	.2
Ri	Russell loam, 3 to 8 percent slopes	278	.1
Rj	Russell loam, 3 to 8 percent slopes, eroded	462	.1
Rk	Russell loam, 8 to 12 percent slopes, eroded	193	.1
Rl	Russell loam, 12 to 25 percent slopes, eroded	215	.1
Rm and Rla	Russell loam and clay loam, 8 to 12 percent slopes, severely eroded	104	(1)
Rn	Russell silt loam, 0 to 3 percent slopes	7,829	2.4
Ro	Russell silt loam, 3 to 8 percent slopes	14,479	4.5
Rp	Russell silt loam, 3 to 8 percent slopes, eroded	12,974	4.0
Rq	Russell silt loam, 8 to 12 percent slopes	506	.2
Rr	Russell silt loam, 8 to 12 percent slopes, eroded	921	.3
Rs	Russell silt loam, 12 to 25 percent slopes	940	.3
Rt	Russell silt loam, 12 to 25 percent slopes, eroded	431	.1
Ru	Russell silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded	469	.2
Rv	Russell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	1,611	.5
Rw	Russell silt loam and silty clay loam, 12 to 25 percent slopes, severely eroded	285	.1
Sa	Shadeland silt loam, 0 to 2 percent slopes	41	(1)
Sb	Shoals silt loam, 0 to 3 percent slopes	155	.1
Sc	Sidell silt loam, 0 to 2 percent slopes	2,512	.8
Sd	Sidell silt loam, 2 to 5 percent slopes	6,608	2.1
Se	Sidell silt loam, 2 to 5 percent slopes, eroded	3,221	1.0
Sf	Sidell silt loam, 5 to 8 percent slopes	44	(1)
Sg	Sidell silt loam, 5 to 8 percent slopes, eroded	680	.2
Sh	Sidell silt loam, 8 to 12 percent slopes	38	(1)
Si	Sidell silt loam, 8 to 12 percent slopes, eroded	54	(1)
Sj	Sidell silt loam and silty clay loam, 2 to 5 percent slopes, severely eroded	136	(1)
Sk	Sidell silt loam and silty clay loam, 5 to 8 percent slopes, severely eroded	347	.1
Sl	Sidell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	100	(1)
Sm	Sleeth silt loam, 0 to 3 percent slopes	453	.1
Sn	Sloan silt loam, 0 to 3 percent slopes	491	.2
So	Sloan silty clay loam, 0 to 3 percent slopes	393	.1
Ta	Tippecanoe silt loam, 0 to 3 percent slopes	609	.2
Tb	Toronto silt loam, 0 to 3 percent slopes	6,128	1.9
Wa	Warsaw loam, 0 to 3 percent slopes	988	.3
Wb	Warsaw loam, 3 to 8 percent slopes	495	.2
Wc	Warsaw loam, 3 to 8 percent slopes, eroded	165	.1
Wd	Warsaw loam, 3 to 8 percent slopes, kame phase	120	(1)
We	Warsaw loam, 3 to 8 percent slopes, eroded kame phase	221	.1
Wf	Warsaw loam, 8 to 20 percent slopes, eroded	142	(1)
Wg	Warsaw loam, 8 to 12 percent slopes, kame phase	55	(1)
Wh	Warsaw loam, 8 to 12 percent slopes, eroded kame phase	160	.1
Wi	Warsaw loam, 12 to 25 percent slopes, eroded kame phase	145	(1)
Wj	Warsaw silt loam, 0 to 3 percent slopes	940	.3
Wk	Warsaw silt loam, 3 to 8 percent slopes	185	.1
Wl	Warsaw silt loam, 3 to 8 percent slopes, eroded kame phase	247	.1
Wm	Warsaw silt loam, 8 to 12 percent slopes, eroded kame phase	180	.1
Wn	Washtenaw silt loam, 0 to 3 percent slopes	800	.3

[1] Less than 1/20 of 1 percent.

TABLE 5.—*Approximate acreage and proportionate extent of the soils mapped in Tippecanoe County, Ind.*—Continued

Map symbol	Soil	Area	Extent
		Acres	*Percent*
Wo	Wea silt loam, 0 to 3 percent slopes	6,679	2.1
Wp	Wea silt loam, 3 to 8 percent slopes	451	.1
Wq	Wea silt loam, 3 to 8 percent slopes, eroded	338	.1
Wr	Westland loam, 0 to 3 percent slopes	305	.1
Ws	Westland silt loam, 0 to 3 percent slopes	924	.3
Wt	Westland silty clay loam, 0 to 3 percent slopes	3,018	.9
Wu	Wingate silt loam, 0 to 3 percent slopes	2,592	.8
	Pits and quarries [2]	372	.1
	Permanent ponds and streams	2,300	.7
	Intermittent ponds	4	([1])
	Total	320,640	100.0

[1] Less than 1/20 of 1 percent.
[2] Indicated by crossed picks symbol on soil map.

very firm when moist, plastic when wet, and hard when dry; slightly acid to neutral.

28 to 58 inches, mottled gray and yellowish-brown clay loam to silty clay loam; moderate very coarse blocky structure; very firm when moist, plastic when wet, and hard when dry; content of sand and partly weathered rock fragments increases with depth; neutral.

58 inches +, mottled gray and yellowish-brown loam or light clay loam glacial till; calcareous.

The thickness of the first two layers ranges from 10 to about 16 inches. Where this soil grades to Kokomo soils, the surface layer is darker colored, thicker, and higher in organic matter than in the profile described. Some small narrow areas in shallow depressions have a silt loam surface texture, are lighter colored, and are somewhat more acid than normal. The depth to calcareous till varies from 38 to about 65 inches. The depth is less where this soil is associated with the Miami soils than where it is associated with the Russell soils.

Use and management.—More than 95 percent of this soil has been cleared of forest and is either cultivated or in permanent bluegrass pasture. Corn, soybeans, wheat, and oats are the main crops. Meadows are usually seeded to a mixture of grasses and legumes. Alfalfa and clover can be grown without applying lime. Tomatoes, sweet corn, and other special crops are suited to this soil.

Brookston silt loam, 0 to 3 percent slopes (Ba) (Management subgroup 9A).—This soil occurs principally in narrow shallow swales and depressions where considerable material washed from higher land has been deposited. Because of this colluvial material, the surface is slightly acid in reaction, and is lighter colored and lower in organic-matter content than that of other Brookston soils.

The surface soil to depths of 7 to 10 inches is very dark brownish-gray to dark-gray heavy silt loam. It grades into the next layer, which is dark-gray to black silty clay loam. At about 15 inches the subsoil is mottled gray and yellowish-brown silty clay loam. Calcareous mottled yellow and gray till occurs at depths of 3 to 5 feet. Color, texture, thickness, and acidity of the surface soil and subsoil vary somewhat.

Use and management.—Yields are slightly lower than on Brookston silty clay loam, 0 to 3 percent slopes. Less corn is grown, but management practices are otherwise similar.

Carlisle Series

Carlisle muck (Ca) (Management group 10).—Carlisle muck has developed from decomposed wood, grass, and sedges. It occupies permanent marshes and areas that once were ponds, where the constant saturation favored growth of organic matter but restricted its decomposition. These areas are in kettle holes on the upland and terraces, and the lowest spots on bottom lands along streams (fig. 12). The native vegetation was sedges, grasses, rushes, and reeds. More recently, these areas have supported elm, ash, soft maple, aspen, willow, and other swamp timber.

Figure 12.—**Carlisle muck, flooded by early spring rains. In many years, corn is drowned out on areas without adequate artificial drainage.**

Profile of Carlisle muck:

0 to 8 inches, black muck; well decomposed; contains numerous woody fragments; strong fine granular structure; very friable when moist, soft when dry; medium acid to slightly acid.

8 to 20 inches, black muck; well decomposed; contains numerous partly decomposed woody fragments mixed with organic material from reeds and sedges; medium coarse granular structure; slightly compact in lower part; medium acid to slightly acid.

20 to 42 inches +, dark-brown mucky and peaty material that grades to brownish-yellow peat; upper part is more thoroughly decomposed than lower part; layer contains distinguishable roots, twigs, stems, and some woody material.

This organic soil varies in depth, acidity, and degree of decomposition of the woody material. The groundwater level varies through the season. Usually in

drained areas the plow layer is moist and the soil below a depth of 2 feet is saturated. Above the saturated layers, the soil is moderately permeable to roots, air, and water.

A few areas of brown, fibrous, strongly acid peat have been included with this soil. About 13 acres of Wallkill silt loam were mapped with the Carlisle muck. The Wallkill soil consists of 10 to 40 inches of grayish-brown silty material that has been washed in over the muck.

Use and management.—Artificial drainage is necessary to make this soil suitable for crops. Open ditches are the usual means of drainage. The lower lying areas are difficult to drain. Some areas have no suitable drainage outlet.

Most of the drained areas are used for corn. Vegetables are well adapted but are seldom grown. Areas not well enough drained to be cultivated are used mostly for permanent bluegrass pasture. They produce an abundance of forage throughout the growing season.

This soil is rich in nitrogen, but it is very deficient in potassium, and after a few years of cropping it becomes deficient in phosphorus. Heavy fertilization of truck crops is profitable. The principal limitations are the short growing season, the possibility of frost damage, and the need for fertilization and drainage. Small grains tend to lodge.

Chalmers Series

The soils of this extensive series are among the most fertile in the county. They occur in fairly extensive areas and are associated with other fertile soils. Chalmers soils occur in depressions on broad, gently undulating upland till plains in the western part of the county. The parent material was moderately compact, slowly permeable loam to light clay loam glacial till.

These soils developed on wet prairies and in broad, flat swales and depressions. The vegetation was sloughgrass, bluejoint, rushes, and reeds. The plants formed a dense sod and often grew 10 to 12 feet high. The poor natural drainage allowed much of this organic matter to be preserved. Artificial drainage by means of open ditches and tile was necessary to make these soils suitable for cultivation.

The Chalmers series is the poorly to very poorly drained member of the catena that includes the well drained Sidell, the moderately well drained Dana, the imperfectly drained Raub, and the very poorly drained Romney series. The Chalmers series is also the poorly drained to very poorly drained member of the Parr catena.

Chalmers silty clay loam, 0 to 3 percent slopes (Cc) (Management subgroup 9A).—This is an extensive soil that occurs in broad, flat depressions that were once marshes. Clayey material was washed from nearby areas and deposited in these depressions, which were settling basins for glacial melt waters. As a result, shallow beds of sandy and assorted materials lie just above the calcareous glacial till substratum in some places.

Profile in a cultivated area:

0 to 8 inches, very dark gray to black silty clay loam; relatively high in organic matter; moderate coarse granular structure; firm when moist; slightly acid to neutral.

8 to 15 inches, very dark gray to black silty clay loam; faint yellowish-brown mottling in lower part; coarse granular structure in upper part grades to moderate medium angular blocky in lower part; firm when moist, sticky and plastic when wet; slightly acid to neutral.

15 to 22 inches, mottled gray and yellowish-brown silty clay loam or clay loam; moderate coarse angular blocky structure; very firm when moist, plastic when wet; contains dark-gray organic material along the vertical cracks; slightly acid to neutral.

22 to 50 inches, mottled gray and yellowish-brown clay loam to coarse silty clay; contains sand and gravel, which may be in thin, slightly stratified layers; moderate coarse to very coarse angular blocky structure; firm to very firm when moist, plastic when wet; neutral.

50 inches +, mottled gray and brown loam to coarse clay loam glacial till; moderately compact; calcareous.

The combined thickness of the upper two horizons varies from 11 to about 17 inches. These horizons are darker colored, thicker, and higher in organic-matter content where this soil grades to the Romney soil. Silty material eroded from the higher ground has accumulated in some small areas around knolls. In a few seepy areas around hillsides and in the deeper kettle holes, slopes range from 2 to 4 percent. Shallow gullies and some sheet erosion may occur on such areas.

Use and management.—More than 90 percent of this soil is used for crops. Some of the rest is in pasture. Corn and soybeans are the principal crops. Small grains are also grown. This soil has high natural fertility. It is well supplied with organic matter and nitrogen and has a good water supply. Yields of corn are high.

Adequate drainage must be provided to get the maximum use from this soil. In the deeper depressions crops are likely to be drowned out.

Chalmers silt loam, 0 to 3 percent slopes (Cb) (Management subgroup 9A).—This soil occurs principally in narrow belts bordering higher lying areas of Raub, Dana, Sidell, Odell, Corwin, and Parr soils. It is like Chalmers silty clay loam, 0 to 3 percent slopes, in most respects, but the surface soil is slightly lighter colored and a little more acid than the surface soil of the silty clay loam. Thin layers of finer textured colluvial wash have been deposited on the soil in these locations. This soil also occurs in shallow depressions where less water was ponded and less clayey material was deposited than in the areas of Chalmers silty clay loam.

The surface soil of Chalmers silt loam, 0 to 3 percent slopes, is very dark brown silt loam to heavy silt loam, from 6 to 9 inches thick. The subsurface layer is silty clay loam, usually black or very dark gray in color. It is richer in organic matter than the surface layer. Below this is mottled gray and yellow plastic silty clay loam, like that under Chalmers silty clay loam, 0 to 3 percent slopes.

Use and management.—The same crops are grown as on Chalmers silty clay loam, 0 to 3 percent slopes, and yields are about the same.

Cope Series

These soils occur on the broad upland divides in the eastern and central parts of the county, in shallow depressions and swales that were formerly ponded. Many areas are at the heads of drainageways. The natural vegetation was marshgrass and sedges and forest of ash, elm, and maple.

Cope soils are known locally as "gray loam." They are moderately dark colored poorly drained soils of the catena that includes the well-drained Russell soils, the imperfectly drained Fincastle soils, the poorly drained Delmar soil, and the very poorly drained Brookston and Kokomo soils. The Cope soils are not so dark colored or so rich in organic matter as the Brookston soils. This is partly because less organic matter accumulated, and partly because organic matter has been lost through cultivation or diluted by deposits of lighter colored soil material. These soils have been artificially drained to make them suitable for crops.

Cope silt loam, 0 to 3 percent slopes (Cd) (Management subgroup 9A).—This soil occurs in very shallow upland depressions. Usually it is less than 2 feet lower than the associated Fincastle soil.

Profile in a cultivated area:

0 to 8 inches, dark gray to very dark gray silt loam; friable when moist, slightly hard when dry; moderate medium granular structure; medium organic-matter content; slightly acid to medium acid.

8 to 14 inches, grayish-brown to gray friable silt loam to light silty clay loam; firm when moist; moderate coarse granular structure; readily permeable to roots and moisture; medium organic-matter content; slightly acid to medium acid.

14 to 48 inches, mottled gray, yellow, and brown silty clay loam to clay loam; plastic and sticky when wet, hard when dry; breaks into subangular lumps ½ to 1½ inches in diameter; some penetration of dark organic clay along structure faces in upper part of layer; slightly acid to medium acid in upper part, but a gradual change to neutral in the lower part.

48 inches +, mottled gray and yellowish-brown loam to light clay loam glacial till; calcareous.

The thickness of the dark-colored surface layer varies from 7 to about 12 inches. Areas grading into the Brookston soils have thicker and darker colored surface soils. The depth to calcareous till ranges from 38 to about 60 inches. The reaction of the surface soil in some areas is medium acid.

Use and management.—The same crops are grown on this soil as on the associated Brookston and Fincastle soils. Corn yields may be slightly lower than on Brookston silty clay loam, 0 to 3 percent slopes. Fertilizer and lime will improve this soil after it has been properly drained.

Cope silty clay loam, 0 to 3 percent slopes (Ce) (Management subgroup 9A).—This soil occurs in slightly wider and deeper depressions than Cope silt loam, 0 to 3 percent slopes. Erosion is not a problem, because the slopes are usually less than 2 percent.

This soil is associated with Cope silt loam, 0 to 3 percent slopes, and with Brookston soils. Small areas of this soil may be included in mapping units of Brookston silty clay loam, which it closely resembles.

Use and management.—The same crops are grown as on Brookston silty clay loam, 0 to 3 percent slopes. Corn yields are slightly lower, but yields of other crops are about the same. Management requirements are similar to those of Cope silt loam, 0 to 3 percent slopes.

Corwin Series

Corwin silt loam, 0 to 2 percent slopes (Cf) (Management subgroup 6A).—This soil occurs on nearly level relief, on slight rises 1 to 3 feet above the associated Chalmers soils. Surface drainage is slow but adequate. Internal drainage is only moderately good. Other soils in the same catena are the well-drained Parr soils, the imperfectly drained Odell soils, and the very poorly drained Chalmers and Romney soils. The original vegetation was tall prairie grasses.

Profile in a cultivated area:

0 to 8 inches, very dark grayish-brown silt loam; moderate medium granular structure; friable when moist; moderately high organic-matter content; medium acid to slightly acid.

8 to 13 inches, very dark grayish-brown silt loam; moderate coarse granular structure; friable when moist; organic-matter content moderately high; contains a few pebbles; medium acid.

13 to 18 inches, dark-brown or dark yellowish-brown heavy silt loam to silty clay loam; moderate fine subangular blocky structure; firm when moist, slightly hard when dry; medium acid.

18 to 31 inches, mottled gray, brown, and dark yellowish-brown silty clay loam to clay loam; moderate medium to coarse subangular blocky structure; firm when moist, hard when dry; medium acid.

31 to 36 inches, dark-brown to dark yellowish-brown, mottled with grayish-brown and gray, clay loam to silty clay loam; moderate coarse subangular structure; firm when moist, hard when dry; has dark-gray organic material on some of the structure faces; neutral.

36 inches +, brown or dark-brown, mottled with gray, loam to light clay loam till; relatively slow permeability; calcareous.

The depth to mottling ranges from 16 to about 30 inches, and the depth to the calcareous till, from 22 to about 40 inches. Although in some places the soil is smooth on top, it generally contains grit and glacial pebbles throughout. In the extreme northwestern part of the county, the profile contains sand. In a few places where the slopes are steeper than 2 percent, there is danger of erosion if the soil is used for row crops.

Use and management.—All of this highly fertile and nearly level soil is suitable for crops. Artificial drainage is not required, but it would improve the usefulness of the soil during unusually wet seasons. Most of the area is used for corn, soybeans, and oats.

Crane Series

Crane silt loam, 0 to 3 percent slopes (Cg) (Management subgroup 8B).—This is a dark-colored imperfectly drained soil. It occurs principally in the lower parts of broad glacial drainageways. It is on the nearly level old glacial stream terraces that are slightly above the adjoining marshland. The soil developed under grass. The underlying material consists of water-assorted gravel and sand and contains from 10 to 30 percent of free lime carbonate. The ground-water level is high because there are few natural drainage outlets.

The Crane soils are the imperfectly drained members of the catena that includes the well drained Wea soils, the moderately well drained Tippecanoe soils, and the very poorly drained Westland and Abington soils. Most areas of this soil have been drained to some extent, often by artificial drainage of the associated Westland soil.

Profile description:

0 to 8 inches, very dark grayish-brown or very dark brown silt loam; organic-matter content relatively high; moderate medium granular structure; friable when moist; medium acid to slightly acid.
8 to 12 inches, very dark grayish-brown to very dark gray silt loam; usually somewhat darker colored than surface layer; moderate coarse granular structure; friable when moist; medium acid.
12 to 16 inches, dark grayish-brown, slightly mottled with gray or grayish-brown, heavy silt loam; moderate fine subangular structure; slightly firm when moist; medium acid.
16 to 28 inches, mottled yellowish-brown and gray silty clay loam; moderate medium subangular structure; firm when moist, hard when dry; medium acid.
28 to 40 inches, mottled gray, yellowish-brown, and brown silty clay loam to clay loam; contains considerable gravel and sand; weak to moderate coarse subangular blocky structure; firm to very firm when moist, hard when dry; medium acid.
40 to 60 inches, mottled gray and yellowish-brown clay loam; content of gravel and sand increases with depth, and clay content decreases; weak coarse to very coarse subangular blocky structure; firm when moist; slightly acid to neutral.
60 inches +, pale-brown to light brownish-gray loose gravel and sand; usually stratified; slightly to highly calcareous.

Depth to mottling varies from 7 to about 16 inches. Depth to gravel and sand ranges from 42 to about 70 inches. Areas of this soil in the Shawnee Valley contain some interbedded silty material.

Use and management.—This is a fertile soil on level topography. Almost all of it is cultivated. Corn is the most important crop. Some areas should be drained, either by ditches or by tile. Lime is needed for legumes.

Crosby Series

Crosby silt loam, 0 to 3 percent slopes (Ch) (Management subgroup 4A).—This imperfectly drained soil is the light-colored part of the "black-and-clay land"[3] that is typical of central Indiana. Most of it occurs on nearly level to gently undulating till plains. It developed from highly calcareous loam glacial till. Surface runoff is slow, and internal drainage is slow. Artificial drainage is necessary to make this soil suitable for cultivation.

Profile in cultivated areas:

0 to 7 inches, grayish-brown silt loam; weak medium granular structure; friable when moist; low organic-matter content; medium acid to slightly acid.
7 to 10 inches, grayish-brown silt loam; weak thin platy structure; friable when moist; medium acid.
10 to 17 inches, mottled gray and yellowish-brown clay loam to silty clay loam; moderate fine subangular blocky structure; firm when moist; medium acid to strongly acid.
17 to 30 inches, mottled gray and yellowish-brown clay loam to silty clay loam; moderate coarse subangular blocky structure; firm to very firm when moist, hard when dry; medium acid.
30 to 34 inches, dark-brown to brown, mottled with gray and yellowish-brown, heavy clay loam to clay loam; moderate very coarse subangular blocky structure; very firm when moist, plastic when wet; slightly acid to neutral.
34 inches +, mottled gray and yellowish-brown loam to light clay loam glacial till; weak very coarse blocky to weak very coarse platy structure; firm; calcareous.

In undisturbed wooded areas, the uppermost 2 or 3 inches is very dark grayish-brown and relatively high in organic matter. Depth to mottling ranges from 6 to about 16 inches. The depth to calcareous till ranges from 24 to about 40 inches. Areas that are next to Brookston soils have somewhat darker colored surface soils than that in the profile described. A few areas have a considerable amount of fine sand throughout the profile. Large areas that are associated with Fincastle soils have smooth, grit-free surface soils, moderately heavy upper subsoils, and friable gritty lower subsoils. In these areas, the parent material of calcareous till is at depths of 3 to 5 feet.

Use and management.—Most areas of this soil have been drained well enough to permit cultivation, but a few places need more nearly adequate drainage. More than 90 percent of this soil is cultivated or used for bluegrass pasture. Less than 10 percent remains in forest. Corn, soybeans, wheat, and hay are the principal crops.

This soil should be limed, especially for legumes. The organic-matter content should be increased by returning all possible crop residues to the soil. Fertilization, especially with nitrogen and potassium, will improve yields.

Crosby silt loam, 3 to 5 percent slopes, eroded (Ci) (Management subgroup 4A).—This soil is like Crosby silt loam, 0 to 3 percent slopes, except that it is on somewhat steeper slopes and has lost part of its surface soil through erosion. In some places about three-fourths of the original surface layer remains; in other places the present plow layer consists almost entirely of subsoil material.

Use and management.—About 85 percent of this soil has been cleared. Approximately half of this is cultivated, and most of the rest is in pasture. A good vegetative cover is necessary to prevent further erosion. Some of the more severely eroded areas are being returned to forest.

Dana Series

Dana silt loam, 0 to 2 percent slopes (Da) (Management subgroup 6A).—This soil occurs on slight elevations on the nearly level till plain. It developed in the 20- to 40-inch mantle of windblown silt that covers the compact glacial till on the broad divides between streams. It is surrounded by or intricately mixed with the Chalmers and Romney soils. It is also associated with the gently undulating Sidell soils and the nearly level Raub soil.

This soil is the moderately well drained member of the catena which includes the well drained Sidell, the imperfectly drained Raub, and the very poorly drained Chalmers and Romney series. The slight slope provides surface drainage without causing erosion. Most areas

[3] See footnote 2, page 19.

of this soil are less than 3 feet above swales and depressions that once were swampy. Internal drainage is slow, and the water table is high during wet seasons.

The plant cover under which this soil developed was mostly big bluestem, little bluestem, and Indiangrass mixed with goldenrod, asters, and other plants.

Profile in a cultivated area:

0 to 7 inches, very dark brown to black silt loam; moderate fine to medium granular structure; friable when moist, slightly sticky when wet; relatively high organic-matter content; medium acid to slightly acid.

7 to 14 inches, very dark brown to black silt loam; coarse to very coarse granular structure; relatively high organic-matter content; friable when moist, slightly sticky when wet; upper few inches may be slightly compact, probably because a weak plow sole has formed; medium acid.

14 to 20 inches, dark-brown to dark yellowish-brown silty clay loam; moderate fine subangular blocky structure; firm when moist, hard when dry; a few faint gray and brownish-yellow mottles may occur in the lower part; medium acid.

20 to 30 inches, mottled gray, yellowish-brown, and dark yellowish-brown slightly gritty silty clay loam; moderate, medium to coarse, subangular blocky structure; firm when moist, hard when dry; medium acid.

30 to 49 inches, mottled gray and yellowish-brown clay loam; contains more gravel and sand than horizon above; moderate coarse subangular blocky structure; firm when moist, hard when dry; lower 2 or 3 inches darker colored than upper part; medium acid in upper part, gradual transition to neutral in lower part.

49 inches +, light brownish-gray, mottled with brownish-yellow, loam to coarse clay loam glacial till; compact in place; weak very coarse blocky or weak coarse platy structure; calcareous (free lime carbonate content ranges from 15 to 25 percent).

The depth to mottling ranges from about 16 to 30 inches. The depth to calcareous till varies from 42 to about 60 inches. The subsoil is smooth silty clay loam or clay loam, depending on the thickness of the silt material from which the soil developed. The silt itself may be calcareous at depths of 30 inches or more.

Use and management.—This soil is high in fertility but is likely to need nitrogen and phosphorus. It has no serious management problems. All of it can be used for crops, but about 10 percent is used for permanent pasture and miscellaneous uses. Corn, soybeans, oats, wheat, and meadow grasses and legumes are the principal crops.

Delmar Series

Delmar silt loam, 0 to 3 percent slopes (Db) (Management group 5).—This is a poorly drained light-colored soil that occurs on small flat areas or in slight depressions on the gently undulating till plain. It developed in windblown silt that is 18 to 40 inches thick over the glacial till. Carbonates have been leached from the upper 4 to 6 feet of this soil.

Because of the nearly level relief and the compact very slowly permeable subsoil, surface drainage and internal drainage are very slow. Sedges and rushes are common in meadows and pastures. The native vegetation was a water-tolerant forest of beech, maple, elm, red oak, and post oak.

Profile in a cultivated area:

0 to 7 inches, light-gray to grayish-brown silt loam; low in organic matter; weak medium granular structure; friable when moist, soft when dry; many small, hard, rounded iron and manganese concretions on the surface and throughout the horizon; medium acid.

7 to 11 inches, gray silt loam; slightly to moderately mottled with yellowish brown; weak platy to weak coarse granular structure; friable when moist, soft when dry; medium acid to strongly acid.

11 to 17 inches, light-gray to grayish-brown, slightly mottled and stained with yellowish brown, light silty clay loam; moderate fine subangular blocky structure; firm when moist, plastic when wet, hard when dry; medium acid to strongly acid.

17 to 37 inches, mottled gray and yellowish-brown silty clay loam; strong coarse angular blocky to prismatic structure; very firm when moist, plastic when wet, hard when dry; strongly acid.

37 to 60 inches, mottled gray and yellowish-brown clay loam; weak coarse subangular blocky structure; contains considerable sand and small rock fragments; strongly acid in upper part, gradual transition to slightly acid or neutral in lower 2 inches; slightly darker colored in lower part.

60 inches +, mottled brownish-yellow and gray loam till; firm in place; calcareous.

In undisturbed wooded areas the surface 1 to 2 inches is dark gray and higher in organic matter. The horizons vary in thickness.

Use and management.—About 75 percent of this land has been cleared of timber, but only about 65 percent of it is cultivated. Yields are lower than on the associated Fincastle silt loam, 0 to 3 percent slopes, because of poor drainage and low natural fertility. Soybeans, oats, and wheat are somewhat better suited to this soil than corn.

If this soil is cultivated when wet, it puddles easily. When it dries, it forms hard clods that are difficult to break. The soil should be drained, and the organic-matter supply and the fertility should be improved. Mixed grass-legume meadows are more productive than pure stands of legumes because of the acidity of the soil and the poor drainage.

Edwards Series

Edwards muck (Ea) (Management group 10).—This soil is similar to Carlisle muck in color and degree of decomposition, and it formed under the same type of vegetation. It differs from Carlisle muck in having a substratum of light-gray soft marl. The depth to the marl ranges from 12 to 42 inches but is normally about 18 inches. In many places the marl contains shells. The muck above the marl ranges from alkaline to slightly acid.

Use and management.—The crops suited to this soil are the same as are suited to the other muck soils in the county. Potatoes may not grow well on the neutral or alkaline areas, because they develop scab disease. Edwards muck is more deficient in potassium than Carlisle muck.

Eel Series

These moderately well drained soils occur in small stream valleys, in shallow swales, and in old meander channels of the larger streams. They developed from neutral to slightly calcareous sediments deposited by streams. About one-third of the alluvial or bottomland soils of the county belong to this series. The well-drained soils associated with the Eel soils belong to the Genesee and Ross series.

The surface soils are grayish brown, and the subsoils below about 18 to 20 inches are mottled gray and yellowish brown. Originally these soils were densely forested, chiefly with beech, sycamore, soft maple, ash, and elm.

Eel silty clay loam, 0 to 3 percent slopes (Ed) (Management subgroup 11C).—This soil occurs principally in swales and old stream channels on the broader flood plains of the Wabash River. It is normally 1 to 3 feet lower than the associated Genesee soils and is consequently subject to more frequent and prolonged overflow.

In cultivated areas the uppermost 8 inches is grayish-brown friable silty clay loam. Tillage is more difficult than on the associated soils because of the clay content. Hard clods form if this soil is tilled when wet; this frequently happens because this soil dries more slowly than the associated soils.

The subsurface soil is similar to the surface soil in color, but it is slightly more compact. At depths ranging from 15 to 30 inches, the subsurface soil grades to mottled gray and yellowish-brown silty clay loam that extends to depths of 40 inches or more. Twigs, organic debris, or thin lenses of silt and sand may occur throughout the soil.

Use and management.—About four-fifths of this soil has been cleared of forest and used for crops and pasture. Although this soil is as fertile as the associated Genesee soils, it is colder and wetter; consequently, crop growth is slower and yields are less.

This soil is frequently flooded, often late in the spring. Early plantings of corn are often drowned out. Small grains are seldom grown because the crops are so frequently destroyed or damaged by flooding. Near stream banks these soils may require special protection against washouts.

Eel silt loam, 0 to 3 percent slopes (Ec) (Management subgroup 11C).—This is the dominant soil on the bottom lands of the small streams in the timbered part of the county. It occurs in the low back bottoms behind the natural levees and bordering the terraces and uplands. The Genesee soils on the slightly higher natural levees are the principal associated soils.

The surface soil, to depths of 6 or 8 inches, is a grayish-brown friable silt loam. It contains varying but small amounts of sand. The subsurface soil is light-brown or yellowish-brown silt loam; it grades to mottled gray, yellow, and rusty-brown silt loam at depths ranging from 14 to 20 inches. Thin layers of sand, into which twigs, leaves, and other debris have been mixed during floods, are present in the soil. There are no fine-textured or compact layers to restrict penetration by roots and moisture.

Use and management.—The areas of this soil are so narrow and so irregular in shape that two-thirds of the soil has been left in woods or is used only as permanent pasture. Corn is the principal crop. Small grains can be grown in these small stream bottoms because the fields are not flooded as frequently as those on the bottom lands of the large rivers.

Eel loam, 0 to 3 percent slopes (Eb) (Management subgroup 11C).—This soil occurs principally on the bottom lands along the Tippecanoe River and the small tributaries of the Wabash River. The surface soil, to depths of 6 or 8 inches, is grayish-brown loam, relatively high in organic matter. This is underlain by brown or yellowish-brown silt loam. Mottled gray and yellowish-brown loam lies at depths ranging from 15 to about 30 inches. This layer contains varying amounts of sand and occasionally some fine gravel.

Use and management.—About one-fourth of this soil is timbered. About 40 percent is used for pasture. Many of the streams overflow during heavy rains, and the woodland cover prevents changes in the stream courses and protects the soil from flood damage.

Crops and yields on this soil are similar to those on Eel silt loam, 0 to 3 percent slopes. In a few areas, the surface soil is loose fine sandy loam; these areas are less fertile than the typical soil.

Elston Series

These are excessively drained soils on nearly level to undulating terraces. They developed from loamy material overlying slightly acid to slightly alkaline stratified sand, which contains a little interbedded gravel.

The interbedded layers of calcareous gravel on these terraces are unevenly distributed. In some places the deposits of sandy parent material are thin and the gravel is close to the surface. Here the Elston soils are associated with and grade to the Wea and Warsaw soils. In other places, dunes of sand were deposited on the terraces, and the gravelly layers are not present. Elston soils in these places are associated with Hagener loamy fine sand, 2 to 12 percent slopes.

Soils of the Elston series are dark colored and moderately well supplied with organic matter. The original vegetation was prairie grasses, including big bluestem, little bluestem, and Indiangrass, and goldenrod and other forbs.

Elston loam, 0 to 3 percent slopes (Eg) (Management subgroup 7B).—This is the most extensive soil of the Elston series. Slopes are generally less than 1 percent. Because it is nearly level and contains some clay, this soil has less rapid internal drainage and better moisture-supplying capacity than most of the other Elston soils.

Profile in a cultivated area:

0 to 6 inches, very dark grayish-brown loam; weak medium granular structure; friable when moist; medium acid to slightly acid.
6 to 13 inches, dark-brown to very dark grayish-brown loam; moderate coarse granular structure; friable when moist; medium acid.
13 to 24 inches, brown to dark yellowish-brown light sandy clay loam; weak fine subangular blocky structure; slightly firm when moist; medium acid.
24 to 33 inches, dark yellowish-brown to yellowish-brown sandy clay loam; moderate medium to coarse subangular blocky structure; firm when moist, hard when dry; medium acid.
33 to 60 inches, brown or yellowish-brown loam or sandy loam that grades with depth to loamy sand; weak medium subangular blocky structure; friable to very friable when moist; medium acid.
60 to 80 inches +, yellowish-brown to brown stratified sand, clayey sand, and fine gravel; slightly acid to slightly calcareous.

Where timber has encroached on the prairie, the surface soil is lighter colored than normal, and the organic-matter content is lower. Areas that are slightly depressed may be darker colored and have a deeper

surface soil. Where this soil grades to Wea or Warsaw soils, there is considerable gravel in the subsoil, and slightly calcareous gravel occurs at shallower depths than normal.

Use and management.—About 95 percent of this soil is cultivated. Corn, soybeans, small grains, and hay are the principal crops. Wheat is probably the best suited crop. Corn yields depend on the amount and distribution of rainfall, because the soil does not hold moisture well. Oats, if grown, must be seeded early to avoid drought damage. Red clover is likely to be damaged by drought; deep-rooted legumes are better suited to this soil, but they need some extra lime. Fertilizer that is high in potassium improves yields.

Elston loam, 3 to 8 percent slopes (Eh) (Management subgroup 7C).—This soil occurs principally around shallow drainageways and shallow depressions, where relief generally does not exceed 10 feet. The surface layer of this soil is not quite so deep or so dark colored as that of Elston loam, 0 to 3 percent slopes, because forest became established on the prairie areas after this soil began to develop. Slight erosion has also diminished the surface soil. The surface soil contains more gravel than that of Elston loam, 0 to 3 percent slopes.

Use and management.—Measures to reduce runoff and control erosion are important, but they may not be practical for small areas on complex slopes. Long areas that parallel the streams can be tilled on the contour. Yields are about the same as on the nearly level soil. Because of the erosion problem, more of this soil is used for small grains than for soybeans.

Elston loam, 3 to 8 percent slopes, eroded (Ei) (Management subgroup 7D).—This soil has lost a considerable part of its surface layer through erosion. The dark-brown surface soil is only 4 to 8 inches deep over most of the area. On some slopes, spots of the subsoil are exposed. The organic-matter content is lower and the clay content is higher than in uneroded Elston loam, 3 to 8 percent slopes; consequently, this soil absorbs moisture more slowly.

Use and management.—Yields of crops, especially of corn and oats, are lower on this soil than on the uneroded soils. Crop rotation should include 2 years of deep-rooted legumes.

Elston loam, 8 to 15 percent slopes, eroded (Ej) (Management subgroup 7E).—This soil occurs on short slopes along terrace breaks and small streams. Sheet erosion has removed part of the surface soil where the soil has been cultivated. The remaining surface soil is generally 4 to 8 inches deep. Some areas are more seriously eroded, so that the subsoil is exposed at the surface. Water is absorbed more slowly than on uneroded soils, and consequently more water runs off. This soil is much less fertile than others of the series, because so much of the organic matter and of the phosphorus have been washed away.

Use and management.—Three-quarters of the soil is still used for crops. Small grains, hay, and pasture are becoming the more usual crops. Pastures are poor in quality and low in carrying capacity.

To halt erosion, contour tillage and terracing are needed, and a good cover of vegetation should be maintained. Lime and fertilizer should be used to promote growth of the plant cover.

Elston silt loam, silted, 0 to 3 percent slopes (Ek) (Management subgroup 7B).—This soil occurs in numerous small depressions and flats, and is associated principally with the Elston loams. It receives varying amounts of silty colluvial material washed from higher areas. Although runoff water accumulates in these depressions, internal drainage through the underlying sand and gravel is rapid enough to prevent ponding except during very heavy rains.

The dark-brown to black surface soil ranges from 18 to 36 inches in depth. It is normally silt loam, but some spots have a loam texture. It is high in organic matter and above average in fertility because it receives fertile soil material from surrounding areas. The subsoil is brown to yellowish-brown clay loam, which may contain small amounts of gravel. It holds moisture well but is readily permeable to roots and moisture. Below depths of 40 to 60 inches is loose yellowish-brown sand that grades into slightly calcareous sand or gravel at lower depths.

Use and management.—This is the most productive soil of the Elston series. Most of it is cultivated to corn, soybeans, and small grains. This soil supplies enough moisture for high yields. Lime is needed for legumes, and fertilizer is required for all crops. This soil is mixed with other soils so intricately that the capabilities and management needs of other soils largely control the use of this soil.

Elston fine sandy loam, 0 to 3 percent slopes (Ee) (Management subgroup 7B).—This soil occurs on nearly level stream terraces and on the smoother parts of low dunelike ridges where the wind has blown the sand about. The uppermost 12 to 15 inches or more is dark-brown moderately coherent fine sandy loam, which breaks readily into soft crumbs. The subsoil, to a depth of about 28 inches, is dark yellowish-brown loam to sandy clay loam, which breaks into aggregates of irregular sizes and shapes. Extending from 28 inches to 60 inches or more is loose to slightly coherent yellowish-brown loamy fine sand. Beneath this is loose sand that is calcareous in some areas. This soil is medium acid to slightly acid to a depth of 45 inches or more.

Use and management.—More than 90 percent of this soil is cultivated. Corn, soybeans, wheat, and mixed hay are the principal crops. Alfalfa and sweetclover are the legumes most commonly grown for hay and pasture. Management requirements are like those of Elston loam, 0 to 3 percent slopes, but yields are lower. This soil is more deficient in potassium than the Elston loams.

Livestock farming is better suited to this soil than grain farming, because it does not deplete the organic-matter supply so rapidly. It is difficult to damage the soil structure by management practices, and the soil is frequently plowed when wet to improve the structure.

Elston fine sandy loam, 3 to 8 percent slopes (Ef) (Management subgroup 7C).—This soil is like Elston fine sandy loam, 0 to 3 percent slopes, except that it has stronger slopes.

Use and management.—This soil is used in about the same way and produces about the same yields as Elston fine sandy loam, 0 to 3 percent slopes. It may be eroded slightly by the wind on exposed slopes.

Fincastle Series

Fincastle silt loam, 0 to 3 percent slopes (Fc) (Management subgroup 4A).—This light-colored, imperfectly drained soil is one of the most extensive soils in Tippecanoe County. It occurs on broad, gently undulating divides in the eastern part of the county, and on the border of the prairie uplands on both sides of the Wabash River. It developed partly from a shallow covering of silt overlying glacial till that has been leached of lime carbonates to depths of 42 to 60 inches or more.

The Fincastle soil lies between the knolls of Russell soil and the shallow depressions of the dark-colored Cope and Brookston soils. Differences in elevation between these soil series rarely exceed 1 or 2 feet. The Fincastle soil is the imperfectly drained member of the catena that includes the well drained Russell soils, the poorly drained Delmar and Cope soils, and the very poorly drained Brookston and Kokomo soils. The Fincastle series is like the Crosby series, except that the Fincastle has a smooth silty surface soil and upper subsoil that are relatively free of grit and pebbles, is more acid, and has the calcareous till at a greater depth.

Both internal drainage and surface drainage are slow. Artificial drainage is needed for good crop yields. Most areas have been partly drained by laying tile through the swales and depressions. Some of the larger areas need more thorough drainage. The native forest on this soil was beech, sugar maple, elm, sweetgum, white pine, and black oak.

Profile in a cultivated area:

0 to 7 inches, grayish-brown smooth silt loam; weak medium granular structure; friable when moist, soft when dry; organic-matter content is low; medium acid to slightly acid.

7 to 11 inches, grayish-brown smooth silt loam; weak platy or weak coarse granular structure; strongly acid.

11 to 18 inches, mottled gray and yellowish-brown light silty clay loam; moderate fine subangular blocky structure; slightly firm when moist; strongly acid.

18 to 30 inches, mottled gray and yellowish-brown silty clay loam; moderate medium to coarse subangular blocky structure; firm when moist, hard when dry, plastic when wet; contains some sand and small rock fragments in lower part; strongly acid.

30 to 55 inches, mottled gray and yellowish-brown clay loam; moderate coarse to very coarse subangular blocky structure; very firm when moist, hard when dry; strongly acid in upper part, grading to slightly acid in lower part; lower 2 to 4 inches of material is darker than that above.

55 inches +, yellowish-brown, mottled with gray, loam glacial till; compact in place; calcareous.

The depth to mottling ranges from 7 to about 17 inches, and the depth to calcareous till ranges from 42 to 60 inches or more.

Where this soil grades to Cope or Brookston soils, the surface is somewhat darker colored and less acid than typical. Level areas that are on broad divides and grade to Delmar soils have gray surface soils and compact, relatively impervious subsoils. In some places the soil may be smooth and free of grit to depths of 36 inches or more. Elsewhere, the surface soil contains grit and sand, so that the soil resembles the Crosby soils. Several small areas of this soil near Lafayette could be classified as loam.

Use and management.—Nearly all of this soil has been cleared and used for crops or pasture. Corn, wheat, oats, soybeans, and hay are the most common crops. This soil can be effectively managed by adding lime, organic matter, and fertilizer, and by improving the drainage where needed.

Fox Series

The soils of this series are locally called "gravelly bench land." Underlying materials are deposits of calcareous sand and gravel at depths of 24 to 42 inches. These soils occur mostly on the terraces above the larger streams. These terraces were the flood plains when these streams carried melt waters from nearby ice sheets during glacial periods. These rivers and creeks now contain much less water, and the present channels and flood plains are at lower levels.

The terraces rise in a series of steps. Relief varies from the nearly level on the terrace tops to steep on the terrace breaks or escarpments. The Fox soils lie 5 to 10 feet or more above the bottom-land, or alluvial, soils. The higher terraces that consist of Ockley soils are 50 to 100 feet above the Fox soils. The soils of the till plains are 10 to 30 feet above the Ockley soils; they belong to the Russell catena.

The Fox series is the well drained member of the catena that includes the imperfectly drained Homer series and the very poorly drained Westland and Abington series. Fox soils developed under a mixed forest cover, most of which has since been cleared. The trees were chiefly black oak, red oak, sugar maple, walnut, hackberry, and ash.

The kame phases of the Fox series developed from calcareous gravel and sand that was deposited on knolls and winding ridges on the till plains of the eastern part of the county. They occur mostly on hillsides that are generally irregular and somewhat steeper than the till plain. Runoff is rapid, and the soils are likely to erode if cultivated. Internal drainage is moderately rapid because the underlying material is readily permeable. The native forest was mostly white oak, red oak, hickory, walnut, maple, and elm.

Fox loam, 0 to 3 percent slopes (Fb) (Management subgroup 2A).—Profile in a cultivated area:

0 to 8 inches, brown to grayish-brown loam; weak medium granular structure; friable when moist, soft when dry; low organic-matter content; medium acid to slightly acid.

8 to 12 inches, yellowish-brown to brown loam; moderate fine subangular blocky to weak coarse platy structure; friable when moist; medium acid.

12 to 18 inches, dark yellowish-brown to dark-brown light clay loam; moderate fine subangular blocky structure; slightly firm when moist, hard when dry; contains variable but usually small amounts of gravel; medium acid.

18 to 36 inches, brown to reddish-brown clay loam to gravelly clay loam; moderate coarse to very coarse subangular blocky structure; firm to very firm when moist, hard when dry; medium acid.

36 to 40 inches, dark brown to very dark brown gravelly or sandy clay loam; weak very coarse blocky structure; very firm when moist, plastic when wet, hard when dry; neutral; tongues of this layer extend into the underlying material.

40 inches +, pale-brown or light brownish-gray, loose, stratified gravel and sand; calcareous.

In undisturbed wooded areas the uppermost 2 to 3 inches is very dark grayish brown and is relatively high in organic matter.

The depth to loose gravel and sand ranges from 30 to 44 inches. The proportion of gravel in the soil and in the underlying material varies considerably. Occasionally considerable gravel is present on or near the surface.

Areas of Fox loam that border Warsaw soils are darker colored and higher in organic matter than others of the Fox series. The dark-brown layer just above the limy gravel is from 1 inch to several inches in thickness. A few small areas mapped as Fox loam are actually Fox fine sandy loam.

Use and management.—The crops most commonly grown on this soil are corn, soybeans, wheat, and mixed hay. Since lack of moisture is the factor that limits yields, management should be directed toward improving the moisture-holding capacity of the soil. Lime and fertilizer improve yields. Irrigation would benefit crops, especially corn.

Fox loam, 3 to 8 percent slopes (Fc) (Management subgroup 2B).—This soil occurs mostly on short slopes around drainageways and above terrace breaks or escarpments. Surface runoff is rapid enough so that the soil is likely to erode if it is improperly cultivated. This soil is similar to Fox loam, 0 to 3 percent slopes, except that much of it is slightly eroded, and small areas have lost considerable surface soil.

Use and management.—About two-thirds of this soil is cropland, and one-third is used for timber and permanent pasture. Most of the areas are long and narrow and can be cultivated around the slope or on the contour. A few areas around depressions and kettle holes cannot be tilled on the contour because the slopes are irregular and slant in several directions. Most farmers control erosion by growing more meadow crops than row crops in the rotations. This soil is well suited to alfalfa. Yields are about the same as on Fox loam, 0 to 3 percent slopes.

Fox loam, 3 to 8 percent slopes, eroded (Fd) (Management subgroup 2C).—This soil occurs in small areas around drainageways where the slopes are a little steeper than in surrounding areas. About one-third of this soil has been moderately to severely eroded. Most of the areas still have from 3 to 7 inches of surface soil, but in the most severely eroded spots little or none of the original surface layer remains. These spots are harder to work, they absorb moisture more slowly, and they hold less moisture for crops.

Use and management.—This soil is used as intensively as Fox loam, 0 to 3 percent slopes. No erosion control practices have been followed; consequently the soil has eroded to such an extent that yields of all crops have been greatly reduced. Meadows are generally weedy and the stands are thin. Management practices that will control erosion, increase the supply of organic matter, increase the moisture supply, and build up fertility are needed.

Fox loam, 8 to 12 percent slopes (Ff) (Management subgroup 2D).—This soil occurs in long, narrow strips around heads of drainageways and above terrace breaks. Most of it is on the escarpments of low terraces, in association with other Fox soils. Some is on the escarpments of higher terraces and is associated with the Ockley soils. This soil is shallower over gravel than Fox loam, 0 to 3 percent slopes.

The areas that are associated with Ockley soils have some of the characteristics of that series. In these areas, the surface texture ranges from silt loam to loam, the soil is deeper than the typical Fox loam, and the subsoil contains more clay and retains moisture better.

Use and management.—If this soil is cultivated it is very likely to erode. It is not seriously eroded because it has been used mostly for timber and pasture. If it is cultivated, tillage should be on the contour and the rotation should consist mostly of small grains and hay crops. However, the use of this soil may be controlled by the use of the associated soils.

Fox loam, 8 to 12 percent slopes, eroded (Fg) (Management subgroup 2D).—Nearly half of this soil is moderately to severely eroded as a result of cultivation on slopes that are better suited to permanent pasture. Many small areas are on terrace breaks that have been cultivated.

The soil is like Fox loam, 0 to 3 percent slopes, except that it is steeper and has lost from one-third to three-quarters of its surface soil. In most places the surface layer is only 3 to 7 inches thick, and in many small areas the reddish-brown subsoil is exposed.

Use and management.—Most of this soil has been cleared of timber and used for crops or permanent pasture. Most of it occurs in small areas within fields of Fox loam, 3 to 8 percent slopes, and is cropped as intensively as that soil. Crop yields are low and are still declining because of erosion and the consequent loss of organic matter, decline in fertility, and reduction of water-holding capacity. Management practices that will control erosion and build up fertility are needed. Corn should not be grown on this soil unless special conservation measures are applied.

Fox loam and clay loam, 8 to 12 percent slopes, severely eroded (Fn) (Management subgroup 2D).—This soil has lost nearly all of its surface layer and some of its subsoil through erosion. The present plow layer ranges in texture from heavy loam like the original surface soil to clay loam like the subsoil. In a few very severely eroded spots, the loose gravel and sand of the substratum are exposed.

Use and management.—Most of this soil has been cultivated in the past, although it is better suited to permanent pasture and timber. Because crop yields are low, most of it is now idle or has been returned to permanent pasture. Under contour tillage, areas that are not too seriously eroded may be used in a 4-year rotation consisting of 1 year of wheat and 3 years of alfalfa and bromegrass.

Fox loam, 12 to 25 percent slopes (Fj) (Management subgroup 2E).—This soil occurs on the breaks of high terraces and steep slopes. It contains more gravel throughout than Fox loam, 0 to 3 percent slopes, and it holds less moisture.

Areas of this soil that are next to Ockley soils are somewhat deeper than is typical and they hold more moisture. On the steeper slopes this soil grades to,

and may include small areas of Rodman gravelly loam.

Use and management.—About equal acreages of this soil are used for forest, permanent pasture, and crops. Permanent pasture and forest are its best uses. When it is cultivated, crop yields are low and erosion is a serious hazard. Some small areas are cultivated because they occur within fields of soils better suited to crops.

Fox loam, 12 to 25 percent slopes, eroded (Fk) (Management subgroup 2E).—This soil occurs on the steep edges of the Fox and Ockley terraces. It is like Fox loam, 12 to 25 percent slopes, except for the effects of erosion. The present surface layer consists partly or entirely of subsoil material.

Use and management.—Pasture and timber cover about 60 percent of this soil. The rest is cropped to corn, soybeans, small grains, and hay. Crop yields are low, and they are decreasing as the erosion damage becomes more serious.

This soil is primarily suited to permanent pasture and timber. The most severely eroded parts of it should be reforested. The rest should be used for permanent pasture.

Fox silt loam, 0 to 3 percent slopes (Fp) (Management subgroup 2A).—This soil is on nearly level to slightly undulating terraces, which are usually less than 10 feet above the flood plains. The subsoil is thicker than that of Fox loam, 0 to 3 percent slopes, contains more clay, and retains moisture better.

In cultivated areas, the surface soil to a depth of 10 inches is brown to grayish-brown gritty silt loam, relatively low in organic matter. It has a distinct reddish or brownish color when moist. This surface soil is granular and easily worked, but hard clods form readily if the soil is trampled by stock or tilled when wet.

The subsoil to a depth of about 32 inches is silty clay loam to clay loam. The content of gravel increases with depth. Both the surface soil and the subsoil are medium acid in reaction. From about 32 to 40 inches there is a layer of dark-brown, plastic, sticky gravelly clay loam that is neutral in reaction. Loose calcareous gravel and sand lie directly under this dark sticky layer. The color and texture of the surface soil may vary somewhat. The depth to the calcareous gravel and sand ranges from 30 to about 44 inches.

Use and management.—Most of this soil has been cleared for cultivation. It is managed in about the same way as Fox loam, 0 to 3 percent slopes, but because it has somewhat better moisture-holding capacity, it produces better yields. Corn, soybeans, wheat, and hay are the most common crops. Meadows are commonly planted to mixtures of red clover, alsike clover, timothy, and alfalfa.

Fox silt loam, 3 to 8 percent slopes (Fq) (Management subgroup 2B).—This soil is like Fox silt loam, 0 to 3 percent slopes, except for slope. It occurs around the heads of drainageways, on gentle slopes above low terrace breaks, and around small depressions or kettle holes in the terraces. Most areas are within fields of other Fox soils.

When this soil is cultivated, much of the rainfall runs off, and the soil is likely to erode. Erosion may do serious damage on the steeper slopes.

Use and management.—This soil is used less for crops than the Fox silt loam, 0 to 3 percent slopes. Most areas are so small that their use is determined by the uses of surrounding soils. Corn, soybeans, wheat, and hay are the usual crops. If tillage is on the contour, this soil will probably not erode seriously.

Fox loam and silt loam, 3 to 8 percent slopes, kame phases (Fo) (Management subgroup 2B).—These soils occur mostly on the tops of knolls and ridges and on the gently sloping hillsides (fig. 13). The profile characteristics are like those of Fox loam, 0 to 3 percent slopes.

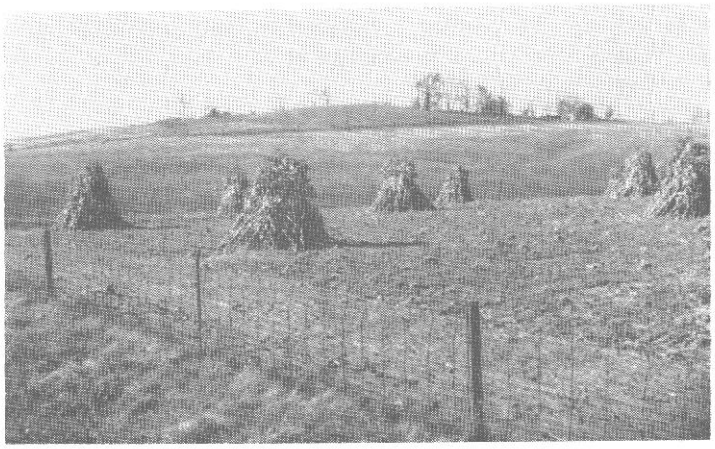


Figure 13.—**Fox loam, kame phase, on a gravelly knoll rising about 40 feet above the till plain.**

In the prairie region, the surface soils are usually slightly darker colored than is typical. Some of the areas associated with the Russell catena of soils have a silt loam texture, but most of the areas associated with the Miami catena have a loam texture. Gravel and sand generally occur at depths of 30 to 40 inches in the areas associated with the Miami soils. Where these soils are associated with soils of the Russell catena, the depth to loose gravel ranges up to 54 inches or more; in such places these soils are more nearly like Ockley soils. The gravel deposits are thin or discontinuous in some places. In these places, especially on the foot slopes of ridges and knolls, the mapping unit includes small areas of Miami or Russell soils.

Use and management.—Most of the acreage has been cleared and cultivated, but only about half of it is now cropped. Corn, beans, wheat, and hay are the most common crops. Yields are declining, and much of the area is now idle or has a weedy pasture cover. The moisture-supplying capacity is limited and erosion is likely. These soils are better suited to small grains and alfalfa than to cultivated crops. Manure and fertilizer should be used to supply organic matter and nitrogen. The slopes are irregular, but contour tillage should be followed whenever possible.

Fox loam, 3 to 8 percent slopes, eroded kame phase (Fe) (Management subgroup 2C).—This soil is similar to the uneroded Fox loam, 3 to 8 percent slopes, kame phase, which is included in the preceding mapping unit (Fox loam and silt loam, 3 to 8 percent, kame phases). However, it has lost part of its surface soil

by erosion. Normally the light-brown surface soil ranges from 3 to 8 inches in depth, but some areas are only slightly eroded and others are so severely eroded that the reddish-brown subsoil is exposed. Gravel and sand are common, on the surface and through the soil, because much of the finer textured material has been washed away. This lost material included most of the original supplies of organic matter, nitrogen, and phosphorus.

Use and management.—Three-quarters of this soil is cultivated, mostly to corn and wheat. Yields have declined according to the amount of erosion that has occurred. Contour tillage should be practiced to control erosion. The proportion of row crops should be reduced and the proportion of small grains and hay crops increased, so as to build up the organic-matter content and improve the moisture-absorbing capacity of the soil.

Fox loam, 8 to 12 percent slopes, kame phase (Fh) (Management subgroup 2D).—This soil occurs chiefly on the tops of small knolls and narrow ridges and along the upper slopes of larger ridges. It is like Fox loam, 0 to 3 percent slopes, except that the slopes are steeper, the layers are somewhat thinner, and the depth to loose gravel and sand is somewhat less. Because of the strong slopes, much of the rainfall runs off the soil. This reduces the moisture available for crops and increases the danger of erosion.

Use and management.—Most of this soil is in permanent pasture or timber. Except for these soil-conserving uses, this soil would be more severely eroded.

Fox loam, 8 to 12 percent slopes, eroded kame phase (Fi) (Management subgroup 2D).—This soil occurs on the sides of gravelly knolls and ridges. Surface drainage is very rapid, and consequently much of the surface soil has been lost through erosion. The light-brown surface soil ranges from 3 to 7 inches deep. Considerable gravel and sand is present in the soil and on top of it. From one-third to nearly all of the present plow layer consists of subsoil material. The texture of the present surface soil varies from silt loam to loam. Depth to the loose gravel and sand varies.

Use and management.—Most of this soil has been cleared and cultivated at some time. Only about half of it is now used for crops. Because of the erosion hazard, small grains and hay are more common crops than corn. About one-third of this soil is used for permanent pastures, but the quality of the pasture is poor and the carrying capacity low.

This soil holds so little moisture and erodes so easily that it is suited only to long-term meadow, pasture, or forestry. If it is cropped, contour tillage is essential. Permanent pastures should be renovated to increase the carrying capacity. The most severely eroded areas should be returned to forest.

Fox loam, 12 to 25 percent slopes, kame phase (Fl) (Management subgroup 2E).—This soil is on the steeper parts of the gravelly knolls and ridges. The light-brown surface layer is 10 to 12 inches deep. It is generally more gravelly and sandy than the surface layers of the more gently sloping Fox soils, and the subsoil contains less clay. Loose gray gravel usually occurs at depths of 3 feet or less. On the steepest slopes the gravel may be at depths of only 12 to 18 inches.

Use and management.—Unless this soil has a thick cover of vegetation it is likely to erode. It is better suited to timber, permanent pasture, and hay crops, especially alfalfa, than to grain crops.

Fox loam, 12 to 25 percent slopes, eroded kame phase (Fm) (Management subgroup 2E).—The cleared and cultivated parts of the steeper slopes of the gravelly knolls and ridges are in this mapping unit. The surface layer varies considerably in depth as a result of erosion. In some areas only a few inches of soil have been removed—in others the original surface soil is entirely gone. Small gullies have formed in some places.

Use and management.—More than half of this soil has been cleared for crops or pasture. Corn, hay, and pasture are the most common crops. Permanent pastures have a low carrying capacity because the soil does not hold much moisture for plants.

This soil should be used only for pasture or timber. Drought-resistant legumes and grasses, such as alfalfa, Ladino clover, and bromegrass, should be seeded in new or renovated pastures.

Genesee Series

These are neutral to mildly alkaline well-drained alluvial soils. They developed from glacial drift washed from the uplands and terraces. Soils of this series occupy the bottom lands of all the larger streams of the county and the natural levees along the small streams. They are associated with the moderately well drained Eel soils of the shallow swales and old meander channels, the imperfectly drained Shoals soils in the deeper swales and abandoned stream channels, and the dark-colored, well-drained Ross soils on high bottoms in the lower stream valleys.

From November to June, the bottom lands of the streams of Tippecanoe County are frequently flooded. Most of the floods occur during the winter months. As new material is deposited, the texture and other characteristics of the bottom-land soils change—sometimes radically during one flood. These changes depend primarily on the position of the soil, its exposure to the currents, and the speed and carrying power of the water. Usually the resulting soils form definite patterns in the bottoms. Sandy types such as Riverwash, Genesee fine sandy loam, and Genesee loam usually develop on natural levees near the stream. The heavier soils, such as Genesee silty clay loam, are likely to occur in the back bottoms. During floods, new channels may be cut through unprotected stream banks. Scouring by floods that cover the back bottoms may remove surface soil instead of depositing material.

The use of this land is governed primarily by the flood hazard. Timber has been left along the larger streams to protect the banks and to prevent changes in the stream courses. Originally all of these bottoms were covered by a dense forest of sycamore, soft maple, elm, ash, cottonwood, and tulip trees. Most of this forest has now been cleared.

Floods occur nearly every winter and about every third summer. They destroy many crops and make it impossible to use systematic crop rotations. Corn and soybeans are popular crops because they can be planted during the summer and harvested early in the fall,

when floods are less likely. Wheat, alfalfa, red clover, and other crops that stand over the winter can be grown only on the higher natural levees from which flood waters recede quickly.

Some of the Genesee soils are on higher levels and are seldom flooded. After these soils had formed, the stream changed its course or cut its channel deep enough so that these soils were no longer flooded every year. These soils are mapped as high-bottom phases. Crops on these soils are safer from floods, but the soils are not so fertile as those that are flooded because they do not receive deposits of rich alluvium every year. They have undergone some soil development since the materials were deposited.

Genesee silt loam, 0 to 4 percent slopes (Ge) (Management subgroup 11A).—Most of this soil is in the Wabash River Valley. Cropping is hazardous because of the frequent floods, many of which occur during the growing season.

Profile in a cultivated area:

0 to 8 inches, yellowish-brown to brown silt loam; weak fine to medium granular structure; friable when moist; organic-matter content medium; neutral to calcareous.
8 to 36 inches, yellowish-brown silt loam; weak coarse granular structure; friable when moist; contains thin lenses or layers of sandy material; neutral to calcareous.
36 inches +, brownish-yellow silt loam, with thin strata of sand, loam, silty clay loam, and an occasional thin gravelly layer; friable; neutral to calcareous.

In wooded areas or old pasture areas the uppermost few inches may be slightly darker colored and richer in organic matter. Partly decomposed twigs, leaves, and other debris have been deposited throughout the profile.

Use and management.—This is the most productive and most easily managed of the Genesee soils. Corn is the principal crop because it is less likely to be drowned out. More than half of the area is planted to corn each year. Soybeans are also suited to this soil. Small grains yield little and often are drowned out. Alfalfa and clover give excellent yields, but are seldom grown because of the flood hazard. Woodlands protect stream banks and prevent washouts in low areas on the bottom lands of the larger streams. The small and irregular-shaped fields in the narrow bottoms of tributary streams are usually kept in woods or pasture because of the difficulty of using machinery.

If possible, levees should be built to protect this fertile soil against floods. Nitrogen can be applied to assure maximum yields of corn.

Genesee silt loam, high bottom, 0 to 4 percent slopes (Gf) (Management subgroup 11B).—This soil lies 2 to 5 feet higher than the first bottoms. The water drains off it readily after floods. The soil is flooded less frequently than those on the bottoms, and little fresh alluvium is deposited on it. The soil layers are like those of Genesee silt loam, 0 to 4 percent slopes. A few areas are underlain by assorted gravel and sand below a depth of 3 feet.

The soil is slightly acid to mildly alkaline. The subsoil shows evidence of some soil development in a few areas—the upper part is a silty clay loam of weak blocky structure. This partly developed soil is slightly acid to medium acid in the surface soil and the upper subsoil.

Use and management.—Nearly all of this soil is cultivated. Less than 10 percent is in pasture or woods. Corn and soybeans are the principal crops. Some oats, wheat, and alfalfa are also grown.

Genesee silty clay loam, 0 to 4 percent slopes (Gg) (Management subgroup 11A).—The largest areas of this soil are in the back bottoms of the Wabash River. The relief is nearly level. The soil occurs in slightly depressed swales and in gently undulating areas traversed by old meander channels of the river. Although this soil is frequently flooded, it receives very little fresh alluvium.

In cultivated areas, the surface soil to a depth of 10 inches is dark grayish-brown friable silty clay loam. This surface layer dries out quickly and becomes so hard that it is difficult to break. Below this surface soil is a brown to yellowish-brown moderately compact silty clay loam, which grades into similar material that is yellowish-brown in color. A few thin strata of silty or loamy material are present in the subsoil.

Use and management.—Most of the soil is used for corn nearly every year. A small part is used for pasture or timber. Soybeans, oats, wheat, and alfalfa are only minor crops.

Careful tillage is required to keep this soil in good physical condition. If possible, levees should be built to protect the fields from floods.

Genesee silty clay loam, high bottom, 0 to 3 percent slopes (Gh) (Management subgroup 11B).—This soil occurs on slightly elevated, very gently sloping to level natural levees that border old meander channels of the Wabash River. The soil is like Genesee silty clay loam, 0 to 4 percent slopes, except that it occurs at slightly higher elevations. Tilth is very poor.

Use and management.—Nearly half of this soil is used for permanent pasture. This soil is less intensively farmed than Genesee silty clay loam, 0 to 4 percent slopes, but systematic rotation of crops is more common. Corn, beans, oats, and alfalfa are the principal crops.

Genesee loam, 0 to 4 percent slopes (Gc) (Management subgroup 11A).—This soil occurs on natural levees along all the larger streams, but chiefly along the Wildcat Creek and Tippecanoe River bottoms. In cultivated areas the surface soil, to a depth of 10 inches, is grayish-brown to dark grayish-brown friable granular loam. The color varies somewhat; it is lighter near the stream where more fresh material is deposited. Beneath the plow layer is yellowish-brown friable loam that contains thin layers of sand, leaves, twigs, and other debris. The amount of sand and its distribution through the soil differ, depending on when it was deposited.

Use and management.—Although this soil is nearly as productive as Genesee silt loam, 0 to 4 percent slopes, it is used much less intensively. About 40 percent is cropped, principally to corn. Small grains and alfalfa can be grown with fewer losses from flooding than on some of the other Genesee soils.

Because of the need to protect stream banks against washouts, about one-third of the soil has been kept in timber. A large part is used for permanent pasture, chiefly in the Wildcat Creek bottoms where flash floods occur frequently.

Genesee loam, high bottom, 0 to 3 percent slopes (Gd) (Management subgroup 11B).—This soil is much like Genesee loam, 0 to 4 percent slopes. However, because it occurs 2 to 5 feet above the rest of the flood plain, it is less likely to be flooded. Some areas that are slightly darker colored than normal resemble Ross loam, 0 to 3 percent slopes. In a few places this soil is underlain by gravel and sand at depths of 3 or 4 feet.

Use and management.—This soil is more intensively used than Genesee loam, 0 to 4 percent slopes. Rotations that include fall-seeded crops can be used because there is little danger of overflow. One-third of this soil is planted to corn, and half of it is planted to wheat, soybeans, and alfalfa in rotation with corn. Good management is required to maintain productivity because the fertility is not renewed by fresh deposits of alluvium such as those many other bottom-land soils receive yearly.

Genesee fine sandy loam, 0 to 4 percent slopes (Ga) (Management subgroup 11A).—This soil occurs on natural stream levees of Wildcat Creek and the Tippecanoe and Wabash Rivers, and on deposits from washouts in the Wabash River bottoms.

In cultivated fields the surface soil to a depth of 10 inches is grayish-brown to pale-brown fine sandy loam. This grades to yellowish-brown fine sandy loam that contains thin layers of sandy loam, loam, and fine sand. The depth of this sandy material is normally 3 feet or more, but it is extremely variable because the changing currents deposited more material in some places than in others. In some places gravel is mixed with the sand; in others thin strata of loamy or silty material occur. Small shells are mixed through the deposits, which are usually mildly alkaline or calcareous. The sandy material is moderately coherent and has fair moisture-supplying capacity. Where the sand is deep, crops like corn may be damaged by droughts.

Use and management.—Much of this soil is kept in woods and pastures for erosion control. Because its fertility is only moderate and its moisture supply is limited, it is not intensively used. About 40 percent is used for crops. Corn is the most common crop; soybeans, wheat, and alfalfa are also grown. Alfalfa is well suited to this soil and is probably the best crop for it. Some watermelons and cantaloups are grown.

Genesee fine sandy loam, high bottom, 0 to 3 percent slopes (Gb) (Management subgroup 11B).—Most of this soil occurs on the flood plains of the larger streams, usually as natural levees along old meander channels. It is associated with and similar to Genesee fine sandy loam, 0 to 4 percent slopes. However, it occupies slightly higher positions and is less likely to be calcareous.

Use and management.—This soil is more intensively used than Genesee fine sandy loam, 0 to 4 percent slopes, and systematic crop rotations are more generally followed. About two-thirds of this soil is used for crops, principally corn, oats, wheat, and alfalfa. Management practices that will increase fertility, add organic matter, and conserve moisture are needed. Fertilizer should be added. Alfalfa especially needs potash fertilizer. If possible, corn should be irrigated.

Glenhall Series

Glenhall silt loam, 0 to 3 percent slopes (Gi) (Management subgroup 1A).—This moderately well drained dark-brown soil is associated with the Westland and Abington soils, but it occurs at slightly higher elevations. It developed on the prairie border, under a forest of oak and hickory. The deep, dark-colored surface layer shows that this soil began to develop under grass, which was later replaced by forest vegetation.

The underlying material consists of gravel and sand deposited by water. This material is usually leached of free lime to depths of 42 to 70 inches. In some areas the soil is smooth and grit-free, so that it resembles a mantle of wind-deposited silt.

Profile in a cultivated area:

0 to 7 inches, dark-brown to very dark grayish-brown silt loam; organic-matter content relatively high; weak medium granular structure; friable when moist, soft when dry; medium acid to slightly acid.
7 to 12 inches, brown to dark grayish-brown silt loam; moderate coarse granular to weak platy structure; friable when moist; medium acid.
12 to 20 inches, brown to dark yellowish-brown silty clay loam; moderate fine subangular blocky structure; firm when moist, hard when dry; medium acid.
20 to 36 inches, mottled gray and yellowish-brown clay loam to silty clay loam; moderate medium to coarse subangular blocky structure; firm when moist, plastic when wet, hard when dry; gravel content variable; medium acid.
36 to 50 inches, mottled gray and yellowish-brown sandy clay loam, gravelly clay loam, or heavy loam; weak coarse blocky structure; firm when moist; contains considerable gravel and sand; medium acid in upper part, but gradual change to slightly acid or neutral in the lower part.
50 inches +, light yellowish-brown or grayish-brown stratified loose sand and fine gravel; calcareous.

Since this soil grades to both the darker colored prairie soils and the lighter colored forest soils, the surface soil varies in thickness, color, and organic-matter content. Very slight differences in elevation above the nearby marshland soils may affect the internal drainage of this soil. Depth to the mottling that indicates restricted drainage varies from 16 to about 30 inches.

Use and management.—Corn, soybeans, and oats are the chief crops. Yields are about the same as on the associated Longlois and Monitor soils. Most of this soil is drained artificially by means of open ditches in the adjoining low ground. Lime should be added so that legumes like alfalfa and sweetclover can be grown.

Hagener Series

Hagener loamy fine sand, 2 to 12 percent slopes (Ha) (Management group 3).—This soil developed from medium acid to slightly acid sandy material that has been reworked and stratified by wind action. It occurs on low dune ridges, usually in association with lower lying Elston soils. The topography is irregular. Slopes range from nearly level to moderately steep. Relief is 5 to 15 feet. The native vegetation consisted of big bluestem, little bluestem, and other prairie grasses, and sunflowers and other flowering plants.

Profile in a cultivated area:

0 to 12 inches, very dark brown loamy fine sand; relatively high in organic matter; very weak medium granular

structure; nearly loose when moist; medium acid to slightly acid.
12 to 18 inches, dark-brown to dark yellowish-brown loamy fine sand; lower in organic matter than horizon above; very weak coarse granular structure; very friable to nearly loose when moist; medium acid.
18 to 30 inches, yellowish-brown loamy fine sand to light fine sandy loam; the fine sandy loam often occurs as thin discontinuous bands, separated by layers of somewhat lighter colored loamy fine sand; very weak coarse subangular blocky structure; medium acid.
30 to 55 inches +, yellowish-brown to brownish-yellow loamy fine sand to fine sand; loose; medium acid to slightly acid; below a depth of 55 inches the material may be stratified fine sand that includes thin layers of loam and sandy clay loam.

The horizons vary in color and depth. The wind-assorted sand is from 3 to 8 feet thick over water-deposited material. Small areas of steep soil are included in this unit.

The color and thickness of the surface layer vary from one place to another, partly because wind erosion has removed sand from exposed slopes and partly because forest encroached on parts of the prairie after the soil started to develop.

Use and management.—More than three-quarters of this soil is used for crops. Corn, soybeans, wheat, and hay are the principal crops. Yields are low because of the low fertility and the limited moisture supply. Corn yields vary widely, depending on the amount of rainfall. Soybeans and fall-seeded small grains can utilize the available moisture more effectively than corn. Deep-rooted legumes such as alfalfa and sweetclover are the best hay and pasture plants for this soil.

Hennepin Series

Hennepin loam, 25 to 50 percent slopes (Hb) (Management subgroup 1H).—This shallow, dark-colored, neutral soil of the uplands occurs on the very steep slopes bordering the deeply entrenched valleys of the Wabash and Tippecanoe Rivers and Wild Cat Creek. It is associated with soils of both the Miami and Russell catenas. Elevations vary as much as 100 feet within a distance of one-eighth of a mile in the deep valleys. Surface drainage is very rapid. Erosion is severe if the native timber is cleared, or if the woods are overgrazed so that the natural ground cover is destroyed.

The original forest consisted of oak, hickory, ash, maple, and walnut. Under forest, the soil has a thin mat of well-decomposed organic matter, neutral in reaction, that overlies the mineral soil. The surface layer, a very dark grayish-brown loam or gritty silt loam, extends to depths of 6 to 10 inches. The subsoil is yellowish-brown weakly granular heavy silt loam. Pale-brown limy glacial till occurs at depths of 18 inches or more. This soil is neutral to slightly alkaline throughout. Grit, stones, and boulders occur on the surface and are embedded in the soil.

The soil varies in texture, in color, and in thickness over the parent material. On the moderately steep slopes and in areas associated with Russell soils, the profile is deeper and the subsoil is thicker and slightly heavier and may be slightly acid. In some areas the dark-colored surface soil is underlain by calcareous till at depths of 8 to 12 inches.

Use and management.—This soil is not suited to crops. The less strongly sloping areas may be used for grazing; good pastures of Kentucky bluegrass can be maintained if grazing is carefully controlled, especially during midsummer. Most of this soil should be used for forestry. More than three-fourths of the acreage has never been cleared, but it has all been cut over.

High Gap Series

High Gap silt loam, 1 to 8 percent slopes (Hc) (Management subgroup 1B).—This is an acid shallow soil of the uplands. It has developed from thin deposits of glacial drift that overlie acid shales and sandstone. It occurs on the ridge west of West Point. This is the well-drained soil in the catena that includes the imperfectly drained Shadland series. A forest of oak and hickory originally covered the area.

In cultivated areas, the uppermost 8 inches of soil is grayish-brown friable silt loam. The subsoil to a depth of 18 inches is friable yellowish-brown to brownish-yellow silty clay loam containing a few glacial stones and pebbles. The subsoil is underlain by a mixture of partly weathered shale and sandstone and small amounts of glacial material, which extends to a depth of 36 inches. The soil is low in organic matter and of low fertility. The moisture-holding capacity is low. The reaction is strongly acid.

The texture and thickness of the surface soil vary, also the depth to bedrock, the slope gradient, and the degree of erosion. Areas that are still under forest cover have at the surface a 2- to 3-inch layer of dark-brown soil that is high in organic matter. Cultivated areas on the stronger slopes have lost most of the original surface soil through erosion; in spots, the subsoil is exposed. In a few places the surface is sandy because the native rock contained sand.

Use and management.—Nearly half of this soil is cropland. Systematic rotations of crops are not usually followed. Yields are low. Most of the rest of the soil is pasture, chiefly woodland pasture of low carrying capacity.

Homer Series

Homer silt loam, 0 to 3 percent slopes (Hd) (Management subgroup 4B).—This is the imperfectly drained member of the catena that includes the Fox, Westland, and Abington soils. It developed from silty and loamy material over loose, stratified, calcareous gravel and sand deposited on low alluvial terraces. Its position is between the Fox and the Westland soils. Relief is nearly level or slightly depressed. Both surface drainage and internal drainage are slow. The water table was near the surface most of the time under natural conditions. The native vegetation consisted of water-tolerant trees, chiefly beech, maple, sycamore, ash, elm, and swamp white oak.

Profile in cultivated areas:

0 to 7 inches, grayish-brown silt loam; low in organic matter; weak medium granular structure; friable when moist, soft when dry; medium acid to slightly acid.
7 to 10 inches, grayish-brown to light brownish-gray silt loam; moderate coarse granular to weak medium platy

structure; friable when moist, soft when dry; medium acid.
10 to 15 inches, mottled gray and yellowish-brown heavy silt loam; moderate fine subangular blocky structure; slightly firm when moist, slightly hard when dry; medium acid to strongly acid.
15 to 38 inches, mottled gray and yellowish-brown clay loam; moderate medium to coarse subangular blocky structure; firm when moist, plastic when wet, hard when dry; gravel and sand content increases with depth; medium acid.
38 to 42 inches, dark-brown, mottled with gray, gravelly clay loam; weak coarse to very coarse blocky structure; very firm when moist, sticky and plastic when wet, very hard when dry; neutral.
42 inches +, pale-brown to light brownish-gray stratified loose gravel and sand; calcareous.

In undisturbed areas the uppermost 2 to 3 inches is silt loam, very dark grayish-brown in color and relatively high in organic matter. In a few areas the surface layer is loam that contains considerable sand. Depth to mottling ranges from 7 to about 16 inches. Depth to gravel and sand varies from 30 to about 44 inches.

Use and management.—Most of this soil has been cleared and artificially drained, but nearly a third of it is used only for permanent pasture because the drainage is still not adequate to make it suitable for crops. The most commonly grown crops are corn, soybeans, wheat, and mixed hay.

Kaskaskia Series

The well-drained Kaskaskia soils are associated with the moderately well drained Pettit soil that borders the upper courses of the small, winding, sluggish streams that drain prairie areas.

They occur chiefly in the valley of Wea Creek on nearly level flood plains bordering the larger streams, usually as narrow, slightly elevated, natural levees. They developed in alluvial materials that came from prairie areas of glacial drift. Where the alluvium is sandy and permeable to moisture, the areas extend farther back from the stream banks.

These soils are flooded at least once each year, usually during the spring rains. The natural vegetation is sod-forming grass. Willows and other water-tolerant trees and shrubs are common near the sluggish streams.

Kaskaskia silt loam, 0 to 3 percent slopes (Kb) (Management subgroup 11A).—This soil occurs principally along the larger, faster flowing streams where the alluvial areas are wider.

The prairie bottoms are usually narrow. The arable area is small and irregular in shape and susceptible to overflow at any time during the year. The natural streams are shallow and meandering. They usually start from a tile line above which there is a large, nearly level drainage basin. Heavy rains result in rapid changes in volume of water and in level of the stream. As a result, the narrow bottoms are flooded.

Profile in a cultivated area:

0 to 8 inches, very dark grayish-brown silt loam, relatively high in organic matter; moderate medium granular structure; friable when moist, soft when dry; neutral to slightly acid.
8 to 18 inches, dark-brown to very dark grayish-brown silt loam to heavy silt loam; organic-matter content is relatively high; lower part contains somewhat less organic matter than the upper part; moderate coarse granular or weak fine subangular blocky structure; friable when moist; neutral.
18 to 40 inches +, yellowish-brown to dark-brown silt loam to heavy silt loam; contains thin lenses and layers of loam, fine sand, tree branches, and twigs; neutral to mildly alkaline.

The surface texture varies. Sometimes small amounts of sandy alluvium are deposited during floods. Where this soil borders Pettit silt loam, small areas of Pettit soil may be included.

Use and management.—This soil is likely to be flooded at any time. More than half of it is used for pasture. It is fertile and would be well suited to corn, except for the flood hazard. Permanent bluegrass pasture is probably the best use for the soil. The carrying capacity of pastures is high, but weeds and brush must be controlled by clipping.

Kaskaskia loam, 0 to 3 percent slopes (Ka) (Management subgroup 11A).—This soil occurs in small scattered areas on slightly higher natural levees along larger, faster flowing streams. It is more sandy throughout the profile than Kaskaskia silt loam, 0 to 3 percent slopes. It is flooded more frequently, but the floodwaters recede rapidly, and little damage is done by standing water.

The very dark grayish-brown surface soil ranges from loam to fine sandy loam. It is underlain by similar material. The surface layer is shallower and lighter colored than that of Kaskaskia silt loam, 0 to 3 percent slopes, and it contains less organic matter.

Use and management.—This soil is used more intensively than Kaskaskia silt loam, 0 to 3 percent slopes. Nearly half of it is cultivated, mostly to corn and truck crops. Pastures are less productive on this soil than on Kaskaskia silt loam. Stream banks should be protected so that they will not be washed out during floods.

Kokomo Series

Kokomo silty clay loam, 0 to 3 percent slopes (Kc) (Management subgroup 9A).—This is a very dark colored, very poorly drained soil, locally known as "blue dough." It occurs in very small areas in the deeper depressions. It developed from accumulated mineral and organic material and from the calcareous glacial till of the region. It is associated primarily with Brookston and Cope soils and with Carlisle muck. Natural drainage is very poor. The native vegetation was marshgrasses and swamp timber, such as ash, elm, soft maple, and birch.

Profile in a cultivated area:

0 to 6 inches, very dark gray to black silty clay loam; high in organic matter; weak coarse granular structure; firm when moist, slightly hard when dry; shrinks upon drying and develops cracks 1 to 3 inches wide; neutral.
6 to 18 inches, black or very dark gray silty clay loam; high in organic matter; moderate medium subangular blocky structure; firm when moist, plastic when wet, hard when dry; neutral.
18 to 26 inches, gray heavy silty clay loam to light silty clay; few faint yellowish-brown mottles in lower part; moderate coarse blocky to weak prismatic structure; very firm when moist, plastic and sticky when wet, very hard when dry; neutral.
26 to 46 inches, mottled gray and yellowish-brown heavy silty clay loam to light silty clay; moderate very coarse

blocky structure; very firm when moist, very plastic when wet, very hard when dry; neutral to mildly alkaline.
46 inches +, mottled gray and yellow loam to light clay loam glacial till; calcareous.

The combined thickness of the first two layers varies from 15 to about 22 inches. A few areas in deeper depressions have silty clay surface layers, which are very difficult to till. Other areas, in deeper depressions that were once ponds, have a thin mucky surface layer; in these places, somewhat more organic matter has penetrated into the underlying mineral soil.

Use and management.—Most of this soil has been artificially drained by ditching and tiling. After the soil is adequately drained, it can be used for the same crops as Brookston silty clay loam, 0 to 3 percent slopes. Although corn yields are occasionally higher, the average yield is lower because the crop is more often drowned out by ponded water. Oats, wheat, clover, and alfalfa are grown, but are often severely damaged by winterkilling or drowning. Areas for which drainage is not practical should be used for pasture.

Linwood Series

Linwood muck (La) (Management group 10).—This soil consists of deposits of muck 12 to 42 inches thick over loam, silt loam, or light clay loam. On the outwash plains the material under the muck may be stratified silt, fine sand, clay, and fine gravel. In some areas near Americus and in the Wabash Valley near the Warren County line, the underlying mineral material is shale.

Linwood muck is associated with Carlisle muck and with dark mineral soils, such as Kokomo silty clay loam, 0 to 3 percent slopes. The organic material in this soil is similar to that in Carlisle muck, but the organic layer is not so deep over the mineral material.

Use and management.—This soil is not suitable for crops unless it is drained. The crops and yields are similar to those on Carlisle muck. If these areas are drained by tile, the tile must be placed deep enough to protect it against crushing by heavy machinery, and to allow for shrinkage. Under cultivation the muck will shrink at a rate of approximately 1/10 to ½ inch or more per year. (*5*). If the muck is underlain by rock within 3 feet, drainage is too expensive to be practical. Such areas are generally used for pasture.

Longlois Series

These soils developed on outwash plains and alluvial terraces that were formed by broad glacial streams. The silt in the surface soil and upper subsoil is probably wind-deposited. Calcareous sand and gravel lie at depths of 42 to 70 inches. Natural drainage is moderate to somewhat rapid. Most of the rainfall drains away through the coarse-textured substrata.

In color and other characteristics, these soils are intermediate between the grassland soils of the Wea series and the forested soils of the Ockley series. Apparently they developed under a cover of tall prairie grass, upon which the forest later encroached. This change probably took place within the last 100 years before the land was settled. The forest consisted chiefly of bur oak, black oak, white oak, shellbark hickory, and pignut hickory.

Longlois silt loam, 0 to 3 percent slopes (Le) (Management subgroup 2A).—The outwash plains where this soil occurs are nearly level except for scattered shallow kettle holes.

Profile in a cultivated area:

0 to 8 inches, very dark grayish-brown to dark-brown silt loam; weak to moderate medium granular structure; friable when moist; medium acid to slightly acid.
8 to 13 inches, brown to grayish-brown silt loam; moderate coarse granular structure; friable when moist; medium acid.
13 to 20 inches, yellowish-brown to dark-brown silty clay loam; moderate fine subangular blocky structure; firm when moist, slightly plastic when wet, slightly hard when dry; medium acid.
20 to 52 inches, dark-brown to reddish-brown clay loam; moderate medium to coarse subangular blocky structure; firm when moist, hard when dry; gravel content varies; medium acid to strongly acid.
52 to 62 inches, dark-brown to very dark grayish-brown light clay loam or gravelly clay loam; weak coarse to very coarse blocky structure; firm when moist, plastic when wet; neutral.
62 inches +, pale-brown to brownish-yellow, loose, stratified gravel and sand; calcareous.

Where this soil grades to Wea soils, the surface layer is darker colored, thicker, and higher in organic matter. Loam glacial till underlies the gravel and sand at depths of 7 to 10 feet in some areas; in such places the moisture-holding capacity is somewhat better than is typical of this soil, and crops are rarely damaged by drought. Most of this soil is underlain by gravel and sand at depths ranging from 44 to about 72 inches.

Use and management.—Nearly all the timber has been cleared from this soil. Almost 90 percent of the area is used for crops grown in rotation. Corn, soybeans, small grains, and hay are the most common crops.

To increase the organic-matter content and improve the moisture-holding capacity, crop residues should be returned to the soil. Lime and fertilizer are needed.

Longlois silt loam, 3 to 8 percent slopes (Lf) (Management subgroup 2B).—This soil occurs mostly around shallow kettle holes or depressions on the outwash plains of glacial streams. It also occurs around shallow drainageways where forests encroached upon prairies. Surface runoff is rapid, and the soil will erode unless it is covered by vegetation. In some spots the surface soil is less than 8 inches thick because of erosion. This soil is similar to Longlois silt loam, 0 to 3 percent slopes, except that the slope is steeper and the surface soil is slightly thinner.

Use and management.—This soil is ordinarily used and managed in the same way as the associated soils. More than half of it is used for small grains and hay. Only 20 percent is cultivated to corn and soybeans. The rest is in pasture or woods, or is used for nonagricultural purposes. This soil is not seriously eroded because it has not been intensively cultivated and because it has a plant cover most of the year. Crop yields are about the same as on Longlois silt loam, 0 to 3 percent slopes.

Contour tillage should be practiced on these slopes, if possible. Rotations should include more meadow crops and fewer corn crops than rotations on the nearly level associated soils.

Longlois silt loam, 3 to 8 percent slopes, eroded (Lg) (Management subgroup 2C).—This soil is like Longlois silt loam, 0 to 3 percent slopes, except that it is steeper and has lost one-third to three-fourths of its surface soil through erosion. In a few spots the entire surface layer is gone and the silty clay loam subsoil is exposed.

Use and management.—This soil is used as intensively as Longlois silt loam, 0 to 3 percent slopes. Most of it is in rotation crops, and more than half of this is used for corn and soybeans. Yields of most crops are lower than on uneroded soils.

It is difficult to till this soil on the contour because the areas surround depressions and slope from all directions toward the center. Management is generally poor. The soil structure is so impaired that the soil does not respond readily to good management. Intensive management practices, including long rotations and liberal use of lime and fertilizer, are needed to check erosion.

Longlois loam, 0 to 3 percent slopes (Lb) (Management subgroup 2A).—This soil has a lighter textured surface soil and subsoil than Longlois silt loam, 0 to 3 percent slopes, and has more sand and less lime in the substratum. Drainage is moderate to somewhat rapid. The moisture-holding capacity is less than that of Longlois silt loam. Some crops are damaged by drought during long dry periods.

The soil varies in color and in organic-matter content. Some areas have more sand in the surface soil than others. The depth to stratified gravel and sand ranges from 44 to 70 inches.

Use and management.—All of this soil is cleared and cultivated. The most common rotation consists of corn, corn or soybeans, wheat, and hay. Management practices are similar to those used on Longlois silt loam, 0 to 3 percent slopes, but yields are somewhat lower. More of this soil is used for mixed meadows and permanent pastures.

The productivity of this soil can be increased by good management. It is especially important to increase the organic-matter content and improve the moisture-holding capacity. Irrigation of corn would improve yields in most years.

Longlois loam, 3 to 8 percent slopes (Lc) (Management subgroup 2B).—This soil is like Longlois loam, 0 to 3 percent slopes, in everything except slope. It occurs around shallow kettle holes and old meander channels on the outwash plains, and also on sandy ridges. Because the slope is gentle and the absorption of water is relatively rapid, this soil is not likely to be damaged by erosion. A few areas have been moderately eroded. Except for a few areas that are somewhat sandy and hold less moisture, this soil is about as productive as Longlois loam, 0 to 3 percent slopes.

Use and management.—This soil is used less intensively than the associated Longlois loam, 0 to 3 percent slopes. More of it is used for small grains, hay, and permanent pasture, which utilize the available moisture supply effectively and protect the soil against erosion. Management practices should be followed that will increase the organic-matter content and improve the water-holding capacity. Tillage should be on the contour, if possible.

Longlois loam, 3 to 8 percent slopes, eroded (Ld) (Management subgroup 2C).—This soil is like Longlois loam, 3 to 8 percent slopes, except that most of the acreage has lost from one-third to three-fourths of its surface soil by erosion. Removal of the surface soil has been uneven. In some places the plow layer is now entirely subsoil material; in others it consists of the original surface soil.

Use and management.—This soil is used for crops to about the same extent as Longlois loam, 3 to 8 percent slopes, but corn and soybeans are grown more often. Intensive use of the soil has accelerated erosion. Yields of corn and soybeans have declined, and these crops have been replaced by rotation pasture in some places.

Erosion has decreased the organic-matter content and impaired the moisture-holding capacity of this soil. Most of the permanent pastures are thin and of low carrying capacity; they should be renovated and seeded to drought-resistant legumes and grasses. Where feasible, tillage should be on the contour. Longer rotations that include more hay and pasture would gradually improve the productivity of this soil.

Made Land

Made Land (Ma).—This unit consists of bottom land, borrow pits, gravel pits, and other depressions that have been filled with refuse and later covered thinly with soil material. Most of these areas have been used as building sites. Occasionally a crop may be grown on such filled-in land.

Martinsville Series

These soils developed on low terraces between the Genesee soils of the flood plains and the Fox soils of the gravel plains and terraces. The parent material consisted of alluvial deposits of sand, silt, and some gravel. Considerable clay is interbedded in the sand and silt in the slack-water areas.

These are nearly level well-drained soils. Small areas of imperfectly drained Whitaker soils around depressions may be included in the unit; these areas are not large or numerous enough to be mapped separately in this county.

Martinsville soils are moderately calcareous. The free lime has been leached to depths of 3 to 5 feet or more. The native forest was composed of oaks and hickories. The soils are light colored and low in organic matter.

Martinsville loam, 0 to 5 percent slopes (Mb) (Management subgroup 1A).—Most of this soil occurs on nearly level terraces, but some is on short terrace breaks and some in small basinlike areas. The areas are small and widely scattered.

Profile in a cultivated area:

0 to 7 inches, brown to grayish-brown loam; weak medium granular structure; friable when moist; medium acid to slightly acid.

7 to 12 inches, grayish-brown to light yellowish-brown loam; weak platy to coarse granular structure; friable when moist; medium acid.

12 to 18 inches, yellowish-brown to strong-brown light clay loam; weak to moderate fine subangular blocky structure; slightly firm when moist; medium acid.

18 to 44 inches, yellowish-brown to strong-brown clay loam or sandy clay loam; moderate medium to coarse subangular blocky structure; firm when moist; sand content increases with depth, and the lower few inches may be loam or fine sandy loam; medium acid in upper part, gradually changing to slightly acid in lower part.
44 inches +, pale-brown to light brownish-gray stratified fine sandy loam, loam, and fine sand, with some gravel and silt.

This soil varies considerably in texture and other properties of the soil profile, because of variations in the parent material. The areas that have fine gravelly substrata and the areas that have fine sandy loam surface soil and weakly coherent subsoil hold less moisture than the typical soil.

Use and management.—More than three-fourths of this soil is cultivated. The rest is used mostly for pasture and timber. A great deal of corn is grown, even though it may not have enough moisture in some years. Wheat and alfalfa are also grown. Alfalfa is well suited to this soil because the acidity is only slight. Lime should be added if sweetclover is grown.

Martinsville silt loam, 0 to 5 percent slopes (Mc) (Management subgroup 1A).—Several small and widely scattered areas of this soil occur in the valleys of small streams. The profile characteristics differ from those of Martinsville loam, 0 to 5 percent slopes, in that the surface soil is silt loam, the upper subsoil is silty clay loam, and the underlying material is chiefly loam and fine sandy loam.

Use and management.—Almost all of this soil is cultivated to corn. It holds more moisture than Martinsville loam, 0 to 5 percent slopes, and gives better yields.

Mellott Series

This series is the well-drained member of a catena which developed from a mantle of silt 18 to 36 inches thick over medium-textured glacial till. Free lime has been leached from this till to depths of 42 to 70 inches. The other soils in the catena are the moderately well drained Wingate soils, the imperfectly drained Toronto soil, and the poorly drained to very poorly drained Chalmers and Romney soils.

This group of soils developed in areas of transition between the forest and the prairie. Oak and hickory trees were scattered, and the ground cover was grasses and low plants. Shallow drainageways that gradually extended into the till plain improved the drainage enough so that trees could establish themselves on the prairies. The Mellott soils developed around these shallow drainageways.

Mellott silt loam, 3 to 8 percent slopes (Me) (Management subgroup 1C).—This soil occupies hilltops and ridges, farther back from the more strongly sloping soils along the drainageways. At present it shows little erosion, but intensive grain farming has encouraged sheet erosion, which is gradually and almost imperceptibly reducing the thickness of the surface soil. In many spots the surface soil is now less than 12 inches thick.

Profile in a cultivated area:

0 to 9 inches, very dark grayish-brown silt loam; relatively high in organic matter; moderate medium granular structure; friable when moist; medium acid to slightly acid.
9 to 13 inches, dark grayish-brown silt loam; weak thin platy or moderate coarse granular structure; friable when moist; medium acid.
13 to 19 inches, brown or dark-brown light silty clay loam; moderate fine subangular blocky structure; slightly firm when moist; medium acid to strongly acid.
19 to 42 inches, dark yellowish-brown to dark-brown silty clay loam; moderate to strong medium subangular blocky structure; firm when moist; contains some gritty material in lower part; medium acid to strongly acid.
42 to 60 inches, dark-brown to dark yellowish-brown light clay loam to light gritty silty clay loam; weak coarse subangular blocky structure; firm when moist; medium acid in upper part, gradual transition to slightly acid in lower part.
60 inches +, brown or pale-brown loam glacial till; calcareous.

In some places sand and glacial rock fragments are on the surface and throughout the soil. In other places, the smooth silty mantle is 40 inches or more thick. The depth to calcareous till ranges from 42 to about 70 inches. The silt and other material above the till are shallower in the more strongly sloping areas.

The soil also varies in color and in organic-matter content. The surface layer is darker colored and deeper where the soil grades into the Sidell catena. The mottled colors that indicate imperfect drainage may be present in nearly level areas where the soil grades to Wingate or Toronto soils.

Use and management.—The fertility of this soil is above average, and the relief is favorable. About 70 percent of it is now used for crops, and about 20 percent for permanent pasture. Corn and wheat were once the dominant crops, but yields have declined because of poor soil management. As a result, there has been a gradual change from grain farming to grain-and-livestock farming. A 4-year rotation of corn, soybeans, wheat, and meadow is commonly followed. Contour tillage is needed to check erosion on the stronger slopes, and liberal amounts of lime and fertilizer should be applied to restore productivity.

Mellott silt loam, 3 to 8 percent slopes, eroded (Mf) (Management subgroup 1D).—This soil occurs on the lower slopes bordering shallow drainageways and also on knolls on the nearby undulating till plain. It is associated with Wingate and Toronto soils.

Typically, the surface soil is 3 to 8 inches thick, but in some places it is as much as 12 inches thick and in other places it has been completely removed by erosion and the yellowish-brown subsoil is exposed. The texture of the present plow layer ranges from silt loam in slightly eroded areas to silty clay loam in places where the clayey subsoil has been plowed up and mixed into the plow layer. These severely eroded areas absorb moisture more slowly; runoff is more rapid; and organic matter, nitrogen, and other plant nutrients are carried away by erosion. Rill erosion along wheel tracks is common, particularly if cultivation is up and down the slope, and shallow gullies are likely to develop.

Use and management.—This soil is more intensively cultivated than the uneroded Mellott silt loam, 3 to 8 percent slopes. About 80 percent is used for corn, soybeans, and wheat. Average yields are lower than on the uneroded phase. Yields are poorest where the most surface soil has been lost.

Grassed waterways would help prevent gullying, and a vegetative cover on the rest of the soil during the entire year would improve the soil.

Mellott silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded (Mi) (Management subgroup 1D).—This soil occurs as narrow strips bordering drainageways. The surface soil is generally 3 inches or less in thickness; in some places it has been entirely removed. In most areas the surface soil has been mixed with the yellowish-brown silty clay loam subsoil and the present plow layer is a silty clay loam. This soil is difficult to till, and it makes a poor seedbed. It becomes hard when dry, and it breaks into clods if tilled when wet. Much of the organic matter, nitrogen, and phosphorus were lost with the surface soil. In severely eroded areas, the profile is not so deep as that of Mellott silt loam, 3 to 8 percent slopes. Glacial rock fragments are scattered throughout the profile.

Use and management.—In spite of erosion and reduced yields, this is the most intensively used soil of the Mellott series. All of it has been cleared of timber, and all of it was formerly cultivated. Now about 15 percent is left idle because the fertility has declined and the soil structure has deteriorated. Corn, wheat, soybeans, and hay are the important crops. Yields are only half of what they would be if the soil were uneroded.

Lime, fertilizer, and manure should be added to restore the phosphorus, nitrogen, and organic matter that have been lost. More meadow crops and fewer row crops should be grown in the rotation. Contour tillage should be practiced if it can be done efficiently.

Mellott silt loam, 0 to 3 percent slopes (Md) (Management subgroup 1A).—This soil occurs on the borders of prairie areas, generally near former glacial stream channels where beds of gravel and sand were deposited within the compact bed of glacial till. The parent material consists of slowly permeable loam till, but the sand and gravel improve the internal drainage without limiting the moisture-supplying capacity. Surface drainage is slow, and little or no erosion occurs. Much of the rain that falls on this soil soaks through into the substratum. Except that it is on gentler slopes and has better internal drainage, this soil is similar to Mellott silt loam, 3 to 8 percent slopes.

Use and management.—This soil has no serious problems of use and management. It can be maintained at a high level of productivity while being intensively cultivated. About two-thirds of it is used for rotation crops. The rest, which is now in pasture, woodland, or miscellaneous uses, could be cleared and used for crops.

Mellott silt loam, 8 to 12 percent slopes (Mg) (Management subgroup 1E).—This soil developed along the border of the prairie, at the heads of the deeper stream valleys. It is associated with less strongly sloping phases of Mellott silt loam, and it grades to the Sidell soils of the prairie and the Russell soils of the forests. The surface soil is slightly lighter colored, shallower, and lower in organic matter than the less strongly sloping Mellott soils. Coarse material, such as sand and glacial rock fragments, is scattered through the entire profile.

Use and management.—More than half of this soil is used for pasture. About one-third is planted to crops, mostly corn. Corn yields are good if this crop follows hay or pasture, but they decline rapidly if corn is grown 2 years in succession. Oats is the principal small-grain crop and also the nurse crop for meadow seedings.

This soil is practically uneroded because it has not been used intensively. If row crops are to be grown, contour tillage and terracing should be practiced. Hay, pasture, and timber are better suited to this soil than row crops.

Permanent pastures should be limed and fertilized and reseeded to legumes. Woodland pastures could be improved by removing the trees.

Mellott silt loam, 8 to 12 percent slopes, eroded (Mh) (Management subgroup 1E).—This soil is like Mellott silt loam, 3 to 8 percent slopes, except that it has lost from one-third to three-fourths of its surface soil through erosion. The dark grayish-brown surface soil ranges from 3 to 7 inches in thickness. In a few small areas the yellowish-brown subsoil is exposed. This soil occurs around the heads of drainageways.

Use and management.—This soil is eroded primarily because, although it is not suited to such use, it has been intensively cultivated. Most of it has been cleared and cropped. About 60 percent is still used for crops. Yields are low, and they continue to decline as the soil erodes. The more severely eroded areas have been returned to pasture. Many permanent pastures have weedy, thin stands. This soil requires more intensive management than the uneroded phase of Mellott silt loam, 8 to 12 percent slopes.

Mellott silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded (Mj) (Management subgroup 1F).—This soil occurs in narrow strips on the lower slopes bordering streams. It has lost more than three-fourths of its surface soil through erosion. Before it was eroded, it was like Mellott silt loam, 8 to 12 percent slopes. Now the surface soil texture is variable. It may be silt loam, silty clay loam, or clay loam, depending on how much original surface soil and how much subsoil are in the present plow layer. Glacial pebbles and small stones are common on the surface and in the soil layers. The limy parent material is normally not far below the surface, and it is exposed in places. Where drainageways are developing, gullies 1 to 3 feet deep have developed.

Use and management.—This soil has been cultivated intensively for a long time. It is severely eroded because it was intensively cropped, although it is not suitable for such use unless carefully managed. Crop yields are too low to be profitable. Pastures have low carrying capacity.

Most of this soil is better for permanent pasture or forest than for row crops. Pastures should be limed, fertilized, and seeded to legumes.

Miami Series

These are well-drained soils that occur on low knolls and morainic ridges on the till plain and on sloping areas around drainageways. The parent material was medium-textured highly calcareous glacial till. The soils are light colored and low in organic matter.

The soils associated with this series are the imperfectly drained Crosby soils and the very poorly drained Brookston and Kokomo soils. The original vegetation was a mixed hardwood forest of sugar maple, beech, ash, elm, walnut, hickory, and white oak.

Miami silt loam, 3 to 8 percent slopes (Mr) (Management subgroup 1C).—Profile in a cultivated area:

0 to 7 inches, brown to grayish-brown silt loam; moderate to weak fine granular structure; friable when moist; usually contains sand and small rock fragments; medium acid to slightly acid.
7 to 10 inches, brown to light yellowish-brown silt loam; moderate thin platy to coarse granular structure; friable when moist; medium acid.
10 to 16 inches, yellowish-brown light silty clay loam to heavy silt loam; moderate fine subangular blocky structure; slightly firm when moist; medium acid to strongly acid.
16 to 28 inches, brown to yellowish-brown silty clay loam to clay loam; moderate to strong medium and coarse subangular blocky structure; firm when moist, hard when dry; medium acid to strongly acid.
28 to 33 inches, dark-brown to very dark grayish-brown clay loam; moderately coarse subangular blocky structure; firm when moist, sticky when wet, hard when dry; slightly acid to neutral.
33 inches +, light yellowish-brown loam to light clay loam glacial till; calcareous.

The soil varies somewhat in the color, texture, and thickness of the different layers. The areas that are associated with the Russell soils may have a smooth silty surface soil, and the carbonates may be leached to greater depth. Depth to the calcareous till ranges from 24 to 42 inches.

Use and management.—About 85 percent of this soil has been cleared and cultivated. A 3-year rotation of corn, a small grain, and hay is generally followed. Sometimes soybeans are added to the rotation following the corn. These two row crops should not be grown in succession unless they are planted on the contour, because of the erosion hazard.

Erosion is the major problem in the use of this soil. Contour tillage should be practiced, and a vegetative cover kept on the soil. This soil dries more quickly than the associated soils, so some crops can be seeded early enough to escape damage by the midsummer droughts.

Miami silt loam, 0 to 3 percent slopes (Mq) (Management subgroup 1A).—This soil occurs near drainageways and near outwash plains, where beds of permeable stratified gravels and sands underlie the calcareous till at depths of 4 feet or more. This soil is like Miami silt loam, 3 to 8 percent slopes, except that it is on gentler slopes and is underlain by gravel and sand. It is associated with and in many places grades into Crosby soils. A few small areas of Crosby soil are included in the mapping unit.

Use and management.—This soil occurs in such small areas that it is generally used and managed in the same way as the associated soils. It is more completely cleared and more intensively used than Miami silt loam, 3 to 8 percent slopes. Crop yields are generally higher and productivity is more easily maintained than on the more strongly sloping soils or the eroded soils of this series. The moisture supply is adequate for most crops. Erosion is not a problem.

Miami silt loam, 3 to 8 percent slopes, eroded (Ms) (Management subgroup 1D).—This soil has lost from one-third to three-fourths of its surface layer through erosion. The remaining surface soil is 3 to 8 inches deep in most places, but in the more severely eroded spots the subsoil is exposed. Where the plow layer consists partly of subsoil, the surface texture is now silty clay loam to heavy silt loam. Continuing erosion has depleted the fertility, reduced the moisture intake, and impaired the tilth of this soil. Rill erosion along wheel tracks is common in cornfields that have been cultivated up and down the slope. Many of the rills have developed into gullies 1 to 3 feet deep. Most of the deterioration of this soil is the result of too intensive use.

Use and management.—Most of this soil has been cleared of timber. About 75 percent of it is cropped. Yields are lower than on the uneroded phase of Miami silt loam, 3 to 8 percent slopes. The more seriously eroded areas are used for pasture, but stands are poor and the carrying capacity is low. Little effort is made to improve pastures.

This soil should be tilled on the contour and terraced to check erosion. Fewer row crops and more of the soil-conserving crops, adequately limed and fertilized, should be grown.

Miami silt loam, 8 to 12 percent slopes (Mt) (Management subgroup 1E).—This soil is like Miami silt loam, 3 to 8 percent slopes, except that the slopes are steeper and the horizons are somewhat thinner. It occurs chiefly around the heads of drainageways and on short irregular slopes on the undulating till plain. A few small areas that have lost one-third or more of the surface soil by erosion are included in this unit.

Use and management.—Very little of this soil is in crops. Small grains and hay are the chief crops grown. About half of the soil is still in forest, and about 30 percent is permanent pasture that is partly wooded.

Both cropland and pasture need careful management to prevent erosion. Row crops should not be grown unless conservation practices are applied. Permanent pasture is the best use for this soil. Lime and fertilizer are needed to maintain a good vegetative cover.

Miami silt loam, 8 to 12 percent slopes, eroded (Mu) (Management subgroup 1E).—Except for slope and depth of the surface soil, this soil is like Miami silt loam, 3 to 8 percent slopes. From one-fourth to three-fourths of the surface soil has been lost through erosion. The silty clay loam subsoil is exposed in some spots because all of the surface soil has been removed.

Use and management.—Most of this soil has been cleared and cultivated. Corn, small grains, and hay are the principal crops. Yields are low and are declining further as erosion continues. About half of this soil is now in permanent pasture, the use to which it is best suited. Pastures should be limed, fertilized, and seeded to Ladino clover and birdsfoot trefoil. For the less seriously eroded areas, a 4-year rotation of a small grain and 3 years of meadow would be suitable.

Miami silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded (Mx) (Management subgroup 1F).—This soil has lost nearly all of the surface layer and, in places, part of the subsoil through erosion. The uneven depth of erosion gives the soil a spotty appearance. Where some of the surface soil remains, the plow layer is silt loam; where part of the subsoil is gone, the plow layer is silty clay loam. Gullies 1 to 3 feet deep occur.

Use and management.—This soil is suitable only for pasture or timber. Most of the cropped areas are small and are surrounded by other soils that are better suited

to crops. The more severely eroded and gullied areas should be reforested.

Pastures should be limed and fertilized. Pasture mixtures should include legumes, which will supply nitrogen. A dense vegetative cover should be maintained.

Miami silt loam, 12 to 25 percent slopes (Mv) (Management subgroup 1G).—This soil is like Miami silt loam, 3 to 8 percent slopes, except that the slope is steeper and the layers of the soil are thinner. The surface soil ranges from 8 to 12 inches in depth, but in some areas part of this layer has been removed by erosion.

Use and management.—Only a little of this soil is used for crops. Yields are low. Unless it is carefully managed, this soil will erode if cultivated. It is suitable only for pasture or forest.

Miami silt loam, 12 to 25 percent slopes, eroded (Mw) (Management subgroup 1G).—From 3 to 8 inches of the original surface layer remains on most of this soil, but there are small areas from which all the surface soil has been lost. In the more severely eroded areas, the plow layer is silty clay loam.

Use and management.—This soil should be used only for pasture or forest. About one-third of it is cropped, although it is unsuitable for cultivation and has eroded as a result of such use. Pastures should be renovated to increase their carrying capacity and to prevent further erosion.

Miami loam, 3 to 8 percent slopes (Mk) (Management subgroup 1C).—Most of this soil occurs on irregular ridgetops. In cultivated areas the surface soil is light yellowish-brown friable loam. The subsoil below 10 inches is yellowish-brown friable clay loam to sandy clay loam, which contains glacial rock fragments. The subsoil is slightly plastic and sticky when wet and is hard and brittle when dry. When moist, it breaks readily into subangular aggregates. The parent material of friable light yellowish-brown calcareous loam till lies at depths of 30 to 40 inches or more.

This soil is low in organic matter. It has excellent tilth. Roots, air, and water permeate the soil freely. Surface drainage is good.

Use and management.—This soil is used and managed in about the same way as Miami silt loam, 3 to 8 percent slopes. Yields are slightly lower unless the soil is carefully managed, and more care is required to maintain the organic-matter content, fertility, and moisture-holding capacity.

Miami loam, 3 to 8 percent slopes, eroded (Ml) (Management subgroup 1D).—This soil is associated with and similar to Miami loam, 3 to 8 percent slopes, except that it has lost much of its surface layer. The surface soil is 3 to 8 inches deep in most places, but in some places none at all remains. In these severely eroded spots the plow layer consists of the clay loam subsoil.

Use and management.—As a result of poor management, this soil has eroded and the organic matter has been depleted, the fertility lowered, and the water-absorbing capacity reduced. Crop yields are already low and are still declining.

If enough lime is applied, legumes can be grown. Alfalfa and red clover yield well, but red clover may be damaged by drought. The major management needs are to control erosion and to increase the organic-matter content.

Miami loam, 8 to 12 percent slopes (Mm) (Management subgroup 1E).—This soil occurs principally around drainageways on the upland. In wooded areas the uppermost 1 to 3 inches is dark grayish-brown loam, which contains more organic matter than the surface soil in cultivated areas. This is underlain by light-brown loam that extends to a depth of 10 or 12 inches and is similar in color to the plow layer in uneroded fields. The rest of the profile is like that of Miami loam, 3 to 8 percent slopes.

Use and management.—Woods and pasture cover most of this soil. A good vegetative cover has protected it from erosion.

Miami loam, 8 to 12 percent slopes, eroded (Mn) (Management subgroup 1E).—The surface layer of this soil varies from 3 to 8 inches in depth and from grayish brown to yellowish brown in color. In areas where the surface soil has been entirely washed away, the plow layer is yellowish-brown loam to clay loam. Some gullies have developed.

Use and management.—Erosion of this soil has resulted primarily from removal of the protective cover of vegetation during cultivation. Because of severe erosion and declining crop yields, much of this soil has been returned to pasture. Pasture stands are poor, and the carrying capacity is low. Permanent pasture and forest are the best uses for this soil.

Miami loam, 12 to 25 percent slopes (Mo) (Management subgroup 1G).—This soil occurs principally around drainageways. In woodland areas it is similar to Miami loam, 3 to 8 percent slopes, except that the soil layers are somewhat thinner and the calcareous till occurs at shallower depths.

Use and management.—This soil has been used almost entirely as woodland and consequently has been protected against erosion. All of the cleared areas are used for permanent pasture.

Miami loam, 12 to 25 percent slopes, eroded (Mp) (Management subgroup 1G).—All of this soil has lost some or all of its surface layer. In most places, 3 to 8 inches of the original surface soil remains, but many small spots have lost nearly all of it. In these spots the present surface soil is clay loam that was formerly part of the subsoil.

Use and management.—Most of this soil has been cleared and cultivated for some time and consequently is eroded. Yields are low. Woodlands in this mapping unit are moderately eroded because they have been overgrazed. Because it is steep and erodes rapidly under cultivation, this soil is best suited to permanent pasture or woodland. Bluegrass is a good pasture crop, if the trees are removed. The carrying capacity of pastures is low, especially during the hot dry summer.

Millsdale Series

Normally, soils of this series have developed from shallow layers of alluvial materials deposited during the Wisconsin glacial age on limestone benches or terraces. In the Wabash Valley, however, the rock terraces underneath the alluvial deposits are composed of shale

and sandstone. In this respect, the Millsdale soil of Tippecanoe County differs from the typical soils of the Millsdale series.

This series is the very poorly drained member of the catena that also includes the moderately well drained Milton soil and the imperfectly drained Randolph soil. In this county the Millsdale series is associated with Carlisle muck.

Millsdale silty clay loam, 0 to 3 percent slopes (My) (Management subgroup 9C).—This soil developed from old alluvial material on shale and sandstone terraces, most of which are only a little higher than the river level. The shale and sandstone are acid. Seepage water from higher areas moves very slowly through the thin beds of shale and sandstone.

This soil occurs in depressions which were originally covered with swamp timber, marshgrasses, and sedges. Natural drainage is very poor. Little water runs off, and internal drainage is very slow. Water is ponded in some places after rains.

Profile in a drained and cultivated area:

0 to 7 inches, very dark grayish-brown to black silty clay loam; high in organic matter; moderate coarse granular structure; firm when moist, slightly hard when dry; neutral.
7 to 17 inches, very dark gray to black silty clay loam to silty clay; organic-matter content high in upper part but diminishes with depth; moderate coarse to very coarse blocky structure; very firm when moist, plastic when wet, hard when dry; neutral to mildly alkaline.
17 to 22 inches, gray, weakly to strongly mottled with yellowish-brown and brownish-yellow, silty clay loam to light silty clay; weak very coarse blocky structure; very firm when moist, plastic when wet, very hard when dry; contains variable amounts of shale and sandstone fragments; neutral.
22 inches +, partly weathered brown shale and sandstone; thin films and layers of silty clay between the rock fragments; grades to shale and sandstone bedrock.

This soil varies in drainage and in texture and thickness of its layers. The most poorly drained areas have a darker colored surface soil that contains more organic matter and a gray to light-gray mottle-free subsoil that is more nearly impervious; these conditions prevail where the Millsdale soil is associated with Carlisle muck. The depth to relatively unweathered bedrock ranges from 20 to about 48 inches. The kind of bedrock beneath the soil varies somewhat.

Use and management.—This is a highly productive soil, well suited to corn and soybeans if adequately drained. Artificial drainage is difficult in most areas and, in some places, impossible. It is hard to find drainage outlets. The soil is so shallow that it may be necessary to cut ditches into bedrock or lay tile in bedrock to get enough fall for drainage.

Yields are good after this soil has been drained. Potassium and phosphorus are needed to balance the high nitrogen content. Fall-seeded crops may be winterkilled. The soil is often too wet for early planting in spring.

Milton Series

This series typically consists of well-drained soils developed from shallow deposits of Wisconsin drift on limestone rock terraces, but all of the Milton soil mapped in Tippecanoe County occurs over acid shale and siltstone of the Devonian and Mississippian periods.

Milton silt loam, 2 to 8 percent slopes (Mz) (Management subgroup 1B).—This soil occurs on the rock terraces of the Wabash Valley. Drainage varies from slow to rapid, depending on the nature of the glacial deposits and the underlying rock.

Profile in a cultivated area:

0 to 7 inches, brown gritty silt loam; weak medium granular structure; friable when moist; medium acid to slightly acid.
7 to 10 inches, grayish-brown to brown silt loam; weak thin platy to coarse granular structure; friable when moist; medium acid.
10 to 15 inches, yellowish-brown light silty clay loam to heavy silt loam; moderate fine subangular blocky structure; firm when moist, slightly hard when dry; medium acid.
15 to 25 inches, yellowish-brown to strong-brown clay loam or silty clay loam; moderate medium and coarse subangular blocky structure; firm when moist, hard when dry; medium acid.
25 inches +, partly weathered shale and sandstone beneath a thin layer of gravelly and sandy material; this grades into solid shale and sandstone bedrock; medium acid.

This soil varies chiefly because of variations in the kind and amount of glacial material deposited over the bedrock. Most of the fine material was deposited in shallow layers. Where the soil is very shallow, the shale has been mixed through the soil by glacial action or by cultivation. Occasional floods have deposited sand on the surface; consequently, in some areas, the surface texture is loam.

Use and management.—This is a shallow, infertile soil. Some areas are often flooded. More than three-fourths of the acreage has been cleared of timber, but only half of it is cropped. Corn is the principal crop. Yields are low. Permanent pasture, hay, small grains, or soybeans would be more suitable. Drought is likely to damage some crops.

Monitor Series

Monitor silt loam, 0 to 3 percent slopes (Mzo) (Management subgroup 4B).—This soil occurs on level to slightly depressed areas next to the prairie and at the edge of the timbered parts of the outwash plains. A thin stand of oak and hickory covered the area before it was settled. Natural drainage is imperfect because the water table is high, as in most old glacial drainageways. Water moves freely through the underlying gravel and sand if there is a drainage outlet.

This soil is associated with the well-drained Longlois soils, the moderately well drained Glenhall soil, and the very poorly drained Westland and Abington soils. It is intermediate in color and in organic-matter content between the Sleeth and Crane soils, which are also imperfectly drained and were derived from similar material.

Profile in a cultivated area:

0 to 8 inches, very dark grayish-brown silt loam; organic-matter content relatively high; moderate medium granular structure; friable; medium acid to slightly acid.
8 to 13 inches, grayish-brown silt loam; weak thin platy to coarse granular structure; friable; medium acid.
13 to 22 inches, mottled gray and yellowish-brown silty clay loam; moderate medium to fine subangular blocky structure; firm when moist; medium acid.
22 to 38 inches, mottled gray, yellowish-brown, and brownish-yellow clay loam; moderate coarse subangular blocky structure; firm when moist; medium acid.

38 to 55 inches, mottled gray and yellowish-brown sandy clay loam containing layers of loamy sand; weak coarse blocky structure; firm to friable; medium acid.
55 to 60 inches, dark-brown to dark yellowish-brown clay loam to heavy loam; weak coarse blocky structure; firm when moist, plastic when wet; slightly acid to neutral.
60 inches +, pale-brown to gray, loose, stratified fine gravel and sand; calcareous.

Depth to mottling ranges from 6 to about 16 inches. Loose gravel and sand lies at depths of 42 to 66 inches. Some areas have loam-textured glacial till at depths of 7 to 10 feet.

Use and management.—This soil occurs in a few small areas. Its use is governed chiefly by the use of the associated soils. Most of it is cultivated.

This soil is artificially drained, mostly by open ditches. Tile drains are likely to be unsatisfactory in this sandy soil because the tile fills with sand. Tiles should not be laid more than 3 feet deep.

Corn, oats, wheat, and hay are the principal crops. On well-drained fields, crop yields are equal to or slightly higher than yields on the associated Longlois silt loam, 0 to 3 percent slopes.

Montmorenci Series

Montmorenci silt loam, 0 to 3 percent slopes (Mzb) (Management subgroup 1A).—This moderately well drained soil occurs on nearly level relief on the interstream divides. It developed from the same kind of parent material as the Octagon soils, and it supports the same kind of natural vegetation. The well-drained Octagon soils and the imperfectly drained Otterbein soil are in the same soil catena as the Montmorenci soil.

Profile in a cultivated area:

0 to 8 inches, very dark grayish-brown silt loam; moderately high organic-matter content; moderate medium granular structure; friable; medium acid to slightly acid.
8 to 12 inches, brown silt loam; weak fine platy or moderate coarse granular structure; friable; medium acid.
12 to 18 inches, dark yellowish-brown light silty clay loam; moderate fine subangular blocky structure; slightly firm; medium acid.
18 to 26 inches, mottled yellowish-brown and gray silty clay loam to clay loam; moderate to strong medium subangular blocky structure; firm when moist, hard when dry; medium acid.
26 to 30 inches, dark-brown, slightly mottled with gray, clay loam; weak to moderate coarse subangular blocky structure; firm when moist, plastic when wet, hard when dry; neutral.
30 inches +, brown and light brownish-gray loam glacial till; calcareous; contains some soft concretions and deposits of lime in the upper 6 to 10 inches.

The depth and color of the surface soil vary, and also the thickness and grayness of the second layer, the depth to the mottled subsoil, and the depth to the calcareous material. In areas bordering Mellott and Sidell soils, the surface layer may be smooth and silty and 1 to 2½ feet deep and the calcareous till parent material may be 24 to 42 inches in depth. The depth to mottling varies from 16 to about 30 inches.

Use and management.—Most of this soil has been cleared and cultivated. Corn occupies nearly half of the cropland. Soybeans, oats, wheat, and hay are also grown. There are no serious problems of erosion or drainage.

In productivity, this soil is about equal to the Octagon soils. A relatively high level of productivity has been maintained without special management practices, but the organic-matter content and fertility are declining. They can be maintained by using lime and fertilizer and by following suitable crop rotations.

Muskingum Series

Muskingum stony silt loam, 10 to 30 percent slopes (Mzc) (Management subgroup 1H).—This is a stony, shallow, infertile soil on steep slopes. It was derived from material weathered from thick-bedded, coarse-grained sandstone and shale. A forest of oak and hickory covered the area before settlement.

Profile in a forested area:

0 to 1 inch, very dark gray well-decomposed organic material; contains some silt, sand, and flat rocks of various sizes; neutral to slightly acid.
1 to 3 inches, dark-brown to very dark grayish-brown stony silt loam; organic-matter content high; weak fine to medium granular structure; friable; contains flat sandstone and shale fragments; slightly acid to medium acid.
3 to 8 inches, brownish-yellow to pale-brown stony silt loam; weak coarse granular structure; friable; contains many flat fragments of shale and sandstone; medium acid.
8 to 18 inches, brownish-yellow or brown stony loam or light silty clay loam; weak coarse granular to weak fine subangular blocky structure; friable; content of rock fragments increases with depth; the soil in the lower part of this horizon occurs as thin layers between the rock fragments; medium acid to strongly acid.
18 inches +, bedrock of shale and sandstone.

In cultivated areas, erosion has removed the upper layers that contain organic matter and the brownish-yellow subsoil is exposed. Slopes range up to 70 percent. In several places the bedrock crops out as rock bluffs.

Use and management.—All of this soil was forested originally. About half of it has been cleared and used for crops or pasture. It erodes rapidly if cultivated. Crop yields are low. Most areas revert to pasture after 3 to 5 years of cultivation. Pasture stands are thin, and the carrying capacity is low.

All of this soil should be in forest. Trees grow most rapidly on the lower slopes, where the soil is deeper and the moisture supply better.

Nineveh Series

Nineveh loam, 0 to 3 percent slopes (Na) (Management subgroup 2A).—This soil developed on loamy outwash 25 to 40 inches thick over highly calcareous gravel and sand. It lies on nearly level alluvial terraces, between the Ross soils of the flood plains and the Fox soils of the low terraces. The native vegetation consisted of hardwoods, chiefly hackberry, ash, walnut, sugar maple, and oaks. Internal drainage through this shallow soil is medium to rapid.

Profile in a cultivated area:

0 to 10 inches, dark-brown to very dark grayish-brown loam; weak medium granular structure; friable; neutral.
10 to 18 inches, brown to dark-brown loam to light clay loam; weak fine subangular blocky structure; slightly firm; contains some small gravel; neutral.
18 to 28 inches, strong-brown to reddish-brown gravelly clay loam; moderate to weak medium subangular blocky structure; firm when moist, plastic and sticky when wet, hard when dry; neutral.

28 to 34 inches, dark-brown to very dark grayish-brown gravelly clay loam; firm when moist, plastic and sticky when wet; neutral.
34 inches +, pale-brown, loose, stratified gravel and sand; calcareous.

The surface soil is lighter colored and slightly acid where this soil grades to Fox soils. A few areas have cobblestones or rounded glacial rocks, 6 to 10 inches in diameter, on the surface and through the soil profile. The depth to loose gravel and sand ranges from 25 to about 40 inches.

Use and management.—Less than half of this soil is cropped. The principal crops are grain and hay. Corn and small grains such as oats are not well suited to this soil because it holds so little moisture. Alfalfa and fall-seeded grain crops such as wheat, rye, and barley are best suited.

This soil is used and managed somewhat like Fox loam, 0 to 3 percent slopes, but yields are lower and more intensive practices are needed to conserve organic matter and moisture.

Oaktown Series

These are light-colored, loose, deep sandy soils developed from wind-deposited fine sand. The soils occur on undulating to rolling dunes and troughs and small flat areas on the river terraces. The sand is 4 to 10 or more feet deep over porous gravelly and sandy alluvium. Internal drainage through this material is very rapid. Hardwood forests, consisting mostly of oak and hickory, covered the dunes before the area was settled.

Oaktown loamy fine sand, 3 to 8 percent slopes (Oa) (Management group 3).—This soil occurs on low dunes and on foot slopes on the windward side of higher dunes. The sandy parent material contains a variety of minerals but is mostly quartz. It contains very little potassium or organic matter. Organic matter decomposes very rapidly because the soil is so open to air and water.

Roots, air, and water easily penetrate the entire profile. Water drains through very rapidly; very little is retained to supply moisture to crops. Even short periods of dry weather cause drought damage to crops.

Even the depressions in this soil are well drained because of the underlying gravel and sand. In depressions the surface soil is deeper, darker colored, and more productive. Some areas are included that have a slightly finer textured subsoil that holds more moisture. Soils in these areas are slightly more productive.

Erosion by wind and by water has removed some surface soil in a few places, but the erosion problem is not generally serious. Water is rapidly absorbed, and the soil is coherent enough to resist wind erosion.

Profile in a cultivated area:

0 to 6 inches, brown loamy fine sand; low in organic matter; very weak medium granular structure; very friable; medium acid.
6 to 12 inches, grayish-brown or light yellowish-brown loamy fine sand; very weak coarse granular structure; nearly loose; medium acid.
12 to 30 inches, pale-brown or yellowish-brown loamy fine sand; nearly loose; medium acid.
30 to 75 inches, brownish-yellow loose loamy fine sand; contains thin and often discontinuous bands and lenses of very friable yellowish-brown heavy loamy fine sand to light fine sandy loam; medium acid in upper part, gradually changing to slightly acid in lower part.
75 inches +, pale-brown to light brownish-gray loose fine sand; usually neutral, but in some areas calcareous.

The depth, number, and thickness of the slightly finer textured bands in the 30- to 75-inch layer varies. Occasionally these bands occur within a depth of 24 inches.

Use and management.—Most of this soil has been cleared, and two-thirds of it is cropped. Corn, soybeans, wheat, alfalfa, and mixed hay are the main crops. Yields are low and depend on the moisture supply. The soil is well suited to special crops such as cantaloups, watermelons, early tomatoes, sweetpotatoes, raspberries, and grapes. Areas that are near markets can be used more profitably for raising special crops than for general farming.

This soil needs all the crop residues and green-manure crops that can be returned to it. Manure and nitrogen and potassium fertilizers should be used liberally.

Oaktown loamy fine sand, 8 to 12 percent slopes (Ob) (Management group 3).—This soil lies along the sides of dunes. The profile is like that of Oaktown loamy fine sand, 3 to 8 percent slopes. About one-third of this soil is moderately wind eroded, and in some small areas the subsoil is exposed. Most of the eroded areas are on the windward side of the dunes.

Use and management.—About half of this soil is cultivated, and about one-fourth is in permanent pasture. Crops and yields are like those on Oaktown loamy fine sand, 3 to 8 percent slopes. This soil is more intensively used for special crops because most of it occurs on warm south-facing slopes.

Contour tillage should be used, wherever possible, to limit water erosion; otherwise the sand may wash downhill along the wheel tracks.

Oaktown loamy fine sand, 12 to 25 percent slopes (Oc) (Management group 3).—This soil is like Oaktown loamy fine sand, 3 to 8 percent slopes, except that it is steeper and has been more eroded. The wind shifts the sand in a few areas.

Use and management.—The steeper areas of this soil have been kept in timber or in permanent pasture. Nearly half of the area is used for crops. Both rotation crops and special crops are grown. These areas are harder to till because of the steep slopes, but yields are only slightly lower than on the less strongly sloping soils. Permanent pastures are poor and have very low carrying capacity. Pastures can be improved by using lime and fertilizer and planting suitable grasses and legumes.

Ockley Series

The Ockley soils are the well-drained members of the catena that includes the imperfectly drained Sleeth soil and the very poorly drained Westland and Abington soils. Ockley soils occur on alluvial terraces and outwash plains, many of which are only slightly lower than the glacial till plain. Usually they lie 50 to 100 feet higher than the Fox soils. The topography is nearly level, except for a very slight slope downstream and mild slopes around old meander channels and kettle holes.

Surface drainage is slow, but internal drainage is good to excessive. There is little danger of erosion.

Originally these areas supported a heavy stand of oak, sugar maple, walnut, and beech.

Ockley silt loam, 0 to 3 percent slopes (Og) (Management subgroup 2A).—Profile in a cultivated area:

0 to 7 inches, brown smooth silt loam; moderate to weak medium granular structure; friable; medium acid to slightly acid.
7 to 12 inches, yellowish-brown or brown silt loam; moderate thin platy or coarse granular structure; friable; medium acid.
12 to 18 inches, yellowish-brown to dark yellowish-brown heavy silt loam to light silty clay loam; moderate fine subangular blocky structure; slightly firm; medium acid to strongly acid.
18 to 39 inches, strong-brown to reddish-brown silty clay loam or clay loam; moderate medium to coarse angular blocky structure; firm when moist, moderately plastic when wet, hard when dry; medium acid to strongly acid.
39 to 55 inches, yellowish-brown to reddish-brown sandy clay loam to heavy sandy loam; moderate coarse subangular blocky structure; firm when moist; medium acid.
55 to 63 inches, dark-brown to very dark grayish-brown clay loam to gravelly or sandy clay loam; considerably darker than horizon above; weak coarse to very coarse blocky structure; firm when moist, sticky when wet; slightly acid to neutral.
63 inches +, pale-brown or light brownish-gray stratified fine gravel and sand; loose; calcareous.

The surface soil is somewhat darker colored and deeper where the Ockley soil grades into the Longlois and Wea soils. The deposits of sand and gravel are shallow in many places. In some places they are completely leached of free lime. Loam glacial till lies at depths of 7 to 10 feet beneath this assorted material in some places; in such places the moisture supply is better than where the deposits of gravel and sand are deep.

The dark-colored layer just above the loose gravel and sand varies in color and thickness. Wedges of this layer extend deep into the gravel in some areas.

Use and management.—Since this soil occurs in large, uniform, level areas and is above average in fertility, nearly all of it has been cleared for cultivation. Corn, soybeans, wheat, and hay are the principal crops.

If the fertility has been built up to a high level, the moisture supply is the factor that limits corn yields. Enough moisture is available for oats, if they are seeded early in the spring. Alfalfa is well suited to this soil because it uses the available moisture effectively and produces large quantities of high-quality hay. Lime and fertilizer should be used on crops.

Ockley silt loam, 3 to 8 percent slopes (Oh) (Management subgroup 2B).—This soil occurs around drainageways and shallow kettle holes on the undulating outwash plains and terraces. It is like Ockley silt loam, 0 to 3 percent slopes, except that it is on steeper slopes. Surface drainage is rapid. Erosion is a serious danger if this soil is farmed intensively without special conservation practices.

Use and management.—Most of this soil has not been eroded, because it is still in timber or in permanent pasture. Areas that are cropped are not used as intensively as Ockley silt loam, 0 to 3 percent slopes. Yields may be slightly less because moisture is lost by runoff.

Contour tillage is necessary on this soil. Where the slopes border streams, contour tillage may control erosion. The slopes around kettle holes are hard to till on the contour. Such areas should be used for permanent pasture; and if they are cultivated, a long rotation should be used.

Ockley silt loam, 3 to 8 percent slopes, eroded (Oi) (Management subgroup 2C).—About two-thirds of this soil has been moderately eroded. The depth of the surface layer ranges from 3 to 8 inches, but in some spots the silty clay loam subsoil is exposed. Scattered gullies occur in many areas. Most of the gullies are shallow, but some have cut through the heavy subsoil into the loose gravel and sand beneath.

Use and management.—This soil has been intensively cultivated, although it is not suited to such use, and has eroded as a result. Yields are declining, and drought is a hazard to crops. Many of the permanent pastures are thin and weedy and low in carrying capacity.

Control of erosion and conservation of water are necessary to improve the productivity of this soil. Row crops should not be grown 2 years in succession.

Ockley loam, 0 to 3 percent slopes (Od) (Management subgroup 2A).—This soil developed from calcareous glacial outwash. The profile is similar to that of Ockley silt loam, 0 to 3 percent slopes, except that the surface soil is loam, the subsoil is clay loam to sandy clay loam, and the underlying material is more sandy and less gravelly.

The texture, color, and thickness of the layers vary, and also the depth to the parent material. Some small areas have more sand in the surface soil and less clay in the subsoil than is typical of this soil. In areas that border on the prairie, this soil is a little darker colored and contains more organic matter.

Use and management.—This soil is suited to and used for the same crops as Ockley silt loam, 0 to 3 percent slopes. Yields are slightly lower. This soil is so open and well aerated that organic matter decomposes more rapidly and the soil holds little moisture for plants. The soil dries out quickly and warms up rapidly in spring. Oats can be planted early enough so that the crop will mature before the summer droughts. Alfalfa is better suited to this soil than red clover because it makes better use of available moisture. The soil is deficient in potassium.

Ockley loam, 3 to 8 percent slopes (Oe) (Management subgroup 2B).—This soil occurs principally on the upper parts of slopes bordering drainageways and in small areas around kettle holes. It is like Ockley loam, 0 to 3 percent slopes, except that some surface soil has been lost by erosion. Small areas have a thin surface layer, and in a few places the subsoil is exposed.

Use and management.—This soil is used and managed in about the same way as Ockley loam, 0 to 3 percent slopes, except that it is less intensively cultivated. More of it is used for grass and timber and less for row crops. Crop yields are the same or slightly less than on the nearly level soil. Contour tillage, strip-cropping, grassed waterways, and cover crops are needed to control erosion.

Ockley loam, 3 to 8 percent slopes, eroded (Of) (Management subgroup 2C).—The surface layer of this soil is generally from 3 to 7 inches deep. The subsoil is exposed in many places, and a few shallow gullies have formed. Otherwise this soil is similar to Ockley loam, 0 to 3 percent slopes.

Use and management.—This soil is cultivated nearly as intensively as the level soil, and conservation methods are not generally practiced. Soil loss is continuing, and yields are declining. Fertility is low and the moisture-holding capacity is poor. Wheat and mixed hay are the best crops for this soil.

Octagon Series

Octagon soils are the well-drained soils of the catena that includes the moderately well drained Montmorenci soil, the imperfectly drained Otterbein soil, and the very poorly drained Chalmers soils.

Octagon silt loam, 3 to 8 percent slopes (Ok) (Management subgroup 1C).—This is a dark-colored, well-drained soil that occurs on the borders of the gently undulating prairies. The ground was once covered by grass and scattered oak and hickory trees. The parent material was friable calcareous loam till, which had been leached of free lime carbonate to depths of 24 to 42 inches.

This soil, in surface color and other characteristics, is intermediate between the Parr soils of the prairie and the Miami soils of the forest.

Profile in a cultivated area:

0 to 7 inches, very dark grayish-brown silt loam; moderate medium granular structure; friable; relatively high in organic matter; medium acid to slightly acid.
7 to 11 inches, brown to yellowish-brown silt loam; weak thin platy or coarse granular structure; friable; medium acid.
11 to 17 inches, yellowish-brown to dark yellowish-brown light silty clay loam to heavy silt loam; moderate fine subangular blocky structure; slightly firm; medium acid.
17 to 23 inches, yellowish-brown to dark yellowish-brown silty clay loam to clay loam; moderate medium to coarse subangular blocky structure; firm; medium acid.
23 to 28 inches, dark yellowish-brown to dark-brown clay loam; weak coarse subangular blocky structure; firm when moist, plastic and sticky when wet, hard when dry; slightly acid to neutral.
28 inches +, brown to light brownish-yellow loam glacial till; calcareous.

Where this soil grades to Parr soils, the surface color is darker than normal; where it grades to Miami soils, the color is lighter. Where this soil is associated with the Mellott and Sidell soils, the upper part is smooth and free of sand and the depth to limy material is more variable. The depth to calcareous till varies from 24 to about 42 inches. A few acres have a loam surface layer.

Use and management.—Nearly all of this soil has been cleared, and most of it is cultivated. Corn, soybeans, and small grains have been the principal crops in the past, but continuous cropping has depleted the organic-matter supply and diminished the fertility of the soil, and the trend is toward more livestock and less grain. Liming, liberal fertilization, contour tillage, and sodded waterways are all needed to retard erosion and improve productivity. Rotations should include more grass and legume crops than row crops.

Octagon silt loam, 3 to 8 percent slopes, eroded (Ol) (Management subgroup 1D).—This soil occurs on the more strongly sloping areas along drainageways. It is like Octagon silt loam, 3 to 8 percent slopes, except for the effects of erosion. From one-third to three-fourths of the surface soil has been lost. Only about 3 to 8 inches of the original surface soil is left. In many places subsoil material has been mixed with the remaining surface soil by tillage. In these places the plow layer is lighter colored than normal, the texture is somewhat clayey, the organic-matter content is lower, and tilth is poorer. This soil is less strongly acid than the uneroded phase.

Use and management.—Intensive use of this soil for grain farming has contributed to the erosion problem. Corn and wheat are the principal crops. Yields have declined because of erosion.

Odell Series

Odell silt loam, 0 to 2 percent slopes (Om) (Management subgroup 8A).—This is an imperfectly drained soil that occurs in small slightly elevated areas on the nearly level prairie upland. Most of it is less than 2 feet higher than the former marshland. It is intricately associated with the very poorly drained Chalmers and Romney soils of the broad flats and depressions and with Parr and Corwin soils on the higher knolls. Surface drainage is slow because the slope is so slight. Internal drainage is retarded by the slowly permeable subsoil and by the low position of the soil. This soil developed under wet prairie vegetation that consisted of bluejoint, sloughgrass, bluestem, and sunflowers.

Profile in a cultivated area:

0 to 7 inches, very dark grayish-brown to very dark brown silt loam; high in organic matter; weak to moderate medium granular structure; friable; medium acid to slightly acid.
7 to 11 inches, very dark brown to very dark gray silt loam; moderate coarse granular structure; friable; lower part may be slightly mottled with yellowish brown; medium acid.
11 to 17 inches, mottled yellowish-brown and gray light silty clay loam; moderate fine subangular blocky structure; firm; many of the structure aggregates have a thin dark-gray coating; medium acid.
17 to 30 inches, mottled gray, yellowish-brown, and brownish-yellow silty clay loam or heavy clay loam; moderate medium and coarse subangular structure; very firm when moist, plastic when wet, hard when dry; medium acid in upper part, but gradual change to slightly acid or neutral in lower few inches.
30 inches +, mottled gray and yellow loam to coarse clay loam glacial till; calcareous.

The depth to calcareous till ranges from 22 to about 40 inches. The color of the surface soil is somewhat lighter where this soil grades to the Otterbein soil. Where it grades to the Raub soil, the uppermost 6 to 20 inches of material contains silt, which was probably deposited by the wind. In the northwestern part of the county, areas of this soil are more sandy in the surface and subsoil than typical. In some places the depth to calcareous till is more than 40 inches.

Use and management.—Use and management of this soil is usually controlled by the use made of the surrounding Chalmers soils. Most of it is cultivated, usually to corn and soybeans. Corn yields are lower than on the associated Chalmers soil, because this soil has less nitrogen and poorer tilth. Most areas have been drained to some extent through the associated Chalmers soils. Additional artificial drainage may be needed, especially in rainy seasons.

Otterbein Series

Otterbein silt loam, 0 to 3 percent slopes (On) (Management subgroup 4A).—This soil developed from medium-textured glacial till that had been leached of free lime to depths of 22 to 40 inches. It occurs in areas where an oak-and-hickory forest has encroached on the border of the prairie. This soil is the imperfectly drained member of the catena that includes the well drained Octagon, the moderately well drained Montmorenci, and the very poorly drained Chalmers soils.

Profile in a cultivated area:

0 to 8 inches, very dark grayish-brown silt loam; moderate medium granular structure; friable; high in organic content; medium acid to slightly acid.
8 to 11 inches, grayish-brown to light brownish-gray silt loam; weak thin platy or coarse granular structure; friable; medium acid.
11 to 18 inches, mottled gray and yellowish-brown light silty clay loam; moderate fine subangular blocky structure; slightly firm; medium acid.
18 to 30 inches, mottled gray and yellowish-brown silty clay loam to heavy clay loam; moderate medium to coarse subangular blocky structure; firm when moist, hard when dry; lower few inches is usually dark brown and more plastic; medium acid above, grading to slightly acid or neutral in lower few inches.
30 inches +, mottled gray and brownish-yellow loam glacial till; calcareous.

The surface color is darker where this soil grades to Odell soils, and lighter where it grades to Crosby soils. The depth to mottled layers ranges from 6 to about 16 inches. The depth to calcareous till ranges from 22 to 40 inches. Where this soil is next to areas of Toronto or Raub soils, it may be capped by 1 to 2 feet of smooth silty material, and the depth to calcareous till may be as much as 45 inches.

Use and management.—The use and management of this soil are the same as for the associated Montmorenci silt loam, 0 to 3 percent slopes. Both surface drainage and internal drainage, however, are slower than for the Montmorenci soil. Artificial drainage is the first requirement for soil improvement.

Parr Series

These soils occupy conspicuous knolls and morainic ridges on the nearly level to gently undulating till plain. These knolls and ridges rise from a few feet to 20 feet or more above the surrounding level imperfectly and poorly drained soils. The parent material was medium-textured glacial till. The till is a mixture of clay, silt, and sand; it contains pebbles and fragments of granite, quartz, shale, and limestone.

On knolls, the slopes may run in several directions from the crest of the hill, but on the morainic ridges and along drainageways, slopes run in one direction. The soils are well drained. Runoff from these long gentle slopes may be rapid, particularly where this soil has been intensively used to grow grain. Moisture is readily absorbed, especially on the morainic ridges, where the soil is likely to be sandy. The original vegetation consisted of big bluestem, little bluestem, Indiangrass, and such plants as goldenrod and aster.

The Parr series is the well drained member of the catena which includes the moderately well drained Corwin, the imperfectly drained Odell, and the very poorly drained Chalmers and Romney series.

Parr silt loam, 2 to 5 percent slopes (Pd) (Management subgroup 6B).—This is the most extensive of the Parr soils. Most of it occurs on knolls about 2 to 4 feet higher than the general level of the till plain. Some areas occur on the crests and others on the foot slopes of the higher morainic ridges.

Profile in a cultivated area:

0 to 7 inches, very dark grayish-brown silt loam; weak fine granular structure; friable; high in organic matter; medium acid to slightly acid.
7 to 12 inches, very dark brown to very dark grayish-brown silt loam; moderate coarse granular structure; friable; high in organic matter; medium acid.
12 to 18 inches, dark yellowish-brown to dark-brown light silty clay loam; moderate fine subangular blocky structure; slightly firm; medium acid.
18 to 26 inches, dark-brown to yellowish-brown silty clay loam or clay loam; moderate medium and coarse subangular blocky structure; firm when moist, hard when dry; medium acid.
26 to 36 inches, dark-brown clay loam; moderate coarse subangular blocky structure; firm when moist; surfaces of many of the aggregates have a thin clayey coating that contains considerable organic matter; slightly acid to neutral.
36 inches +, yellowish-brown to brown loam glacial till; calcareous.

Where this soil grades to Octagon or Miami soils, the surface is lighter colored than that described. The depth to calcareous till ranges from 22 to about 40 inches. Areas next to areas of Sidell soils may have almost no sand in the upper part and no carbonate of lime to a depth of 3½ feet or more. The surface layers in such areas may have developed from windblown silt. Around the morainic ridges there may be considerable amounts of sand and other coarse-textured material.

Use and management.—About 80 percent of this soil is cropped. Corn, oats, wheat, soybeans, and sweetclover or alfalfa hay are the most common crops.

This soil is fertile and has good moisture-holding capacity. The chief problem is the danger of serious sheet erosion on the long slopes. This soil should not be fall-plowed, because of the erosion hazard. Terracing or stripcropping is required on long slopes. Contour tillage should be used wherever possible. Waterways should be sodded to prevent gullying.

Parr silt loam, 0 to 2 percent slopes (Pc) (Management subgroup 6A).—This soil is like Parr silt loam, 2 to 5 percent slopes, except that it is on nearly level areas. It is associated with other soils of the Parr catena near the morainic ridges, only 1 to 3 feet above the poorly drained soils.

Surface runoff is slow, but internal drainage is moderately good. Shallow beds of sandy to slightly gravelly assorted material or till occur below depths of 4 to 8 feet. This material provides good internal drainage but is not deep or coarse enough to reduce the water-supplying capacity.

Use and management.—This soil can be cultivated intensively because it is not in danger of erosion. It is fertile and well drained. Most of it is cultivated to corn, oats, soybeans, and wheat. Little of it is used for hay or permanent pasture. Its use is often controlled by the use made of adjoining soils. Yields are similar to those from Corwin silt loam, 0 to 2 percent slopes.

Parr silt loam, 2 to 5 percent slopes, eroded (Pe) (Management subgroup 6C).—Much of this soil has

lost from one-third to three-fourths of its surface layer. The very dark brown silt loam surface layer is generally 3 to 8 inches deep, but in places the silty clay loam subsoil has been mixed into the plow layer in tillage. As the clayey subsoil is plowed up, the soil becomes less permeable to moisture, runoff increases, erosion is accelerated, and the soil is more likely to be plastic and sticky when wet and to clod when dry. Erosion of the finer soil particles has left the small glacial pebbles in the soil; the quantity varies with the severity of erosion.

Use and management.—This soil is used more intensively than the normal Parr silt loam, 2 to 5 percent slopes. Corn is the principal crop. Yields are lower than on the uneroded soil.

Practices to control erosion and conserve moisture should be intensively applied. Rotations should consist largely of hay crops and pasture. Wheat is better suited than oats because it keeps the ground covered during winter. Alfalfa is a well-suited legume and should be included in the hay mixture.

Parr silt loam, 5 to 8 percent slopes, eroded (Pf) (Management subgroup 6D).—This soil is like Parr silt loam, 2 to 5 percent slopes, except that it is on steeper slopes and has lost a considerable amount of surface soil through erosion. The slopes are from 30 to 100 feet or more in length; many are irregular. The very dark brown surface soil is 3 to 8 inches deep, as a rule. In some small areas it is 12 to 14 inches deep, and in other places all of the surface soil has been removed by erosion. In places where the surface soil is less than 6 inches deep, the upper part of the lighter colored silty clay loam subsoil has been mixed into the plow layer. The soil in these spots absorbs less water, contains less organic matter, and provides a less favorable seedbed.

Use and management.—Nearly all of this soil is used for crops, along with the surrounding soils. The principal management problem is the control of erosion on the long or irregular slopes. Rotation should consist largely of hay crops.

Parr silt loam, 8 to 12 percent slopes, eroded (Pg) (Management subgroup 6F).—This soil occurs in small areas on short single slopes around the morainic ridges. It is associated chiefly with the less strongly sloping Parr soils. Runoff is rapid, and erosion is a serious danger when the soil is intensively cultivated.

The uppermost 10 or 12 inches of this soil is dark-brown to very dark brown gritty silt loam to heavy silt loam. The organic-matter content is lower than before the soil was eroded, and glacial pebbles are more common on the surface. The present surface layer is a mixture of subsoil and original surface soil.

Use and management.—Most of this soil is used for crops, principally corn and soybeans. Some is in pasture.

Parr silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded (Ph) (Management subgroup 6G).—The texture of the present plow layer of this soil ranges from silt loam to silty clay loam. The color is lighter and the organic-matter content is lower where the erosion is more severe. The subsoil is exposed over a considerable part of the area. Glacial pebbles are common on the surface.

Use and management.—Use of these areas is governed mostly by the use of associated soils. Nearly all of it is used for crops. Little attention is paid to conservation practices. Erosion is active and crop yields are declining. Long rotations that consist mostly of meadow crops are needed.

Parr loam, 2 to 5 percent slopes (Pa) (Management subgroup 6B).—This soil occurs on the higher morainic ridges and winding sandy ridges and on associated low knolls. It is like Parr silt loam, 2 to 5 percent slopes, except that the surface texture is loam and the subsoil contains more sand. The depth to calcareous till ranges from 30 to 50 inches.

The sand content and the organic-matter content of the surface soil vary. Where the surface soil is more open and permeable to water and air, the organic-matter content is lower. In some places the parent material was water-sorted sand and silt. In such areas the soil is more sandy than is typical and the carbonates are leached to greater depths.

One long ridge of loose, uniformly sorted, dark-colored, deep sandy soil, located in T. 24 N., R. 5 W., sec. 6, has been mapped with this unit, although the same type of soil was classified as Ade loamy fine sand elsewhere in Indiana. The soil on this ridge closely resembles Hagener loamy fine sand. It is much lower in moisture-holding capacity and fertility than the Parr loam.

Use and management.—Except for the more sandy areas, this soil is used and managed in about the same way as Parr silt loam, 2 to 5 percent slopes. Yields are slightly lower. About four-fifths of this soil is cropland. Corn, soybeans, and small grains are important crops. The higher and sandier areas are used for permanent pasture.

Drought-resistant crops like alfalfa, rye, wheat, and soybeans are better suited to this soil than corn, oats, or clover. Potassium is likely to be needed, especially on the sandy areas.

Parr loam, 2 to 10 percent slopes, eroded (Pb) (Management subgroup 6C).—This soil is similar to Parr loam, 2 to 5 percent slopes, except that some of its slopes range up to 12 percent, and it has lost from one-fourth to three-fourths of its surface layer by erosion. The present surface soil ranges from dark grayish-brown silt loam to yellowish-brown silty clay loam.

Use and management.—This soil gives lower yields, particularly of corn and soybeans, than Parr loam, 2 to 5 percent slopes; consequently, less of it is cropped and more of it is in permanent pasture.

Pettit Series

Pettit silt loam, 0 to 3 percent slopes (Pi) (Management subgroup 11C).—This moderately well drained soil developed in dark-colored alluvium washed from the prairie of the Wisconsin drift region. It is the principal soil along the upper stream courses. Downstream, where the well-drained Kaskaskia soils border the larger streams, this soil occurs on back bottoms. The natural vegetation was chiefly sloughgrass, sedges, rushes, willows, and other water-tolerant plants.

Profile under a cover of sod:

0 to 8 inches, very dark grayish-brown to black silt loam; moderate fine granular structure; friable; high in organic matter; medium acid to neutral.
8 to 22 inches, black heavy silt loam; moderate coarse granular structure; friable; medium acid to neutral.
22 to 48 inches +, very dark brown, mottled with gray and yellowish-brown, heavy silt loam; rests on glacial till at depths of 3 to 5 feet.

The glacial till restricts internal drainage. This soil varies in depth, texture, natural drainage, and organic-matter content. In some areas considerable fine sand is mixed into the soil. A few small marshy areas are imperfectly drained, and in these the soil is prominently mottled with gray, yellow, and brown within 10 to 15 inches of the surface.

Use and management.—Permanent pasture is the best use for this soil because the areas are small, irregular in shape, and poorly drained. Corn is the best suited row crop; it yields well if the soil is properly drained. Small grains are likely to lodge, and the grain is of poor quality because the soil contains too much nitrogen to be suitable for them. Many of the more poorly drained areas support a growth of willows and brush.

Much of this soil has been improved by building ditches to straighten stream channels and speed drainage. Pastures should be mowed to remove brush, willows, and weeds.

Randolph Series

Randolph silt loam, 0 to 3 percent slopes (Ra) (Management subgroup 4C).—This soil, developed from shallow deposits of glacial drift, is the imperfectly drained member of the catena that includes the well-drained Milton soils and the very poorly drained Millsdale soils. This soil resembles Homer soils, except that it overlies bedrock instead of limy gravel. In other counties where the Randolph series is mapped, the bedrock is limestone, but in Tippecanoe County it is shale.

Internal drainage is slow, because the water table is above the very slowly permeable bedrock. Surface drainage is also slow. The original vegetation was a mixed hardwood forest.

Profile in a cultivated area:

0 to 7 inches, grayish-brown to dark grayish-brown silt loam; organic-matter content is relatively low; medium acid to slightly acid.
7 to 10 inches, light brownish-gray to grayish-brown silt loam; weak thin platy to coarse granular structure; friable; medium acid.
10 to 15 inches, mottled yellowish-brown, brownish-yellow, and gray light clay loam or silty clay loam; moderate fine subangular blocky structure; firm; medium acid to strongly acid.
15 to 30 inches, mottled gray and yellowish-brown clay loam; moderate medium and coarse subangular blocky structure; firm to very firm when moist; contains a considerable quantity of partly weathered shale fragments, especially in lower part; medium acid to strongly acid.
30 inches +, brown, gray, or nearly black partly weathered shale that grades to shale bedrock.

In wooded areas the uppermost 2 to 3 inches is very dark grayish-brown silt loam, high in organic matter and slightly acid to neutral. The surface color is darker in areas that grade to the Millsdale soil. Depth to mottling ranges from 7 to about 18 inches. Rounded brown iron and manganese concretions, locally called "buckshot gravel," are present on the surface and through the profile in the more poorly drained areas. In some areas considerable sand has been deposited on the surface by floodwaters. The depth to bedrock varies from 18 to 42 inches.

Use and management.—More than one-fourth of this soil is used for timber and permanent pasture. All areas to be cropped need artificial drainage. Corn and soybeans are the principal crops. Oats and hay are also grown. Corn yields are low. Fall-seeded small grains and red clover are often winterkilled. For meadow crops, grass-legume mixtures are better suited than pure stands of clover. This soil is so hard to drain and so low in fertility that it is better suited to permanent pasture than to crops.

Raub Series

Raub silt loam, 0 to 2 percent slopes (Rb) (Management subgroup 8A).—This soil developed in material weathered from a layer of silt 18 to 42 inches deep that overlies glacial till. Normally this silt has been leached of carbonates. The glacial till consists of unassorted silt, clay, and sand, with which are mixed rock fragments, some derived from the local bedrock and some transported and deposited by glaciers. Free carbonates occur at depths of 42 to 70 inches.

This soil occurs on nearly level, slightly elevated areas on the prairie. It is intricately associated with the Chalmers and Romney soils which occur in depressions that were once marshy. The Dana and Sidell soils have developed in higher and better drained areas from the same parent material. All of these soil series belong to the same catena as the Raub series.

Both internal drainage and external drainage are slow. The original prairie sod was composed of big bluestem, little bluestem, Indiangrass, bluejoint, flowering plants, and some sedges and rushes.

Profile in a drained and cultivated area:

0 to 9 inches, black or very dark grayish-brown smooth silt loam; high in organic matter; moderate medium granular structure; friable; medium acid to slightly acid.
9 to 14 inches, very dark grayish-brown smooth silt loam; lower part contains slightly less organic matter than horizon above; moderate coarse granular structure; friable; medium acid.
14 to 22 inches, mottled gray and yellowish-brown light silty clay loam; moderate fine subangular blocky structure; slightly firm; dark organic coatings on the structure faces; medium acid to strongly acid.
22 to 34 inches, mottled gray, yellowish-brown, and brownish-yellow silty clay loam; contains some grit, sand, and glacial pebbles in the lower part; moderate medium to coarse subangular blocky structure; firm when moist, plastic when wet, hard when dry; medium acid.
34 to 47 inches, mottled gray and brownish-yellow clay loam; moderate coarse subangular blocky structure; firm; medium acid in upper part and gradually becomes neutral in the lower 2 or 3 inches.
47 inches +, mottled yellowish-brown and gray loam glacial till; calcareous.

The mantle of silt is 18 to 42 inches deep. In areas where it is thick, it may be calcareous just above the glacial till; such soils in more recent surveys have

been given the name of Flanagan silt loam.[4] Small isolated areas, usually less than 200 feet in diameter, have a compact silty clay subsoil at depths of 15 to 20 inches.

Use and management.—All of this land was brought under cultivation many years ago. Most of it is still used for crops, but some is in pasture. Corn, soybeans, oats, and wheat are the principal crops. Red clover, lespedeza, alfalfa, and timothy are common hay crops.

The wet areas should be drained by tile. The soil is relatively high in organic matter but is deficient in nitrogen and phosphorus.

Riverwash

Riverwash (Rc).—Riverwash occurs as islands or as gravel bars and sandbars in the rivers and larger creeks. It consists of gravel and rocks mixed with a little finer textured material.

Most of the areas lie only a few feet above the water when the streams are at normal level. A single flood may change the size and shape of an area considerably, or may wash it away entirely.

Use and management.—Areas of Riverwash support a scanty growth of willows and shrubs. The vegetation catches finer textured sediments, which may raise the level of the land enough so that it may eventually become suitable for cultivation. Most areas of Riverwash are not suited to any agricultural use.

Rodman Series

Rodman gravelly loam, 25 to 35 percent slopes (Rd) (Management subgroup 1H).—This dark-colored soil occurs on the steep breaks or escarpments of the gravelly terraces. It is between the Ockley soils of the higher terraces and the Fox soils of the lower terraces.

Runoff is very rapid from these steep slopes. Even under forest, the soil material is washed away too rapidly for a soil to form to normal depth. This soil is less than a foot deep. It is underlain by limy gravel and sand. The forest is mostly oak, hickory, and walnut.

The uppermost ⅛ to ¼ inch, in wooded areas, is well-decomposed leaf mold and other organic material. This is underlain to depths of from 6 to about 10 inches by dark-brown or very dark grayish-brown gravelly loam. Below this is dark-brown or yellowish-brown very gravelly loam, which grades into stratified gravel and sand. The two layers of gravelly loam are neutral in reaction, and the gravel-and-sand layer is calcareous.

A thin layer of heavy gravelly loam to light gravelly clay loam has developed above the loose gravel and sand in some of the more mildly sloping areas. Some areas have lost a large part of the dark-colored surface soil through erosion. Loam-textured glacial till is present on the lower slopes in some areas, especially on the slopes of the higher terraces; these areas would have been mapped separately as Hennepin soils if they had been large enough.

Use and management.—About half of this soil has been left in timber. About 10 percent is in crops, and the rest is permanent pasture. Crop yields are already very low and are likely to decline further if erosion continues. Pastures of Kentucky bluegrass produce a lush growth during the moist season in the spring but have low carrying capacity during the summer.

Romney Series

Romney silty clay loam, 0 to 2 percent slopes (Re) (Management subgroup 9A).—This very poorly drained soil occurs in the deeper parts of elongated swales and depressions and in kettle holes on the broad divides of the prairie upland. The parent material was glacial till of loam to light clay loam texture. The Romney soil usually occurs with and is surrounded by the very poorly drained Chalmers soils. It is also associated with members of both the Sidell and Parr catenas.

The native vegetation consisted of a dense growth of rushes, weeds, sloughgrass, and Indiangrass. Artificial drainage was necessary to make this soil suitable for cultivation. Many areas are still not well enough drained because the soil is slowly permeable and the slope gradient is slight. Some areas are too low to be drained by existing tile systems.

Profile in a drained and cultivated area:

0 to 6 inches, very dark gray to black silty clay loam; weak medium granular structure; firm when moist, plastic when wet; slightly acid to neutral.

6 to 15 inches, black silty clay loam; very weak coarse granular to nearly massive structure; firm when moist, plastic when wet, hard when dry; slightly acid to neutral.

15 to 20 inches, very dark gray and brownish-yellow silty clay loam to light silty clay; moderate coarse blocky structure; thin coating of organic matter on the structure faces and along vertical cracks; firm when moist, plastic when wet, hard when dry; neutral.

20 to 35 inches, gray or light-gray light silty clay to silty clay loam; faint yellowish-brown mottles and stains; weak medium prismatic to very coarse blocky structure; very firm when moist, very plastic when wet, very hard when dry; neutral to mildly alkaline.

35 to 50 inches, gray, mottled with yellowish brown and brownish yellow, fine silty clay loam to coarse silty clay; moderate very coarse blocky structure; very firm when moist, plastic when wet, hard when dry; neutral.

50 inches +, mottled gray and yellowish-brown loam to light clay loam glacial till; calcareous.

The combined thickness of the upper two horizons range from 14 to 20 or more inches. Depth to the calcareous till ranges from 42 to about 60 inches. The depth is greater in areas associated with members of the Sidell catena than in those associated with members of the Parr catena.

Use and management.—Nearly all of this soil is cultivated. About 10 percent is in pasture and other uses. Corn, soybeans, and oats are the principal crops. Corn yields well in dry years, but in wet years partial loss of the crop is common. Corn does not respond well to fertilizer because the soil is so wet that the roots grow only near the surface. Wheat and alfalfa are likely to be drowned out.

[4] The Flanagan series is extensive in Illinois, but it was not recognized in the classification scheme at the time Tippecanoe County was surveyed. Today small areas of this soil would be mapped. The thickness of the silt varies. Areas of Raub soils and Flanagan soils would intergrade so that it would be difficult to outline each precisely.

Meadows are generally weedy and poor in quality because the better legumes and grasses are often drowned out. A common meadow mixture consists of red clover and timothy seeded in the oats.

Drainage should be provided for the areas that are ponded after rains, if practical. It may not be possible to drain areas that are below large watersheds. Crops that are not likely to be injured by standing water are best. Potassium fertilizer may be necessary.

Ross Series

These soils are dark colored and well drained. They occur principally on high bottoms in the valleys of the larger rivers. They are occasionally flooded. These soils were derived from alluvial sediments washed from light-colored soils of the timbered uplands on glacial drift. Little sediment is now being deposited. The Genesee and Eel soils are associated with soils of this series.

Ross silty clay loam, 0 to 3 percent slopes (Rh) (Management subgroup 11B).—This is the most extensive of the Ross soils. It occurs principally on high bottoms and back bottoms. In cultivated areas the uppermost 8 inches is very dark brown silty clay loam, which dries to a dark grayish brown. If the soil is tilled at the right moisture content it is friable, but if it is worked when wet it forms hard clods. The subsurface soil, to a depth of 20 or more inches, is about the same color but is somewhat heavier and more compact. The subsurface layer grades into a brown to yellowish-brown silty clay loam subsoil. Thin layers of silty or loamy material may occur in the subsoil.

This soil is fertile and fairly high in organic matter. The reaction is neutral throughout. Where this soil grades to Genesee soils, the surface layer is not as dark colored nor as deep as is typical.

Use and management.—This soil was originally forested, but almost all of it is now cleared. About 90 percent of it is cultivated. More than 60 percent is used for corn. Yields are lower than on the associated Genesee soils. The supply of plant nutrients has been depleted by continued intensive cultivation, and not enough fresh sediment is deposited to renew the supply. Crop losses from overflow are small. Alfalfa is the principal meadow crop. Sweetclover is occasionally grown as an intercrop. All organic-matter residues should be returned to the soil after harvest, to improve the structure, and to increase the fertility of the soil.

Ross silt loam, 0 to 3 percent slopes (Rg) (Management subgroup 11B).—This soil occurs principally in the valleys of tributary streams. It is not so fine as Ross silty clay loam, 0 to 3 percent slopes, because it was derived from coarser sediments. It does not bake and harden when it dries.

The surface soil is a very dark grayish-brown friable silt loam, rich in organic matter. The depth of this layer varies from 15 to 20 inches or more. It grades into the friable yellowish-brown silt loam subsoil. This soil may have a slightly lighter colored surface layer than Ross silty clay loam, 0 to 3 percent slopes. The reaction is generally neutral; at depths of 4 feet or more, the soil may be slightly calcareous.

Use and management.—The crops grown and the yields obtained are similar to those on Ross silty clay loam, 0 to 3 percent slopes. Less of this soil is cultivated because it occurs in smaller areas.

Ross loam, 0 to 3 percent slopes (Rf) (Management subgroup 11B).—This soil occurs principally in the valley of the Tippecanoe River. It is open and permeable and is well aerated; consequently, organic matter decomposes rapidly and the soil is somewhat lighter colored than other Ross soils.

The surface soil to depths of 15 to 20 inches is dark grayish-brown loam. This grades to a yellowish-brown loam subsoil. Variable amounts of sand occur on the surface and as thin layers through the soil. In a few places the surface texture is fine sandy loam. In such areas, the soil is more open and permeable and the moisture-holding capacity is lower.

Use and management.—More than one-fourth of this soil is used for forest and pasture. The rest is cultivated. Corn is the chief crop. Small grains, alfalfa, and red clover are also grown. Yields are lower than on the other Ross soils. To increase yields, this soil needs management that will increase the organic-matter content, raise the fertility level, and improve the moisture-supplying capacity. Liberal fertilization with potash is necessary. Rotations should consist mostly of legumes.

Russell Series

This is one of the most extensive soil series in Tippecanoe County. Some of the Russell soils occur on low knolls and short ridges that slope gently in all directions to the nearly level till plain; others occur near drainageways, on stronger slopes that grade toward the stream. These soils developed from medium-textured, highly calcareous glacial till that was leached of free lime to depths of 42 to 70 inches or more. A thin mantle of silt, normally less than 40 inches deep, covers most of these soils. This silt was probably blown from nearby glacial stream valleys.

These soils are naturally well drained. They are associated with the light-colored imperfectly drained Fincastle soil, the poorly drained Delmar soil, and the dark-colored very poorly drained Cope, Brookston, and Kokomo soils.

Russell silt loam resembles Miami silt loam in many ways. The Russell soil is more acid. It is deeper over the limy till of the parent material than the Miami soil. Miami silt loam has grit and rock fragments in its top layer; the Russell soil has a uniformly silty surface soil, an upper subsoil that contains almost no grit, and a friable gritty horizon between the clayey subsoil and the underlying till.

The native forest, most of which has been removed, consisted of black walnut, sugar maple, black oak, white oak, American elm, and ash.

Russell silt loam, 3 to 8 percent slopes (Ro) (Management subgroup 1C).—This is an upland soil. Some areas border streams, and some are on gently undulating knolls and ridges on the divides between streams.

Profile in a cultivated area:

0 to 7 inches, brown to grayish-brown smooth silt loam; low in organic matter; moderate to weak medium granular structure; friable; medium acid to slightly acid.

7 to 11 inches, pale-brown to brown smooth silt loam; weak fine platy or moderate coarse granular structure; friable; in some areas the upper 3 inches is a "plow sole" compacted by heavy machinery; medium acid.
11 to 18 inches, yellowish-brown to dark-brown smooth light silty clay loam; moderate to strong fine subangular blocky structure; slightly firm when moist; medium acid to strongly acid.
18 to 28 inches, dark-brown or dark yellowish-brown smooth silty clay loam; moderate to strong medium blocky structure; firm when moist, slightly hard when dry; strongly acid to medium acid.
28 to 54 inches, dark yellowish-brown to dark-brown clay loam; moderate coarse subangular blocky structure; firm when moist, hard when dry; contains considerable grit and small rock fragments; medium acid to strongly acid in upper part, grading with depth to slightly acid to neutral in the lower few inches.
54 inches +, brown or pale-brown loam to light clay loam glacial till; calcareous.

In undisturbed wooded areas the surface 2 to 3 inches is very dark brown or very dark gray silt loam, relatively high in organic matter. The mantle of smooth silt is deeper on the nearly level areas and thinner on the sloping areas. It varies from a few inches to 40 inches in depth, but in places it is very thin or absent. Small areas that have lost some surface soil by erosion are included.

Some areas are on slopes of less than 3 percent; internal drainage is slow in these areas and the soil may be slightly mottled below a depth of 18 inches. The soil in these places resembles the Xenia soils, which are mapped elsewhere in Indiana.

Use and management.—Nearly 90 percent of this soil has been cleared of timber and used for crops and pasture. About two-thirds of it is in crops. Corn is the chief crop. It is usually grown in rotation with soybeans, wheat, oats, or meadow.

Alfalfa, red clover, alsike, and timothy are common hay and pasture crops on this soil. Lime and potassium are needed for good yields. Nitrogen should be applied to most crops.

Wherever possible, this soil should be tilled on the contour, or terraced. A good vegetative cover, including winter cover crops, should be maintained on areas where contour tillage is not feasible. Practices that will increase the organic-matter content and the moisture-holding capacity should be used.

Russell silt loam, 3 to 8 percent slopes, eroded (Rp) (Management subgroup 1D).—This soil is like Russell silt loam, 3 to 8 percent slopes, except that part of the surface layer has been removed by erosion. About 3 to 8 inches of the original surface layer remains over most of the area, but in some places all of it is gone and the yellowish-brown silty clay loam subsoil is exposed. The mixing of subsoil with the remnants of the surface soil during tillage makes the present plow layer more clayey and less permeable to moisture than that of the uneroded Russell silt loam.

Excessive use of this soil for clean-tilled crops has depleted the organic-matter content, lowered fertility, reduced the moisture-absorbing capacity, impaired tilth, and accelerated the loss of topsoil. Rill erosion along wheel tracks is common in areas that have been cultivated up and down the slope. Gullies 1 to 3 feet deep have formed in places; some cannot be crossed by tillage implements, but most can be filled in by plowing.

Use and management.—Nearly all of this soil has been cleared and cultivated. Some of the more severely eroded areas have reverted to pasture because yields were getting too low to be worthwhile. The pastures are of low carrying capacity; they need to be limed, fertilized, and reseeded to legumes.

Crop yields are much lower than on the uneroded phase of Russell silt loam. They could be improved by building up the organic-matter content and by adding lime and fertilizer. It is very important to prevent further erosion. Contour tillage and terracing are beneficial where practical. Waterways should be grassed to prevent gullying.

Russell silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded (Ru) (Management subgroup 1D).—These soils occur in many small areas around drainageways. They are so severely eroded that less than one-fourth of the original surface layer remains; in many places, part of the subsoil has been lost. What does remain of the original surface layer is less than 3 inches thick. The present plow layer is a mixture of subsoil and surface soil. It is yellowish-brown heavy silt loam to silty clay loam, which is plastic and sticky when wet and hard when dry. It forms a very poor seedbed. It absorbs water very slowly. It contains very little organic matter and is very low in fertility. Below the plow layer, the profile is like that of Russell silt loam, 3 to 8 percent slopes.

Use and management.—Yields have declined so much that some farmers are planting soybeans instead of corn on these soils, and using the poorest areas for permanent pasture. Many areas are included in fields of other soils and are used in the same way as the surrounding soils.

Continued use for clean-tilled crops will hasten the destruction of these soils. Contour tillage will help to control erosion, and productivity can be built up by liming and liberal fertilization. A 5-year rotation should include 3 years of an alfalfa-bromegrass mixture.

The larger and more eroded areas can best be used for woods or permanent bluegrass pasture. A good plant cover should be kept on the soil at all times.

Russell silt loam, 0 to 3 percent slopes (Rn) (Management subgroup 1A).—Except for slope, this soil is similar to Russell silt loam, 3 to 8 percent slopes. It occurs on the till plains bordering or near the streams. Permeable beds of sand and gravel lie in the glacial till at depths of 6 to 10 feet. These sand and gravel beds allow good drainage through the soil, but internal drainage is not excessive. Surface drainage is slow, and much of the rainfall is absorbed. There is little runoff and no serious erosion hazard.

In a few areas that border Fincastle silt loam, internal drainage is only moderately good and the subsoil is mottled gray and yellow within a depth of 3 feet. If these areas were large enough to map separately, they would be classified in the Xenia series. Xenia soils are now mapped separately elsewhere in Indiana, but they were not classified when Tippecanoe County was surveyed.

Use and management.—As this is a productive soil that has no serious limitations, it is used intensively.

Only 15 percent of it is used for woods or pasture. The most important crop is corn. Yields are higher than on other soils of the Russell series.

The management of this soil could be improved by rotating crops systematically and building up the organic-matter content so as to improve the structure and increase the moisture-holding capacity.

Russell silt loam, 8 to 12 percent slopes (Rq) (Management subgroup 1E).—This soil has the same characteristics as Russell silt loam, 3 to 8 percent slopes, except that the slopes are steeper and the profile layers are thinner. It occurs as long narrow strips along the courses of streams that cut into the till plain. The mantle of silty material is thin, and the sand and rocks of the glacial till are near the surface.

Runoff is rapid. If this soil is cultivated, erosion is likely to be severe.

Use and management.—Only about half of this soil has been cleared, and half of that is used for permanent pasture. Corn, oats, wheat, and mixed hay are grown on about 20 percent of the soil. Crop yields are lower than those on Russell silt loam, 3 to 8 percent slopes. Much of the water runs off, and fertility has been lowered somewhat by slight erosion.

This soil is too steep for intensive cultivation, and those areas now cropped are being damaged by erosion. Wheat and hay are better crops for this soil than corn or oats because they grow during the time of the year when moisture is plentiful, and they keep the soil covered for most of the year.

If this soil must be used for crops, contour tillage and terracing should be practiced, wherever possible, and waterways should be sodded. In areas that can be tilled on the contour, corn can be grown once in a 5-year rotation with 1 year of wheat and 3 years of an alfalfa-bromegrass mixture. Other areas should be used for permanent pasture or for a rotation consisting of wheat and an alfalfa-bromegrass mixture. Pastures should be limed and fertilized, and grazing should be controlled.

Russell silt loam, 8 to 12 percent slopes, eroded (Rr) (Management subgroup 1E).—This soil is similar to Russell silt loam, 3 to 8 percent slopes, except that it is steeper and has lost one-third to three-fourths of the surface soil over most of the area. The remaining surface soil in most places is 3 to 7 inches thick, but in many spots the subsoil is exposed. The soil occurs on short slopes or breaks around the heads of drainageways. Some of the slopes are steeper than 12 percent.

Use and management.—About 85 percent of this soil has been cleared and is used intensively for crops or pasture. The erosion was caused by intensive use of soil not suited to cultivation. Yields of crops are very low. Pasture stands are thin and weedy, and the carrying capacity is low.

Tillage should be on the contour wherever this soil is cultivated. Rotations should include nothing more intensively cultivated than wheat or hay. Severely eroded areas should be reforested or used for permanent pasture. Lime, fertilizer, and seeding of legumes are necessary to renovate permanent pastures.

Russell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded (Rv) (Management subgroup 1F).—Soils in this unit have lost, through erosion, 75 percent or more of their surface layer and, in many places, some of their subsoil. The present plow layer, a mixture of surface soil and subsoil, is heavy silt loam to silty clay loam. In a few places all of the subsoil is gone, and the calcareous parent material is at the surface. Many small stones lie on the surface where the silty and clayey material has been removed by erosion. Scattered gullies 1 to 3 feet deep occur. In a few places gullies are numerous.

Use and management.—This soil has been almost destroyed by erosion caused by intensive use of land not suited to grain or rotation farming. Nearly all of this soil is cleared and used for crops and pasture. Crop yields are too low for profitable farming.

This land should be used for permanent pasture and forestry. Areas that are gullied or very severely sheet eroded should be reforested. Permanent pastures of good quality can be established by using lime and fertilizer liberally and seeding suitable grasses and legumes.

Some of the less severely eroded areas can be used for hay if the stand is kept for a long time.

Russell silt loam, 12 to 25 percent slopes (Rs) (Management subgroup 1G).—Most of this soil lies just above areas of Hennepin loam, 25 to 50 percent slopes. It is like Russell silt loam, 3 to 8 percent slopes, except that the soil layers are thinner and the depth to parent material is less. In many places grit and pebbles occur on the surface and the soil is less than 36 inches deep over calcareous glacial till. In such areas this soil resembles the Miami soils. The steeper areas where this soil grades into the Hennepin soil may be slightly darker colored, may be neutral in reaction, and may contain considerable amounts of sand.

Runoff is very rapid. The erosion hazard is severe if the soil is cultivated.

Use and management.—A little of this soil is used to grow grain and hay, but most of it is in woodland or permanent pasture. If this soil is cropped, yields are high at first, but they decline rapidly because the organic-matter content and fertility are quickly depleted.

Permanent pastures are likely to be overgrazed during the hot, dry summer. When the pasture stand is reduced, the soil erodes readily.

Russell silt loam, 12 to 25 percent slopes, eroded (Rt) (Management subgroup 1G).—This soil has lost one-third to three-fourths of its surface layer through erosion, which was caused by overgrazing of permanent pastures and by cultivating hillsides that are too steep to be farmed. About one-third of this soil has never been cleared of timber, but it has eroded because woodland pastures were overgrazed and the ground cover was destroyed.

Use and management.—About one-fifth of this soil is used for grain and hay crops, but yields are so low that the soil should be returned to permanent pasture or to forest. Pastures of low carrying capacity should be treated with lime and fertilizer and reseeded to legumes.

Russell silt loam and silty clay loam, 12 to 25 percent slopes, severely eroded (Rw) (Management subgroup 1G).—Only a thin layer of the original surface soil remains on most of this mapping unit. In a few areas the subsoil is also gone and the limy parent material

is exposed. The texture of the present surface layer ranges from heavy silt loam to silty clay loam or clay loam.

Use and management.—These soils are intensively used, although they are not suited to cultivation. Nearly half of the acreage is in crops, but yields are low.

These areas are suitable only for permanent pasture and timber. More intensive use only increases erosion. The gullied and least productive areas should be reforested. The rest can be used for pasture if liberally limed and fertilized and seeded to a good mixture of grass and legumes.

Russell loam, 3 to 8 percent slopes (Ri) (Management subgroup 1C).—The color and arrangement of layers in this soil are like those of Russell silt loam, 3 to 8 percent slopes, but the texture differs. The surface soil and upper subsoil are loam in which considerable gritty material is mixed. There is little or no capping of windblown silt. The subsoil is mostly clay loam. The underlying calcareous glacial till, which occurs at depths of 42 to 72 inches, is usually more sandy and loamy than that under Russell silt loams.

This soil loses a considerable amount of water by runoff; consequently there is a moderate erosion hazard.

Use and management.—This soil is less productive than Russell silt loam, 3 to 8 percent slopes, and it is suited to fewer crops. More of it is used for timber and permanent pasture. It is well suited to alfalfa if properly limed and fertilized. Red clover is likely to be damaged by drought, especially on the sandy areas. Sweetclover is good, but it must be limed and otherwise well managed.

The organic-matter content of this soil should be increased by return of crop residues. The soil should be covered as much of the time as possible. Lime and fertilizer are necessary.

Russell loam, 3 to 8 percent slopes, eroded (Rj) (Management subgroup 1D).—This soil occurs in scattered areas that are closely associated with areas of Russell loam, 3 to 8 percent slopes. In most places the surface soil is 3 to 7 inches deep, but in many spots the clay loam subsoil is exposed.

Use and management.—This soil is eroded as a result of intensive cultivation. More corn and beans are grown than on the uneroded phase, although crop yields are lower. Meadows and pastures are generally weedy and less productive.

Wherever feasible, tillage should be on the contour and waterways should be grassed. Rotations should consist largely of meadow crops, especially if contour cultivation is not practical.

Russell loam, 8 to 12 percent slopes, eroded (Rk) (Management subgroup 1E).—This soil occurs in long narrow strips around drainageways. Most cleared areas have lost much of the original surface soil. The surface soil is now only 3 to 7 inches thick, and in some places the clay loam subsoil is exposed. A few gullies show in pastures.

Use and management.—The use of this soil is generally controlled by the use of surrounding soils. Most cleared areas either are or have been cultivated. Yields are low.

This soil is not suited to cultivation. Most of it should be used for pasture or forest. If any of it is cultivated, the crop rotations should consist mostly of meadow. Most of the pastures need improvement.

Russell loam and clay loam, 8 to 12 percent slopes, severely eroded (Rm and Rlc) Management subgroup 1F).—This soil has lost some of its surface layer and, in some places, some of its subsoil. The present plow layer ranges from loam to clay loam, depending on how much of the subsoil has been mixed into the surface layer by cultivation. Gullies up to 3 feet deep have been cut in many areas. Otherwise, this soil resembles Russell loam, 3 to 8 percent slopes, in everything except slope.

Use and management.—Nearly all of this soil is used for crops and pasture. Yields are low. Small grains and alfalfa hay are the chief crops. Much of the permanent pasture should be renovated to increase its carrying capacity. The gullied and least productive areas should be reforested. The rest should be used for permanent pasture.

Russell loam, 12 to 25 percent slopes, eroded (Rl) (Management subgroup 1G).—This soil occurs on the steeper slopes and long narrow breaks along the deeper stream valleys. It is associated with Hennepin loam, 25 to 50 percent slopes. It usually occurs upstream from the Hennepin soil and above it on the slope.

The profile of this soil is like that of Russell loam, 3 to 8 percent slopes, except that the horizons are thinner, the parent material is nearer the surface, the slopes are steeper, and the surface soil is more severely eroded.

The surface soil, over a considerable part of the area, is light-brown loam 3 to 8 inches thick. The subsoil, which is exposed where erosion is severe, is a yellowish-brown clay loam that allows free movement of moisture and roots. The subsoil becomes gritty with depth. Limy glacial till is the parent material; it occurs at depths of 3 to 4 feet or more. In a few places the parent material is less than 3 feet from the surface.

The soil on the steeper slopes, where it grades to the Hennepin soil, may be darker colored and nearly neutral in reaction. A few areas that have remained in forest may have 1 to 2 inches of dark grayish-brown loam at the surface.

Use and management.—Water runs off these steep slopes very rapidly, and erosion would be severe under cultivation. About one-third of the area has been kept in timber and is only slightly eroded. The soil is suited primarily to pasture and forest. If any of it is cultivated, wheat and alfalfa are the best crops.

Shadeland Series

Shadeland silt loam, 0 to 2 percent slopes (Sa) (Management subgroup 4C).—This is an acid, shallow soil developed from thin deposits of glacial drift that overlie acid shale and sandstone. It is imperfectly drained. It is associated with the well-drained High Gap soil and with soils of the Russell catena. The forest that originally covered it consisted of beech and maple trees.

The uppermost 6 to 10 inches is grayish-brown silt loam, medium to strongly acid and low in organic matter. The next layer is mottled gray, yellow, and yellowish-brown silty clay loam that extends to a

depth of 15 inches. Below this is mottled gray and yellowish-brown heavy silty clay loam to silty clay that is compact and relatively impervious to moisture and root movement. Boulders and round pebbles occur throughout these upper layers. At depths of 24 to 36 inches the material grades to partly weathered shale and sandstone that contains considerable clayey and silty material between the rock fragments. This layer grades to the unaltered bedrock.

This soil is strongly acid throughout. It is low in fertility. In woodland areas the uppermost 3 inches is dark grayish-brown silt loam.

Use and management.—Although it is best suited to forestry or pasture, about half of this soil is cropped to corn, grain, and meadow. Crop yields are low, and pastures have low carrying capacity. Artificial drainage of the more nearly level areas may be practical.

Shoals Series

Shoals silt loam, 0 to 3 percent slopes (Sb) (Management subgroup 11C).—This alluvial or bottom-land soil occurs in old bayous, meander channels, and depressed flats in the larger valleys. It is the imperfectly drained soil of the catena that includes the well drained Genesee soils, the moderately well drained Eel soils, and the very poorly drained Sloan soils.

The surface soil is grayish-brown silt loam about 10 inches deep. Beneath this is mottled gray, yellow, and brown silt loam to coarse silty clay loam that extends to depths of 3 feet or more. Both layers are neutral and well supplied with organic matter.

Nearly half of this soil in the Wabash Valley has a coarse silty clay loam surface soil and subsoil. Such areas are wetter than Shoals silt loam, because water moves through the soil more slowly.

Use and management.—Drainage is the principal management problem. It is difficult to get enough fall in tile lines or ditches to drain the soil. About one-third of the area is so hard to drain that it has been left in the native timber. The remainder is used for crops and pasture.

Crop yields are low except where the soil has been properly drained. Corn and soybeans are the most suitable field crops. Sedges and weeds are common in wet pastures. Pasture grasses that can grow on wet land, such as reed canarygrass, should be introduced.

Sidell Series

These dark-brown soils developed under dense sod in the humid prairie regions. The parent material consists of 16 to 40 inches of windblown silt over medium-textured, moderately compact glacial till. Most of the clay, silt, sand, and rock fragments of the till were moved in from elsewhere, but some shale and limestone from the underlying bedrock is mixed in; consequently, 18 to 25 percent of the material is free carbonate of lime.

These soils lie on slightly elevated knolls and ridges on the till plain. Slopes in some areas are long and gentle, but in other areas the slopes are irregular and complex. The simple, or one-way, slopes are mainly along the shallow drainageways.

These soils are rich in organic matter and have good natural drainage. The catena also includes the moderately well drained Dana soil, the imperfectly drained Raub soil, and the very poorly drained Chalmers and Romney soils. The original prairie vegetation consisted of big bluestem, little bluestem, Indiangrass, and forbs.

Sidell silt loam, 2 to 5 percent slopes (Sd) (Management subgroup 6B).—This soil occurs on low knolls and ridges throughout the prairie upland. Except along drainageways, the slopes are irregular, and water may run in several directions. The slopes, though gentle, may be as much as 300 to 500 feet long. During heavy rains, after the surface soil is saturated, runoff water develops considerable speed and carrying power. This is a serious erosion hazard when clean-tilled crops are grown. This soil is freely permeable to moisture, and both internal and external drainage are well established.

Profile in a cultivated area:

0 to 10 inches, very dark grayish-brown to very dark brown smooth silt loam; relatively high in organic matter; moderate medium granular structure; friable; medium acid to slightly acid.

10 to 14 inches, very dark grayish-brown smooth silt loam; relatively high in organic matter; moderate coarse granular structure; friable; slightly acid to strongly acid.

14 to 25 inches, dark-brown to dark yellowish-brown silty clay loam; moderate fine to medium subangular blocky structure; firm; medium acid to strongly acid.

25 to 35 inches, yellowish-brown to dark-brown silty clay loam; contains some gritty material, especially in lower part of the horizon; moderate medium to coarse subangular blocky structure; firm; medium acid to strongly acid.

35 to 55 inches, dark yellowish-brown clay loam; contains considerable grit and partly weathered rock fragments; moderate coarse subangular blocky structure; firm; medium acid to strongly acid in upper part, lower 2 or 3 inches slightly acid or neutral and slightly darker colored.

55 inches +, brown or pale-brown loam to light clay loam glacial till; calcareous.

The dark-colored surface soil ranges in thickness from 8 to about 15 inches (fig. 14). The silty mantle is from 18 to over 36 inches thick, and is normally thinnest on the westward slopes of knolls. In a few small areas the surface soil is a loam or fine sandy loam. Depth to calcareous till ranges from 42 to about 70 inches.

Use and management.—Most of this soil is used for rotation crops, principally corn and small grains. Because surface drainage is good on these low knolls, this soil is used for farmstead sites and for permanent pasture. Yields of corn, soybeans, and wheat are generally good. Oat yields are low, and wheat does not do well north of the Wabash River. Red clover and lespedeza are grown for hay and pasture. Alfalfa is a well-suited crop, but it is not generally grown in short rotations.

Erosion is a hazard on these long slopes. Where the slopes are simple, contour tillage, terraces, and stripcropping should be practiced to control erosion. Where the slopes are complex, these methods may not be feasible. In such places the soil should be kept under a plant cover as much as possible. Suitable rotations and practices that will increase the content of organic matter will help control erosion. Sod waterways should be established where shallow gullies have formed.

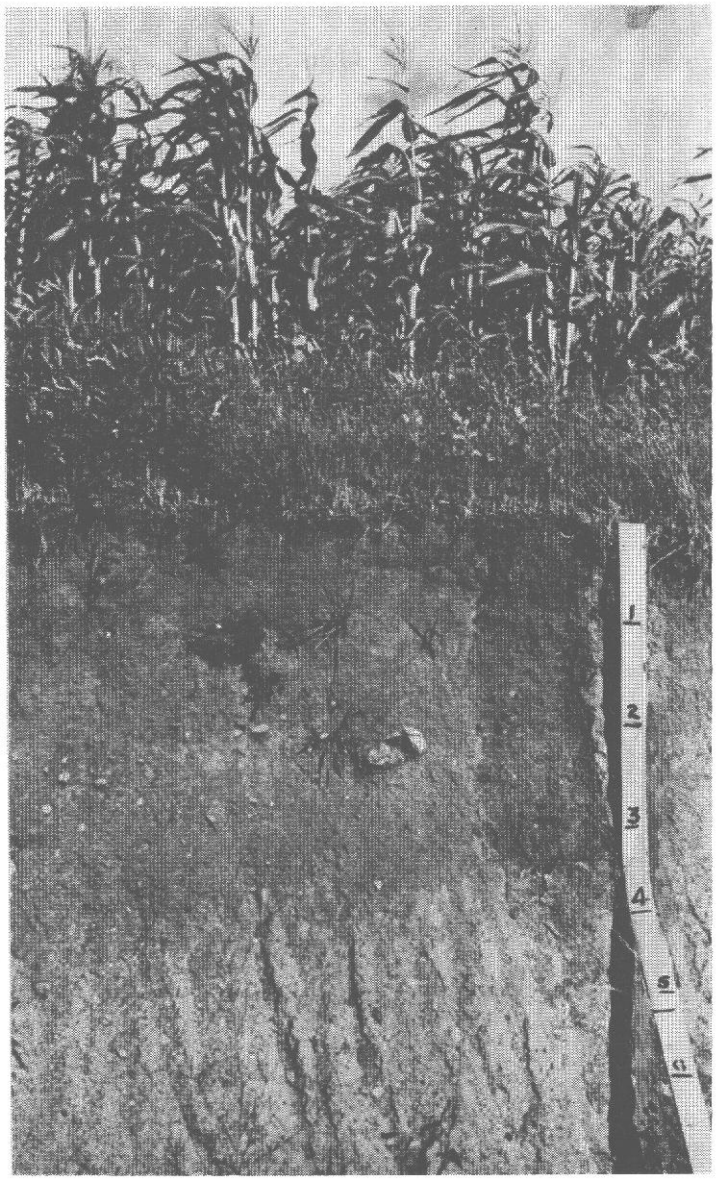


Figure 14.—**Profile of Sidell silt loam. Dark surface soil is more than a foot deep; stones are exposed at depths of 2 feet or more; calcareous glacial till lies at a depth of 4 feet.**

Sidell silt loam, 0 to 2 percent slopes (Sc) (Management subgroup 6A).—This soil is naturally well drained in spite of its nearly level relief. Surface drainage is slow, but internal drainage is well established, probably because of the beds of permeable sand or gravel at depths of 5 to 10 feet. This soil is associated with Dana, Raub, and Chalmers soils, and the mapping unit may include small areas of the associated soils.

The profile is about the same as that of Sidell silt loam, 2 to 5 percent slopes, but there is little hazard of erosion. Even where it has been intensively cropped, the surface soil is 12 to 15 inches or more deep. This soil holds a good supply of moisture for crops.

Use and management.—This level soil is suitable for more intensive use than the more strongly sloping Sidell soils. All of it can be used for rotation crops. Yields are slightly higher than on Sidell silt loam, 2 to 5 percent slopes, because no fertility is lost through erosion. Productivity is high, and improved management will further increase yields. Lime is needed for deep-rooted legumes.

Sidell silt loam, 2 to 5 percent slopes, eroded (Se) (Management subgroup 6C).—This soil is like the uneroded Sidell silt loam, 2 to 5 percent slopes, except that from one-third to three-fourths of the surface soil has been removed by erosion. The remaining surface soil is 3 to 7 inches deep in most places. Some areas are so severely eroded that the subsoil is exposed. Erosion is more severe on the crests of slopes. On the gentler foot slopes deep layers of surface soil washed from higher areas have accumulated.

Use and management.—Most of this soil is in crops, but some is used for permanent pasture and other purposes. Intensive cropping, mostly to row crops, removes organic matter faster than it can be restored. As the silty surface soil becomes thinner, more of the subsoil is plowed up and mixed into the surface layer. As more subsoil is mixed in, the plow layer becomes less permeable and, consequently, more water and soil are lost through runoff. The loss of readily available nitrogen and phosphorus reduces crop yields. Sheet erosion increases, rill erosion along wheel tracks occurs, and shallow gullies develop.

Terracing, stripcropping, and contour tillage should be used wherever possible. Grassed waterways should be established where gullies develop. Fewer row crops and more meadow crops should be grown in rotations. Lime, fertilizer, and all available organic matter and crop residues should be added to the soil.

Sidell silt loam and silty clay loam, 2 to 5 percent slopes, severely eroded (Sj) (Management subgroup 6E).—This soil occurs in small, scattered, and irregularly shaped areas on knolls and along drainageways. Most of it is on the crests of slopes. Runoff water flows rapidly and causes severe erosion of clean-cultivated soil. In most places, less than 3 inches of the original silt loam surface soil remains.

The remaining surface soil has been mixed with subsoil during tillage. The present plow layer ranges in texture from fine silt loam to silty clay loam. Tillage is difficult. The surface soil is plastic and sticky when wet, and it breaks into hard clods when dry. In some places most of the fine clay has been removed and only the pebbles, sand, and coarse material have been left. In the most severely eroded spots the limy parent material is exposed.

Use and management.—Despite active and destructive erosion and declining yields, this soil is intensively used. Nearly all of it is in crops, and the rest is in pasture. Its uses are controlled by the use of surrounding soils. Corn, soybeans, small grains, and hay are the usual crops. Yields are low because of the limited moisture supply, poor tilth, low organic-matter content, and low fertility.

It is important to use all erosion control practices possible. The organic-matter content should be built up by growing green-manure crops, by plowing under residues from crops, and by adding manure. Crop rotation should include few or no row crops and as many soil-building crops as possible.

Sidell silt loam, 5 to 8 percent slopes (Sf) (Management subgroup 6B).—This soil has a thinner silt mantle and a shallower profile than Sidell silt loam, 2 to 5 percent slopes. As a rule it is less intensively cultivated. Much of it is in permanent pastures, and the dense plant cover has retarded erosion.

Use and management.—This soil would erode if it were intensively cultivated. Use and management should be similar to that for Sidell silt loam, 5 to 8 percent slopes, eroded.

Sidell silt loam, 5 to 8 percent slopes, eroded (Sg) (Management subgroup 6D).—This soil is like Sidell silt loam, 2 to 5 percent slopes, except for steeper slopes and the effects of erosion. All but about 4 to 8 inches of the original surface layer has been washed away. The present plow layer is, in many small areas, a mixture of surface soil and subsoil. The present surface layer is a dark-brown or dark yellowish-brown silt loam to coarse silty clay loam. The surface soil and upper subsoil are relatively free of grit, but pebbles and small stones may be exposed in eroded spots.

Fertility has been reduced by erosion. Organic matter, nitrogen, and phosphorus have been lost. Some small areas are only slightly eroded. A few acres, which probably had more sand in the parent material, have a loam surface soil.

Use and management.—About half of the cropped area is used for row crops, and about half for small grains and hay. This is a high proportion of row crops for a soil that is so strongly sloping and so likely to erode. The trend is to return the soil to permanent pasture or to reduce the number of row crops and grow more small grains and hay. The management suggested for Sidell silt loam, 2 to 5 percent slopes, eroded, would also be good for this soil.

Sidell silt loam and silty clay loam, 5 to 8 percent slopes, severely eroded (Sk) (Management subgroup 6E).—This soil occurs along drainageways. In most places less than 4 inches of the original surface soil of very dark brown silt loam remains. Subsoil has been mixed with the original surface layer in tillage; consequently the plow layer is now lighter colored and finer textured than the original surface soil and has poorer tilth. The texture ranges from fine silt loam to silty clay loam, depending on how much subsoil has been mixed in. Where all of the surface soil and some of the subsoil are gone, pebbles and small stones are common. Many areas have a few shallow gullies.

Use and management.—More than 90 percent of this soil is cropped. Corn, soybeans, and small grains are the principal crops. Hay is also grown. Some severely eroded areas are used for permanent pasture, but the carrying capacity is low.

This soil is rather low in fertility because it has lost so much surface soil. Most of the readily available nitrogen and phosphorus are gone. Crop yields are low. Drought damages crops more on this soil than on the uneroded soils.

Sidell silt loam, 8 to 12 percent slopes (Sh) (Management subgroup 6F).—This soil occurs on the more strongly sloping areas along drainageways. The profile is like that of Sidell silt loam, 2 to 5 percent slopes, in many characteristics, but the surface soil is lighter brown and probably contains less organic matter. This soil contains more sand and glacial rock material than Sidell silt loam, 2 to 5 percent slopes. The limy parent material is nearer the surface.

Use and management.—Most of this soil has been cultivated at some time and has been somewhat eroded. It has not been cropped for a long time and has been protected by a thick plant cover. Although no erosion has taken place recently, it would be a serious hazard if this soil were used intensively. It would be suited only to long rotations of wheat and hay, or to permanent pasture.

Sidell silt loam, 8 to 12 percent slopes, eroded (Si) (Management subgroup 6F).—Moderate erosion has occurred on this soil. The surface layer ranges from 3 to 8 inches in thickness. Some small severely eroded areas where the subsoil has been plowed up show as yellowish-brown spots in the dark-brown fields.

Use and management.—This soil should be used for wheat, hay, or permanent pasture.

Sidell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded (Sl) (Management subgroup 6G).—These soils have lost most of the surface soil and some subsoil through erosion. In most places, less than 3 inches of the original silt loam surface soil is left, and some of the yellowish-brown silty clay loam of the subsoil has been mixed into the plow layer. In a few places even the subsoil is gone and the calcareous till beneath is exposed. Fragments of rock are common in the more severely eroded areas.

Use and management.—This soil occurs in small areas within cultivated fields. Since its use is controlled chiefly by the use of surrounding soils, it is intensively cultivated. Corn and small grains are the principal crops.

No measures have been taken to control erosion. Crop yields are low and declining. Permanent pasture or long rotations of wheat and hay would be better uses for this soil. Improved management practices suggested for other soils of this series would apply to this soil.

Sleeth Series

Sleeth silt loam, 0 to 3 percent slopes (Sm) (Management subgroup 4B).—This soil occurs on the higher alluvial terraces and outwash plains. It developed in silty and sandy deposits that are 42 to 72 inches deep over calcareous sand and gravel. It is more acid and more deeply leached than the Homer soil. The Sleeth soil occurs in level to slightly depressed positions between the Ockley and Westland soils. It is the imperfectly drained member of the catena that includes these soils and the Abington soil.

Surface drainage is slow. Most of the areas have now been artificially drained for crops, but the natural water table was near the surface much of the time. A heavy forest of water-tolerant trees, chiefly beech, maple, sycamore, ash, elm, and swamp white oak, originally covered the soil.

Profile in a cultivated area:

0 to 8 inches, grayish-brown to light grayish-brown smooth silt loam; organic-matter content relatively low; weak medium granular structure; friable; medium acid to slightly acid.

8 to 11 inches, gray to light grayish-brown silt loam; weak platy to moderate coarse granular structure; friable; medium acid.
11 to 17 inches, mottled gray and yellowish-brown light silty clay loam; moderate fine subangular blocky structure; slightly firm; medium acid to strongly acid.
17 to 30 inches, mottled gray, yellowish-brown, and brownish-yellow silty clay loam; moderate medium subangular blocky structure; firm when moist, plastic when wet, hard when dry; medium acid to strongly acid.
30 to 60 inches, mottled yellowish-brown and gray sandy clay loam, clay loam, or heavy loam; sand and gravel content usually increase with depth; weak coarse subangular blocky structure; firm; medium acid in upper part, grading to slightly acid or neutral in lower 2 or 3 inches; the lower few inches is often darker colored than the rest of the layer.
60 inches +, pale-brown or light brownish-gray stratified gravel and sand; calcareous.

Depth to mottling varies from 7 to about 16 inches. The stratified gravel and sand is underlain by loam till at depths of 7 to 10 feet in some areas. In some other areas, where till occurs at relatively shallow depths, the stratified gravel and sand is noncalcareous. Included with this separation are several areas on high bottoms that are closely associated with the alluvial soils. In these places the soil is only slightly acid, and the subsoil is not so fine textured nor so well developed. These areas are infrequently flooded. Some areas have loam surface soils.

Use and management.—Crops and yields are similar to those on Homer silt loam, 0 to 3 percent slopes. Corn, soybeans, wheat, and hay are the usual crops.

If adequately drained, limed, and fertilized, this soil is well suited to soybeans, small grains, and mixed legumes for hay.

The soil can be drained by lowering the water table by means of open ditches. Tile drainage is satisfactory if the tiles are laid where the soil is moderately clayey. If the soil is sandy, the tiles fill with sand or get out of line.

Sloan Series

These soils occupy swales and depressions in stream bottoms. They are occasionally flooded, and some alluvial material is deposited. These lighter colored alluvial deposits have been mixed by tillage with the dark-colored soils. The resulting surface soil is slightly lighter colored and lower in organic matter, but it is more friable and has better tilth than the original soil.

Natural drainage, both surface and internal, is very poor. The soil may receive overflow water from the major streams or from small tributary streams. Some areas in the back bottoms next to the terraces are kept wet by seepage water from the gravel plains above. The native vegetation on these soils was swamp timber, such as sycamore, cottonwood, and willow trees.

Sloan silty clay loam, 0 to 3 percent slopes (So) (Management subgroup 9C).—This soil occurs in the deeper depressions where water is often ponded. The alluvial sediments from which the soil formed were medium to fine in texture.

Profile in a drained and cultivated area:

0 to 9 inches, dark brown to very dark gray silty clay loam; organic-matter content varies but is usually relatively high; thin lenses of brown heavy silt loam may occur throughout this layer; weak medium granular structure; friable to firm; neutral.
9 to 20 inches, very dark brown to black silty clay loam; weak coarse granular to weak medium blocky structure; firm; neutral.
20 to 45 inches, gray, grading to mottled gray and yellowish brown, silty clay loam or clay loam; texture and color vary; content of sand and gravel varies but usually increases with depth; neutral.
45 inches +, mottled gray and brownish-yellow stratified silt, clay, sand, and gravel; neutral to calcareous.

In the lower lying areas of this soil, there is more organic matter and the dark-colored layers are deeper. The subsoil is light gray in many places. Several areas are underlain by shale at 3 to 5 feet.

Use and management.—This soil is high in natural fertility. Nearly all of it has been cleared, drained, and cultivated. Corn, soybeans, hay, and pasture are the principal crops. Corn is grown several years in succession. Small grains are not well suited because of the flood hazard.

Drainage is the chief problem. Some areas are so low that it is difficult to find outlets for ditches or tile lines. Sweetclover is a more suitable legume than red clover or alfalfa because of the poor drainage. Potassium deficiency may limit corn yields on the wetter areas, especially where the soil is somewhat mucky or high in organic matter.

Weed control is a problem if corn is grown continuously. An occasional crop of soybeans, a small grain, or grass will help control weeds.

Sloan silt loam, 0 to 3 percent slopes (Sn) (Management subgroup 9C).—This soil normally receives larger deposits of alluvium than Sloan silty clay loam, 0 to 3 percent slopes. It is more frequently flooded, mostly by overflow from small tributary streams, but has better surface drainage.

The surface soil is mostly silty, but some spots are sandy or loamy. It is slightly lighter colored and is lower in organic matter than the surface layer of Sloan silty clay loam.

The subsoil varies. Generally it is stratified silt, loam, silt loam, and coarse clay loam and contains thin layers of sandy and gravelly material.

Use and management.—The management problems are about the same as those of Sloan silty clay loam, 0 to 3 percent slopes. Corn is the principal crop. Soybeans, oats, hay, and permanent pasture are also important. Yields are about the same as are obtained on Sloan silty clay loam.

Tippecanoe Series

Tippecanoe silt loam, 0 to 3 percent slopes (Ta) (Management subgroup 7A).—This dark-colored moderately well drained soil occurs on nearly level plains or terraces that border the marshes but are slightly elevated above them. The underlying material is stratified gravel and sand, which contains 15 to 25 percent free carbonate of lime.

This soil developed under a cover of bluestem prairie grasses. The organic-matter content is high. Mottling below 18 to 30 inches shows that internal drainage is moderately slow. The high water table is the result of the relatively low position and the lack of drainage outlets. This soil is the moderately well drained member of the catena that includes the well drained Wea

soils, the imperfectly drained Crane soil, and the very poorly drained Westland and Abington soils.

Profile in a cultivated area:

0 to 9 inches, very dark brown smooth silt loam; relatively high in organic matter; moderate medium granular structure; friable; medium acid to slightly acid.
9 to 16 inches, dark grayish-brown to very dark gray silt loam; moderate coarse granular structure; friable; medium acid.
16 to 24 inches, dark yellowish-brown to dark-brown silty clay loam; moderate fine to medium subangular blocky structure; firm; medium acid.
24 to 42 inches, mottled gray and yellowish-brown gritty silty clay loam; moderate medium to coarse subangular blocky structure; firm; medium acid.
42 to 60 inches, mottled gray and yellowish-brown clay loam containing a small amount of fine gravel; weak coarse subangular blocky structure; firm; lower few inches is darker colored and more plastic when wet; medium acid in upper part, grading to slightly acid or neutral in lower few inches.
60 inches +, pale-brown to light brownish-gray stratified gravel and sand; calcareous.

The thickness of the upper two horizons ranges from 12 to about 17 inches. Depth to mottling ranges from 15 to about 30 inches. Calcareous gravel and sand begin at depths between 44 and 70 inches. Several areas in the western part of the county, including those in the valley of Shawnee Creek, are underlain by stratified sand and silt instead of gravel and sand.

Use and management.—This soil is level and fertile. It is almost entirely cultivated. Corn is the most important crop; it is often grown 2 years in succession. Yields are similar to those on Wea silt loam, 0 to 3 percent slopes. Beans and wheat are common crops, and hay is also grown on this soil.

Drainage should be improved by draining the adjoining marshy soils. Lime is needed if legumes are grown.

Toronto Series

Toronto silt loam, 0 to 3 percent slopes (Tb) (Management subgroup 4A).—This soil developed in shallow deposits of smooth, silty, wind-transported material overlying glacial deposits of loam till that is calcareous at depths of 4 to 6 feet. It is associated with the well-drained Mellott soils on nearly level areas of the interstream divides, around the heads of drainageways. It also occurs next to prairies, in association with the very poorly drained Chalmers soils of the depressions and swales. In many places it adjoins and grades into areas of the light-colored Fincastle soil.

This is an imperfectly drained, dark-colored soil. Both surface drainage and internal drainage are slow. The original forest was thin and parklike; it was transitional between the dense forests and the prairie. The oaks and hickories in the native vegetation apparently had established themselves among the prairie vegetation several hundred years before this soil was cleared for cultivation.

Profile in a cultivated area:

0 to 8 inches, very dark grayish-brown smooth silt loam; relatively high organic-matter content; moderate medium granular structure; friable; somewhat lighter colored when dry; medium acid to slightly acid.
8 to 12 inches, grayish-brown smooth silt loam; moderate thin platy to coarse granular structure; friable; medium acid.
12 to 18 inches, mottled gray, yellowish-brown, and brownish-yellow, light silty clay loam; moderate fine subangular blocky structure; firm; medium acid.
18 to 35 inches, mottled gray and yellowish-brown clay loam or silty clay loam; moderate medium subangular blocky structure; firm when moist, plastic when wet, hard when dry; medium acid.
35 to 47 inches, mottled gray and brownish-yellow clay loam; contains considerable sand and partly weathered rock fragments; moderate coarse subangular blocky structure; firm; lower few inches is darker colored and more plastic than upper part of horizon; medium acid in upper part, grading to slightly acid in lower part.
47 inches +, pale-brown, mottled with gray, loam to coarse clay loam glacial till.

The thickness of the windblown silt (loess) ranges from about 15 inches to as much as 40 inches, and probably averages 24 inches. Depth to calcareous till ranges from 42 to 70 inches. Thickness of the dark-colored surface soil varies from 7 to about 11 inches. Where this soil grades to Fincastle soil the surface soil is thinner and lighter colored than is typical, and where it grades to Raub soils the surface soil is thicker and darker colored and the lighter colored subsurface layer is correspondingly thinner.

Use and management.—Most of this soil is cropland. Corn, soybeans, small grains, and hay are the principal crops. Corn is often grown 2 years in succession. Wheat is often seeded without a companion crop of grass and legumes. Yields have declined because of continued intensive cultivation.

The woodland areas of this soil should be cleared, drained, and cultivated. Some areas of cropland would be benefited by additional tile drainage. Practices that will increase the organic-matter content of the soil will help to increase yields. All crop residues should be returned to the soil, and cover crops, green-manure crops, and legumes should be included in the rotation. Lime will be needed if legumes are grown.

Warsaw Series

Most soils of the Warsaw series occur on the alluvial terraces. The underlying material is water-assorted gravel and sand, which may contain a few boulders. Although surface drainage is slow on the level areas, internal drainage is relatively rapid through the gravelly substratum. These soils grade into the light-colored Fox soils next to the terrace breaks or escarpments.

The kame phases of this series are widely scattered on knolls and winding ridges on the glacial till plain. Slopes are steep, and direction of slope varies within small areas. Both surface drainage and internal drainage are good to somewhat excessive. Relatively smooth and noneroded areas occur on ridgetops. The hillsides erode rapidly under cultivation. These kame phases are likely to be associated with Octagon and Mellott soils.

The Warsaw soils are dark colored and high in organic matter. They developed under grass. Some areas on the border of the prairie supported bur oaks and hickories.

Warsaw loam, 0 to 3 percent slopes (Wa) (Management subgroup 7B).—This phase occurs on the broad, nearly level terraces.

Profile in a pastured area:

0 to 7 inches, very dark grayish-brown loam; organic-matter content relatively high; weak medium granular structure; friable; medium acid to slightly acid.

7 to 14 inches, very dark brown loam; relatively high in organic matter; moderate coarse granular structure; friable; medium acid.
14 to 22 inches, dark-brown gravelly clay loam to clay loam; moderate medium subangular blocky structure; firm when moist, slightly plastic when wet, hard when dry; medium acid.
22 to 38 inches, dark-brown to dark yellowish-brown gravelly clay loam, clay loam, or heavy gravelly loam; moderately coarse to very coarse subangular blocky structure; firm when moist, plastic when wet, hard when dry; medium acid.
38 to 42 inches, very dark grayish-brown to dark-brown gravelly clay loam; darker colored than above horizon; organic coatings on some structure faces; weak coarse blocky structure; firm when moist, plastic and sticky when wet; slightly acid to neutral.
42 inches +, pale-brown stratified gravel and sand; calcareous.

The combined thickness of the uppermost two layers varies from 9 to about 16 inches. Where this soil grades to Fox soils the surface color is lighter than normal. Depth to calcareous gravel and sand ranges from 24 to about 44 inches. The quantity of gravel in the subsoil varies, but there is usually more in the lower subsoil than in the upper subsoil.

Use and management.—Near cities, these soils provide good sites for airports, urban construction, or industrial development. The limited supply of moisture is the principal problem in agricultural use. Much of this soil is used for permanent pasture.

Corn, beans, wheat, and hay are common crops on these areas. Soybeans, fall-seeded small grains, and deep-rooted legumes like alfalfa and sweetclover can use the available moisture more effectively than corn, oats, or other spring-seeded crops.

Management practices that will build up the organic-matter content are important on this soil. Proper liming and fertilization will build up the fertility. Some areas can be irrigated.

Warsaw loam, 3 to 8 percent slopes (Wb) (Management subgroup 7C).—This soil usually occurs on single slopes toward drainageways. Except for slope, this soil is like Warsaw loam, 0 to 3 percent slopes. Some small areas are slightly eroded, but erosion has not become a serious problem. Varying amounts of gravel occur on and near the surface in eroded areas.

Use and management.—Nearly one-fourth of this soil is used for corn. Half of the acreage is used for other cultivated crops. Control of erosion and improvement of the moisture-supplying capacity are the principal management practices. Tillage should be on the contour.

Warsaw loam, 3 to 8 percent slopes, eroded (Wc) (Management subgroup 7D).—Most areas of this soil are long narrow strips within fields of other soils. The profile is like that of Warsaw loam, 3 to 8 percent slopes, except that the dark-brown loam surface soil is only 3 to 8 inches deep over the brown gravelly clay loam subsoil. On the more strongly sloping areas, some spots have lost all of the surface soil.

Use and management.—Almost three-fourths of this soil is cultivated. Corn and wheat are the most important crops. Oats and soybeans are also common. Crop yields are lower, especially on the more eroded spots, than on uneroded Warsaw loam. Alfalfa is grown as a hay crop.

Row crops should not be grown on this soil 2 years in succession. Management requirements are about the same as for the other phases of Warsaw loam.

Warsaw loam, 8 to 20 percent slopes, eroded (Wf) (Management subgroup 7E).—This soil occurs on long narrow slopes, most of which are 12 percent or less, along drainageways. In many places it borders and grades into areas of Fox soils. It is like Warsaw loam, 0 to 3 percent slopes, except that the slopes are stronger, and the profile is shallower. From one-third to three-fourths or more of the original surface soil has been removed by erosion. A few gullies have formed. The present surface layer varies from dark-brown heavy loam to brown clay loam, depending on how much of the original surface soil remains. The texture is predominantly clay loam. The moisture-supplying capacity of the soil is impaired because the more absorptive surface soil has been lost and because runoff is rapid.

Use and management.—About half of this soil is cultivated, and the rest is used for pasture. Crop yields are very low. Wheat, alfalfa, and sweetclover are the principal crops. Sweetclover is well suited to this soil because its roots quickly penetrate the shallow, somewhat acid soil and reach the highly calcareous gravelly substratum.

Control of erosion is the principal management problem. Permanent pastures should be seeded to drought-resistant grasses.

Warsaw silt loam, 0 to 3 percent slopes (Wj) (Management subgroup 7B).—This soil is similar to Warsaw loam, 0 to 3 percent slopes, except that the surface soil is silt loam and the upper subsoil is silty clay loam in places. It holds more moisture than Warsaw loam and therefore is higher in productivity.

Use and management.—A considerable part of this soil has been used for urban development around West Lafayette. About half of this soil is cultivated. Corn, soybeans, wheat, and hay are the most common crops. Conservation of moisture is the principal management problem. Drought-resistant varieties of grain and hay should be used.

Warsaw silt loam, 3 to 8 percent slopes (Wk) (Management subgroup 7C).—This soil is like Warsaw silt loam, 0 to 3 percent slopes, except that it is steeper and somewhat shallower. It slopes gently and fairly uniformly toward the first bottoms or overflow areas.

Use and management.—More than half of this soil is cultivated. Some erosion has taken place, but it is easy to prevent further erosion by contour tillage.

Warsaw loam, 3 to 8 percent slopes, kame phase (Wd) (Management subgroup 7C).—This soil occurs on low knolls and on the tops and lower slopes of higher knolls and ridges. It is commonly associated with the Sidell soils of the Wisconsin till plain; in these areas, it has a thin mantle of silt that varies in thickness with the slope, the rate of runoff, and the degree of erodibility. Small areas occur in association with Parr soils.

This soil is located on glacial kames and moraines instead of on alluvial terraces. Otherwise it is similar to Warsaw loam, 0 to 3 percent slopes. Some areas have a surface layer of silt loam. The depth to calcareous gravel and sand varies more in this phase than in the other phases of Warsaw loam. Around the bases of the knolls and ridges the material is less well assorted and

may grade to loam glacial till like that beneath the associated Sidell and Parr soils, instead of to gravel and sand.

Use and management.—Most of this soil is used for cultivated crops; the rest is permanent pasture. Corn, wheat, and hay are the most common crops. Corn yields are limited by the moisture supply. Fall-seeded small grains and deep-rooted legumes make better use of the available moisture.

Contour tillage should be used wherever possible to conserve moisture and retard erosion. The moisture supply can be improved by building up the content of organic matter and by proper tillage. Pastures should be renovated and replanted to drought-resistant species such as birdsfoot trefoil and bromegrass.

Warsaw loam, 3 to 8 percent slopes, eroded kame phase (We) (Management subgroup 7D).—This soil occurs around the sides of low gravelly knolls and ridges. It is like Warsaw loam, 3 to 8 percent slopes, kame phase, but it has lost one-third to three-fourths of its original surface soil by erosion. Under cultivation the dark-brown surface soil is typically 3 to 7 inches thick, but in spots the yellowish-brown clay loam subsoil is exposed. Generally a little gravel is mixed into the clay loam, especially where the soil is more severely eroded.

Surface runoff from this soil is rapid. Conservation of soil and water is difficult because the soil occurs in small areas and on irregular slopes. If the soil is worked when wet it clods and forms a poor seedbed; this results in a thin stand and a low yield. This soil holds less moisture and is less productive than the uneroded soil.

Use and management.—About three-quarters of this soil is cultivated, and the rest is used for pasture. Corn, soybeans, wheat, and sweetclover are the principal crops. Fall-seeded small grains and deep-rooted legumes like alfalfa and sweetclover can use the limited moisture supply more effectively than corn, oats, or soybeans. There is enough moisture for wheat and rye, but they do not yield well because of the low fertility and poor tilth of the more severely eroded areas.

All conservation practices that will improve fertility, conserve moisture, increase organic-matter content, and retard erosion are urgently needed on this soil.

Warsaw loam, 8 to 12 percent slopes, kame phase (Wg) (Management subgroup 7E).—This soil occurs on the sides of the gravelly kames and moraines on the till plain. It is like Warsaw loam, 3 to 8 percent slopes, kame phase, except that it is steeper and shallower and contains more gravel throughout its profile.

Use and management.—This soil has not been seriously eroded because it is used chiefly for hay and pasture. Under cultivation, erosion would be severe and crop yields would be low. This soil should have a continuous protective cover of the crops that can most effectively use the limited supply of moisture.

Slopes are so irregular that contour tillage is difficult. If it is necessary to crop this soil, a rotation of wheat and 3 years of alfalfa-bromegrass meadow is suitable. Phosphorus and nitrogen should be applied to the wheat crop. Alfalfa will need to be fertilized with potassium.

Warsaw loam, 8 to 12 percent slopes, eroded kame phase (Wh) (Management subgroup 7E).—This soil is similar to Warsaw loam, 8 to 12 percent slopes, kame phase, except that it has lost one-third to three-fourths of its original surface soil by erosion. Only 3 to 7 inches of the original dark-brown loam surface soil remains. In the most severely eroded spots, some of the subsoil has been mixed with the remaining surface soil. The resulting plow layer is lighter colored and more clayey and somewhat gravelly in texture; it is less fertile and lower in moisture-supplying capacity.

Use and management.—Crop yields are lower than on the uneroded phase that has slopes of 8 to 12 percent. Permanent pasture is a good use for these areas. A long-time meadow that includes deep-rooted crops like alfalfa is also suited to this soil.

Warsaw loam, 12 to 25 percent slopes, eroded kame phase (Wi) (Management subgroup 2E).—This soil occurs on the steeper slopes of the higher gravelly knolls and ridges. The profile is like that of Warsaw loam, 3 to 8 percent slopes, kame phase, except that the horizons are thinner, and varying amounts of soil have been removed from the upper layers by erosion. The present surface soil ranges from 3 to 7 inches in thickness. On many of the more severely eroded spots the yellowish-brown gravelly clay loam of the former subsoil is exposed, and the reaction is neutral.

The vegetation on this soil was originally prairie grass, but an oak-hickory forest developed on many of the knolls. All of this forest has since been cleared. This allows rapid runoff and severe erosion when the soil is cultivated.

Use and management.—This soil is used both for permanent pasture and for cropland, but it is not as intensively cultivated as the less sloping Warsaw soils. Small grains and hay are grown more extensively than clean-tilled crops. Crop yields are lower and the erosion hazard is greater than on other Warsaw soils. This soil is best suited to mixtures of drought-resistant grasses and legumes in long-time meadows or permanent pastures. Alfalfa, bromegrass, bluegrass, and birdsfoot trefoil are suitable.

Warsaw silt loam, 3 to 8 percent slopes, eroded kame phase (Wl) (Management subgroup 7D).—This soil developed in a mantle of silt overlying sand and gravel.

Profile in a cultivated area:

0 to 8 inches, dark-brown silt loam to dark yellowish-brown silty clay loam; weak coarse granular to weak fine subangular blocky structure; friable to firm; slightly acid to medium acid.

8 to 16 inches, dark yellowish-brown to dark-brown silty clay loam; moderate medium subangular blocky structure; firm; medium acid.

16 to 40 inches, dark yellowish-brown gravelly clay loam to clay loam; gravel content usually increases with depth; weak coarse subangular blocky structure; firm; medium acid in upper part, grading to slightly acid or neutral in the lower part.

40 inches +, pale-brown stratified gravel and sand; calcareous.

The silt ranges from a few inches to as much as 24 inches in thickness. Depth to calcareous gravel and sand ranges from 30 to about 44 inches.

Use and management.—Intensive cultivation without conservation measures has caused severe erosion on

nearly all areas of this soil. This phase erodes more easily than Warsaw loam, 3 to 8 percent slopes, kame phase.

This soil is not extensive. Its use is likely to be controlled by the use of more productive soils with which it is associated. Most of it is cultivated, and the rest is in pasture. Corn and soybeans are the principal crops. Yields are low. Drought-resistant grasses and legumes in long-time meadows and permanent pastures are best suited to this soil.

Warsaw silt loam, 8 to 12 percent slopes, eroded kame phase (Wm) (Management subgroup 7E).—This soil is like Warsaw silt loam, 3 to 8 percent slopes, eroded kame phase, except that it is steeper and is shallower over loose gravel and sand.

Use and management.—About two-thirds of this soil is cultivated, and the rest is used for permanent pasture. Corn, wheat, and hay are the chief crops. A rotation that includes only wheat and hay would be better for controlling erosion.

Washtenaw Series

Washtenaw silt loam, 0 to 3 percent slopes (Wn) (Management subgroup 9A).—This soil occupies shallow to deep kettle holes and depressions that are widely scattered on the uplands. It developed from light-colored mineral soil material eroded from the surrounding terrace soils and upland soils and deposited over dark-colored soils such as those in the Brookston, Kokomo, and Westland series.

Natural drainage ranges from fair to poor. Water is likely to stand on the surface for several hours to several days after heavy rains. The native vegetation was forest of water-tolerant trees.

Profile in a cultivated area:

0 to 8 inches, grayish-brown or brown silt loam; organic-matter content varies but is usually moderate to low; weak medium granular structure; friable; slightly acid to neutral.

8 to 20 inches, grayish-brown to dark yellowish-brown silt loam to heavy silt loam; weak platy to very weak coarse granular structure; friable to firm; slightly acid to neutral.

20 to 33 inches, very dark grayish-brown silty clay loam or clay loam; organic-matter content high; weak coarse blocky structure; firm; neutral to slightly acid.

33 to 50 inches +, mottled gray and yellowish-brown heavy silty clay loam to heavy clay loam; weak very coarse blocky structure; very firm; neutral; grades to calcareous till.

The thickness of the two upper layers ranges from 10 to about 40 inches. The surface soil is loam in some areas. Areas associated with Ockley soils are slightly better drained than the others because they are underlain by gravel and sand.

Use and management.—Most of this soil has been cleared and is now cultivated. Artificial drainage is necessary to make this soil suitable for crops. Some of the kettle holes cannot be drained.

If drainage is fair, the use of the soil is determined by the use of the associated soils. Crop yields are similar to those on Brookston soils. Corn is the principal crop on the less well drained areas. Soybeans, oats, hay, and pasture are also important. Fall-seeded small grains and legumes like red clover and alfalfa may be injured by standing water or may be winterkilled.

This soil should be drained wherever drainage is economically practical. Excess water and soil material can be kept off these areas if an adequate plant cover is maintained on the surrounding slopes.

Wea Series

These dark-colored soils occur in broad glacial channels and outwash plains. They developed from silty material that is up to 20 inches thick over water-deposited loamy material and is underlain by stratified gravel and sand at depths of 42 to 70 inches.

These soils occur in large areas and are practically unmixed with other soils. The original vegetation was grass. Surface drainage is slow in most places. Internal drainage varies from moderate to moderately rapid, depending on the depth to and the thickness of the underlying gravel and sand.

Wea silt loam, 0 to 3 percent slopes (Wo) (Management subgroup 7A).—This is the most extensive phase of Wea silt loam. It occupies broad, nearly level areas.

Profile in a cultivated area:

0 to 8 inches, very dark brown silt loam; organic-matter content high; moderate fine to medium granular structure; friable; medium acid to slightly acid.

8 to 16 inches, very dark grayish-brown silt loam; organic-matter content slightly lower than in above horizon; moderate coarse granular structure; friable; medium acid.

16 to 21 inches, dark-brown silty clay loam; moderate fine subangular blocky structure; firm; medium acid to strongly acid.

21 to 29 inches, dark yellowish-brown silty clay loam; contains more sand than above layers; moderate medium subangular blocky structure; firm; medium acid to strongly acid.

29 to 57 inches, dark-brown sandy clay loam, heavy loam, or gravelly clay loam; weak coarse subangular blocky structure; firm; content of gravel usually increases with depth; lower few inches darker colored than upper part of horizon; medium acid to strongly acid in upper part, gradually changing to slightly acid or neutral in lower few inches.

57 inches +, grayish-brown or pale-brown loose stratified gravel and sand; calcareous.

Where this soil grades into Longlois or Ockley soils, the surface soil and upper subsoil are lighter colored and somewhat lower in organic matter. Some areas contain more sand and therefore have a loam surface texture. The depth to loose gravel and sand ranges from 42 to about 70 inches.

Use and management.—All of this soil can be cultivated, and most of it is. Relief is level, organic-matter content is high, and fertility is above average. All of the crops common to the county, except oats, are well suited to this soil. Corn, soybeans, oats, wheat, and mixed hay are the principal crops grown.

Conservation of moisture is the main management requirement. Drought-resistant crops should be favored. Oats do not use the available moisture as efficiently as fall-seeded wheat.

Wea silt loam, 3 to 8 percent slopes (Wp) (Management subgroup 7C).—Several small areas of this soil border kettle holes and shallow glacial drainageways. Slopes are short and irregular, and areas are small. The profile is similar to that of Wea silt loam, 0 to 3 percent slopes, but this soil is a little steeper and shallower. Some of the surface soil has been removed by erosion, and the subsoil is exposed in a few areas.

Use and management.—This soil is generally associated with Wea silt loam, 0 to 3 percent slopes, and its use is controlled by the use made of that soil. However, it is less intensively cropped. Yields are lower than normal in eroded areas.

Contour tillage should be used on this soil wherever it is practical. Fewer row crops and more meadow crops are best in the rotation.

Wea silt loam, 3 to 8 percent slopes, eroded (Wq) (Management subgroup 7D).—This soil occurs in small areas around kettle holes and shallow glacial drainageways. Intensive cropping has resulted in loss of the upper part of the surface soil. The remaining surface soil is generally from 3 to 8 inches thick, but in several small spots it is gone and the subsoil is exposed. Otherwise, this soil is like Wea silt loam, 0 to 3 percent slopes.

Use and management.—Most of this soil is cultivated—nearly half of it to row crops. It is not suited to such intensive use, but because it occurs in small areas, it is likely to be used according to the suitability of the soils around it. All practices suggested for the improvement and conservation of other Wea soils are applicable.

Westland Series

These soils are associated with soils of the Fox, Ockley, and Wea catenas. They lie in elongated swales and depressions. In most places the underlying material consists of assorted and stratified gravel and sand. In several small basins and old glacial channels the underlying material is mostly sand.

Natural drainage is very poor. All areas have to be artificially drained before they can be cultivated. Most of the soils were developed under a swamp forest of soft maple, elm, ash, and birch trees. In prairie areas, these soils supported sloughgrass, rushes, and reeds.

Westland silty clay loam, 0 to 3 percent slopes (Wt) (Management subgroup 9B).—Most areas of this soil occur on high outwash plains. A few small areas are associated with Fox soils on low terraces in the valleys of the larger streams.

Profile in a drained and cultivated area:

0 to 8 inches, very dark grayish-brown silty clay loam; moderate medium granular structure; firm; slightly acid to neutral.
8 to 16 inches, very dark grayish-brown to black silty clay loam weakly mottled with yellowish brown in lower part of horizon; weak coarse granular to weak fine subangular blocky structure; firm; slightly acid to neutral.
16 to 24 inches, mottled gray, brownish-yellow, and yellowish-brown heavy silty clay loam or heavy clay loam; moderate coarse blocky structure; very firm; slightly acid to neutral.
24 to 45 inches, mottled gray and yellowish-brown clay loam, silty clay loam, or gravelly clay loam; gravel content usually increases with depth; weak coarse blocky structure; very firm; neutral.
45 inches +, pale-brown or gray, mottled with brownish-yellow, stratified loose sand and gravel; calcareous.

The surface and subsurface layers are darker colored, thicker, and higher in organic matter where this soil is associated with Wea soils than where it is associated with Ockley and Fox soils. The depth to gravel and sand ranges from 40 to 60 inches or more; it is greatest where the soil is associated with Wea soils. Some areas are underlain by calcareous sand, silt, and clay. In other areas the gravel and sand are underlain by loam till at depths of 5 to 10 feet.

Use and management.—This soil has an abundant moisture supply and is high in natural fertility. If it is properly drained, it returns high yields of all crops.

Corn, soybeans, small grain, and hay are the principal crops. Corn is often grown 2 or more years in succession. Too intensive use may reduce the organic-matter content of the soil and result in lower crop yields.

Poor drainage is the chief limitation on production of crops. Wheat, red clover, and alfalfa are occasionally damaged by standing water. Wet areas may be deficient in potassium.

Westland silt loam, 0 to 3 percent slopes (Ws) (Management subgroup 9B).—This soil is like Westland silty clay loam, 0 to 3 percent slopes, except that the surface soil contains less clay. In many places the silt in the surface soil was washed onto this soil from higher terraces or uplands. In such areas the soil may be somewhat less fertile, lower in organic matter, and slightly to moderately acid in reaction.

Use and management.—Natural drainage is poor, but crops are less likely to be injured by standing water than crops on Westland silty clay loam, 0 to 3 percent slopes. Yields are about the same.

Westland loam, 0 to 3 percent slopes (Wr) (Management subgroup 9B).—This soil occurs principally in narrow swales and depressions. It is associated with the Fox soils. It has more sand and gravel on the surface and throughout the soil than Westland silt loam, 0 to 3 percent slopes, or Westland silty clay loam, 0 to 3 percent slopes. Calcareous gravel and sand normally occur within 3 to 4 feet. This soil is lighter colored and contains less organic matter than the other Westland soils.

Use and management.—Unless adequately fertilized, this soil is less productive under intensive farming than other Westland soils. Most of the swales in which it occurs are narrow and difficult to drain. Water seeps into the soil from the adjoining high terraces and uplands.

Because of its coarser texture, this soil is more likely to be deficient in potassium than the more clayey Westland soils. The soil is well suited to corn, but a legume should be included in the rotation every few years.

Wingate Series

Wingate silt loam, 0 to 3 percent slopes (Wu) (Management subgroup 1A).—This is a moderately well drained soil of the prairie borders. It developed in a mantle of silt, 18 to 40 inches deep, overlying glacial till of loam to light clay loam texture. The till becomes calcareous at depths of 42 to 72 inches.

This soil occurs on nearly level to very gentle slopes, between the imperfectly drained Toronto and the well-drained Mellott soils. These areas lie near, and slope toward, shallow streams and drainageways. Surface drainage is adequate, but internal drainage is moderately slow because the compact glacial till impedes the movement of water. Most of the original vegetation of scattered oaks and hickories has now been cleared.

Profile in a cultivated area:

0 to 7 inches, very dark grayish-brown smooth silt loam; organic-matter content high; moderate medium granular structure; friable; medium acid to slightly acid.
7 to 12 inches, dark grayish-brown to grayish-brown silt loam; weak thin platy or coarse granular structure; friable; medium acid.
12 to 18 inches, dark-brown smooth heavy silt loam to light silty clay loam; moderate fine subangular blocky structure; slightly firm; medium acid.
18 to 24 inches, yellowish-brown to dark-brown smooth silty clay loam; moderate medium subangular structure; firm; medium acid to strongly acid.
24 to 54 inches, mottled gray and yellowish-brown clay loam or silty clay loam; moderate coarse subangular blocky structure; very firm; medium acid to strongly acid in upper part, grading to slightly acid or neutral in lower part; lower few inches is darker colored than rest of layer.
54 inches +, pale-brown or brown, mottled with gray, loam to light clay loam glacial till; calcareous.

Where Wingate soils grade toward the soils of the Russell catena, the surface layer is lighter colored and thinner than typical, and the organic-matter content is lower. Where they grade to the soils of the Sidell catena, the surface layer is darker colored, thicker, and higher in organic matter. Depth to mottling ranges from 16 to about 30 inches. Depth to calcareous till varies from 42 to about 72 inches.

Use and management.—Most of this soil is planted to corn, soybeans, small grain, and hay. Corn and wheat are often grown more than 1 year in succession.

The topography is level, the supply of organic matter is moderate, and fertility is above average. Although fertility is declining in areas that are intensively cultivated, the average crop yields are slightly higher than on the associated Toronto silt loam, 0 to 3 percent slopes, because this soil is better drained. The practices that would improve the Toronto soil would also improve this soil.

Management of Soils

Table 6 lists the soils of Tippecanoe County by management groups and subgroups. For each subgroup it gives the chief management problems, the suitable crops and rotations, the requirements for lime and fertilizer, and other management needs.

The soils in any one subgroup have similar limitations, need about the same kind of management, and respond to that management in approximately the same way.

Some of the factors that must be considered in sound soil management are discussed in the following pages.

Crop Rotation

A suitable crop rotation, along with liming, fertilization, and protection from erosion or excess moisture, will provide good yields and conserve the soil. A rotation that will conserve organic matter and improve soil structure is especially important on light-colored loam and silt loam soils, eroded soils, sandy soils, and soils underlain by gravel or sand at 4 feet or less. Row crops take the most organic matter and fertility from the soil, close-growing crops take less, and legume-grass mixtures improve the fertility and increase the organic-matter content of the soil.

Table 6 gives suitable rotations for each management subgroup of Tippecanoe County, and supporting practices that should be used with these rotations. In the rotation suggestions in table 6, "R" stands for a row crop; "G" for a small grain; "M" for meadow, usually a legume-grass mixture; and (Sc) for sweetclover, sometimes mixed with other legumes and grass, sown with small grain, and plowed down. Each symbol indicates 1 year of the crop. The first rotation listed for each management subgroup is the most intensive one suitable under the conditions indicated.

The row crops most commonly grown in this county are corn and soybeans. Sweet corn, tomatoes, and potatoes are grown as specialty row crops. Wheat is the most commonly grown small grain; others are oats, rye, and barley. Meadows usually include one or more of the following grasses and legumes: Alfalfa, red clover, timothy, and Ladino clover. Alfalfa and bromegrass is a desirable but less common mixture. Sweetclover is often sown as a catch crop.

In a grain system of farming, a suitable rotation includes a high proportion of row crops and close-seeded grain crops and a small proportion of meadow crops. The organic-matter content must be maintained by liberal fertilization, the return of crop residues, and the use of cover crops and soil-improving crops. This system is practical only on farms that have large, level fields of fertile soils that are high in organic-matter content and have no serious problems of tilth or erosion. Most such areas are on the river bottoms, the prairies, or the level till plains.

For areas where fertility is low, erosion active, and soil tilth poor, a livestock farming system is more suitable. The meadow crops and cover crops that fit into such a farming system help to build up and maintain productivity and to control erosion. Mixtures of legumes and grasses provide the best pasture stands.

Legumes can be grown on most soils in Tippecanoe County if the soils have been adequately limed and fertilized, and drained where necessary. Sweetclover, grown as an intercrop with grain, is effective in replenishing the organic-matter content and adding nitrogen to the soil. Alfalfa, either alone or as an important part of a meadow mixture, is well suited to the excessively drained soils that have a small supply of moisture. It is also well suited to the well-drained but erodible soils, but a grass-legume mixture will give more complete ground cover and more effective control of erosion.

Liming

About 60 percent of the soils of Tippecanoe County are medium acid in reaction; the others are neutral to slightly alkaline (fig. 9). There are no very strongly acid soils in the county.

Most soils, as they develop, slowly become more acid. As long as a soil remains acid, plants cannot absorb all of the nutrients that are in the soil or that are applied in fertilizer. Acidity should be corrected so that the maximum benefit can be obtained from the application of commercial fertilizer, the growth of legumes, and other soil-improving practices.

TABLE 6.— *Use suitability and*

Management group and subgroup and soil type or phase	Chief management problems	Suitable crops	Suitable rotations [1]
			Without special practices for erosion control
Management group 1—Light-colored, well drained and moderately well drained, medium-textured soils of the uplands and terraces:			
Subgroup 1A—Level to gently sloping soils	No serious problems	All general crops of area.	R-R-G(Sc).
Glenhall silt loam, 0 to 3 percent slopes.			R-R-R-G-M-M-R-G(Sc).
Martinsville silt loam, 0 to 5 percent slopes.			R-R-G-M-M.
Martinsville loam, 0 to 5 percent slopes.			R-R-G-M.
Mellott silt loam, 0 to 3 percent slopes.			R-G-M.
Miami silt loam, 0 to 3 percent slopes.			
Montmorenci silt loam, 0 to 3 percent slopes.			
Russell silt loam, 0 to 3 percent slopes.			
Wingate silt loam, 0 to 3 percent slopes.			
Subgroup 1B—Level to gently sloping shallow soils	Shallowness; limited fertility; limited water-supplying capacity.	Small grains, meadow, pasture. Corn not well suited.	R-G-M-M.
High Gap silt loam, 1 to 8 percent slopes.			
Milton silt loam, 2 to 8 percent slopes.			
Subgroup 1C—Gently sloping soils	Moderate erosion hazard	General crops of area	R-G-M-M.
Mellott silt loam, 3 to 8 percent slopes.			
Miami silt loam, 3 to 8 percent slopes.			
Miami loam, 3 to 8 percent slopes.			
Octagon silt loam, 3 to 8 percent slopes.			
Russell silt loam, 3 to 8 percent slopes.			
Russell loam, 3 to 8 percent slopes.			
Subgroup 1D—Eroded gently sloping soils:			
Moderately eroded soils	Serious erosion hazard	General crops, but higher proportion of grass-legume meadows needed.	R-G-M-M-M.
Mellott silt loam, 3 to 8 percent slopes, eroded.			
Miami silt loam, 3 to 8 percent slopes, eroded.			
Miami loam, 3 to 8 percent slopes, eroded.			
Octagon silt loam, 3 to 8 percent slopes, eroded.			
Russell silt loam, 3 to 8 percent slopes, eroded.			
Russell loam, 3 to 8 percent slopes, eroded.			
Severely eroded gently sloping soils	Serious erosion hazard; low organic-matter supply; low fertility; poor tilth.	Principally long-term meadows and pasture.	G-M-M-M.
Mellott silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded.			
Russell silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded.			
Subgroup 1E—Slightly to moderately eroded sloping soils:			
Slightly eroded soils	Serious erosion hazard	Same	G-M-M-M.
Mellott silt loam, 8 to 12 percent slopes.			
Miami loam, 8 to 12 percent slopes.			
Miami silt loam, 8 to 12 percent slopes.			
Russell silt loam, 8 to 12 percent slopes.			
Moderately eroded soils	Serious erosion hazard	Same	G-M-M-M.
Mellott silt loam, 8 to 12 percent slopes, eroded.			
Miami silt loam, 8 to 12 percent slopes, eroded.			
Miami loam, 8 to 12 percent slopes, eroded.			
Russell loam, 8 to 12 percent slopes, eroded.			
Russell silt loam, 8 to 12 percent slopes, eroded.			
Subgroup 1F—Severely eroded sloping soils	Serious erosion hazard; low organic-matter supply; low fertility; poor tilth.	Same	G-M-M-M.
Mellott silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded.			
Miami silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded.			
Russell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded.			
Russell loam and clay loam, 8 to 12 percent slopes, severely eroded.			
Subgroup 1G—Eroded, sloping to moderately steep soils	Unfavorable slopes; serious erosion hazard when cleared of timber.	Same	Permanent pasture
Miami silt loam, 12 to 25 percent slopes.			
Miami silt loam, 12 to 25 percent slopes, eroded.			
Miami loam, 12 to 25 percent slopes.			
Miami loam, 12 to 25 percent slopes, eroded.			
Russell loam, 12 to 25 percent slopes, eroded.			
Russell silt loam, 12 to 25 percent slopes.			
Russell silt loam, 12 to 25 percent slopes, eroded.			
Russell silt loam and silty clay loam, 12 to 25 percent slopes, severely eroded.			

See footnotes at end of table.

management requirements

Suitable rotations [1] With special practices for erosion control	Initial lime requirement [2] per acre	Fertilization [3]						Other suggestions
		Common management [4]			Superior management [5]			
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	
	Tons	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	
No special erosion-control practices necessary.	2	20 on wheat	20	20	50 on corn, 20 on wheat.	25	40	Use for high acre-value crops such as corn, beans, and alfalfa.
No special erosion-control practices necessary.	1 to 3	20 on wheat	20	20	20 on wheat	25	40	Grow deep-rooted legumes and fall-seeded small grains to make best use of available moisture; increase the organic-matter supply.
R-R-G-G-M if contour tilled, R-R-G-M if stripcropped or terraced.	1 to 3	20 on wheat	20	20	50 on corn, 20 on wheat.	25	40	Till on contour, keep waterways sodded, and use other means of erosion control; increase the organic-matter content.
R-R-G-M-M if contour tilled, R-R-G-M if stripcropped or terraced.	2	20 on wheat	20	20	50 on corn, 20 on wheat.	25	40	Maintain a vegetative cover; use all suitable erosion-control practices; on slopes 200 feet or more in length use stripcropping or terracing, or both; to build up organic-matter content and reduce erosion, apply barnyard manure and grow green-manure crops.
R-G-M-M if contour tilled, R-R-G-M-M if stripcropped, R-R-G-M if terraced.	3	20 on wheat	20	25	20 on wheat	25	50	Same.
R-G-M-M-M if contour tilled, R-G-M-M if stripcropped, R-G-M-M-R-G-G(Sc) if terraced.	2	20 on wheat	20	25	20 on wheat	25	50	Same.
R-G-M-M-M if contour tilled or stripcropped, R-G-M-M if terraced.	2	20 on wheat	20	25	20 on wheat	25	50	Same.
G-M-M-M if contour tilled or stripcropped, R-G-M-M if terraced.	2	20 on wheat	20	25	20 on wheat	25	50	Return the more severely eroded areas to permanent pasture.
G-M-M-M if contour tilled or stripcropped.	1 to 2					20	20	Renovate permanent pastures whenever needed, if slope permits; reseed with legume-grass mixture of birdsfoot trefoil, bromegrass, Kentucky bluegrass, and orchardgrass; adopt rotation grazing program; control weeds in pasture.

TABLE 6.— *Use suitability and*

Management group and subgroup and soil type or phase	Chief management problems	Suitable crops	Suitable rotations [1]
			Without special practices for erosion control
Subgroup 1H—Steeply sloping soils	Same	Permanent pasture or timber.	Not suitable for crop rotations.
Hennepin loam, 25 to 50 percent slopes.			
Rodman gravelly loam, 25 to 35 percent slopes.			
Muskingum stony silt loam, 10 to 30 percent slopes.			
Management group 2—Well-drained and somewhat excessively drained medium-textured soils underlain by sand and gravel:			
Subgroup 2A—Level soils:			
Somewhat excessively drained soils	Moderate to low moisture-supplying capacity.	General crops of area	R-R-G-M-M.
Fox loam, 0 to 3 percent slopes.			
Fox silt loam, 0 to 3 percent slopes.			
Nineveh loam, 0 to 3 percent slopes.			
Well-drained soils	Moderate to good moisture-supplying capacity.	General crops of area	R-R-G-M-M.
Longlois loam, 0 to 3 percent slopes.			
Longlois silt loam, 0 to 3 percent slopes.			
Ockley loam, 0 to 3 percent slopes.			
Ockley silt loam, 0 to 3 percent slopes.			
Subgroup 2B—Gently sloping soils	Moderate to low moisture-supplying capacity; erosion hazard.	General crops of area	R-G-M-M.
Fox loam and silt loam, 3 to 8 percent slopes, kame phases.			
Fox loam, 3 to 8 percent slopes.			
Fox silt loam, 3 to 8 percent slopes.			
Ockley loam, 3 to 8 percent slopes.			
Ockley silt loam, 3 to 8 percent slopes.			
Longlois loam, 3 to 8 percent slopes.			
Longlois silt loam, 3 to 8 percent slopes.			
Subgroup 2C—Eroded gently sloping soils	Same	Most general crops of area. Oats not well suited.	R-G-M-M-M.
Fox loam, 3 to 8 percent slopes, eroded kame phase.			
Fox loam, 3 to 8 percent slopes, eroded.			
Ockley loam, 3 to 8 percent slopes, eroded.			
Ockley silt loam, 3 to 8 percent slopes, eroded.			
Longlois loam, 3 to 8 percent slopes, eroded.			
Longlois silt loam, 3 to 8 percent slopes, eroded.			
Subgroup 2D—Eroded sloping soils	Low moisture-supplying capacity; serious erosion hazard.	Wheat, fall-seeded grains, and deep-rooted legumes such as alfalfa and sweetclover best suited.	G-M-M-M.
Fox loam, 8 to 12 percent slopes.			
Fox loam, 8 to 12 percent slopes, eroded.			
Fox loam and clay loam, 8 to 12 percent slopes, severely eroded.			
Fox loam, 8 to 12 percent slopes, kame phase.			
Fox loam, 8 to 12 percent slopes, eroded kame phase.			
Subgroup 2E—Eroded sloping to moderately steep soils	Same	Grain and meadow crops. Permanent pasture and forests on the steeper and more severely eroded areas.	No cropping without erosion-control practices.
Fox loam, 12 to 25 percent slopes.			
Fox loam, 12 to 25 percent slopes, eroded.			
Fox loam, 12 to 25 percent slopes, kame phase.			
Fox loam, 12 to 25 percent slopes, eroded kame phase.			
Warsaw loam, 12 to 25 percent slopes, eroded kame phase.			
Management group 3—Excessively drained light- and dark-colored loose sandy soils.	Low moisture-supplying capacity, very low fertility, wind-erosion hazard.	Melons, raspberries and other brambles, early tomatoes, sweetpotatoes, rye, alfalfa-and-bromegrass meadow. Corn, oats, red clover, and soybeans not suited.	Melons, sweetpotatoes, rye intercrop, tomatoes. R-G-M-M-M.
Hagener loamy fine sand, 2 to 12 percent slopes.			
Oaktown loamy fine sand, 3 to 8 percent slopes.			
Oaktown loamy fine sand, 8 to 12 percent slopes.			
Oaktown loamy fine sand, 12 to 25 percent slopes.			
Management group 4—Level, imperfectly drained, medium-textured soils:			
Subgroup 4A—Soils on loam till	Poor drainage; erosion hazard.	General crops of area	R-R-G(Sc).
Crosby silt loam, 3 to 5 percent slopes, eroded.			R-R-R-G-M-M-R-G(Sc).
Crosby silt loam, 0 to 3 percent slopes.			R-R-G-M.
Fincastle silt loam, 0 to 3 percent slopes.			R-G-M.
Otterbein silt loam, 0 to 3 percent slopes.			R-R-G-M-M.
Toronto silt loam, 0 to 3 percent slopes.			

See footnotes at end of table.

management requirements—Continued

Suitable rotations [1]	Initial lime requirement [2] per acre	Fertilization [3]						Other suggestions
		Common management [4]			Superior management [5]			
With special practices for erosion control		N	P_2O_5	K_2O	N	P_2O_5	K_2O	
	Tons	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	
Not suitable for crop rotations.	0					20	20	Same.
No special erosion-control practices necessary.	0 to 3	20 on wheat	20	25	40 on corn, 20 on wheat.	25	50	Plant drought-resistant crops, such as alfalfa, bromegrass, wheat, and soybeans; irrigate if possible; increase the organic-matter content. Nineveh loam rarely needs lime.
Same	0 to 3		20	25	40 on corn	25	50	As long as productivity is maintained and there is enough moisture, a 3-year rotation of corn, soybeans, and grain with sweetclover intercrop may be used; any less intensive rotation is also satisfactory.
R-R-G-M-M if contour tilled, stripcropped, or terraced.	1 to 3	20 on wheat	20	25	40 on corn	25	50	Use erosion-control practices such as contour tillage; on complex slopes (chiefly the kame phases of the Fox soils) use rotations that provide good ground cover.
R-G-M-M-R-G-G(Sc) if contour tilled, R-R-G-M-M if stripcropped or terraced.	1 to 3	20 on wheat	20	25	40 on corn	25	50	Same.
G-M-M-M if contour tilled, R-G-M-M-M if stripcropped, R-G-M-M if terraced.	1 to 2	20 on wheat	20	25	20 on wheat	25	50	On severely eroded soils and soils that have complex slopes, use rotations of 3 or more years of meadow followed by 1 year of wheat.
G-M-M-M if contour tilled	1 to 2					20	20	Renovate pastures when needed; seed legumes such as birdsfoot trefoil in mixture with grasses; control weeds; adopt rotation grazing.
No special erosion-control practices necessary.	1½ to 2	30 on wheat	20	30	30 on wheat	25	50	Plant drought-resistant crops such as rye, wheat, and alfalfa-bromegrass mixtures; increase organic-matter content. To protect steeper slopes from wind erosion, use mostly for pasture and timber crops.
Same	1½ to 3	40 on corn, 20 on wheat.	20	25	60 on corn, 20 on wheat.	25	45	Add organic matter; crop the darker-colored soils more intensively. Install tile drainage as needed, at depths of about 3 feet and spaced 3 to 4 rods apart. Protect Crosby silt loam, 3 to 5 percent slopes, eroded, by a longer rotation that includes more meadow. Use the more severely eroded areas for permanent pasture.

TABLE 6.— *Use suitability and*

Management group and subgroup and soil type or phase	Chief management problems	Suitable crops	Suitable rotations [1]
			Without special practices for erosion control
Subgroup 4B—Soils on coarse-textured substrata Homer silt loam, 0 to 3 percent slopes. Monitor silt loam, 0 to 3 percent slopes. Sleeth silt loam, 0 to 3 percent slopes.	Poor drainage	General crops of area	R-R-G(Sc). R-R-G-M.
Subgroup 4C—Soils less than 3½ feet deep over rock Randolph silt loam, 0 to 3 percent slopes. Shadeland silt loam, 0 to 2 percent slopes.	Poor drainage; shallowness; low moisture-supplying capacity; low fertility; low organic-matter content.	Shallow-rooted crops; meadows and permanent pasture on shallower soils. Alfalfa in meadow mixtures if drainage is good enough.	R-G-M-M.
Management group 5—Poorly drained, medium-textured soils Delmar silt loam, 0 to 3 percent slopes.	Poor drainage	General crops of area	R-R-G-M.
Management group 6—Dark-colored, well drained and moderately well drained, medium-textured soils:			
Subgroup 6A—Level soils Corwin silt loam, 0 to 2 percent slopes. Dana silt loam, 0 to 2 percent slopes. Parr silt loam, 0 to 2 percent slopes. Sidell silt loam, 0 to 2 percent slopes.	No serious problem	Corn, soybeans, small grains.	R-R-G(Sc). R-R-R-G-M-M-R-G(Sc). R-R-G-M-M. R-R-G-M.
Subgroup 6B—Gently sloping soils Parr loam, 2 to 5 percent slopes. Parr silt loam, 2 to 5 percent slopes. Sidell silt loam, 2 to 5 percent slopes. Sidell silt loam, 5 to 8 percent slopes.	Erosion hazard	General crops of area	R-G-M-M.
Subgroup 6C—Eroded gently sloping soils Parr loam, 2 to 10 percent slopes, eroded. Parr silt loam, 2 to 5 percent slopes, eroded. Sidell silt loam, 2 to 5 percent slopes, eroded.	Erosion hazard	Grass-legume meadows especially needed.	R-G-M-M-M.
Subgroup 6D—Eroded gently sloping to sloping soils Sidell silt loam, 5 to 8 percent slopes, eroded. Parr silt loam, 5 to 8 percent slopes, eroded.	Erosion hazard	Grass-legume meadows especially needed.	G-M-M-M.
Subgroup 6E—Severely eroded gently sloping soils Sidell silt loam and silty clay loam, 2 to 5 percent slopes, severely eroded. Sidell silt loam and silty clay loam, 5 to 8 percent slopes, severely eroded.	Erosion hazard	Few row crops, higher proportion of grass-legume meadow and permanent pasture needed. Small grains, preferably seeded in fall.	G-M-M-M.
Subgroup 6F—Eroded sloping soils Parr silt loam, 8 to 12 percent slopes, eroded. Sidell silt loam, 8 to 12 percent slopes. Sidell silt loam, 8 to 12 percent slopes, eroded.	Erosion hazard	Same	G-M-M-M.
Subgroup 6G—Severely eroded sloping soils Sidell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded. Parr silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded.	Erosion hazard	Meadow or permanent pasture.	None.
Management group 7—Dark-colored, moderately well drained to somewhat excessively drained, medium-textured soils underlain by sand and gravel:			
Subgroup 7A—Level, well drained and moderately well drained soils. Tippecanoe silt loam, 0 to 3 percent slopes. Wea silt loam, 0 to 3 percent slopes.	No serious problem	All general crops of the area.	R-R-G(Sc). R-R-R-G-M-R-G(Sc). R-R-G-M-M.

See footnotes at end of table.

management requirements—Continued

Suitable rotations [1] With special practices for erosion control	Initial lime requirement [2] per acre	Fertilization [3] Common management [4] N	P_2O_5	K_2O	Superior management [5] N	P_2O_5	K_2O	Other suggestions
	Tons	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	
Same	1 to 2	40 on corn, 20 on wheat.	20	25	60 on corn, 20 on wheat.	25	45	Add organic matter; crop the darker-colored soils more intensively. Lower or control the water table by open ditches through the associated Westland soils.
Same	1 to 2	40 on corn, 20 on wheat.	20	25	60 on corn, 20 on wheat.	25	45	Some areas are difficult to drain properly because of the shallowness.
Same	2 to 3	40 on corn, 20 on wheat.	20	25	60 on corn, 20 on wheat.	25	45	Space drainage tile at intervals of 2 to 3 rods; grow sweetclover to improve tilth and permeability.
Same	2 to 3	40 on corn, 20 on wheat.	25	30	40 on first-year corn, 60 on second-year corn, 20 on wheat.	30	45	None.
R-R-G-M if contour tilled, stripcropped, or terraced.	2 to 3	40 on corn, 20 on wheat.	25	25	40 on first-year corn, 60 on second-year corn, 20 on wheat.	30	45	Use contour tillage wherever possible; on slopes longer than 200 feet use stripcropping or terracing.
R-R-G-M-M if contour tilled, R-R-G-M if stripcropped or terraced.	2 to 3	40 on corn, 20 on wheat.	20	25	40 on first-year corn, 60 on second-year corn, 20 on wheat.	30	45	Use contour tillage wherever possible; on slopes longer than 200 feet use stripcropping or terracing; increase the organic-matter content; grow drought-resistant meadow crops such as alfalfa and bromegrass if the meadow is to stand 2 years or more.
R-G-M-M-M if contour tilled, R-G-M-M if stripcropped, R-G-M if terraced.	2 to 3	40 on corn, 20 on wheat.	20	25	40 on first-year corn, 60 on second-year corn, 20 on wheat.	30	45	Same.
G-M-M-M if contour tilled, R-G-M-M-M if stripcropped, R-G-M-M if terraced.	2 to 3	20 on wheat	20	30	20 on wheat	30	50	Renovate permanent pastures when necessary; seed a legume such as birdsfoot trefoil in pasture mixture; control weeds; adopt rotation grazing.
R-G-M-M-M if contour tilled or stripcropped, R-G-M-M if terraced.	2 to 3	20 on wheat	20	30	20 on wheat	30	50	Same.
G-M-M-M-M if contour tilled or stripcropped.	1 to 3	20 on wheat	20	30	20 on wheat	30	30	Same.
No special erosion-control practices necessary.	2 to 3	40 on corn, 20 on wheat.	20	30	50 on corn, 20 on wheat.	30	30	Drain artificially where necessary.

TABLE 6.— *Use suitability and*

Management group and subgroup and soil type or phase	Chief management problems	Suitable crops	Suitable rotations [1]
			Without special practices for erosion control
Subgroup 7B—Level, somewhat excessively drained soils	Low moisture-supplying capacity.	Alfalfa, wheat, and rye well suited. Oats, corn, and soybeans may be damaged by drought.	R-R-G-M-M.
Warsaw loam, 0 to 3 percent slopes.			
Warsaw silt loam, 0 to 3 percent slopes.			
Elston silt loam, silted, 0 to 3 percent slopes.			
Elston loam, 0 to 3 percent slopes.			
Elston fine sandy loam, 0 to 3 percent slopes.			
Subgroup 7C—Gently sloping soils	Low moisture-supplying capacity, erosion hazard.	Same	R-G-M-M.
Wea silt loam, 3 to 8 percent slopes.			R-G-M-M-M.
Warsaw loam, 3 to 8 percent slopes.			
Warsaw silt loam, 3 to 8 percent slopes.			
Warsaw loam, 3 to 8 percent slopes, kame phase.			
Elston loam, 3 to 8 percent slopes.			
Elston fine sandy loam, 3 to 8 percent slopes.			
Subgroup 7D—Eroded gently sloping soils	Same	Same	R-G-M-M-M.
Warsaw silt loam, 3 to 8 percent slopes, eroded kame phase.			
Warsaw loam, 3 to 8 percent slopes, eroded kame phase.			
Warsaw loam, 3 to 8 percent slopes, eroded.			
Wea silt loam, 3 to 8 percent slopes, eroded.			
Elston loam, 3 to 8 percent slopes, eroded.			
Subgroup 7E—Eroded sloping soils	Same	Pasture, alfalfa, grass-legume meadows.	G-M-M-M.
Elston loam, 8 to 15 percent slopes, eroded.			
Warsaw loam, 8 to 20 percent slopes, eroded.			
Warsaw loam, 8 to 12 percent slopes, kame phase.			
Warsaw loam, 8 to 12 percent slopes, eroded kame phase.			
Warsaw silt loam, 8 to 12 percent slopes, eroded kame phase.			
Management group 8—Dark-colored, level, imperfectly drained, medium-textured soils:			
Subgroup 8A—Soils over till	Poor drainage	General crops of area	R-R-G(Sc).
Odell silt loam, 0 to 2 percent slopes.			R-R-R-G-M-M-R-G(Sc).
Raub silt loam, 0 to 2 percent slopes.			R-R-G-M.
			R-R-G-M-M.
Subgroup 8B—Soils over gravel	Poor drainage	General crops of area	R-R-G(Sc).
Crane silt loam, 0 to 3 percent slopes.			R-R-R-G-M-R-G(Sc).
			R-R-G-M-M.
			R-R-G-M.
Management group 9—Very poorly drained dark-colored soils of the depressional areas:			
Subgroup 9A—Soils underlain by clayey materials	Poor drainage, ponding which may injure alfalfa, red clover, and wheat.	Corn, beans, grains	R-R-G(Sc).
Brookston silt loam, 0 to 3 percent slopes.			R-R-G-M.
Brookston silty clay loam, 0 to 3 percent slopes.			R-R-G-M-M.
Cope silt loam, 0 to 3 percent slopes.			R-R-G-M-R-G(Sc).
Cope silty clay loam, 0 to 3 percent slopes.			R-R-R-G-M-M-R-G(Sc).
Chalmers silt loam, 0 to 3 percent slopes.			
Chalmers silty clay loam, 0 to 3 percent slopes.			
Kokomo silty clay loam, 0 to 3 percent slopes.			
Romney silty clay loam, 0 to 2 percent slopes.			
Washtenaw silt loam, 0 to 3 percent slopes.			
Subgroup 9B—Soils underlain by gravel and sand	Same	Corn, beans, grain crops.	R-R-G(Sc).
Abington silty clay loam, 0 to 3 percent slopes.			
Westland loam, 0 to 3 percent slopes.			
Westland silt loam, 0 to 3 percent slopes.			
Westland silty clay loam, 0 to 3 percent slopes.			
Subgroup 9C—Soils subject to overflow or otherwise difficult to drain.	Same	Same	Continuous row crops.
			R-R-G(Sc).
Millsdale silty clay loam, 0 to 3 percent slopes.			
Sloan silt loam, 0 to 3 percent slopes.			
Sloan silty clay loam, 0 to 3 percent slopes.			
Management group 10—Organic soils	Poor drainage; potassium deficiency.	Corn, potatoes, mint, onions, carrots, and permanent pasture.	Continuous row crops.
Carlisle muck.			
Edwards muck.			
Linwood muck.			

See footnotes at end of table.

management requirements—Continued

Suitable rotations [1] With special practices for erosion control	Initial lime requirement [2] per acre	Fertilization [3] Common management [4] N	P_2O_5	K_2O	Superior management [5] N	P_2O_5	K_2O	Other suggestions
	Tons	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	
Same	1 to 3	40 on corn, 20 on wheat.	20	25	50 on corn, 20 on wheat.	25	40	Increase the organic-matter content; grow drought-resistant crops such as alfalfa, bromegrass, wheat, rye, and soybeans; irrigate corn if possible.
R-R-G-M-M or R-G-M-M-M if contour tilled, stripcropped, or terraced.	2 to 3	40 on corn, 20 on wheat.	20	25	50 on corn, 20 on wheat.	25	40	Use contour tillage wherever possible.
R-G-M-M-R-G-G(Sc) if contour tilled, R-R-G-M-M if stripcropped or terraced.	2 to 3	40 on corn, 20 on wheat.	20	30	50 on corn, 20 on wheat.	25	45	Where slopes are complex, chiefly on the kame phases of Warsaw soils, erosion-control practices are difficult to apply. On such slopes, meadows should stand 3 years and be followed by a year of wheat.
G-M-M-M if contour tilled R-G-M-M-M if stripcropped, R-G-M-M if terraced.	2 to 3	40 on corn, 20 on wheat.	20	35	50 on corn, 20 on wheat.	25	50	Same.
No special erosion-control practices necessary.	1 to 2	40 on corn, 20 on wheat.	25	25	60 on corn, 20 on wheat.	25	45	Install drainage tiles about 3 feet deep and about 3 to 4 rods apart.
Same	2 to 3	40 on corn, 20 on wheat.	25	25	60 on corn, 20 on wheat.	25	45	Drain through gravelly substratum by means of ditches or tile in the associated Westland soils.
Same	0	20 on wheat	20	20	40 on corn, 20 on wheat.	25	35	Provide adequate drainage by installing tile about 3 feet deep and about 5 rods apart. Potassium supply may be low, especially on mucky or highly organic spots of Kokomo and Romney soils. The more clayey "gumbo" may require fall plowing and closer tiling.
Same	0	None	20	25	40 on corn, 20 on wheat.	25	45	Provide adequate drainage by installing tile about 3 feet deep and about 5 rods apart; take care to prevent tile from filling in with material from sandy substrata.
Same	0	None	20	20	50 on corn	30	30	Protect from overflow; drain by open ditches or tile if suitable outlets are available.
Same	0	None	20	20	50 on corn	30	60	Install tile drains along base of hill to intercept seepage water from higher areas; provide controlled drainage to remove surplus water in spring and maintain water level during dry summer months.

TABLE 6.— *Use suitability and*

Management group and subgroup and soil type or phase	Chief management problems	Suitable crops	Suitable rotations [1]
			Without special practices for erosion control
Management group 11—Alluvial or bottom-land soils:			
Subgroup 11A—Well-drained soils, frequently flooded	Stream overflow	Row crops and pasture, alfalfa on sandy soils, timber for stream-bank protection. Fall-seeded grain poorly suited.	Continuous row crops. R-R-G(Sc).
Genesee fine sandy loam, 0 to 4 percent slopes.			
Genesee loam, 0 to 4 percent slopes.			
Genesee silt loam, 0 to 4 percent slopes.			
Genesee silty clay loam, 0 to 4 percent slopes.			
Kaskaskia loam, 0 to 3 percent slopes.			
Kaskaskia silt loam, 0 to 3 percent slopes.			
Subgroup 11B—Well-drained soils (high bottoms), infrequently flooded.	Stream overflow	Alfalfa	R-R-G(Sc).
Genesee fine sandy loam, high bottom, 0 to 3 percent slopes.			
Genesee loam, high bottom, 0 to 3 percent slopes.			
Genesee silt loam, high bottom, 0 to 4 percent slopes.			
Genesee silty clay loam, high bottom, 0 to 3 percent slopes.			
Ross loam, 0 to 3 percent slopes.			
Ross silt loam, 0 to 3 percent slopes.			
Ross silty clay loam, 0 to 3 percent slopes.			
Subgroup 11C—Moderately well drained and imperfectly drained soils, frequently flooded.	Stream overflow; channel cutting.	Permanent pasture and timber on very small bottoms. Wheat and alfalfa not well suited.	Continuous row crops.
Eel loam, 0 to 3 percent slopes.			
Eel silt loam, 0 to 3 percent slopes.			
Eel silty clay loam, 0 to 3 percent slopes.			
Shoals silt loam, 0 to 3 percent slopes.			
Pettit silt loam, 0 to 3 percent slopes.			

[1] Abbreviations: R = row crop (corn, soybeans, vegetables, etc.); G = small grain (oats, wheat, rye, or barley); M = meadow (one or more of alfalfa, red clover, timothy, Ladino clover); (Sc) = sweetclover catch crop. Each symbol indicates one year of that crop. The first rotation listed for each management group is the most intensive one suitable with the practices indicated. Less intensive rotations are also suitable.

[2] Approximate amount of commercial limestone needed per acre. Test soil before liming. If less than 40 percent will pass through a 60-mesh sieve, use 50 percent more. If immediate results are wanted in order to seed legumes, use twice this amount. Test and relime as needed each round of rotation or about every 5 years.

Table 6 gives the amount of commercial limestone needed to correct the natural acidity of the soils that have not previously been limed. The need for lime depends upon the acidity of both the surface soil and subsoil, the depth of acid soil, and the kind of crops to be grown. A field may contain several soils that differ in lime requirements. Some fields are less acid than the table indicates because they have been limed in past years. Fields should be tested for acidity, and then limed selectively if there are marked differences in lime requirements. If a coarser grade of limestone is applied, it will be necessary to use more than otherwise, because it takes longer to dissolve and become effective.

Soils that are acid to a considerable depth may require more lime than shown in the table if legumes are grown. Enough lime should be applied to bring the soil to pH 6.2 to 6.5 for red clover, or up to pH 7.0 for alfalfa and sweetclover.

Fertilization

In all of the mineral soils of this county, the supplies of nitrogen, phosphorus, and potassium are either low or unbalanced. Applications of commercial fertilizer are needed to provide enough plant nutrients to make uniformly good yields possible. The amount of fertilizer needed depends on the nutrient supply in the soil as shown by soil tests, the kind of crop to be grown, and the management practiced.

Table 6 gives requirements for fertilizer under common management and under superior management. Requirements are given in terms of pounds of nitrogen, phosphate (P_2O_5) and potash (K_2O) required annually for the first rotation listed for each management subgroup.

The fertility of the soils in a particular field can best be determined by soil tests. For a nominal fee, the Purdue University Soil Testing Laboratory will test soil samples and make recommendations for fertilization. Application blanks and containers for soil samples may be obtained from the county agricultural agent.

The rates of fertilization given in table 6 are for the first, or most intensive, crop rotation suggested in the same table. These rates will maintain productivity when tests show a medium supply of phosphorus and potassium in the soil. Soils that are low in phosphorus and potassium will need more than the suggested amounts of fertilizer until the plant nutrient supply is brought up to a medium level. After the supply of phosphorus and potassium has been built up, productivity can be maintained by applying fertilizer at the rates suggested in table 6.

The amounts of fertilizer suggested in table 6 may be applied in the following manner. Miami silt loam, 3 to 8 percent slopes, for example, is in management subgroup 1C. A 4-year rotation of corn, wheat, and 2 years

management requirements—Continued

Suitable rotations [1] With special practices for erosion control	Initial lime requirement [2] per acre	Fertilization [3] Common management [4]			Superior management [5]			Other suggestions
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	
	Tons	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	
Same	0	50 on corn	20	20	80 on corn	30	30	Keep a timber strip along larger streams to protect against streambank erosion and washouts into old stream courses.
Same	0	50 on corn	20	20	80 on corn	30	30	Build levees to protect larger bottom areas from stream overflow, or grow crops that can mature within the season normally free from floods. Control weeds by crop rotation or by spraying with 2, 4–D.
Same	0	None	20	20	40 on corn	30	30	Grow soybeans, buckwheat, or other short-season crops if corn has been drowned out.

[3] Fertilizer recommendations are based on pounds of nitrogen (N), available phosphorus (P_2O_5), and water-soluble potash (K_2O) per acre required annually under the first rotation listed for each management group. Where fertility is low, superior management requires that it be built up by heavy applications of phosphorus, potassium, and perhaps nitrogen fertilizers in addition to the amounts recommended for fertility maintenance. See text for sample calculation of fertilizer program for a specific soil.

[4] Common management is that usually followed in the county. Intensive practices to control erosion, to add organic matter to the soil, or to maintain and increase soil fertility and productivity are not generally used.

[5] Superior management consists of more careful and intensive practices than are generally followed in the county. More attention is given to control of insects, diseases, and weeds. Regular crop rotations that include legumes where possible are used. Contour tillage, stripcropping, terracing, and construction of diversion ditches are practiced wherever necessary to control erosion.

of mixed grass-legume meadow is suitable. For superior management of the soils of subgroup 1C, 25 pounds of P_2O_5 and 40 pounds of K_2O per year are needed; therefore, 100 pounds of P_2O_5 and 160 pounds of K_2O would be applied over the 4-year period. The amount of nitrogen needed is 70 pounds during the 4-year rotation. If 200 pounds of 3-12-12 fertilizer is applied to corn in the row, this will make up 6 pounds of the nitrogen and 24 pounds each of the available phosphate and potash. If 400 pounds of 3-12-12 fertilizer is drilled with the small grain, another 12 pounds of nitrogen and another 48 pounds each of available phosphate and potash will be added. There will still be needed 28 pounds of available phosphate and 88 pounds of potash. This can be supplied by broadcasting 300 pounds per acre of 0-9-27 fertilizer after the first cutting of the second year of meadow. This would add 27 pounds of available phosphate and 81 pounds of potash per acre. The rest of the nitrogen should be applied separately, on the corn and the wheat.

Extra nitrogen is usually required for corn, wheat, and oats. It may be supplied by legumes in the rotation, by manure, or by commercial fertilizers.

Nitrogen deficiency is likely to be the factor that limits corn yields on all soils except those that have the highest nitrogen content (see figure 10). Corn may need from 40 to 120 pounds per acre, especially when it is grown 2 or more years in succession.

Wheat requires nitrogen fertilizer as a starter at the time it is planted in the fall. It usually responds well if 20 to 50 pounds of nitrogen is applied as a topdressing in the spring. Oats respond to 20 to 40 pounds of nitrogen applied in the spring.

Most of the soils in the county do not contain enough phosphorus. The darker colored soils generally have more than the light-colored soils. Liberal amounts should be applied, by drilling along the rows to start the plants and by broadcasting.

Most of the soils have too little available potassium to maintain high yields. Potassium is held by the clay in the soil. Very little is lost by leaching, except from very sandy soils. Most of the potassium lost from the soil is removed in the forage grown. Potassium must be supplied by fertilization if crop yields are to be maintained. Manure, if it has been protected from leaching, is a good source of potassium.

Organic-Matter Content

The natural source of nitrogen in the soil is organic matter. Nitrogen gradually becomes available to plants as the organic matter decays, but the natural supply is not enough for crops if the soil is less than 3 percent organic matter. Light-colored, loose, sandy soils contain very little organic matter, and therefore little nitrogen; dark-colored organic soils may have 20 times as much nitrogen. Fine-textured soils hold more organic matter and nitrogen than sandy soils.

The accumulation and distribution of organic matter in mineral soils is directly affected by the native vegetation and the drainage. A cover of prairie grass produces fairly large amounts of organic matter, which is uniformly distributed by root growth and decay through several feet of the soil. Under trees, less organic matter accumulates. Most of it is in the form of fallen leaves and is concentrated on the surface of the soil. In moist locations more organic matter accumulates because the vegetation is thicker. Marshy conditions slow up the decomposition of organic material so that it accumulates in large quantities. Excessively aerated sandy soils of low moisture-holding capacity support little vegetation, and the limited amounts of organic matter produced decompose very rapidly.

More organic matter and nitrogen are needed in all of the light-colored soils, especially the poorly drained soils and loose sandy soils. Organic matter is particularly needed in severely eroded soils that have lost much of the surface soil and have very poor tilth because of the clay plowed up from the subsoil. Tilth and the physical condition of the soil are improved by addition of organic matter. If the supply of nitrogen is adequate, plants are dark green. In Tippecanoe County, the organic-matter content of the soils ranges from about 1 percent to 70 percent or more.

The organic-matter content of a soil can be increased by the following practices:

(1) Preserving and returning to the soil all crop residues. If other conditions are favorable, liberal fertilization of corn, including adequate amounts of nitrogen, will produce a maximum amount of organic matter, which can be returned to build up the supply in the soil.

(2) Apply manure to the soil. If the manure is not protected from rainfall, much of the nitrogen and potash content will be leached out. If the manure is protected by a roof, the liquid part can be readily absorbed by litter and bedding, which is then spread on the soil.

(3) Adopting a crop rotation in which the row crops that deplete nitrogen and organic matter are balanced by soil-building meadow crops that will maintain or increase the organic-matter content and improve the physical condition of the soil.

(4) Using winter cover crops and sod crops to increase the organic-matter content, to absorb and hold nitrogen that might be washed away in drainage water, and to provide adequate ground cover for protection against erosion. Suitable legumes, usually mixed with grasses, are best for cover crops, soil-improving crops, or meadow crops. Sweetclover and alfalfa are suitable if drainage is good enough.

Erosion

Erosion is the principal management problem on many soils. The pattern of erosion in Tippecanoe County is shown in figure 7. Soils that have been eroded enough to affect their management are separated into different soil phases.

The soils of this county vary widely in the extent of erosion that has taken place and in their susceptibility to erosion when cultivated. Heavy rainfall and severe storms are erosion hazards. Their effect can be controlled only by providing adequate ground cover. If the soil is under a protective cover, such as the original forest, the original grass, or a thick meadow or pasture stand, little soil will be removed by either water or wind.

Loss of soil under cultivation varies in severity, depending on the nature of the soil, the length and steepness of slopes, and the proportion of row crops in the rotation. Erosion of cultivated soils can be reduced by increasing the organic-matter content of the surface soil, by growing more cover crops or sod crops in the rotation, and by using contour tillage, stripcropping, terracing, and similar soil-conserving practices. The conservation practices suggested in table 6, if combined with the rotations and levels of fertilization suggested in the same table, should be adequate to protect the soils from erosion damage.

Drainage and Moisture Supply

About two-thirds of the soils of Tippecanoe County originally had poor or inadequate natural drainage. Figure 5 shows the natural internal drainage of large areas of the soils of this county.

Poor drainage, if not corrected, limits land use and crop yields and reduces the improving effects of good management practices. Basic to any soil-improving program is the rapid removal of excess water from the soil down to a depth of 3 or more feet. Table 6 shows which soils of the county need artificial drainage or protection from overflow.

Moisture moves very rapidly through the gravelly and sandy soil materials deposited in stream valleys and outwash areas, but it moves slowly through the relatively impermeable glacial till underlying the uplands. The swales and depressions were ponded before the land was artificially drained.

In 1950, 147,584 acres of land in Tippecanoe County were artificially drained. The drainage systems consisted of 132 miles of open ditches and 369.4 miles of tile drains. Widely spaced open ditches are used mostly on the soils underlain by sandy and gravelly materials, because the water table can be lowered readily over large areas. Tile drains in such soils are hard to maintain and rapidly lose their effectiveness. Tile drainage is more commonly used in the upland soils that were derived from the compact but friable medium-textured glacial till.

Drought resistance, or capacity to supply moisture to crops, depends on the following soil characteristics: (1) An adequate supply of organic matter; (2) a moderate proportion of clay, well distributed through the soil; (3) uniformity of texture; (4) freedom from both

restricting layers (hardpan or bedrock) and coarse-textured material to depths of 4 to 7 feet. These characteristics also affect root development and influence the suitability of the soil for crops. Figure 6 shows the general pattern of drought resistance of the soil associations in Tippecanoe County.

Yields and Productivity Ratings of Soils

Table 7 shows, for each soil in the county, the average acre yields of the principal crops that can be expected over a period of years, under two levels of management.

In the "A" columns are estimates of yields obtained under the management practices that were common about 1945. These practices generally include the use of small to moderate quantities of lime and commercial fertilizers. Usually a 3-12-12 analysis fertilizer is applied at a rate of 100 pounds or less per acre on corn and 100 to 200 pounds per acre on wheat. The common management does not include careful and intensive practices to control erosion, to add organic matter to the soil, or to maintain and increase soil fertility and productivity.

In the "B" columns are estimates of the yields that can be obtained under more careful and intensive management. Under this level of management, crops are grown in systematic rotations that include legumes; the soil is limed to pH 6.5 or 7.0; liberal quantities of suitable commercial fertilizers are applied; and barnyard manure and green manure are used. Artificial drainage is installed where necessary. Improved varieties of high-quality seed are planted at rates that will yield most efficiently. Contour tillage, stripcropping, terracing, or construction of diversion ditches are practiced wherever necessary to control erosion. Other practices that will control insects, diseases, and weeds are followed consistently.

The yield estimates in table 7 are based primarily on interviews with farmers, the county agent, and members of the Purdue University Agricultural Experiment Station; on direct observation by members of the soil survey party; and on results obtained on experimental farms by the Experiment Station. They are presented only as estimates of the average production over a period of years, according to the two broadly defined levels of management.

It should be understood that these yield figures may not apply directly to specific tracts of land for any particular year, because the soils vary somewhat from place to place, management practices differ slightly from farm to farm, and weather conditions vary from year to year. Nevertheless, these estimates appear to be as accurate a guide as can be obtained without further detailed and lengthy investigations. They are useful in showing the relative productivity of the soils, and how soils respond to improved management.

The expected yields of various crops on the soils of the county are shown as productivity ratings in table 8. In this table the soils are listed by management groups. The ratings are comparisons of the productivity of each of the soils to a standard rating of 100. The standard rating represents the approximate average acre yield obtained, without the use of amendments, on the more extensive and better soils of the regions of the United States where the crop is most widely grown. The standard yield for each crop shown in table 8 is given in the heading of its column. The ratings for the soils of this county show what percentage of that standard yield can be expected from each soil. For example, a rating of 50 indicates that the soil is half as productive, for the specified crop, as a soil that normally produces the standard yield. Soils that are especially good, and some soils that have been improved by drainage, protective levees, lime, fertilizers, and other special practices and amendments, have productivity ratings of more than 100 for some crops.

Productivity, as measured by yields of specific crops, is not the only measure of the value of a soil for agriculture. The productivity ratings do not indicate land values, except in a very general way. Distance to market, relative prices of farm products, and other factors influence the value of agricultural land. The ease or difficulty of tilling the soil and maintaining its productivity affect the general worth of a soil. The ease with which a soil can be tilled depends on the steepness of slope, presence or absence of stones, soil consistence and structure, and the size and shape of the areas to be tilled. Natural fertility and susceptibility to erosion affect the ease of maintaining soil productivity at any given level. Drainage, moisture-holding capacity, permeability to roots and water, and other factors are important in judging the relative value of land for agricultural use.

Land-Capability Classification

The soils of Tippecanoe County have been grouped into capability classes and subclasses that show their suitability for crops, grazing, forestry, and wildlife. This grouping is based on the uses that can be made of each soil, its needs for management, and the hazards of soil erosion or other damage when it is used. Since it is a practical grouping based on needs and responses, it can bring together, in one group, soils that were formed from different parent materials or in different ways.

There are eight general land-capability classes, but all do not necessarily occur in a particular area. Class I land is nearly level and has few limitations; the soils are productive and not subject to erosion. Class VIII land has little or no useful vegetation because the soils are too rough or stony, or too wet, or too droughty, or are limited in some other way.

Classes I, II, and III are suitable for some of the crops ordinarily grown in the locality that require annual, or at least periodic, tillage. Management needs, or risks of damage, or both, are successively greater on soils in class II and class III than on those in class I. Soils in class IV are less suitable for a regular cropping system than those in the first three classes, but they can be used for tillage part of the time or with special precautions. In addition, soils in all four of these classes ordinarily are well suited to uses that require little or no cultivation, such as grazing, forestry, or wildlife. Management needs and probable yields can vary a great deal on the different soils.

TABLE 7.—*Estimated average acre yields to be expected over a period of years*

[Yields in columns A can be expected under the management now commonly used in the county; those in columns B can be expected under improved methods of farm management that include crop rotations, erosion control, and the use of legumes, commercial fertilizer, lime, barnyard manure, and green manure. Absence of a yield figure means that the crop is not commonly grown under the management level indicated]

Map symbol	Name of soil	Corn		Wheat		Oats		Soybeans		Mixed hay		Clover		Alfalfa	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Aa	Abington silty clay loam, 0 to 3 percent slopes:														
	Drained	50	83	17	22	38	50	20	27	1.8	2.4	1.2	2.0	2.8	3.6
	Undrained	20	----	8	----	15	----	13	----	1.6	----	.6	----	----	----
Ba	Brookston silt loam, 0 to 3 percent slopes:														
	Drained	50	78	20	32	40	65	21	32	1.8	2.5	1.6	2.3	3.0	4.0
	Undrained	25	----	13	----	20	----	15	----	1.2	----	----	----	----	----
Bb	Brookston silty clay loam, 0 to 3 percent slopes:														
	Drained	55	80	20	32	40	65	22	32	1.8	2.5	1.6	2.3	3.0	4.0
	Undrained	25	----	8	----	20	----	15	----	1.2	----	----	----	----	----
Ca	Carlisle muck:														
	Drained	45	60	----	----	----	----	17	25	1.8	2.4	----	----	----	----
	Undrained	----	----	----	----	----	----	----	----	1.2	----	----	----	----	----
Cb	Chalmers silt loam, 0 to 3 percent slopes:														
	Drained	58	88	21	30	40	65	23	32	2.0	2.6	1.8	2.4	3.2	4.4
	Undrained	30	----	13	----	25	----	15	----	1.8	----	1.4	----	----	----
Cc	Chalmers silty clay loam, 0 to 3 percent slopes:														
	Drained	58	87	22	30	40	65	25	32	2.0	2.6	1.8	2.4	3.2	4.4
	Undrained	25	----	13	----	20	----	15	----	1.8	----	1.4	----	----	----
Cd	Cope silt loam, 0 to 3 percent slopes:														
	Drained	40	70	20	30	40	60	20	30	1.6	2.5	1.6	2.0	2.8	4.0
	Undrained	25	----	13	----	23	----	15	----	1.4	----	----	----	----	----
Ce	Cope silty clay loam, 0 to 3 percent slopes:														
	Drained	45	75	20	32	40	60	21	32	1.8	2.5	1.6	2.3	2.8	4.0
	Undrained	25	----	13	----	20	----	15	----	1.4	----	----	----	----	----
Cf	Corwin silt loam, 0 to 2 percent slopes:														
	Drained	47	83	19	25	35	50	21	30	1.4	2.2	1.4	2.2	2.2	3.4
	Undrained	45	----	18	----	30	----	18	----	1.4	----	1.2	----	1.6	----
Cg	Crane silt loam, 0 to 3 percent slopes:														
	Drained	45	70	19	30	35	50	20	30	1.4	2.2	1.4	2.2	2.0	3.2
	Undrained	35	----	15	----	25	----	15	----	1.4	----	1.0	----	1.2	----
Ch	Crosby silt loam, 0 to 3 percent slopes:														
	Drained	35	65	21	32	35	60	19	132	1.4	2.4	1.4	2.4	2.4	3.4
	Undrained	20	----	10	----	20	----	13	----	1.0	----	1.0	----	1.2	----
Ci	Crosby silt loam, 3 to 5 percent slopes, eroded:														
	Drained	30	50	15	27	30	50	15	27	1.2	2.0	1.2	1.8	2.0	3.0
	Undrained	25	----	13	----	25	----	13	----	1.0	----	1.0	----	1.2	----
Da	Dana silt loam, 0 to 2 percent slopes:														
	Drained	50	83	21	32	35	50	23	30	1.4	2.2	1.4	2.2	2.6	3.8
	Undrained	45	----	18	----	30	----	20	----	1.4	----	1.2	----	----	----
Db	Delmar silt loam, 0 to 3 percent slopes:														
	Drained	25	40	15	20	20	35	12	25	1.0	1.5	.8	1.2	.8	2.0
	Undrained	15	----	8	----	15	----	10	----	.8	----	.6	----	----	----
Ea	Edwards muck:														
	Drained	30	45	----	----	----	----	12	22	1.4	2.0	----	----	----	----
	Undrained	----	----	----	----	----	----	----	----	1.0	----	----	----	----	----
Eb	Eel loam, 0 to 3 percent slopes:														
	Protected by levees and drained	45	65	15	20	35	50	22	27	2.0	2.5	1.2	1.5	2.4	3.0
	Unprotected by levees	40	----	10	----	25	----	23	----	2.0	----	.6	----	----	----
Ec	Eel silt loam, 0 to 3 percent slopes:														
	Protected by levees and drained	55	70	15	20	35	50	22	27	2.0	2.5	1.2	1.5	2.4	3.0
	Unprotected by levees	45	----	8	----	25	----	22	----	2.0	----	.6	----	----	----
Ed	Eel silty clay loam, 0 to 3 percent slopes:														
	Protected by levees and drained	50	70	10	15	20	25	22	25	2.0	2.5	----	1.0	----	1.0
	Unprotected by levees	45	----	----	----	15	----	20	----	1.9	----	----	----	----	----
Ee	Elston fine sandy loam, 0 to 3 percent slopes	25	40	15	20	20	30	17	22	.5	1.0	----	----	.8	2.4
Ef	Elston fine sandy loam, 3 to 8 percent slopes	25	40	14	20	20	30	15	22	.5	1.0	----	----	.8	2.4
Eg	Elston loam, 0 to 3 percent slopes	30	45	17	28	25	40	17	27	.8	1.5	.6	1.2	1.2	3.0
Eh	Elston loam, 3 to 8 percent slopes	30	45	15	28	25	40	15	25	.8	1.5	.6	1.2	1.2	2.8
Ei	Elston loam, 3 to 8 percent slopes, eroded	25	35	13	20	20	25	13	20	.5	1.0	----	----	1.0	2.6
Ej	Elston loam, 8 to 15 percent slopes, eroded	20	30	12	18	17	22	10	15	.5	1.0	----	----	----	2.0
Ek	Elston silt loam, silted, 0 to 3 percent slopes	45	60	20	30	35	55	22	30	1.5	2.0	1.5	2.0	2.0	3.4
Fa	Fincastle silt loam, 0 to 3 percent slopes:														
	Drained	40	65	19	32	35	60	20	32	1.4	2.4	1.2	2.2	2.0	3.4
	Undrained	20	----	10	----	20	----	13	----	1.0	----	1.0	----	1.2	----
Fb	Fox loam, 0 to 3 percent slopes	33	43	19	30	25	40	19	30	.9	1.3	.8	1.2	1.6	2.8
Fc	Fox loam, 3 to 8 percent slopes	30	35	19	30	23	40	19	28	.9	1.3	.8	1.2	1.6	2.8
Fd	Fox loam, 3 to 8 percent slopes, eroded	20	30	14	20	18	25	15	22	.9	1.2	.5	1.0	1.4	2.6
Fe	Fox loam, 3 to 8 percent slopes, eroded kame phase	23	35	10	15	15	25	10	15	.6	1.0	.5	1.1	1.4	2.0
Ff	Fox loam, 8 to 12 percent slopes	20	30	10	15	15	25	10	15	.9	1.2	.5	1.0	1.2	2.4

TABLE 7.—*Estimated average acre yields to be expected over a period of years*—Continued

Map symbol	Name of soil	Corn		Wheat		Oats		Soybeans		Mixed hay		Clover		Alfalfa	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Fg	Fox loam, 8 to 12 percent slopes, eroded	15	25	8	12	13	20	5	10	0.5	1.0	0.4	0.8	1.0	2.2
Fh	Fox loam, 8 to 12 percent slopes, kame phase	18	27	7	12	12	20	----	----	.7	1.0	----	----	1.2	2.4
Fi	Fox loam, 8 to 12 percent slopes, eroded kame phase	15	25	5	10	10	18	----	----	.5	.8	----	----	1.2	1.6
Fj	Fox loam, 12 to 25 percent slopes	12	20	6	10	12	17	6	10	.5	1.0	.4	.6	.8	2.0
Fk	Fox loam, 12 to 25 percent slopes, eroded	10	15	5	8	----	----	----	----	.3	.7	----	----	.6	1.8
Fl	Fox loam, 12 to 25 percent slopes, kame phase	12	20	6	10	----	----	----	----	.5	.8	----	----	.8	1.6
Fm	Fox loam, 12 to 25 percent slopes, eroded kame phase	10	15	3	8	----	----	----	----	.4	.6	----	----	.8	1.2
Fn	Fox loam and clay loam, 8 to 12 percent slopes, severely eroded	10	18	6	8	----	----	4	8	.4	.8	----	----	.8	1.6
Fo	Fox loam and silt loam, 3 to 8 percent slopes, kame phase	30	40	15	20	20	30	12	17	.8	1.3	.6	1.2	2.0	3.0
Fp	Fox silt loam, 0 to 3 percent slopes	35	48	20	30	25	45	20	30	1.2	1.6	1.0	1.4	2.0	3.2
Fq	Fox silt loam, 3 to 8 percent slopes	32	45	19	30	23	40	19	30	1.2	1.6	1.0	1.4	2.0	3.2
Ga	Genesee fine sandy loam, 0 to 4 percent slopes	35	45	13	18	15	30	18	22	1.3	1.7	.6	1.0	2.8	3.6
Gb	Genesee fine sandy loam, high bottom, 0 to 3 percent slopes	33	50	15	20	28	28	17	22	1.3	1.8	.8	1.2	2.4	3.2
Gc	Genesee loam, 0 to 4 percent slopes	50	65	17	25	20	35	22	28	1.8	2.3	1.6	2.0	3.0	3.6
Gd	Genesee loam, high bottom, 0 to 3 percent slopes	45	60	20	25	35	50	20	28	1.8	2.2	1.5	2.2	3.0	4.0
Ge	Genesee silt loam, 0 to 4 percent slopes	55	70	12	20	20	25	25	35	2.0	2.5	1.3	1.4	2.6	3.0
Gf	Genesee silt loam, high bottom, 0 to 4 percent slopes	50	65	20	25	30	40	20	30	2.2	2.5	1.5	2.2	3.2	4.0
Gg	Genesee silty clay loam, 0 to 4 percent slopes	50	55	10	15	15	20	25	30	1.9	2.5	1.1	1.3	1.6	2.0
Gh	Genesee silty clay loam, high bottom, 0 to 3 percent slopes	45	60	20	25	30	38	20	25	2.0	2.4	1.4	1.8	3.0	4.0
Gi	Glenhall silt loam, 0 to 3 percent slopes:														
	Drained	40	63	20	32	35	50	21	32	1.5	2.2	1.4	2.0	2.4	3.4
	Undrained	35	----	18	----	30	----	20	----	1.4	----	1.2	----	1.6	----
Ha	Hagener loamy fine sand, 2 to 12 percent slopes	15	35	10	17	12	20	12	18	.4	.8	----	----	----	2.0
Hb	Hennepin loam, 25 to 50 percent slopes	----	----	----	----	----	----	----	----	.6	.8	----	----	----	----
Hc	High Gap silt loam, 1 to 8 percent slopes	20	35	10	18	15	25	10	15	.8	1.4	.6	1.2	----	2.0
Hd	Homer silt loam, 0 to 3 percent slopes:														
	Drained	35	50	15	22	30	45	15	25	1.5	2.0	1.4	1.8	2.0	3.2
	Undrained	25	----	13	----	25	----	14	----	1.3	----	.8	----	----	----
Ka	Kaskaskia loam, 0 to 3 percent slopes	45	58	13	20	35	45	20	25	1.6	2.0	1.0	1.3	2.0	3.0
Kb	Kaskaskia silt loam, 0 to 3 percent slopes	50	60	15	20	40	50	20	27	1.8	2.2	1.4	1.6	2.6	3.4
Kc	Kokomo silty clay loam, 0 to 3 percent slopes:														
	Drained	45	65	15	20	30	50	15	25	1.8	2.4	1.4	2.2	2.0	3.2
	Undrained	20	----	8	----	15	----	13	----	1.0	----	----	----	----	----
La	Linwood muck:														
	Drained	40	60	----	----	----	----	18	25	1.2	2.4	----	----	----	----
	Undrained	----	----	----	----	----	----	----	----	1.0	----	----	----	----	----
Lb	Longlois loam, 0 to 3 percent slopes	35	58	18	30	30	43	18	30	1.2	1.8	1.0	1.5	2.2	3.4
Lc	Longlois loam, 3 to 8 percent slopes	35	58	17	30	30	43	17	30	1.2	1.8	1.0	1.5	2.2	3.4
Ld	Longlois loam, 3 to 8 percent slopes, eroded	30	38	15	25	22	38	15	25	.9	1.5	.8	1.0	1.8	3.0
Le	Longlois silt loam, 0 to 3 percent slopes	40	63	20	32	33	45	20	32	1.4	2.0	1.2	2.0	2.4	3.6
Lf	Longlois silt loam, 3 to 8 percent slopes	40	55	20	32	30	45	19	28	1.3	1.9	1.2	1.9	2.2	3.4
Lg	Longlois silt loam, 3 to 8 percent slopes, eroded	32	47	16	25	25	40	15	22	1.0	1.6	1.0	1.5	2.0	3.2
Ma	Made land	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Mb	Martinsville loam, 0 to 5 percent slopes	35	55	18	30	30	45	18	30	1.3	2.0	1.4	2.0	2.4	3.6
Mc	Martinsville silt loam, 0 to 5 percent slopes	40	65	20	33	32	55	23	33	1.4	2.4	1.8	2.6	2.8	4.0
Md	Mellott silt loam, 0 to 3 percent slopes	43	75	22	32	30	55	23	32	1.4	2.1	1.3	1.8	2.3	3.8
Me	Mellott silt loam, 3 to 8 percent slopes	43	73	20	30	30	50	23	32	1.4	2.0	1.3	2.0	2.2	3.6
Mf	Mellott silt loam, 3 to 8 percent slopes, eroded	35	55	15	25	25	40	16	25	1.1	1.5	1.0	1.5	1.8	3.0
Mg	Mellott silt loam, 8 to 12 percent slopes	30	55	14	22	25	33	15	25	1.0	1.4	1.0	1.4	1.8	3.2
Mh	Mellott silt loam, 8 to 12 percent slopes, eroded	23	50	10	15	20	30	12	18	.8	1.1	.7	1.0	1.6	2.4
Mi	Mellott silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded	23	45	10	17	15	25	10	15	.8	1.1	.7	1.1	1.3	2.5
Mj	Mellott silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	18	40	8	12	15	25	8	11	.6	.9	.6	.8	1.0	2.0
Mk	Miami loam, 3 to 8 percent slopes	35	55	17	30	30	50	17	22	1.2	1.8	1.2	1.8	2.2	3.2
Ml	Miami loam, 3 to 8 percent slopes, eroded	30	43	15	27	25	40	12	17	1.0	1.6	.9	1.5	1.6	2.4
Mm	Miami loam, 8 to 12 percent slopes	30	50	15	25	25	40	15	20	1.0	1.6	1.0	1.5	1.8	2.8
Mn	Miami loam, 8 to 12 percent slopes, eroded	20	35	12	16	20	30	10	15	.8	1.4	.8	1.2	1.4	2.2
Mo	Miami loam, 12 to 25 percent slopes	15	22	8	12	15	20	----	----	.8	1.1	.8	1.0	1.6	2.2
Mp	Miami loam, 12 to 25 percent slopes, eroded	10	15	7	10	10	15	----	----	.6	1.0	.4	.6	1.2	2.0
Mq	Miami silt loam, 0 to 3 percent slopes	43	65	18	32	35	60	20	30	1.4	2.0	1.4	2.0	2.4	4.0
Mr	Miami silt loam, 3 to 8 percent slopes	38	60	18	30	35	55	20	27	1.3	2.2	1.3	2.0	2.4	3.8
Ms	Miami silt loam, 3 to 8 percent slopes, eroded	30	43	15	22	25	38	13	18	1.0	1.6	1.1	1.6	2.0	3.4
Mt	Miami silt loam, 8 to 12 percent slopes	25	37	14	21	25	38	12	19	.9	1.2	.9	1.2	2.0	3.2
Mu	Miami silt loam, 8 to 12 percent slopes, eroded	20	33	11	16	20	30	11	16	.8	1.0	.8	1.2	1.6	2.4
Mv	Miami silt loam, 12 to 25 percent slopes	20	27	9	12	15	23	----	----	.8	1.1	.8	1.0	1.6	2.4
Mw	Miami silt loam, 12 to 25 percent slopes, eroded	15	23	5	7	10	15	----	----	.6	1.0	.5	.8	1.2	2.0
Mx	Miami silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	15	25	7	11	15	25	----	----	.6	.8	.5	.8	1.2	2.0
My	Millsdale silty clay loam, 0 to 3 percent slopes:														
	Drained	45	65	15	20	30	55	20	27	1.5	2.0	1.2	1.6	2.0	3.0
	Undrained	20	----	8	----	20	----	8	----	1.0	----	----	----	----	----

TABLE 7.—*Estimated average acre yields to be expected over a period of years*—Continued

Map symbol	Name of soil	Corn		Wheat		Oats		Soybeans		Mixed hay		Clover		Alfalfa	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Mz	Milton silt loam, 2 to 8 percent slopes	25	40	12	17	25	35	15	20	1.2	1.8	1.0	1.5	2.0	2.8
Mza	Monitor silt loam, 0 to 3 percent slopes:														
	Drained	40	65	20	30	35	50	20	30	1.5	2.2	1.4	2.0	2.2	3.4
	Undrained	33	----	16	----	23	----	18	----	----	1.4	----	.9	----	----
Mzb	Montmorenci silt loam, 0 to 3 percent slopes:														
	Drained	45	75	19	33	35	50	24	30	1.4	2.0	1.3	2.0	2.4	4.0
	Undrained	25	----	13	----	25	----	13	----	1.3	----	1.0	----	1.6	----
Mzc	Muskingum stony silt loam, 10 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Na	Nineveh loam, 0 to 3 percent slopes	28	35	18	25	22	40	18	28	.8	1.3	.7	1.0	2.0	2.8
Oa	Oaktown loamy fine sand, 3 to 8 percent slopes	22	28	10	15	10	15	10	15	.4	.8	----	----	1.6	2.8
Ob	Oaktown loamy fine sand, 8 to 12 percent slopes	20	25	10	15	10	15	10	12	.4	.8	----	----	1.6	2.8
Oc	Oaktown loamy fine sand, 12 to 25 percent slopes	18	20	8	10	8	10	8	10	.3	.6	----	----	1.2	2.0
Od	Ockley loam, 0 to 3 percent slopes	35	45	18	30	28	45	18	30	1.2	1.8	1.0	1.4	2.2	3.4
Oe	Ockley loam, 3 to 8 percent slopes	35	45	18	30	28	45	18	30	1.1	1.7	1.0	1.4	2.2	3.4
Of	Ockley loam, 3 to 8 percent slopes, eroded	27	38	15	25	22	40	15	25	1.0	1.6	.8	1.3	1.8	3.0
Og	Ockley silt loam, 0 to 3 percent slopes	40	55	20	32	30	50	20	32	1.3	1.9	1.3	1.8	2.4	3.6
Oh	Ockley silt loam, 3 to 8 percent slopes	38	50	20	32	30	50	20	32	1.3	1.9	1.3	1.8	2.4	3.6
Oi	Ockley silt loam, 3 to 8 percent slopes, eroded	30	45	16	25	25	40	16	25	1.0	1.6	1.1	1.5	2.0	3.2
Ok	Octagon silt loam, 3 to 8 percent slopes	43	73	20	33	30	50	20	32	1.4	2.0	1.3	2.0	2.4	3.6
Ol	Octagon silt loam, 3 to 8 percent slopes, eroded	35	55	15	25	25	33	16	25	1.1	1.5	1.0	1.5	2.0	3.0
Om	Odell silt loam, 0 to 2 percent slopes:														
	Drained	48	80	17	24	35	50	20	30	1.6	2.2	1.4	2.2	1.6	2.8
	Undrained	30	----	13	----	25	----	13	----	1.4	----	1.0	----	.8	----
On	Otterbein silt loam, 0 to 3 percent slopes:														
	Drained	40	75	17	32	33	50	17	30	1.4	2.0	1.2	1.8	2.2	3.6
	Undrained	20	----	10	----	20	----	13	----	1.2	----	1.0	----	1.2	----
Pa	Parr loam, 2 to 5 percent slopes	38	65	20	30	32	42	20	27	1.4	2.0	1.2	1.8	2.2	4.0
Pb	Parr loam, 2 to 10 percent slopes, eroded	35	50	17	25	22	32	17	25	1.1	1.6	1.0	1.6	1.4	2.6
Pc	Parr silt loam, 0 to 2 percent slopes	50	80	21	27	35	50	25	32	1.4	2.2	1.4	2.2	2.4	4.0
Pd	Parr silt loam, 2 to 5 percent slopes	42	75	21	27	35	55	22	30	1.4	2.0	1.4	2.0	2.4	4.0
Pe	Parr silt loam, 2 to 5 percent slopes, eroded	35	65	18	22	30	40	18	25	1.3	1.8	1.2	1.8	1.6	2.8
Pf	Parr silt loam, 5 to 8 percent slopes, eroded	35	60	16	21	25	35	17	22	1.2	1.6	1.1	1.6	1.6	2.8
Pg	Parr silt loam, 8 to 12 percent slopes, eroded	27	38	12	17	25	35	14	19	.9	1.2	.8	1.2	1.4	2.6
Ph	Parr silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	20	45	10	16	20	30	10	16	.7	1.0	.6	1.0	.8	2.0
Pi	Pettit silt loam, 0 to 3 percent slopes:														
	Drained	50	65	13	18	35	40	20	25	1.8	2.2	1.4	1.8	2.4	3.2
	Undrained	15	----	----	----	----	----	10	----	1.0	----	.8	----	----	----
Ra	Randolph silt loam, 0 to 3 percent slopes:														
	Drained	25	40	14	19	27	40	15	20	1.0	1.4	.9	1.3	1.6	2.4
	Undrained	13	----	6	----	15	----	8	----	.8	----	.6	----	----	----
Rb	Raub silt loam, 0 to 2 percent slopes:														
	Drained	48	83	19	30	35	50	21	30	1.6	2.2	1.4	2.2	2.4	3.6
	Undrained	30	----	15	----	25	----	15	----	1.4	----	1.0	----	----	----
Rc	Riverwash	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rd	Rodman gravelly loam, 25 to 35 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Re	Romney silty clay loam, 0 to 2 percent slopes:														
	Drained	53	75	15	20	35	45	20	28	1.8	2.4	1.6	2.2	2.4	3.2
	Undrained	20	----	8	----	15	----	13	----	1.6	----	1.0	----	----	----
Rf	Ross loam, 0 to 3 percent slopes	40	60	18	22	30	40	25	30	1.6	2.2	1.6	2.0	2.8	3.6
Rg	Ross silt loam, 0 to 3 percent slopes	48	60	22	30	40	55	25	30	1.6	2.5	2.0	2.5	2.8	3.8
Rh	Ross silty clay loam, 0 to 3 percent slopes	50	68	20	28	35	50	22	28	1.6	2.4	1.6	2.2	2.8	3.6
Ri	Russell loam, 3 to 8 percent slopes	33	50	18	32	30	50	18	32	1.2	1.8	1.0	1.5	2.0	3.6
Rj	Russell loam, 3 to 8 percent slopes, eroded	30	40	14	23	25	40	14	20	1.0	1.5	.8	1.2	1.8	3.2
Rk	Russell loam, 8 to 12 percent slopes, eroded	18	25	11	15	20	30	10	15	.8	1.1	.6	.9	1.4	2.4
Rl	Russell loam, 12 to 25 percent slopes, eroded	12	20	7	10	10	18	----	----	.4	.8	.3	.6	1.0	2.0
Rm and Rla	Russell loam and clay loam, 8 to 12 percent slopes, severely eroded	10	20	7	10	12	20	----	----	.6	.8	.3	.6	1.0	2.0
Rn	Russell silt loam, 0 to 3 percent slopes	43	65	20	32	35	60	18	34	1.5	2.1	1.5	2.0	2.2	3.8
Ro	Russell silt loam, 3 to 8 percent slopes	38	60	20	32	35	55	18	32	1.4	2.0	1.2	1.8	2.2	3.6
Rp	Russell silt loam, 3 to 8 percent slopes, eroded	33	45	14	23	25	40	15	20	1.1	1.6	.9	1.4	1.8	3.0
Rq	Russell silt loam, 8 to 12 percent slopes	27	40	14	22	25	37	15	22	1.0	1.5	.8	1.3	1.8	3.2
Rr	Russell silt loam, 8 to 12 percent slopes, eroded	20	30	12	16	20	30	12	16	.8	1.1	.7	.9	1.4	2.4
Rs	Russell silt loam, 12 to 25 percent slopes	20	27	10	15	17	25	----	----	.8	1.2	.6	1.0	1.4	2.4
Rt	Russell silt loam, 12 to 25 percent slopes, eroded	15	22	8	12	15	22	----	----	.6	1.0	.4	.8	1.0	2.0
Ru	Russell silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded	25	38	10	15	20	30	10	15	.8	1.1	.5	.8	1.2	2.4
Rv	Russell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	15	22	8	12	15	25	----	----	.6	.8	.3	.6	1.0	2.0
Rw	Russell silt loam and silty clay loam, 12 to 25 percent slopes, severely eroded	----	----	----	----	----	----	----	----	.5	.8	.3	.5	.8	1.6
Sa	Shadeland silt loam, 0 to 2 percent slopes:														
	Drained	15	30	7	15	15	25	10	15	.8	1.4	.6	1.2	----	1.6
	Undrained	10	----	5	----	10	----	10	----	.6	----	.4	----	----	----

TABLE 7.—*Estimated average acre yields to be expected over a period of years*—Continued

Map symbol	Name of soil	Corn		Wheat		Oats		Soybeans		Mixed hay		Clover		Alfalfa	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Sb	Shoals silt loam, 0 to 3 percent slopes:														
	Drained	37	50	----	10	----	20	15	20	----	----	----	----	----	----
	Undrained	----	----	----	----	----	----	7	----	----	----	----	----	----	----
Sc	Sidell silt loam, 0 to 2 percent slopes	53	80	21	32	35	50	22	30	1.4	2.2	1.4	2.2	2.8	4.4
Sd	Sidell silt loam, 2 to 5 percent slopes	43	80	21	32	35	48	22	30	1.4	2.0	1.4	2.0	2.4	4.0
Se	Sidell silt loam, 2 to 5 percent slopes, eroded	38	65	17	25	25	35	17	25	1.3	1.8	1.2	1.8	1.6	2.8
Sf	Sidell silt loam, 5 to 8 percent slopes	42	80	20	30	35	45	21	27	1.4	2.0	1.4	2.0	2.4	4.0
Sg	Sidell silt loam, 5 to 8 percent slopes, eroded	35	65	17	25	25	35	17	22	1.2	1.6	1.1	1.6	1.6	2.8
Sh	Sidell silt loam, 8 to 12 percent slopes	30	55	15	18	28	35	13	17	1.0	1.6	.9	1.4	1.5	2.6
Si	Sidell silt loam, 8 to 12 percent slopes, eroded	27	37	12	17	25	35	12	17	.8	1.2	.7	1.2	1.3	2.5
Sj	Sidell silt loam and silty clay loam, 2 to 5 percent slopes, severely eroded	30	50	12	20	20	30	12	17	.9	1.2	.8	1.2	.8	2.0
Sk	Sidell silt loam and silty clay loam, 5 to 8 percent slopes, severely eroded	27	47	11	20	20	30	12	17	.9	1.2	.7	1.2	.8	2.0
Sl	Sidell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	20	45	10	17	17	27	10	16	.7	1.0	.5	1.0	.8	1.8
Sm	Sleeth silt loam, 0 to 3 percent slopes:														
	Drained	40	55	15	22	30	45	15	25	1.5	2.0	1.4	2.0	2.2	3.2
	Undrained	25	----	13	----	25	----	14	----	1.3	----	.6	----	----	----
Sn	Sloan silt loam, 0 to 3 percent slopes:														
	Drained	45	70	13	20	30	50	20	25	1.8	2.5	1.0	1.7	----	3.2
	Undrained	25	----	----	----	20	----	10	----	1.6	----	.4	----	----	----
So	Sloan silty clay loam, 0 to 3 percent slopes:														
	Drained	45	70	10	22	30	50	20	30	1.8	2.5	1.0	1.7	----	3.2
	Undrained	20	----	----	----	15	----	10	----	1.6	----	.4	----	----	----
Ta	Tippecanoe silt loam, 0 to 3 percent slopes:														
	Drained	48	70	20	32	35	50	21	30	1.6	2.2	1.4	2.2	2.4	3.4
	Undrained	35	----	18	----	30	----	18	----	1.4	----	1.2	----	1.6	----
Tb	Toronto silt loam, 0 to 3 percent slopes:														
	Drained	40	75	18	32	33	50	17	30	1.4	1.8	1.2	1.8	2.0	3.2
	Undrained	20	----	10	----	20	----	13	----	1.2	----	1.0	----	1.2	----
Wa	Warsaw loam, 0 to 3 percent slopes	30	45	20	30	23	43	20	30	.9	1.3	.8	1.2	1.6	2.8
Wb	Warsaw loam, 3 to 8 percent slopes	30	45	20	30	23	43	20	30	.9	1.3	.8	1.2	1.6	2.8
Wc	Warsaw loam, 3 to 8 percent slopes, eroded	23	38	15	25	20	28	15	25	.6	1.2	.5	1.0	1.4	2.6
Wd	Warsaw loam, 3 to 8 percent slopes, kame phase	32	45	17	25	20	30	15	22	1.1	1.5	.9	1.2	2.4	3.2
We	Warsaw loam, 3 to 8 percent slopes, eroded kame phase	25	38	12	19	15	25	14	18	.9	1.2	.6	1.0	1.6	2.4
Wf	Warsaw loam, 8 to 20 percent slopes, eroded	15	25	7	10	13	20	7	10	.5	1.0	.5	.8	1.0	2.2
Wg	Warsaw loam, 8 to 12 percent slopes, kame phase	20	40	14	20	12	20	12	17	.9	1.3	.8	1.2	2.0	2.8
Wh	Warsaw loam, 8 to 12 percent slopes, eroded kame phase	15	33	11	16	10	15	8	13	.6	1.0	.5	.9	1.4	2.2
Wi	Warsaw loam, 12 to 25 percent slopes, eroded kame phase	10	15	4	8	----	----	----	----	.5	.9	----	----	1.2	2.0
Wj	Warsaw silt loam, 0 to 3 percent slopes	35	50	21	30	28	45	21	30	1.2	1.6	1.0	1.3	2.0	3.2
Wk	Warsaw silt loam, 3 to 8 percent slopes	33	48	21	30	25	45	21	30	1.0	1.4	.9	1.2	2.0	3.2
Wl	Warsaw silt loam, 3 to 8 percent slopes, eroded kame phase	28	40	12	20	15	25	14	20	.9	1.3	.8	1.2	1.8	2.6
Wm	Warsaw silt loam, 8 to 12 percent slopes, eroded kame phase	18	33	9	15	12	17	8	15	.7	1.1	.6	1.0	1.4	2.2
Wn	Washtenaw silt loam, 0 to 3 percent slopes:														
	Drained	45	70	15	25	35	55	17	27	1.8	2.2	1.4	1.8	2.0	2.8
	Undrained	25	----	10	----	25	----	15	----	1.8	----	.8	----	----	----
Wo	Wea silt loam, 0 to 3 percent slopes	45	70	20	32	35	50	22	32	1.6	2.2	1.4	2.0	2.4	3.8
Wp	Wea silt loam, 3 to 8 percent slopes	40	65	20	32	33	50	21	28	1.6	2.2	1.3	2.0	2.2	3.6
Wq	Wea silt loam, 3 to 8 percent slopes, eroded	35	50	16	25	28	45	17	25	1.2	1.8	1.1	1.6	2.0	3.4
Wr	Westland loam, 0 to 3 percent slopes:														
	Drained	45	65	18	27	35	55	19	27	1.6	2.2	1.3	2.2	2.8	4.2
	Undrained	30	----	13	----	20	----	16	----	1.4	----	1.1	----	----	----
Ws	Westland silt loam, 0 to 3 percent slopes:														
	Drained	50	80	20	30	40	60	20	30	1.8	2.5	1.4	2.4	3.0	4.4
	Undrained	30	----	10	----	20	----	18	----	----	1.4	----	1.0	----	----
Wt	Westland silty clay loam, 0 to 3 percent slopes:														
	Drained	57	87	21	30	40	60	22	30	1.8	2.5	1.5	2.4	3.0	4.4
	Undrained	30	----	8	----	20	----	18	----	1.6	----	.8	----	----	----
Wu	Wingate silt loam, 0 to 3 percent slopes:														
	Drained	43	75	20	33	35	50	20	30	1.4	2.0	1.3	2.0	2.4	4.0
	Undrained	18	----	13	----	25	----	13	----	1.4	----	1.0	----	1.6	----

TABLE 8.—*Productivity ratings of soils*

[The productivity rating is the percentage of a standard yield for each crop that can be obtained on a given soil under a specified level of management. The standard yield is the approximate average yield per acre obtained, without the use of fertilizer or other amendments, on the more extensive and better soils of the regions of the United States in which the crop is most widely grown. The ratings in columns A are computed from the estimated average yields per acre that can be expected over a period of years under the management commonly used. Those in columns B are computed from the estimated average yields per acre that can be obtained by the intensive application of improved methods of farm management, including suitable crop rotations, erosion control, and the use of legumes, commercial fertilizer, lime, barnyard manure, and green manure. Absence of a figure means that the crop is not commonly grown under the management level specified. No index is given under good management for soils that are undrained because under good management they would be drained]

Management group and subgroup and soil name	Crop productivity index													
	Corn for grain (100=50 bu.)		Wheat (100=25 bu.)		Oats (100=50 bu.)		Soybeans (100=25 bu.)		Mixed hay (100=2 tons)		Clover (100=2 tons)		Alfalfa (100=4 tons)	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Management group 1.—Light-colored, well drained and moderately well drained, medium-textured soils of the uplands and terraces.														
Subgroup 1A—Level to gently sloping soils:														
Glenhall silt loam, 0 to 3 percent slopes:														
Artificially drained	80	125	80	130	70	100	85	130	75	110	70	100	60	85
Undrained	70		70		60		80		70		60		40	
Martinsville silt loam, 0 to 5 percent slopes	80	130	80	130	65	110	90	130	70	120	90	130	70	100
Martinsville loam, 0 to 5 percent slopes	70	110	70	120	60	90	70	120	65	100	70	100	60	90
Mellott silt loam, 0 to 3 percent slopes	85	150	90	130	60	110	90	130	70	105	65	90	57	95
Miami silt loam, 0 to 3 percent slopes	85	130	70	130	70	120	80	120	70	100	70	100	60	100
Montmorenci silt loam, 0 to 3 percent slopes:														
Artificially drained	90	150	75	130	70	100	95	120	70	100	65	100	60	100
Undrained	50		50		50		50		65		50		40	
Russell silt loam, 0 to 3 percent slopes	85	130	80	130	70	120	70	135	75	105	75	100	55	95
Wingate silt loam, 0 to 3 percent slopes:														
Artificially drained	85	150	80	130	70	100	80	120	70	100	65	100	60	100
Undrained	35		50		50		50		70		50		40	
Subgroup 1B—Level to gently sloping shallow soils:														
High Gap silt loam, 1 to 8 percent slopes	40	70	40	70	30	50	40	60	40	70	30	60		50
Milton silt loam, 2 to 8 percent slopes	50	80	50	70	50	70	60	80	60	90	50	75	50	70
Subgroup 1C—Gently sloping soils:														
Mellott silt loam, 3 to 8 percent slopes	85	145	80	120	60	100	90	130	70	100	65	100	55	90
Miami silt loam, 3 to 8 percent slopes	75	120	70	120	70	110	80	110	65	110	65	100	60	95
Miami loam, 3 to 8 percent slopes	70	110	70	120	60	100	70	90	60	90	60	90	55	80
Octagon silt loam, 3 to 8 percent slopes	85	145	80	130	60	100	80	130	70	100	65	100	60	90
Russell silt loam, 3 to 8 percent slopes	75	120	80	130	70	110	70	130	70	100	60	90	55	90
Russell loam, 3 to 8 percent slopes	65	100	70	130	60	100	70	130	60	90	50	75	50	90
Subgroup 1D—Eroded gently sloping soils:														
Mellott silt loam, 3 to 8 percent slopes, eroded	70	110	60	100	50	80	65	100	55	75	50	75	45	75
Mellott silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded	45	90	40	70	30	50	40	60	40	55	35	55	32	63
Miami silt loam, 3 to 8 percent slopes, eroded	60	85	60	90	50	75	50	70	50	80	55	80	50	85
Miami loam, 3 to 8 percent slopes, eroded	60	85	60	110	50	80	50	70	50	80	45	75	40	60
Octagon silt loam, 3 to 8 percent slopes, eroded	70	110	60	100	50	65	65	100	55	75	50	75	50	75
Russell silt loam, 3 to 8 percent slopes, eroded	65	90	55	90	50	80	60	80	55	80	45	70	45	75
Russell loam, 3 to 8 percent slopes, eroded	60	80	55	90	50	80	55	80	50	75	40	60	45	80
Russell silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded	50	75	40	60	40	60	40	60	40	55	25	40	30	60
Subgroup 1E—Slightly to moderately eroded sloping soils:														
Mellott silt loam, 8 to 12 percent slopes	60	110	55	90	50	65	60	100	50	70	50	70	45	80
Mellott silt loam, 8 to 12 percent slopes, eroded	45	100	40	60	40	60	50	70	40	55	35	50	40	60
Miami loam, 8 to 12 percent slopes	60	100	60	100	50	80	60	80	50	80	50	75	45	70
Miami loam, 8 to 12 percent slopes, eroded	40	70	50	65	40	60	40	60	40	70	40	60	35	55
Miami silt loam, 8 to 12 percent slopes	50	75	55	85	50	75	50	75	45	60	45	60	50	80
Miami silt loam, 8 to 12 percent slopes, eroded	40	65	45	65	40	60	45	65	40	50	40	60	40	60
Russell silt loam, 8 to 12 percent slopes	55	80	55	90	50	75	60	90	50	75	40	65	45	80
Russell loam, 8 to 12 percent slopes, eroded	35	50	45	60	40	60	40	60	40	55	30	45	35	60
Russell silt loam, 8 to 12 percent slopes, eroded	40	60	50	65	40	60	50	65	40	55	35	45	35	60
Subgroup 1F—Severely eroded sloping soils:														
Mellott silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	35	80	30	50	30	50	30	45	30	45	30	40	25	50
Miami silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	30	50	30	45	30	50			30	40	25	40	30	50
Russell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	30	45	30	50	30	50			30	40	15	30	25	50
Russell loam and clay loam, 8 to 12 percent slopes, severely eroded	20	40	30	40	25	40			30	40	15	30	25	50

TABLE 8.—*Productivity ratings of soils*—Continued

Management group and subgroup and soil name	Crop productivity index													
	Corn for grain (100=50 bu.)		Wheat (100=25 bu.)		Oats (100=50 bu.)		Soybeans (100=25 bu.)		Mixed hay (100=2 tons)		Clover (100=2 tons)		Alfalfa (100=4 tons)	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Subgroup 1G—Eroded sloping to moderately steep soils:														
Miami silt loam, 12 to 25 percent slopes	40	55	35	50	30	45	-----	-----	40	55	40	50	40	60
Miami silt loam, 12 to 25 percent slopes, eroded	30	45	20	30	20	30	-----	-----	30	50	25	40	30	50
Miami loam, 12 to 25 percent slopes	30	45	35	50	30	40	-----	-----	40	55	40	50	40	55
Miami loam, 12 to 25 percent slopes, eroded	20	30	30	40	20	30	-----	-----	30	50	20	35	30	50
Russell loam, 12 to 25 percent slopes, eroded	25	40	30	40	20	35	-----	-----	20	40	15	30	25	50
Russell silt loam, 12 to 25 percent slopes	40	55	40	60	35	50	-----	-----	40	60	30	50	35	60
Russell silt loam, 12 to 25 percent slopes, eroded	30	45	30	50	30	45	-----	-----	30	50	20	40	25	50
Russell silt loam and silty clay loam, 12 to 25 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	25	40	15	25	20	40
Subgroup 1H—Steeply sloping soils:														
Hennepin loam, 25 to 50 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	30	40	-----	-----	-----	-----
Rodman gravelly loam, 25 to 35 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Muskingum stony silt loam, 10 to 30 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Management group 2.—Well drained and somewhat excessively drained medium-textured soils underlain by sand and gravel.														
Subgroup 2A—Level soils:														
Fox loam, 0 to 3 percent slopes	65	85	75	120	50	80	75	120	45	65	40	60	40	70
Fox silt loam, 0 to 3 percent slopes	70	95	80	120	50	90	80	120	60	80	50	70	50	80
Longlois loam, 0 to 3 percent slopes	70	115	70	120	60	85	70	120	60	90	50	75	55	85
Longlois silt loam, 0 to 3 percent slopes	80	125	80	130	65	90	80	130	70	100	60	100	60	90
Nineveh loam, 0 to 3 percent slopes	55	70	70	100	45	80	70	110	40	65	35	50	50	70
Ockley loam, 0 to 3 percent slopes	70	90	70	120	55	90	70	120	60	90	50	70	55	85
Ockley silt loam, 0 to 3 percent slopes	80	110	80	130	60	100	80	130	65	95	65	90	60	90
Subgroup 2B—Gently sloping soils:														
Fox loam, 3 to 8 percent slopes	60	70	75	120	45	80	75	110	45	65	40	60	40	70
Fox loam and silt loam, 3 to 8 percent slopes, kame phases	60	80	60	80	40	60	50	70	40	65	30	60	50	75
Fox silt loam, 3 to 8 percent slopes	65	90	75	120	45	80	75	120	60	80	50	70	50	80
Longlois loam, 3 to 8 percent slopes	70	115	70	120	60	85	70	120	60	90	50	75	55	85
Longlois silt loam, 3 to 8 percent slopes	80	110	80	130	60	90	75	110	65	95	60	95	55	85
Ockley loam, 3 to 8 percent slopes	70	90	70	120	55	90	70	120	55	85	50	70	55	85
Ockley silt loam, 3 to 8 percent slopes	75	100	80	130	60	100	80	130	65	95	65	90	60	90
Subgroup 2C—Eroded gently sloping soils:														
Fox loam, 3 to 8 percent slopes, eroded	40	60	55	80	35	50	60	90	45	60	25	50	35	65
Fox loam, 3 to 8 percent slopes, eroded kame phase	45	70	40	60	30	50	40	60	30	50	25	55	35	50
Longlois loam, 3 to 8 percent slopes, eroded	60	75	60	100	45	75	60	100	45	75	40	50	45	75
Longlois silt loam, 3 to 8 percent slopes, eroded	65	95	65	100	50	80	60	90	50	80	50	75	50	80
Ockley loam, 3 to 8 percent slopes, eroded	55	75	60	100	45	80	60	100	50	80	40	65	45	75
Ockley silt loam, 3 to 8 percent slopes, eroded	60	90	65	100	50	80	65	100	50	80	55	75	50	80
Subgroup 2D—Eroded sloping soils:														
Fox loam, 8 to 12 percent slopes	40	60	40	60	30	50	40	60	45	60	25	50	30	60
Fox loam, 8 to 12 percent slopes, eroded	30	50	30	50	25	40	20	40	25	50	20	40	25	55
Fox loam and clay loam, 8 to 12 percent slopes, severely eroded	20	35	25	30	-----	-----	15	30	20	40	-----	-----	20	40
Fox loam, 8 to 12 percent slopes, kame phase	35	55	30	50	25	40	-----	-----	35	50	-----	-----	30	60
Fox loam, 8 to 12 percent slopes, eroded kame phase	30	50	20	40	20	35	-----	-----	25	40	-----	-----	30	40
Subgroup 2E—Eroded sloping to moderately steep soils:														
Fox loam, 12 to 25 percent slopes	25	40	25	40	25	35	25	40	25	50	20	30	20	50
Fox loam, 12 to 25 percent slopes, eroded	20	30	20	30	-----	-----	-----	-----	15	35	-----	-----	15	45
Fox loam, 12 to 25 percent slopes, kame phase	25	40	25	40	-----	-----	-----	-----	25	40	-----	-----	20	40
Fox loam, 12 to 25 percent slopes, eroded kame phase	20	30	10	30	-----	-----	-----	-----	20	30	-----	-----	20	30
Warsaw loam, 12 to 25 percent slopes, eroded kame phase	20	30	15	30	-----	-----	-----	-----	25	45	-----	-----	30	50
Management group 3.—Excessively drained light-colored and dark-colored loose sandy soils.														
Hagener loamy fine sand, 2 to 12 percent slopes	30	70	40	70	25	40	50	70	20	40	-----	-----	-----	50
Oaktown loamy fine sand, 3 to 8 percent slopes	45	55	40	60	20	30	40	60	20	40	-----	-----	40	70
Oaktown loamy fine sand, 8 to 12 percent slopes	40	50	40	60	20	30	40	50	20	40	-----	-----	40	70
Oaktown loamy fine sand, 12 to 25 percent slopes	35	40	30	40	15	20	30	40	15	30	-----	-----	30	50

TABLE 8.—*Productivity ratings of soils*—Continued

Management group and subgroup and soil name	Crop productivity index													
	Corn for grain (100=50 bu.)		Wheat (100=25 bu.)		Oats (100=50 bu.)		Soybeans (100=25 bu.)		Mixed hay (100=2 tons)		Clover (100=2 tons)		Alfalfa (100=4 tons)	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Management group 4.—Level, imperfectly drained medium-textured soils.														
Subgroup 4A—Soils on loam till:														
Crosby silt loam, 3 to 5 percent slopes, eroded:														
Artificially drained	60	100	60	110	60	100	60	110	60	100	60	90	50	75
Undrained	50	-----	50	-----	50	-----	50	-----	50	-----	50	-----	30	-----
Crosby silt loam, 0 to 3 percent slopes:														
Artificially drained	70	130	85	130	70	120	75	130	70	120	70	120	60	85
Undrained	40	-----	40	-----	40	-----	50	-----	50	-----	50	-----	30	-----
Fincastle silt loam, 0 to 3 percent slopes:														
Artificially drained	80	130	75	130	70	120	80	130	70	120	60	110	50	85
Undrained	40	-----	40	-----	40	-----	50	-----	50	-----	50	-----	30	-----
Otterbein silt loam, 0 to 3 percent slopes:														
Artificially drained	80	150	70	130	65	100	70	120	70	100	60	90	55	90
Undrained	40	-----	40	-----	40	-----	50	-----	60	-----	50	-----	30	-----
Toronto silt loam, 0 to 3 percent slopes:														
Artificially drained	80	150	70	130	65	100	70	120	70	90	60	90	50	80
Undrained	40	-----	40	-----	40	-----	50	-----	60	-----	50	-----	30	-----
Subgroup 4B—Soils on coarse-textured substrata:														
Homer silt loam, 0 to 3 percent slopes:														
Artificially drained	70	100	60	90	60	90	60	100	75	100	70	90	50	80
Undrained	50	-----	50	-----	50	-----	55	-----	65	-----	40	-----	-----	-----
Monitor silt loam, 0 to 3 percent slopes:														
Artificially drained	80	130	80	120	70	100	80	120	75	110	70	100	55	85
Undrained	65	-----	65	-----	45	-----	70	-----	70	-----	45	-----	-----	-----
Sleeth silt loam, 0 to 3 percent slopes:														
Artificially drained	80	110	60	90	60	90	60	100	75	100	70	100	55	80
Undrained	50	-----	50	-----	50	-----	55	-----	65	-----	30	-----	-----	-----
Subgroup 4C—Soils less than 3½ feet deep over rock:														
Randolph silt loam, 0 to 3 percent slopes:														
Artificially drained	50	80	55	75	55	80	60	80	50	70	45	65	40	60
Undrained	25	-----	25	-----	30	-----	30	-----	40	-----	30	-----	-----	-----
Shadeland silt loam, 0 to 2 percent slopes:														
Artificially drained	30	60	30	60	30	50	40	60	40	70	30	60	-----	40
Undrained	20	-----	20	-----	20	-----	40	-----	30	-----	20	-----	-----	-----
Management group 5.—Poorly drained, medium-textured soils.														
Delmar silt loam, 0 to 3 percent slopes:														
Artificially drained	50	80	60	80	40	70	50	100	50	75	40	60	20	50
Undrained	30	-----	30	-----	30	-----	40	-----	40	-----	30	-----	-----	-----
Management group 6.—Dark-colored, well drained and moderately well drained, medium-textured soils.														
Subgroup 6A—Level soils:														
Corwin silt loam, 0 to 2 percent slopes:														
Artificially drained	95	165	75	100	70	100	85	120	70	110	70	110	55	85
Undrained	90	-----	70	-----	60	-----	70	-----	70	-----	60	-----	40	-----
Dana silt loam, 0 to 2 percent slopes:														
Artificially drained	100	165	85	130	70	100	90	120	70	110	70	110	65	95
Undrained	90	-----	70	-----	60	-----	80	-----	70	-----	60	-----	-----	-----
Parr silt loam, 0 to 2 percent slopes	100	160	85	110	70	100	100	130	70	110	70	110	60	100
Sidell silt loam, 0 to 2 percent slopes	105	160	85	130	70	100	90	120	70	110	70	110	70	110
Subgroup 6B—Gently sloping soils:														
Parr loam, 2 to 5 percent slopes	75	130	80	120	65	85	80	110	70	100	60	90	55	100
Parr silt loam, 2 to 5 percent slopes	85	150	85	110	70	110	90	120	70	100	70	100	60	100
Sidell silt loam, 2 to 5 percent slopes	85	160	85	130	70	95	90	120	70	100	70	100	60	100
Sidell silt loam, 5 to 8 percent slopes	85	160	80	120	70	90	85	110	70	100	70	100	60	100
Subgroup 6C—Eroded gently sloping soils:														
Parr loam, 2 to 10 percent slopes, eroded	70	100	70	100	45	65	70	100	55	80	50	80	35	65
Parr silt loam, 2 to 5 percent slopes, eroded	70	130	70	90	60	80	70	100	65	90	60	90	40	70
Sidell silt loam, 2 to 5 percent slopes, eroded	75	130	70	100	50	70	70	100	65	90	60	90	40	70
Subgroup 6D—Eroded gently sloping to sloping soils:														
Sidell silt loam, 5 to 8 percent slopes, eroded	70	130	70	100	50	70	70	90	60	80	55	80	40	70
Parr silt loam, 5 to 8 percent slopes, eroded	70	120	65	85	50	70	70	90	60	80	55	80	40	70
Subgroup 6E—Severely eroded gently sloping soils:														
Sidell silt loam and silty clay loam, 2 to 5 percent slopes, severely eroded	60	100	50	80	40	60	50	70	45	60	40	60	20	50
Sidell silt loam and silty clay loam, 5 to 8 percent slopes, severely eroded	55	95	45	80	40	60	50	70	45	60	35	60	20	50

TABLE 8.—*Productivity ratings of soils*—Continued

Management group and subgroup and soil name	Crop productivity index													
	Corn for grain (100=50 bu.)		Wheat (100=25 bu.)		Oats (100=50 bu.)		Soybeans (100=25 bu.)		Mixed hay (100=2 tons)		Clover (100=2 tons)		Alfalfa (100=4 tons)	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Subgroup 6F—Eroded sloping soils:														
Parr silt loam, 8 to 12 percent slopes, eroded	55	75	50	70	50	70	55	75	45	60	40	60	35	65
Sidell silt loam, 8 to 12 percent slopes	70	120	75	110	60	80	75	100	60	90	60	90	50	90
Sidell silt loam, 8 to 12 percent slopes, eroded	50	75	65	90	45	65	65	85	45	60	40	60	35	65
Subgroup 6G—Severely eroded sloping soils:														
Parr silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	40	90	40	65	40	60	40	65	35	50	30	50	20	50
Sidell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded	40	90	40	70	35	55	40	65	35	50	25	50	20	45
Management group 7.—Dark-colored, moderately well drained to somewhat excessively drained, medium-textured soils underlain by sand and gravel.														
Subgroup 7A—Level, moderately well drained soils:														
Tippecanoe silt loam, 0 to 3 percent slopes:														
Artificially drained	95	140	80	130	70	100	85	120	80	110	70	110	60	85
Undrained	70	-----	70	-----	60	-----	70	-----	70	-----	60	-----	40	-----
Wea silt loam, 0 to 3 percent slopes	90	140	80	130	70	100	90	130	80	110	70	100	60	95
Subgroup 7B—Level somewhat excessively drained soils:														
Elston fine sandy loam, 0 to 3 percent slopes	50	80	60	80	40	60	70	90	25	50	-----	-----	20	60
Elston loam, 0 to 3 percent slopes	60	90	70	110	50	80	70	110	40	75	30	60	30	75
Elston silt loam, silted, 0 to 3 percent slopes	90	120	80	120	70	110	90	120	75	100	75	100	50	85
Warsaw loam, 0 to 3 percent slopes	60	90	80	120	45	85	80	120	45	65	40	60	40	70
Warsaw silt loam, 0 to 3 percent slopes	70	100	85	120	55	90	85	120	60	80	50	65	50	80
Subgroup 7C—Gently sloping soils:														
Elston fine sandy loam, 3 to 8 percent slopes	50	75	60	80	40	60	60	80	25	50	-----	-----	20	60
Elston loam, 3 to 8 percent slopes	60	90	60	110	50	80	60	100	40	75	30	60	30	70
Warsaw loam, 3 to 8 percent slopes	60	90	80	120	45	85	80	120	45	65	40	60	40	70
Warsaw loam, 3 to 8 percent slopes, kame phase	65	90	70	100	40	60	60	90	55	75	45	60	60	80
Warsaw silt loam, 3 to 8 percent slopes	65	95	85	120	50	90	85	120	50	70	45	60	50	80
Wea silt loam, 3 to 8 percent slopes	80	130	80	130	65	100	85	110	80	110	65	100	55	90
Subgroup 7D—Eroded gently sloping soils:														
Elston loam, 3 to 8 percent slopes, eroded	50	70	50	80	40	50	50	80	25	50	-----	-----	25	65
Warsaw loam, 3 to 8 percent slopes, eroded	45	75	60	100	40	55	60	100	30	60	25	50	35	65
Warsaw loam, 3 to 8 percent slopes, eroded kame phase	50	75	50	75	30	50	55	70	45	60	30	50	40	60
Warsaw silt loam, 3 to 8 percent slopes, eroded kame phase	55	80	50	80	30	50	55	80	45	65	40	60	45	65
Wea silt loam, 3 to 8 percent slopes, eroded	70	100	65	100	55	90	70	100	60	90	55	80	50	85
Subgroup 7E—Eroded sloping soils:														
Elston loam, 8 to 15 percent slopes, eroded	40	60	50	70	35	45	40	60	25	50	-----	-----	-----	50
Warsaw loam, 8 to 20 percent slopes, eroded	30	50	30	40	25	40	30	40	25	50	25	40	25	55
Warsaw loam, 8 to 12 percent slopes, kame phase	40	80	55	80	25	40	50	70	45	65	40	60	50	70
Warsaw loam, 8 to 12 percent slopes, eroded kame phase	30	65	45	65	20	30	30	50	30	50	25	45	35	55
Warsaw silt loam, 8 to 12 percent slopes, eroded kame phase	35	65	35	60	25	35	30	60	35	55	30	50	35	55
Management group 8.—Dark-colored, level, imperfectly drained, medium-textured soils.														
Subgroup 8A—Soils over till:														
Odell silt loam, 0 to 2 percent slopes:														
Artificially drained	95	160	70	95	70	100	80	120	80	110	70	110	40	70
Undrained	60	-----	50	-----	50	-----	50	-----	70	-----	50	-----	20	-----
Raub silt loam, 0 to 2 percent slopes:														
Artificially drained	95	165	75	120	70	100	85	120	80	110	70	110	60	90
Undrained	60	-----	60	-----	50	-----	60	-----	70	-----	50	-----	-----	-----
Subgroup 8B—Soils over gravel:														
Crane silt loam, 0 to 3 percent slopes:														
Artificially drained	90	140	75	120	70	100	80	120	70	110	70	110	50	80
Undrained	70	-----	60	-----	50	-----	60	-----	70	-----	50	-----	30	-----
Management group 9.—Very poorly drained dark-colored soils of the depressional areas.														
Subgroup 9A—Soils underlain by clayey materials:														
Brookston silt loam, 0 to 3 percent slopes:														
Artificially drained	100	155	80	130	80	130	85	130	90	125	80	115	75	100
Undrained	50	-----	50	-----	40	-----	60	-----	60	-----	-----	-----	-----	-----
Brookston silty clay loam, 0 to 3 percent slopes:														
Artificially drained	110	160	80	130	80	130	90	130	90	125	80	115	75	100
Undrained	50	-----	30	-----	40	-----	60	-----	60	-----	-----	-----	-----	-----

TABLE 8.—*Productivity ratings of soils*—Continued

Management group and subgroup and soil name	Crop productivity index													
	Corn for grain (100=50 bu.)		Wheat (100=25 bu.)		Oats (100=50 bu.)		Soybeans (100=25 bu.)		Mixed hay (100=2 tons)		Clover (100=2 tons)		Alfalfa (100=4 tons)	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Cope silt loam, 0 to 3 percent slopes:														
Artificially drained	80	140	80	120	80	120	80	120	80	125	80	100	70	100
Undrained	50	-----	50	-----	45	-----	60	-----	70	-----	-----	-----	-----	-----
Cope silty clay loam, 0 to 3 percent slopes:														
Artificially drained	90	150	80	130	80	120	85	130	90	125	80	115	70	100
Undrained	50	-----	50	-----	40	-----	60	-----	70	-----	-----	-----	-----	-----
Chalmers silt loam, 0 to 3 percent slopes:														
Artificially drained	115	175	85	120	80	130	90	130	100	130	90	120	80	110
Undrained	60	-----	50	-----	50	-----	60	-----	90	-----	70	-----	-----	-----
Chalmers silty clay loam, 0 to 3 percent slopes:														
Artificially drained	115	175	90	120	80	130	100	130	100	130	90	120	80	110
Undrained	50	-----	50	-----	40	-----	60	-----	90	-----	70	-----	-----	-----
Kokomo silty clay loam, 0 to 3 percent slopes:														
Artificially drained	90	130	60	80	60	100	60	100	90	120	70	110	50	80
Undrained	40	-----	30	-----	30	-----	50	-----	50	-----	-----	-----	-----	-----
Romney silty clay loam, 0 to 2 percent slopes:														
Artificially drained	105	150	60	80	70	90	80	110	90	120	80	110	60	80
Undrained	40	-----	30	-----	30	-----	50	-----	80	-----	50	-----	-----	-----
Washtenaw silt loam, 0 to 3 percent slopes:														
Artificially drained	90	140	60	100	70	110	70	110	90	110	70	90	50	70
Undrained	50	-----	40	-----	50	-----	60	-----	90	-----	40	-----	-----	-----
Subgroup 9B—Soils underlain by gravel and sand:														
Abington silty clay loam, 0 to 3 percent slopes:														
Artificially drained	100	165	70	90	75	100	80	110	90	120	60	100	70	90
Undrained	40	-----	30	-----	30	-----	50	-----	80	-----	30	-----	-----	-----
Westland loam, 0 to 3 percent slopes:														
Artificially drained	90	130	70	110	70	110	75	110	80	110	65	110	70	105
Undrained	60	-----	50	-----	40	-----	65	-----	70	-----	55	-----	-----	-----
Westland silt loam, 0 to 3 percent slopes:														
Artificially drained	100	160	80	120	80	120	80	120	90	125	70	120	75	110
Undrained	60	-----	40	-----	40	-----	70	-----	70	-----	50	-----	-----	-----
Westland silty clay loam, 0 to 3 percent slopes:														
Artificially drained	115	175	85	120	80	120	90	120	90	125	75	120	75	110
Undrained	60	-----	30	-----	40	-----	70	-----	80	-----	40	-----	-----	-----
Subgroup 9C—Soils subject to overflow or otherwise difficult to drain:														
Millsdale silty clay loam, 0 to 3 percent slopes:														
Artificially drained	90	130	60	80	60	110	80	110	75	100	60	80	50	75
Undrained	40	-----	30	-----	40	-----	30	-----	50	-----	-----	-----	-----	-----
Sloan silt loam, 0 to 3 percent slopes:														
Artificially drained	90	140	50	80	60	100	80	100	90	125	50	85	-----	80
Undrained	50	-----	-----	-----	40	-----	40	-----	80	-----	20	-----	-----	-----
Sloan silty clay loam, 0 to 3 percent slopes:														
Artificially drained	90	140	40	90	60	100	80	120	90	125	50	85	-----	80
Undrained	40	-----	-----	-----	30	-----	40	-----	80	-----	20	-----	-----	-----
Management group 10.—Organic soils.														
Carlisle muck:														
Artificially drained	90	120	-----	-----	-----	-----	70	100	90	120	-----	-----	-----	-----
Undrained	-----	-----	-----	-----	-----	-----	-----	-----	60	-----	-----	-----	-----	-----
Edwards muck:														
Artificially drained	60	90	-----	-----	-----	-----	50	90	70	100	-----	-----	-----	-----
Undrained	-----	-----	-----	-----	-----	-----	-----	-----	50	-----	-----	-----	-----	-----
Linwood muck:														
Artificially drained	80	120	-----	-----	-----	-----	70	100	60	120	-----	-----	-----	-----
Undrained	-----	-----	-----	-----	-----	-----	-----	-----	50	-----	-----	-----	-----	-----
Management group 11.—Alluvial or bottom-land soils.														
Subgroup 11A—Well-drained frequently flooded soils:														
Genesee fine sandy loam, 0 to 4 percent slopes	70	90	50	70	30	60	70	90	65	85	30	50	70	90
Genesee loam, 0 to 4 percent slopes	100	130	70	100	40	70	90	110	90	115	80	100	75	90
Genesee silt loam, 0 to 4 percent slopes	110	140	50	80	40	50	100	140	100	125	65	70	65	75
Genesee silty clay loam, 0 to 4 percent slopes	100	110	40	60	30	40	100	120	95	125	55	65	40	50
Kaskaskia loam, 0 to 3 percent slopes	90	115	50	80	70	90	80	100	80	100	50	65	50	75
Kaskaskia silt loam, 0 to 3 percent slopes	100	120	60	80	80	100	80	110	90	110	70	80	65	85
Subgroup 11B—Well-drained infrequently flooded soils (high bottoms):														
Genesee fine sandy loam, high bottom, 0 to 3 percent slopes	65	100	60	80	55	75	70	90	65	90	40	60	60	80
Genesee loam, high bottom, 0 to 3 percent slopes	90	120	80	100	70	100	80	110	90	110	75	110	75	100

TABLE 8.—*Productivity ratings of soils*—Continued

Management group and subgroup and soil name	Crop productivity index													
	Corn for grain (100=50 bu.)		Wheat (100=25 bu.)		Oats (100=50 bu.)		Soybeans (100=25 bu.)		Mixed hay (100=2 tons)		Clover (100=2 tons)		Alfalfa (100=4 tons)	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Genesee silt loam, high bottom, 0 to 4 percent slopes	100	130	80	100	60	80	80	120	110	125	75	110	80	100
Genesee silty clay loam, high bottom, 0 to 3 percent slopes	90	120	80	100	60	75	80	100	100	120	70	90	75	100
Ross loam, 0 to 3 percent slopes	80	120	70	90	60	80	100	120	80	110	80	100	70	90
Ross silt loam, 0 to 3 percent slopes	95	120	90	120	80	110	100	120	80	125	100	125	70	95
Ross silty clay loam, 0 to 3 percent slopes	100	135	80	110	70	100	90	110	80	120	80	110	70	90
Subgroup 11C—Moderately well drained and imperfectly drained soils, frequently flooded:														
Eel loam, 0 to 3 percent slopes:														
Protected by levees and artificially drained [1]	90	130	60	80	70	100	90	110	100	125	60	75	60	75
Unprotected by levees [2]	80	-----	40	-----	50	-----	90	-----	100	-----	30	-----	-----	-----
Eel silt loam, 0 to 3 percent slopes:														
Protected by levees and artificially drained [1]	110	140	60	80	70	100	90	110	100	125	60	75	60	75
Unprotected by levees [2]	90	-----	30	-----	50	-----	90	-----	100	-----	30	-----	-----	-----
Eel silty clay loam, 0 to 3 percent slopes:														
Protected by levees and artificially drained [1]	100	140	40	60	40	50	90	100	100	125	-----	50	-----	25
Unprotected by levees [2]	90	-----	-----	-----	30	-----	80	-----	95	-----	-----	-----	-----	-----
Pettit silt loam, 0 to 3 percent slopes:														
Artificially drained	100	130	50	70	70	80	80	100	90	110	70	90	60	80
Undrained	30	-----	-----	-----	-----	-----	40	-----	50	-----	40	-----	-----	-----
Shoals silt loam, 0 to 3 percent slopes:														
Artificially drained	75	100	-----	40	-----	40	60	80	-----	-----	-----	-----	-----	-----
Undrained	-----	-----	-----	-----	-----	-----	30	-----	-----	-----	-----	-----	-----	-----

[1] Soil receives little overflow except by backwater.

[2] Soil is occasionally overflowed during growing season.

Soils that are not suitable for cultivation, or that require extreme management of any kind, including those soils subject to severe erosion if cultivated, are placed in classes V, VI, VII, or VIII. Class V contains soils that are nearly level and not subject to erosion but are too wet, too frequently flooded, or too stony for cultivation. Soils placed in class VI are more limited in one or more features than those in class IV, but they will supply some forage, orchard crops, or forest products. Some soils in class VI can be cultivated enough to prepare them for longtime forage crops, orchards, planted forests, or special perennial crops.

Soils in class VII are more limited than those in class VI. Generally they must be managed by harvesting the native cover or a partly controlled succession of plants. The choices in management are fewer, production is lower, or risk of erosion is greater than on the soils in class VI.

Class VIII consists of soils so severely limited that they produce little useful vegetation. They may provide scenery or furnish shelter for wildlife. Some make up parts of watersheds on which runoff should be controlled.

Subclasses: Each of the eight classes contains soils that have limitations and management problems of about the same degree. The soils within a class may be of different kinds, however, and therefore the kinds of limitations are different. The dominant kind of limitation is indicated by one of four subclasses. The four subclasses indicate: Soil subject to erosion if cover is not maintained, designated by the symbol (e); excess water either on or in the soil (w); shallow, droughty, or infertile soil (s); or soil limited chiefly by climate (c). Usually not all the subclasses will occur in an area the size of a county.

The capability classes and subclasses in Tippecanoe County are described in the following list. Only the general nature of the principal soils in each subclass is described.

Class I.—Deep, well-drained, nearly level, productive soils; suitable for longtime intensive cultivation if good farming practices are followed.

Class II.—Soils that can be cultivated with only moderate risk of erosion or have only slight limitations in use.

- IIe: Gently sloping silty and loamy soils.
- IIw: Nearly level to gently sloping soils that have moderate limitations caused by excess water.
- IIs: Nearly level and gently sloping soils that have only moderate capacity for holding moisture for plants.

Class III.—Soils that are suited to cultivation in a regular cropping system but require special treatment or protection to maintain productivity; moderately severe risks of erosion or other moderately severe limitations.

- IIIe: Gently sloping or sloping soils that are subject to erosion.
- IIIw: Imperfectly drained and poorly drained mineral soils and very poorly drained organic soils.
- IIIs: Gently sloping and sloping somewhat droughty soils.

Class IV.—Soils that are severely limited in use or subject to serious risk of damage if used for tilled crops; suited to cultivation if specially managed.

IVe: Moderately steep to steep soils, most of them eroded.

IVs: Sloping to moderately steep eroded soils with low to very low capacity for holding moisture for plants.

Class V.—Soils suited to pasture but not suited to cultivation because of excess water.

Vw: Bottom-land soils subject to frequent overflow, and very poorly drained organic soils.

Class VI.—Soils not suitable for regular cultivation because they are too steep or too droughty; suited to the occasional shallow tillage needed to establish forage or trees.

VIe: Moderately steep and steep soils; some are eroded and some are severely eroded.

VIs: Moderately steep droughty soils; most are eroded.

Class VII.—Soils not suited to cultivation; serious hazards or limitations when used for forage or as woodland.

VIIe: Moderately steep and very steep soils.

VIIs: Very droughty soils and Riverwash.

Class VIII.—Land types suited to wildlife or recreation but not to commercial production of crops.

VIIIs: Gravel pits.

VIIIw: Shallow lakes.

The soils of Tippecanoe County are listed by class and subclass as follows:

	Capability class and subclass
Abington silty clay loam, 0 to 3 percent slopes (Aa)	IIw.
Brookston silt loam, 0 to 3 percent slopes (Ba)	IIw.
Brookston silty clay loam, 0 to 3 percent slopes (Bb)	IIw.
Carlisle muck [1] (Ca)	IIIw, Vw.
Chalmers silt loam, 0 to 3 percent slopes (Cb)	IIw.
Chalmers silty clay loam, 0 to 3 percent slopes (Cc)	IIw.
Cope silt loam, 0 to 3 percent slopes (Cd)	IIw.
Cope silty clay loam, 0 to 3 percent slopes (Ce)	IIw.
Corwin silt loam, 0 to 2 percent slopes (Cf)	I.
Crane silt loam, 0 to 3 percent slopes (Cg)	IIw.
Crosby silt loam, 0 to 3 percent slopes (Ch)	IIw.
Crosby silt loam, 3 to 5 percent slopes, eroded (Ci)	IIw.
Dana silt loam, 0 to 2 percent slopes (Da)	I.
Delmar silt loam, 0 to 3 percent slopes (Db)	IIIw.
Edwards muck [1] (Ea)	IIIw, Vw.
Eel loam, 0 to 3 percent slopes (Eb)	IIw.
Eel silt loam, 0 to 3 percent slopes (Ec)	IIw.
Eel silty clay loam, 0 to 3 percent slopes (Ed)	IIw.
Elston fine sandy loam, 0 to 3 percent slopes (Ee)	IIIs.
Elston fine sandy loam, 3 to 8 percent slopes (Ef)	IVs.
Elston loam, 0 to 3 percent slopes (Eg)	IIs.
Elston loam, 3 to 8 percent slopes [2] (Eh)	IIs, IIIs.
Elston loam, 3 to 8 percent slopes, eroded [2] (Ei)	IIs, IIIs.
Elston loam, 8 to 15 percent slopes, eroded [2] (Ej)	IIIs, IVs.
Elston silt loam, silted, 0 to 3 percent slopes (Ek)	I.
Fincastle silt loam, 0 to 3 percent slopes (Fa)	IIw.
Fox loam, 0 to 3 percent slopes (Fb)	IIs.
Fox loam, 3 to 8 percent slopes [2] (Fc)	IIs, IIIs.
Fox loam, 3 to 8 percent slopes, eroded [2] (Fd)	IIs, IIIs.
Fox loam, 3 to 8 percent slopes, eroded kame phase [2] (Fe)	IIs, IIIs.
Fox loam, 8 to 12 percent slopes (Ff)	IIIs.
Fox loam, 8 to 12 percent slopes, kame phase (Fh)	IIIs.
Fox loam, 8 to 12 percent slopes, eroded (Fg)	IIIs.
Fox loam, 8 to 12 percent slopes, eroded kame phase (Fi)	IIIs.
Fox loam, 12 to 25 percent slopes [2] (Fj)	IVs, VIs.
Fox loam, 12 to 25 percent slopes, eroded [2] (Fk)	IVs, VIs.
Fox loam, 12 to 25 percent slopes, kame phase [2] (Fl)	IVs, VIs.
Fox loam, 12 to 25 percent slopes, eroded kame phase [2] (Fm)	IVs, VIs.
Fox loam and clay loam, 8 to 12 percent slopes, severely eroded (Fn)	IVs.
Fox loam and silt loam, 3 to 8 percent slopes, kame phases [2] (Fo)	IIs, IIIs.
Fox silt loam, 0 to 3 percent slopes (Fp)	IIs.
Fox silt loam, 3 to 8 percent slopes [2] (Fq)	IIs, IIIs.
Genesee fine sandy loam, 0 to 4 percent slopes [1] (Ga)	I, IIs.
Genesee fine sandy loam, high bottom, 0 to 3 percent slopes [1] (Gb)	I, IIs.
Genesee loam, 0 to 4 percent slopes [1] (Gc)	I, Vw.
Genesee loam, high bottom, 0 to 3 percent slopes (Gd)	I.
Genesee silt loam, 0 to 4 percent slopes [1] (Ge)	I, Vw.
Genesee silt loam, high bottom, 0 to 4 percent slopes (Gf)	I.
Genesee silty clay loam, 0 to 4 percent slopes [1] (Gg)	I, Vw.
Genesee silty clay loam, high bottom, 0 to 3 percent slopes (Gh)	I.
Glenhall silt loam, 0 to 3 percent slopes [2] (Gi)	I, IIe.
Gravel pits [3]	VIIs, VIIIs.
Hagener loamy fine sand, 2 to 12 percent slopes [2] (Ha)	IIIs, IVs, VIIs.
Hennepin loam, 25 to 50 percent slopes (Hb)	VIIe.
High Gap silt loam, 1 to 8 percent slopes [2] (Hc)	IIe, IIIe.
Homer silt loam, 0 to 3 percent slopes (Hd)	IIw.
Kaskaskia loam, 0 to 3 percent slopes [1] (Ka)	I, Vw.
Kaskaskia silt loam, 0 to 3 percent slopes [1] (Kb)	I, Vw.
Kokomo silty clay loam, 0 to 3 percent slopes (Kc)	IIw.
Linwood muck [1] (La)	IIIw, Vw.
Longlois loam, 0 to 3 percent slopes [2] (Lb)	I, IIe.
Longlois loam, 3 to 8 percent slopes [2] (Lc)	IIe, IIIe.
Longlois loam, 3 to 8 percent slopes, eroded [2] (Ld)	IIe, IIIe.
Longlois silt loam, 0 to 3 percent slopes [2] (Le)	I, IIe.
Longlois silt loam, 3 to 8 percent slopes [2] (Lf)	IIe, IIIe.
Longlois silt loam, 3 to 8 percent slopes, eroded [2] (Lg)	IIe, IIIe.
Made land (Ma)	VIIs.
Martinsville loam, 0 to 5 percent slopes [2] (Mb)	I, IIe.
Martinsville silt loam, 0 to 5 percent slopes [2] (Mc)	I, IIe.
Mellott silt loam, 0 to 3 percent slopes [2] (Md)	I, IIe.
Mellott silt loam, 3 to 8 percent slopes [2] (Me)	IIe, IIIe.
Mellott silt loam, 3 to 8 percent slopes, eroded [2] (Mf)	IIe, IIIe.
Mellott silt loam, 8 to 12 percent slopes (Mg)	IIIe.
Mellott silt loam, 8 to 12 percent slopes, eroded (Mh)	IIIe.
Mellott silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded [2] (Mi)	IIIe, IVe.
Mellott silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded (Mj)	IVe.
Miami loam, 3 to 8 percent slopes [2] (Mk)	IIe, IIIe.
Miami loam, 3 to 8 percent slopes, eroded [2] (Ml)	IIe, IIIe.
Miami loam, 8 to 12 percent slopes (Mm)	IIIe.
Miami loam, 8 to 12 percent slopes, eroded (Mn)	IIIe.
Miami loam, 12 to 25 percent slopes [2] (Mo)	IVe, VIe,
Miami loam, 12 to 25 percent slopes, eroded [2] (Mp)	IVe, VIe.
Miami silt loam, 0 to 3 percent slopes [2] (Mq)	I, IIe.
Miami silt loam, 3 to 8 percent slopes [2] (Mr)	IIe, IIIe.
Miami silt loam, 3 to 8 percent slopes, eroded [2] (Ms)	IIe, IIIe.
Miami silt loam, 8 to 12 percent slopes (Mt)	IIIe.
Miami silt loam, 8 to 12 percent slopes, eroded (Mu)	IIIe.
Miami silt loam, 12 to 25 percent slopes [2] (Mv)	IVe, VIe.
Miami silt loam, 12 to 25 percent slopes, eroded [2] (Mw)	IVe, VIe.
Miami silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded (Mx)	IVe.
Millsdale silty clay loam, 0 to 3 percent slopes (My)	IIw.
Milton silt loam, 2 to 8 percent slopes [2] (Mz)	IIe, IIIe.
Monitor silt loam, 0 to 3 percent slopes (Mza)	IIw.
Montmorenci silt loam, 0 to 3 percent slopes [2] (Mzb)	I, IIe.
Muskingum stony silt loam, 10 to 30 percent slopes [2] (Mzc)	VIe, VIIe.
Nineveh loam, 0 to 3 percent slopes (Na)	IIIs.
Oaktown loamy fine sand, 3 to 8 percent slopes [2] (Oa)	IVs, VIIs.
Oaktown loamy fine sand, 8 to 12 percent slopes (Ob)	VIIs.
Oaktown loamy fine sand, 12 to 25 percent slopes (Oc)	VIIs.
Ockley loam, 0 to 3 percent slopes [2] (Od)	I, IIe.
Ockley loam, 3 to 8 percent slopes [2] (Oe)	IIe, IIIe.
Ockley loam, 3 to 8 percent slopes, eroded [2] (Of)	IIe, IIIe.
Ockley silt loam, 0 to 3 percent slopes [2] (Og)	I, IIe.
Ockley silt loam, 3 to 8 percent slopes [2] (Oh)	IIe, IIIe.
Ockley silt loam, 3 to 8 percent slopes, eroded [2] (Oi)	IIe, IIIe.
Octagon silt loam, 3 to 8 percent slopes [2] (Ok)	IIe, IIIe.
Octagon silt loam, 3 to 8 percent slopes, eroded [2] (Ol)	IIe, IIIe.
Odell silt loam, 0 to 2 percent slopes (Om)	IIw.
Otterbein silt loam, 0 to 3 percent slopes (On)	IIw.
Parr loam, 2 to 5 percent slopes (Pa)	IIe.
Parr loam, 2 to 10 percent slopes, eroded [2] (Pb)	IIe, IIIe.
Parr silt loam, 0 to 2 percent slopes (Pc)	I.
Parr silt loam, 2 to 5 percent slopes (Pd)	IIe.

	Capability class and subclass
Parr silt loam, 2 to 5 percent slopes, eroded (Pe)	IIe.
Parr silt loam, 5 to 8 percent slopes, eroded [2] (Pf)	IIe, IIIe.
Parr silt loam, 8 to 12 percent slopes, eroded (Pg)	IIIe.
Parr silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded (Ph)	IVe.
Pettit silt loam, 0 to 3 percent slopes [3] [1] (Pi)	IIw, Vw.
Randolph silt loam, 0 to 3 percent slopes (Ra)	IIIw.
Raub silt loam, 0 to 2 percent slopes (Rb)	IIw.
Riverwash (Rc)	VIIs.
Rodman gravelly loam, 25 to 35 percent slopes (Rd)	VIIe.
Romney silty clay loam, 0 to 2 percent slopes (Re)	IIw.
Ross loam, 0 to 3 percent slopes (Rf)	I.
Ross silt loam, 0 to 3 percent slopes (Rg)	I.
Ross silty clay loam, 0 to 3 percent slopes (Rh)	I.
Russell loam, 3 to 8 percent slopes [2] (Ri)	IIe, IIIe.
Russell loam, 3 to 8 percent slopes, eroded [2] (Rj)	IIe, IIIe.
Russell loam, 8 to 12 percent slopes, eroded (Rk)	IIIe.
Russell loam, 12 to 25 percent slopes, eroded [2] (Rl)	IVe, VIe.
Russell loam and clay loam, 8 to 12 percent slopes, severely eroded (Rm and Rla)	IVe.
Russell silt loam, 0 to 3 percent slopes [2] (Rn)	I, IIe.
Russell silt loam, 3 to 8 percent slopes [2] (Ro)	IIe, IIIe.
Russell silt loam, 3 to 8 percent slopes, eroded [2] (Rp)	IIe, IIIe.
Russell silt loam, 8 to 12 percent slopes (Rq)	IIIe.
Russell silt loam, 8 to 12 percent slopes, eroded (Rr)	IIIe.
Russell silt loam, 12 to 25 percent slopes [2] (Rs)	IVe, VIe.
Russell silt loam, 12 to 25 percent slopes, eroded [2] (Rt)	IVe, VIe.
Russell silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded [2] (Ru)	IIIe, IVe.
Russell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded (Rv)	IVe.
Russell silt loam and silty clay loam, 12 to 25 percent slopes, severely eroded [2] (Rw)	VIe, VIIe.
Shadeland silt loam, 0 to 2 percent slopes (Sa)	IIIw.
Shallow lakes	VIIIw.
Shoals silt loam, 0 to 3 percent slopes [1] (Sb)	IIw, Vw.
Sidell silt loam, 0 to 2 percent slopes (Sc)	I.
Sidell silt loam, 2 to 5 percent slopes (Sd)	IIe.
Sidell silt loam, 2 to 5 percent slopes, eroded (Se)	IIe.
Sidell silt loam, 5 to 8 percent slopes [2] (Sf)	IIe, IIIe.
Sidell silt loam, 5 to 8 percent slopes, eroded [2] (Sg)	IIe, IIIe.
Sidell silt loam, 8 to 12 percent slopes (Sh)	IIIe.
Sidell silt loam, 8 to 12 percent slopes, eroded (Si)	IIIe.
Sidell silt loam and silty clay loam, 2 to 5 percent slopes, sevcrely eroded (Sj)	IIIe.
Sidell silt loam and silty clay loam, 5 to 8 percent slopes, severely eroded [2] (Sk)	IIIe, IVe.
Sidell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded (Sl)	IVe.
Sleeth silt loam, 0 to 3 percent slopes (Sm)	IIw.
Sloan silt loam, 0 to 3 percent slopes [1] (Sn)	IIw, Vw.
Sloan silty clay loam, 0 to 3 percent slopes [1] (So)	IIw, Vw.
Tippecanoe silt loam, 0 to 3 percent slopes [2] (Ta)	I, IIe.
Toronto silt loam, 0 to 3 percent slopes (Tb)	IIw.
Warsaw loam, 0 to 3 percent slopes (Wa)	IIs.
Warsaw loam, 3 to 8 percent slopes [2] (Wb)	IIs, IIIs.
Warsaw loam, 3 to 8 percent slopes, eroded [2] (Wc)	IIs, IIIs.
Warsaw loam, 3 to 8 percent slopes, kame phase [2] (Wd)	IIs, IIIs.
Warsaw loam, 3 to 8 percent slopes, eroded kame phase [2] (We)	IIs, IIIs.
Warsaw loam, 8 to 20 percent slopes, eroded [2] (Wf)	IIIs, IVs, VIs.
Warsaw loam, 8 to 12 percent slopes, kame phase (Wg)	IIIs.
Warsaw loam, 8 to 12 percent slopes, eroded kame phase (Wh)	IIIs.
Warsaw loam, 12 to 25 percent slopes, eroded kame phase [2] (Wi)	IVs, VIs.
Warsaw silt loam, 0 to 3 percent slopes (Wj)	IIs.
Warsaw silt loam, 3 to 8 percent slopes [2] (Wk)	IIs, IIIs.
Warsaw silt loam, 3 to 8 percent slopes, eroded kame phase [2] (Wl)	IIs, IIIs.
Warsaw silt loam, 8 to 12 percent slopes, eroded kame phase (Wm)	IIIs.
Washtenaw silt loam, 0 to 3 percent slopes (Wn)	IIw.
Wea silt loam, 0 to 3 percent slopes [2] (Wo)	I, IIe.
Wea silt loam, 3 to 8 percent slopes [2] (Wp)	IIe, IIIe.
Wea silt loam, 3 to 8 percent slopes, eroded [2] (Wq)	IIe, IIIe.
Westland loam, 0 to 3 percent slopes (Wr)	IIw.
Westland silt loam, 0 to 3 percent slopes (Ws)	IIw.
Westland silty clay loam, 0 to 3 percent slopes (Wt)	IIw.
Wingate silt loam, 0 to 3 percent slopes [2] (Wu)	I, IIe.

[1] This mapping unit is in more than one capability class because of changes from the concept of mapping ranges at the time the fieldwork was completed to present-day concepts of land-capability classification.

[2] This mapping unit is in more than one capability class because of changes in land-capability classification concepts, principally in the ranges of slope groups, between the time the fieldwork was completed and the present.

[3] This mapping unit is in more than one capability class because it includes small areas of other soils.

Formation and Classification of Soils

Factors of Soil Formation

Soil is the product of climatic and biological forces acting over a period of time on materials deposited or accumulated by geologic agencies. The characteristics of the natural soil at any given place depend on the interrelationship of the following factors:

1. The physical and mineralogical composition of the parent material.
2. The climate while the soil material was accumulating and while the soil was developing.
3. The relief or lay of the land.
4. The plant and animal life on and in the soil during its development.
5. The length of time each of these forces of development has been acting on the soil material.

Climate and vegetation are the active factors in soil formation. Their action on the accumulated parent material changes it into soil that has distinguishable layers or horizons. The composition of the parent material limits the kind of soil that can be formed. The relief increases or decreases the effect of temperature and moisture. The length of time a soil has been developing affects its characteristics because it takes a long time for the full effect of weathering to produce distinct differences in layers of the soil profile.

Soil Formation in Tippecanoe County

Tippecanoe County is on the border between the Gray-Brown Podzolic soil region of the east-central part of the United States and the Brunizem (Prairie) soil region of the midwest. The climate is humid and temperate. The average annual rainfall of 38 inches is fairly uniformly distributed throughout the year.

The Gray-Brown Podzolic soils developed under mixed deciduous hardwood forest. The layer of organic litter that covers the surface is much thinner than in the Podzol region to the north, but thicker than in the Red-Yellow Podzolic region to the south. Only the upper few inches of mineral soil are dark colored. Below the A_1 horizon the Gray-Brown Podzolic soils are light colored, low in organic matter, and medium acid to strongly acid.

The Brunizems developed on well-drained to imperfectly drained areas under a cover of sod-forming grass. Little or no organic matter accumulated on the surface, because most of the litter dried and was blown away

during the dry midsummer season. The organic matter contained in the roots was well distributed through the soil. The heaviest concentration was in the uppermost 12 to 18 inches, and the amount gradually decreased with depth. The soils of these areas are medium acid.

Between areas of the two principal soil groups are narrow transitional belts, where forest encroached on the prairie, resulting in a parklike vegetative cover of scattered trees over a ground cover of shrubs and grasses. These belts are widest along the drainageways. The soils that developed in these transitional areas are intermediate in characteristics between the Gray-Brown Podzolic soils and the Brunizems, but are more nearly like the Gray-Brown Podzolic soils. Consequently, they are classified as Gray-Brown Podzolic, intergrading to Brunizems.

The sources of parent material of the soils in Tippecanoe County are as follows:

1. Glacial drift of Wisconsin age.
2. Loess (windblown silt) deposited over glacial drift of Wisconsin age.
3. Sandstone and shale of the Pennsylvanian (Mansfield), Mississippian (Borden), and Devonian (New Albany) periods.
4. Alluvium washed from soils developed on the other materials.

Most of the soils of the county developed on deposits of unassorted glacial till. Some of these deposits were covered by deep mantles of silt; these areas were generally leached to depths of 42 inches or more. In other areas, little or no silt was deposited over the glacial till, and the till was leached of carbonates to depths of less than 42 inches.

The parent material of the Brunizem soils includes slightly thicker deposits of silt than that of the Gray-Brown Podzolic soils. The carbonate content of both till and silt varies, but the average is between 17 and 20 percent.

Soils of the Russell and Sidell catenas have been leached of carbonates to a greater depth than those of the Miami and Parr catenas. The average depth to carbonates in 309 observations of soils in the Russell and Sidell catenas was 47.5 inches; in 211 observations of soils in the other two catenas, 35.5 inches. The observations showed little difference in depth to carbonates in Brunizems and Gray-Brown Podzolic soils.

The bedrock formations, consisting of sandstone, flint, shale, and limestone, crop out in the Wabash Valley as rock terraces thinly covered with water-sorted or alluvial material. In the uplands Mansfield sandstone and Borden shale are thinly mantled with glacial till. Outcrops of these same formations occur on steep slopes. The bedrock has had only a minor influence on soil development. Over most of the county, it is buried under thick deposits of glacial drift.

Neutral to mildly alkaline alluvium borders all the major streams and their tributaries in this county. The alluvium derived from prairie areas is dark colored and high in organic matter. The alluvium from the forested areas is light colored and has only a medium amount of organic matter.

Local relief is generally less pronounced in the prairie area than in the forested parts of the county. In the prairies the streams are few in number and low in gradient. Most of them originate in areas that were formerly large marshes.

Classification of Soils

The soils in Tippecanoe County belong to ten great soil groups: Gray-Brown Podzolic; Gray-Brown Podzolic, intergrading to Brunizem; Brunizem; Humic Gley; Brown Forest; Planosol; Rendzina; Lithosol; Alluvial; and Organic.

In table 9 the soil series of the county are classified by great soil groups and the drainage, relief, and parent material are shown for each series. All of the soil series listed in each column developed under the same type of drainage, but from different parent materials. The Roman numerals at the heads of the columns are those used in the Indiana system of designation of major soil profiles (*1*). The soil series on each horizontal line developed from the same material, but differ because of differences in drainage and in vegetation.

Gray-Brown Podzolic soils

The Gray-Brown Podzolic soils have a thin dark-colored A_1 horizon, a light-colored eluviated A_2 horizon, and an illuviated B horizon that is usually finer textured than the A, C, or D horizon. The accumulation of clay in the B horizon probably represents both downward movement from the A horizon and development of clay in place. The soil series in the Gray-Brown Podzolic great soil group are well to excessively drained, well drained, or imperfectly drained.

Russell soils are representative of the well-drained Gray-Brown Podzolic soils in this county. They developed in 18 to 36 inches of loess, or windblown silt, over weathered loam or light clay loam till of Wisconsin age. The till is calcareous at depths of from 42 to about 70 inches from the surface. Table 10 gives analytical data for a profile of Russell silt loam.

Profile of Russell silt loam in a wooded area:

A_0	¼ to 0 inch, very dark brown partly decomposed leaves, twigs, and stems; pH 7.2.[5]
A_1	0 to 2 inches, very dark grayish-brown (10YR 3/2, moist) silt loam; organic content high; weak fine granular structure; friable when moist, soft when dry; pH 6.9.
A_2	2 to 11 inches, grayish-brown to dark grayish-brown (10YR 5/2 to 4/2, moist) silt loam; weak thin platy structure; friable; numerous small roots; pH 6.6.
B_1	11 to 18 inches, brown (7.5YR 5/4, moist) light silty clay loam; moderate fine subangular blocky structure; slightly firm; pH 5.6.
B_{21}	18 to 33 inches, dark-brown or dark yellowish-brown (7.5YR 4/4 to 10YR 4/4, moist) silty clay loam; strong medium subangular blocky structure; firm; contains a small amount of sand in the lower few inches; pH 5.9.
B_{22}	33 to 46 inches, dark yellowish-brown or yellowish-brown (10YR 4/4 to 5/4, moist) clay loam to silty clay loam; moderate coarse subangular blocky structure; firm; content of sand and partly weathered rock fragments increases with depth; pH 5.9.
B_{23}	46 to 51 inches, dark yellowish-brown to dark-brown (10YR 4/4 to 4/3, moist) clay loam; weak coarse subangular blocky structure; very firm; pH 7.2.
C	51 inches +, yellowish-brown or light olive-brown (10YR 5/4 to 2.5Y 5/4, moist) loam till; calcareous.

[5] pH determined by colorimetric method in the field.

The *Miami* soils are also well drained. They developed from weathered loam till, covered by loess up to about 17 inches deep. The till is calcareous at depths of 24 to 42 inches.

The well-drained *Milton* soil developed in glacial drift 20 to 42 inches thick over bedrock. The drift has been leached of carbonates.

The *Martinsville* soils are well drained. They developed from stratified silts and fine sands that include a few small strata of clay. This stratified material is calcareous at depths of 36 to about 60 inches.

The *High Gap* soil formed from glacial till that contains considerable shale. The till is 18 to 36 inches deep over bedrock of acid shale and sandstone. This soil is well drained.

The *Ockley* soils developed on silty and loamy outwash, which is 42 to about 70 inches thick over calcareous stratified gravel and sand. These soils are well drained to somewhat excessively drained.

Profile of Ockley silt loam in a wooded area:

- A_0 ½ to 0 inch, very dark brown partly decomposed leaves, twigs, and other forest debris; neutral.
- A_1 0 to 3 inches, very dark grayish-brown (10YR 3/2, moist) silt loam; high in organic matter; moderate fine granular structure; friable; slightly acid.
- A_2 3 to 12 inches, yellowish-brown to pale-brown (10YR 5/4 to 6/3, moist) silt loam; moderate thin platy structure; friable; medium acid.
- B_1 12 to 18 inches, yellowish-brown or dark yellowish-brown (10YR 5/4 to 4/4, moist) light silty clay loam; moderate fine subangular blocky structure; slightly firm; medium acid.
- B_{21} 18 to 39 inches, dark-brown (7.5YR 4/4 to 10YR 4/3, moist) silty clay loam or clay loam; moderate medium subangular blocky structure; firm; content of sand and partly weathered rock fragments increases with depth; medium to strongly acid.
- B_{22} 39 to 55 inches, dark yellowish-brown to dark-brown (10YR 4/4 to 4/3, moist) clay loam or sandy clay loam; weak coarse subangular blocky structure; firm; medium to strongly acid.
- B_{23} 55 to 63 inches, dark grayish-brown (10YR 4/2, moist) clay loam to gravelly clay loam; weak very coarse subangular blocky structure; very firm; slightly acid to neutral.
- D 63 inches +, pale-brown (10YR 6/3, moist) stratified gravel and sand; calcareous.

The *Fox* soils are like the Ockley soils except that the silty and loamy outwash from which they developed is only 24 to 42 inches thick over the calcareous stratified gravel and sand. The Fox soils are well drained to somewhat excessively drained.

The *Oaktown* soils are excessively drained. They developed from mildly alkaline to slightly acid loose sands and loamy sands. The B horizon is weakly developed; a color B may occur as thin discontinuous bands.

The *Fincastle* soil developed in 18 to 36 inches of loess over highly calcareous loam to light clay loam glacial till. It is like the Russell soil except that it developed under imperfect drainage. The horizons of the two soils are similar, but the Fincastle soil is mottled in the upper B horizon, and it contains more clay in the B_2 horizon.

The *Crosby* soils are imperfectly drained. They developed in highly calcareous loam to light clay loam glacial till. They resemble the Miami soils, except for the higher clay content in the B_2 horizon of the Crosby soils, and the mottling in the upper B horizon.

The *Randolph* soil is like the Milton soil except that the Randolph is imperfectly drained. Aside from the mottling in the upper B horizon, and the increase in clay content in the B_2 horizon of the Randolph soil, the profiles of these two series are much the same.

The *Shadeland* soil developed from the same kind of shaly till over shallow-depth bedrock as the High Gap soil. However, the Shadeland soil is imperfectly drained, and is mottled in the lower A and upper B horizon.

The *Homer* soil is like the Fox soils except for the effects of imperfect drainage. It developed from the same kind of silty and loamy outwash 24 to 44 inches thick over stratified calcareous gravel and sand. The upper B horizon of the Homer soil is mottled, and the B_2 horizon contains more clay than the similar profile of a Fox soil.

The *Sleeth* soil developed from the same parent material as the Ockley soils—42 to 70 inches of silty and loamy outwash over stratified calcareous gravel and sand. The imperfect drainage of the Sleeth soil has caused mottling to develop in the upper B horizon and also caused more clay to concentrate in the B_2 horizon.

Gray-Brown Podzolic soils, intergrading to Brunizems

These soils were probably originally Brunizem soils, because they developed under prairie vegetation. After their development, the forest encroached on the prairie in these areas. This change in vegetation began to change the soils into typical forest soils of the Gray-Brown Podzolic great soil group. The forest was on these soils long enough so that an A_2 horizon developed in the lower part of the original A_1 horizon. The soils were not under forest long enough to lose all of their Brunizem characteristics.

The *Mellott* soils are well drained. They developed from the same parent material as the Russell and Fincastle soils, but developed differently because of the difference in vegetation.

Profile of Mellott silt loam in a cultivated area:

- A_p 0 to 9 inches, very dark grayish-brown (10YR 3/2, moist) smooth silt loam; moderate medium granular structure; friable; moderately high organic content; medium to slightly acid.
- A_2 9 to 13 inches, brown to grayish-brown (10YR 5/3 to 5/2, moist) smooth silt loam; weak thin platy structure; friable; medium acid.
- B_1 13 to 19 inches, yellowish-brown to dark yellowish-brown (10YR 5/4 to 4/4, moist) light silty clay loam; moderate fine subangular blocky structure; slightly firm; medium acid.
- B_{21} 19 to 42 inches, dark-brown (10YR 4/3 to 7.5YR 4/4, moist) silty clay loam; moderate medium subangular blocky structure; firm; medium to strongly acid.
- B_{22} 42 to 55 inches, dark yellowish-brown (10YR 4/4, moist) clay loam; contains many partly weathered rock fragments; moderate coarse to very coarse subangular blocky structure; firm; medium acid.
- B_{23} 55 to 60 inches, dark-brown (10YR 4/3 to 3/3, moist) clay loam; weak coarse subangular blocky structure; firm; medium to slightly acid.
- C 60 inches +, yellowish-brown or brown (10YR 5/4 to 4/4, moist) loam glacial till; calcareous.

The *Octagon* soils developed in the same way as did the Miami soils, except that they were under grass during part of their development. They have the same parent material and drainage.

TABLE 9.—*Soil series classified by great soil groups,*
[Roman numerals in the column heads are those used in the series under the same numeral are generally similar in similar in kind and sequence of layers]

Parent material	Gray-Brown Podzolic soils			Gray-Brown Podzolic soils, intergrading to Brunizems			
	Nearly level to strongly sloping		Nearly level to gently sloping	Nearly level to sloping		Nearly level	
	Well drained to excessively drained V	Well drained IV	Imperfectly drained II	Well drained to somewhat excessively drained V	Well drained IV	Moderately well drained III	Imperfectly drained II
Highly calcareous loam to light clay loam glacial till of Wisconsin age; calcareous at depths of 24 to 42 inches.		Miami	Crosby		Octagon	Montmorenci	Otterbein
Loess, 18 to 36 inches deep over highly calcareous loam to light clay loam glacial till of Wisconsin age; calcareous at depths of 42 to 60 inches.		Russell	Fincastle		Mellott	Wingate	Toronto
Medium textured to moderately fine textured glacial drift of Wisconsin age, 24 to 42 inches thick over bedrock.		Milton	Randolph				
Glacial till, high in shale, 18 to 36 inches deep over shale and sandstone bedrock		High Gap	Shadeland				
Sandstone and shale, weathered to depths of 8 to 24 inches							
Silty and loamy outwash, 24 to 44 inches thick over stratified calcareous gravel and sand	Fox		Homer				
Silty and loamy outwash, 42 to 70 inches thick over stratified calcareous gravel and sand	Ockley		Sleeth	Longlois		Glenhall	Monitor
Stratified fine sands, silts, and loam, calcareous at depths of 40 to 50 inches		Martinsville					
Sandy loam outwash, 54 to 72 inches thick over stratified sand and fine gravel							
Loamy sands to sands, medium acid to neutral							
Loamy sand to sand, mildly alkaline to slightly acid	Oaktown						
Loamy material, 3 to 12 inches deep over stratified calcareous gravel and sand							
Medium textured to moderately fine textured neutral to alkaline alluvium from Wisconsin drift.							
Medium-textured slightly acid to neutral alluvium, 10 to 40 inches thick over dark-colored moderately fine textured materials.							
Black muck, 12 to 42 inches thick over gray marl							
Black woody muck more than 42 inches thick over peaty material, medium acid to neutral.							
Black muck, 12 to 42 inches thick over medium-textured mineral material							

[1] These soils are associated with Gray-Brown Podzolic soils.

[2] These soils have dark-colored surface and upper subsoils.

The *Montmorenci* soil is like the Octagon soils in parent material, but it is only moderately well drained. The principal difference in the profiles of the two series is that the B_2 horizon of the Montmorenci soil is mottled at depths ranging from 16 to 30 inches.

The *Wingate* soil has the same parent material as the Mellott soils, but it is moderately well drained. It has a profile like the Mellott soil, except for the mottled B_2 horizon in the Wingate soil.

The *Longlois* soils are like the Ockley soils except for the effect of the change in vegetation. They are well drained to somewhat excessively drained soils that developed in silty and loamy outwash 42 to 70 inches thick over stratified calcareous gravel and sand.

The *Glenhall* soil has generally the same horizons as the Longlois soils, but since it is only moderately well drained, it is mottled between depths of 16 and 30 inches. Its parent material is the same as that of the Longlois soils.

The *Otterbein* soil has imperfect drainage, otherwise it would be like the Octagon soils. The well-drained Octagon soils are not mottled, but the Otterbein soil is mottled in the lower A_2 or upper B horizon and in the horizons below. The Otterbein soil has more clay in the B_2 horizon than the better drained soils.

The *Toronto* soil is imperfectly drained. It resembles the Mellott soils except that it is mottled in the lower A_2 or upper B horizon and in the horizons below. The imperfect drainage of the Toronto soil shows also in the higher concentration of clay in the B_2 horizon. It developed from the same parent material as did the Mellott soils.

The *Monitor* soil is like the Longlois soil except that it is mottled in all horizons below the A_2 and has higher clay content in the B_2 horizon. These differences are due to the imperfect drainage of the Monitor soil.

Brunizem soils

The Brunizem soils were developed under a humid prairie vegetation. Their A horizons are thick, dark-colored, and high in organic matter. The B horizons can be distinguished by their lighter brown color, well-developed structure, and higher concentrations of clay. This increase in clay content probably results from downward movement from the A horizon and from formation of clay in place.

The *Parr* soils developed in calcareous loam till of Wisconsin age, capped with from 0 to about 17 inches of loess. They are well drained.

and relief, drainage, and parent material of each series
Indiana system of designation of major soil profiles (*1*). All of the topography and drainage, and all have profiles that are generally

Brunizems				Humic Gley soils			Brown forest soils	Planosols	Rendzina soils	Lithosols	Alluvial soils				Organic soils
Nearly level to strongly sloping	Nearly level to sloping	Nearly level		Nearly level to slightly depressional	Nearly level to depressional		Nearly level	Nearly level	Steep	Steep	Nearly level			Nearly level to depressional	Nearly level to depressional
Well drained to excessively drained	Well drained	Moderately well drained	Imperfectly drained	Poorly drained	Very poorly drained	Very poorly drained	Well drained to somewhat excessively drained	Poorly drained	Excessively drained	Somewhat excessively drained to excessively drained	Well drained	Moderately well drained	Imperfectly drained	Poorly to very poorly drained	Very poorly drained to ponded
V	IV	III	II	VII	VIII	IX	V	I	VI	VI	IV	III	II	VIII	X
	Parr	Corwin	Odell	Cope [1]	Brookston [1] Chalmers	Kokomo [1] Romney			Hennepin						
	Sidell	Dana	Raub	Cope [1]	Brookston [1] Chalmers	Kokomo [1] Romney		Delmar							
					Millsdale	Millsdale									
										Muskingum					
Warsaw							Nineveh								
Wea		Tippecanoe	Crane		Westland	Abington									
Elston															
Hagener															
									Rodman						
											Genesee Ross [2] Kaskaskia [2]	Eel Pettit [2]	Shoals	Sloan [3]	
													Washtenaw	Washtenaw	
															Edwards.
															Carlisle.
															Linwood.

[3] Sloan is not a true Alluvial soil, but is intergrading to Humic Gley soils.

Profile of Parr silt loam in a cultivated area:

- A_p 0 to 7 inches, very dark grayish-brown (10YR 3/2, moist) silt loam; high in organic matter; moderate medium granular structure; friable; medium to slightly acid.
- A_{12} 7 to 12 inches, very dark grayish-brown (10YR 3/2, moist) silt loam; moderate coarse granular structure; slightly compact in upper part; friable; medium acid.
- B_{21} 12 to 18 inches, dark-brown (10YR 4/3 to 3/3, moist) light silty clay loam; moderate fine subangular blocky structure; slightly firm; thin organic coating on many of the structure faces; medium acid.
- B_{22} 18 to 26 inches, dark yellowish-brown (10YR 4/4, moist) silty clay loam; moderate medium subangular blocky structure; firm; medium acid.
- B_{23} 26 to 36 inches, dark-brown (10YR 4/3, moist) clay loam; thin organic coating on structure faces; moderate coarse to very coarse subangular blocky structure; firm; medium acid in upper part, grading to slightly acid or neutral in lower part.
- C 36 inches +, pale-brown or yellowish-brown (10YR 6/3 to 5/4, moist) loam till; calcareous.

The *Sidell* soils developed in 18 to about 36 inches of loess overlying loam glacial till. The till is calcareous at depths ranging from 42 to about 70 inches. These soils are well drained.

The *Warsaw* soils are well drained to somewhat excessively drained. They developed in silty and loamy outwash 24 to 44 inches thick over calcareous gravel and sand. They developed from the same kind of parent material and under the same drainage conditions as the Fox soils, but they are not like them because the Warsaw soils developed under grass and the Fox soils under forest.

The *Wea* soils are siltier than the Warsaw soils in the A and upper B horizons and the calcareous gravel and sand is more than 42 inches below the surface. In drainage and underlying material, they are like the Ockley soils.

The *Elston* soils developed in outwash material of sandy loam, sand, or loam texture. Medium acid to mildly alkaline loose sand and fine gravel lie at depths ranging from 60 to 80 inches. The texture is coarser than that of the Wea series, but the material beneath is somewhat finer textured and more acid than that beneath the Wea soils.

The *Hagener* soil is excessively drained. It developed on medium acid to neutral sands and loamy sands. It has a dark-colored, thick, sandy A_1 horizon and a sandy

TABLE 10.—*Analytical data for Russell silt loam (T. 23 N., R. 6 W., sec. 24, 1 mile west of Granville Bridge)*

MECHANICAL ANALYSIS

Sample No.	Horizon	Depth	pH	Organic carbon	Size class and diameter of particles							Other classes
					Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.1 mm.)	Very fine sand (0.1–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Coarse fragments (>2 mm.)
		Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
2863188	A_1	0 – 4	7.0	1.72	0.6	2.3	3.4	7.4	8.5	68.9	8.9	1
2863189	A_2	4 – 9	6.8	1.01	1.1	2.9	4.0	8.1	8.5	66.7	8.7	2
2863190	A_3	9 –12	6.3	.51	.7	1.9	2.6	5.7	8.1	71.4	9.6	1
2863191	B_1	12 –24	5.2	.22	.5	1.4	2.0	4.7	7.9	67.0	16.5	1
2863192	B_2	24 –48	4.8	.20	1.3	3.5	5.2	10.4	6.5	45.3	27.8	4
2863193	B_3	48 –56	5.9	.26	3.1	5.8	7.9	15.2	7.0	35.1	25.9	10
2863194	C	56+	8.0	.19	4.0	7.0	8.3	15.6	8.1	41.8	15.2	10

CHEMICAL ANALYSIS

Sample No.	Horizon	Depth	Exchangeable cations						Base saturation
			Ca	Mg	K	Na	H	Sum	
		Inches	*m.e./100 gm.*	*m.e./100 gm.*	*m.e./100 gm.*	*m.e./100 gm.*	*m.e./100 gm.*	*m.e./100 gm.*	*Percent*
2863188	A_1	0 – 4	7.8	1.8	0.1	0.3	2.0	11.8	83
2863189	A_2	4 – 9	5.1	1.4	.1	.3	2.6	9.5	73
2863190	A_3	9 –12	2.7	.8	.1	.2	2.6	6.4	59
2863191	B_1	12 –24	2.6	1.4	.1	.2	5.1	9.4	46
2863192	B_2	24 –48	5.2	3.5	.3	.3	6.9	16.2	57
2863193	B_3	48 –56	6.1	4.0	.2	.3	3.9	14.5	73
2863194	C	[1]56+							

[1] Calcareous.

B horizon. In many places the B_2 horizon consists of thin, discontinuous brown bands that vary in thickness and in clay content.

The *Corwin* soil is a moderately well drained Brunizem soil. It developed from the same kind of highly calcareous loam to light clay loam glacial till as the Parr soils, and its profile is very similar. However, the Corwin soil is mottled in the B horizon below depths of 16 to about 30 inches.

The *Dana* soil is like the Sidell soil except that it is only moderately well drained. It developed in loess 18 to 36 inches deep over highly calcareous loam to light clay loam glacial till. The B horizon of the Dana soil is mottled below 16 to 30 inches; otherwise the profile resembles that of the Sidell soil.

The *Tippecanoe* soil also has a B horizon that is mottled below 16 to 30 inches. In other respects, its profile is like that of the Wea soils. Both soils developed from silty and loamy outwash 42 to 70 inches thick over stratified calcareous gravel and sand.

The *Odell* soil has imperfect drainage. It developed from the same kind of parent material as the Parr and Corwin soils, but is mottled in the upper B horizon, and has a little more clay concentrated in the B horizon.

The *Raub* soil is the imperfectly drained member of the catena that includes the Sidell and Dana soils. Its upper B horizon is mottled, and it has more clay in the B horizon than these better drained soils from the same kind of parent material.

The *Crane* soil developed from the same kind of parent material as the Wea and Tippecanoe soils, but it has imperfect drainage. The Crane profile is similar to that of the other soils, except that it is mottled in the upper B horizon, and it contains more clay in its B horizon.

Humic Gley soils

The Humic Gley soils developed on nearly level areas or depressed flats, where the natural drainage was poor to very poor. The vegetation that was probably dominant during the development of all of these soils was sloughgrass, rushes, reeds, and sedges. Those Humic Gley soils which developed among areas of Gray-Brown Podzolic soils, however, were later encroached upon by forest vegetation. The Brookston, Kokomo, Cope, and Millsdale series, and most of the Westland and Abington series, are the Humic Gley soils that are associated with Gray-Brown Podzolic soils.

The *Brookston* soils are representative of this great soil group. They developed in highly calcareous loam to light clay loam glacial till, some areas of which were covered by 18 to 36 inches of windblown silt. Drainage was very poor.

Profile of Brookston silty clay loam in a cultivated area:

A_p 0 to 8 inches, very dark brown to very dark grayish-brown (10YR 2/2 to 3/2, moist) silty clay loam; weak medium to coarse granular structure; firm; high in organic matter; slightly acid to neutral.

A_{12} 8 to 15 inches, very dark brown (10YR 2/2, moist), slightly mottled with yellowish brown (10YR 5/6, moist) in lower part, silty clay loam; moderate very coarse granular to fine subangular blocky structure; firm; high in organic matter, slightly decreasing with depth; slightly acid to neutral.

B_{21g} 15 to 25 inches, mottled grayish-brown (10YR 5/2, moist), yellowish-brown (10YR 5/8, moist), and light brownish-gray (10YR 6/2, moist) heavy silty clay loam or heavy clay loam; weak coarse prismatic or coarse angular blocky structure; very firm when moist, plastic and sticky when wet, very hard when dry; neutral to mildly alkaline.

B_{22g} 25 to 50 inches, mottled yellowish-brown and light brownish-gray (10YR 5/8 and 6/2, moist) heavy clay loam; moderate coarse to very coarse blocky structure; very firm when moist, plastic when wet, very hard when dry; mildly alkaline.

C 50 inches +, mottled light brownish-gray and yellowish-brown loam glacial till; calcareous.

The *Kokomo* soil has a thicker and darker colored A horizon than the Brookston soils, and the B_{21g} horizon is dominantly gray. It developed from the same kind of parent material, under very poor drainage.

The *Cope* soils have thinner and somewhat lighter colored A_1 horizons than Brookston soils. They have less organic matter, and in this respect, they are more like the Low-Humic Gley soils, another great soil group which is not typically represented in this county. The Cope soils were not as wet during their development as the Brookston soils were, but they came from the same parent material, and had similar vegetation.

The *Chalmers* soils developed from the same parent material as the Brookston soils and also have very poor drainage. However, they developed among Brunizem soils and Gray-Brown Podzolic soils intergrading to Brunizem soils. The vegetation nearby and on the Chalmers soil was grass during their development, consequently, the A_1 horizon of the Chalmers soils was thicker, darker colored, and higher in organic matter than the A_1 horizon of the Brookston soils.

The *Romney* soil has very poor drainage like that of the Kokomo soil, and it developed from the same parent material. It was associated with Brunizem soils and the Gray-Brown Podzolic intergrades to Brunizem soils. The A_1 horizon of the Romney soil contains more organic matter than that of the Kokomo soil and is thicker and darker colored.

The *Westland* soils developed on medium to moderately fine textured outwash that overlies stratified calcareous gravel and sand at depths of 40 inches or more. They are very poorly drained.

The *Abington* soil developed from material similar to that on which the Westland soils developed, but under even wetter conditions. The A_1 horizon of the Abington soil is thicker and darker, and it contains more organic matter. The B_{21g} horizon is dominantly gray.

The *Millsdale* soil developed on moderately fine textured to fine textured glacial drift 20 to 42 inches deep over bedrock. It is very poorly drained.

Planosols

The *Delmar* soil is the only Planosol that was mapped in Tippecanoe County. It is a poorly drained soil that developed under forest cover in loess 18 to 40 inches deep over weathered till of Wisconsin age. The loam till is calcareous at depths of from 48 to about 70 inches. The light-gray to gray silt loam A horizon of the Delmar soil is relatively thick. The heavy silty clay loam B horizon is gray, with mottles (10YR 5/4 to 2.5Y 6/4) that increase in number with depth. The transition from the A horizon to the more compacted B horizon is abrupt to clear.

Brown Forest soils

The *Nineveh* soil is the only Brown Forest soil mapped in this county. It is well drained to somewhat excessively drained. It developed from loamy or silty outwash, underlain by stratified calcareous gravel and sand at depths ranging from 25 to 40 inches. The A_1 horizon is moderately high in organic matter and is dark grayish brown to very dark grayish brown in color. The B horizon is dark brown, and it has some concentration of clay. The entire profile is neutral in reaction. The dark color of the A_1 horizon and the concentration of clay in the B horizon indicate that the Nineveh series is an intergrade between the typical Brown Forest soils and the Brunizem soils.

Rendzina soils

Both of the Rendzina series in this county are steep and shallow soils. Some areas of these series have been severely eroded, and the calcareous material beneath the normal profile is exposed at the surface. Such areas, which have lost most of the true soil that has developed, might better be classified in the Regosol great soil group. Regosols, which consist mostly of parent material in which little soil development has taken place, are not represented by any of the soil series in this survey.

The *Hennepin* soil has a thin dark-colored A_1 horizon, underlain by calcareous loam till. Some areas show slight development of a B horizon. These areas are grading toward the Gray-Brown Podzolic soils.

The *Rodman* soil has a dark-colored, neutral to calcareous A_1 horizon that is high in organic matter. This horizon is only 5 to 10 inches deep over calcareous gravel and sand.

Lithosols

The *Muskingum* soil is the only Lithosol in this county. It developed on acid sandstone and shale that has been weathered to depths of 8 to 24 inches. The solid bedrock lies at depths of 10 to 24 inches. This soil is well drained to somewhat excessively drained. The A horizon is silty or loamy, and the B horizon is weakly developed. Where the B horizon has a blocky structure and some accumulation of clay, the soil is grading toward the Gray-Brown Podzolic soils.

Alluvial soils

The Alluvial soils are on first bottoms near the streams. The parent material was washed from glacial drift of Wisconsin age. New alluvium may be added to these soils during floods.

The *Genesee* soils have little or no profile development. They are composed of well-drained, light-colored alluvium that is neutral to alkaline.

The *Eel* soils are in the same kind of light-colored, neutral to alkaline alluvium as the Genesee soils, but they are only moderately well drained. They show little or no development of a soil profile.

The *Shoals* soil is in the imperfectly drained areas of the light-colored neutral to alkaline alluvium just mentioned. Like the Genesee and Eel soils, the Shoals soil has not developed a definite profile.

The *Sloan* soils have poor to very poor drainage. The alluvium from which they developed was neutral to alkaline. Their A_1 horizon is thick and dark colored. The mottled subsoil that shows a slight accumulation of clay indicates that these soils are intergrading toward the Humic Gley soils.

The *Ross* soils are on higher positions than the Genesee soils. They are well drained. Their dark-colored A_1 horizon ranges up to 18 inches in thickness. Some areas show slight development of a B horizon.

The *Kaskaskia* soils developed in well-drained alluvium in regions of Brunizem soils. They have thick dark-colored A_1 horizons and are neutral to alkaline in reaction.

The *Pettit* soil developed in the moderately well drained alluvium that is associated with Brunizem soils. Pettit soil has a thick dark-colored A_1 horizon and is neutral to alkaline in reaction.

The *Washtenaw* soil has imperfect, poor, or very poor drainage. It consists of light-colored alluvium or colluvium that washed from uplands and terraces into depressions where dark-colored Humic Gley soils had already developed. The thickness of the lighter colored alluvium over the dark soil ranges from 10 to 40 inches.

Organic soils

These soils have developed in accumulations of decomposed organic material in nearly level areas and depressions. The drainage was very poor, and in some places water was ponded on the surface.

Carlisle muck developed in neutral to medium acid well-decomposed woody black muck overlying partly decomposed peaty material. The total thickness of the organic materials is over 42 inches.

Linwood muck has a black mucky surface that contains a high proportion of woody material. This is underlain at depths ranging from 12 to 42 inches by medium-textured mineral material.

Edwards muck consists of black neutral muck that is 12 to 42 inches deep over gray marl.

Literature Cited

(1) BUSHNELL, T. M.
1944. THE STORY OF INDIANA SOILS. Purdue Univ. Agr. Expt. Sta. Spec. Cir. 1, 52 pp., illus.

(2) DEHART, GENERAL R. P.
1909. PAST AND PRESENT OF TIPPECANOE COUNTY. Vol. 1, 508 pp., illus.

(3) FIDLAR, M. M.
1948. PHYSIOGRAPHY OF THE LOWER WABASH VALLEY. Ind. Dept. Conserv. Bul. 2, 112 pp., illus.

(4) HARRELL, MARSHALL.
1935. GROUND WATER IN INDIANA. Ind. Dept. Conserv. Pub. 133, pp. 452-455.

(5) JONGEDYK, H. A., HICKOK, R. B., MAYER, I. D. and ELLIS, N. K.
1950. SUBSIDENCE OF MUCK SOILS IN NORTHERN INDIANA. Purdue Univ. Agr. Expt. Sta. Cir. 366, 10 pp., illus.

(6) MALOTT, CLYDE A.
1922. THE PHYSIOGRAPHY OF INDIANA. In Handbook of Indiana Geology. Ind. Dept. Conserv. Pub. 21, pp. 67-256, illus.

(7) MAVITY, PAUL W.
1925. THE CENTENNIAL BOOK. 103 pp., illus. Lafayette, Ind.

(8) PURDUE UNIVERSITY.
1957. SMALL GRAIN VARIETIES FOR INDIANA. Agr. Expt. Sta. Bul. 646, 20 pp., illus.

(9) TIPPECANOE COUNTY HISTORICAL ASSOCIATION.
(No date) FORT OUIATENON "ON THE BANKS OF THE WABASH." Leaflet, 2 pp., illus.

(10) VISHER, STEPHEN S.
1944. CLIMATE OF INDIANA. 511 pp., illus.

Soils of Tippecanoe County, Indiana:

Map symbol	Soil	Topography	Parent or underlying material	Surface soil	Upper subsoil
Aa	Abington silty clay loam, 0 to 3 percent slopes.	Deeper depressions, in many places former stream channels.	Medium textured to moderately fine textured outwash, 42 to 65 inches thick over highly calcareous gravel and sand.	Very dark gray to black silty clay loam.	Gray silty clay loam with some yellowish-brown mottling.
Ba	Brookston silt loam, 0 to 3 percent slopes.	Swales and depressed flats on uplands.	Highly calcareous loam till at 38 to 65 inches.	Very dark grayish-brown silt loam.	Mottled gray and yellowish-brown silty clay loam.
Bb	Brookston silty clay loam, 0 to 3 percent slopes.	Same	Same	Very dark grayish-brown silty clay loam.	Same
Ca	Carlisle muck	Former lakes, ponds, and marshes on uplands, on terraces, or in bottoms.	Decomposed mosses, sedges, and wood.	Black granular muck 15 to 20 inches thick.	Dark-brown fibrous and woody muck to peat.
Cb	Chalmers silt loam, 0 to 3 percent slopes.	Shallow, many-lobed swales and depressions.	Highly calcareous loam till at depths of 40 to 60 inches.	Very dark gray to black silt loam, grading into silty clay loam at depths of 10 to 15 inches.	Mottled gray and yellowish-brown silty clay loam.
Cc	Chalmers silty clay loam, 0 to 3 percent slopes.	Same	Same	Very dark brown to black silty clay loam.	Same
Cd	Cope silt loam, 0 to 3 percent slopes.	Shallow depressions in uplands.	Same	Dark gray to very dark gray silt loam.	Mottled gray, yellow, and brown silty clay loam.
Ce	Cope silty clay loam, 0 to 3 percent slopes.	Same	Same	Dark gray to very dark gray silty clay loam.	Same
Cf	Corwin silt loam, 0 to 2 percent slopes.	Nearly level to gently undulating knolls on uplands.	Highly calcareous loam till at depths of 22 to 40 inches.	Very dark grayish-brown silt loam 12 to 14 inches thick.	Dark-brown to dark yellowish-brown friable silty clay loam to clay loam.
Cg	Crane silt loam, 0 to 3 percent slopes.	Terraces, outwash plains, and valley trains.	Water-deposited stratified gravel and sand, calcareous at depths of 42 to 70 inches.	Very dark grayish-brown silt loam.	Mottled gray and yellowish-brown silty clay loam.
Ch	Crosby silt loam, 0 to 3 percent slopes.	Nearly level to gently undulating uplands.	Highly calcareous loam till at depths of 24 to 40 inches.	Grayish-brown silt loam	Same
Ci	Crosby silt loam, 3 to 5 percent slopes, eroded.	Very gently sloping uplands.	Same	Grayish-brown silt loam, 3 to 7 inches thick; spots of mottled subsoil are exposed.	Same
Da	Dana silt loam, 0 to 2 percent slopes.	Gently undulating to nearly level till plains.	18 to 40 inches of loess on loam till; calcareous at depths of 42 to 60 inches.	Very dark brown smooth silt loam.	Dark yellowish-brown silty clay loam.
Db	Delmar silt loam, 0 to 3 percent slopes.	Level to very slightly depressed uplands.	Same	Grayish-brown to light-gray smooth silt loam.	Light-gray silty clay loam, mottled with yellowish brown.
Ea	Edwards muck	Depressed flats; former lakes and marshes.	Decomposed mosses, sedges, shrubs, and wood over light-gray marl at depths of 12 to 42 inches.	Black granular muck 18 inches or more thick.	Dark-brown fibrous to woody muck or peat.
Eb	Eel loam, 0 to 3 percent slopes.	Bottom lands of small streams; swales and meander channels of larger streams.	Neutral to calcareous alluvium from timbered glacial drift areas.	Grayish-brown loam 12 to 14 inches thick.	Yellowish-brown loam, mottled with gray at depths of 16 to 30 inches.
Ec	Eel silt loam, 0 to 3 percent slopes.	Same	Same	Grayish-brown silt loam 12 to 14 inches thick.	Yellowish-brown silt loam, mottled with gray at depths of 16 to 30 inches.
Ed	Eel silty clay loam, 0 to 3 percent slopes.	Same	Same	Grayish-brown silty clay loam.	Dark yellowish-brown silty clay loam, mottled with gray at depths of 16 to 30 inches.
Ee	Elston fine sandy loam, 0 to 3 percent slopes.	Nearly level to very gently sloping terraces and outwash plains.	Yellowish-brown to brown sand and sandy loam, neutral to slightly calcareous at depths of 4½ to 6 feet.	Very dark grayish-brown fine sandy loam 12 to 18 inches thick.	Brown to dark yellowish-brown sandy clay loam to loam.
Ef	Elston fine sandy loam, 3 to 8 percent slopes.	Unduating to gently slodling terraces.	Same	Same	Same

Summary of important characteristics

Acidity		Natural soil drainage	Permeability	Runoff	Susceptibility to erosion	Moisture-supplying capacity	General productivity
Surface	Subsoil						
Slightly acid to neutral.	Neutral	Very poor	Slow	Very slow to ponded.	None	Very high	Very high.
Slightly acid to neutral.	Neutral	Very poor	Slow	Very slow to ponded.	None	Very high	Very high.
Slightly acid to neutral.	Neutral	Very poor	Slow	Very slow to ponded.	None	Very high	Very high.
Medium to slightly acid.	Medium to slightly acid.	Very poor	Moderately rapid.	Ponded to very slow.	Slight wind erosion.	High to very high.	High to very high.
Slightly acid to neutral.	Slightly acid to neutral.	Very poor	Slow	Very slow	None	Very high	Very high.
Slightly acid to neutral.	Slightly acid to neutral.	Very poor	Slow	Very slow	None	Very high	Very high.
Slightly acid to medium acid.	Slightly acid to neutral.	Very poor to poor.	Slow	Very slow	None	High to very high.	High to very high.
Slightly acid to medium acid.	Slightly acid to neutral.	Poor to very poor.	Slow	Very slow	None	High to very high.	High to very high.
Medium to slightly acid.	Medium acid	Moderately good.	Moderate	Slow	Slight	High	High to very high.
Medium to slightly acid.	Medium acid	Imperfect	Moderate to slow.	Slow	Slight	High	High.
Medium to slightly acid.	Medium to strongly acid.	Imperfect	Slow	Slow	Slight	High	High.
Medium acid	Medium to strongly acid.	Imperfect	Slow	Medium to slow.	Moderate	Medium	Medium.
Medium to slightly acid.	Medium acid	Moderately good.	Slow	Slow	Slight	High	High to very high.
Medium acid	Medium to strongly acid.	Poor	Very slow	Very slow	None	Medium	Medium to low.
Slightly acid to neutral.	Neutral to alkaline.	Very poor	Moderately rapid.	Ponded	Slight wind erosion.	Very high	Medium to high.
Neutral to alkaline.	Neutral to alkaline.	Moderately good.	Moderate	Very slow	Slight to moderate danger of streambank erosion.	High to very high.	High to very high.
Neutral to alkaline.	Neutral to alkaline.	Moderately good.	Moderate	Very slow	Slight to moderate danger of streambank erosion.	Very high	Very high.
Neutral to alkaline.	Neutral to alkaline.	Moderately good.	Moderate	Very slow	None	Very high	Very high.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Rapid	Very slow	Slight	Low	Medium.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Rapid	Slow	Very slight wind erosion.	Low	Medium.

Soils of Tippecanoe County, Indiana:

Map symbol	Soil	Topography	Parent or underlying material	Surface soil	Upper subsoil
Eg	Elston loam, 0 to 3 percent slopes.	Nearly level to very gently sloping terraces.	Same	Very dark grayish-brown loam 12 to 15 inches thick.	Brown to dark yellowish-brown sandy clay loam.
Eh	Elston loam, 3 to 8 percent slopes.	Undulating to gently sloping terraces.	Same	Same	Same
Ei	Elston loam, 3 to 8 percent slopes, eroded.	Same	Same	Same	Same
Ej	Elston loam, 8 to 15 percent slopes, eroded.	Sloping terraces	Same	Same	Same
Ek	Elston silt loam, silted, 0 to 3 percent slopes.	Depressed flats	Same	Very dark brown silt loam 2 to 3 feet thick.	Same
Fa	Fincastle silt loam, 0 to 3 percent slopes.	Level to very gently undulating uplands.	18 to 40 inches of loess over loam till; calcareous at depths of 42 to 60 inches.	Grayish-brown smooth silt loam.	Mottled gray and yellowish-brown silty clay loam.
Fb	Fox loam, 0 to 3 percent slopes.	Level, low stream terraces, usually 10 to 15 feet above bottom land.	Loam over calcareous gravel and sand at depths of 30 to 44 inches.	Brown to grayish-brown loam.	Dark yellowish-brown to dark-brown clay loam.
Fc	Fox loam, 3 to 8 percent slopes.	Gentle slopes around kettle holes and streams.	Same	Same	Same
Fd	Fox loam, 3 to 8 percent slopes, eroded.	Same	Same	Same	Same
Fe	Fox loam, 3 to 8 percent slopes, eroded kame phase.	Same	Same	Brown to dark yellowish-brown clay loam.	Same
Ff	Fox loam, 8 to 12 percent slopes.	Sloping areas bordering streams and kettle holes.	Same	Brown to grayish-brown loam.	Same
Fh	Fox loam, 8 to 12 percent slopes, kame phase.	Slopes of kames and eskers.	Same	Brown loam to silt loam	Same
Fg	Fox loam, 8 to 12 percent slopes, eroded.	Same	Same	Brown to dark yellowish-brown loam to light clay loam.	Same
Fi	Fox loam, 8 to 12 percent slopes, eroded kame phase.	Slopes of kames and eskers.	Same	Brown loam to dark yellowish-brown clay loam.	Same
Fj	Fox loam, 12 to 25 percent slopes.	Slopes bordering streams and kettles.	Same	Brown to grayish-brown loam.	Same
Fk	Fox loam, 12 to 25 percent slopes, eroded.	Same	Same	Brown to dark yellowish-brown loam to clay loam.	Same
Fl	Fox loam, 12 to 25 percent slopes, kame phase.	Slopes of kames and eskers.	Same	Grayish-brown to brown loam.	Same
Fm	Fox loam, 12 to 25 percent slopes, eroded kame phase.	Same	Same	Brown loam to dark yellowish-brown clay loam.	Same
Fn	Fox loam and clay loam, 8 to 12 percent slopes, severely eroded.	Slopes bordering streams and kettles.	Same	Light-brown loam to dark yellowish-brown clay loam.	Same
Fo	Fox loam and silt loam, 3 to 8 percent slopes, kame phases.	Gently sloping parts of kames and eskers on uplands.	Same	Brown to grayish-brown loam to silt loam.	Same
Fp	Fox silt loam, 0 to 3 percent slopes.	Level low stream terraces.	Same	Grayish-brown to brown gritty silt loam.	Dark yellowish-brown to dark-brown silty clay loam to gravelly clay loam.
Fq	Fox silt loam, 3 to 8 percent slopes.	Gentle slopes along drainageways.	Same	Same	Same
Ga	Genesee fine sandy loam, 0 to 4 percent slopes.	Nearly level, slightly elevated natural levees.	Neutral to calcareous sandy alluvium from timbered glacial drift areas.	Yellowish-brown to brown fine sandy loam.	Yellowish-brown fine sandy loam.
Gb	Genesee fine sandy loam, high bottom, 0 to 3 percent slopes.	Same	Same	Same	Same

Summary of important characteristics—Continued

Acidity		Natural soil drainage	Permeability	Runoff	Susceptibility to erosion	Moisture-supplying capacity	General productivity
Surface	Subsoil						
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Rapid	Very slow	Slight	Low	Medium.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Rapid	Slow	Slight	Low	Low to medium.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Rapid	Medium	Moderate	Low	Low.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Rapid	Medium	Moderate	Low	Low.
Medium to slightly acid.	Medium acid	Good	Rapid to moderate.	Ponded	None	Low to medium	Medium.
Medium to slightly acid.	Strongly acid	Imperfect	Slow	Slow	Slight	High	High.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Moderately rapid.	Very slow	Slight	Medium	High.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Moderately rapid.	Medium	Moderate	Medium	Medium to high.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Moderately rapid.	Medium to rapid.	Moderate	Medium to low	Medium.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Moderately rapid.	Medium	Moderate	Medium to low	Medium.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Rapid	Rapid	Moderate	Medium to low	Medium to low.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Moderately rapid.	Rapid	Moderate to high.	Medium to low	Medium to low.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Rapid	Rapid	Moderate to high.	Low	Low.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Moderately rapid.	Rapid	High	Low	Low.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Rapid	Very rapid	High	Low to very low	Very low.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Rapid	Very rapid	High	Low to very low	Very low.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Moderately rapid.	Rapid	High	Low to very low	Low to very low.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Moderately rapid.	Rapid	High	Low to very low	Low to very low.
Medium acid	Medium acid	Somewhat excessive.	Rapid	Rapid	High	Low to very low	Low to very low.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Moderately rapid.	Medium	Moderate	Medium	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate	Very slow	Slight	Medium	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate	Very slow to medium.	Slight to moderate.	Low to medium	Medium.
Neutral to alkaline.	Neutral to alkaline.	Good	Moderately rapid.	Very slow	Streambank erosion if cleared of timber.	Medium	Medium.
Neutral to alkaline.	Neutral to alkaline.	Good	Moderately rapid.	Very slow	None	Medium	Medium.

Soils of Tippecanoe County, Indiana:

Map symbol	Soil	Topography	Parent or underlying material	Surface soil	Upper subsoil
Gc	Genesee loam, 0 to 4 percent slopes.	Same	Neutral to calcareous loamy alluvium from timbered glacial drift areas.	Yellowish-brown to brown loam.	Yellowish-brown loam
Gd	Genesee loam, high bottom, 0 to 3 percent slopes.	Same	Same	Same	Yellowish-brown heavy loam.
Ge	Genesee silt loam, 0 to 4 percent slopes.	Nearly level flood plains of large and small streams.	Neutral to calcareous silty alluvium from timbered glacial drift areas.	Yellowish-brown to brown silt loam.	Yellowish-brown silt loam.
Gf	Genesee silt loam, high bottom, 0 to 4 percent slopes.	Slightly elevated high bottoms and natural levees along old meander channels of larger streams.	Same	Same	Yellowish-brown heavy silt loam.
Gg	Genesee silty clay loam, 0 to 4 percent slopes.	Nearly level flood plains of large streams, chiefly in back bottoms.	Neutral to calcareous coarse silty clay loam alluvium from timbered glacial areas.	Same	Yellowish-brown silty clay loam.
Gh	Genesee silty clay loam, high bottom, 0 to 3 percent slopes.	Slightly elevated high bottoms of larger streams.	Same	Same	Same
Gi	Glenhall silt loam, 0 to 3 percent slopes.	Level high terraces and outwash plains; "oak openings" on prairie border.	Loamy materials over stratified calcareous gravel and sand at depths of 42 to 70 inches.	Dark-brown to very dark grayish-brown silt loam.	Brown to dark yellowish-brown silty clay loam 16 to 30 inches deep over mottled silty clay loam.
Ha	Hagener loamy fine sand, 2 to 12 percent slopes.	Sand dunes on the river terraces.	Medium acid to slightly acid stratified sands, partly assorted by wind.	Very dark brown loamy fine sand.	Dark yellowish-brown loamy fine sand.
Hb	Hennepin loam, 25 to 50 percent slopes.	Steep slopes bordering deeply entrenched streams.	Highly calcareous loam glacial till.	Very dark grayish-brown silt loam to loam.	Pale-brown loam to yellowish-brown heavy silt loam.
Hc	High Gap silt loam, 1 to 8 percent slopes.	Nearly level to gently sloping glaciated uplands and nearby terraces.	Shallow glacial drift deposits, 18 to 36 inches thick over acid shale and sandstone.	Grayish-brown silt loam	Yellowish-brown silty clay loam.
Hd	Homer silt loam, 0 to 3 percent slopes.	Level to slightly depressed areas on terraces.	Loamy and silty outwash over stratified calcareous gravel and sand at depths of 30 to 44 inches.	Grayish-brown silt loam	Mottled gray and yellowish-brown clay loam.
Ka	Kaskaskia loam, 0 to 3 percent slopes.	Nearly level natural levees along streams.	Neutral to mildly alkaline alluvium from prairie areas of glacial drift.	Very dark grayish-brown loam.	Dark-brown loam
Kb	Kaskaskia silt loam, 0 to 3 percent slopes.	Same	Same	Very dark grayish-brown silt loam.	Dark-brown silt loam
Kc	Kokomo silty clay loam, 0 to 3 percent slopes.	Deeper depressions, intermittent ponds, and kettle holes in uplands.	Highly calcareous loam glacial till.	Very dark gray to black silty clay loam.	Gray plastic silty clay loam.
La	Linwood muck	Level depressions, formerly ponds and marshes.	Decomposed mosses, sedges, shrubs, and wood, 12 to 40 inches thick, over medium-textured mineral material.	Very dark gray to black granular muck.	Very dark gray to brown muck, well decomposed.
Lb	Longlois loam, 0 to 3 percent slopes.	Nearly level high terraces and outwash plains; "oak openings" on prairie border.	Loamy materials over calcareous gravel and sand at depths of 44 to 72 inches.	Dark-brown to very dark grayish-brown loam.	Dark-brown to yellowish-brown clay loam to silty clay loam.
Lc	Longlois loam, 3 to 8 percent slopes.	Gently sloping areas around streams and kettle holes.	Same	Same	Same
Ld	Longlois loam, 3 to 8 percent slopes, eroded.	Same	Same	Dark-brown loam to yellowish-brown silty clay loam.	Same

Summary of important characteristics—Continued

Acidity		Natural soil drainage	Permeability	Runoff	Susceptibility to erosion	Moisture-supplying capacity	General productivity
Surface	Subsoil						
Neutral to alkaline.	Neutral to alkaline.	Good	Moderate	Very slow	Streambank erosion if cleared of timber.	High to very high	High.
Neutral to alkaline.	Neutral to alkaline.	Good	Moderate	Very slow	None	High to very high	High.
Neutral to alkaline.	Neutral to alkaline.	Good	Moderate	Very slow	Streambank erosion if cleared of timber.	Very high	Very high.
Neutral to alkaline.	Neutral to alkaline.	Good	Moderate	Very slow	None	Very high	Very high.
Neutral to alkaline.	Neutral to alkaline.	Good	Moderate	Very slow	None	Very high	Very high to high.
Neutral to alkaline.	Neutral to alkaline.	Good	Moderate	Very slow	None	Very high	Very high to high.
Medium to slightly acid.	Medium to acid.	Moderately good.	Moderate	Slow	None	Medium	High to very high.
Medium to slightly acid.	Medium acid	Somewhat excessive.	Very rapid	Slow	Slight wind erosion.	Low	Low.
Neutral to mildly alkaline.	Neutral to mildly alkaline.	Excessive	Slow	Very rapid	High to very high.	Low	Very low.
Slightly to strongly acid.	Strongly acid	Good	Slow	Medium to rapid.	Moderate to high.	Low	Low.
Medium to slightly acid.	Medium to strongly acid.	Imperfect	Slow to moderate.	Slow	Slight	Medium	Medium.
Neutral to slightly acid.	Neutral	Good	Moderate	Slow	Slight danger of streambank erosion during floods.	High	Very high to high.
Neutral to slightly acid.	Neutral	Good	Moderate	Slow	Same	Very high	Very high.
Neutral to slightly alkaline.	Neutral	Very poor	Slow	Very slow to ponded.	None	High to very high	High to very high.
Medium to slightly acid.	Medium acid to neutral.	Very poor	Moderate	Very slow to ponded.	Slight wind erosion.	High	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Slow	Slight	Medium to high	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Medium	Moderate	Moderate	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Medium	Moderate	Moderate	Medium.

Soils of Tippecanoe County, Indiana:

Map symbol	Soil	Topography	Parent or underlying material	Surface soil	Upper subsoil
Le	Longlois silt loam, 0 to 3 percent slopes.	Nearly level high terraces and outwash plains; "oak openings" on prairie border.	Same	Dark-brown to very dark grayish-brown silt loam.	Same
Lf	Longlois silt loam, 3 to 8 percent slopes.	Gently sloping areas around streams and kettle holes.	Same	Same	Same
Lg	Longlois silt loam, 3 to 8 percent slopes, eroded.	Same	Same	Dark-brown silt loam to yellowish-brown silty clay loam.	Same
Ma	Made land		Industrial waste material; usually unsuitable for agriculture.		
Mb	Martinsville loam, 0 to 5 percent slopes.	Nearly level low alluvial terraces along glacial meltwater streams.	Calcareous stratified fine sandy loam and silt, contains some clayey and gravelly material at 36 to 60 inches.	Grayish-brown loam	Yellowish-brown clay loam to sandy clay loam.
Mc	Martinsville silt loam, 0 to 5 percent slopes.	Same	Same	Grayish-brown silt loam	Yellowish-brown silty clay loam.
Md	Mellott silt loam, 0 to 3 percent slopes.	Slight rises on undulating till plains and very gentle slopes bordering streams.	18 to 40 inches of loess over loam till, calcareous at depths of 42 to 70 inches.	Very dark grayish-brown smooth silt loam.	Dark yellowish-brown to dark-brown smooth silty clay loam.
Me	Mellott silt loam, 3 to 8 percent slopes.	Gentle slopes bordering streams.	Same	Same	Same
Mf	Mellott silt loam, 3 to 8 percent slopes, eroded.	Same	Same	Very dark grayish-brown silt loam to dark yellowish-brown light silty clay loam.	Same
Mg	Mellott silt loam, 8 to 12 percent slopes.	Moderately sloping areas along streams.	Same	Very dark grayish-brown silt loam.	Same
Mh	Mellott silt loam, 8 to 12 percent slopes, eroded.	Same	Same	Very dark grayish-brown silt loam to dark yellowish-brown light silty clay loam.	Same
Mi	Mellott silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded.	Gentle slopes bordering streams.	Same	Yellowish-brown silty clay loam to very dark grayish-brown silt loam.	Same
Mj	Mellott silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded.	Moderately sloping areas along streams.	Same	Same	Same
Mk	Miami loam, 3 to 8 percent slopes.	Knolls and ridges on till plains and slopes along drainageways.	Highly calcareous loam glacial till.	Brown to grayish-brown loam.	Yellowish-brown to brown clay loam to silty clay loam.
Ml	Miami loam, 3 to 8 percent slopes, eroded.	Same	Same	Grayish-brown loam to yellowish-brown heavy loam.	Same
Mm	Miami loam, 8 to 12 percent slopes.	Sloping knolls and ridges on till plains and areas along drainageways.	Same	Grayish-brown loam	Same
Mn	Miami loam, 8 to 12 percent slopes, eroded.	Same	Same	Grayish-brown loam to yellowish-brown heavy loam.	Same
Mo	Miami loam, 12 to 25 percent slopes.	Moderately steep areas along drainageways.	Same	Grayish-brown loam	Same
Mp	Miami loam, 12 to 25 percent slopes, eroded.	Same	Same	Grayish-brown loam to yellowish-brown heavy loam.	Same
Mr	Miami silt loam, 0 to 3 percent slopes.	Nearly level areas on till plains, often along glacial drainage outlets where gravel was deposited and later covered with till.	Same	Brown to grayish-brown silt loam.	Brown to yellowish-brown silty clay loam to clay loam.
Ms	Miami silt loam, 3 to 8 percent slopes.	Gently sloping knolls and ridges on till plains or bordering streams.	Same	Same	Same
Mt	Miami silt loam, 3 to 8 percent slopes, eroded.	Same	Same	Grayish-brown silt loam to yellowish-brown heavy silt loam.	Same

Summary of important characteristics—Continued

Acidity		Natural soil drainage	Permeability	Runoff	Susceptibility to erosion	Moisture-supplying capacity	General productivity
Surface	Subsoil						
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Slow	Slight	Medium to high	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Medium	Moderate	Medium to high	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Medium	Moderate	Medium	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate	Slow to medium.	Slight	High to medium	Medium to high.
Medium to slightly acid.	Medium acid	Good	Moderate	Slow to medium.	Slight	High	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Slow	Slight	High to very high	High to very high.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Slight	High	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	High to medium	High to medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Rapid	High	Medium	Medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Rapid	High	Medium to low	Medium to low.
Medium acid	Medium to strongly acid.	Good	Moderate	Medium to rapid.	High	Medium to low	Low to medium.
Medium acid	Medium to strongly acid.	Good	Moderate	Rapid	Very high	Low	Low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium	Medium to high.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium	Medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium to rapid.	Moderate to high.	Medium	Medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium to rapid.	High	Medium to low	Medium to low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Rapid	High	Low	Low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Rapid	High	Low	Low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Slow	Slight	High	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium to high	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium to high	Medium.

Soils of Tippecanoe County, Indiana:

Map symbol	Soil	Topography	Parent or underlying material	Surface soil	Upper subsoil
Mt	Miami silt loam, 8 to 12 percent slopes.	Sloping knolls and ridges bordering streams.	Same	Brown to grayish-brown silt loam.	Same
Mu	Miami silt loam, 8 to 12 percent slopes, eroded.	Same	Same	Grayish-brown silt loam to yellowish-brown heavy silt loam.	Same
Mv	Miami silt loam, 12 to 25 percent slopes.	Moderately steep areas along drainageways.	Same	Grayish-brown silt loam	Same
Mw	Miami silt loam, 12 to 25 percent slopes, eroded.	Same	Same	Grayish-brown silt loam to yellowish-brown heavy silt loam.	Same
Mx	Miami silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded.	Sloping knolls and ridges and areas bordering streams.	Same	Yellowish-brown silty clay loam to grayish-brown silt loam.	Same
My	Millsdale silty clay loam, 0 to 3 percent slopes.	Formerly marshy swales on bedrock terraces.	Glacial drift, 20 to 42 inches thick over sandstone and shale bedrock.	Very dark grayish-brown to black silty clay loam.	Gray, mottled with yellowish brown, silty clay loam to light silty clay.
Mz	Milton silt loam, 2 to 8 percent slopes.	Bedrock terraces, slightly higher than flood plains.	Same	Brown silt loam	Yellowish-brown clay loam to silty clay loam.
Mza	Monitor silt loam, 0 to 3 percent slopes.	Level to slightly depressed areas around swales in outwash plains.	Loamy and silty outwash, 42 to 66 inches thick over stratified calcareous gravel and sand.	Very dark grayish-brown silt loam.	Mottled gray and yellowish-brown silty clay loam to clay loam.
Mzb	Montmorenci silt loam, 0 to 3 percent slopes.	Nearly level areas, often bordering drainageways.	Loam glacial till, calcareous at depths of 24 to 42 inches.	Same	Dark yellowish-brown silty clay loam; mottled gray and yellowish-brown clay loam at depths of 18 to 30 inches.
Mzc	Muskingum stony silt loam, 10 to 30 percent slopes.	Steep bluffs and valley walls in uplands.	Residuum from weathering of sandstone and shale.	Dark-brown stony silt loam to loam.	Brownish-yellow loam or silt loam.
Na	Nineveh loam, 0 to 3 percent slopes.	Outwash plains and terraces.	Loamy outwash, 25 to 40 inches thick over calcareous stratified gravel and sand.	Dark-brown to very dark grayish-brown loam.	Brown loam to gravelly clay loam.
Oa	Oaktown loamy fine sand, 3 to 8 percent slopes.	Gently rolling dunes on terraces, usually east of bottom lands.	Neutral fine sands assorted by wind, stratified below depths of 60 to 80 inches.	Brown loamy fine sand	Light yellowish-brown, slightly coherent, loamy fine sand.
Ob	Oaktown loamy fine sand, 8 to 12 percent slopes.	Moderately rolling dunes, mostly on side away from wind.	Same	Same	Same
Oc	Oaktown loamy fine sand, 12 to 25 percent slopes.	Strongly rolling dunes, mostly on side away from wind.	Same	Same	Same
Od	Ockley loam, 0 to 3 percent slopes.	Nearly level high terraces, outwash plains, and some kettle holes.	Loamy outwash, 42 to 70 inches thick over stratified calcareous gravel and sand.	Brown loam	Yellowish-brown to reddish-brown clay loam to silty clay loam.
Oe	Ockley loam, 3 to 8 percent slopes.	Gently sloping areas, often around kettle holes and drainageways.	Same	Same	Same
Of	Ockley loam, 3 to 8 percent slopes, eroded.	Same	Same	Brown to yellowish-brown loam.	Same
Og	Ockley silt loam, 0 to 3 percent slopes.	Nearly level high terraces and outwash plains.	Silty and loamy outwash, 42 to 72 inches thick over stratified calcareous gravel and sand.	Brown silt loam	Yellowish-brown to reddish-brown silty clay loam.
Oh	Ockley silt loam, 3 to 8 percent slopes.	Gently sloping areas around drainageways and kettle holes.	Same	Same	Same
Oi	Ockley silt loam, 3 to 8 percent slopes, eroded.	Same	Same	Brown to yellowish-brown heavy silt loam.	Same
Ok	Octagon silt loam, 3 to 8 percent slopes.	Low knolls on till plains and gentle slopes around drainageways.	Loam glacial till, calcareous at depths of 24 to 42 inches.	Very dark grayish-brown silt loam.	Dark yellowish-brown silty clay loam.
Ol	Octagon silt loam, 3 to 8 percent slopes, eroded.	Same	Same	Same	Same

Summary of important characteristics—Continued

Acidity		Natural soil drainage	Permeability	Runoff	Susceptibility to erosion	Moisture-supplying capacity	General productivity
Surface	Subsoil						
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate to high.	Medium	Medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium to rapid.	High	Medium to low	Medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Rapid	High	Low	Low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Rapid	High	Low	Low.
Medium acid	Medium to strongly acid.	Good	Moderate	Medium to rapid.	High	Low	Low.
Neutral to mildly alkaline.	Neutral to mildly alkaline.	Very poor	Slow to very slow.	Very slow to ponded.	None	High	High to medium.
Medium to slightly acid.	Medium acid	Good	Moderate	Medium	Slight to moderate.	Medium	Medium.
Medium to slightly acid.	Medium acid	Imperfect	Moderate	Very slow	Slight	High	High.
Medium to slightly acid.	Medium acid	Moderately good.	Moderate	Slow	Slight	High	High to very high.
Medium to slightly acid.	Medium acid	Somewhat excessive to excessive.	Moderate to rapid.	Very rapid	Very high	Very low	Very low.
Neutral	Neutral	Good to somewhat excessive.	Moderate to rapid.	Slow	Slight	Medium to low	Medium to low.
Medium to slightly acid.	Medium acid	Somewhat excessive to excessive.	Very rapid	Slow	Moderate wind erosion.	Very low	Low.
Medium to slightly acid.	Medium acid	Somewhat excessive to excessive.	Very rapid	Slow	Moderate wind erosion.	Very low	Low.
Medium to slightly acid.	Medium acid	Somewhat excessive to excessive.	Very rapid	Slow	Moderate wind erosion.	Very low	Very low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Very slow	Slight	Medium	Medium to high.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Medium	Moderate	Medium	Medium to high.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Medium	Moderate	Medium	Medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Very slow	Slight	Medium to high	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Medium	Moderate	Medium to high	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to rapid.	Medium	Moderate	Medium	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate	Medium	Moderate	High	High.
Medium to slightly acid.	Medium acid	Good	Moderate	Medium	Moderate	Medium to high	Medium to high.

Map symbol	Soil	Topography	Parent or underlying material	Surface soil	Upper subsoil
Om	Odell silt loam, 0 to 2 percent slopes.	Nearly level to very gently undulating prairie uplands.	Same	Same	Mottled gray and yellowish-brown silty clay loam.
On	Otterbein silt loam, 0 to 3 percent slopes.	Same	Same	Same	Same
Pa	Parr loam, 2 to 5 percent slopes.	Gently undulating knolls and morainic ridges on the till plains.	Same	Very dark grayish-brown loam.	Dark yellowish-brown clay loam to silty clay loam.
Pb	Parr loam, 2 to 10 percent slopes, eroded.	Same	Same	Same	Same
Pc	Parr silt loam, 0 to 2 percent slopes.	Nearly level areas near former glacial drainageways; in many places underlain by sand or gravel within 10 feet.	Same	Very dark grayish-brown silt loam.	Same
Pd	Parr silt loam, 2 to 5 percent slopes.	Gently undulating knolls and ridges on the till plains.	Same	Same	Same
Pe	Parr silt loam, 2 to 5 percent slopes, eroded.	Same	Same	Very dark brown silt loam.	Same
Pf	Parr silt loam, 5 to 8 percent slopes, eroded.	Moderately sloping areas, many along drainageways.	Same	Same	Same
Pg	Parr silt loam, 8 to 12 percent slopes, eroded.	Sloping areas, many along drainageways.	Same	Same	Same
Ph	Parr silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded.	Same	Same	Brown to dark yellowish-brown silty clay loam to dark-brown heavy silt loam.	Same
Pi	Pettit silt loam, 0 to 3 percent slopes.	Bottom lands along small streams, and swales in bottom lands along larger streams.	Neutral alluvium from prairie area of glacial drift.	Very dark grayish-brown to black silt loam.	Dark grayish-brown silt loam; contains brown and yellowish-brown mottles below 20 inches.
Ra	Randolph silt loam, 0 to 3 percent slopes.	Level bedrock terraces	Glacial drift 18 to 42 inches thick, over sandstone and shale bedrock.	Grayish-brown silt loam	Mottled gray and yellowish-brown silty clay loam to heavy silt loam.
Rb	Raub silt loam, 0 to 2 percent slopes.	Level to slightly undulating areas on till plains.	Loess 18 to 40 inches thick over loam till; calcareous at depths of 42 to 60 inches.	Very dark grayish-brown smooth silt loam.	Dark-gray and yellowish-brown mottled silty clay loam.
Rc	Riverwash	Sand bars in or bordering channels; suitable chiefly for timber.	Calcareous gravelly sand		
Rd	Rodman gravelly loam, 25 to 35 percent slopes.	Steep slopes of terraces, kames, and eskers.	Stratified calcareous gravel and sand.	Dark-brown gravelly loam.	Loose gravel and sand
Re	Romney silty clay loam, 0 to 2 percent slopes.	Deeper parts of swales and depressions in the till plains.	Calcareous loam to clay loam glacial till.	Very dark gray to black silty clay loam.	Gray silty clay to silty clay loam; contains a few rust-brown mottles.
Rf	Ross loam, 0 to 3 percent slopes.	Natural levees of infrequently flooded high bottoms.	Neutral alluvium from areas of glacial drift.	Very dark brown loam 15 to 20 inches thick.	Dark-brown to yellowish-brown loam to heavy loam.
Rg	Ross silt loam, 0 to 3 percent slopes.	Same	Same	Very dark grayish-brown silt loam 15 to 20 inches thick.	Yellowish-brown heavy silt loam.
Rh	Ross silty clay loam, 0 to 3 percent slopes.	Infrequently flooded high bottoms.	Same	Very dark grayish-brown silty clay loam 15 to 20 inches thick.	Yellowish-brown silty clay loam; contains lenses of silt and sand at depths of 40 inches or more.
Ri	Russell loam, 3 to 8 percent slopes.	Low knolls and morainic ridges on till plains, and gentle slopes along drainageways.	Thin layer of loam to sandy loam glacial drift on loam till; calcareous at depths of 42 to 60 inches.	Brown to grayish-brown loam.	Dark-brown to yellowish-brown clay loam.
Rj	Russell loam, 3 to 8 percent slopes, eroded.	Same	Same	Grayish-brown to dark yellowish-brown loam to heavy loam.	Same
Rk	Russell loam, 8 to 12 percent slopes, eroded.	Sloping areas around knolls and drainageways.	Same	Same	Same

Summary of important characteristics—Continued

Acidity		Natural soil drainage	Permeability	Runoff	Susceptibility to erosion	Moisture-supplying capacity	General productivity
Surface	Subsoil						
Medium to slightly acid.	Medium acid	Imperfect	Slow	Slow	Slight	Very high	Very high.
Medium to slightly acid.	Medium acid	Imperfect	Slow	Slow	Slight	High to very high	High to very high.
Medium to slightly acid.	Medium acid	Good	Moderate	Medium	Moderate	High	Medium to high.
Medium to slightly acid.	Medium acid	Good	Moderate	Medium	Moderate	Medium to high	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate	Slow	Slight	High	High to very high.
Medium to slightly acid.	Medium acid	Good	Moderate	Medium	Moderate	High	High.
Medium to slightly acid.	Medium acid	Good	Moderate	Medium	Moderate	Medium to high	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate	Medium to rapid.	Moderate	Medium to high	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate	Medium to rapid.	Moderate to high.	Medium	Low.
Medium acid	Medium acid	Good	Moderate to slow.	Rapid	High	Low	Low.
Medium acid to neutral.	Medium acid to neutral.	Moderately good.	Moderate	Slow to very slow.	None	Very high	Very high.
Medium to slightly acid.	Medium to strongly acid.	Imperfect	Slow	Slow to very slow.	None	Low to medium	Medium.
Medium to slightly acid.	Medium to strongly acid.	Imperfect	Slow	Slow to very slow.	Slight	Very high	Very high.
Mildly alkaline to alkaline.	Alkaline	Excessive	Very rapid	Very rapid	Moderate to high.	Very low	Very low.
Slightly acid to neutral.	Neutral	Very poor	Slow	Very slow to ponded.	None	Very high	High to very high.
Neutral	Neutral	Good	Moderate	Slow	None	High	High.
Neutral	Neutral	Good	Moderate	Slow	None	High	High to very high.
Neutral	Neutral	Good	Moderate	Slow	None	High	High to very high.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium	Medium to high.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium	Medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium to rapid.	Moderate to high.	Medium to low	Medium.

Soils of Tippecanoe County, Indiana:

Map symbol	Soil	Topography	Parent or underlying material	Surface soil	Upper subsoil
Rl	Russell loam, 12 to 25 percent slopes, eroded.	Moderately steep slopes around drainageways.	Same	Same	Same
Rla and Rm	Russell loam and clay loam, 8 to 12 percent slopes, severely eroded.	Sloping areas around knolls and drainageways.	Same	Dark yellowish-brown clay loam to grayish-brown heavy loam.	Same
Rn	Russell silt loam, 0 to 3 percent slopes.	Nearly level to undulating areas, usually bordering glacial drainageways.	Loess 16 to 40 inches thick over loam till; calcareous at depths of 42 to 70 inches.	Grayish-brown smooth silt loam.	Brown to yellowish-brown friable silty clay loam.
Ro	Russell silt loam, 3 to 8 percent slopes.	Gently sloping knolls, ridges, and upper slopes along drainageways.	Same	Same	Same
Rp	Russell silt loam, 3 to 8 percent slopes, eroded.	Same	Same	Grayish-brown silt loam to dark yellowish-brown heavy silt loam.	Same
Rq	Russell silt loam, 8 to 12 percent slopes.	Sloping areas along drainageways.	Same	Grayish-brown silt loam	Same
Rr	Russell silt loam, 8 to 12 percent slopes, eroded.	Same	Same	Grayish-brown silt loam to dark yellowish-brown heavy silt loam.	Same
Rs	Russell silt loam, 12 to 25 percent slopes.	Moderately steep areas along drainageways.	Same	Grayish-brown silt loam	Same
Rt	Russell silt loam, 12 to 25 percent slopes, eroded.	Same	Same	Grayish-brown silt loam to dark yellowish-brown heavy silt loam.	Same
Ru	Russell silt loam and silty clay loam, 3 to 8 percent slopes, severely eroded.	Gently sloping knolls, ridges, and upper slopes along drainageways.	Same	Yellowish-brown silty clay loam to grayish-brown silt loam.	Same
Rv	Russell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded.	Sloping areas along drainageways.	Same	Same	Same
Rw	Russell silt loam and silty clay loam, 12 to 25 percent slopes, severely eroded.	Moderately steep areas along drainageways.	Same	Yellowish-brown clay loam or silty clay loam to grayish-brown heavy silt loam.	Same
Sa	Shadeland silt loam, 0 to 2 percent slopes.	Nearly level glaciated uplands and nearby terraces.	Glacial drift, 24 to 36 inches thick over acid shale and sandstone.	Grayish-brown silt loam	Mottled gray and yellow silty clay loam.
Sb	Shoals silt loam, 0 to 3 percent slopes.	Level swales and bayous of larger streams.	Neutral to calcareous alluvium from timbered glacial drift areas.	Grayish-brown silt loam	Mottled gray, yellow, and brown silt loam to silty clay loam.
Sc	Sidell silt loam, 0 to 2 percent slopes.	Nearly level areas, usually near glacial channels where porous material was deposited below the till.	Loess, 18 to 40 inches thick over loam glacial till; calcareous at depths of 42 to 70 inches.	Very dark brown smooth silt loam.	Dark-brown to dark yellowish-brown silty clay loam.
Sd	Sidell silt loam, 2 to 5 percent slopes.	Low knolls on the undulating till plains.	Same	Same	Same
Se	Sidell silt loam, 2 to 5 percent slopes, eroded.	Gently sloping areas around kettle holes, and low knolls on till plains.	Same	Very dark brown smooth silt loam to dark yellowish-brown heavy silt loam.	Same
Sf	Sidell silt loam, 5 to 8 percent slopes.	Sloping areas on the till plains.	Same	Very dark brown smooth silt loam.	Same
Sg	Sidell silt loam, 5 to 8 percent slopes, eroded.	Same	Same	Very dark brown silt loam to dark yellowish-brown heavy silt loam.	Same
Sh	Sidell silt loam, 8 to 12 percent slopes.	Sloping areas along higher knolls, ridges, and drainageways.	Same	Very dark brown smooth silt loam.	Same
Si	Sidell silt loam, 8 to 12 percent slopes, eroded.	Same	Same	Very dark brown silt loam to dark yellowish-brown heavy silt loam.	Same
Sj	Sidell silt loam and silty clay loam, 2 to 5 percent slopes, severely eroded.	Gently sloping areas around kettle holes, and low knolls on the till plains.	Same	Dark yellowish-brown silty clay loam to dark-brown heavy silt loam.	Same

Summary of important characteristics—Continued

Acidity		Natural soil drainage	Permeability	Runoff	Susceptibility to erosion	Moisture-supplying capacity	General productivity
Surface	Subsoil						
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium to rapid.	High to very high.	Low	Low.
Medium acid	Medium to strongly acid.	Good	Slow	Medium to rapid.	Very high	Low	Low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Slow	Slight	High	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium to high	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium	Medium to high.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium to rapid.	High	Medium	Medium.
Medium acid	Medium to strongly acid.	Good	Moderate	Medium to rapid.	High	Medium to low	Medium to low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Rapid	High to very high.	Low	Low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Rapid	High	Low	Low.
Medium acid	Medium to strongly acid.	Good	Moderate	Medium	High to very high.	Medium to low	Low.
Medium acid	Medium to strongly acid.	Good	Moderate	Rapid	High	Low	Low.
Medium acid	Medium to strongly acid.	Good	Moderate	Rapid	High to very high.	Very low	Very low.
Medium to strongly acid.	Strongly acid	Imperfect	Slow	Slow	Slight	Low	Low.
Neutral to alkaline.	Neutral to alkaline.	Imperfect	Slow to moderate.	Very slow	None	High	Low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Slow	None to slight	High	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	High	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium to high	Medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate to high.	Medium	Medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate to high.	Medium	Low to medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium to rapid.	High	Medium to low	Low to medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium to rapid.	High	Low	Low to medium.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to slow.	Medium	Moderate to high.	Medium to low	Low.

Soils of Tippecanoe County, Indiana

Map symbol	Soil	Topography	Parent or underlying material	Surface soil	Upper subsoil
Sk	Sidell silt loam and silty clay loam, 5 to 8 percent slopes, severely eroded.	Sloping areas on till plains.	Same	Same	Same
Sl	Sidell silt loam and silty clay loam, 8 to 12 percent slopes, severely eroded.	Sloping areas along higher knolls, ridges, and drainageways.	Same	Same	Same
Sm	Sleeth silt loam, 0 to 3 percent slopes.	Nearly level to very gently sloping outwash terraces.	Silty and loamy outwash, 42 to 72 inches thick over stratified calcareous gravel and sand.	Grayish-brown silt loam.	Mottled gray and yellowish-brown silty clay loam over clay loam.
Sn	Sloan silt loam, 0 to 3 percent slopes.	Swales and old drainageways on bottom lands.	Neutral to calcareous alluvium from timbered glacial drift areas.	Dark-brown to very dark gray silt loam.	Mottled gray and yellowish-brown silty clay loam to clay loam.
So	Sloan silty clay loam, 0 to 3 percent slopes.	Same	Same	Dark-brown to very dark gray silty clay loam, 18 to 20 inches thick.	Mottled gray and yellowish-brown clay loam to silty clay loam.
Ta	Tippecanoe silt loam, 0 to 3 percent slopes.	Nearly level terrace areas, very slightly higher than nearby swales.	Silty and loamy outwash, 42 to 70 inches thick over stratified calcareous gravel and sand.	Very dark brown silt loam, 12 to 16 inches thick.	Dark-brown to dark yellowish-brown silty clay loam to depths of 24 inches, then mottled with gray to depths of 40 inches.
Tb	Toronto silt loam, 0 to 3 percent slopes.	Nearly level areas on till plains.	Loess, 18 to 40 inches thick over loam till; calcareous at depths of 42 to 70 inches.	Very dark grayish-brown smooth silt loam.	Mottled gray and yellowish-brown silty clay loam.
Wd	Warsaw loam, 3 to 8 percent slopes, kame phase.	Gently sloping knolls and winding ridges (kames and eskers).	Loamy outwash, 24 to 44 inches thick over stratified calcareous gravel and sand.	Very dark grayish-brown loam.	Brown to dark yellowish-brown gravelly clay loam.
We	Warsaw loam, 3 to 8 percent slopes, eroded kame phase.	Same	Same	Same	Same
Wg	Warsaw loam, 8 to 12 percent slopes, kame phase.	Sloping knolls and winding ridges.	Same	Same	Same
Wh	Warsaw loam, 8 to 12 percent slopes, eroded kame phase.	Same	Same	Very dark grayish-brown loam to dark-brown heavy loam.	Same
Wi	Warsaw loam, 12 to 25 percent slopes, eroded kame phase.	Moderately steep kames and eskers.	Same	Very dark grayish-brown loam.	Same
Wa	Warsaw loam, 0 to 3 percent slopes.	Level alluvial terraces	Same	Same	Dark-brown to dark yellowish-brown clay loam.
Wb	Warsaw loam, 3 to 8 percent slopes.	Gently sloping terraces	Same	Same	Same
Wc	Warsaw loam, 3 to 8 percent slopes, eroded.	Same	Same	Very dark grayish-brown loam to dark-brown heavy loam.	Same
Wf	Warsaw loam, 8 to 20 percent slopes, eroded.	Sloping terraces, usually along drainageways.	Same	Very dark grayish-brown loam.	Brown to dark yellowish-brown gravelly clay loam.
Wl	Warsaw silt loam, 3 to 8 percent slopes, eroded kame phase.	Gently sloping knolls and winding ridges.	Same	Very dark grayish-brown silt loam to dark-brown heavy silt loam.	Same
Wm	Warsaw silt loam, 8 to 12 percent slopes, eroded kame phase.	Sloping knolls and winding ridges.	Same	Same	Same
Wj	Warsaw silt loam, 0 to 3 percent slopes.	Low alluvial terraces	Same	Very dark grayish-brown silt loam.	Brown to dark yellowish-brown silty clay loam to clay loam, over gravelly clay loam.
Wk	Warsaw silt loam, 3 to 8 percent slopes.	Gently sloping areas on alluvial terraces.	Same	Same	Same
Wn	Washtenaw silt loam, 0 to 3 percent slopes.	Depressed flats and kettle holes.	Light-colored colluvium 10 to 40 inches thick, washed from timbered glacial drift, over dark-colored soil.	Grayish-brown silt loam.	Grayish-brown to dark grayish-brown silt loam to silty clay loam.

Summary of important characteristics—Continued

Acidity		Natural soil drainage	Permeability	Runoff	Susceptibility to erosion	Moisture-supplying capacity	General productivity
Surface	Subsoil						
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to slow.	Medium	Moderate to high.	Medium to low	Low.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate to slow.	Medium to rapid.	Very high	Low	Low.
Medium to slightly acid.	Medium to strongly acid.	Imperfect	Slow to moderate.	Slow	Slight	High	Medium to high.
Neutral	Neutral	Very poor	Slow to moderate.	Very slow	None	Very high	Very high.
Neutral	Neutral	Very poor	Slow to moderate.	Very slow	None	Very high	Very high.
Medium to slightly acid.	Medium acid	Moderately good.	Moderate	Very slow	Slight	High	Very high.
Medium to slightly acid.	Medium acid	Imperfect	Slow	Very slow	Slight	High	High to very high.
Medium to slightly acid.	Medium acid	Good	Moderate to rapid.	Medium	Moderate	Low to medium	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate to rapid.	Medium	Moderate	Low to medium	Medium.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Moderate to rapid.	Rapid	High	Low	Low.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Moderate to rapid.	Rapid	High	Low	Low.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Moderate to rapid.	Very rapid	High	Low to very low	Very low.
Medium to slightly acid.	Medium acid	Good	Moderate	Very slow	Slight	Low to medium	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate to rapid.	Medium	Moderate	Low to medium	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate to rapid.	Medium	Moderate	Low	Low to medium.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Moderate to rapid.	Rapid	High	Low	Low.
Medium to slightly acid.	Medium acid	Good	Moderate to rapid.	Medium	Moderate	Low to medium	Low.
Medium to slightly acid.	Medium acid	Good to somewhat excessive.	Moderate to rapid.	Rapid	High	Low	Low.
Medium to slightly acid.	Medium acid	Good	Moderate to rapid.	Very slow	Slight	Medium	Medium.
Medium to slightly acid.	Medium acid	Good	Moderate to rapid.	Medium	Moderate	Medium	Medium.
Slightly acid to neutral.	Slightly acid to neutral.	Imperfect to poor.	Moderate	Very slow to ponded.	None	High	High.

Soils of Tippecanoe County, Indiana:

Map symbol	Soil	Topography	Parent or underlying material	Surface soil	Upper subsoil
Wo	Wea silt loam, 0 to 3 percent slopes.	Nearly level high terrace and outwash plains.	Silty and loamy outwash, 42 to 70 inches thick over stratified calcareous gravel and sand.	Very dark brown silt loam, 12 to 16 inches thick.	Dark-brown to dark yellowish-brown silty clay loam.
Wp	Wea silt loam, 3 to 8 percent slopes.	Gently sloping areas around drainageways and kettle holes.	Same	Same	Same
Wq	Wea silt loam, 3 to 8 percent slopes, eroded.	Same	Same	Very dark brown silt loam to dark yellowish-brown heavy silt loam.	Same
Wr	Westland loam, 0 to 3 percent slopes.	Level swales, former meander channels.	Loamy and silty outwash, 40 to 60 inches thick over stratified calcareous gravel and sand.	Very dark grayish-brown loam, 12 to 18 inches thick.	Mottled gray and yellowish-brown clay loam to silty clay loam.
Ws	Westland silt loam, 0 to 3 percent slopes.	Same	Same	Very dark grayish-brown silt loam, 13 to 16 inches thick.	Mottled gray and yellowish-brown silty clay loam.
Wt	Westland silty clay loam, 0 to 3 percent slopes.	Same	Same	Very dark grayish-brown silty clay loam, 12 to 16 inches thick.	Mottled gray and yellowish-brown silty clay loam.
Wu	Wingate silt loam, 0 to 3 percent slopes.	Nearly level to gently undulating areas, usually near drainageways.	Loess, 18 to 40 inches thick over loam glacial till; calcareous at depths of 42 to 72 inches.	Very dark grayish-brown smooth silt loam.	Dark-brown silty clay loam.

Summary of important characteristics—Continued

Acidity		Natural soil drainage	Permeability	Runoff	Susceptibility to erosion	Moisture-supplying capacity	General productivity
Surface	Subsoil						
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Very slow	Slight	High	High to very high.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium to high	High.
Medium to slightly acid.	Medium to strongly acid.	Good	Moderate	Medium	Moderate	Medium to high	High.
Slightly acid to neutral.	Slightly acid to neutral.	Very poor	Slow	Very slow	None	Very high	High to very high.
Slightly acid to neutral.	Slightly acid to neutral.	Very poor	Slow	Very slow	None	Very high	Very high.
Slightly acid to neutral.	Slightly acid to neutral.	Very poor	Slow	Very slow	None	Very high	Very high.
Medium to slightly acid.	Medium to strongly acid.	Moderately good.	Moderate	Slow	Slight	High	High to very high.

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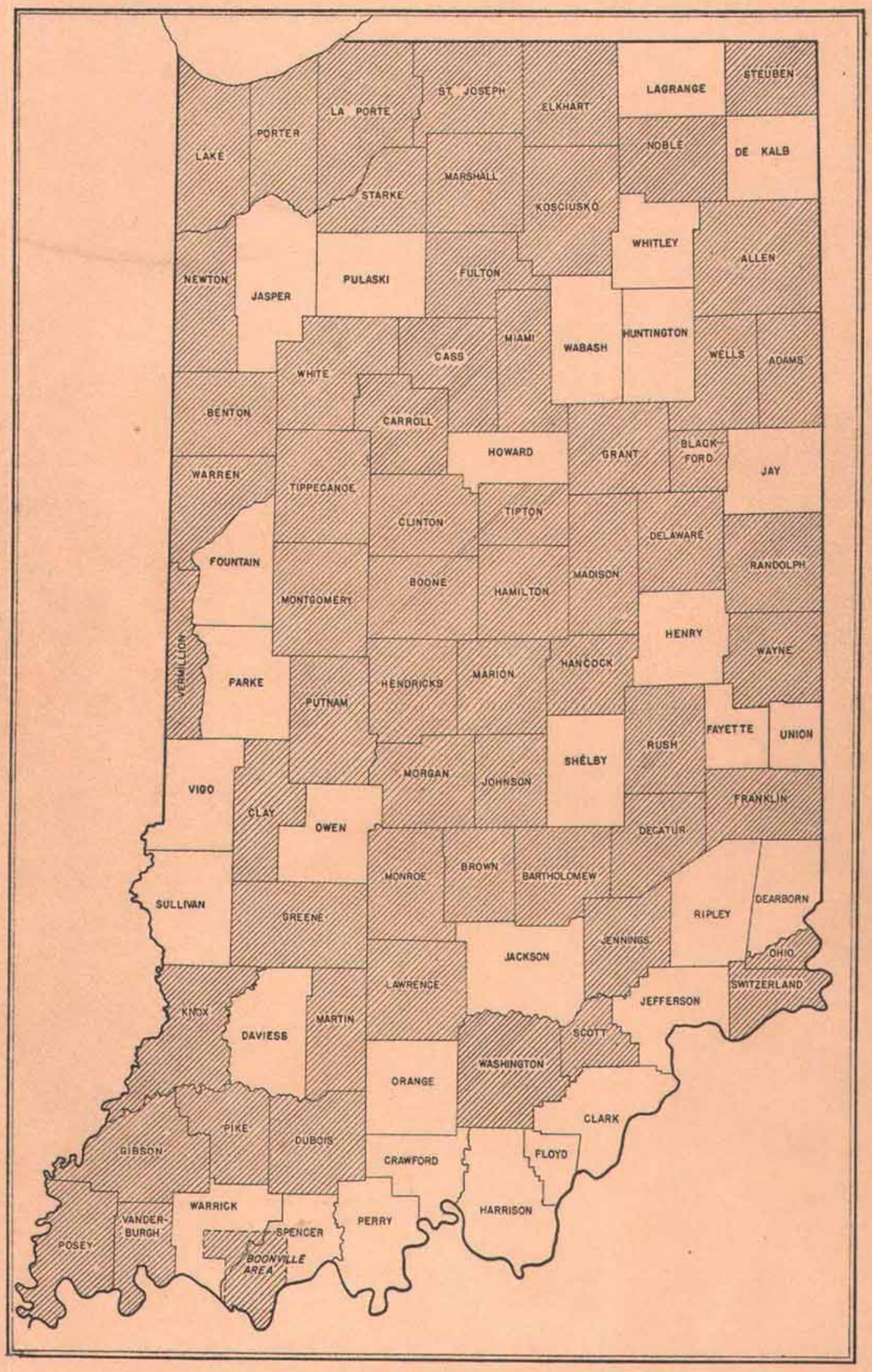

Areas surveyed in Indiana shown by shading.

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