Series 1949, No. 12

Issued April 1967

SOIL SURVEY

Parke County Indiana

This is the last soil survey of the 1949 series

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

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Parke County, Ind., contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

All the soils of Parke County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described and the page for the capability unit in which the soil has been placed. It also lists the woodland group of each soil.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils in the soil descriptions and in the section describing the soils and the section discussing management of soils for cultivated crops and pasture.

Foresters and others can refer to the section "Use of Soils as Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the subsection "Wildlife."

Engineers and builders will find under "Use of Soils in Engineering" tables that give engineering properties of the soils in the county and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation and Classification of Soils."

Students, teachers, and others will find information about soils and their management in various parts of the text, depending on their particular interest.

Newcomers in Parke County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the Area," which gives additional information about the county.

* * * * *

Fieldwork for this survey was done during the period 1946 through 1949. In the years that followed, most of the soil map and the report was revised for publication. Unless otherwise indicated, all statements in the report refer to conditions in the county at the time of the original fieldwork, but predictions of yields are based on the use of modern farming methods. Although the soil map has been published on an airphoto mosaic, it does not have the same degree of accuracy as more recent soil maps, especially in features required for on-site planning.

This survey of Parke County was made as part of the technical assistance furnished by the Purdue University Agricultural Experiment Station and the Soil Conservation Service to the Parke County Soil Conservation District.

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SOIL SURVEY OF PARKE COUNTY, INDIANA

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION

PARKE COUNTY is located in the west-central part of Indiana. It is roughly square in outline and has an area of 451 square miles, or 288,640 acres. Rockville, the county seat and largest town in the county, has a population of 2,756. It is 58 miles west of Indianapolis, the State capital, and is conveniently located to several other commercial and cultural centers (fig. 1).

Figure 1.—Location of Parke County in Indiana.

General Nature of the Area

This section provides general information about the physiography, relief, and drainage, the climate, natural resources and industry, transportation, water supply, and agriculture of Parke County. The statistics given are from reports published by the U.S. Bureau of the Census.

Physiography, Relief, and Drainage

The nearly level to gently undulating relief that characterizes the broad upland divides of Parke County was caused by the constructive action of glaciers that covered the county two or more times (fig. 2). The undulating upland area lying generally northward from Rockville is the Wisconsin till plain; it resulted from the Tazewell stage of the Wisconsin age. An east-west ridge, the Shelbyville moraine, divides the Wisconsin till plain from the nearly level areas lying southward, which are characteristic of the Illinoian till plain. The deep gorgelike valleys, such as that along Sugar Creek, were cut by streams into the preglacial land surface.

All of the county is within the drainage basin of the Wabash River. The Wabash, and Leatherwood and Big Raccoon Creeks, flow near or above deeply entrenched preglacial valleys that were filled with glacial deposits. The terraces at different levels above the flood plains were formed by glacial meltwater of past ages that flowed through these valleys (*17*).[1]

Climate [2]

The climate of Parke County is continental. The temperature varies widely during the year, but precipitation is rather uniform through the seasons, compared to that in parts of the world having a wet or a dry season. Precipitation generally is greatest in June and least in winter.

Changes in weather every few days are closely associated with centers of low and high air pressure that pass through the central United States. In general, high pressure brings lower temperatures, lower humidity, and sunny skies. Often accompanying low pressure are higher temperatures from southerly winds, higher humidity, and rain. The intensity of these alterations diminishes in summer, but thunderstorms increase in spring and reach a climax late in spring or early in summer, when showers are scattered and general rain is less frequent. Table 1 gives temperature and precipitation data compiled from records of the United States Weather Bureau at Rockville.

[1] Italic numbers in parentheses refer to Literature Cited, page 93.
[2] By LAWRENCE A. SCHAAL, State climatologist, U.S. Weather Bureau.

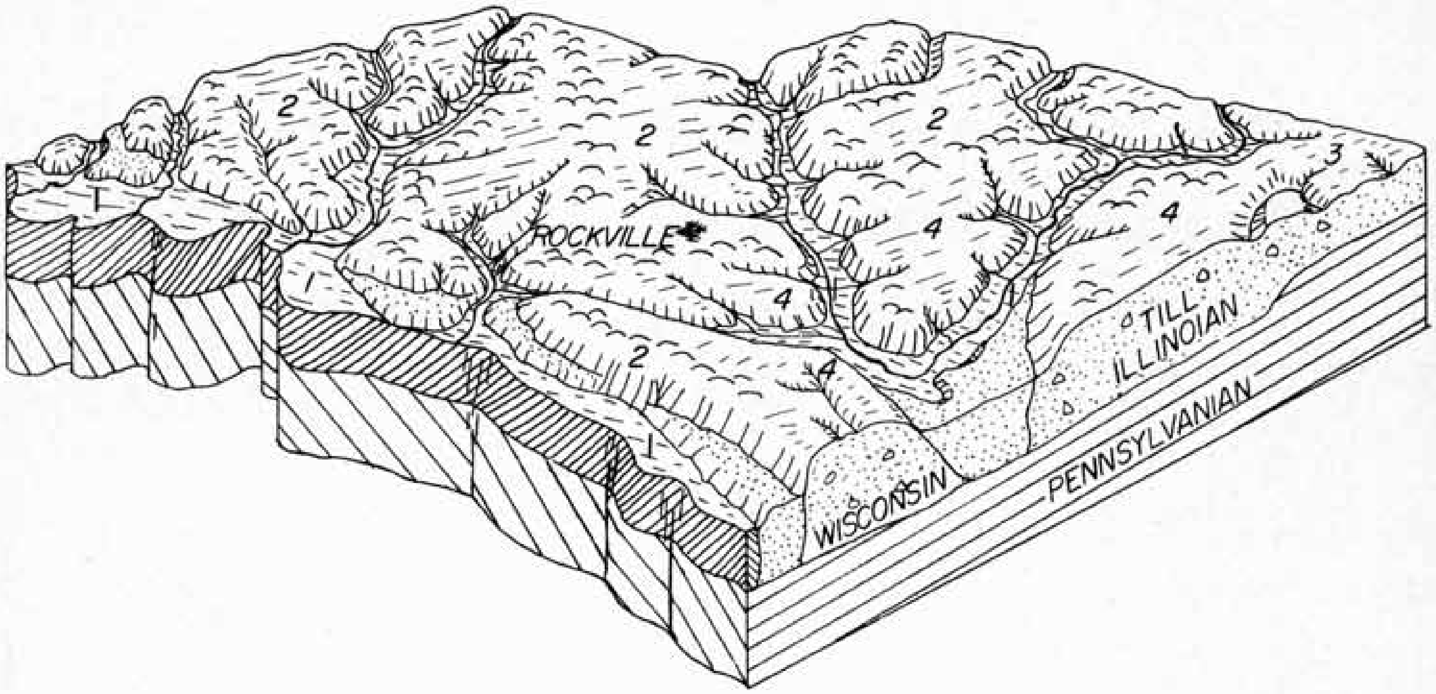

***Figure 2.*—Physiographic features of Parke County: (1) bottom land and terraces along the Wabash River and its tributaries; (2) the Wisconsin till plain lying northward and westward from Rockville; (3) the Crawford Upland in the southeastern corner of the county, a part of the Illinoian till plain; and (4) the level but deeply dissected Illinoian till plain.**

TABLE 1.—*Temperature*

[Based on records kept at Rockville, Ind., from 1931 through

Month	Temperature							Average degree days [1]
	Average			Extremes				
	Daily maximum	Daily minimum	Monthly	Highest on record	Year	Lowest on record	Year	
	°F.	°F.	°F.	°F.		°F.		
January	38.2	22.0	30.1	70	1950	−18	1936	1,082
February	40.8	23.7	32.3	71	1944 [2]	−15	1951	916
March	49.8	31.0	40.4	82	1939	−9	1943	763
April	63.3	42.2	52.8	88	1960	20	1950 [2]	375
May	74.4	52.2	63.3	96	1934	29	1947	140
June	84.1	61.8	73.0	103	1954 [2]	40	1945	24
July	88.2	65.2	76.7	109	1936	46	1947	0
August	86.2	63.6	74.9	103	1936	43	1946	6
September	79.2	55.8	67.5	103	1954	25	1942	78
October	68.0	45.3	56.7	91	1954 [2]	19	1942	288
November	51.2	33.0	42.1	82	1950	−5	1950	687
December	40.0	24.6	32.3	72	1948	−11	1960 [2]	1,014
Year	63.6	43.4	53.5	109	1936	−18	1936	5,373

[1] Based on a temperature of 65° F. and computed from monthly average temperatures. These data show relative heating requirements for dwellings. Degree days for a single day are obtained by subtracting the average temperature of the day from 65°.
[2] Also on earlier dates, months or years.

Table 2 lists, for each week of the year, the chance, in percent, that stated amounts of precipitation will fall. The most likely time for a drought is midsummer, when evaporation losses are high, soil-moisture content is low, and showers are scattered, not general. At such times the soils that have a high available moisture capacity are an advantage in farming. Nevertheless, a drought that reduced crop yields drastically has never occurred in Parke County.

The average growing season, or the average number of days between the last killing frost in spring and the first in fall, is 180 days. In low depressions, or basins, the average growing season is shorter, and those areas are not good for growing some fruits and tender crops. Table 3 gives the chance, in percent, that specified temperatures will occur at Rockville after listed dates in spring and before listed dates in fall.

Thunderstorms occur in the county on about 46 days of the year. Accompanying a few thunderstorms are winds that damage property, but usually the storms are small and local. Tornadoes have been reported 10 times in the county between 1916 and 1960. Most of these were small and inconsequential. In all seasons but winter, winds flow from the southwest most of the time. In winter, winds from the west or northwest are most common.

Relative humidity in summer varies from the 40's on a typical afternoon to near 90 percent just before dawn. In winter, the range in humidity is generally from the 60's to the 90's.

Fog seriously reduces visibility about 12 days a year. It is most prevalent in the valley of the Wabash River late at night and early in morning because cool, humid air concentrates in the river bottoms. Fog and early morning dew commonly slow the harvesting of hay and small grain, but they also reduce the loss of moisture through evaporation and transpiration during dry periods in midsummer.

In Parke County there are local differences in climate because of differences in elevation, direction of slope, nearness to bodies of water, air drainage, soil cover, soil moisture, and wetness. All of these factors should be considered in estimating the climate at any one location. The climate at Rockville can be expected to be a little warmer than that in the open, windswept areas of the county.

Natural Resources and Industry

Parke County is principally an agricultural area, and little industry has been developed. Most nonfarm employment is provided by the development and use of sand, gravel, clay, and other natural resources and by the processing of agricultural products, mainly cheese and milled grain. Coal mining, once important, now is virtually nonexistent. Clay tile is manufactured at Mecca and Bloomingdale. At Marshall there is a cheese factory that employs about 70 people and uses about 45 tons of milk daily.

Because the county is an area of much natural beauty, it is likely that recreational facilities will be developed and will bring added income to the county. At Turkey Run State Park, which has been enlarged through acquisition of The Shades, a park that formerly was privately owned, there is opportunity for many kinds of recreation in an area of sandstone cliffs, bluffs, and ravines along deeply entrenched Sugar Creek. Additional recreation is furnished at Mansfield Reservoir above Mansfield Dam, a structure built for erosion control. Mansfield Reservoir is 2,060 acres in size and has a shoreline 30 miles long.

and precipitation data

1960. Absence of data indicates no occurrence]

Precipitation									Average number of days with—				
			Snow, sleet							Temperature			
										Maximum		Minimum	
Average	Greatest daily	Year	Average	Maximum monthly	Year	Greatest daily	Year	Precipitation of 0.10 inch or more	90° and above	32° and below	32° and below	0° and below
Inches	*Inches*		*Inches*	*Inches*		*Inches*						
2. 87	2. 91	1950	4. 4	14. 1	1956	6. 0	1956 [2]	5	0	10	27	2
2. 43	2. 34	1946	4. 3	12. 0	1960	7. 5	1960	5	0	6	23	1
3. 53	3. 48	1938	5. 1	16. 5	1960	7. 0	1959 [2]	7	0	3	19	[4]
3. 62	2. 10	1950	. 5	4. 5	1940	4. 0	1940	8	0	0	5	0
4. 96	4. 24	1935	[3]	[3]	1960 [2]	[3]	1960 [2]	9	1	0	[4]	0
5. 29	8. 74	1957	0	0	--------	0	--------	7	8	0	0	0
3. 41	3. 32	1937	0	0	--------	0	--------	5	12	0	0	0
3. 23	3. 90	1950	0	0	--------	0	--------	5	11	0	0	0
3. 14	4. 02	1931	0	0	--------	0	--------	5	4	0	[4]	0
2. 93	3. 67	1949	[3]	[3]	1957 [2]	[3]	1957 [2]	5	[4]	0	3	0
3. 07	2. 76	1936	2. 6	9. 0	1938	7. 0	1938	6	0	2	15	[4]
2. 58	1. 80	1952	5. 4	15. 5	1960	7. 5	1943	5	0	8	24	1
41. 06	8. 74	1957	22. 3	16. 5	1960	7. 5	1960 [2]	72	36	29	116	4

[3] Trace.

[4] Less than one-half.

TABLE 2.—*Chance, in percent, for stated amount of precipitation, in inches, each week of the year* [1]

[Computed from records at Rockville, Ind.]

Week beginning—	0.20 or more	0.60 or more	1.0 or more	2.0 or more
January:				
3	63	39	25	9
10	68	41	24	7
17	72	44	27	8
24	54	29	17	5
31	61	29	14	2
February:				
7	66	31	14	2
14	66	36	19	3
21	71	35	17	3
March:				
1	71	40	22	5
8	79	52	34	11
15	78	50	29	6
22	82	56	37	12
29	78	55	39	15
April:				
5	88	63	42	14
12	76	50	33	11
19	73	43	25	6
26	77	51	34	13
May:				
3	81	54	35	11
10	77	53	37	16
17	80	57	40	15
24	73	50	34	13
31	76	54	39	17
June:				
7	79	56	39	15
14	70	47	32	12
21	82	63	46	20
28	73	50	34	14
July:				
5	70	48	33	15
12	70	46	31	11
19	62	33	17	3
26	61	33	18	4
August:				
2	69	46	31	13
9	79	57	41	17
16	68	43	27	9
23	57	36	24	8
30	65	43	29	11
September:				
6	71	45	28	9
13	65	46	32	12
20	65	43	29	10
27	61	43	31	14
October:				
4	66	40	24	8
11	61	40	26	9
18	58	38	25	10
25	55	34	23	9
November:				
1	64	43	28	9
8	69	38	19	3
15	63	40	26	9
22	65	34	18	3
29	65	38	22	5
December:				
6	66	36	20	5
13	66	40	25	8
20	68	41	23	6
27	73	42	21	3

[1] Calculations by G. L. BARGER, R. H. SHAW, and R. F. DALE in CHANCES OF RECEIVING SELECTED AMOUNTS OF PRECIPITATION IN THE NORTH-CENTRAL REGION OF THE UNITED STATES (*4*).

TABLE 3.—*Chance of last critical temperatures in spring and first in fall at Rockville* [1]

Temperature	Chance of occurrence after date in spring					Chance of occurrence before date in fall				
	90 percent	75 percent	50 percent [2]	25 percent	10 percent	10 percent	25 percent	50 percent [2]	75 percent	90 percent
°F.										
40	May 3	May 9	May 15	May 21	May 27	Sept. 15	Sept. 22	Sept. 29	Oct. 6	Oct. 13
36	Apr. 23	Apr. 28	May 5	May 12	May 17	Sept. 23	Sept. 30	Oct. 7	Oct. 14	Oct. 21
32	Apr. 7	Apr. 15	Apr. 23	May 1	May 9	Oct. 5	Oct. 12	Oct. 19	Oct. 26	Nov. 2
28	Mar. 21	Mar. 29	Apr. 6	Apr. 14	Apr. 22	Oct. 20	Oct. 26	Nov. 2	Nov. 9	Nov. 15
24	Mar. 5	Mar. 14	Mar. 24	Apr. 3	Apr. 12	Oct. 27	Nov. 2	Nov. 9	Nov. 16	Nov. 22
20	Feb. 27	Mar. 6	Mar. 14	Mar. 22	Mar. 29	Nov. 6	Nov. 13	Nov. 22	Dec. 1	Dec. 8
16	Feb. 6	Feb. 17	Mar. 2	Mar. 15	Mar. 26	Nov. 14	Nov. 24	Dec. 5	Dec. 16	Dec. 26

[1] Official readings are taken from thermometers located about 5 feet above grass in a standard thermometer shelter. Since temperatures on a windless, cloudless night are often lower below the shelter or in a crop, some probabilities are shown for in-shelter, above-freezing temperatures. Temperatures below freezing are pertinent to the growth or survival of hardy crops. From RISKS OF FREEZING TEMPERATURES—SPRING AND FALL IN INDIANA (*10*).

[2] Dates in this column are average dates.

Transportation

Parke County has good transportation facilities. U.S. Highway No. 36 crosses the county from east to west and passes through Rockville. U.S. Highway No. 41 crosses from north to south, also through Rockville. Several other hard surfaced roads provide good farm-to-market outlets in other parts of the county. Secondary roads of gravel furnish all-weather routes for nearly all the farms. Livestock, farm produce, and supplies commonly are carried to market or farm by motortruck.

Six railroads pass through or near all the towns in the county and provide facilities for shipping grain and agricultural supplies. A main line of the New York Central Railroad that runs between Indianapolis and St. Louis touches the southeastern corner of the county, but trains do not stop there.

Water Supply

Wells and springs provide plenty of good, but hard, water for livestock and domestic use. Water for livestock is available from streams on many farms. It is near the surface in nearly all the bottom lands, where pitcher pumps are commonly used. On most of the gravelly and sandy terraces, water for farm use is generally within 20 to 40 feet of the surface, but supplies adequate for irrigation or industrial use generally occur at a greater depth.

On the upland till plains, water is available at a depth of 50 to 100 feet or more. Most of this water comes from the sand and gravel strata within the till. In the northern half of the county—an area that was covered by Wisconsin glacial drift—an abundant supply of water is available in the deep valleys that occur in several places. In the southern part, where glacial drift is of Illinoian age and is thinner, water-bearing strata are less common. Here, the underlying rock is chiefly sandstone, and though the water occurs at a variable depth, it is generally adequate for livestock and domestic use.

Agriculture

The farms in Parke County are gradually increasing in size but are decreasing in number. In 1959, the number of farms in the county was 1,161, or less than half as many as in 1910. Because so many operations have been mechanized, the number of persons employed on farms has decreased, and nearly half the farmers supplement their income by working at jobs off the farm.

In recent decades the total acreage in farms has changed only a little, but cropland is used more intensively. In 1959, there were 229,105 acres in farms, or 79.4 percent of the total land area in the county. Of the acreage in farms, about 60 percent, or 138,616 acres, was cropland. Data on farms in the county are shown in table 4.

Many farmers in the county are using improved farming methods on their soils, but better management is needed on a much larger acreage of pasture and woodland. In 1959, farmers reported 5,900 acres of cropland in cover crops, 1,940 acres farmed on the contour, 565 acres stripcropped, and 3,220 acres of cropland and pasture terraced.

TABLE 4.—*Data on farms for stated years*

	1949	1954	1959
	Acres	*Acres*	*Acres*
Land area of county	288, 640	288, 640	288, 640
Land in farms	247, 682	241, 553	229, 105
Cropland (total)	136, 925	140, 194	138, 616
Harvested	118, 032	121, 967	119, 243
Idle or fallow	------	------	2, 547
Used only for pasture	13, 035	12, 313	10, 738
Not harvested or pastured	5, 858	3, 189	6, 088
Pasture (total)	11, 776	17, 804	17, 763
Improved	------	2, 856	2, 340
Other	11, 776	14, 948	15, 423
Woodland (total)	81, 987	75, 693	63, 528
Pastured	54, 594	48, 149	33, 537
Not pastured	27, 393	27, 544	29, 991
Other land (lots, roads, and so on)	16, 994	13, 443	14, 085

Of the 1,161 farms in the county in 1959, 350 were listed as unclassified farms. The rest, classified according to their major source of income, were divided as follows:

Type of farm	*Number*
Livestock farms other than dairy and poultry farms	487
Cash grain	261
Dairy farms	39
Poultry farms	13
Fruit farms	9
Vegetable farms	4
General farms	47

In 1959, 50.1 percent of the farm income from products sold by farmers came from livestock and livestock products, except dairy and poultry products. Dairy products provided 5.35 percent of the farm income, and poultry products, 2 percent. Sale of fruits, vegetables, and forest products brought 1.53 percent of the income. All crops sold by farmers accounted for 42.45 percent of the total farm income in Parke County.

The agriculture in Parke County is based mainly on the raising of livestock and the production of grain. Grain farming is especially suitable on river bottoms and much of the level uplands. The raising of livestock is more suitable in other upland areas, where corn and a large amount of roughage are available for feeding.

Table 5 lists the number of the various kinds of livestock in stated years.

TABLE 5.—*Number of livestock on farms in stated years*

Livestock	1949	1954	1959
Horses and mules	1, 151	440	392
Cattle and calves	16, 463	23, 933	18, 362
Hogs and pigs	57, 232	56, 879	72, 393
Sheep and lambs	5, 523	5, 738	4, 637
Chickens, 4 months old and older	90, 021	82, 947	56, 553

The acreages of principal crops grown in the county in 1949, 1954, and 1959 are listed in table 6.

TABLE 6.—*Acreage of principal crops*

Crop	1949	1954	1959
	Acres	*Acres*	*Acres*
Corn for all purposes	50, 554	51, 501	59, 276
Soybeans for all purposes	23, 515	28, 113	23, 577
Wheat	20, 662	14, 509	14, 043
Oats	8, 782	7, 142	5, 694
Barley	181	476	703
Rye	718	2, 234	817
All hay	12, 225	16, 702	12, 790
Alfalfa and alfalfa-grass	5, 181	7, 915	5, 443

How This Soil Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Parke County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants. Figure 3 shows the horizons in a representative profile of a Russell silt loam.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this report efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Genesee and Russell, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Genesee silt loam and Genesee loam are two soil types in the Genesee series. The difference in texture of their surface layers is apparent from their names.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Camden silt loam, 2 to 5 percent slopes, is one of several phases of Camden silt loam, a soil type that ranges from nearly level to sloping.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this report was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed, and so small in size that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it. For example, the Cincinnati-Hickory complex consists mainly of Cincinnati silt loam and Hickory silt loam. Also, on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Steep stony and rocky land, and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil survey reports. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups, and test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

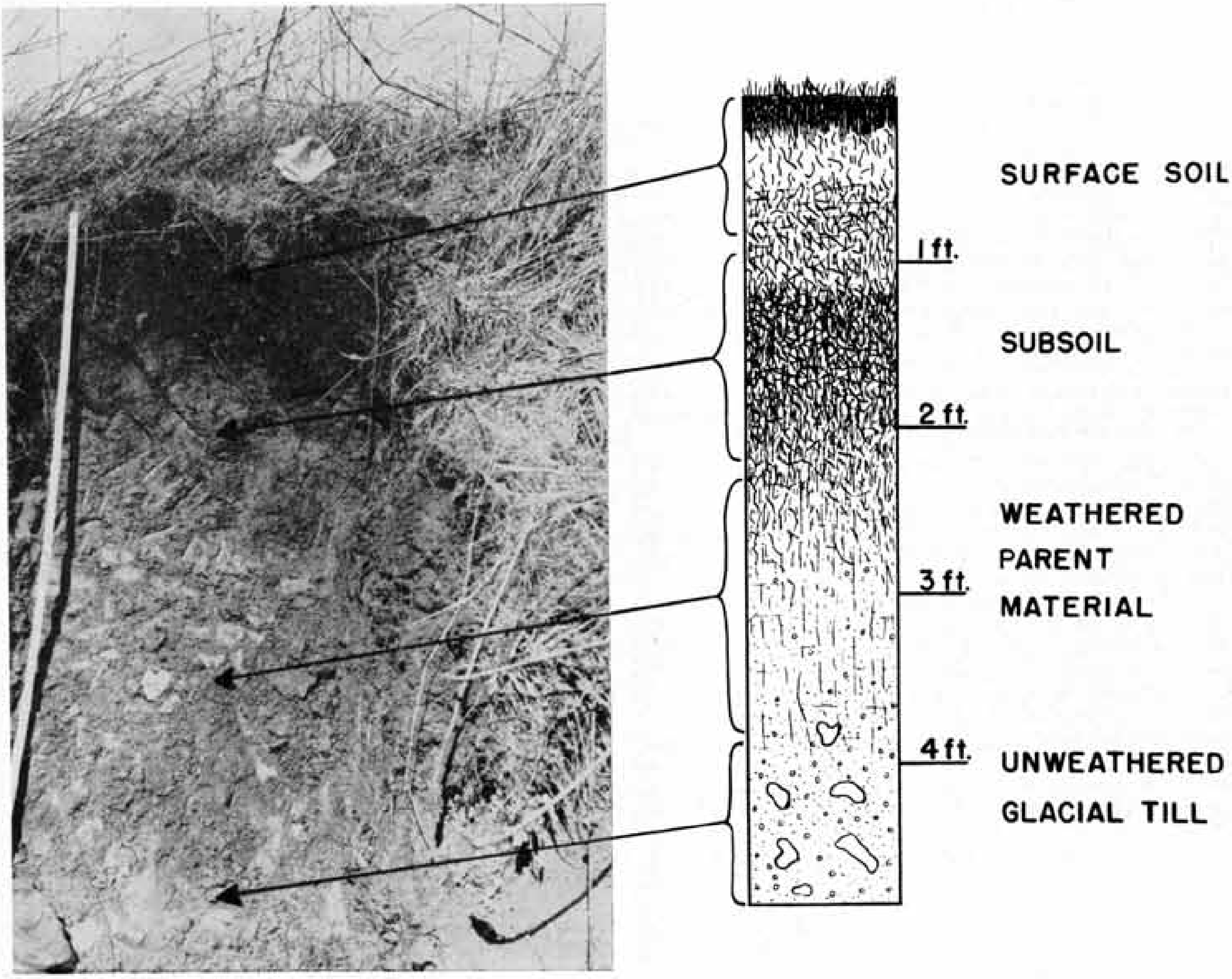

***Figure 3.*—A profile showing the horizons in a Russell silt loam.**

General Soil Map

The general soil map at the back of this report shows, in color, the soil associations in Parke County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

Soil associations 1 and 2 in this county are on bottom lands and terraces, chiefly along the Wabash River and its tributary streams. Soil association 3 occurs mainly in areas of dune sand along the east side of the river valley and its major tributaries. Soil associations 4, 5, 6, and 7 occupy the silt-mantled glacial till plains. They are nearly level and gently sloping or slightly undulating. Soil associations 8, 9, and 10 are gently sloping to steep and occur on low hills and along the sides of drainageways in glacial till.

1. Genesee-Eel-Allison association: Deep, well drained and moderately well drained silty soils on nearly level bottom lands

This soil association occupies about 12 percent of the county. It occurs mainly on nearly level flood plains along the Wabash River and its tributaries, but it includes small areas on terraces, or second bottoms. The flood plains are traversed by long, narrow, winding swales, or meander channels, that are flooded and ponded more frequently than adjoining areas.

Dominant on the flood plains are the brown, well drained Genesee soils, the moderately well drained Eel soils, and

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the very dark brown, well drained Allison soils. All of these soils developed in moderately fine to moderately coarse textured, neutral or slightly calcareous sediments that were deposited during periodic floods.

On the terraces are the Camden, Fox, and Ockley soils. These three kinds of soils are light colored, acid, and well drained. They developed in medium-textured to coarse-textured materials that generally are calcareous below a depth of 3 to 5 feet.

The soils on flood plains are fertile and highly productive. Because they are subject to flooding from late in fall to late in spring, they are suited chiefly to corn and soybeans. The soils on terraces have few limitations that restrict their use, but extended drought damages some crops on the coarser textured soils, and poor tilth is a problem on the finer textured ones.

2. Ockley-Fox-Warsaw-Elston association: Deep or moderately deep, well-drained or somewhat excessively drained loamy and silty soils on stream terraces underlain by sand and gravel

This soil association makes up about 7 percent of the county and occurs chiefly on the nearly level terraces, or second bottoms, along the Wabash River and its tributary streams. These terraces are 10 to 70 feet above the adjacent flood plain and are separated from it by a short, steep escarpment that is highly dissected in many places.

The Ockley, Fox, Warsaw, and Elston soils are the main soils. They are light to dark colored, range from silty to sandy, are dominantly well drained to excessively drained, and are underlain by gravelly or sandy materials. The Fox soils and the light-colored Ockley soils developed on calcareous gravel and sand, but the subsoil of the Ockley soils is thicker, more silty, and higher in available moisture capacity. The Warsaw and Elston soils are dark-colored loams and sandy loams that developed under prairie grasses. The Warsaw soils are underlain by gravel; the Elston, by sand.

The soils in this association have limited available moisture capacity, which is highest in the Ockley soils. All the common crops can be grown, but fall-seeded small grain and drought-resistant grasses and legumes are best suited. Also well suited are corn and other crops of high value grown under irrigation.

3. Chelsea-Princeton-Ayrshire association: Deep, excessively drained to well-drained sandy soils on dunes, and intermingled somewhat poorly drained loamy soils in small depressions

Areas of undulating to nearly level dune sand make up most of this soil association. These areas occupy less than 2 percent of the county and occur on terraces and uplands that border the Wabash River and Big Raccoon Creek. The largest areas are near Howard, but the association extends from that community to Rosedale.

The Chelsea and Princeton soils are dominant, but the Ayrshire soils also are important. In most places the soils of the association are light colored, low in organic-matter content, well drained to excessively drained, and strongly acid. The Chelsea soils are deeper, more sandy, and lower in available moisture capacity than the Princeton soils, which are sandy loams and have a finer textured subsoil than the Chelsea soils.

The Ayrshire soils occupy small areas in depressions that have no natural outlet and are somewhat poorly drained. Also in depressions are small areas of light- and dark-colored soils.

Watermelons, cantaloups, and other special crops are well suited to the droughty Chelsea soils and are extensively grown on them. Most of the common crops are suited to the Princeton soils, but wheat, rye, and alfalfa are best suited because of the limited moisture supply. Wind erosion is a minor problem on high areas of these loose, sandy soils.

4. Reesville-Ragsdale association: Deep, somewhat poorly drained silty soils over calcareous glacial till of Wisconsin age, and intermingled poorly drained soils in depressions

This soil association occupies about 20 percent of the county. It is extensive in undulating and nearly level areas on the Wisconsin till plain, mainly in the northern two-thirds of the county. The till is covered by a mantle of silt 3 to 5 feet thick or more. On the broad divides are a few low knolls, and there are many shallow depressions that are the heads of drainageways.

The soils are chiefly grayish-brown, somewhat poorly drained Reesville silt loam and very dark gray, more poorly drained Ragsdale silty clay loam. On the low knolls and slopes around drainageways are small areas of browner, better drained Alford and Russell soils.

The soils in this association are productive and respond well to good management. Almost all the acreage is used for corn, soybeans, small grain, and mixed meadow crops. Improved drainage is the principal need in cultivated areas, and random tiling has been used to drain the depressions and most of the nearly level areas.

5. Reesville-Ragsdale-Whitson association: Deep, somewhat poorly drained and poorly drained silty soils over glacial till of Illinoian age

This soil association makes up about 10 percent of Parke County and occurs in the central and southern parts. It is similar to association 4, but the soils developed on the silt-covered Illinoian till plain. The divides are nearly level and are broader than those in association 4, though they are almost completely dissected by drainageways.

The Reesville soils in this association are thicker and more acid than the ones on the Wisconsin till plain, and their subsoil is a little finer textured and is less permeable. Carbonates have been leached to an average depth of 4 feet, but the depth is somewhat greater toward the eastern side of the association. The Ragsdale soils are in depressions that are smaller and shallower than those of association 4 and represent a smaller proportion of the total acreage. Generally, they are not so dark colored as the Ragsdale soils in the northern part of the county, but they are a little more acid.

Whitson silt loam occurs in some of the depressions. This soil is lighter colored and more poorly drained than the other major soils, and it has a finer textured, more slowly permeable subsoil than the Reesville soils.

In places there are narrow areas of gently sloping, better drained Alford soils bordering the steep slopes of the valleys.

The soils in this association are used in much the same ways as those in association 4, but they require heavier liming and more intensive drainage.

6. Fincastle-Reesville-Ragsdale association: Deep, somewhat poorly drained silty soils over glacial till of Wisconsin age, and intermingled poorly drained soils in depressions

This soil association occupies less than 5 percent of the county and occurs around Milligan in the northeastern part. The relief, characteristic of the Wisconsin till plain, consists of undulating and nearly level slopes and many shallow depressions.

Dominant in the association are the Fincastle, Reesville, and Ragsdale soils. The somewhat poorly drained Fincastle soils developed in a mantle of silt, about 3 feet thick, over glacial till; they generally are leached of carbonates to a depth of about 4 feet. Intermingled with the Fincastle soils on some of the nearly level divides, where the mantle of silt is a little thicker than 3 feet, are areas of somewhat poorly drained Reesville soils. The dark-colored, poorly drained Ragsdale soils lie in depressions and make up a larger proportion of the total acreage than they do in associations 4 and 5.

Also in this association are the well-drained Russell soils. These soils developed in about 3 feet of silt and, in most places, are leached of carbonates.

The soils in this association are a little more acid than those in associations 4 and 5, but they are suited to about the same crops and need similar drainage.

7. Iva association: Deep, somewhat poorly drained silty soils over glacial till of Illinoian age

This soil association makes up less than 4 percent of Parke County. It occurs mainly in nearly level areas of the Illinoian till plain that are dissected by streams in the southeastern part of the county.

The soils are light colored, deeply leached, strongly acid, and low in organic-matter content. They developed in a deposit of silt about 6 feet thick overlying Illinoian glacial till that is free of carbonates. In many places there is a weakly expressed fragipan that is nearly impermeable to moisture. Iva silt loam, the principal soil, is somewhat poorly drained.

Also in the association are areas of lighter gray, more poorly drained soils in shallow depressions and areas of the better drained Alford and Cincinnati soils around the heads of drainageways.

Of the soils in the county that formed in windblown silt, or loess, the ones in this association are more poorly drained and less fertile than others. However, these soils respond well to good management. They can be successfully farmed if they are drained by tiling systems and are limed and liberally fertilized. The principal crops are corn, soybeans, small grain, and mixed meadow crops.

8. Russell-Alford-Reesville association: Deep, well-drained to somewhat poorly drained silty soils on low hills and moderately steep drainageways of the silt-mantled glacial till plain

This soil association occupies less than 10 percent of the county and occurs in rolling areas around the upper courses of streams on the Wisconsin and Illinoian till plains. Near streamheads the slopes are gentle and, consequently, are only moderately dissected. The association ranges from gently sloping on the ridges and around the heads of drainageways to moderately steep in some places.

The soils in this association developed in calcareous glacial till that is mantled with windblown silt, or loess, on the upper slopes. Russell silt loam, the principal soil, is well drained and developed in silt less than 3 feet thick over loam till that generally is calcareous at a depth of 3½ to 4 feet. Where the mantle of loess is 4 feet or more thick on the upper slopes, there are small areas of the well-drained Alford soils and small, nearly level areas of the somewhat poorly drained Reesville soils.

Also in the association are areas of the well-drained Hennepin soils. These soils occur on the steeper slopes that have been rapidly cut by streams, and they developed entirely in glacial till. In the valley of Big Raccoon Creek above Mansfield, sandstone crops out in places on the lower slopes.

Most of the acreage in this association is suitable for cultivation and can be safely used for small grain, meadow, or pasture. Erosion is a hazard in areas that are row cropped, and the hazard increases with increasing slope. Measures needed to control erosion are contour tillage and other conservation practices and use of crop rotations that keep the soils covered by small grain, meadow, or pasture all or most of the time.

9. Hennepin-Russell association: Deep to shallow, excessively drained to well-drained silty soils on the steep sides of deep drainageways in calcareous glacial till of Wisconsin age

This soil association occupies about 14 percent of the county. It consists of rough, broken areas that lie along the valleys of the Wabash River and its tributaries. The main areas are along Sugar Creek and in the upper and lower valleys of Big Raccoon Creek. In places there are crags and bluffs formed by outcrops of brown Mansfield sandstone and some shale.

The chief soils are the well-drained Hennepin, but the Russell soils also are important. Hennepin soils are shallow and developed in glacial till that is calcareous at a depth of 1 to 2 feet. Russell soils are on moderately steep upper slopes and around the heads of drainageways. They formed in a thin mantle of silt over leached glacial till. Little soil has formed in material weathered from sandstone, which occurs chiefly as outcrops.

The soils in this association are used principally as woodland for their use is determined largely by slope. If the moderately steep upper slopes are cleared and renovated, however, they are suitable for permanent pasture of good quality. Because runoff is rapid, erosion is a hazard unless the soils are protected by a dense cover of plants.

10. Hickory-Cincinnati-Alford association: Deep to shallow, excessively drained to well-drained silty soils on the steep sides of deep drainageways in weathered glacial till of Illinoian age

This soil association accounts for nearly 16 percent of the county and consists of rough, broken areas that lie along the valleys of the Wabash River and its tributaries. In these areas the soils formed in weathered glacial till of Illinoian age. They occur on slopes of 18 to 70 percent and are light colored, strongly acid, and low in fertility.

Dominant in the association are the Hickory soils, which occupy the steeper slopes. These soils developed mainly in glacial till of Illinoian age, though in some places they developed partly in a mantle of silt less than 20 inches thick. On the moderately steep upper slopes and the narrow ridgetops are the well-drained Cincinnati soils. These soils are similar to the Hickory soils in acidity and fertility, but they are deeper and have a fragipan that impedes the movement of moisture and the development of roots. The Alford soils occur in areas where the fragipan is missing and the mantle of silt is thicker than about 40 inches.

Because the soils in this association generally are steep, they are suitable mainly as woodland. Some of the upper slopes that are less strongly sloping have been cleared and are used for pasture. Unless pasture is adequately limed and fertilized, however, its carrying capacity for livestock is low. Rapid runoff causes an erosion hazard if a cover of plants is not maintained.

Use and Management of Soils

In the first part of this section, the grouping of soils according to their capability is described and the capability units are discussed. In the second part, predicted acre yields are given for the principal crops under two levels of management. Next are discussions on the use of soils as woodland and for wildlife. Finally, there is a part that gives information about the use of soils in engineering.

Capability Groups of Soils

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest grouping, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I. Soils have few limitations that restrict their use.

Class II. Soils have some limitations that reduce the choice of plants or require moderate conservation practices.

Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV. Soils have very severe limitations that restrict the choice of plants, require very careful management, or both.

Class V. Soils subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover. (In Parke County there are no soils in class V.)

Class VI. Soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII. Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (In Parke County there are no soils in class VIII.)

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an arabic numeral to the subclass symbol, for example, IIe-3 or IIIe-9. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined earlier. The arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

In the following pages the 37 capability units in Parke County are described and suggestions for the use and management of the soils are given. The capability units are not numbered consecutively, because not all of the units used in Indiana are in this county. Discussed for each unit are the characteristics of the soils in the unit, the suitability of these soils for crops, and management suitable for the soils. Lime and fertilizer should be applied to tilled crops and pasture if soil tests indicate that they are needed. The crop rotations mentioned are the most intensive that can be used to control runoff and erosion, but they are not the only rotations suited to the soils in the unit. Representatives of the Soil Conservation Service will help you select a cropping system that maintains your soils.

Except for those capability units having only a single soil, the names of soils placed in each capability unit are not given in the following pages. The capability unit in which each soil in the county has been classified can readily be found by referring either to the description of that soil in the section "Descriptions of the Soils" or to the "Guide to Mapping Units" at the back of the report.

CAPABILITY UNIT I-1

This unit consists of deep, medium-textured, well-drained soils on nearly level terraces. These soils are moderately permeable and have high available moisture capacity. Their organic-matter content and supply of plant nutrients are moderate. Surface runoff is slow.

These soils are suited to many kinds of crops and, if properly managed, produce favorable yields of corn, soybeans, small grain, hay, and pasture. The soils are generally acid, are low in nitrogen and phosphorus, and are medium in potassium, but they respond well to lime and fertilizer. Only ordinary practices of good farming are needed to maintain fertility, good tilth, and the supply of organic matter.

If crops and their residues are well managed, the soils can be row cropped continuously, or they can be farmed in a suitable rotation. Under an average level of management, a suitable rotation is 2 years of row crops and 1 year of small grain followed by an intercrop. If the level of management is high, 3 years of row crops and 1 year of small grain followed by an intercrop are satisfactory.

The soils in this unit are suitable for irrigation, but irrigating them may not be economical unless crops of high value are grown.

If the soils are used for hay or pasture, a mixture of alfalfa, orchardgrass, and Ladino clover is good. Properly fertilized and carefully managed pasture remains productive and produces forage of high quality. Bluegrass and tall fescue make good sod crops, but they need nitrogen to produce favorable yields.

These soils are good as woodland. The areas now in trees contain walnut, white oak, tulip-poplar, and other desirable hardwoods, and these areas should be protected and managed.

Crop residues and grassy strips provide food, cover, and nesting areas for small mammals and birds.

CAPABILITY UNIT I-2

This unit consists of deep, moderately coarse textured to moderately fine textured soils on nearly level bottom lands. These soils are moderately well drained or well drained, moderately permeable, and high in available moisture capacity. Some areas are flooded, but flooding normally occurs in winter and spring before the crops are planted and generally last for only a short time. Streambank erosion is a problem in some areas.

The soils of this unit are productive and generally are suited to intensive use. Most areas are especially well suited to corn and soybeans. Narrow areas along small streams, however, are most suitable as pasture or woodland. Winter cover crops are needed if tilled crops are intensively grown, especially on Allison silty clay loam and Armiesburg silty clay loam. Improved tilth is needed on all the soils. Because the soils are flooded at times in winter and early in spring, growing winter grain crops is hazardous, and the planting of corn and soybeans ordinarily is delayed until June 1. Crops on the low-lying Eel soils are especially susceptible to flooding. Tile lines set at random are used to drain low spots that are wet, and dikes along the Wabash River help to protect the soils from flooding.

These soils can be row cropped continuously if intercrops are used, or they can be farmed in a suitable rotation consisting of 3 or 4 years of row crops and 1 year of a legume-grass mixture.

The soils in this unit are well suited to grasses and legumes grown for pasture. If pasture is properly fertilized and is carefully managed, it remains productive and produces forage of high quality.

Woodland is productive in these soils. Species to favor in natural stands are walnut, white oak, and tulip-poplar. Other trees in wooded areas are cottonwood, birch, sycamore, and silver maple.

Crop stubble and grassy strips provide nesting areas for birds and food and cover for birds and small mammals.

CAPABILITY UNIT IIe-1

Only Parke silt loam, 2 to 5 percent slopes, is in this unit. It is deep, moderately dark colored, and well drained. Permeability is moderate, available moisture capacity is high, and natural fertility and the organic-matter content are medium. Surface runoff is slow or medium, and erosion is the major limitation.

This soil is suited to corn, soybeans, sorghum, and small grain, and to orchardgrass, tall fescue, timothy, alfalfa, Ladino clover, red clover, and lespedeza for hay and pasture. Lime and fertilizer are needed to maintain favorable yields.

Good tilth can be maintained and erosion can be controlled by using minimum tillage, returning crop residues, and planting winter cover crops. Management that controls insect pests and weeds helps to maintain production.

This soil is subject to splash and rill erosion and, if cultivated up and down slope, is likely to erode. In cultivated areas a suitable combination of crop rotations and mechanical practices is needed to reduce runoff and control erosion. Tillage on the contour and terraces and diversions are needed in fields intensively cropped. Drainageways should be sodded to help control runoff.

If the management of this soil is average, and contouring and terracing are not used, a suitable rotation is 2 years of row crops, 1 year of a small grain, and 3 years of meadow. If contour tillage is used, a suitable rotation is 2 years of row crops, 1 year of a small grain, and 2 years of meadow. If the soil is terraced, a suitable rotation is 2 years of row crops, 1 year of a small grain, and 1 year of meadow.

If the level of management is high, and contouring and terracing are not used, a suitable rotation is 2 years of row crops, 1 year of a small grain, and 2 years of meadow. If contour tillage is used, a rotation consisting of 3 years of row crops, 1 year of a small grain, and 1 year of meadow is suitable. If terraces are used, a suitable rotation is 3 years of row crops and 1 year of a small grain followed by an intercrop.

In areas used for pasture or hay, a legume-grass mixture is well suited. Roots of alfalfa and bromegrass or orchardgrass improve tilth and penetrate the friable subsoil. Even in dry periods, these deep-rooted plants maintain a good stand if lime and fertilizer are added in adequate amounts.

If this soil is well managed, it produces timber of high quality. Most of the acreage has been cleared, however, and only small areas that adjoin steeper soils remain wooded. Stands in wooded areas consist mainly of tulip-poplar, red and white oaks, black walnut, and ash.

Crop residues, grassy strips, and brushy borders provide food and cover for small mammals and birds.

CAPABILITY UNIT IIe-3

This unit consists of deep, gently sloping, moderately dark colored soils on uplands and terraces. These soils are deep, medium textured, and well drained. They are moderately permeable, high in available moisture capacity, medium acid or strongly acid, and medium in natural fertility and organic-matter content.

The soils in this unit are suited to corn, soybeans, sorghum, and small grain. They also are suited to orchardgrass, bromegrass, tall fescue, timothy, alfalfa, red clover, and Ladino clover for pasture and hay.

If the soils are row cropped continuously or are cultivited up and down the slope, they are moderately susceptible to erosion. Runoff can be reduced and soil losses controlled by cultivating on the contour and by using terraces and diversion ditches. Grassed waterways are needed as outlets for terraces and diversions.

Also needed in cultivated areas is a suitable crop rotation combined with other practices that help maintain good tilth and control soil losses. Among these practices are using minimum tillage, returning crop residues, and planting winter cover crops. Controlling weeds and insect pests helps to maintain production.

If average management is practiced on these soils, and contouring and terracing are not used, a suitable rotation is row crops for 1 year, small grain for 1 year, and meadow for 2 years. If the soils are cultivated on the contour, row crops can be grown for 2 years, small grain for 1 year, and meadow for 2 years. If terraces are provided, 2 years of row crops, 1 year of small grain, and 1 year of meadow is a suitable rotation.

If the level of management is high, and contour cultivation and terraces are not provided, a suitable rotation consists of 1 year of a row crop, 1 year of small grain, and 1 year of meadow. Where the soils are cultivated on the contour, row crops can be used for 2 years, small grain for 1 year, and meadow for 1 year. Suitable if the soils are terraced is a rotation consisting of 3 years of row crops and 1 year of small grain followed by an intercrop.

In areas used for pasture, a legume-grass mixture is well suited to these soils. Alfalfa seeded with either bromegrass or orchardgrass produces well if lime and fertilizer are added to maintain a good stand.

If the soils are well managed, they produce good hardwood timber. Favored in existing stands are yellow-poplar, red and white oaks, black walnut, ash, and other hardwoods.

Crop residues, grassy strips, and brushy borders provide food and cover for small mammals and birds. Grassy strips provide nesting areas for birds.

CAPABILITY UNIT IIe-8

This unit consists of gently sloping, moderately deep and deep, dark-colored soils on terraces underlain by sand and gravel. These soils are medium textured and well drained. Their available moisture capacity is moderate in the surface layer and subsoil but is low in the gravel and sand. Permeability is moderate except in the underlying layers, which are rapidly permeable. The soils are medium in natural fertility, high in organic-matter content, and slightly acid or medium acid. Surface runoff is slow to medium. Erosion is the major limitation, but droughtiness also is a problem during long dry periods.

The soils in this unit are best suited to soybeans and fall-seeded small grain and to alfalfa-grass mixtures for hay or pasture. These crops use the available moisture more effectively than do corn, oats, and other crops that are seeded in spring but the latter produce medium yields if they are well managed.

If clean-tilled crops are grown, conservation practices are needed that conserve moisture and control runoff and erosion. Among the effective practices are contour cultivation, diversion terraces, grassed waterways, minimum tillage, and the use of crop residues and winter cover crops. Controlling insect pests and weeds helps to maintain production.

If management of these soils is average, and contouring is not used, a suitable rotation consists of 2 years of row crops, 1 year of a small grain, and 3 years of meadow. If contouring is used, a good rotation is row crops for 3 years, a small grain for 1 year, and meadow for 1 year.

If the level of management is high but contouring is not used, a suitable rotation is 3 years of row crops, 1 year of a small grain, and 2 years of meadow. If contouring is a part of management, 3 years of row crops and 1 year of a small grain followed by an intercrop is suitable.

Alfalfa mixed with bromegrass or orchardgrass is highly suitable for pasture or hay. These plants are deep rooted and obtain adequate moisture even in dry periods. Mowing and clipping help to control weeds and to maintain a good stand.

The native vegetation on these soils was prairie grasses, and woodland is of little importance.

Crop residues and grassy strips provide food and cover for birds and small mammals, and they furnish nesting areas for birds.

CAPABILITY UNIT IIe-9

This unit consists of gently sloping, moderately deep and deep, moderately dark colored soils on terraces. These soils are medium textured but are underlain by gravel and sand and are somewhat excessively drained. The surface layer and the subsoil are moderate in permeability and available moisture capacity, but the underlying gravel and sand are rapidly permeable and have low available moisture capacity. The soils are medium in fertility and in organic-matter content and are medium acid or strongly acid. Although erosion is the major limitation, droughtiness is a problem if dry periods are long.

These soils are suited to corn, soybeans, small grain, and plants used for hay and pasture. Soybeans and fall-seeded small grain make better use of the available moisture than corn, oats, and other spring-seeded crops. Corn yields vary with the moisture content in the soils, but yields of corn and small grain are medium under good management.

If clean-tilled crops are grown, practices are needed that conserve moisture, reduce runoff, and control erosion. Among the effective practices are contour cultivation, diversion terraces, and grassed waterways. Using minimum tillage, returning crop residues to the soil, and growing winter cover crops will help to reduce erosion. Management that controls crop diseases, insect pests, and weeds helps to maintain production.

If the level of management is average, and contouring is not used, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 2 years of meadow. By cultivating on the contour, row crops can be grown for 2 years, a small grain for 1 year, and meadow for 2 years.

If the soils are managed at a high level, and contouring is not used, a suitable rotation consists of 2 years of row crops, 1 year of a small grain, and 2 years of meadow. If contour tillage is used, 3 years of row crops, 1 year of a small grain, and 1 year of meadow is satisfactory.

For hay or pasture, a suitable mixture consists of alfalfa and either bromegrass or orchardgrass. Because these plants are deep rooted, they can use the moisture available in dry periods. Kentucky bluegrass makes good pasture, but it is dormant in July and August. Sudangrass can be used for supplemental pasture. Mowing or clipping helps to control weeds and to maintain the stand.

If these soils are well managed, they produce good stands of hardwood timber. Among the trees favored in natural stands are red and white oaks, tulip-poplar, black walnut, and white ash.

Crop residues, grassy strips, and brushy borders provide food, cover, and nesting areas for birds and small mammals.

CAPABILITY UNIT IIe-11

Princeton fine sandy loam, 2 to 5 percent slopes—the only soil in this unit—is a deep, moderately dark colored, well-drained soil on gently sloping uplands. The available moisture capacity generally is moderate, but crops may be damaged by drought in extended dry periods. Permeability is moderate, and surface runoff is slow to medium. This soil is low in fertility, medium in organic-matter content, and strongly acid. The major limitation is wind erosion, for blowing occurs in areas that are poorly covered with plants.

This soil is well suited to corn, soybeans, sorghum, small grain, and alfalfa and to truck crops, apples, and peaches. When the moisture supply is limited, the best suited crops are wheat, rye, and alfalfa. The first two crops mature early, and alfalfa has a deep tap root. Yields of corn and soybeans are likely to be reduced in dry periods.

This soil is low in available nitrogen and phosphorus and is medium in available potassium. Lime and fertilizer are needed to maintain yields and should be added in amounts determined by soil tests.

If this soil is row cropped continuously, it is subject to erosion by wind and water. Grass should be used to protect the drainageways that carry off surplus water. In fields where specialty crops are grown, grain windbreaks help to prevent wind erosion. In addition, erosion can be controlled and moisture conserved by farming on the contour, building diversion ditches or terraces, using minimum tillage, returning crop residues, and planting cover crops.

This soil is suitable for irrigation, which may be practical for specialty crops and orchard fruits of high value.

If the management of this soil is average, and contouring is not used, a suitable crop rotation is 2 years of row crops, 1 year of a small grain, and 2 years of meadow. By using contour cultivation, row crops can be grown for 2 years, small grain for 1 year, and meadow for 1 year. If the level of management is high, and contouring is not used, 2 years of row crops, 1 year of a small grain, and 1 year of meadow is suitable. In fields that are farmed on the contour, a suitable rotation consists of 2 years of row crops and 1 year of a small grain that is followed by an intercrop.

Well suited to this soil for hay or pasture is a legume-grass mixture consisting of alfalfa and bromegrass or alfalfa and orchardgrass. Applying adequate amounts of lime and fertilizer helps to maintain good yields.

This soil produces good hardwood timber, but clearing it for crops may be advisable where the stands are thin and of poor quality. In areas kept wooded, favored trees are white oak, red oak, black walnut, and tulip-poplar.

Crop residues, grassy strips, and brushy borders provide food and cover for small mammals and nesting areas for birds. Grain windbreaks provide cover and travel lanes for small animals.

CAPABILITY UNIT IIw-1

This unit consists of nearly level and depressional, dark-colored soils on terraces. These soils are deep, medium textured or moderately fine textured, and very poorly drained. They have high available moisture capacity and moderately slow or slow permeability. These soils are medium to high in natural fertility and in organic matter, and they are medium acid to neutral. Surface runoff is ponded to slow. Wetness is the major limitation; the soils warm up slowly in spring. Furthermore, working the soils when they are too wet puddles them and forms clods.

If drainage is adequate, these soils are suited to most of the cultivated crops grown in the area. Corn and soybeans produce satisfactory yields under good management, but alfalfa and similar crops are damaged by frost heaving in winter.

Surface drainage and tile lines are used to drain these soils. Runoff from the adjoining sloping soils frequently causes ponding, but it can be diverted by constructing diversion terraces, ditches, waterways, or dikes. Using minimum tillage and returning crop residues help to maintain good tilth and the organic-matter content. Yields of crops can be maintained by controlling weeds and insect pests and by adding lime and fertilizer.

If the management of these soils is average, a suitable rotation is 2 years of row crops and 1 year of a small grain followed by an intercrop. If the level of management is high, the soils can be row cropped continuously, or they can be farmed in a suitable rotation consisting of 3 years of row crops and 1 year of a small grain followed by an intercrop.

Although the soils of this unit are well suited to row crops, they can be used for alfalfa alone or in mixture with grass. Needed to maintain the stand for more than 2 years are the control of ponding and the liberal use of fertilizer, especially potassium.

Because these soils are ponded and have a high water table, they are not well suited to trees. The kinds of native trees growing on them are less desirable than those growing on better drained soils. Among the trees to favor in wooded areas are pin oak, sweetgum, and white ash.

For wildlife, crop residues can be left as food and cover. Grassy strips and borders are needed to provide nesting areas.

CAPABILITY UNIT IIw-2

In this unit are nearly level and gently sloping, light-colored soils on uplands and terraces. These soils are deep, medium textured, and somewhat poorly drained. They are slowly permeable, have high available moisture capacity, and are low in fertility, medium in organic-matter content, and slightly acid to strongly acid. Wetness is the major limitation, but erosion is a hazard on the gentle slopes. The soils warm up slowly in spring.

If the soils of this unit are adequately drained, they are suited to most of the cultivated crops grown in the county. Corn and soybeans produce favorable yields under good management, but added nitrogen is needed if corn is grown intensively. Drained areas are suited to alfalfa and grass for hay or pasture.

Working these soils when they are wet puddles the surface layer and forms clods. In addition, farming gently sloping areas on the contour may increase wetness unless drainage is improved. Tile lines, laid either at random or in a parallel system, effectively remove excess water from the root zone. Improving surface drainage removes water from small ponded areas. In some places diversion terraces can be used to divert runoff from higher slopes.

By using minimum tillage and returning crop residues, the soils are kept in good tilth and the organic-matter content is maintained. Growing deep-rooted legumes helps to improve drainage and tilth in drained areas. Satisfactory yields can be maintained by controlling insect pests and weeds and by adding lime and fertilizer.

If management is at an average level, a suitable rotation is 2 years of row crops, 1 year of a small grain, and 1 year of meadow. Also suitable is 2 years of row crops and 1 year of a small grain followed by an intercrop. Row crops can be grown continuously if management is kept at a high level.

Among the grasses and legumes suitable for meadow in undrained areas are Ladino clover, red clover, alsike clover, bromegrass, orchardgrass, timothy, and birdsfoot trefoil. In drained areas alfalfa mixed with orchardgrass or timothy produces satisfactory yields.

These soils generally have been cleared, and only small areas remain wooded. Beech, elm, pin oak, and sweetgum are the principal trees in wooded areas. Species favored for timber are pin oak, sweetgum, white ash, and tulip-poplar.

Crop residues should be left as food and cover for wildlife. Grassy strips provide nesting areas.

CAPABILITY UNIT IIw-7

Only Shoals silt loam is in this unit. It is a deep, nearly level or slightly depressional soil on somewhat poorly drained bottom land. This soil is medium textured in the upper part but is slightly sandy in the lower layers. It is medium in fertility and neutral in reaction. Surface runoff is slow. Wetness—the major limitation—is caused by occasional flooding and a high water table.

This soil is suitable for cropping only in areas where flooding and the high water table are controlled. Narrow areas along streams and on bottoms dissected by streams are most suitable for permanent pasture. In areas that have been drained, corn and soybeans produce average yields, but growing of small grain is limited by seasonal flooding. The soil is well suited to tall fescue and Ladino clover for hay and to reed canarygrass, fescue, or orchardgrass mixed with Ladino clover or red clover for permanent pasture.

Tiling, along with practices that drain the surface, will remove impounded water and drain the root zone. Scouring can be prevented in overflow channels by establishing a grass cover. In cultivated areas the channels should be alined and straightened, the outlets maintained, and the brush removed.

Small areas of this soil are covered with stands of birch, silver maple, cottonwood, ash, pin oak, sweetgum, and other hardwoods. In managing these stands the species to favor are pin oak, sweetgum, tulip-poplar, and black walnut.

Food and cover can be provided for wildlife by leaving crop residues, planting grassy strips, and allowing the edges of fields to revert to brush. Grassy strips provide nesting areas for birds.

CAPABILITY UNIT IIw-10

Linwood muck—the only soil in this unit—occupies very poorly drained depressions. This soil is made up of black organic matter that is 12 to 42 inches thick and is underlain by mineral material consisting of loam to light clay loam. Wetness is the major limitation, though wind erosion also is a problem when the surface is dry.

All of this soil has been drained and is used intensively for corn and soybeans. The soil also is suited to potatoes and some vegetable crops. After a few years of heavy cropping, liberal additions of potash and phosphate are needed. Small grain is well suited if it is grown for cover or green manure. And if pasture is desired, a good stand of bluegrass can be obtained.

Under intensive cultivation, this soil is compacted by tillage and shrinks. Controlled drainage is desirable for keeping the muck moist, reducing shrinkage, and preventing excessive dryness. During periods of heavy rainfall, however, open ditches are not suitable for draining this soil if their outlet has a low gradient.

CAPABILITY UNIT IIw-11

The only soil in this unit—Ayrshire fine sandy loam—is a nearly level or slightly depressional, moderately dark colored soil on terraces. It is deep, somewhat poorly drained, moderately permeable, and moderate in available moisture capacity. The soil is low in fertility, has a medium content of organic matter, and is slightly acid to strongly acid. Wetness is the major limitation.

This soil is inextensive and generally occurs within areas of other soils. Consequently, it is used and managed in about the same way as those soils. A few areas are larger and are used for corn and wheat. Improved drainage is needed for cultivated crops, but locating outlets for tile is difficult in some of the shallow depressions. Because of wetness, yields of melons, specialty crops, and orchard fruits generally are not satisfactory. If yields are to be maintained, lime and fertilizer should be added.

If the management of this soil is average, a suitable crop rotation is 2 years of row crops, 1 year of a small grain, and 1 year of meadow. If the level of management is high, row crops can be grown each year.

Among the legumes and grasses suitable for hay or pasture are Ladino clover, red clover, alsike clover, bromegrass, orchardgrass, and timothy.

The native vegetation on this soil consisted of silver maple, beech, oaks, and other hardwoods, but all areas have been cleared and are cultivated.

Crop residues left in the fields provide cover for small mammals and birds.

CAPABILITY UNIT IIs-1

This unit consists of nearly level, moderately deep or deep, moderately dark colored soils on stream terraces. These soils are medium textured but are underlain by gravel and sand and are somewhat excessively drained. The available moisture capacity is low to moderate in the surface layer and subsoil but is low in the layers of gravel and sand. Permeability is moderate except in the underlying layers, which are rapidly permeable. The soils are low to medium in fertility, are medium in organic-matter content, and are medium acid or strongly acid. Surface runoff is slow. Droughtiness is the major limitation.

The soils in this unit are best suited to fall-seeded wheat, rye, and other small grains—crops that mature before the dry months in summer—and to bromegrass and deep-rooted legumes, such as alfalfa. They are suited to corn, soybeans, and oats, but yields of these crops vary widely with the amount and distribution of rainfall during the growing season.

If lime and fertilizer are applied in adequate amounts, the available moisture is used most efficiently and the most favorable yields are produced. Because the moisture supply is variable, however, the need for fertilizer should be determined year by year.

Moisture can be conserved and the organic-matter content maintained by using minimum tillage, returning crop residues to the soil, and turning under cover crops and green-manure crops. Management that controls weeds and insect pests also helps to maintain productivity. Favorable yields can be obtained by using irrigation if the soils are kept fertile.

If the level of management is average, a suitable rotation is 2 years of row crops, 1 year of small grain, and 1 year of meadow. If the level of management is high, 2 years of row crops and 1 year of small grain followed by an intercrop is suitable.

For hay or pasture, alfalfa mixed with bromegrass or orchardgrass yields best because these plants are deep rooted and thus can obtain moisture in dry periods. Kentucky bluegrass usually provides excellent pasture but is dormant in July and August. Sudangrass is a good plant for supplemental pasture. Mowing or clipping helps to control weeds and to maintain a good stand.

Properly managed, the soils in this unit produce good stands of hardwood timber. Among the species to favor in existing stands are white and red oaks, black walnut, tulip-poplar, and white ash.

Crop residues, grassy strips, and brushy edges provide food, cover, and nesting areas for small mammals and birds.

CAPABILITY UNIT IIs-2

This unit consists of nearly level, medium-textured, dark-colored soils on outwash plains and terraces. These soils are moderately deep or deep and are somewhat excessively drained. The available moisture capacity is low to moderate in the upper part of the profile and is low in the underlying material. Permeability is moderate except in the underlying material, which is rapidly permeable. These soils are medium in fertility, high in organic-matter content, and slightly acid or medium acid. Surface runoff is slow. Droughtiness is the major limitation.

The Warsaw soils in this unit are underlain by sand and gravel. The Elston soil is underlain by stratified sands and a little gravel; in some places it is gently undulating or dunelike because wind has shifted the surface material.

Among the crops suited to the soils of this unit are soybeans, fall-seeded small grain, and mixtures of grasses and legumes. These crops can use the available moisture more effectively than corn, oats, and others seeded in spring. If management is good, yields of corn and soybeans are medium. Sweet corn, strawberries, and other crops of high value also are suited to these soils and can be irrigated. An adequate supply of water for irrigation is near the surface in the Elston soil.

Adequate amounts of lime and fertilizer are needed for maintaining satisfactory yields. Because the moisture supply is variable, however, the fertilizer should be applied each year rather than in large amounts at longer intervals. Organic matter can be maintained and moisture conserved by using minimum tillage, returning crop residues, and turning under cover crops as green manure. Management that controls insect pests and weeds helps to maintain production.

These soils can be row cropped continuously, or they can be farmed in a suitable rotation. Yields vary with the amount of moisture available. If average management is provided, a suitable rotation is 2 years of row crops, 1 year of a small grain, and 1 year of meadow. Suitable at a high level of management is a rotation consisting of 2 years of row crops and 1 year of a small grain followed by an intercrop.

A deep-rooted legume such as alfalfa is well suited to hay or pasture. If alfalfa is mixed with bromegrass or orchardgrass, good use is made of the moisture available. Mowing and clipping help to control weeds.

These soils produce good hardwood timber if they are well managed. Favored trees in areas that remain wooded are white and red oaks, tulip-poplar, black walnut, and white ash.

Crop residues, grassy strips, and brushy borders provide food and cover for small mammals and nesting areas for birds.

CAPABILITY UNIT IIs-5

Princeton fine sandy loam, 0 to 2 percent slopes—the only soil in this unit—is a deep, moderately dark colored soil on well-drained terraces. It has moderate available moisture capacity, but it may be droughty in extended dry periods. The soil is low in fertility, has a medium content of organic matter, and is strongly acid. Permeability is moderate. Surface runoff is slow. Droughtiness is the major limitation, and slight erosion by wind is likely in areas where the plant cover is sparse.

This soil is suited to corn, soybeans, sorghum, small grain, and alfalfa, and it is well suited to truck crops and orchards of fruits. Yields of corn and soybeans vary with the amount of moisture available. Spring-planted small grain produces medium yields. Wheat, rye, and alfalfa are the crops best suited when moisture is limited.

This soil is low in available nitrogen and phosphorus and is medium in available potassium. Needed to maintain yields are adequate additions of lime and fertilizer.

Using minimum tillage, returning crop residues, and turning under cover crops and green-manure crops help to protect soil structure and to conserve moisture. Controlling insect pests and weeds helps to maintain production.

This soil is suitable for irrigation, and it may be practical to irrigate special crops and orchards.

A suitable rotation under an average level of management is 2 years of row crops, 1 year of a small grain, and 1 year of meadow. If management is at a high level, a satisfactory rotation is 2 years of row crops and 1 year of a small grain followed by an intercrop.

Row crops can be safely grown continuously on this soil, but yields vary with the moisture available. For hay or pasture, favorable yields are obtained from a mixture of alfalfa and bromegrass or orchardgrass.

Although this soil has been cleared in most areas, it produces good stands of white and red oaks, tulip-poplar, and black walnut. Crop residues and grassy strips provide food and cover for wildlife.

CAPABILITY UNIT IIIe-1

Only Parke silt loam, 5 to 8 percent slopes, moderately eroded, is in this unit. It is a moderately dark colored soil that is deep and well drained. It is moderate in permeability and available moisture capacity, is moderately fertile, and has a low organic-matter content. Surface runoff is medium; erosion is the major limitation.

This soil is suited to corn, soybeans, and small grain. It also is suited to orchardgrass, tall fescue, timothy, alfalfa, Ladino and red clovers, and lespedeza for hay and pasture. To maintain yields, lime and fertilizer are required in adequate amounts.

Minimum tillage, use of crop residues, and planting of crops for winter cover are effective in maintaining good tilth and controlling erosion. The control of weeds and insect pests helps to maintain production.

This soil is subject to splash and rill erosion and, if plowed up and down slope, is moderately or severely washed by runoff. In cultivated areas a suitable combination of crop rotations and practices is needed to check further soil losses. Farming on the contour, constructing diversion terraces, and grassing the waterways are among the practices needed.

If the level of management is average, and contouring is not used, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 3 years of meadow. If contouring is used, 1 year of a row crop, 1 year of a small grain, and 1 year of meadow are suitable. If management is at a high level, but contouring is not used, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 1 year of meadow. If contouring is used, 2 years of row crops, 1 year of a small grain, and 2 years of meadow are suitable.

The soil in this unit is well suited to legume-grass mixtures used for pasture or hay. Alfalfa mixed with either bromegrass or orchardgrass improves soil structure and sends down roots that penetrate the friable subsoil. Adding lime and fertilizer in adequate amounts will maintain a good stand.

Under good management, this soil produces timber of high quality, though most of the acreage has been cleared for crops and pasture. Among the trees to favor in natural stands are tulip-poplar, red and white oaks, black walnut, and ash. Woodland can be improved by protecting it from fire and grazing.

Food and cover are provided for wildlife if crop residues are left standing, if grassy strips are planted, and if brush is allowed to grow along the edges of fields. Sodded waterways and grassy strips furnish travel lanes and nesting areas.

CAPABILITY UNIT IIIe-3

This unit is made up of deep, well-drained, gently sloping and sloping soils on uplands and terraces. These soils generally are medium textured and moderately dark colored. In most places they are moderately or severely eroded. Fertility and the organic-matter content are low to medium, permeability and the available moisture capacity are moderate. The soils are medium acid or strongly acid. Surface runoff is medium; erosion is the major limitation.

The soils of this unit are suited to corn, soybeans, and small grain. In addition, they are suited to orchardgrass, bromegrass, tall fescue, timothy, alfalfa, red clover, and Ladino clover for hay or pasture. Small grains and meadow crops are managed less intensively than row crops, which can be safely grown only 1 year in 2 or 3.

These soils are susceptible to further erosion. Contour cultivation and diversion ditches or terraces are needed to reduce runoff and help control soil losses. Terraces are more suitable than diversions on the shorter slopes, and they are needed on some of the longer slopes. Excess runoff is carried away safely in grassed waterways, an important part of the system for disposing of water on sloping soils.

Good tilth can be maintained by using minimum tillage, returning crop residues, and planting crops for winter cover.

Practices that control insect pests and weeds help to maintain yields.

If management is at an average level, and contour cultivation is not used, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 2 years of meadow. If contouring is used, 2 years of row crops, 1 year of a small grain, and 3 years of meadow is suitable. If the level of management is high, but contouring is not used, a suitable rotation is 2 years of row crops, 1 year of a small grain, and 3 years of meadow. If contour cultivation is used, 2 years of row crops, 1 year of a small grain, and 1 year of meadow is suitable.

For hay or pasture, alfalfa in mixture with bromegrass or orchardgrass produces well. A good stand can be maintained by using adequate amounts of lime and fertilizer. Also important are mowing, clipping, and controlled grazing.

Under good management, the soils in this unit produce favorable yields of hardwoods. Among the preferred trees are tulip-poplar, red and white oaks, black walnut, and ash. Protecting woodland from fire and grazing improves the stand.

Crop residues, grassy strips, and brushy borders furnish food and cover for small mammals and birds. Meadows and grassed waterways provide travel lanes and nesting areas.

CAPABILITY UNIT IIIe-9

Only Fox loam, 5 to 8 percent slopes, moderately eroded, is in this unit. It is a moderately deep, moderately dark colored soil on terraces. It is underlain by stratified sand and gravel and is somewhat excessively drained. The available moisture capacity is moderate to low in the surface layer and subsoil and is low in the underlying gravel and sand. Permeability is moderate above the underlying material but is rapid in it. The soil is low in fertility and organic-matter content and is medium acid or strongly acid. Surface runoff is medium. Erosion is the major limitation, though droughtiness is a problem during the growing season.

This soil is suited to corn, soybeans, and small grain and to plants grown for hay or pasture. Soybeans, fall-seeded small grain, and mixtures of grasses and legumes make better use of the available moisture than corn, oats, and other crops seeded in spring. Although corn yields vary with the amount of moisture available, medium yields of corn and of small grain can be obtained by using good management.

Adequate additions of lime and fertilizer are needed to maintain yields. Because the soil is droughty at times but is readily leached during rainy periods, fertilizer should be applied on a year-to-year basis.

In fields used for clean-tilled crops, contour cultivating, diversion terraces, and grassed waterways are effective in reducing runoff, conserving moisture, and controlling soil losses. Turning under crop residues, using minimum tillage, and growing cover crops help to save moisture and thereby help to check erosion. Weeds and damaging insects should be controlled.

If the management of this soil is average, and contouring is not used, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 3 years of meadow. If contouring is used, a rotation consisting of 1 year of a row crop, 1 year of a small grain, and 1 year of meadow is suitable. If the soil is managed at a high level but is not contour farmed, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 1 year of meadow. If contouring is used at this high level of management, 2 years of row crops, 1 year of a small grain, and 2 years of meadow is suitable.

A mixture of alfalfa and bromegrass or orchardgrass does well on this soil because the plants are deep rooted and tolerant of drought. Kentucky bluegrass usually furnishes excellent pasture but is dormant in July and August. Sudangrass is a good plant for supplemental pasture. Mowing or clipping controls weeds and helps to maintain the stand.

This soil, if well managed, produces good hardwood timber. Trees favored in natural stands are red and white oaks, tulip-poplar, black walnut, and white ash. Wooded areas should be protected from fire and from grazing animals.

Crop residues and brushy edges provide food and cover for wildlife. Grassed waterways and meadows provide travel lanes and nesting areas.

CAPABILITY UNIT IIIe-12

The only soil in this unit is Chelsea loamy fine sand, 5 to 8 percent slopes. This soil occupies uplands and is deep, moderately dark colored, and excessively drained. It has slow to medium surface runoff, is rapidly permeable, and has low available moisture capacity. Fertility is low, and the organic-matter content is low to medium. The soil is neutral to acid. Erosion and droughtiness are the major limitations. A few blowouts, or wind-eroded areas, occur on the windward side of slopes that lack a good cover.

Special crops, small grain, and plants used for hay or pasture are best suited to this soil. Rye, wheat, and alfalfa are among the most common crops, but corn, soybeans, and spring-seeded small grain also are grown. Yields depend on the amount and distribution of rainfall during the growing season. Because the soil has rapid internal drainage and retains little moisture for crops, especially shallow-rooted ones, there is damage to corn, soybeans, and oats in short periods of drought. Watermelons, cantaloups, and early tomatoes produce favorable yields. If these special crops are grown, grain windbreaks help to prevent the soil from blowing.

Because this soil is porous and is rapidly leached of plant nutrients, fertilizer should be applied annually instead of every 2 years.

Cover cropping in winter and the use of crop residues are effective in conserving moisture and controlling erosion.

Controlling weeds and insect pests helps to maintain production.

A suitable rotation under average management is 3 years of row crops, 1 year of a small grain, and 2 years of meadow. Under a high level of management, 4 years of row crops, 1 year of a small grain, and 1 year of meadow are suitable. Row crops can be grown every year in areas where irrigation is practical, but continuous row cropping requires good management, including the liberal use of fertilizer.

Alfalfa seeded alone or in mixture with bromegrass or orchardgrass produces well. Birdsfoot trefoil and timothy are suitable for pasture if the trefoil is seeded early in spring (February) and is liberally fertilized.

The soil in this unit produces timber of low quality. The trees have little resistance to insects and disease and are seriously damaged by them. In hardwood stands the species to favor are white oak, black oak, and black cherry. In areas where production is low and damage from insects is heavy, the owner should consider converting to pines. White, red, and shortleaf pines are suitable for planting. Scotch pine makes good Christmas trees.

CAPABILITY UNIT IIIe-13

This unit consists of gently sloping and sloping, dark and moderately dark, moderately coarse textured soils that occupy small areas on terraces in the Wabash River valley. These soils are moderately deep or deep and are somewhat excessively drained. They have low available moisture capacity and moderately rapid or rapid permeability. They are low in fertility, medium to low in organic-matter content, and medium acid or strongly acid. Surface runoff is slow or medium. The soils are highly susceptible to erosion, the major limitation, but they also are likely to be droughty.

The Elston soil is deep over stratified sand and a small amount of gravel. Fox soils are moderately deep to gravel and sand.

Corn, soybeans, small grain, alfalfa, and grass are grown on the soils of this unit. Soybeans, fall-seeded small grain, and legume-grass mixtures can use the available moisture more effectively than corn, oats, and other crops seeded in spring. Sweet corn and strawberries are among the special crops grown.

To maintain yields, lime and fertilizer are needed in adequate amounts. Because the soils are droughty at times but are readily leached during rainy periods, it is best to add nutrients annually.

Using minimum tillage, returning crop residues, and turning under cover crops and green-manure crops are among the practices that conserve moisture and help control erosion. By establishing a grass cover in drainageways, runoff can be carried away safely.

If management is at an average level, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 1 year of meadow. If the level of management is high, 2 years of row crops, 1 year of a small grain, and 2 years of meadow is suitable.

Alfalfa seeded alone or in a mixture with bromegrass and Ladino clover provides hay and pasture. A mixture of birdsfoot trefoil and timothy does well. Mowing or clipping helps to control weeds and brushy growth.

Although most areas of these soils have been cleared for cultivation, a few are used as woodland. Trees to favor in wooded areas are red oak, white oak, white ash, and tulip-poplar.

Crop residues and grassy strips provide food, cover, and nesting areas for wildlife.

CAPABILITY UNIT IIIe-14

Only Warsaw loam, 5 to 8 percent slopes, moderately eroded, is in this unit. It is a moderately deep, dark-colored, well-drained soil on terraces that is underlain by sand and gravel. The available moisture capacity is moderate in the surface layer and subsoil but is low in the underlying gravel and sand. Permeability is moderate above the underlying material but is rapid in it. This soil is medium in fertility, has a high organic-matter content, and is slightly acid or medium acid. It is susceptible to erosion, the major limitation, but is likely to be droughty during long dry periods.

The soil in this unit is inextensive and is farmed like the adjacent soils. Corn, soybeans, small grain, and meadow crops are most commonly grown, though yields of corn and oats may be reduced during dry periods. In fields used for clean-tilled crops, cultivating on the contour, using diversion ditches, and grassing the waterways are effective in conserving moisture, reducing runoff, and controlling erosion.

Adequate applications of lime and fertilizer are needed to maintain yields on this soil.

Minimum tillage, making use of crop residues, and planting winter cover crops are practices that maintain organic matter and check erosion. Controlling insect pests and weeds helps to keep yields at a satisfactory level.

If management is at an average level, and contouring is not used, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 2 years of meadow. If contouring is used, 2 years of row crops, 1 year of a small grain, and 2 years of meadow are suitable. If management is at a high level, but contouring is not used, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 1 year of meadow. If contouring is used at this high level, 2 years of row crops, 1 year of a small grain, and 1 year of meadow is suitable.

Alfalfa-bromegrass and alfalfa-orchardgrass mixtures are well suited to this soil. Because they are deep rooted, the plants in these mixtures can use the moisture available in dry periods. Mowing or clipping helps to control weeds and to maintain a good stand.

The soil in this unit is of little importance as woodland. The native vegetation was prairie grasses.

Food and cover for small mammals and birds are provided in meadows and by use of crop residues and grassy strips.

CAPABILITY UNIT IIIe-15

The only soil in this unit is Princeton fine sandy loam, 5 to 8 percent slopes, moderately eroded. This soil occurs on uplands and is deep, moderately dark colored, and well drained. Although it has moderate available moisture capacity, it may be droughty during extended dry periods. The soil has medium surface runoff and is moderately permeable, low in fertility, medium to low in organic-matter content, and strongly acid. Erosion is the major limitation. Soil blowing is likely to occur in areas where the plant cover is poor.

This soil is suited to corn, soybeans, sorghum, small grain, and alfalfa. In addition, it is well suited to truck crops and orchard fruits. Wheat, rye, and alfalfa are the best crops at times when the supply of moisture is short. The soil is low in available nitrogen and phosphorus and is medium in available potassium.

By cultivating on the contour and using diversion terraces, runoff and erosion can be reduced on this soil. Other practices needed to check blowing and washing are minimum tillage, returning crop residues, and planting winter cover crops. Grassed waterways carry off excess runoff safely. Where specialty crops are grown, grain windbreaks are effective in checking wind erosion. Practices that control weeds and insect pests help to maintain production.

If the level of management is average, and contouring is not used, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 3 years of meadow. If contouring is used, 2 years of row crops, 1 year of a small grain, and 3 years of meadow are suitable. If management is at a high level, but contour cultivation is not used, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 1 year of meadow. If contour cultivation is used at the high level of management, a rotation consisting of 2 years of row crops, 1 year of a small grain, and 1 year of meadow is suitable.

Where the soil is used for hay or pasture, a grass-legume mixture is well suited. Alfalfa seeded with either bromegrass or orchardgrass produces favorable yields if lime and fertilizer are applied in adequate amounts and are added as topdressing each spring.

This soil can produce good timber, but areas covered with thin stands or poor kinds of trees should be cleared for crops or meadow. Trees to favor in wooded areas are white oak, red oak, black walnut, and tulip-poplar.

Crop residues, grassy strips, and brushy edges provide food and cover for birds and small mammals. Grassy strips furnish nesting areas, and grain windbreaks provide cover and travel lanes.

CAPABILITY UNIT IIIw-2

Zipp silty clay loam—the only soil in this unit—occurs in swales and bayous on bottom lands and low terraces. It is level, deep, moderately dark colored, and very poorly drained. This soil is very hard when dry but is plastic and sticky when wet. It is very slowly or slowly permeable and has high available moisture capacity. Wetness is the major limitation; flooding is likely at infrequent times; and maintaining good tilth is a problem.

Drained areas of this soil are suited to corn, soybeans, small grain, clover, and timothy. Undrained areas remain in marsh grasses or brush. The only effective way to remove excess water is by use of open ditches together with land smoothing and other practices that improve surface drainage.

The content of available potassium generally is low in this soil, and crops grown in drained areas respond to fertilization. Corn responds well to fertilizer applied in or along the rows and to extra amounts of nitrogen.

Soil compaction can be reduced by plowing and planting in a single operation. Fall plowing is satisfactory if there is no danger of scouring by floodwater, but machinery and livestock should be kept out of fields that are wet. Field operations may be delayed in spring because the soil warms up slowly. Using pre-emergent sprays in wet periods controls weeds.

If the soil in this unit is managed at an average level, a suitable rotation is 2 years of row crops, 1 year of a small grain, and 1 year of meadow. If management is at a high level, a rotation consisting of 3 years of row crops, 1 year of a small grain, and 1 year of meadow is suitable.

For hay or pasture, tall fescue and Ladino clover produce good stands. Timothy mixed with Ladino clover is suitable for 1 year of hay or pasture.

The native vegetation on this soil was a forest of pin oak, sweetgum, silver maple, ash, and other hardwoods. Only a few areas are still wooded, and these produce poor timber.

Food and cover for wildlife can be provided by improving the banks and berms along open ditches. Additional sources of food and cover are crop residues and grassy strips.

CAPABILITY UNIT IIIw-12

Only Whitson silt loam is in this unit. It is a deep, nearly level or slightly depressional soil on uplands. It has a heavy, compact subsoil and is poorly drained. Permeability is very slow or slow; the available moisture capacity is high. The soil is low in fertility and is strongly acid to neutral. Surface runoff is slow to ponded, and wetness is the major limitation.

This soil occurs in small areas that generally are farmed with the adjoining soils. It is suitable for cropping if excess water is removed from the surface and if the water table is lowered. Among the crops grown are corn, soybeans, wheat, and legumes and grasses for hay or pasture, although the growth of fall-seeded legumes and small grain is retarded by excess water. Productivity is moderate, and crops respond to drainage, liming, and fertilization. Surface drainage is satisfactory in level areas, but tiling is needed to control the high water table in depressional areas. Crops on this soil are grown in the same rotations as those on adjoining soils.

Suitable for mixed hay are Ladino, alsike, and red clovers. For permanent pasture, a mixture of reed canarygrass, fescue, and orchardgrass is especially suitable.

Because all of this soil is cultivated, woodland is of no importance. Crop residues provide food and cover for wildlife.

CAPABILITY UNIT IIIs-1

The only soil in this unit is Chelsea loamy fine sand, 2 to 5 percent slopes. This moderately dark colored soil occupies uplands and is deep and excessively drained. Permeability is rapid, the available moisture capacity is low, and droughtiness is the major limitation. Surface runoff is slow, and erosion generally is not a serious problem, but a few blowouts, or wind-eroded areas, occur on windward slopes that lack a plant cover. The soil is low in fertility, low to medium in organic-matter content, and neutral to acid.

The soil in this unit is best suited to plants grown for hay or pasture, small grain seeded in fall, and special crops. It is most commonly used for corn, soybeans, and small grain, all of which produce yields that vary with the amount and distribution of rainfall during the growing season. Alfalfa, rye, and wheat are well suited. Because internal drainage is rapid, little moisture is retained for crops, especially shallow-rooted ones, and corn is damaged in short periods of drought. Watermelons, cantaloups, and early tomatoes yield well. If these or other special crops are grown, grain windbreaks can be used for checking wind erosion.

This soil can be row cropped continuously if it is irrigated and well fertilized. Because the soil is porous and rapidly leached of nutrients, however, the fertility program should be on a year-to-year basis. A suitable rotation under average management is 4 years of row crops, 1 year of a small grain, and 1 year of meadow.

Good forage can be obtained from alfalfa seeded alone or in mixture with orchardgrass or bromegrass. Birdsfoot trefoil and timothy are suitable for pasture.

Timber of low quality is produced on this soil. The trees have little resistance to insects and diseases and are seriously damaged by them. Species to favor in hardwood stands are black oak, white oak, and black cherry, but where production is low and damage from insects is heavy, the owner should consider converting to pines.

Crop residues, plantings of small grain, and pasture consisting of legumes and grasses provide food and cover for wildlife. Hardwoods and pines furnish cover and nesting areas.

CAPABILITY UNIT IIIs-2

This unit consists of nearly level or gently sloping, dark and moderately dark colored soils on terraces. These soils are moderately deep or deep, moderately coarse textured, and somewhat excessively drained. They are moderately rapid or rapid in permeability and have low available moisture capacity. The soils are low in fertility, have a medium to low content of organic matter, and are medium acid or strongly acid. Surface runoff is slow. Droughtiness is the major limitation, but wind erosion is a slight hazard in open areas.

The Elston soil in this unit is underlain by stratified sand and some gravel. In places it occupies areas of low dunes. The Fox soil is underlain by sand and gravel.

Corn, soybeans, small grain, and mixtures of alfalfa and grass are grown on the soils of this unit. Soybeans, fall-seeded wheat and other small grain, and legume-grass mixtures make better use of the available moisture than corn, oats, and other crops seeded in spring. Sweet corn and strawberries are among the special crops grown. Crops of high value produce favorable yields if they are irrigated. An adequate supply of water for irrigation is near the surface of these soils.

To maintain yields, adequate amounts of lime and fertilizer are needed. Because moisture is in limited supply in these soils but moves freely through them, it is best to fertilize on a year-to-year basis.

Moisture can be conserved and the organic-matter content maintained by using minimum tillage, returning crop residues, and turning under cover crops and green-manure crops. Controlling weeds and insect pests helps to maintain production.

This soil can be successfully row cropped year after year, especially if it is irrigated. If irrigation water is not applied, yields vary with the amount of moisture provided through rainfall during the growing season.

A suitable rotation under average management is 2 years of row crops, 1 year of a small grain, and 2 or 3 years of meadow. Under a high level of management, 2 years of row crops, 1 year of a small grain, and 1 year of meadow are satisfactory.

Suitable for hay or rotation pasture is alfalfa seeded alone or in mixture with bromegrass and Ladino clover. A mixture of legumes and grass makes good use of the available moisture. Mowing or clipping helps to control weeds.

In wooded areas the trees to favor are red oak, white oak, white ash, and tulip-poplar. Crop residues and grassy strips provide food and cover for wildlife and nesting areas for birds.

CAPABILITY UNIT IVe-1

This unit consists of sloping to strongly sloping, medium-textured, moderately dark and light colored soils that are deep and well drained. These soils generally are moderately permeable, but the Cincinnati soils have a weak fragipan that is slowly permeable. All the soils in the unit have moderate available moisture capacity and are medium in fertility, low to medium in organic-matter content, and medium acid or strongly acid. Surface runoff is medium to rapid, and erosion is the major limitation.

About one-fifth of the Cincinnati-Hickory complex is woodland. Roughly one-half of the Parke soil is wooded, and the rest is used for permanent pasture. All soils in the unit are best suited to hay, pasture, or trees, but a rotation of corn, small grain, and 3 to 5 years of a grass-legume mixture can be grown on sloping areas. To help control further erosion, runoff should be diverted from higher slopes.

Suitable plants for pasture are alfalfa, clovers, birdsfoot trefoil, orchardgrass, bromegrass, and tall fescue. Mixtures of legumes and grasses can be seeded with or without a small grain. After pasture is established, careful management is required to obtain satisfactory yields of quality forage and to maintain a vigorous stand. Renovating on the contour and controlling the degree of grazing are among the practices needed. Pasture should not be grazed in spring until there is at least 4 inches of new growth on grasses and about 8 inches on legumes. Livestock should be removed when most of the stand has been grazed to a height of 2 inches. Clipping keeps the plants at an even height and controls weeds and brush.

Some wooded areas of these soils are pastured, but forage yields are low and livestock damage the growing trees. Woodland should be protected from grazing and fire. Areas that are better suited to pasture should be cleared, fenced, and treated to improve the stand of forage plants. Because of the erosion hazard, however, clearing slopes greater than 12 percent is not advisable.

The soils in this unit produce good tree crops. Timber of high quality can be obtained from such species as white and red oaks, tulip-poplar, and black walnut. Among the acceptable trees are sweetgum, chestnut oak, scarlet oak, and sugar maple.

Eroded areas on short, steep breaks can be planted to white, red, or shortleaf pine. Scotch pine is suitable for Christmas trees. Areas that formerly were farmed but now are abandoned revert to brush or reseed naturally to trees.

Pasture, brushy edges, and woodland provide food, cover, travel lanes, and nesting areas for wildlife.

CAPABILITY UNIT IVe-3

This unit consists of sloping to strongly sloping, moderately dark and light colored soils on uplands. They are deep, moderately fine textured and medium textured, and well drained. Available moisture capacity is moderate, and permeability is moderate. These soils are low in fertility and organic-matter content and are medium acid or strongly acid. Surface runoff is medium to rapid. Erosion is the major limitation.

The soils in this unit are best suited to hay, pasture, and trees. Corn and small grain can be grown 1 year in every 5 or 6 on the Russell silt loam, but permanent pasture or woodland is best for the Alford soils and the other Russell soils.

Suitable plants for pasture are alfalfa, clover, orchardgrass, bromegrass, and tall fescue. Applying adequate amounts of lime and fertilizer helps in obtaining satisfactory yields of forage and in maintaining a vigorous stand.

In areas where pasture needs reseeding, the mixture can be seeded with a small grain. Essential for the maintenance of pasture are controlled grazing; avoiding overgrazing; protecting the stand from livestock in spring until grasses are at least 4 inches high and legumes are about 8 inches high; removing livestock when most of the forage plants have been grazed to a height of 2 inches; and clipping to remove uneven growth and to control weeds and brush. When pasture needs renewing, renovation should be on the contour.

The soils in this unit produce timber of good quality. Hardwoods to favor in natural stands are white oak, red oak, black oak, white ash, tulip-poplar, and black walnut. Careful managing of woodland encourages the natural seeding of desirable trees. Protect wooded areas from fire and grazing, and use care in cutting and removing timber so that surface litter is protected and young trees are not damaged.

Among the trees suitable for planting on these soils are white, red, and shortleaf pines. Virginia pine is satisfactory in severely eroded areas. Scotch pine planted for Christmas trees does well. Areas that are cultivated and then abandoned revert to brush or woods.

Food, cover, and travel lanes for wildlife are provided in pasture, along brushy edges, and in woodland.

CAPABILITY UNIT IVe-9

This unit consists of moderately eroded soils on terraces that are moderately deep and somewhat excessively drained. These soils are sloping or strongly sloping, moderately dark colored, and medium textured or moderately coarse textured. Permeability is moderate to rapid, and the available moisture capacity is low. The soils are low in fertility, low to medium in organic-matter content, and medium acid or strongly acid. Surface runoff is medium to rapid. Erosion is the major limitation, but droughtiness also is a problem.

Although the soils of this unit are best suited to hay, pasture, or trees, they occupy only small areas that are used and managed like the adjacent soils. Row crops and small grain are suitable if they are grown in a long rotation with meadow. Soybeans, wheat, other fall-seeded small grain, and alfalfa make better use of the available moisture than corn and oats, but yields of all crops vary with the amount of moisture available. In fields used for row crops or small grain, moisture can be conserved and erosion reduced by using minimum tillage, returning crop residues to the soil, and cultivating on the contour. Grassed waterways and diversion terraces help to control runoff and to check erosion.

To maintain yields, lime and fertilizer are needed in adequate amounts, but they should be applied annually, for soil moisture varies from one year to the next.

A suitable rotation under average management is 1 year of a row crop, 1 year of a small grain, and 5 years of meadow. Under a high level of management, 1 year of a row crop, 1 year of a small grain, and 3 years of meadow are suitable.

For hay or pasture, alfalfa-bromegrass and alfalfa-orchardgrass are mixtures well suited to these soils. On the Fox sandy loam, birdsfoot trefoil and timothy maintain good stands. On the other Fox soils, a mixture of birdsfoot trefoil and Kentucky bluegrass furnishes excellent pasture, though the bluegrass is dormant in July and August. A good plant for supplemental pasture is sudangrass. After pasture is established, it should be topdressed each spring with phosphorus, potassium, and lime according to needs indicated by soil tests. Controlling grazing, preventing overuse, and clipping weeds, brush, and uneven growth of forage plants are other practices needed in the management of pasture.

The soils in this unit can produce trees of good quality. In areas that are kept wooded, the species to favor are red oak, white oak, white ash, tulip-poplar, and black walnut. Woodland should be protected from grazing and fire.

Trees suitable for planting on these eroded soils are white, red, and shortleaf pines. Virginia pine can be planted in severely eroded areas. Scotch pine is suitable for Christmas trees. Cleared areas of these soils, if farmed and then abandoned, are soon covered with a growth of native brush and trees.

Food, cover, travel lanes, and nesting areas are available for wildlife along brushy edges and in areas of pasture and woodland. Additional food and cover are provided by grassy strips and crop residues.

CAPABILITY UNIT IVe-12

Only Chelsea loamy fine sand, 8 to 15 percent slopes, is in this unit. It is a deep, moderately dark colored, excessively drained soil on uplands. This soil is rapidly permeable and has low available moisture capacity. It is acid, is low in fertility, and contains little organic matter. Surface runoff, though medium, is not a serious problem, but wind shifts the soil in areas that are bare. Wind erosion and droughtiness are the major limitations.

The soil in this unit is best suited to deep-rooted grasses and legumes used for meadow. In addition, it is well suited to such special crops as watermelons, cantaloups, and early tomatoes. Among the better suited field crops are rye, wheat, and alfalfa. Corn, soybeans, and spring-seeded small grain are grown, but their yields depend on the amount and distribution of rainfall during the growing season. Short periods of drought damage corn, soybeans, oats, and other shallow-rooted crops.

Because this sandy soil is porous, plant nutrients are leached out rapidly. Therefore, it is best to add nutrients annually.

Cover cropping in winter and returning crop residues to the soil conserve moisture, control erosion, and tend to increase the organic-matter content. In fields used for special crops, grain windbreaks help to control soil blowing.

If the soil is managed at an average level, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 1 year of meadow. If management is at a high level, 2 years of row crops, 1 year of a small grain, and 2 years of meadow are suitable.

Alfalfa seeded alone or mixed with orchardgrass or bromegrass produces good forage. Birdsfoot trefoil and timothy make good pasture. After pasture is established, a topdressing of phosphorus, potassium, and lime is needed, so that the plants continue growing well. If the stand consists mostly of grass, add nitrogen early in spring each year. Careful managing of pasture will keep the stand vigorous and the yields satisfactory.

Timber of low quality is produced on this soil. Insects and disease are a serious problem because the trees have little resistance against them. In natural stands the species to favor are white oak, black oak, and black cherry, but if yields are low and damage from insects is heavy, the owner should consider converting to pines. In areas where planting is needed, white, red, and shortleaf pines are suitable. Scotch pine can be planted for Christmas trees.

Crop residues, stands of small grain, and fields in meadow provide food and cover for wildlife. Nesting areas and additional cover are available along brushy edges and in areas of hardwoods or pine trees.

CAPABILITY UNIT IVe-15

The only soil in this unit is Princeton fine sandy loam, 8 to 15 percent slopes, moderately eroded. It occupies uplands and is deep, moderately dark colored, and well drained. Permeability and the available moisture capacity are moderate. This soil is low in fertility, has a medium to low content of organic matter, and is strongly acid. Surface runoff is medium to rapid, and erosion is the major limitation, but droughtiness is a problem in long dry periods.

This soil occurs in small areas that are used and managed like the adjoining soils. It is best suited to small grain and meadow crops, but it produces favorable yields of orchard fruits if well managed. Among the crops that do well on this eroded soil are wheat, rye, alfalfa, and grass. Corn can be grown once in every 3 to 5 years.

Cultivating on the contour and using diversion terraces will reduce runoff and help to control erosion. Grassed waterways keep drainageways from eroding and carry away excess runoff safely. Using minimum tillage, returning crop residues, and growing hay and pasture crops are ways of maintaining the organic-matter content and checking erosion. Practices that control weeds and insect pests are needed to maintain production.

This soil is low in available nitrogen and phosphorus and is medium in available potassium. Adequate amounts of lime and fertilizer should be used, though nutrients applied on the surface are likely to be removed by the medium to rapid runoff.

If management is at an average level, and contour cultivation is not used, a suitable rotation is 1 year of a small grain and 3 to 5 years of meadow. If contour cultivation is used, 1 year of a row crop, 1 year of a small grain, and 5 years of meadow are suitable. If management is at a high level, but contouring is not used, a suitable rotation is 1 year of a row crop, 1 year of a small grain, and 4 years of meadow. If contouring is used with high-level management, 1 year of a row crop, 1 year of a small grain, and 3 years of meadow are suitable.

For hay or pasture, mixtures of legumes and grasses are well suited. Alfalfa mixed with either bromegrass or orchardgrass produces good stands. Grass-legume pasture should be topdressed with phosphate, potash, and lime early in spring. On bluegrass pasture, nitrogen also is needed. To keep the plants vigorous and productive, grazing should be controlled, overgrazing avoided, and clipping used to remove uneven growth and to control weeds and brush.

In wooded areas the trees to favor are white oak, black walnut, and tulip-poplar. White, red, and shortleaf pines are suitable for planting, and Virginia pine does well in severely eroded areas. Scotch pine can be used for Christmas trees.

Hay and pasture crops provide food, cover, travel lanes, and nesting areas for birds and small mammals.

CAPABILITY UNIT VIe-1

This unit consists of sloping to steep, moderately dark and light colored, moderately fine textured to moderately coarse textured soils that are deep and well drained. These soils have moderate available moisture capacity and generally are moderately permeable. They are low to medium in fertility and in organic-matter content. Surface runoff is medium to rapid, and erosion is the major limitation. Droughtiness may be a problem during dry periods in steep areas of the Princeton soil and on the severely eroded Russell soils and the Cincinnati-Hickory complex.

The Cincinnati soils have a fragipan, which is slowly permeable.

Most areas of the Hickory complex and of the Princeton soil are wooded. The Cincinnati-Hickory complex, the Negley soils, and the Russell soils have been used for cultivated crops and are eroded.

Because the soils in this unit are highly susceptible to erosion, they are not suitable for row cropping and ought to be kept covered by growing plants. Best suited are trees and crops used for permanent hay or pasture. Alfalfa, clovers, birdsfoot trefoil, orchardgrass, bromegrass, tall fescue, and Kentucky bluegrass are suitable for hay or pasture. A good mixture consists of legumes and grasses that can be seeded with or without a small grain. By diverting water from higher slopes, damaging runoff can be controlled.

After pasture is established, careful management is required to obtain satisfactory yields of quality forage and to maintain a vigorous stand. Apply phosphate, potash, and lime as topdressing. If the stand consists mostly of grass, add nitrogen early in spring each year. Grazing should be controlled early in spring and in fall, and overgrazing should be avoided throughout the growing season. In spring, keep livestock off pasture until the grasses are at least 4 inches high and the legumes are about 8 inches high. Livestock should be removed when most of the forage plants have been grazed to a height of 2 inches. Clipping removes uneven growth and controls weeds and brush.

Some areas of these soils are only partly wooded and are used for pasture, though their yield of forage is low. In these places grazing damages the growing timber. Wooded areas that have good stands of productive trees should be protected from livestock and fire. Areas more suitable for pasture should be cleared, fenced, and improved.

The soils of this unit are good as woodland. In existing stands the species to favor are white and red oaks, white ash, black walnut, and tulip-poplar. If woodland is well managed and is protected from grazing, reseeding of desirable trees is encouraged. When mature trees are harvested, young trees can be protected and the surface litter left mostly undisturbed if the timber is cut and removed carefully.

Where these soils are used for hay and pasture or as woodland, habitat for wildlife is provided. Fields of hay and pasture furnish food for deer and other forms of wildlife and nesting areas for birds. Brushy edges provide food, cover, and travel lanes. Food and nesting areas are available in stands of hardwoods and pines.

CAPABILITY UNIT VIe-3

Only Chelsea loamy fine sand, 15 to 40 percent slopes, is in this unit. It is a deep, moderately dark colored, excessively drained soil on uplands. It is acid, is low in fertility, and contains little organic matter. Permeability is rapid, and the available moisture capacity is low. Erosion is a major limitation on this soil, for surface runoff is medium to rapid, and wind shifts the sand in areas without a plant cover. Droughtiness also is a major limitation.

This soil is best suited to plants for hay or pasture and to trees. Most of it is used as pasture or woodland. Drought-resistant grasses and legumes make good forage.

Alfalfa seeded alone or mixed with orchardgrass or bromegrass produces pasture of good quality. A mixture of birdsfoot trefoil and timothy yields well. If pasture needs renewing and slopes are not too steep, a suitable mixture of grasses and legumes can be seeded with a companion crop of small grain. However, the soil is droughty and, on the steeper slopes, is difficult to cultivate.

If pasture is carefully managed, satisfactory yields are obtained. After the stand is established, it should be topdressed with phosphate, potash, and lime. On grass pasture, it is desirable to add nitrogen early in spring each year. Because the soil is porous and is readily leached of nutrients, fertilizer should be applied annually. Clipping, control of grazing, and avoidance of overgrazing are other practices that keep forage plants vigorous.

The soil in this unit produces timber of low quality. The trees have little resistance to disease and are seriously damaged by them. Species to favor in natural stands are white oak, black oak, and black cherry. In areas where production is low and damage from insects is heavy, the owner should consider converting to pines. White, red, and shortleaf pines are suitable for planting. Scotch pine can be used for Christmas trees.

Hay and pasture crops provide food and nesting areas for wildlife. Along brushy edges there are travel lanes, food, and cover. Nesting areas and food are provided in stands of hardwoods or pines.

CAPABILITY UNIT VIIe-1

The only soils in this unit are those of the Hickory complex, 30 to 70 percent slopes. These soils are deep and well drained. Their surface layer is generally loam, but in small areas it is silt loam. Permeability and the available moisture capacity are moderate. The soils are low to medium in fertility and organic-matter content and are strongly acid. Surface runoff is rapid or very rapid, and erosion is the major limitation.

These soils are used chiefly as woodland, their best use. Some of the upper slopes adjoining ridgetops are used for permanent pasture, but these produce little forage. Because of the erosion hazard, the soils are not suited to row crops.

Some areas of these soils are only partly wooded and are used as pasture. In these areas the yield of forage is low, the timber is damaged by livestock, and erosion is active. Wooded areas should be protected from grazing and fire, and they should be managed in a way that encourages the reseeding of desirable trees.

The soils in this unit can produce good stands of timber. Trees to favor in natural stands are white and red oaks, white ash, tulip-poplar, and black walnut. Less desirable but acceptable species are sugar maple, slippery elm, black oak, and beech. When merchantable trees are harvested, young trees can be protected and the surface litter can be left as a protective cover if the timber is cut and removed carefully.

Among the trees suitable for planting are red, white, and shortleaf pine. If the owner is interested in producing Christmas trees, Scotch pine is suitable.

CAPABILITY UNIT VIIe-2

This unit is made up of strongly sloping, moderately dark colored soils. Surface runoff is rapid or very rapid on these soils, and erosion is the major limitation.

The Hennepin and the Russell soils in this unit are medium textured and well drained. The Russell soils are deep, whereas the Hennepin soils are shallow to loam and clay loam glacial till. Both kinds of soils are moderate in permeability and available moisture capacity. Steep stony and rocky land consists mostly of rock outcrops but includes small areas of shallow and stony soil material that is somewhat excessively drained and has low available moisture capacity.

The soils and the stony and rocky land in this unit are best suited to trees. Most areas are used as woodland or pasture; the few that are cropped produce low yields. Because erosion is a severe hazard, row crops should not be grown.

Permanent pasture furnishes little forage in summer and, on slopes exceeding 30 percent, is difficult to maintain. If used for pasture, the soils are best suited to legume-grass mixtures. Alfalfa, clovers, birdsfoot trefoil, orchardgrass, bromegrass, tall fescue, and Kentucky bluegrass are some of the better plants.

Managing pasture with care will maintain a good cover of plants. Topdress the stand with phosphate, potash, and lime according to needs indicated by soil tests. If the pasture is mostly grass, add nitrogen early in spring each year. Because slopes are steep and runoff is rapid, fertilizer should be applied every year.

Other practices needed in the management of pasture are controlling grazing early in spring and in fall, avoiding overgrazing throughout the growing season, and clipping to remove uneven growth and to control weeds and brush. If pasture on these soils is abandoned, it reverts to brush and trees.

The soils in this unit produce woodland crops of high quality. Among the trees to favor in natural stands are white, red, and black oaks, white ash, tulip-poplar, and black walnut. Less desirable but acceptable species are slippery elm, sugar maple, and beech. If woodland is well managed and is protected from grazing and fire, reseeding of desirable trees is encouraged. When timber is harvested, cutting and removing the trees carefully will protect young growth and save the protective cover of surface litter. Trees suitable for planting on these soils are white, red, shortleaf, and Virginia pine. Scotch pine planted for Christmas trees does well.

Pasture provides food, cover, and nesting areas for wildlife. Wooded areas are suitable for squirrel, deer, certain songbirds, and other kinds of woodland wildlife.

CAPABILITY UNIT VIIe-3

Clay pits, Gravel pits, and Mine pits and dumps are in this unit. These land types occupy only a small acreage and are most suitable as areas for wildlife.

Clay pits have a growth of shrubs and grasses that provide food and cover. Also suitable for wildlife are abandoned Gravel pits, which occur along the Wabash River and other large streams. Some of the abandoned pits contain water that is used for fishing and swimming.

Mine pits and dumps are strip-mined areas where coal has been removed. The spoil banks consist of soil material, glacial till, shale, sandstone, and siltstone that are piled in steep ridges and generally are well mixed. The spoil has medium to rapid surface runoff and is highly susceptible to erosion. Between the banks are deep cuts, some of them filled with water that forms lakes.

Except in areas of inert refuse from shaft mines, these land types are best suited to trees and to grasses and legumes. Natural seeding produces a growth of cottonwood, silver maple, aspen, and sassafras. Neutral spoil is covered by trees in a few years, but strongly acid areas may remain uncovered for several years. A few areas have been planted to pines.

Spoil areas provide excellent habitat for birds and other wildlife. The lakes can be developed for fishing, swimming, and boating, and other areas can be made suitable for picnicking.

CAPABILITY UNIT VIIs-1

The soils in this unit are gravelly, very shallow, dark colored, moderately coarse textured, and excessively drained. They occur on narrow, strongly sloping to very steep sides of terraces. These soils are rapidly permeable and have low available moisture capacity. They are high in fertility and organic-matter content and are neutral to calcareous. Although surface runoff is medium to rapid, droughtiness is the major limitation.

These soils are best suited to trees, and most of the acreage is wooded. Pasture and meadow crops can be grown in areas where the soil is less shallow than ordinary or where slopes are not too steep. The upper part of slopes generally is more droughty than the lower part. Most suitable for pasture are legumes and grasses that are deep rooted and drought resistant. Rotation grazing and use of pasture only in spring and early in summer are advisable.

Trees to favor in wooded areas are chinkapin oak, red oak, basswood, and white ash. These wooded areas provide cover and nesting places for wildlife.

Predicted Yields

Table 7 lists average acre yields of the principal crops that can be expected on each soil in Parke County under two levels of management. In columns A are yields to be expected under average or medium level of management, and in columns B are yields to be expected under the improved, or high, level of management that some farmers in the county are now practicing.

The yields are estimated averages for a period of 5 to 10 years. They are based on farm records and on interviews with farmers, members of the staff of the Purdue Agricultural Experiment Station, and others familiar with the agriculture of the county, as well as on direct observation of soil scientists and work unit conservationists. Considered in making the estimates were the prevailing climate, characteristics of the soils, and the influence of different kinds of management on the soils.

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 management needed to get the yields in columns A consists of (a) using cropping systems that maintain tilth and organic mater; (b) using management practices that lessen erosion sufficiently so that the qualities of the land are not greatly reduced; (c) applying fertilizers and lime in moderate amounts as determined by soil tests; (d) returning crop residues to the soil; (e) plowing and tilling by conventional methods; (f) using crop varieties generally adapted to the climate and soils; (g) controlling weeds moderately well by tillage and spraying; and (h) draining wet land sufficiently for cropping (in some places yields are somewhat restricted by wetness).

The management needed to get the yields in columns B consist of (a) using a cropping system that maintains or improves tilth and organic matter; (b) using the cultural practices, mechanical practices, or both, that are needed to control erosion and thereby maintain or improve the qualities of the land rather than reduce them; (c) maintaining a high level of available phosphorus, potassium, and nitrogen as determined by frequent soil tests and according to recommendations of the State Agricultural Experiment Station; (d) liming the soils as indicated by soil tests and according to recommendations; (e) using crop residues to the fullest extent for protecting and improving the soil; (f) practicing minimum tillage; (g) using only the best adapted varieties of crops; (h) thoroughly controlling weeds by tillage and spraying; and (i) adequately draining wet land so that wetness does not restrict yields.

Use of Soils as Woodland [3]

Hardwood trees originally covered most of Parke County, and prairie vegetation covered the rest. The Conservation Needs Inventory reported that in 1959 the woodland in the county amounted to 73,000 acres. Also reported was the need for planting trees to control erosion on 2,300 acres.

The soils of the county vary widely in their suitability for trees. Most of the existing woodland is on steep slopes, but most of the soils have the capacity to produce hard wood timber of high quality.

The first part of this subsection names the kinds of trees that are common in the county and tells where these trees are found. In the second part, the soils are placed in 14 woodland suitability groups and the woodland management of these groups is discussed.

Kinds of trees

The woodland in the county can be divided into three kinds of stands according to the kinds of valuable trees that are dominant in them. These trees are upland oaks, tulip-poplar, and pin oak.

Upland oaks occur in most well-drained areas of uplands. The major species of oak in these areas are white, red, black, and chinkapin, but growing with these oaks are hickory, white ash, sugar maple, and tulip-poplar.

Tulip-poplar is generally on the lower part of steep slopes facing north and northeast (cool aspects) and in coves. Stands in these areas are called tulip-poplar because that is the most valuable tree in them and is the one that should be encouraged in management. Other trees in these areas are white ash, red oak, basswood, white oak, hickory, beech, black walnut, and sugar maple.

Pin oak occurs on poorly drained soils on uplands, terraces, and bottom lands in the county. Other trees growing with it are soft maple, sweetgum, swamp white oak, elm, and ash.

Woodland suitability groups

To assist owners of woodland in planning the use of their soils, the soils of the county have been placed in 14 woodland suitability groups. These groups are numbered according to a system used throughout the State, so the group numbers are not consecutive in Parke County. Each group is made up of soils that are similar in potential productivity, are suitable for similar trees, and require similar management. These groups are described later in this subsection.

Listed in the descriptions are the site indexes for upland oaks, tulip-poplar, and pin oak. Site index is the total height, in feet, that trees of a given species, growing on a given soil in an even-aged, well-managed stand, will attain in 50 years. It is, therefore, a measure of potential productivity.

Of the properties that determine the productivity of a soil for trees, the capacity to provide optimum moisture and root zone of adequate depth are most important. These conditions are determined by the thickness of the surface layer, the texture and consistence of each significant layer, aeration, drainage, depth to the water table, and natural supply of plant nutrients.

[3] By JOHN HOLWAGER, woodland conservationist, Soil Conservation Service.

TABLE 7.—*Predicted average acre yields of the principal crops under two levels of management*

[Yields in columns A are those obtained under the management commonly practiced; those in columns B are yields to be expected under improved management. Absence of yield indicates crop is not commonly grown]

Map symbol	Soil	Corn		Soybeans		Wheat		Oats		Alfalfa-grass mixture		Red clover for hay	
		A	B	A	B	A	B	A	B	A	B	A	B
		Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Tons	Tons	Tons	Tons
AfB2	Alford silt loam, 2 to 5 percent slopes, moderately eroded	65	100	25	35	30	40	45	55	3.0	4.0	2.0	3.0
AfC2	Alford silt loam, 5 to 8 percent slopes, moderately eroded	55	80	21	30	25	35	30	40	3.0	4.0	1.5	2.5
AhC3	Alford soils, 5 to 8 percent slopes, severely eroded	45	75	----	----	15	28	----	----	2.0	3.0	1.5	2.5
Al	Allison silty clay loam	82	100	26	40	----	----	----	----	3.0	4.0	2.0	3.0
Ar	Armiesburg silty clay loam	82	100	26	40	----	----	----	----	----	----	----	----
As	Ayrshire fine sandy loam	60	90	25	40	25	35	45	60	2.5	3.5	2.0	3.0
Bp	Bonpas silty clay loam	75	115	25	36	35	50	45	60	----	----	2.0	3.0
CaA	Camden loam, 0 to 2 percent slopes	70	105	25	35	30	50	50	70	3.0	4.0	2.0	3.0
CaB	Camden loam, 2 to 5 percent slopes	65	95	20	30	30	45	45	60	3.0	4.0	2.0	3.0
CdA	Camden silt loam, 0 to 2 percent slopes	75	105	25	35	30	50	50	70	3.0	4.0	2.0	3.0
CdB	Camden silt loam, 2 to 5 percent slopes	65	95	20	28	30	45	45	60	3.0	4.0	2.0	3.0
CdC2	Camden silt loam, 5 to 8 percent slopes, moderately eroded	55	80	18	26	22	32	42	55	2.5	3.5	1.8	2.5
ChB	Chelsea loamy fine sand, 2 to 5 percent slopes	45	65	15	20	20	25	----	----	2.2	3.2	1.2	1.5
ChC	Chelsea loamy fine sand, 5 to 8 percent slopes	40	60	12	20	18	23	----	----	2.0	3.0	1.0	1.5
ChD	Chelsea loamy fine sand, 8 to 15 percent slopes	35	55	10	18	15	21	----	----	2.5	3.5	----	----
ChF	Chelsea loamy fine sand, 15 to 40 percent slopes	----	----	----	----	----	----	----	----	2.0	3.0	----	----
CnD2	Cincinnati-Hickory complex, 8 to 15 percent slopes, moderately eroded	35	53	----	----	19	28	25	35	2.3	3.3	1.3	2.5
CnD3	Cincinnati-Hickory complex, 8 to 15 percent slopes, severely eroded	----	----	----	----	----	----	----	----	2.0	3.0	1.2	2.2
Cp	Clay pits	----	----	----	----	----	----	----	----	----	----	----	----
Ea	Eel loam	70	90	25	35	----	----	----	----	----	----	----	----
Eb	Eel loam, high bottom	70	93	30	40	35	45	----	----	2.0	3.0	1.5	2.5
El	Eel silt loam	75	95	30	40	----	----	----	----	----	----	----	----
Em	Eel silt loam, high bottom	75	97	30	40	35	50	----	----	2.0	3.0	1.5	2.5
En	Eel silty clay loam	75	95	30	40	----	----	----	----	----	----	----	----
EoA	Elston loam, 0 to 3 percent slopes	70	85	20	35	30	42	----	----	2.5	3.5	2.2	2.8
EsA	Elston sandy loam, 0 to 3 percent slopes	55	75	20	30	25	35	----	----	2.5	3.0	1.2	1.8
EsC2	Elston sandy loam, 5 to 8 percent slopes, moderately eroded	50	65	20	25	25	30	----	----	2.0	3.0	1.2	1.8
FcA	Fincastle silt loam, 0 to 2 percent slopes	75	100	25	40	25	40	45	65	3.0	4.0	2.5	3.2
FcB	Fincastle silt loam, 2 to 5 percent slopes	70	90	20	35	23	35	40	55	3.0	4.0	2.5	3.2
FmA	Fox loam, 0 to 2 percent slopes	67	87	21	30	27	40	37	55	3.0	4.0	2.0	2.5
FmB	Fox loam, 2 to 5 percent slopes	60	80	20	25	27	38	35	50	3.0	4.0	2.0	2.5
FmC2	Fox loam, 5 to 8 percent slopes, moderately eroded	40	55	----	----	20	28	----	----	2.8	3.8	1.6	2.7
FmD2	Fox loam, 8 to 15 percent slopes, moderately eroded	35	50	----	----	19	28	----	----	2.5	3.0	1.5	2.5
FsA	Fox sandy loam, 0 to 2 percent slopes	65	80	20	30	27	33	----	----	3.0	4.0	2.0	3.0
FsB	Fox sandy loam, 2 to 5 percent slopes	60	75	18	25	27	33	----	----	3.0	4.0	2.0	3.0
FsC	Fox sandy loam, 5 to 8 percent slopes	50	60	15	20	23	28	----	----	3.0	4.0	2.0	3.0
FsD2	Fox sandy loam, 8 to 15 percent slopes, moderately eroded	30	45	----	----	17	25	35	50	2.5	3.5	1.5	2.7
FtA	Fox silt loam, 0 to 2 percent slopes	70	90	21	30	27	40	42	60	3.0	4.0	2.0	3.0
FtB	Fox silt loam, 2 to 5 percent slopes	60	84	20	25	27	38	40	50	3.0	4.0	2.0	2.5
FtD2	Fox silt loam, 8 to 15 percent slopes, moderately eroded	35	40	----	----	19	28	30	40	2.5	3.0	1.5	2.5
Gf	Genesee fine sandy loam	60	80	20	30	----	----	----	----	2.0	3.5	----	----
Gh	Genesee loam	82	100	26	40	----	----	----	----	----	----	----	----
Gm	Genesee loam, high bottom	82	100	26	40	35	45	35	50	3.0	4.0	2.0	3.0
Gn	Genesee silt loam	82	100	26	40	----	----	----	----	----	----	----	----
Go	Genesee silt loam, high bottom	85	100	26	40	30	40	35	50	3.0	4.0	2.0	3.0
Gr	Gravel pits	----	----	----	----	----	----	----	----	----	----	----	----
HnF	Hennepin association, 30 to 60 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----
HrE2	Hennepin-Russell complex, 15 to 30 percent slopes, moderately eroded	----	----	----	----	----	----	----	----	----	----	----	----
HsE	Hickory complex, 15 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	1.5	2.5
HsF	Hickory complex, 30 to 70 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----
Hu	Huntsville silt loam	85	100	26	40	----	----	----	----	----	----	----	----
IvA	Iva silt loam, 0 to 2 percent slopes	75	100	25	35	30	43	45	65	3.0	4.0	2.0	3.0
IvB	Iva silt loam, 2 to 5 percent slopes	70	90	22	32	27	38	40	55	2.5	3.5	1.5	2.5
Lm	Linwood muck	60	110	20	30	----	----	----	----	----	----	----	----
Mp	Mine pits and dumps	----	----	----	----	----	----	----	----	----	----	----	----
NsE	Negley soils, 15 to 60 percent slopes	----	----	----	----	----	----	----	----	----	----	1.5	2.0
OaA	Ockley loam, 0 to 2 percent slopes	70	100	25	35	35	50	45	55	3.5	4.5	2.0	3.0
OaB	Ockley loam, 2 to 5 percent slopes	65	95	23	30	30	40	45	55	3.5	4.5	2.0	3.0
OcA	Ockley silt loam, 0 to 2 percent slopes	75	105	25	35	32	50	45	60	3.5	4.5	2.0	3.0

TABLE 7.—*Predicted average acre yields of the principal crops under two levels of management*—Continued

Map symbol	Soil	Corn		Soybeans		Wheat		Oats		Alfalfa-grass mixture		Red clover for hay	
		A	B	A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
OcB	Ockley silt loam, 2 to 5 percent slopes	65	95	23	30	30	40	45	60	3.5	4.5	2.0	3.0
OcC2	Ockley silt loam, 5 to 8 percent slopes, moderately eroded	55	80	20	28	28	37	35	45	3.0	4.0	2.0	3.0
PaB	Parke silt loam, 2 to 5 percent slopes	60	90	22	32	30	45	45	60	3.0	4.0	2.0	3.0
PaC2	Parke silt loam, 5 to 8 percent slopes, moderately eroded	50	80	17	26	25	35	40	50	3.0	4.0	2.0	2.5
PaD2	Parke silt loam, 8 to 15 percent slopes, moderately eroded	40	60	15	23	18	28	35	45	2.5	3.5	1.5	2.5
PrA	Princeton fine sandy loam, 0 to 2 percent slopes	65	85	25	35	25	40	42	55	3.0	4.0	2.0	3.0
PrB	Princeton fine sandy loam, 2 to 5 percent slopes	60	80	23	32	23	37	42	55	3.0	4.0	2.0	3.0
PrC2	Princeton fine sandy loam, 5 to 8 percent slopes, moderately eroded	50	70	20	25	20	33	38	45	2.0	3.0	1.5	2.5
PrD2	Princeton fine sandy loam, 8 to 15 percent slopes, moderately eroded	40	60	----	----	18	28	----	----	2.0	4.0	1.5	2.5
PrE	Princeton fine sandy loam, 15 to 30 percent slopes	----	----	----	----	----	----	----	----	2.0	3.0	----	----
Ra	Ragsdale silt loam	80	115	25	40	32	43	45	65	3.0	4.0	2.0	3.0
Rc	Ragsdale silty clay loam	80	115	25	40	32	43	45	65	3.0	5.0	2.0	3.0
ReA	Reesville silt loam, 0 to 2 percent slopes	75	100	25	40	25	40	45	65	3.0	5.0	2.5	3.2
ReB	Reesville silt loam, 2 to 5 percent slopes	70	90	20	35	23	35	40	55	3.0	4.5	2.5	3.2
RoE	Rodman gravelly soils, 15 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----
RoF	Rodman gravelly soils, 30 to 70 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----
RsB	Russell loam, 2 to 5 percent slopes	60	90	20	30	25	35	45	60	3.0	4.0	2.0	3.0
RsC	Russell loam, 5 to 8 percent slopes	50	80	18	26	22	32	42	55	3.0	4.0	2.0	3.0
RtB2	Russell silt loam, 2 to 5 percent slopes, moderately eroded	60	90	20	30	25	32	45	60	3.0	4.0	2.5	3.0
RtC2	Russell silt loam, 5 to 8 percent slopes, moderately eroded	45	70	18	26	20	28	40	50	2.5	3.5	2.0	3.0
RtD2	Russell silt loam, 8 to 15 percent slopes, moderately eroded	30	50	----	----	15	23	----	----	2.0	3.0	1.5	2.5
RuB3	Russell soils, 2 to 5 percent slopes, severely eroded	40	65	18	26	18	25	30	40	3.0	4.0	2.0	3.0
RuC3	Russell soils, 5 to 8 percent slopes, severely eroded	35	60	15	23	15	22	25	35	2.0	3.0	1.5	3.0
RuD3	Russell soils, 8 to 15 percent slopes, severely eroded	----	----	----	----	----	----	----	----	2.0	3.0	1.5	2.5
Sb	Shoals silt loam	65	85	25	35	----	----	----	----	----	----	----	----
ShA	Sleeth loam, loamy substratum, 0 to 2 percent slopes	75	100	25	40	25	40	45	60	3.0	4.0	2.0	3.0
SmA	Sleeth silt loam, loamy substratum, 0 to 2 percent slopes	75	100	25	40	25	40	45	60	3.0	4.0	2.0	3.0
St	Steep stony and rocky land	----	----	----	----	----	----	----	----	----	----	----	----
WbA	Warsaw loam, 0 to 2 percent slopes	67	90	22	32	30	45	35	50	3.0	4.0	2.0	3.0
WbB	Warsaw loam, 2 to 5 percent slopes	65	85	20	30	25	40	35	50	3.0	4.0	1.5	2.5
WbC2	Warsaw loam, 5 to 8 percent slopes, moderately eroded	50	65	18	28	20	30	30	40	3.0	4.0	1.5	2.5
WcA	Warsaw silt loam, 0 to 2 percent slopes	70	90	22	35	30	45	35	50	3.0	4.0	2.0	3.0
WcB	Warsaw silt loam, 2 to 5 percent slopes	65	85	20	30	25	40	35	50	3.0	4.0	2.0	3.0
Wd	Westland loam, loamy substratum	75	115	28	40	30	43	45	65	3.0	4.0	2.0	3.0
Wo	Westland silt loam	75	115	28	40	30	43	45	65	3.0	5.0	2.0	3.0
Wp	Westland silty clay loam	75	115	28	40	30	43	45	60	3.0	5.0	2.0	3.0
Wr	Westland silty clay loam, loamy substratum	75	115	28	40	30	43	45	65	3.0	5.0	2.0	3.0
Ww	Whitson silt loam	60	80	20	30	20	30	35	50	2.5	4.0	2.0	3.0
Zc	Zipp silty clay loam	70	95	25	33	----	----	----	----	----	----	----	----

Also given in the descriptions of woodland groups are ratings of hazard to management and lists of trees to favor in natural stands and trees to use in plantings. Some terms used in the ratings require explanation.

Seedling mortality is the failure of seedlings to grow after natural seeding or after seedlings have been planted. It is affected by the kind of soil, the degree of erosion, and the direction of slope. Mortality is *slight* if not more than 25 percent of the planted seedlings die, or if trees ordinarily regenerate naturally in places where there are enough seeds. It is *moderate* if 25 to 50 percent of the seedlings die, or if trees do not regenerate naturally in numbers needed for adequate restocking. In some places, replanting to fill open spaces is necessary. Mortality is *severe* if more than 50 percent of the planted seedlings die, or if trees do not ordinarily reseed naturally in places where there are enough seeds. If mortality is severe, obtaining a satisfactory stand requires considerable replanting, special preparation of a seedbed, and superior planting techniques.

Erosion hazard is rated according to the risk of erosion on well-managed woodland that is not protected by special practices. It is *slight* where only a slight loss of soil is expected. The erosion hazard is *moderate* if the loss of soil is moderate in places where runoff is not controlled and the vegetative cover is not adequate for protection. It is *severe* if steep slopes, rapid runoff, slow infiltration and permeability, and past erosion make the soil susceptible to severe erosion.

Windthrow hazard depends on the development of roots and on the capacity of soils to hold trees firmly. The hazard is *slight* if windthrow is no special problem or if trees can be expected to remain standing after they are released, or freed from competition, on all sides. It is *moderate* if roots hold the trees firmly, except when the soil is excessively wet or when the wind is strongest. The hazard is *severe* if roots do not provide enough stability to prevent the trees from being blown over when they are released on all sides.

Equipment limitations are rated according to the degree that soils restrict or prevent the use of equipment commonly used in tending and harvesting the trees. Limitations are *slight* if there are no restrictions on the type of equipment or on the time of year that equipment can be used. They are *moderate* if the time the equipment cannot be used is less than 3 months a year or if the use of equipment is moderately restricted by slope, stones, wetness, or other unfavorable soil features. Limitations are *severe* if the time the equipment cannot be used is more than 3 months a year, if special equipment is needed, or if the use of such equipment is severely restricted by steep slopes, stoniness, or many gullies.

Discussed in the following pages are the woodland suitability groups in Parke County. Except for those woodland groups having only a single soil, the names of soils placed in each group are not given. The woodland suitability group in which each soil in the county has been classified can be found by referring to the description of that soil in the section "Descriptions of the Soils" or to the "Guide to Mapping Units" at the back of the report.

For hazards to management that are not specifically rated in the following discussion, the rating is only *slight*. For each woodland group, the listing of trees suitable for planting is only partial. A complete list of suitable species can be obtained from the local farm forester or woodland conservationist.

WOODLAND SUITABILITY GROUP 1

This group consists of medium-textured, well-drained soils that generally are deep. Slopes range from 0 to 15 percent. Permeability is moderate, and the available moisture capacity is generally high. Surface runoff is slow on the nearly level soils and is medium on the strongly sloping ones.

The Fox soils are moderately deep and have moderate available moisture capacity.

The soils of this group are some of the best in the State for producing timber. The site index is 85 to 95 for upland oaks and is 90 to 105 for tulip-poplar.

Trees to favor in natural stands are red oak, white oak, white ash, tulip-poplar, and black walnut. Among the trees suitable for planting are white pine, red pine, and black locust.

On the soils of this group, seedling mortality is generally slight, but it may be as high as 50 percent in severely eroded areas and on all south-facing slopes. The erosion hazard is slight, except on slopes of more than 12 percent. On the steeper slopes, skid trails and logging roads should be located with care. The use of equipment is moderately limited on the steeper slopes.

WOODLAND SUITABILITY GROUP 2

This group consists of moderately deep or deep, well-drained or somewhat excessively drained soils that have a surface layer of silt loam, loam, or fine sandy loam. Slopes range from 0 to 60 percent but are less than 30 percent in most places. Permeability is moderate, and the available moisture capacity is moderate to high. Surface runoff is slow on the nearly level soils and is rapid on the steep soils.

The soils in this group produce good timber because their root zone is deep and their available moisture capacity is good. The site index is 85 to 95 for upland oaks and is 95 to 105 for tulip-poplar.

Trees to favor in natural stands are red oak, white oak, white ash, tulip-poplar, and black walnut. Among the trees preferred for planting are white pine, red pine, and black locust.

Seedling mortality is moderate on the steeper slopes and in areas of fine sandy loam that have a southern exposure. On slopes of more than 15 percent, skid trails and logging roads should be located with care, for the hazard of erosion is moderate or severe on the steep Hennepin, Russell, and Hickory soils. The limitation to the use of equipment is moderate on slopes of 15 to 30 percent; on these slopes the use of regular farm equipment is impractical. Special equipment is needed for logging on slopes of more than 30 percent, where the limitation is severe.

WOODLAND SUITABILITY GROUP 4

Soils in this group are very steep, shallow or moderately deep, medium textured, and well drained. They are on slopes of more than 30 percent. Permeability is moderate, the available moisture capacity is high, and surface runoff is rapid.

Because of the sharp breaks and steep slopes, the soils in this group are suitable only as woodland, and most areas remain wooded. Some trees have been damaged by grazing animals and fire.

These soils have a deep root zone and can produce good yields of hardwoods. The site index is 80 to 90 for upland oaks and is 90 to 100 for tulip-poplar.

The trees preferred in natural stands are red oak, white oak, black oak, tulip-poplar, and black walnut. Species suitable for planting include white pine, red pine, and black locust.

The erosion hazard is moderate or severe, for slopes are steep and runoff is rapid. Limitations on the use of equipment are severe, and logging requires special equipment. The main logging roads should be located on the ridgetops, along the bottoms, or in nearly level areas above the soils of this group. In places where skid trails must run up and down slope, large gullies can be prevented by using cutoff ditches that remove runoff safely. Seeding fescue on bare areas at log decks and along trails helps to check erosion.

WOODLAND SUITABILITY GROUP 5

In this group are moderately deep or deep, moderately coarse textured or medium-textured, somewhat poorly drained soils that occupy level plains and gently rolling areas on the terraces and uplands. Slopes range from 0 to 5 percent. Permeability is slow or very slow, available moisture capacity is high, and runoff is slow.

On the soils of this group, the site index is 80 to 92 for upland oaks, 90 to 100 for tulip-poplar, and 85 to 100 for pin oak.

Trees to favor in natural stands are pin oak, silver maple, bur oak, white ash, and tulip-poplar. White pine, soft maple, and cottonwood are among the trees suitable for planting.

Seedling mortality is usually slight, but the soils may be too wet for natural seeding in exceptionally wet years. To supplement natural seeding, use a system of management that assures good growth of coppices or sprouts. Because drainage is somewhat poor and root growth is shallow, windthrow is a moderate or severe hazard. For this reason, widely scattered seed trees cannot be left after logging. The use of equipment is limited to dry periods. The soils are so wet late in winter and early in spring that they should not be logged. Logging in wet periods damages the shallow roots and compacts the soils.

WOODLAND SUITABILITY GROUP 8

This group consists of deep, moderately coarse textured to moderately fine textured soils that are moderately well drained or well drained. These soils occur on level or nearly level bottom land and are subject to flooding. They are moderately permeable and have high available moisture capacity.

Timbered areas of these soils generally are in narrow strips along the major streams and in strips below steep breaks adjacent to uplands and terraces.

The site index is 95 to 105 for tulip-poplar and is 70 to 80 for cottonwood.

Trees to favor in natural stands are cottonwood, sycamore, tulip-poplar, black walnut, and white ash. Among the species preferred for planting are white pine, cottonwood, and black locust.

The soils in this group have only slight limitations to production of timber. Because fertility is high and moisture is ample, conditions for the growth of trees are ideal. In places that are occasionally flooded, the floodwater is beneficial to tree growth and to establishment of seedlings. Cottonwood, sycamore, and soft maple generally depend on high water for dispersing their seeds.

WOODLAND SUITABILITY GROUP 9

This group consists of sloping or strongly sloping, medium-textured soils that are moderately deep to very deep and are well drained. Slopes range from 8 to 15 percent. The available moisture capacity is moderate, and surface runoff is medium.

The Hickory soils of this group are moderately permeable. The Cincinnati soils have a fragipan, at a depth of 24 to 35 inches, that retards the movement of moisture. In these soils permeability is moderate above the fragipan but is slow or very slow in it.

On the soils of this group, the site index is 75 to 85 for upland oaks and is 90 to 100 for tulip-poplar.

Trees preferred in natural stands are white oak, white ash, tulip-poplar, and chestnut oak. Among the species suitable for planting are white pine and red pine.

Erosion is a moderate hazard in areas where the slope is near 15 percent. On the Cincinnati soils, which have a fragipan, the hazard of windthrow is moderate because root growth is shallow.

WOODLAND SUITABILITY GROUP 11

This group consists of deep, medium-textured or moderately fine textured soils that are level, nearly level, or depressional. These soils are very poorly drained or poorly drained. Permeability is very slow or slow, available moisture capacity is high, and surface runoff is very slow or ponded. The water table is seasonally high.

Woodland on these soils occurs in areas that have not been drained for farming. The areas generally are small and are surrounded by cropland.

The site index is 90 to 105 for tulip-poplar and is 85 to 105 for pin oak.

Trees to favor in natural stands are pin oak, silver maple, bur oak, white ash, and tulip-poplar. These trees regenerate naturally and planting is not needed.

Seedling mortality is moderate, for the soils of this group are often so wet that natural reseeding is poor. Because of ponding and a high water table, roots do not penetrate deeply and the windthrow hazard is severe. Equipment limitations also are severe. For more than 3 months of the year, the soils are so wet that the use of equipment is limited and logging is difficult.

WOODLAND SUITABILITY GROUP 12

Only Steep stony and rocky land is in this group. This land consists mainly of sandstone outcrops, but there are small areas of stony soils underlain by sandstone or shale. The soils are strongly sloping to very steep, moderately deep or shallow, medium textured, and well drained or somewhat excessively drained. Permeability is moderate, available moisture capacity is moderately low or low, and surface runoff is medium to very rapid.

On north-facing slopes the site index is 80 to 90 for upland oaks and for tulip-poplar. On south-facing slopes the estimated site index is 75 to 92 for upland oaks.

Among the trees to favor in natural stands are white oak, black oak, red oak, and white ash. On north-facing slopes tulip-poplar also is favored, but too little moisture is available for this species on slopes facing south and west. Trees suitable for planting include red pine and white pine.

Erosion is a moderate hazard on Steep stony and rocky land. Care should be taken in locating skid trails and logging roads. Although the small areas of soils are shallow or only moderately deep, trees are anchored by sending their roots deeply through the cracks in the underlying bedrock. Consequently, the windthrow hazard is only moderate and is less than might be expected on this land. The use of equipment is severely limited by the steep slopes and the rough, broken rocks. Special logging equipment is needed but is difficult to use.

WOODLAND SUITABILITY GROUP 13

Shoals silt loam—the only soil in this group—is a deep, medium-textured, somewhat poorly drained soil on level bottom land. It is flooded at times and has a seasonally high water table. Surface runoff and permeability are slow, and the available moisture capacity is moderate.

The site index is 90 to 105 for pin oak and is 90 to 100 for cottonwood.

Trees favored in natural stands are pin oak, silver maple, and tulip-poplar. Among the species suitable for planting are white pine and cottonwood.

Because the water table is seasonally high, trees do not root deeply and the windthrow hazard is moderate. Limitations on the use of equipment are moderate, for the soil usually is wet late in winter and early in spring. Logging during this wet period damages the shallow roots and compacts the soil.

WOODLAND SUITABILITY GROUP 15

The soils in this group are gently sloping to strongly sloping, moderately deep, moderately coarse textured, and somewhat excessively drained. They are moderately rapid in permeability and have moderately low available moisture capacity. Surface runoff is slow or medium.

The site index is 80 to 85 for upland oaks and is 75 to 85 for tulip-poplar.

The trees to favor in natural stands are black oak, tulip-poplar, red oak, white oak, and black walnut. White pine and red pine are among the trees preferred for planting.

Because the soils in this group are sandy, seedling mortality may be as high as 50 percent on slopes facing south. Erosion is a moderate hazard on slopes of more than 8 percent. All other hazards are rated as slight, though the soils are more suitable as cropland than as woodland.

WOODLAND SUITABILITY GROUP 16

In this group are three miscellaneous land types—Clay pits, Gravel pits, and Mine pits and dumps. Many of the pits and low-lying areas are filled with water. The sloping or strongly sloping spoil has been deposited in high, long ridges. This soil material is moderately to slowly permeable and has moderate available moisture capacity. Erosion is difficult to control in spoil areas.

Estimating the site index is impractical because the condition of the sites and the soil material varies widely.

In areas where natural stands occur, the trees to favor are cottonwood, sycamore, silver maple, and green ash. Trees suitable for planting are white pine, black locust, and jack pine.

This woodland group commonly is not suitable for producing trees. Erosion is a moderate hazard on the steep and broken slopes. Posts and pulpwood can be produced in some areas, but harvesting these crops is difficult. In many places it is necessary to construct logging roads before harvesting.

WOODLAND SUITABILITY GROUP 17

Soils of this group are deep, nearly level to steep, coarse textured, and excessively drained. They are rapidly permeable and have low available moisture capacity. Surface runoff is slow.

The site index is 65 to 75 for upland oaks.

The trees preferred in natural stands are black oak, white oak, and black cherry. Among the trees suitable for planting are white pine, red pine, and jack pine.

Seedling mortality may be as high as 50 percent on steep slopes and on southern exposures. Wind erosion is moderate in places where the soils are left bare for some time. After blowouts are formed, wind erosion is difficult to control. Because the soils of the group are sandy, the use of some types of logging equipment is limited. In steep areas and on sandy ridges, a track-type tractor may be needed.

Oaks on these soils are of low quality and have little resistance to insects and disease. If oaks are heavily damaged by insects and disease, the owner should consider converting to pines.

WOODLAND SUITABILITY GROUP 19

This group consists of strongly sloping to very steep, medium-textured or moderately coarse textured soils that are shallow and excessively drained. These soils are rapidly permeable and have low available moisture capacity. Surface runoff is medium to rapid.

The site index is 60 to 70 for upland oaks.

Trees to favor in natural stands are chinkapin oak, red oak, basswood, and white ash. Among the species suitable for planting are black locust, white pine, and jack pine.

Seedling mortality may be as high as 50 percent on the steeper slopes and on slopes facing south. Erosion is a moderate or severe hazard on the steep and very steep slopes. Gullies are formed rather rapidly and, once formed, are soon deepened into the gravelly substratum. Windthrow is a moderate hazard because root development is shallow. Only a few roots go deeper than 12 to 18 inches. The use of equipment is moderately or severely limited by the short and steep slopes. Needed for logging is a crawler-type tractor equipped with a cable on a winch.

WOODLAND SUITABILITY GROUP 23

This group consists of soils that are of little or no importance in producing timber. Because they are generally not suitable as woodland, their capacity to produce wood crops is not rated.

On these soils tree plantings may become important in windbreaks that protect fields and farmsteads. Among the trees suitable for planting are white pine, red pine, Norway spruce, and arborvitae.

Wildlife [4]

A well-planned and well-managed system of farming maintains the soils and provides food and cover for wildlife. Farming that depletes the soils reduces wildlife and, therefore, leads to an increase in the number of destructive insects, rodents, and other undesirable animal life. On most farms, habitats for wildlife can be improved by practices that supply or increase food and cover (*12*).

On only a few farms in the county is the balance ideal between cover and food for wildlife. Some farms consist almost entirely of class I soils that are used to produce crops. Here, food for wildlife may be abundant but cover is scarce. Other farms consist largely of class VI and class VII soils. Here, the pasture and woods furnish ample cover but food may be scarce.

The soils in the different classes, however, can be managed so that both food and cover are available. On the soils in capability classes I, II, and III where food is ample but cover is scarce, cover can be provided by fence rows, by vegetation in waterways and along drainage ditches and streambanks, by windbreaks, and by perennial borders. In addition to these places of cover, odd areas and areas around ponds and in marshes can be used for both food and cover on soils in classes III, IV, and VI. On class VI and class VII soils, plant wildlife borders that produce seed and fruit and plant small areas to grasses and conifers.

Kinds of wildlife

Most kinds of wildlife common in Indiana live in Parke County, but their numbers vary from one soil association to another. Much of the county has an abundance of edges, or borders, between wooded areas and open areas, and the amount of cover generally does not limit the wild-

[4] By JAMES MCCALL, biologist, Soil Conservation Service.

life population. Cover is especially plentiful on the steep, rolling Russell and Hennepin soils in association 9; and on the Hickory, Cincinnati, Parke, and Negley soils and on Steep stony and rocky land in association 10. On these associations food may be in short supply for bobwhite quail and some songbirds.

Bobwhite quail occur throughout the farmed areas of the county, where their average population is about eight birds per 100 acres. Some of the best quail habitat in the State is on the Ockley, Fox, Warsaw, and Elston soils in association 2; on the sloping Russell, Hennepin, and Chelsea soils in associations 3 and 8; on the Princeton soils in association 3; and on the Alford, Iva, and Fincastle soils in associations 4, 5, 6, and 7. In these areas the population of quail is as high as two coveys per 100 acres.

Ringneck pheasants are not plentiful in the county, though they have been stocked many times. The county does not have good habitat for pheasants, and the average population is less than one bird per 100 acres.

Waterfowl appear in the county during their migrating periods. They are found along the Wabash River and on the adjacent Genesee, Eel, and Shoals soils in association 1. The wood duck commonly nests here and, where water is accessible for rearing a brood of young, competes with the raccoon for hollow trees. Mallard and black duck are the most numerous of more than 25 species of ducks and geese that migrate along their flight lanes in spring and fall. A few mallards and bluewing teals nest in open areas that are idle and in meadows near water. Waterfowl can be encouraged to use the sloughs along the Wabash River by protecting them from human disturbance. A refuge for waterfowl has esthetic value and increases the opportunity for hunting in surrounding areas during the open season.

Songbirds of many kinds are numerous throughout most of the year. Seed-eating birds can be attracted to an area if grain sorghum is planted in a patch near cover that furnishes escape from enemies. Fruit-producing shrubs provide both food and nesting sites. In addition to helping control insects, songbirds offer many hours of recreation to persons who enjoy seeing birds about their homes.

Deer habitat of excellent quality occurs on the rough, broken, stony soils in the Hennepin, Hickory, Russell, and Cincinnati series in associations 9 and 10. Habitat for deer is good in wooded areas of the Genesee, Eel, and Shoals soils in association 1 along the Wabash River and other major streams. An abundance of browse is produced in woodland and along the edges of woodland; most of these areas are not grazed by livestock in Parke County. Developing springs and waterholes is beneficial for deer in places where water is needed. Deer and many other kinds of wildlife make use of salt blocks located in areas that have sufficient food, cover, and water. But hunting illegally and allowing dogs to run free will keep the deer population at a low level, even though the habitat is otherwise satisfactory.

Rabbits and squirrels are the most abundant game mammals in the county. Rabbits prefer agricultural areas, and the edges of these areas, where they can obtain food and cover. Squirrels require wooded habitat and are found mostly on the Hennepin, Russell, Hickory, and Cincinnati soils in associations 9 and 10. Fox squirrels are plentiful in small woodlots next to cultivated fields throughout the county.

Fish. The Wabash River and its tributaries support many kinds of fish common in Indiana. Among the game fish highly prized are bass, bluegill, channel catfish, and perch (fresh-water drum). Many carp, sucker, and buffalo fish are taken on sports tackle. Both commercial and game fishing are done in the several miles of the Wabash River that border the county. Big Raccoon Creek, Sugar Creek, and other tributaries support many warm water game fish.

Furbearing animals. Raccoon, muskrat, mink, skunk, opossum, and other furbearing animals are hunted by sportsmen. Commercial hunting and trapping are not profitable, because prices are too low. Raccoon and opossum are abundant and are increasing in number in wooded areas and along streams.

Preying mammals and birds are numerous in the county. The extensive wooded areas protect dens and nests. Most predators, including hawks, owls, and foxes, are of value most of the time because they consume mice and other rodents in large numbers. An occasional individual needs controlling, however, if it has preyed on chickens or other farm birds.

Use of Soils in Engineering[5]

Soils are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, facilities for water storage, erosion control structures, drainage systems, and sewage disposal systems. The properties most important to the engineer are permeability to water, shear strength, compaction characteristics, soil drainage, shrink-swell characteristics, grain size, plasticity, and pH. Depths to water table and to bedrock also are important. The topographic position of the soils may be significant.

The information in this report can be used to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway and airport locations and in planning detailed soil investigations at the selected locations.
3. Assist in designing drainage systems, farm ponds, diversion terraces, and other structures for soil and water conservation.
4. Locate possible sources of sand and gravel.
5. Correlate performance of structures with soil mapping units and, thus, develop information that is useful in designing and maintaining new structures.
6. Determine the suitability of soil units for cross-county movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and aerial photographs for the purpose of making maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

[5] By A. R. GRUNEWALD, assistant State soil scientist, Soil Conservation Service.

It is not intended that this report will eliminate the need for on-site sampling and testing of sites for design and construction of specific engineering works and uses. It should be used only in planning more detailed field surveys to determine the condition of the soil, in place, at the site of the proposed engineering construction.

Much of the information in this subsection is in tables 8, 9, and 10. The data in table 8 are from actual laboratory tests, and the estimates for the soils listed in tables 9 and 10 were made by comparing these soils with the ones tested.

Information useful for engineering can be obtained from the soil map and from other parts of this report, particularly the sections "Descriptions of the Soils" and "Formation and Classification of Soils." Although the detailed soil map and the tables serve as a guide for evaluating most soils, a detailed investigation at the site of the proposed construction is needed because as much as 15 percent of an area designated as a specific soil on the map may consist of areas of other soils too small to be shown on the published map. By comparing the soil description with the result of investigations at the site, the presence of an included soil can usually be determined.

Some terms used by the soil scientist may be unfamiliar to the engineer, and some terms have special meanings in soil science. These terms, as well as other special terms that are used in this report, are defined in the Glossary.

Engineering classification systems

The U.S. Department of Agriculture (USDA) system of classifying soil texture is used by agricultural scientists. In some ways this system for classifying soils is comparable to the two systems generally used by engineers.

AASHO CLASSIFICATION SYSTEM

Most highway engineers classify soil materials according to the system approved by the American Association of State Highway Officials (*2*). In this system, soil materials are classified in seven principal groups on the basis of their texture and plasticity characteristics. The groups range from A–1 (gravelly soils of high bearing capacity, the best soils for subgrades) to A–7 (clay soils of low strength when wet, the poorest soils for subgrades). Highly organic soils, such as peat and muck, are not included in this classification, because they should not be used in construction or as material for foundations.

Within each of the principal groups, the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest. The group index numbers for the horizons tested are shown in parentheses after the soil group symbol in the next to last column of table 8. The estimated AASHO classification, without the group index number, is given for each soil in the county in table 9.

UNIFIED CLASSIFICATION SYSTEM

Some engineers also use the Unified soil classification system, as contained in reports by the Waterways Experiment Station, Corps of Engineers (*14*). In this system, soils are classified according to their texture and plasticity and their performance as engineering construction materials. The major groupings are of course-textured soils, fine-textured soils, and organic soils. Table 8 shows the Unified classification of the samples tested, and table 9 gives the estimated Unified classification of each soil in Parke County.

210-405—67——3

Engineering test data

Soil samples from three soil series of Parke County were taken from ten locations selected by the Soil Conservation Service. These samples were tested by standard procedures in the laboratories of the Joint Highway Research Project, Purdue University, under sponsorship of the Bureau of Public Roads, to assist in evaluating the soils for engineering purposes. These samples do not represent the entire range of soil characteristics in Parke County, or even within the three soil series sampled, and not all layers of each profile were sampled. The test results, however, have been used as a general guide in estimating the engineering properties of the soils in the county. The test data are given in table 8. The samples tested generally were obtained at a depth of less than 6 feet. Therefore, they are not representative of the soil material in deeper excavations.

The results of the tests and the classification of each sample according to both the AASHO and Unified systems are given in the table. The data were obtained by mechanical analyses and by testing the soils to determine the liquid limits and plastic limits. Mechanical analyses were made by a combination of the sieve and hydrometer methods. The results of the mechanical analyses can be used to determine the relative proportions of the different size particles. Percentages of clay obtained by the hydrometer method should not be used as a basis for naming the textural classes of soils for agricultural purposes.

Table 8 also lists data on the relationship between moisture content and the density of the compacted soil, as determined by the standard methods described in AASHO Designation: T 99–57 (*2*). If the soil material is compacted at a successively higher moisture content, assuming that the same amount of force is used in compacting the soil, the density of the compacted material will increase until the "optimum moisture content" is reached. After that, the density decreases as the moisture content increases. The oven-dry weight in pounds per cubic foot of the soil at the optimum moisture content is the "maximum dry density." Data on the relationship of moisture to density are important in planning earthwork, because generally the soil is most stable if it is compacted to about its maximum dry density when it is at approximately the optimum moisture content.

Engineering interpretations of soils

This subsection is intended as a reference guide and not as a manual for using soil materials in engineered construction. In table 9, the soil types of the county and the symbols for the mapping units on these soil types are listed, and certain characteristics that are significant to engineering use are described. The color of soils and other characteristics that are not important to engineering are omitted. The estimated classification of each important soil layer is given according to the AASHO and the Unified classification systems.

Some features of a soil may be a help in one kind of engineering work and a hindrance in another. For example, a highly permeable substratum makes a soil unsuitable as a site for a farm pond, but it might be favorable for artificial drainage.

TABLE 8.—*Data[1] for soil samples taken from 10 soil profiles, Parke County, Ind.*

Soil name and location	Parent material	SCS report No.	Depth	Horizon	Moisture density[2]: Maximum dry density	Moisture density[2]: Optimum moisture	CBR test[3]: Molded specimen: Dry density	CBR test[3]: Molded specimen: Moisture content	CBR test[3]: CBR	CBR test[3]: Swell	Mechanical analysis[4]: Percentage passing sieve—: ¾-in.	⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Percentage smaller than—: 0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.	Liquid limit	Plasticity index	Classification: AASHO[5]	Classification: Unified[6]
		S60 & S61-Ind-61-	*Inches*		*Lb. per cu. ft.*	*Percent*	*Lb. per cu. ft.*	*Percent*	*Percent*	*Percent*														
Iva silt loam: NE¼NW¼NE¼ sec. 17, T. 14 N., R. 6 W. (Modal)	Loess of Peorian age over Illinoian till.	8-1	0-9	Ap	105	18	105. 7	17. 7	8	0. 07			100	98	93	89	85	69	26	18	29	4	A-4(8)	ML.
		8-2	19-37	B22g	100	21	101. 6	22. 2	6	. 51					100	99	95	77	41	35	48	23	A-7-6(15)	CL.
		8-3	58-68	C1	110	17	110. 2	17. 4	4	. 24				100	99	97	90	60	26	25	33	12	A-6(9)	CL.
Center of NW¼SW¼ sec. 31, T. 14 N., R. 6 W.	Loess of Peorian age over Illinoian till.	6-1	7-13	A2	107	16	108. 7	15. 9	17	. 16				100	96	91	85	65	26	19	32	8	A-4(8)	ML-CL.
		6-2	17-35	B2	107	18	107. 2	16. 8	13	. 13				100	96	92	90	71	37	30	47	22	A-7-6(14)	CL.
		6-3	35-87	B31	112	15	114. 0	15. 6	5	. 20				100	96	82	80	61	33	28	36	18	A-6(11)	CL.
NE¼SE¼NW¼ sec. 35, T. 15 N., R. 6 W.	Loess of Peorian age over Illinoian till.	7-1	18-31	B1	110	17	110. 6	17. 1	4	. 20				100	98	92	86	65	30	23	29	6	A-4(8)	ML-CL.
		7-2	31-38	B21	102	21	104. 6	20. 7	6	. 18			100	99	97	93	90	75	43	37	53	20	A-7-5(15)	MH.
		7-3	38-66	B31	107	17	107. 7	18. 2	4	. 33				100	98	94	90	67	33	27	33	13	A-6(9)	CL.
Reesville silt loam: NE¼NW¼SW¼ sec. 4, T. 17 N., R. 7 W. (Modal)	Loess over glacial till.	1-1	0-7	Ap	103	18	103. 2	18. 7	8	. 13				100	94	92	88	67	28	19	32	7	A-4(8)	ML-CL.
		1-2	14-28	B21g	100	23	98. 3	24. 5	7	. 56			100	99	98	97	96	81	45	36	50	24	A-7-6(16)	ML-CL.
		1-3	30-53	C1	113	14	113. 5	14. 5	19	. 11		100	99	99	98	98	93	62	25	20	32	11	A-6(8)	CL.
NE¼NW¼NW¼ sec. 11, T. 14 N., R. 8 W. (Modal)	Loess over Illinoian drift, chiefly till.	10-1	0-9	Ap	101	20	101. 6	19. 3	12	. 42			100	99	96	93	88	67	25	15	34	5	A-4(8)	ML or OL.
		10-2	13-27	B21	99	23	98. 5	23. 4	5	. 29						100	94	75	41	34	52	27	A-7-6(17)	CH.
		10-3	46-90	C2	112	15	111. 4	16. 1	12	. 18					100	99	95	75	27	23	29	6	A-4(8)	ML-CL.
SE¼NE¼NE¼ sec. 30, T. 16 N., R. 7 W.	Loess over glacial till.	3-1	0-9	Ap	103	18	103. 3	17. 8	18	. 40			100	98	93	88	85	67	26	18	31	11	A-6(8)	CL.
		3-2	15-24	B22mg	99	23	98. 5	24. 0	7	. 53				100	99	97	91	70	43	36	59	27	A-7-5(19)	MH-CH.
		3-3	45-72	C2	108	17	108. 7	17. 9	5	. 31				100	99	98	94	70	30	24	38	16	A-6(10)	CL.
NW¼NE¼ sec. 1, T. 16 N., R. 8 W.	Loess over glacial till.	4-1	0-11	Ap	96	22	94. 8	2. 15	10	. 49				100	96	92	87	65	22	13	41	14	A-7-6(10)	ML-CL.
		4-2	19-30	B22m	104	20	104. 5	19. 4	8	. 42				100	99	98	93	70	40	34	57	27	A-7-5(18)	MH-CH.
		4-3	45-70	C2	112	15	112. 6	15. 5	20	. 33				100	99	98	93	60	23	17	32	10	A-4(8)	ML-CL.
SE¼NW¼SE¼ sec. 21, T. 15 N., R. 8 W.	Loess over Illinoian drift, chiefly till.	2-1	0-9	Ap	111	17	107. 8	17. 4	10	. 27				100	92	89	85	66	28	19	36	12	A-6(9)	ML-CL.
		2-2	13-32	B22mg	102	21	102. 4	20. 3	11	. 96				100	99	98	97	88	53	46	65	38	A-7-6(20)	CH.
		2-3	48-55	C2	109	16	110. 3	17. 7	6	. 20				100	99	98	90	65	28	22	34	13	A-6(9)	CL.
NW¼SE¼SW¼ sec. 14, T. 15 N., R. 8 W.	Loess over Illinoian drift, chiefly till.	9-1	0-6	Ap	103	18	104. 4	17. 7	11	. 31	100	99	99	99	95	93	84	65	27	17	30	4	A-4(8)	ML or OL.
		9-2	10-27	B2	100	20	101. 6	21. 1	10	1. 44				100	99	98	97	87	54	45	63	34	A-7-6(20)	CH.
		9-3	32-48	C1	110	17	111. 1	16. 3	9	. 20				100	99	98	90	65	26	20	33	11	A-6(8)	ML-CL.
Whitson silt loam: NE¼SE¼SW¼ sec. 35, T. 5 N., R. 8 W.	Loess over Illinoian till.	5-1	0-9	Ap	103	18	103. 4	17. 8	15	. 60				100	98	96	91	72	33	22	36	12	A-6(9)	ML-CL.
		5-2	9-22	B21m	94	22	101. 5	21. 8	8	1. 31				100	99	98	95	83	53	43	67	29	A-7-5(20)	MH.
		5-3	53-89	C2	111	15	110. 4	14. 9	21	. 33				100	99	98	90	59	21	17	31	8	A-4(8)	ML-CL.

[1] Tests performed by Purdue University in cooperation with the Indiana State Highway Commission and U.S. Department of Commerce, Bureau of Public Roads, in accordance with standard procedures of the American Association of State Highway Officials (AASHO), except the CBR test.

[2] Based on the Moisture-density Relations of Soils Using 5.5-lb. Rammer and 12-in. Drop. AASHO Designation: T 99-57, Method A *(2)*.

[3] The soil sample is prepared according to AASHO Designation: T 87-49. Water is added to bring moisture content to within ±0.5 percent of optimum. Specimens are compacted according to AASHO Designation: T 99-57, Method B, to within ±1 lb. per cubic foot of maximum dry density, a surcharge of 35 pounds is added, and the specimen is soaked from top and bottom for 4 days. The penetration is performed at a rate of 0.05 inch per minute, while the 35-pound surcharge is on the specimen. The CBR value is for 0.1 inch penetration.

[4] Mechanical analyses according to the AASHO Designation: T 88 *(2)*. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[5] Based on methods described in Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes. AASHO Designation: M 145-49 *(2)*.

[6] Based on the Unified Soil Classification System. Technical Memorandum No. 3-357, volume 1, Waterways Experiment Station, Corps of Engineers, March 1953 *(14)*.

TABLE 9.—*Estimated properties of soils*

[Not listed are Clay pits (Cp), Gravel pits (Gr), and Mine pits and dumps (Mp)]

Soil type and map symbol	Depth from surface	Classification: USDA texture	Classification: Unified	Classification: AASHO	Percentage passing sieve—: No. 4	No. 10	No. 40	No. 200	Permeability	Available water capacity	Reaction	Hazard of frost damage	Shrink-swell potential
	Inches								*Inches per hour*	*Inches per inch of soil*	*pH*		
Alford silt loam (AfB2, AfC2, AhC3).	0-12	Silt loam	ML or CL	A-4	100	95-100	95-100	85-95	0.8-2.5	0.20	5.6-6.5	High	Low to moderate.
	12-41	Silty clay loam	CL	A-7	100	95-100	90-95	85-95	0.2-2.5	.18	5.1-5.5	Moderate to high	Moderate.
	41-60	Silt loam	ML	A-4	100	95-100	90-95	85-95	0.8-2.5	.20	5.6-6.5	Moderate to high	Low.
Allison silty clay loam (Al).	0-18	Silty clay loam	CL	A-6	100	95-100	90-100	80-90	0.2-0.8	.22	6.6-7.3	Moderate	Moderate.
	18-36	Silty clay loam	CL or CH	A-6 or A-7	100	95-100	90-100	80-90	0.2-0.8	.19	6.6-7.3	Moderate	Moderate to high.
	36	Silty clay loam areas with variable materials.	CL; variable	A-6 or A-7	100	95-100	90-100	80-90	0.2-0.8	.19	6.6-8.4	Moderate	Moderate.
Armiesburg silty clay loam (Ar).	0-12	Silty clay loam	CL	A-6	100	100	90-95	85-95	0.2-2.5	.18	6.6-7.3	Moderate	Moderate.
	12-30	Silty clay loam	CL	A-4 or A-6	100	100	95-100	85-95	0.8-2.5	.20	6.6-7.3	High	Moderate.
	40	Silty clay loam, silt loam, and seams of sandy loam and loam.	ML or CL	A-4	100	100	80-90	60-70	0.8-2.5	.18	[1] 6.6-8.4	Moderate to high	Low to moderate.
Ayrshire fine sandy loam (As).	0-17	Fine sandy loam	ML	A-4	100	95-100	85-95	50-80	2.5-5.0	.14	5.6-6.0	Moderate	Low.
	17-50	Sandy clay loam	SC	A-2 or A-6.	100	95-100	85-95	30-40	0.8-2.5	.16	5.1-5.5	Moderate	Low to moderate.
	50-68	Loam	ML	A-4	100	95-100	70-80	55-65	0.8-2.5	.16	5.1-6.0	Moderate to high	Low.
	68	Layers of fine sandy loam and silt	ML or SM	A-4	100	95-100	85-95	50-70	0.8-2.5	.16	5.6-6.0	Moderate	Low.
Bonpas silty clay loam (Bp).	0-10	Silty clay loam	CL	A-6	100	95-100	90-95	85-95	0.2-0.8	.21	6.1-6.5	Moderate	Moderate.
	10-25	Silty clay loam to silty clay	CL or CH	A-7	100	95-100	90-100	90-100	.05-0.8	.19	6.1-7.3	Moderate to high	Moderate to high.
	25-50	Silty clay loam	CL	A-7	100	95-100	90-95	85-95	0.2-0.8	.19	6.6-7.3	Moderate to high	Moderate.
	50-100	Stratified and interbedded silt and fine sandy loam.	ML or SM	A-4	100	95-100	85-95	50-80	0.8-2.5	.19	(1)	High	Low.
Camden loam (CaA, CaB). Camden silt loam (CdA, CdB, CdC2).	0-11	Loam or silt loam	ML	A-4	100	95-100	95-100	70-90	0.8-2.5	.20	5.6-6.5	Moderate to high	Low.
	11-22	Silty clay loam	CL	A-6	100	95-100	90-95	75-85	0.2-0.8	.19	5.1-6.0	Moderate	Moderate.
	22-36	Clay loam to silty clay	CL	A-6	100	95-100	90-95	65-75	0.2-0.8	.17	5.1-5.5	Moderate	Moderate.
	36-75	Sandy clay loam	SC or CL	A-4	100	95-100	85-95	45-65	0.8-2.5	.17	5.1-7.3	Moderate	Low to moderate.
	75	Stratified sand, silt, and some gravel	ML or SM	A-4	100	95-100	55-90	40-80	5-10	.03	(1)	Low	Low.
Chelsea loamy fine sand (ChB, ChC, ChD, ChF).	0-12	Loamy fine sand	SP or SM	A-2	100	100	90-100	10-25	5-10	.05	4.5-6.0	Low	Low.
	12-50	Loamy fine sand	SM	A-2	100	100	95-100	10-25	5-10	.05	4.5-6.0	Low	Low.
	50-72	Loamy fine sand; seams of sandy loam	SM or SP	A-2 or A-3	100	100	80-90	5-15	5-10	.05	4.5-6.0	Low	Low.
	72	Fine sand	SP or SM	A-2	100	100	55-65	10-15	5-10	.03	4.5-6.0	Low	Low.
Cincinnati-Hickory complex (CnD2, CnD3).[2]	0-10	Silt loam	ML	A-4	100	95-100	95-100	85-95	0.8-2.5	.20	5.1-5.5	High	Low.
	10-27	Silty clay loam	CL	A-6	100	95-100	90-95	85-95	0.2-0.8	.19	4.6-5.0	Moderate to high	Moderate.
	27-48	Heavy silt loam	ML or CL	A-6	100	95-100	95-100	85-95	0.8-2.5	.20	4.6-5.0	High	Low to moderate.
	48-96	Clay loam	CL	A-6	100	95-100	90-95	65-75	0.2-0.8	.18	4.6-5.5	Moderate to high	Moderate.
	96-108	Loam to clay loam	ML or CL	A-4	100	95-100	80-90	55-70	0.8-2.5	.18	5.1-6.0	Moderate to high	Low to moderate.
	108	Loam	ML	A-4	100	95-100	75-85	60-70	0.2-0.8	.15	(1)	Moderate to high	Low.
Eel loam (Ea, Eb). Eel silt loam (El, Em).	0-10	Silt loam or loam	ML	A-4	100	100	95-100	80-95	0.8-2.5	.20	6.3-7.3	Moderate to high	Low.
	10-40	Silt loam	ML or CL	A-4 or A-6	100	100	95-100	85-95	0.8-2.5	.19	6.3-7.3	Moderate to high	Low to moderate.
	40	Variable	ML or CL	A-4	100	90-100	70-90	50-80	0.8-2.5	0.14-0.18	7.3-8.4	Moderate	Low.
Eel silty clay loam (En).	0-8	Silty clay loam	CL	A-6	100	95-100	90-95	85-95	0.2-0.8	.19	6.1-7.3	Moderate	Moderate.
	8-16	Silty clay loam to heavy silt loam	CL	A-6 or A-7	100	95-100	95-100	85-95	0.2-0.8	.19	6.6-7.3	Moderate to high	Moderate.
	16-40	Silt loam	ML or CL	A-6	100	95-100	95-100	85-95	0.8-2.5	.20	6.6-8.4	High	Low.
	40	Variable	ML	A-4	100	95-100	80-90	70-80	0.8-2.5	.18	(1)	Moderate to high	Low.
Elston loam (EoA). Elston sandy loam (EsA, EsC2).	0-8	Loam or sandy loam	ML or OL	A-4	100	95-100	95-100	60-70	0.8-2.5	.20	5.5-6.5	Moderate to high	Low.
	8-18	Loam	ML	A-4	100	95-100	95-100	60-70	0.8-2.5	.16	5.5-6.0	Moderate to high	Low.
	18-42	Sandy clay loam to light clay loam	CL	A-6	100	95-100	95-100	35-45	0.8-2.5	.18	5.1-5.5	Moderate	Moderate.
	42-78	Sandy loam to loamy sand	SM	A-2	100	95-100	80-90	20-30	2.5-10	.08	5.1-6.0	Low	Low.
	78	Medium and coarse sand	SP or SM	A-2	100	95-100	55-65	10-15	5-10	.03	5.5-6.5	Low	Low.
Fincastle silt loam (FcA, FcB).	0-14	Silt loam	ML	A-4	100	95-100	95-100	85-95	0.8-2.5	.20	5.1-6.5	Moderate to high	Low.
	14-33	Silty clay loam	CL	A-6	100	95-100	90-95	85-95	0.2-0.8	.19	5.1-5.5	Moderate	Moderate.
	33-60	Clay loam	CL	A-6	100	95-100	90-95	65-75	0.2-0.8	.17	5.6-7.3	Moderate	Moderate.
	60	Loam	ML	A-4	100	95-100	75-85	60-70	0.2-0.8	.15	(1)	Moderate to high	Low.
Fox loam (FmA, FmB, FmC2, FmD2). Fox sandy loam (FsA, FsB, FsC, FsD2). Fox silt loam (FtA, FtB, FtD2).	0-10	Silt loam, loam, or sandy loam	ML or SM	A-4	100	95-100	85-100	50-65	0.8-5.0	.17-.20	5.6-6.5	High to moderate	Low.
	10-38	Gravelly clay loam	CL	A-4 or A-6	70-80	70-80	60-70	50-60	0.8-2.5	.16	5.1-6.0	Moderate	Moderate.
	38	Stratified sand and gravel	GP or SP	A-1	50-80	35-70	15-30	0-10	16	.02	(1)	Low	Low.

See footnotes at end of table.

TABLE 9.—*Estimated properties of soils*—Continued

Soil type and map symbol	Depth from surface	Classification			Percentage passing sieve—				Permeability	Available water capacity	Reaction	Hazard of frost damage	Shrink-swell potential
		USDA texture	Unified	AASHO	No. 4	No. 10	No. 40	No. 200					
	Inches								*Inches per hour*	*Inches per inch of soil*	*pH*		
Genesee fine sandy loam (Gf).	0–10	Fine sandy loam, loam, or silt loam	SM or ML	A-4	100	95–100	80–100	40–80	0.8–5.0	.17–.20	6.6–7.6	Moderate to high	Low.
Genesee loam (Gh, Gm).	10–30	Silt loam	ML	A-4	100	95–100	95–100	75–80	0.8–2.5	.20	6.6–7.6	Moderate to high	Low.
Genesee silt loam (Gn, Go).	30	Silt loam and seams of sand, fine sandy loam, and loam.	ML or CL	A-4	100	95–100	90–100	70–85	0.8–2.5	.18	[3] 6.6–7.6	Moderate to high	Low.
Hennepin association (HnF).	0–8	Loam	ML	A-4	100	95–100	95–100	60–70	0.8–2.5	.17	6.1–6.5	Moderate to high	Low.
Hennepin-Russell complex (HrE2).[4]	8–16	Clay loam	CL	A-6	100	95–100	90–95	65–75	0.2–0.8	.17	6.6–7.3	Moderate	Moderate.
	16	Loam to clay loam	ML or CL	A-4 or A-6	100	95–100	95–100	60–70	0.2–0.8	.15	[1] 6.6–7.3	Moderate to high	Low to moderate.
Hickory complex (HsE, HsF).	0–10	Silt loam	ML	A-4	100	95–100	95–100	85–95	0.8–2.5	.20	5.1–6.0	Moderate to high	Low.
	10–14	Light silty clay loam	CL	A-6	100	95–100	90–95	85–95	0.2–2.5	.19	5.1–5.5	Moderate	Moderate.
	14–68	Clay loam	CL	A-6	100	95–100	90–95	65–75	0.2–0.8	.18	4.6–6.5	Moderate	Moderate.
	68	Loam	ML	A-4	100	95–100	75–85	60–70	0.2–0.8	.15	([1])	Moderate to high	Low.
Huntsville silt loam (Hu).	0–12	Silt loam	ML or OL	A-4	100	95–100	95–100	85–95	0.8–2.5	.23	6.6–7.3	Moderate to high	Low.
	12–30	Silt loam	ML	A-4	100	95–100	95–100	85–95	0.8–2.5	.20	[1] 6.6–8.4	Moderate to high	Low.
Iva silt loam (IvA, IvB).	0–13	Silt loam	ML or CL	A-4	100	95–100	90–100	85–95	0.8–2.5	.20	5.6–6.5	High	Low to moderate.
	13–48	Silty clay loam	CL	A-6 or A-7	100	95–100	90–100	85–95	0.5–0.2	.18	5.1–5.5	High	Moderate.
	48–72	Silt loam	CL	A-6	100	95–100	90–100	85–95	0.2–0.8	.18	5.1–5.5	High	Moderate.
	72	Loam	ML	A-4	100	95–100	80–90	60–70	0.2–0.8	.15	([1])	Moderate to high	Low.
Linwood muck (Lm).	0–18	Muck	Pt	----	----	----	----	----	5–10	>.25	5.6–6.0	Moderate	Low.
	18–24	Mucky peat	Pt	----	----	----	----	----	5–10	>.25	5.6–6.0	Moderate	Low.
	24	Silt loam or loam	ML or CL	A-4 or A-6	100	95–100	95–100	70–80	0.2–2.5	.20	([1])	Moderate to high	Low to moderate.
Negley soils (NsE).	0–9	Loam	ML	A-4	100	95–100	95–100	60–70	0.8–2.5	.18	5.1–5.5	Moderate to high	Low.
	9–36	Sandy clay loam	SC	A-2 or A-6	100	95–100	85–95	30–40	0.8–2.5	.17	4.6–5.0	Moderate	Low to moderate.
	36–50	Light sandy clay loam to loam	SC or ML	A-4 or A-6	100	95–100	85–95	45–60	0.8–2.5	.17	4.6–5.0	Moderate to high	Low to moderate.
	50	Sandy loam	SM	A-2	100	95–100	80–90	20–30	2.5–5.0	.14	5.1–5.5	Moderate	Low.
Ockley loam (OaA, OaB).	0–13	Silt loam or loam	ML	A-4	100	95–100	90–100	85–95	0.8–2.5	.20	5.1–6.0	Moderate to high	Low.
Ockley silt loam (OcA, OcB, OcC2).	13–36	Silty clay loam	CL	A-6	100	95–100	90–100	80–90	0.2–0.8	.19	5.6–6.0	Moderate	Moderate.
	36–65	Clay loam to sandy clay loam	CL or SC	A-6 or A-4	100	95–100	85–95	45–60	0.2–2.5	.18	5.6–6.5	Moderate	Moderate.
	65	Stratified sand and gravel	GP, SP or SM	A-1 or A-2	50–80	35–70	15–30	0–10	10	.02	([1])	Low	Low.
Parke silt loam (PaB, PaC2, PaD2).	0–18	Silt loam	ML	A-4	100	95–100	95–100	85–95	0.8–2.5	.20	5.6–6.0	Moderate to high	Low.
	18–38	Silty clay loam	CL	A-6	100	95–100	90–100	80–90	0.2–0.8	.19	4.6–5.5	Moderate	Moderate.
	38–60	Clay loam to sandy clay loam	CL or SC	A-6 or A-4	100	95–100	85–95	45–60	0.2–2.5	.18	5.1–5.5	Moderate	Moderate.
	60–84	Loam to gravelly loam	ML	A-4	80–90	80–90	80–90	60–70	0.8–2.5	.18	5.1–6.0	Moderate to high	Low.
	84	Sandy loam to loamy sand	SM	A-2	100	95–100	75–90	20–30	2.5–10	.06	6.6–7.3	Low	Low.
Princeton fine sandy loam (PrA, PrB, PrC2, PrD2, PrE).	0–14	Fine sandy loam	SM	A-4	100	95–100	80–90	40–50	2.5–5.0	.15	6.1–6.5	Moderate	Low.
	14–30	Sandy clay loam	SC	A-2 or A-6	100	95–100	85–95	30–40	0.8–2.5	.17	4.6–5.0	Moderate	Low to moderate.
	30–70	Sandy loam to sandy clay loam	SM or SC	A-4 or A-2	100	90–100	80–90	30–40	0.8–2.5	.16	4.6–5.5	Moderate	Low.
	70–102	Sandy loam	SM	A-2	100	90–100	80–90	20–30	2.5–5.0	.12	5.1–6.5	Moderate	Low.
	102	Sand	SP or SM	A-3	85–100	85–95	40–50	0–10	5–10	.03	6.1–7.3	Low	Low.
Ragsdale silt loam (Ra).	0–16	Silt loam or silty clay loam	ML or CL	A-4 or A-6	100	95–100	95–100	85–95	0.2–2.5	.22	5.6–6.5	Moderate to high	Low to moderate.
Ragsdale silty clay loam (Rc).	16–50	Silty clay loam	CL	A-6 or A-7	100	95–100	95–100	85–95	0.2–0.8	.19	6.1–6.5	Moderate	Moderate.
	50–75	Silt loam	ML or CL	A-4 or A-6	100	95–100	95–100	90–95	0.8–2.5	.20	6.1–8.4	Moderate to high	Low to moderate.
	75	Clay loam	CL	A-6	100	95–100	85–95	55–75	0.8–2.5	.18	([1])	Moderate	Low to moderate.
Reesville silt loam (ReA, ReB).	0–13	Silt loam	ML or CL	A-4 or A-6	100	95–100	95–100	90–95	0.8–2.5	.20	5.6–6.0	Moderate to high	Low.
	13–36	Silty clay loam	CL	A-6 or A-7	100	95–100	95–100	95–100	0.2–0.8	.19	4.6–5.0	Moderate	Moderate.
	36–54	Silt loam	ML or CL	A-6	100	95–100	95–100	95–100	0.8–2.5	.20	5.6–7.6	High	Low to moderate.
	54	Loam	ML	A-4 or A-6	100	95–100	95–100	80–90	0.8–2.5	.18	([1])	Moderate to high	Low.
Rodman gravelly soils (RoE, RoF).	0–3	Gravelly loam	ML	A-4	75–80	75–80	65–75	50–60	0.8–2.5	.16	6.6–7.3	Moderate to high	Low.
	3–8	Gravelly clay loam	CL	A-6	75–80	75–80	60–70	60–70	0.2–2.5	.16	6.6–8.4	Moderate	Moderate.
	8	Fine gravel and sand	SW or SP	A-1	70–80	60–70	15–25	0–10	5–10	.02	([1])	Low	Low.
Russell loam (RsB, RsC).	0–18	Loam	ML	A-4	100	95–100	80–95	60–70	0.8–2.5	.16	5.6–6.0	Moderate to high	Low.
	18–36	Silty clay loam	CL	A-6	100	95–100	90–100	85–95	0.2–0.8	.18	5.1–5.5	Moderate	Moderate.
	36–60	Clay loam	CL	A-6	100	95–100	90–95	65–75	0.2–0.8	.18	5.6–6.5	Moderate	Moderate.
	60	Loam	ML or CL	A-4 or A-6	100	95–100	80–90	60–70	0.2–0.8	.18	([1])	Moderate to high	Low to moderate.

See footnotes at end of table.

TABLE 9.—*Estimated properties of soils*—Continued

Soil type and map symbol	Depth from surface	Classification: USDA texture	Classification: Unified	Classification: AASHO	Percentage passing sieve—: No. 4	No. 10	No. 40	No. 200	Permeability	Available water capacity	Reaction	Hazard of frost damage	Shrink-swell potential
	Inches								*Inches per hour*	*Inches per inch of soil*	*pH*		
Russell silt loam (RtB2, RtC2, RtD2). Russell soils (RuB3, RuC3, RuD3).	0-12	Silt loam	ML	A-4	100	95-100	95-100	85-95	0.8-2.5	.20	5.6-6.5	Moderate to high	Low.
	12-35	Silty clay loam	CL	A-6	100	95-100	90-100	85-95	0.2-2.5		5.1-5.5	Moderate	Moderate.
	35-60	Clay loam	CL	A-6	100	95-100	90-95	65-75	0.2-2.5		5.6-6.5	Moderate	Moderate.
	60	Loam	ML or CL	A-4 or A-6	100	95-100	80-90	60-70	0.2-0.8		(1)	Moderate to high	Low to moderate.
Shoals silt loam (Sb).	0-40	Silt loam	ML	A-4	100	95-100	95-100	85-95	0.8-2.5	.21	6.5-8.4	Moderate to high	Low.
	40	Silt loam (and layers of sand and sandy loam).	ML	A-4	100	95-100	90-100	75-85	0.8-2.5	.20	(1)	Moderate to high	Low.
Sleeth loam (ShA). Sleeth silt loam (SmA).	0-8	Silt loam or loam	ML	A-4	100	95-100	95-100	85-95	0.8-2.5	.20	5.6-6.5	Moderate to high	Low.
	8-32	Silty clay loam	CL	A-6	100	95-100	90-100	85-95	0.2-0.8	.18	5.1-6.0	Moderate	Moderate.
	32-72	Sandy clay loam	SC	A-2 or A-6	100	95-100	85-95	40-80	0.8-2.5	.17	5.6-7.3	Moderate	Low to moderate.
	72	Stratified sand, silt, and some gravel	ML or SM	A-4	100	95-100	90-100	30-40	0.8-2.5	.16	(1)	Moderate to high	Low.
Steep stony and rocky land (St).	0-6	Loam	ML	A-4	100	95-100	90-100	60-70	0.8-2.5	.16	4.6-5.0	Moderate to high	Low.
	6-18	Sandy loam	SM	A-4 or A-2	100	95-100	80-90	20-30	2.5-5.0	.12	4.6-5.0	Low to moderate	Low.
	18	Sandstone bedrock							<.05		5.1-5.5		
Warsaw loam (WbA, WbB, WbC2). Warsaw silt loam (WcA, WcB).	0-11	Loam or silt loam	ML	A-4	100	95-100	90-100	60-95	0.8-2.5	0.19-0.22	6.1-6.5	Moderate to high	Low.
	11-42	Gravelly clay loam	CL	A-6	75-80	75-80	70-80	60-70	0.8-2.5	.18	5.6-7.3	Moderate to high	Moderate.
	42	Sand and gravel	GP or SP-SM	A-1	70-80	60-70	15-30	0-10	5-10	.03	(1)	Low	Low.
Westland silt loam (Wo). Westland silty clay loam (Wp).	0-20	Silty clay loam or silt loam	CL or OL	A-6	100	95-100	95-100	85-95	0.2-0.8	.20	6.1-6.5	Moderate to high	Moderate.
	20-55	Gravelly clay loam	CL	A-6	75-80	75-80	60-70	60-70	0.2-2.5	.18	6.5-7.3	Moderate to high	Moderate.
	55	Stratified sand and gravel	GP, SP, or SM	A-1	70-80	60-70	15-30	0-10	5-10	.02	(1)	Low	Low.
Westland loam, loamy substratum (Wd). Westland silty clay loam, loamy substratum (Wr).	0-13	Loam or silty clay loam	ML or OL	A-4	100	95-100	95-100	60-70	0.8-2.5	.19	6.1-7.3	Moderate to high	Low.
			CL or OL	A-6	100	95-100	90-95	85-95	0.2-0.8	.20	6.1-7.3	Moderate	Moderate.
	13-36	Silty clay loam	CL	A-6 or A-7	100	95-100	90-95	85-95	0.2-0.8	.19	6.6-7.3	Moderate to high	Moderate.
	36-55	Sandy clay loam	SC	A-2 or A-6.	100	95-100	85-95	40-80	0.8-2.5	.16	6.6-7.3	Moderate	Low to moderate.
	55	Stratified sand and silt; thin strata of gravel or clay.	ML or SM	A-4	100	95-100	95-100	30-40	0.8-2.5	.20	(1)	Moderate to high	Low.
Whitson silt loam (Ww).	0-9	Silt loam	ML or CL	A-4 or A-6	100	100	95-100	90-100	0.8-2.5	.21	5.6-6.0	Moderate to high	Low to moderate.
	9-22	Silty clay	CL or CH	A-7	100	100	95-100	90-100	<.05	.17	5.6-6.0	Moderate to high	Moderate to high.
	22-46	Silty clay loam	CL	A-6 or A-7	100	100	95-100	90-100	0.2-0.3	.19	6.1-7.3	Moderate to high	Moderate.
	46-89	Silt loam	ML	A-4	100	100	90-100	90-100	0.2-0.8	.21	6.6-8.4	High	Low.
	89	Clay loam	CL	A-6	100	100	70-80	60-70	0.2-0.8	.18	6.5-7.0	Moderate to high	Moderate.
Zipp silty clay loam (Zc).	0-9	Silty clay loam	CL	A-6	100	95-100	90-100	90-100	0.2-0.8	.20	6.6-7.3	Moderate to high	Moderate.
	9-40	Silty clay	CL or CH	A-7	100	95-100	90-100	90-100	<.05	.18	6.6-7.3	Moderate to high	High.
	40	Silty clay loam; thin lenses of silt and clay.	CL	A-7	100	95-100	90-100	90-100	.05-0.2	.19	6.6-7.3	Moderate to high	Moderate to high.

[1] Calcareous.
[2] Cincinnati soils only; for estimated properties of the Hickory soils, see the Hickory complexes.
[3] Noncalcareous on high bottoms; commonly calcareous on first bottoms.
[4] Hennepin soils only; for estimated properties of the Russell soils, see descriptions of those soils.

TABLE 10.—*Interpretations of engineering properties of soils in Parke County, Indiana*

Soil series and map symbol	Suitability [1] as a source of—: Topsoil	Suitability [1] as a source of—: Sand and gravel	Suitability [1] for—: Road subgrade	Suitability [1] for—: Foundations for low buildings	Soil features affecting—: Highway location	Soil features affecting—: Dikes and levees	Soil features affecting—Continued: Farm ponds: Reservoir area	Farm ponds: Embankments	Agricultural drainage	Terraces and diversions	Grassed waterways	Limitations for septic tank fields	Corrosion potential for conduits
Alford (AfB2, AfC2).	Surface layer good (deep but erosive on slopes); subsoil fair (erosive on slopes).	Not suitable	Subsoil and substratum poor (low stability; poor bearing capacity).	Good to fair; medium shear strength and compressibility; permeable; low to moderate shrink-swell potential.	Cuts and fills commonly needed; unstable when wet; poor bearing capacity; erosive on embankments.	Fair stability; medium compressibility; very poor resistance to piping.	Well drained; medium to slow seepage.	Semipervious to impervious; fair stability; good to poor compaction; close control essential.	Not needed; moderate permeability; sloping.	Soil features favorable.	Gently sloping to sloping; subject to runoff and erosion.	Slight; moderately permeable material.	Metal low; concrete low.

See footnote at end of table.

TABLE 10.—*Interpretations of engineering properties of soils in Parke County, Indiana*—Continued

Soil series and map symbol	Suitability [1] as a source of— Topsoil	Suitability [1] as a source of— Sand and gravel	Suitability [1] for— Road subgrade	Suitability [1] for— Foundations for low buildings	Soil features affecting— Highway location	Soil features affecting— Dikes and levees	Soil features affecting—Continued Farm ponds: Reservoir area	Soil features affecting—Continued Farm ponds: Embankments	Soil features affecting—Continued Agricultural drainage	Soil features affecting—Continued Terraces and diversions	Soil features affecting—Continued Grassed waterways	Limitations for septic tank fields	Corrosion potential for conduits
Allison (Al)	Surface layer fair; subsoil poor.	Not suitable	Subsoil and substratum poor (high volume change; poor bearing capacity when wet).	Fair; subject to overflow; poor bearing capacity when wet; subject to frost heaving.	Subject to overflow; poor to fair stability; subject to frost heaving.	Fair stability; medium compressibility; fair resistance to piping; intermittently wet.	High water table; slow seepage; subject to overflow.	Semipervious to impervious; fair stability; good compaction but poor when wet; high water table.	Not needed; moderately slow permeability; subject to overflow.	Not needed; level.	Not needed; level.	Severe; subject to flooding.	Metal moderate to high; concrete low.
Armiesburg (Ar)	Surface layer fair; subsoil fair to poor (clayey).	Not suitable	Subsoil and substratum poor (difficult to compact when wet; subject to flooding).	Fair; medium shear strength and compressibility; permeable; subject to seasonal flooding; low to moderate shrink-swell potential.	Subject to overflow and frost heaving.	Fair stability; medium compressibility; poor resistance to piping.	Subject to overflow; well drained.	Semipervious to impervious; fair stability; fair to good compaction; high water table.	Not needed; moderate permeability; random tile installed through soil from adjacent wet areas.	Not needed; level.	Not needed; level.	Severe; subject to stream flooding.	Metal moderate; concrete low.
Ayrshire (As)	Surface layer fair (droughty); subsoil fair to poor (high water table).	Not suitable	Subsoil fair (moderate to low volume change; fair bearing capacity; high water table); substratum fair.	Fair; medium sheer strength and compressibility; permeable; high water table; subject to frost heaving.	High water table; fair bearing capacity; subject to frost heaving.	Fair stability; slight to medium compressibility; poor to good resistance to piping; intermittently wet.	High water table; medium to slow seepage.	Semipervious to impervious; fair stability and compaction; high water table.	High water table; moderate permeability; subsurface drainage needed.	Not needed; level.	Not needed; level.	Moderate to severe; seasonally high water table.	Metal low; concrete low.
Bonpas (Bp)	Surface layer fair; subsoil fair to poor (clayey, high water table).	Not suitable	Subsoil and substratum poor (high volume change; low bearing capacity; high water table).	Poor; low shear strength; high compressibility; slowly permeable; high water table; moderate to high shrink-swell potential.	High water table; poor stability; low bearing capacity; subject to frost heaving.	Fair stability; high compressibility; good to excellent resistance to piping; intermittently wet.	High water table; slow seepage; suited to pit ponds.	Semipervious to impervious; poor to fair stability; fair compaction.	High water table; slow permeability; surface and subsurface drainage needed.	Not needed; depressional; wet.	Not needed; depressional; wet.	Severe; high water table; slowly permeable material.	Metal high; concrete low.
Camden (CdA, CdB, CdC2)	Surface layer good; subsoil fair.	Not suitable in upper profile; fair in underlying material (sand with some fines; 10 to 15 percent passes No. 200 sieve).	Subsoil poor (poor bearing capacity); substratum good (low volume change and good bearing strength).	Good; medium shear strength; low compressibility; permeable; low shrink-swell potential.	Cuts and fills commonly needed; fair bearing capacity, substratum has good stability.	Fair stability; medium compressibility except in substratum, which has slight compressibility; poor to fair resistance to piping.	Well drained; medium to slow seepage.	Semipervious to impervious; fair stability and good compaction; substratum fairly stable and pervious; good compaction; rapid seepage in substratum.	Not needed; moderate permeability.	Soil features favorable.	Soil features favorable.	Slight; substratum porous sand; hazard of contaminating nearby water supplies.	Metal low; concrete low.
Chelsea (ChB, ChC, ChD, ChF).	Surface layer and subsoil poor (low available moisture capacity).	Fair; highly variable stratified materials.	Subsoil good; substratum fair to good (low volume change; good to fair bearing capacity; lacks stability under wheel loads except when damp; low shrink-swell and frost potential).	Good to fair; medium shear strength; low compressibility; low shrink-swell potential; rapidly permeable.	Cuts and fills commonly needed; loose, sandy material often hinders hauling; difficult to vegetate.	Good to fair stability; slight to very slight compressibility; poor resistance to piping.	Sandy material too porous to hold water; rapid seepage.	Semipervious to impervious; fair stability; fair compaction.	Not needed; rapid permeability.	Not needed; porous sand; little runoff.	Not needed; porous sand; little runoff.	Slight; rapid permeability, porous materials, hazard of contaminating nearby water supplies; layout and construction are problems on slopes exceeding 10 percent.	Metal low; concrete low.

See footnote at end of table.

TABLE 10.—*Interpretations of engineering properties of soils in Parke County, Indiana*—Continued

Soil series and map symbol	Suitability [1] as a source of—		Suitability [1] for—		Soil features affecting—		Soil features affecting—Continued					Limitations for septic tank fields	Corrosion potential for conduits
							Farm ponds						
	Topsoil	Sand and gravel	Road subgrade	Foundations for low buildings	Highway location	Dikes and levees	Reservoir area	Embankments	Agricultural drainage	Terraces and diversions	Grassed waterways		
Cincinnati (CnD2, CnD3).	Surface layer good (thin); subsoil fair (erosive on steep slopes).	Not suitable	Subsoil and substratum poor (high volume change; erosive).	Fair; medium shear strength and compressibility; fragipan, slowly permeable.	Cuts and fills commonly needed; unstable when wet; erosive on embankments and slopes.	Fair stability; medium compressibility; poor resistance to piping.	Well drained; medium to slow seepage.	Semipervious to impervious; fair stability; fair compaction.	Not needed; steep slopes.	Soil features favorable except on slopes exceeding 12 percent.	Sloping to strongly sloping; subject to runoff and erosion; construction difficult on steeper slopes.	Moderate; fragipan at depth of 2 to 3 feet; layout and construction are problems on slopes exceeding 10 percent; flow down slopes.	Metal moderate; concrete low.
Eel:													
(El, Em)	Good to fair; subject to stream flooding; high water table.	Not suitable	Subsoil and substratum poor (moderate to high volume change; poor bearing capacity; difficult to work and compact when wet; subject to flooding and high water table.)	Poor; subject to overflow; high water table; poor bearing strength; subject to frost heaving.	Subject to overflow; high water table; subject to frost heaving.	Fair stability; medium compressibility; poor resistance to piping; intermittently wet.	High water table; medium to slow seepage; subject to overflow.	Semipervious to impervious; poor to fair stability; fair compaction; high water table.	Subject to overflow; high water table; moderate permeability; adequate outlets needed.	Not needed; level.	Not needed; level.	Severe; subject to stream flooding; high water table.	Metal moderate to high; concrete low.
(En)	Fair to poor; clayey; high water table; subject to flooding.	Not suitable	Subsoil and substratum poor (moderate to high volume change; poor bearing capacity; difficult to work and to compact when wet; susceptible to overflow and has a seasonally high water table).	Poor; subject to overflow; high water table; poor bearing strength; subject to frost heaving.	Subject to overflow; high water table; subject to frost heaving.	Fair stability; medium compressibility, poor to fair resistance to piping; intermittently wet.	High water table; moderately well drained; suited to pit ponds; subject to overflow.	Semipervious to impervious; fair stability; poor to fair compaction; high water table.	Subject to overflow; high water table; protect from stream flow; subsurface drainage by random tile lines.	Not needed; level; wet.	Not needed; level; wet.	Severe; subject to stream flooding; moderately slow permeability.	Metal moderate to high; concrete low.
Elston (EsA, EsC2).	Surface layer fair (dark); subsoil good to fair (variable in texture).	Fair in underlying material; medium and coarse sand with some fines.	Subsoil fair (moderate volume change; fair bearing capacity); substratum good (low volume change; good bearing capacity).	Good; medium shear strength and compressibility; low to moderate shrink-swell potential; permeable.	Cuts and fills commonly needed; fair stability; underlying material sandy and loose, often hinders hauling.	Fair stability; medium compressibility except in substratum which has very slight compressibility; poor resistance to piping.	Well drained; medium to slow seepage, substratum sandy and too porous to hold water.	Semipervious to impervious; fair stability; fair to good compaction; substratum; pervious but fairly stable; rapid seepage in substratum.	Not needed; moderate permeability.	Soil features favorable.	Sloping; subject to runoff and erosion.	Slight; substratum porous; hazard of contaminating nearby water supplies.	Metal low to moderate; concrete low.
Fincastle (FcA, FcB).	Surface layer good; subsoil fair to poor (high water table).	Not suitable	Subsoil and substratum poor (high volume change; difficult to compact when wet; high water table).	Fair; medium shear strength and compressibility; moderate to low shrink-swell potential; high water table; subject to frost heaving.	High water table; fair bearing capacity and stability; subject to frost heaving.	Fair stability; medium compressibility; poor resistance to piping; intermittently wet.	High water table; somewhat poorly drained; suited to pit ponds.	Semipervious to impervious; fair stability; fair compaction; high water table.	High water table; moderately slow permeability; subsurface drainage needed.	Not needed; level; wet.	Not needed; level.	Moderate to severe; seasonally high water table; moderately slow permeability.	Metal high; concrete low.

See footnote at end of table.

TABLE 10.—*Interpretations of engineering properties of soils in Parke County, Indiana*—Continued

Soil series and map symbol	Suitability [1] as a source of—		Suitability [1] for—		Soil features affecting—		Soil features affecting—Continued					Limitations for septic tank fields	Corrosion potential for conduits
	Topsoil	Sand and gravel	Road subgrade	Foundations for low buildings	Highway location	Dikes and levees	Farm ponds		Agricultural drainage	Terraces and diversions	Grassed waterways		
							Reservoir area	Embankments					
Fox (FmA, FmB, FmC2, FmD2).	Surface layer good; subsoil fair (lower subsoil commonly droughty and gravelly).	Good; well-drained sand and gravel with some fines.	Subsoil fair to poor (moderate to high volume change; good bearing capacity when compacted properly); substratum excellent (highly stable).	Good; very low compressibility; good shear strength; good material for subbase and fill.	Cuts and fills commonly needed; good bearing capacity; good subbase and fill material.	Fair stability; medium to slight compressibility; poor resistance to piping; substratum very stable and has very slight compressibility.	Well drained; medium to slow seepage; substratum porous sand and gravel; seal blanket needed above porous materials.	Semipervious to impervious; fair stability; good compaction; substratum pervious, very stable, and good compaction; rapid seepage in substratum.	Not needed; moderate to moderately rapid permeability.	Soil features favorable except on slopes exceeding 12 percent.	May be difficult to vegetate because of droughtiness.	Slight; sand and gravel at depth of 24 to 42 inches; hazard of contaminating nearby water supplies.	Metal low to moderate; concrete low.
Genesee (Gn, Go)	Good to fair; subject to flooding.	Not suitable	Subsoil and substratum poor (moderate to high volume change; poor bearing capacity; difficult to work and compact when wet; subject to flooding).	Poor; subject to overflow; poor bearing capacity; subject to frost heaving.	Subject to overflow; poor bearing capacity.	Fair stability; medium compressibility; poor resistance to piping.	Subject to overflow; well drained; medium to slow seepage.	Semipervious to impervious; fair stability; fair to poor compaction.	Subject to overflow; protect from streamflow.	Not needed; level.	Not needed; level.	Severe; subject to stream flooding; slight limitation on high bottoms above flood plain.	Metal moderate to high; concrete low.
Hennepin (HnF, HrE2).	Surface layer good (thin); subsoil fair (thin; underlying material good).	Not suitable	Subsoil and substratum fair (low to moderate volume change; fair stability when wet).	Good to fair; medium shear strength and compressibility; permeable; low to moderate shrink-swell potential.	Cuts and fills commonly needed; fair stability; erosive on slopes.	Fair stability; medium compressibility; poor resistance to piping.	Well drained; medium to slow seepage.	Semipervious to impervious; fair stability; fair to good compaction.	Not needed; steep slopes.	Not suitable; steep slopes.	Steep slopes; difficult to construct and to vegetate.	Moderate; slopes make layout and construction difficult.	Metal moderate; concrete low.
Hickory (HsE, HsF, CnD2, CnD3).	Surface layer good to fair (thin); subsoil fair.	Not suitable	Subsoil poor (high volume change; difficult to compact when wet); substratum fair (moderate volume change; erosive).	Good to fair; medium shear strength and compressibility; permeable; low to moderate shrink-swell potential.	Cuts and fills commonly needed; fair stability; erosive on slopes.	Fair stability; medium compressibility; poor resistance to piping.	Well drained; medium to slow seepage.	Semipervious to impervious; fair stability; fair to good compaction.	Not needed; steep slopes.	Not suitable; steep slopes.	Steep slopes; difficult to construct and to vegetate.	Moderate; slopes make layout and construction difficult.	Metal moderate; concrete low.
Huntsville (Hu)	Good to fair; dark; thick; subject to flooding.	Not suitable	Subsoil and substratum poor (relatively unstable; poor bearing capacity when wet; moderate to high volume change).	Poor; subject to overflow; poor bearing capacity; subject to frost heaving.	Subject to overflow; poor bearing capacity; subject to frost heaving.	Fair stability; medium compressibility; poor resistance to piping.	Subject to overflow; well drained; medium to slow seepage.	Semipervious to impervious; fair stability; fair to good compaction; high water table.	Subject to overflow; protect from stream flow; moderate permeability.	Not needed; level.	Not needed; level.	Severe; subject to stream flooding.	Metal moderate; concrete low.
Iva (IvA, IvB)	Surface layer good (thick); subsoil good to fair (high water table).	Not suitable	Subsoil and substratum poor (high volume change; difficult to compact when wet; high water table).	Fair; medium shear strength and compressibility; permeable; low shrink-swell potential; high water table.	High water table; fair bearing capacity and stability; subject to frost heaving.	Fair stability; medium compressibility; poor resistance to piping; intermittently wet.	High water table; somewhat poorly drained; slow seepage; suited to pit ponds.	Semipervious to impervious; fair stability; poor compaction when wet; high water table.	High water table; moderately slow permeability; subsurface drainage needed.	Not needed; level; wet; diversions reduce overflow from adjacent areas.	Not needed; level; wet.	Moderate to severe; seasonally high water table; slow permeability.	Metal high; concrete low.

See footnote at end of table.

TABLE 10.—*Interpretations of engineering properties of soils in Parke County, Indiana*—Continued

Soil series and map symbol	Suitability [1] as a source of—		Suitability [1] for—		Soil features affecting—		Soil features affecting—Continued					Limitations for septic tank fields	Corrosion potential for conduits
							Farm ponds						
	Topsoil	Sand and gravel	Road subgrade	Foundations for low buildings	Highway location	Dikes and levees	Reservoir area	Embankments	Agricultural drainage	Terraces and diversions	Grassed waterways		
Linwood (Lm)	Poor; oxidizes; erosive; fair to good if mixed with mineral soil.	Not suitable	Not suitable; unstable; ponded and high water table.	Not suitable; unstable; very high compressibility; high water table to ponded.	High water table to ponded; organic material is unstable and must be removed; substratum has fair bearing capacity.	Organic materials; unstable; rapid seepage; wet to ponded.	High water table to ponded; organic material will float to surface unless removed; slow seepage in substratum.	Organic materials 18 to 42 inches thick; ponded; high water table; substratum has fair stability; poor compaction.	High water table to ponded; protect against overflow from adjacent soils; controlled drainage desirable; organic material subsides; adequate outlets are needed.	Not suitable; depressional and wet; diversions reduce overflow from adjacent areas.	Not suitable; organic material.	Not suitable; organic basin; high water table to ponded.	Metal high; concrete low.
Negley (NsE)	Surface layer good; subsoil fair (erosive on steep slopes).	Not suitable	Subsoil poor (high volume change and fair bearing capacity); substratum fair to good (low volume change; good bearing capacity).	Good; medium shear strength and low compressibility; permeable; low shrink-swell potential.	Cuts and fills commonly needed; fair bearing capacity; erosive on slopes; substratum has good stability.	Fair stability; slight compressibility; poor to good resistance to piping.	Well drained; medium to slow seepage; substratum has medium seepage.	Semipervious to impervious; fair stability; fair to good compaction.	Not needed; steep slopes.	Not suitable; steep slopes.	Steep slopes; difficult to construct and to vegetate.	Moderate; slopes make layout and construction difficult.	Metal moderate; concrete low.
Ockley (OcA, OcB, OcC2).	Surface layer good; subsoil fair.	Not suitable in upper profile; good in underlying sand and gravel (well to poorly graded; 0 to 10 percent passes No. 200 sieve).	Subsoil poor to fair (moderate to high volume change; poor bearing capacity); substratum excellent (low volume change and good shear strength).	Good to fair; medium shear strength; low compressibility; permeable; low shrink-swell potential.	Cuts and fills commonly needed; fair bearing capacity and good stability; erosive on slopes.	Fair stability; medium compressibility; poor resistance to piping; substratum is very stable and has very slight compressibility.	Well drained; medium to slow seepage; substratum of porous sand and gravel that has rapid seepage.	Semipervious to impervious; fair stability; fair compaction; substratum is pervious and fairly stable and has good compaction.	Not needed; moderately slow permeability.	Soil features favorable except on slopes exceeding 12 percent.	Soil features favorable.	Slight; substratum of sand and gravel; hazard of contaminating nearby water supplies.	Metal low to moderate; concrete low to moderate.
Parke (PaB, PaC2, PaD2).	Surface layer good (thick); subsoil fair (erosive on slopes).	Not suitable	Subsoil and substratum poor (high volume change; poor bearing capacity and low stability).	Good to fair; medium shear strength and compressibility; permeable; low shrink-swell potential.	Cuts and fills commonly needed; fair stability; erosive on slopes.	Fair stability; medium compressibility; poor to fair resistance to piping; substratum has slight compressibility and poor resistance to piping.	Well drained; medium to slow seepage.	Semipervious to impervious; fair stability; fair to good compaction.	Not needed; steep slopes.	Soil features favorable except on slopes exceeding 12 percent.	Soil features favorable on milder slopes; difficult to construct and to vegetate on steeper slopes.	Slight; moderately slow to moderate permeability; layout and construction difficult on slopes exceeding 10 percent.	Metal low to moderate; concrete low.
Princeton (PrA, PrB, PrC2, PrD2, PrE).	Surface layer fair; subsoil fair (droughty during dry periods).	Not suitable in upper profile; good in underlying sand (0 to 10 percent passes No. 200 sieve).	Subsoil fair to poor (moderate to low volume change; fair bearing capacity); substratum good (low volume change and good bearing strength).	Good; medium to high shear strength; low compressibility; permeable to rapidly permeable; low shrink-swell potential.	Cuts and fills commonly needed; fair to good stability; erosive on slopes.	Fair stability; slight compressibility; poor resistance to piping; substratum of sandy material that has rapid seepage.	Well drained; medium seepage; substratum is sandy material and is too porous to hold water.	Semipervious to impervious; fair stability; fair to good compaction; substratum is pervious and fairly stable; good compaction and rapid seepage in substratum.	Not needed; moderate permeability.	Soil features favorable except on slopes exceeding 12 percent.	Difficult to construct and to vegetate on steeper slopes.	Slight; moderate permeability; layout and construction difficult on steep slopes; lateral seepage and flow downslope.	Metal low to moderate; concrete low.

See footnote at end of table.

TABLE 10.—*Interpretations of engineering properties of soils in Parke County, Indiana*—Continued

Soil series and map symbol	Suitability [1] as a source of—		Suitability [1] for—		Soil features affecting—		Soil features affecting—Continued					Limitations for septic tank fields	Corrosion potential for conduits
							Farm ponds						
	Topsoil	Sand and gravel	Road subgrade	Foundations for low buildings	Highway location	Dikes and levees	Reservoir area	Embankments	Agricultural drainage	Terraces and diversions	Grassed waterways		
Ragsdale (Ra)	Surface layer good to fair (dark, thick); subsoil fair (high water table).	Not suitable	Subsoil and substratum poor (high volume change; poor bearing capacity; high water table).	Poor; high water table; medium shear strength; low compressibility; low shrink-swell potential; subject to frost heaving.	High water table; fair stability; subject to frost heaving.	Fair stability; medium compressibility; fair resistance to piping; intermittently wet.	High water table; poorly drained; suited to pit ponds.	Semipervious to impervious; fair stability; fair compaction; high water table.	High water table; moderately slow permeability; subsurface drainage needed.	Not needed; depressional; wet.	Not needed; depressional and wet.	Severe; seasonally high water table; moderately slow permeability.	Metal low to moderate; concrete low.
Reesville (ReA, ReB).	Surface layer good (thick); subsoil fair (high water table).	Not suitable	Subsoil and substratum poor (high volume change; poor bearing capacity; high water table).	Fair; medium shear strength and compressibility; low shrink-swell potential; high water table.	High water table; fair stability; subject to frost heaving.	Fair stability; medium compressibility; poor to fair resistance to piping; intermittently wet.	High water table; somewhat poorly drained; suited to pit ponds.	Semipervious to impervious; fair stability; poor compaction when wet; high water table.	High water table; moderate to moderately slow permeability; subsurface drainage needed.	Not needed; level; wet.	Not needed; level.	Severe; seasonally high water table; moderately slow permeability.	Metal high; concrete low.
Rodman (RoE, RoF).	Surface layer and subsoil fair to poor (gravel throughout; shallow to underlying gravel and sand; droughty).	Poor in upper 12 to 18 inches; good below (sand and gravel are well graded).	Subsoil fair (moderate volume change; fair bearing capacity); substratum excellent (low volume change; good bearing capacity and shear strength).	Good; medium to high shear strength; low compressibility; rapidly permeable; loose materials at depth of 12 to 18 inches.	Cuts and fills commonly needed; numerous pebbles throughout; good stability; erosive on slopes.	Subsoil has fair stability; medium compressibility; substratum has good stability, very slight compressibility, rapid seepage, and fair resistance to piping.	Shallow to sand and gravel; medium seepage at depth of 12 to 18 inches; rapid seepage in substratum.	Semipervious; fair stability; good compaction pebbles throughout; substratum, at depth of 12 to 18 inches, is stable and has good compaction and rapid seepage.	Not needed; moderately rapid to rapid permeability; steep slopes.	Not needed; steep slopes.	Shallow to sand and gravel; difficult to vegetate; subject to rapid runoff and severe erosion.	Moderate to severe; steep slopes make layout and construction difficult; 12 to 18 inches deep to sand and gravel; lateral seepage and flow down-slope.	Metal low to moderate; concrete low.
Russell:													
(RsB, RsC, HrE2).	Surface layer good (thick); subsoil fair (erosive on exposed slopes).	Not suitable	Subsoil poor (high volume change; poor bearing capacity); substratum fair (moderate volume change; fair bearing capacity and stability).	Good to fair; medium shear strength and compressibility; permeable; low shrink-swell potential.	Cuts and fills commonly needed; fair stability; erosive on slopes.	Poor to fair stability; medium compressibility; poor resistance to piping.	Well drained; medium to slow seepage.	Semipervious to impervious; fair stability; fair to good compaction.	Not needed; steep slopes.	Soil features favorable except on slopes exceeding 12 percent.	Soil features favorable on milder slopes; steeper slopes subject to medium runoff and moderate erosion.	Slight; moderate to moderately slow permeability.	Metal low to moderate; concrete low.
(RtB2, RtC2, RtD2).	Surface layer good; subsoil fair (erosive on exposed slopes).	Not suitable	Subsoil poor (high volume change; poor bearing capacity); substratum fair (moderate volume change; fair bearing capacity and stability).	Good to fair; medium shear strength and compressibility; permeable; low shrink-swell potential.	Cuts and fills commonly needed; fair stability; erosive on slopes.	Poor to fair stability; medium compressibility; poor resistance to piping.	Well drained; medium to slow seepage.	Semipervious to impervious; fair stability; fair to good compaction.	Not needed; steep slopes.	Soil features favorable except on slopes exceeding 12 percent.	Soil features favorable on milder slopes; subject to medium runoff and moderate erosion on steeper slopes.	Slight; moderate to moderately slow permeability.	Metal low to moderate; concrete low.
Shoals (Sb)	Good to fair; underlying layers variable; subject to flooding; high water table.	Not suitable	Subsoil and substratum, poor (high volume change; poor bearing capacity; difficult to work and compact when wet; high water table).	Poor; subject to overflow; high water table; subject to frost heaving.	Subject to overflow; high water table; subject to frost heaving.	Fair stability; medium compressibility; poor resistance to piping; intermittently wet.	High water table; subject to overflow; slow seepage.	Semipervious; fair stability; poor compaction; high water table.	High water table; protect from stream overflow; subsurface drainage by random tile lines.	Not needed; level; wet.	Not needed; level.	Severe; subject to flooding; seasonally high water table.	Metal high; concrete low.

See footnote at end of table.

TABLE 10.—*Interpretations of engineering properties of soils in Parke County, Indiana*—Continued

Soil series and map symbol	Suitability [1] as a source of—		Suitability [1] for—		Soil features affecting—		Soil features affecting—Continued					Limitations for septic tank fields	Corrosion potential for conduits
	Topsoil	Sand and gravel	Road subgrade	Foundations for low buildings	Highway location	Dikes and levees	Farm ponds		Agricultural drainage	Terraces and diversions	Grassed waterways		
							Reservoir area	Embankments					
Sleeth (SmA)	Surface layer good; subsoil fair.	Not suitable; substratum is variable.	Subsoil fair to poor (moderate to high volume change; poor bearing capacity); substratum fair (moderate volume change; fair bearing capacity).	Good; high to medium shear strength; low compressibility; low to moderate shrink-swell potential.	High water table; fair to good stability; subject to frost heaving.	Fair to good stability; medium compressibility; poor resistance to piping.	High water table; somewhat poorly drained; suited to pit ponds; substratum has medium seepage.	Semipervious to impervious; fair stability; fair to good compaction; high water table.	High water table; moderate to moderately slow permeability; subsurface drainage needed.	Not needed; level; wet.	Not needed; level.	Moderate; high water table; moderately slow to moderate permeability.	Metal high; concrete low.
Steep stony and rocky land (St).	Poor; shallow over sandstone; rock outcrops; fragments throughout; erosive.	Not suitable; sandstone bedrock at depth of 12 to 18 inches.	Subsoil fair to poor (moderate to high volume change; sandstone fragments throughout; sandstone bedrock).	Good; shallow to sandstone bedrock; rocky materials.	Cuts and fills needed through sandstone bedrock; sandstone at depth of 12 to 18 inches.	Fair stability; slight to medium compressibility; poor resistance to piping; sandstone bedrock at depth of 12 to 18 inches.	Shallow to sandstone bedrock; seepage may occur along joints and cracks.	Semipervious; fair stability; sandstone fragments and rocks throughout; sandstone bedrock at depth of 12 to 18 inches; impervious.	Not needed; rough, broken slopes.	Not suitable; steep slopes and rocky.	Shallow to sandstone; difficult to construct and vegetate.	Severe; 12 to 18 inches deep over sandstone bedrock.	Shallow to sandstone bedrock.
Warsaw (WbA, WbB, WbC2).	Surface layer good (dark, thick); subsoil fair to poor (clayey gravel throughout; underlying material droughty).	Not suitable in upper profile; good in underlying sand and gravel (well graded, some fines).	Subsoil fair to poor (moderate to high volume change; difficult to work and compact when wet); substratum excellent (low volume change; stable; good shear strength).	Good; high shear strength; low compressibility; permeable; low shrink-swell potential.	Cuts and fills commonly needed; fair stability; substratum has good stability; numerous pebbles throughout.	Fair stability; medium compressibility; poor to fair resistance to piping; substratum is very stable and has very slight compressibility; fair resistance to piping; rapid seepage.	Semipervious; well drained; medium seepage; seal blanket needed over porous sand and gravel substratum.	Semipervious; fair stability; fair to good compaction; substratum is very stable; has good compaction and rapid seepage.	Not needed; moderate permeability.	Soil features favorable.	Soil features favorable.	Slight; substratum of sand and gravel; hazard of contaminating nearby water supplies.	Metal low to moderate; concrete low.
Westland:													
(Wd)	Surface layer good (dark and thick); subsoil fair to poor (high water table).	Not suitable	Subsoil and substratum poor (moderate to high volume change; poor shear strength; high water table).	Fair; medium shear strength and compressibility; slow permeability; high water table.	High water table; fair stability; subject to frost heaving.	Fair stability; medium compressibility; poor to fair resistance to piping.	High water table; poorly drained; suited to pit ponds.	Semipervious to impervious; fair stability; fair compaction; high water table; moderate seepage.	High water table; moderately slow permeability; subsurface drainage needed.	Not needed; depressional; wet.	Not needed; depressional; wet.	Severe; seasonally high water table; moderately slow permeability.	Metal high; concrete low.
(Wo)	Surface layer good to fair; subsoil fair to poor (high water table).	Surface layer not suitable; substratum has well-graded sand and gravel, some fines.	Subsoil poor (high volume change; low stability); substratum good to excellent (low volume change; stable).	Good to fair; high shear strength; low compressibility; permeable; low shrink-swell potential; high water table.	High water table; fair stability; substratum has good stability; subject to frost heaving.	Subsoil has fair stability; medium compressibility; poor to fair resistance to piping; substratum is very stable; has very slight compressibility, fair resistance to piping, and rapid seepage.	High water table; poorly drained; suited to pit ponds; substratum has rapid seepage.	Semipervious to impervious; fair stability; fair compaction; substratum is very stable; has good compaction and rapid seepage.	High water table; slow permeability; subsurface and surface drainage needed.	Not needed; depressional; diversion ditches reduce overflow from adjacent areas.	Not needed; depressional and wet.	Severe; high water table.	Metal high; concrete low.
Whitson (Ww)	Surface layer good; subsoil poor (clayey; high water table).	Not suitable	Subsoil and substratum poor (high volume change; poor bearing capacity; high water table).	Poor; medium to low shear strength; high compressibility; slowly permeable; high water table.	High water table; clayey; unstable; subject to frost heaving.	Fair stability; medium to high compressibility; poor to fair resistance to piping; intermittently wet.	High water table; poorly drained; suited to pit ponds.	Semipervious to impervious; fair stability; poor compaction when wet; high water table.	High water table; slow permeability; adequate outlets needed; subsurface drainage needed.	Not needed; level; wet.	Not needed; level; wet.	Severe; seasonally high water table; slow permeability.	Metal high; concrete low.

See footnote at end of table.

TABLE 10.—*Interpretations of engineering properties*

Soil series and map symbol	Suitability [1] as a source of—		Suitability [1] for—		Soil features affecting—	
	Topsoil	Sand and gravel	Road subgrade	Foundations for low buildings	Highway location	Dikes and levees
Zipp (Zc)	Surface layer fair; subsoil poor (clayey; high water table).	Not suitable	Subsoil and substratum very poor (high volume change; poor bearing capacity and shear strength; high water table).	Poor; low shear strength; high compressibility; slowly permeable; high shrink-swell potential; high water table.	High water table to ponded; clayey; unstable; subject to frost heaving.	Fair stability; high compressibility; excellent resistance to piping; clayey material; intermittently wet; cracks when dry.

[1] Suitability is *good* if there are no serious limitations to use. It is *fair* if limitations are moderate but can be removed or corrected. Suitability is *poor* if there are severe limitations that are difficult to remove or correct. A soil is rated *not suitable* if it has severe limitations that make use undesirable or unsound.

Frozen soil materials should not be used in constructing embankments. If the soil material is gravelly or sandy and contains only a very small percentage of silt or clay, it may be used in earthwork in winter, provided the material is compacted according to the required standards for such construction and provided that none of the material is frozen.

Frost action is a serious problem in this county. Soils that consist of a mixture of clay, silt, and coarser materials are not so susceptible to frost heaving and the resulting frost boils as are soils that contain a high percentage of silt or very fine sand. A coarse-textured soil is susceptible to damaging frost action if about 10 percent or more of the soil material passes a No. 200 mesh sieve (0.074 millimeter).

Because differences in expansion between one material and another cause damage from frost heaving, uniformity of soil materials is important in grading design to prevent frost damage. Some deposits of glacial till in this county contain lenses or pockets of fine sand and silt that cause differential frost heave.

Poorly drained and very poorly drained soils are extensive in depressions. In some of these areas the surface material is high in organic-matter content. In one area muck and peat extend to a depth of 1 to 3½ feet. Peat or muck is not suitable for use as foundations of roads or other engineering structures, because it has low strength and is highly compressible. Peat and other highly organic material should be removed and replaced with a more suitable soil material. Thick deposits of organic materials require special investigation and design of structures.

In most depressional areas the water table is normally high. Structures built across or in these depressional areas should be on embankments. A thorough field investigation is necessary to plan and design structures in depressions that have a high water table or a perched water table.

Some soils that have a high water table can be made more suitable as borrow material by constructing drainage ditches before earthwork is started. Underdrains may be required where either a perched or normal water table might cause the soil to be unstable.

Because parts of bottom lands are flooded each year, structures on them should be built on an embankment above the level of high water. Suitable materials for use in embankments can be taken from most soils on bottom lands. If manmade fills on bottom lands encroach on adjacent waterways, the reduced size of these waterways cause serious flooding and severe erosion.

Table 10 rates the suitability of soils in each series for various engineering uses. It also lists soil features that might affect the selection and design of structures and the applications of various engineering practices. These features are evaluated on the basis of test data and field performance.

The following soils and land types are not listed in table 10:

- Alford soils (AhC3).
- Camden loam (CaA, CaB).
- Eel loam (Ea, Eb).
- Elston loam (EoA).
- Fox sandy loam (FsA, FsB, FsC, FsD2).
- Fox silt loam (FtA, FtB, FtD2).
- Genesee loam (Gh, Gm).
- Gravel pits (Gr).
- Mine pits and dumps (Mp).
- Ockley loam (OaA, OaB).
- Ragsdale silty clay loam (Rc).
- Russell soils (RuB3, RuC3, RuD3).
- Sleeth loam, loamy substratum (ShA).
- Warsaw silt loam (WcA, WcB).
- Westland silty clay loam (Wp).
- Westland silty clay loam, loamy substratum (Wr).

In the columns that show the suitability of the soil material as a source of topsoil and of sand and gravel, the ratings are expressed as *good*, *fair*, *poor*, and *not suitable*. The suitability as a source of sand and gravel applies to soil material within a depth of 5 to 7 feet.

Ratings of the soils for foundations of low buildings are for buildings of three stories or less. The ratings refer to the undisturbed substratum, which generally is that part of the soil used as a base for foundations.

The soil features listed as affecting the location of highways are based on the profile of the soil, as described in table 9. The features selected are those of the undisturbed soil, without artificial drainage.

of soils in Parke County, Indiana—Continued

Soil features affecting—Continued					Limitations for septic tank fields	Corrosion potential for conduits
Farm ponds		Agricultural drainage	Terraces and diversions	Grassed waterways		
Reservoir area	Embankments					
High water table; poorly drained; slow seepage; suited to pit ponds.	Impervious; fair stability on flat slopes; fair compaction but poor when wet; ponded and high water table.	High water table; slow permeability; surface drainage needed; subsurface drainage difficult.	Not needed; depressional; diversion ditches reduce overflow from adjacent areas.	Not needed; depressional; clay materials.	Severe; high water table; slowly permeable material; clayey.	Metal very high; concrete low.

Resistance to seepage is the main feature that determines the choice of soils for the reservoir area of farm ponds. The features listed are those of undisturbed soils.

For agricultural drainage, the soil features considered are those that affect the installation and performance of surface and subsurface structures and practices. Among the features are slope or relief, soil texture, permeability, seasonal level of ground water, and restricting layers, if any.

Soil features affecting the layout and construction of terraces and diversions are slope, texture, and depth to material, if any, that hinders the growth of crops.

For grassed waterways, the features are those that affect layout and construction of the waterways and the establishment and growth of a grass cover.

In determining the degree of limitation—*slight*, *moderate*, or *severe*—for septic tank disposal fields, the soil features considered are slope, permeability, hazard of flooding, and level of ground water.

The corrosion potential for conduits is rated as *low*, *moderate*, or *high*. It is based mainly on soil texture, which affects aeration, moisture content, and water properties in soils.

Descriptions of the Soils

This section describes the soil series (groups of soils) and single soils (mapping units) of Parke County. The acreage and proportionate extent of each mapping unit are given in table 11.

The procedure in this section is first to describe the soil series, and then the mapping units in that series. For each soil series, a profile of a soil representative of the series is described in detail. Thus, to get full information on any one mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs. As mentioned in the section "How This Soil Survey Was Made," not all mapping units are members of a soil series. Steep stony and rocky land, for example, does not belong to a soil series, but nevertheless, is listed in alphabetical order along with the soil series.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and the woodland suitability group in which the mapping unit has been placed. The pages on which each capability unit and each woodland group are described can be found by referring to the "Guide to Mapping Units" at the back of the report.

Unless otherwise indicated, the colors given in the descriptions are for the soils when moist. Many terms used in the soil descriptions and other sections of the report are defined in the Glossary.

Alford Series

The Alford series consists of deep, light-colored soils that are normally on the silt-covered Illinoian till plain in the southern third of the county. They also are on the Wisconsin till plain, which is thickly covered with silt. These well-drained soils developed in a mantle of silt generally more than 6 feet thick. They occur on side slopes, along drainageways, on narrow, sloping ridgetops, and in areas that adjoin areas of imperfectly drained Iva and Reesville soils. The native vegetation was a mixed stand of maple, tulip-poplar, oak, hickory, and other hardwoods.

The Alford soils occur with the Princeton, Camden, and Cincinnati soils. They are finer textured than the Princeton soils, which developed in windblown fine sand and coarse silt that, in this county, generally are completely leached of carbonates. Alford soils are somewhat finer textured than Camden soils, for the Camden soils developed in stratified sand and silt overlaid, in some places, with a thin mantle of silt. The Alford soils lack the fragipan of the Cincinnati soils, which developed in 20 to 40 inches of windblown silt, or loess, underlain by leached loam to clay loam till of Illinoian age. In addition, the

TABLE 11.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Alford silt loam, 2 to 5 percent slopes, moderately eroded	7,850	2.7
Alford silt loam, 5 to 8 percent slopes, moderately eroded	5,750	2.0
Alford soils, 5 to 8 percent slopes, severely eroded	450	.1
Allison silty clay loam	1,550	.5
Armiesburg silty clay loam	2,770	1.0
Ayrshire fine sandy loam	432	.1
Bonpas silty clay loam	370	.1
Camden loam, 0 to 2 percent slopes	1,200	.4
Camden loam, 2 to 5 percent slopes	437	.1
Camden silt loam, 0 to 2 percent slopes	1,900	.7
Camden silt loam, 2 to 5 percent slopes	350	.1
Camden silt loam, 5 to 8 percent slopes, moderately eroded	85	(1)
Chelsea loamy fine sand, 2 to 5 percent slopes	380	.1
Chelsea loamy fine sand, 5 to 8 percent slopes	750	.3
Chelsea loamy fine sand, 8 to 15 percent slopes	150	.1
Chelsea loamy fine sand, 15 to 40 percent slopes	180	.1
Cincinnati-Hickory complex, 8 to 15 percent slopes, moderately eroded	2,450	.8
Cincinnati-Hickory complex, 8 to 15 percent slopes, severely eroded	200	.1
Clay pits	20	(1)
Eel loam	300	.1
Eel loam, high bottom	200	.1
Eel silt loam	4,500	1.5
Eel silt loam, high bottom	458	.2
Eel silty clay loam	2,000	.7
Elston loam, 0 to 3 percent slopes	500	.1
Elston sandy loam, 0 to 3 percent slopes	630	.2
Elston sandy loam, 5 to 8 percent slopes, moderately eroded	100	(1)
Fincastle silt loam, 0 to 2 percent slopes	8,500	2.9
Fincastle silt loam, 2 to 5 percent slopes	4,300	1.5
Fox loam, 0 to 2 percent slopes	1,200	.4
Fox loam, 2 to 5 percent slopes	1,300	.4
Fox loam, 5 to 8 percent slopes, moderately eroded	300	.1
Fox loam, 8 to 15 percent slopes, moderately eroded	140	(1)
Fox sandy loam, 0 to 2 percent slopes	120	(1)
Fox sandy loam, 2 to 5 percent slopes	400	.1
Fox sandy loam, 5 to 8 percent slopes	150	.1
Fox sandy loam, 8 to 15 percent slopes, moderately eroded	100	(1)
Fox silt loam, 0 to 2 percent slopes	175	.1
Fox silt loam, 2 to 5 percent slopes	325	.1
Fox silt loam, 8 to 15 percent slopes, moderately eroded	300	.1
Genesee fine sandy loam	520	.2
Genesee loam	2,100	.7
Genesee loam, high bottom	650	.2
Genesee silt loam	12,950	4.5
Genesee silt loam, high bottom	2,300	.8
Gravel pits	200	.1
Hennepin association, 30 to 60 percent slopes	33,930	11.8
Hennepin-Russell complex, 15 to 30 percent slopes, moderately eroded	2,500	.9
Hickory complex, 15 to 30 percent slopes	4,200	1.5
Hickory complex, 30 to 70 percent slopes	26,940	9.3
Huntsville silt loam	135	(1)
Iva silt loam, 0 to 2 percent slopes	9,335	3.2
Iva silt loam, 2 to 5 percent slopes	700	.2
Linwood muck	200	.1
Mine pits and dumps	330	.1
Negley soils, 15 to 60 percent slopes	2,000	.7
Ockley loam, 0 to 2 percent slopes	340	.1
Ockley loam, 2 to 5 percent slopes	80	(1)
Ockley silt loam, 0 to 2 percent slopes	1,500	.5
Ockley silt loam, 2 to 5 percent slopes	1,900	.7
Ockley silt loam, 5 to 8 percent slopes, moderately eroded	560	.2
Parke silt loam, 2 to 5 percent slopes	165	.1
Parke silt loam, 5 to 8 percent slopes, moderately eroded	160	.1
Parke silt loam, 8 to 15 percent slopes, moderately eroded	180	.1
Princeton fine sandy loam, 0 to 2 percent slopes	235	.1
Princeton fine sandy loam, 2 to 5 percent slopes	1,238	.4
Princeton fine sandy loam, 5 to 8 percent slopes, moderately eroded	1,225	.4
Princeton fine sandy loam, 8 to 15 percent slopes, moderately eroded	125	(1)
Princeton fine sandy loam, 15 to 30 percent slopes	180	.1
Ragsdale silt loam	11,000	3.8
Ragsdale silty clay loam	1,000	.3
Reesville silt loam, 0 to 2 percent slopes	55,950	19.4
Reesville silt loam, 2 to 5 percent slopes	22,150	7.7
Rodman gravelly soils, 15 to 30 percent slopes	800	.3
Rodman gravelly soils, 30 to 70 percent slopes	800	.3
Russell loam, 2 to 5 percent slopes	270	.1
Russell loam, 5 to 8 percent slopes	620	.2
Russell silt loam, 2 to 5 percent slopes, moderately eroded	7,140	2.5
Russell silt loam, 5 to 8 percent slopes, moderately eroded	11,600	4.0
Russell silt loam, 8 to 15 percent slopes, moderately eroded	5,400	1.9
Russell soils, 2 to 5 percent slopes, severely eroded	400	.1
Russell soils, 5 to 8 percent slopes, severely eroded	850	.3
Russell soils, 8 to 15 percent slopes, severely eroded	200	.1
Shoals silt loam	550	.2
Sleeth loam, loamy substratum, 0 to 2 percent slopes	650	.2
Sleeth silt loam, loamy substratum, 0 to 2 percent slopes	1,400	.5
Steep stony and rocky land	150	.1
Warsaw loam, 0 to 2 percent slopes	1,600	.6
Warsaw loam, 2 to 5 percent slopes	660	.2
Warsaw loam, 5 to 8 percent slopes, moderately eroded	130	(1)
Warsaw silt loam, 0 to 2 percent slopes	600	.2
Warsaw silt loam, 2 to 5 percent slopes	75	(1)
Westland loam, loamy substratum	500	.2
Westland silt loam	270	.1
Westland silty clay loam	100	(1)
Westland silty clay loam, loamy substratum	400	.1
Whitson silt loam	200	.1
Zipp silty clay loam	375	.1
Lakes and streams	2,582	.9
Total	291,222	100.0

[1] Less than 0.05 percent.

Cincinnati soils are low in content of bases and are strongly acid.

Representative profile of an Alford silt loam in a wooded area located in the SW¼NE¼ sec. 33, T. 15 N., R. 8 W.—

O2—¼ inch to 0, very dark grayish-brown (10YR 3/2) mold consisting of decomposed leaves, twigs, and stems; neutral.

A1—0 to ½ inch, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; many worm casts; many fibrous feeder roots; neutral; abrupt, smooth boundary.

A21—½ inch to 2½ inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A22—2½ to 9 inches, yellowish-brown (10YR 5/4) silt loam; weak to moderate, medium, granular structure to weak, medium, platy structure; friable; strongly acid; clear, wavy boundary.

B1—9 to 12 inches, yellowish-brown (10YR 5/6) silt loam; moderate, fine to medium, subangular blocky structure; friable or slightly firm; thin clay films on a few ped faces; very strongly acid; clear, wavy boundary.

B21t—12 to 26 inches, yellowsh-brown (10YR 5/4) silty clay loam; moderate to strong, medium, subangular blocky structure; aggregates yellowish brown (10YR 5/6) when crushed; firm; dark reddish-brown (5YR 3/4) clay films on a few ped faces; very strongly acid; gradual, wavy boundary.

B22t—26 to 41 inches, yellowish-brown (10YR 5/8) light silty clay loam with a few, fine, faint mottles of very pale brown (10YR 7/4); weak, coarse, angular blocky structure; firm; thin, dark-brown (7.5YR 4/4) clay skins on many ped faces; very strongly acid; smooth, wavy boundary.

B3—41 to 54 inches, yellowish-brown (10YR 5/8) heavy silt loam; very weak, coarse, blocky structure grading to massive (structureless); slightly firm; very strongly acid; gradual, wavy boundary.

C1—54 to 60 inches +, yellowish-brown (10YR 5/8) silt loam; a few, fine, very pale brown (10YR 7/4) mottles; very weak, coarse, blocky structure to massive (structureless); slightly firm; very strongly acid.

The loess ranges from 4 to 9 feet in thickness but generally is about 6½ feet thick. In cultivated fields the plow layer is 6 to 8 inches thick and is not so dark as the surface layer in wooded areas. In some areas where the Alford soils grade toward the Princeton or the Reesville soils, the profile is neutral or slightly alkaline below a depth of about 5 feet. On the narrow ridges and in the more sloping areas where the mantle of loess is thinner and the soil grades toward the Cincinnati soils, there is a firm and brittle, weakly developed fragipan in some places. Where the Alford soils grade toward the Iva and Reesville soils, internal drainage is slower and the lower subsoil may be mottled with gray.

The Alford soils have medium to rapid surface runoff and are susceptible to erosion. Internal drainage generally is medium, permeability is moderate, and the available moisture capacity is high. Except in areas limed, the soils are medium acid or strongly acid.

These soils respond well to lime and fertilizer. Because they are subject to washing, however, they should be carefully farmed and protected from erosion by contouring, terracing, and other practices.

Alford silt loam, 2 to 5 percent slopes, moderately eroded (AfB2).—The present surface layer of this soil generally is 6 to 8 inches of light-colored silt loam that consists of material from the original surface layer mixed with some of the yellowish-brown subsoil. In small areas the subsoil is exposed, and in these areas the surface layer is finer textured, more clayey, and somewhat cloddy. In areas where this soil occurs on the Wisconsin till plain in the northern and southern parts of the county, it is commonly less acid than normal and, in many places, is underlain by calcareous silt.

Included with this soil are small areas of moderately well drained soils that are mottled in the lower subsoil; and small areas of Cincinnati silt loam on slopes exceeding 5 percent along drainageways and on narrow ridgetops. These included soils have a compact subsoil at a depth of 24 to more than 40 inches; the subsoil is slowly permeable and impedes the penetration of air, water, and roots. Also included are areas of Alford silt loam where erosion is none or slight and the surface layer ranges from 8 to 12 inches in thickness.

This soil is desirable for farming, and most of it is cultivated. It is easily tilled but must be protected from further erosion. Other problems in management are impaired tilth, low organic-matter content, and a deficiency of phosphorus and nitrogen. Row crops should not be grown in succession unless contour tillage and terraces are used to control soil losses and unless the surface is protected by close-growing plants much of the time. (Capability unit IIe-3; woodland suitability group 1)

Alford silt loam, 5 to 8 percent slopes, moderately eroded (AfC2).—The original surface layer of this soil was thinner than that of Alford silt loam, 2 to 5 percent slopes, moderately eroded, and it has been thinned even more by accelerated erosion. This layer is now only 3 to 8 inches thick, and in cultivated fields it has been mixed with subsoil material. In some places the yellowish-brown subsoil is exposed. Gullies have been formed in places.

Included are areas of this soil that are only slightly eroded and areas of Cincinnati silt loam that have a nearly impervious pan at a depth of 2 to 3 feet.

If this soil is cultivated, it can be kept productive and protected from further erosion by growing legumes in the rotation, by adding manure and fertilizer, and by using suitable practices that control soil losses. (Capability unit IIIe-3; woodland suitability group 1)

Alford soils, 5 to 8 percent slopes, severely eroded (AhC3).—These soils are around the heads of streams that commonly lie above steep, wooded slopes. Because the soils were cleared of trees and then row cropped, they have lost most of their original grayish-brown surface soil through erosion and now have a surface layer consisting of material from the yellowish-brown silty clay loam subsoil. In many places there are gullies 1 to 3 feet deep, and in the northern part of the county, deeper ones have been cut into the underlying glacial till. In other respects, these soils have a profile that is similar to the one described as typical for the series.

Included in mapping are many areas where the slope is greater than 8 percent. Also included are small areas of Cincinnati silt loam that have a compact; slowly permeable subsoil.

Erosion on these soils has greatly reduced the supply of organic matter and has lowered fertility and the capacity to absorb water. Consequently, the surface layer is cloddy and makes a poor seedbed. Crop yields are low, and much of the acreage is idle or used for low-grade pasture. The soils are suitable for occasional cropping if they are protected from further erosion, are graded where gullies occur, and are limed and liberally fertilized. Meadow and permanent pasture generally need renovating, seeding to a mixture that includes legumes, liming, and fertilizing. (Capability unit IVe-3; woodland suitability group 1)

Allison Series

In the Allison series are dark-colored, friable, well-drained soils that developed in alluvium washed from prairie and timbered areas of glacial drift of Wisconsin age. These soils are subject to occasional overflow, but there is little deposition of recent alluvial material. They are flooded less frequently than the nearby Genesee soils, which lie at a slightly lower level than the Allison soils and are closer to streams. The natural vegetation was a stand of hardwood trees, chiefly silver maple, sycamore, elm, and ash.

The dark-colored surface layer extends to a depth of 22 inches or more and is underlain by dark yellowish-brown silty clay loam.

The Allison soils are finer textured than the Huntsville soils. The Allison soils—and also the Huntsville soils—have a darker, thicker surface layer and upper subsoil than the Armiesburg and Genesee soils, but Armiesburg and Genesee soils have similar drainage characteristics and developed in somewhat similar material.

Representative profile of Allison silty clay loam, located in the SW¼NW¼ sec. 2, T. 17 N., R. 9 W.—

- Ap—0 to 7 inches, very dark brown (10YR 2/2) silty clay loam; moderate, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.
- A12—7 to 16 inches, very dark gray (10YR 3/1) to very dark brown (10YR 2/2) silty clay loam; weak, coarse, subangular blocky structure; firm; slightly acid; clear, wavy boundary.
- A13—16 to 22 inches, very dark grayish-brown (10YR 3/2) silty clay loam; weak, medium, subangular blocky structure; firm to friable; slightly acid; clear, wavy boundary.
- B—22 to 27 inches, dark-brown (7.5YR 4/4) silty clay loam with very dark grayish-brown (10YR 3/2) organic mineral stains and coatings on ped faces; weak, medium to coarse, subangular blocky structure; slightly acid to neutral; clear, wavy boundary.
- C—27 to 42 inches, dark-brown (7.5YR 4/4) silty clay loam; weak, coarse, subangular blocky structure; firm; neutral.

The A horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). In places where the Allison soils grade toward the Armiesburg soils, the A horizon is as thin as about 20 inches. In most profiles there is the beginning of a weak B horizon. Between the Ap horizon and a depth of 40 inches, the clay content is 35 percent, on the average, but ranges from 30 to 37 percent.

In places the C horizon has one or more strata of loam, silt loam, clay loam, or silty clay loam. The A horizon ranges from slightly acid to mildly alkaline, and the C horizon is neutral or mildly alkaline. Silty clay loam is the only type mapped in Parke County.

The Allison soils are dominantly well drained and are high in available moisture capacity and fertility. Although the soils are occasionally flooded, little sediment is deposited. Loss of crops from flooding is generally less than on the nearby Genesee soils.

Allison silty clay loam (Al). This soil generally is well drained, but in some swales it is moderately well drained and is mottled with gray below a depth of 24 inches. Included in mapping are areas of Armiesburg soils that have a dark surface layer only 14 to 20 inches thick.

Although the organic-matter content is high in this soil, the surface layer of silty clay loam tends to puddle and to get cloddy if the soil is tilled when wet or is row cropped too intensively.

Corn is the principal crop grown, but soybeans are well suited. The hazard of flooding is greater in areas that lie in swales than it is in other areas, and it is greater for crops that stand over winter. Corn and soybeans are likely to be damaged by flooding only late in spring. Alfalfa can be grown in higher areas that are protected from overflow or are covered by floodwater for only a short time. Wheat and other fall-seeded grain are not so well suited, because they are subject to winterkilling or to damage from heaving. The included Armiesburg soils are cropped about the same as this soil, and they produce about the same yields. (Capability unit I-2; woodland suitability group 23)

Armiesburg Series

In the Armiesburg series are dark-brown to brown Alluvial soils that are well drained in most places. These soils are neutral, but they formed in slightly calcareous silty clay loam and finer textured material that washed from soils formed under forest in Wisconsin glacial drift. Armiesburg soils occupy nearly level flood plains and slightly elevated areas on high bottoms in the Wabash River valley. They are subject to periodic overflow and are covered by a small amount of new material each time they are flooded. The original plant cover consisted mainly of elm, sycamore, ash, silver maple, and tulip-poplar.

Although the Armiesburg soils are generally well drained, they are moderately well drained in some places. They occur with the Allison and Huntsville soils, but their surface layer is neither so dark nor so thick as the ones in those soils. In addition, Armiesburg soils have a higher percentage of clay than the Huntsville soils. They are finer textured and somewhat lighter colored than the Genesee soils, and they are more difficult to till.

Representative profile of Armiesburg silty clay loam in an area located one-half mile west of Numa in the SW¼SE¼NE¼ sec. 26, T. 14 N., R. 9 W.—

- Ap—0 to 4½ inches, very dark grayish-brown (10YR 3/2 moist) silty clay loam; moderate, fine, granular structure; friable when moist, slightly sticky when wet; neutral; abrupt, smooth boundary.
- A12—4½ to 14 inches, very dark grayish-brown (10YR 3/2) to dark-brown (10YR 3/3) silty clay loam; strong, fine and medium, angular blocky structure; firm when moist, slightly sticky when wet; neutral; clear, wavy boundary.
- B—14 to 29 inches, brown (10YR 4/3) silty clay loam; brown (10YR 4/3) when crushed; common, very thin, dark to very dark grayish-brown (10YR 4/2 to 3/2) films of silt and organic mineral on ped faces; weak to moderate, coarse to very coarse, prismatic structure breaking to moderate, coarse, angular and subangular blocky structure; firm when moist, sticky when wet; neutral; clear, wavy boundary.
- C1—29 to 39 inches, grayish-brown (10YR 5/2) to brown (10YR 5/3) silty clay loam; moderate, coarse, angular blocky structure; firm or friable when moist, slightly sticky when wet; neutral; gradual, wavy boundary.
- C2—39 to 50 inches, brown (10YR 5/3) silty clay loam; moderate, fine to medium, subangular blocky structure; friable when moist, slightly sticky when wet; neutral.

The dark-colored surface layer generally is 10 to 14 inches thick, but it ranges from 8 to 20 inches in thickness and from very dark grayish brown to brown in color. Between the Ap horizon and a depth of 40 inches, the clay content is about 34 percent, on the average, but ranges from 30 to 37 percent. On high bottoms that have not been covered by fresh alluvium, the horizons may show more development than on other areas of Armiesburg soils, as is indicated by slight acidity, stronger structure, or a brighter colored subsoil. In areas where the Armiesburg soils grade toward the Allison soils, the surface layer is darker and thicker than normal. Where Armiesburg soils grade toward Genesee soils, the A horizon is thinner and lighter in color than in the profile described. Where the Armiesburg soils grade toward the Eel soils, the surface layer is grayer and the subsoil, in places, is slightly mottled with gray below a depth of 24 inches.

Armiesburg silty clay loam (Ar).—This soil occurs in shallow swales and gently undulating areas that are crossed by old meander channels along the Wabash River. The largest areas are on back bottoms in the river valley.

This soil contains more clay than the lighter colored Genesee soils, and it requires more care in management. It is generally subject to periodic overflow and, if possible, should be protected by building levees. A few small areas are slightly above the flood plain and are less likely to be flooded. In some of these areas the soil is a little lighter in color than normal and is slightly acid. (Capability unit I–2; woodland suitability group 23)

Ayrshire Series

In the Ayrshire series are deep, light-colored, loamy and sandy soils that are somewhat poorly drained and occupy nearly level or slightly depressional areas, chiefly in the northwestern part of the county. The surface layer of these soils is dark grayish-brown, friable fine sandy loam 8 to 12 inches thick. It is underlain by a sandy clay loam subsoil that is yellowish brown mottled with light grayish brown and light gray. The clay content decreases with depth.

Ayrshire soils developed in windblown material, 3 to more than 5 feet thick, that consists mainly of fine sand but partly of coarse silt. In Parke County this material commonly is strongly acid, though it ranges to nearly neutral. The native vegetation consisted of silver maple, beech, oaks, and other hardwoods.

The Ayrshire soils are coarser textured and more acid than the nearby Reesville and Iva soils, both of which developed in lœss. The Ayrshire soils are coarser textured throughout the solum than Sleeth soils that have a loamy substratum.

Representative profile of Ayrshire fine sandy loam in an area located in the SW¼SE¼ sec. 21, T. 17 N., R. 8 W.—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable; slightly acid; abrupt, smooth boundary.

A2—8 to 12 inches, grayish-brown (10YR 5/2) fine sandy loam; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary.

B1—12 to 17 inches, yellowish-brown (10YR 5/4) heavy sandy loam; many, medium, distinct mottles of grayish brown (10YR 5/2); weak, medium, subangular blocky structure; friable; medium to strongly acid; clear, smooth boundary.

B21tg—17 to 35 inches, yellowish-brown (10YR 5/6) light sandy clay loam; many, medium, distinct to prominent mottles of light gray (10YR 7/2); moderate, medium, subangular blocky structure; firm; thin clay skins on a few ped faces; strongly acid; clear, smooth boundary.

B22tg—35 to 50 inches, dark-gray (10YR 4/1) light sandy clay loam; many, medium, distinct mottles of yellow (10YR 7/6); moderate, medium, subangular blocky structure; firm; thin clay films on a few ped faces; strongly acid; clear, wavy boundary.

B3tg—50 to 68 inches, very pale brown (10YR 7/3) loam; many, distinct mottles of yellow (10YR 7/6); weak, coarse, subangular blocky structure; friable; medium to strongly acid; abrupt, irregular boundary.

IIC—68 inches +, yellowish-brown (10YR 5/8) fine sandy loam and coarse silt; massive; very friable; medium acid.

The thickness of the solum is variable and ranges from 48 inches to 70 inches or more. In some areas the Ayrshire soils developed in dune sand overlying strongly acid, stratified silt and sand. The surface layer is darker and thinner in wooded areas than in plowed fields.

Ayrshire fine sandy loam (As).—This soil occupies enclosed flats and shallow swales within areas of the Princeton and Chelsea soils. In places, too, this soil is near the Reesville soils. Near those soils it developed in a layer of sandy material, generally less than 15 inches thick, and there it has a fine-textured subsoil similar to the one in the Reesville soils.

Included in mapping are a few areas that have a surface layer of loam and a subsoil that is slightly finer textured than the subsoil described in the representative profile.

Where this soil occurs in large areas, the principal crops grown are corn and wheat. Because the soil is somewhat poorly drained, it is not well suited to orchards or to melons and other special crops. Orchard fruits generally are small, the trees are not thrifty, and injury is common in winter. After drainage is improved, however, more kinds of crops can be grown, for the response to lime and fertilizer is good. Tiling is satisfactory if suitable outlets are available, but an outlet is difficult to locate for draining some areas in depressions. Because the soil commonly occurs in fields with Ayrshire and Ragsdale soils, the crop rotation and other management used on it are determined partly by needs of the adjacent soils. (Capability unit IIw–11; woodland suitability group 5)

Bonpas Series

Soils of the Bonpas series are very dark colored and very poorly drained. These soils occur in areas that formerly were marshland and developed in moderately fine textured lacustrine material, chiefly silty clay loam. The surface layer, to a depth of 15 to 25 inches, is very dark gray to black silty clay loam. This layer is underlain by dark-gray to light-gray silty clay loam that is faintly mottled with olive and, in turn, is underlain by neutral or slightly alkaline silty clay loam. The lacustrine material is on calcareous silt and fine sand at a depth of 50 to 100 inches or more.

Bonpas soils are very slowly permeable and, in most places, are ponded by surface water during rains. The original plant cover was marsh grass and such water-tolerant trees as cottonwood, maple, elm, and ash.

The Bonpas soils have a darker, thicker surface layer and a grayer subsoil than the Westland soils that have a loamy substratum. These Westland soils developed in thinner material that overlies calcareous silt and fine sand at a depth of about 3 feet.

Representative profile of Bonpas silty clay loam in an area located one-half mile north of Rosedale in the SE¼NE¼NE¼ sec. 27, T. 14 N., R. 8 W.—

Ap—0 to 8 inches, very dark gray (10YR 3/1) to very dark brown (10YR 2/2) silty clay loam; strong, fine, granular structure; firm; slightly acid; abrupt, smooth boundary.

A12—8 to 12 inches, very dark gray (10YR 3/1) silty clay loam; moderate, coarse, subangular blocky structure; firm; slightly acid; clear, wavy boundary.

A13—12 to 18 inches, very dark gray (10YR 3/1) fine silty clay loam with common, fine, faint mottles of very dark grayish brown (10YR 3/2); weak, coarse, prismatic structure breaking to moderate, coarse, angular blocky structure; firm; thin patchy clay films on ped faces; slightly acid; clear, wavy boundary.

A14—18 to 25 inches, black (10YR 2/1) to very dark brown (10YR 2/2) fine silty clay loam to silty clay with common, medium, faint, dark-brown (7.5YR 3/2) mottles that increase in size with depth; moderate, coarse to medium, angular blocky structure; firm; neutral; clear, wavy boundary.

B2g—25 to 60 inches, olive-gray (5Y 5/2) fine silty clay loam with common, fine, faint mottles of greenish gray (5GY 5/2); massive (structureless); neutral; clear, wavy boundary.

IIC1—60 inches +, pale-brown (10YR 6/3), stratified and interbedded silt and fine sandy loam; massive; calcareous.

The A horizon ranges from 15 to 28 inches in thickness and from very dark gray (10YR 3/1) to black (10YR 2/1) in color. The A horizon is thickest in areas where the Bonpas soils grade toward Linwood muck. In areas where the Bonpas soils occur with the Westland soils that have a loamy substratum, the deposits of silty clay loam are thinner than normal, and there is stratified sand, silt, and, in a few places, fine gravel in the lower B2g horizon below a depth of 3 feet.

Bonpas silty clay loam (0 to 2 percent slopes) (Bp).—This is the only Bonpas soil mapped in Parke County. Included with it in mapping are small areas around muck beds that have a mucky surface layer, generally less than 6 inches thick.

This soil is fertile and, if drained, produces favorable yields of corn, soybeans, small grain, hay, pasture, and other crops. Where the organic-matter content is high, the surface layer tends to be mellow if cultivated and is in better tilth than in other areas. In areas covered by standing water in winter, winter wheat may be damaged from winterkilling. Some wet areas dry out too slowly in spring for early seeding of oats. (Capability unit IIw-1; woodland suitability group 11)

Camden Series

The Camden series is made up of light-colored, medium-textured, well-drained soils on outwash plains and alluvial terraces along the Wabash River and its tributaries. These soils developed in silt-mantled medium-textured deposits that were sorted and stratified by water. Their surface layer generally is brown to dark grayish brown, and their subsoil is dark yellowish-brown heavy loam to clay loam. The underlying material consists mainly of stratified, fine to medium sand, but there is some silt and, in places, a small amount of sand or gravel.

The Camden soils developed in silty and loamy material over stratified silt and sand of Wisconsin age. In most places the underlying material is calcareous within a depth of 45 to 75 inches. The native vegetation was a stand of mixed hardwoods, principally white and red oaks, beech, ash, elm, maple, walnut, and hickory.

The Camden soils occur with the Fox and Ockley soils and are similar to them, but Camden soils are finer textured throughout and developed on stratified silt and sand instead of on gravel and some sand.

Representative profile of Camden loam, 0 to 2 percent slopes, located in the SE¼ sec. 11, T. 14 N., R. 7 W.—

Ap—0 to 8 inches, brown (10YR 5/3) to dark-brown (7.5YR 4/2) loam or gritty silt loam; moderate, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—8 to 11 inches, dark grayish-brown (10YR 4/2) loam; weak, thin, platy structure that breaks readily to moderate, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

B1t—11 to 16 inches, dark-brown (7.5YR 4/4) to strong-brown (7.5YR 5/6) light silty clay loam; moderate, medium, subangular blocky structure; friable or firm; medium to strongly acid; clear, wavy boundry.

IIB21t—16 to 22 inches, dark-brown (7.5YR 4/4) to strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; firm or very firm; thin clay films on a few ped faces; strongly acid; clear, wavy boundary.

IIIB22t—22 to 36 inches, strong-brown (7.5YR 5/6) clay loam; strong, medium, subangular blocky structure; firm or very firm; thin clay films on many ped faces; strongly acid; clear, wavy boundary.

IIIB23t—36 to 53 inches, strong-brown (7.5YR 5/6) sandy clay loam; medium, coarse, blocky structure; friable or firm; thin clay films on many ped faces; strongly acid; clear, wavy boundary.

IIIB24t—53 to 65 inches, dark-brown (7.5YR 4/2) light sandy clay loam; weak, coarse, blocky structure; friable; medium acid.

IVB25t—65 to 75 inches, strong-brown (7.5YR 5/6) sandy clay loam; weak, coarse, blocky structure; neutral.

VC1—75 inches +, pale-brown (10YR 6/3) sand; calcareous.

Camden soils vary somewhat from the profile described as representative, depending on the thickness of the silty material and the variability and vertical arrangement of the stratified material in which the soils developed. The surface layer is loam or silt loam. The subsoil ranges from yellowish brown to strong brown, but where these soils adjoin the Sleeth soils that have a loamy substratum, the subsoil may be mottled with gray below a depth of 3 feet. This mottling is evidence of a seasonally high water table. In areas where the Camden soils grade toward the Fox or the Ockley soils, the subsoil contains gravel and coarse sand. The depth to calcareous material ranges from 45 inches to more than 75 inches.

The Camden soils have high available moisture capacity. They are medium in natural fertility and are medium acid or strongly acid unless they have been limed. Their response to lime and fertilizer is good.

Camden loam, 0 to 2 percent slopes (CaA).—This soil has the profile described for the Camden series. It occurs mostly on terraces along Big Raccoon Creek, but there are small areas in the Wabash River valley and along other tributary creeks. In small areas the subsoil is sandy loam at a depth of 24 to 30 inches. Here, the available moisture capacity is lower than normal and crops are more likely to be damaged by drought. This soil occurs with the Fox and Ockley soils and commonly occupies slightly higher positions than the Fox soils.

Raising livestock and growing mixed grains make up the system of farming generally followed in areas of this soil. Corn, wheat, and hay are the principal crops and are grown in rotation. Except for a deficiency of moisture in areas where the soil is relatively shallow to sand, there are no series limitations to the use of this soil. (Capability unit I–1; woodland suitability group 1)

Camden loam, 2 to 5 percent slopes (CaB).—In small areas this soil is eroded and has a slightly thinner surface layer than Camden loam, 0 to 2 percent slopes. In some eroded spots the yellowish-brown subsoil is exposed. Included in mapping are small areas that are steeper than 5 percent.

This soil produces slightly lower yields than Camden loam, 0 to 2 percent slopes, but it is well suited to most of the common crops, including alfalfa, if it is limed and fertilized. Alfalfa responds well to potash. (Capability unit IIe–3; woodland suitability group 1)

Camden silt loam, 0 to 2 percent slopes (CdA).—This soil has a silt loam surface layer and a silty clay loam subsoil, but otherwise its profile is similar to the one described for Camden loam, 0 to 2 percent slopes. This soil occurs chiefly in the valleys of Big and Little Raccoon Creeks. Many areas are on low terraces or high bottoms and are subject to occasional flooding. In flooded areas the water recedes rapidly, however, and there is little deposition of fresh sediments.

Almost all of this soil is cultivated. Corn, soybeans, wheat, and mixed hay are the principal crops. Because the available moisture capacity is slightly higher, yields of most crops are slightly better on this soil than on the Camden loam. (Capability unit I–1; woodland suitability group 1)

Camden silt loam, 2 to 5 percent slopes (CdB).—Except for its silt loam surface layer, this soil has a profile similar to that described as representative of the Camden series. The soil is subject to erosion under intensive row cropping, and some included areas are moderately eroded. In these areas are spots where the surface layer is thinner and somewhat lighter colored than typical. This soil responds well to fertilizer and lime. (Capability unit IIe–3; woodland suitability group 1)

Camden silt loam, 5 to 8 percent slopes, moderately eroded (CdC2).—This inextensive soil occurs on slopes and escarpments around drainageways and on the breaks of terraces. It has a considerably thinner surface layer than Camden loam, 0 to 2 percent slopes, but is slightly deeper to calcareous silt and sand. Included with this soil are some wooded areas that are only slightly eroded. In addition, there are severely eroded spots where the plow layer consists of material from the original brown surface layer mixed with part of the yellowish-brown subsoil.

Because the hazard of erosion is greater, this soil is less suitable for row cropping than the more gently sloping Camden soils. The safe intensity of cropping depends on the effectiveness of measures used to control further soil losses. (Capability unit IIIe–3; woodland suitability group 1)

Chelsea Series

The Chelsea series consists of deep, light-colored, loose, sandy soils that developed in fine sand deposited by wind. These soils occur in areas of undulating or rolling dunes and troughs and in small, flat areas on the Wabash River terrace and the adjoining upland. Wooded areas have a surface layer of very dark grayish-brown loamy fine sand, 4 inches thick, and a subsurface layer of dark yellowish-brown loamy fine sand, 8 inches or more thick. The textural B horizon consists of thin, wavy bands and lenses of light sandy clay loam or sandy loam and thicker layers of loose fine sand. The loamy material is brown when moist.

The Chelsea soils developed in neutral or acid fine sand that was deposited during the recession of ice of the Wisconsin glacial stages. This sand was laid down by westerly winds that swept the mud flats along streams of glacial melt water. In most places the windblown deposits lie east or southeast of broad flood plains and commonly are in the angle formed by the junction of large tributary streams. Deciduous hardwoods, chiefly oaks and hickories, make up the native vegetation.

The Chelsea soils somewhat resemble the Princeton soils in the upper part of the profile, but they have a much weaker textural B horizon.

Representative profile of a Chelsea loamy fine sand, located in the SW¼SE¼ sec. 12, T. 17 N., R. 9 W.—

O1—¼ inch to 0, very dark brown (10YR 2/2) decayed leaves and twigs; neutral.

A11—0 to 1 inch, very dark brown (10YR 2/2) loamy fine sand; weak, medium, granular structure; very friable; very high in organic-matter content; slightly acid; abrupt, smooth boundary.

A12—1 to 4 inches, very dark grayish-brown (10YR 3/2) loamy fine sand; weak, fine, granular structure; loose to very friable; slightly acid; clear, wavy boundary.

A2—4 to 12 inches, dark yellowish-brown (10YR 4/4) loamy fine sand; structureless to weak, fine, granular structure; loose; nonsticky; organic-matter content very low; slightly acid; clear, wavy boundary.

B11—12 to 24 inches, yellowish-brown (10YR 5/4) loamy fine sand; color B horizon only; single grain; loose, nonsticky; medium acid.

B12—24 to 50 inches, yellowish-brown (10YR 5/6) loamy fine sand; single grain; loose, nonsticky; medium acid.

A2&B2t—50 to 72 inches, brown (10YR 5/3) loamy fine sand and wavy horizontal bands and lenses, ¼ inch to 2½ inches thick, of strong-brown (7.5YR 5/8) sandy loam to light sandy clay loam; bands have weak, medium, subangular blocky structure; loose to friable when moist, slightly sticky when wet; slightly acid.

C—72 to 90 inches, yellowish-brown (10YR 5/4) fine sand; single grain; loose, nonsticky; slightly acid.

In the banded part of the solum, the bands of finer textured material vary considerably in depth, number, and thickness. The depth to the first band ranges from 12 to 60 inches but averages 38 inches. Although banding extends to an average depth of 87 inches, the observed lower limit of banding ranges from 55 to 132 inches. In thickness the bands range from ⅛ inch to more than 2 inches, and those of greatest thickness occur between the depths of 5 and 6 feet. The B horizon ranges from slightly acid to strongly acid.

Internal drainage is very rapid in the Chelsea soils, and there is little moisture available for crops, especially shallow-rooted ones. Even short periods of drought cause damage to crops such as corn. Because the soils are underlain by porous material, drainage is likely to be good, even in depressions. Some blowing and washing can occur, but erosion generally is not a serious problem. A few blowouts, or wind-eroded areas, are on the windward side of ridgetops that lack a plant cover and have a low organic-matter content.

The Chelsea soils are low in fertility, particularly in content of organic matter and in supply of nitrogen and potassium. They are best suited to special crops such as melons, early tomatoes, and blackberries and raspberries and similar cane fruits. They also are suited to drought-resistant pasture plants and to trees, chiefly conifers. Because fertility and the available moisture capacity are low, the best yields of forage can be obtained from alfalfa grown alone or in a mixture with orchardgrass or bromegrass.

Chelsea loamy fine sand, 2 to 5 percent slopes (ChB).—This soil occurs on low dunes and on foot slopes along the windward side of higher dunes. It is excessively drained and is easily penetrated by water, roots, and air. The available moisture capacity is very low.

Most of this soil has been cleared and is cropped. The soil is best suited to cantaloups, watermelons, early tomatoes, and other special crops. Among the field crops that can be grown are alfalfa, rye, and wheat. Yields of corn and soybeans generally are low but depend on the amount and distribution of rainfall during the growing season. (Capability unit IIIs-1; woodland suitability group 17)

Chelsea loamy fine sand, 5 to 8 percent slopes (ChC).—Except for its stronger slopes, this soil is similar to Chelsea loamy fine sand, 2 to 5 percent slopes. It is suited to the same crops and produces about the same yields. Water erosion can be controlled by use of contour tillage. (Capability unit IIIe-12; woodland suitability group 17)

Chelsea loamy fine sand, 8 to 15 percent slopes (ChD).—This soil is steeper than Chelsea loamy fine sand, 2 to 5 percent slopes, and has been slightly eroded. Included with it in mapping are small areas that are moderately eroded. These areas are a little lighter colored and have a lower content of organic matter than other areas, and they tend to erode more easily when exposed to the wind.

The steeper areas of this soil are more difficult to till than the less strongly sloping ones, but they produce only slightly lower yields. The steeper areas have been kept in trees, longtime meadow, or permanent pasture. (Capability unit IVe-12; woodland suitability group 17)

Chelsea loamy fine sand, 15 to 40 percent slopes (ChF).—This soil is more droughty and is more difficult to till than the less strongly sloping Chelsea soils. Included are some areas that have slopes exceeding 40 percent and small areas that have been eroded by water.

In most places this soil is used for permanent pasture or as woodland. Where it is cropped, it produces about the same yields as other Chelsea soils. The soil is best suited to trees, drought-resistant plants used for pasture, and alfalfa and other deep-rooted legumes. If it is left unprotected, it is readily eroded by wind. (Capability unit VIe-3; woodland suitability group 17)

Cincinnati Series

In the Cincinnati series are well-drained soils that occur on narrow ridgetops and upper slopes and have a fragipan. These soils developed in a thin layer of loess over glacial till of Illinoian age. The native vegetation is a forest of mixed hardwoods, including oak, hickory, and yellow-poplar (fig. 4).

***Figure 4.*—Second-growth forest on a dissected ridgetop in an area of Cincinnati and Hickory soils.**

The Cincinnati soils developed in the same kind of material as the Hickory soils, but they generally occupy milder slopes, developed in a thicker mantle of silt, and have a fragipan. On slopes greater than 15 to 18 percent, the Cincinnati soils grade into the Hickory soils.

The Cincinnati soils occur with the Alford soils, which developed in a mantle of silt generally more than 6 feet thick and lack a fragipan. They also occur with the Hennepin soils, which are thinner and less acid than Cincinnati soils and developed on steep slopes underlain by calcareous glacial till of Wisconsin age.

Representative profile of a Cincinnati silt loam in a bluegrass area located in the SE¼NW¼ sec. 11, T. 14 N., R. 8 W.—

A1—0 to 4 inches, dark grayish-brown (10YR 4/2) smooth silt loam; moderate, coarse, granular structure; friable; many roots; very strongly acid; clear, wavy boundary.

A2—4 to 10 inches, dark yellowish-brown (10YR 4/4) smooth silt loam; moderate, fine, granular structure; friable; very strongly acid; clear, wavy boundary.

B1—10 to 18 inches, reddish-brown (5YR 5/4) light silty clay loam; moderate, fine and medium, angular blocky structure; friable to firm; very strongly acid; clear, wavy boundary.

B21t—18 to 27 inches, yellowish-brown (10YR 5/8) silty clay loam; moderate, medium and coarse, angular blocky structure; firm; a few, thin, light-brown (7.5YR 6/4) clay films on ped faces; few iron and manganese concretions in this layer; very strongly acid; clear, wavy boundary.

IIB22x—27 to 48 inches, yellowish-brown (10YR 5/6) gritty heavy silt loam; weak to moderate, coarse, prismatic or polygonal structure breaking to moderate, coarse, angular blocky structure; firm; a few light-gray (10 YR 7/2) to light brownish-gray (10YR 6/2) silt coats on prism faces; very strongly acid; gradual, wavy boundary.

IIB23x—48 to 96 inches, brown (10YR 5/3) gritty clay loam; a few, distinct, light brownish-gray (10YR 6/2) mottles; weak to moderate, coarse, prismatic structure breaking to weak, coarse, subangular blocky structure; firm; a few dark-brown to black iron and manganese concretions; strongly acid; gradual, irregular boundary.

IIB3—96 to 108 inches, light yellowish-brown (10YR 6/4) loam to clay loam with common, medium, distinct mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; strongly acid to medium acid.

IIC—108 inches +, yellowish-brown (10YR 5/4) loam till with fine and medium, distinct mottles of yellowish brown (10YR 5/6); calcareous.

The thickness of the loess mantle commonly ranges from 20 to more than 40 inches but is less than 20 inches on some of the steeper slopes. The color of the surface layer ranges from very dark grayish brown in forested areas to dark grayish brown in cultivated areas. As the slope increases, the thickness of the horizons decreases and the fragipan is less distinct. The depth to calcareous till ranges from about 90 inches on steeper slopes to 12 feet or more on milder slopes.

In Parke County the Cincinnati soils occur so closely with the Hickory soils that they are mapped only in complexes with those soils. A representative profile of a Hickory soil is described under the heading "Hickory Series."

Cincinnati-Hickory complex, 8 to 15 percent slopes, moderately eroded (CnD2).—This complex is made up of soils that occur in such intricate patterns that mapping the soils separately is impractical. Most of the complex lies on short slopes or breaks around the heads of drainageways. The Cincinnati soils are on the narrow ridgetops and the milder upper slopes; the Hickory soils occupy the steeper lower slopes.

Most of the acreage is moderately eroded and has a surface layer that is thinner than normal. The surface layer commonly ranges from 3 to 7 inches in thickness, but many cultivated areas have a plow layer consisting of the remaining part of the original dark-colored surface layer mixed with light-colored material from the subsoil. In spots the yellowish-brown subsoil is exposed and a few gullies have been formed. In about one-fifth of the total acreage, the soils remain wooded and have profiles that resemble those described for the Cincinnati soils and the Hickory soils. Included in areas mapped as this complex are areas that are steeper than 15 percent. Also included are small areas of Alford soils in places where the fragipan is missing and the mantle of loess is thicker than typical.

Because the risk of further erosion is severe, the most suitable use for the soils of this complex is permanent hay, pasture, or woodland. (Capability unit IVe–1; woodland suitability group 9)

Cincinnati-Hickory complex, 8 to 15 percent slopes, severely eroded (CnD3).—The soils of this complex have lost most of their original surface layer and, in places, part of their subsoil through erosion. In some areas the subsoil is exposed and the plow layer is grayish-brown to yellowish-brown silt loam to silty clay loam. Where erosion is most severe, there are many gullies 3 to more than 5 feet deep.

Many areas of these soils formerly were cultivated but now are idle. These areas are covered with broomsedge or are reverting to woodland. The main problems in managing the soils are the erosion hazard, strong acidity, low content of plant nutrients, and poor tilth. The soils are best kept in pasture or trees and, if seeded to grasses and legumes, should be limed and fertilized according to needs indicated by soil tests. If cultivated crops are grown, special care is needed to control further erosion and to increase the supply of plant nutrients. (Capability unit VIe–1; woodland suitability group 9)

Clay Pits

Clay pits (Cp) are excavations made to remove clay from geological material or from weathered shale that underlies soil. The clay is used in manufacturing drainage tile, tile blocks for buildings, and other products of the ceramics industry. The disturbed soil or bare rock is useful mainly as woodland or as wildlife habitat. (Capability unit VIIe–3; woodland suitability group 16)

Eel Series

The Eel series consists of nearly level, dark grayish-brown, moderately well drained soils that occur mostly in the valleys of small streams and in shallow swales and old meander channels along larger streams. These soils developed in neutral to calcareous alluvium washed from terraces and uplands on the silt-mantled glacial drift area of Wisconsin or Illinoian age. The original plant cover was a dense forest of hardwoods, chiefly sycamore, silver maple, ash, elm, and beech.

Representative profile of Eel silt loam, located in the SW¼NE¼ sec. 13, T. 16 N., R. 9 W.—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; medium granular structure; friable; neutral; abrupt, smooth boundary.

C1—8 to 18 inches, dark yellowish-brown (10YR 4/4) to pale-brown (10YR 6/4) silt loam; weak, coarse, granular structure; slightly firm; neutral or mildly alkaline; clear, wavy boundary.

C2—18 to 40 inches, grayish-brown (10YR 5/2) silt loam that is slightly mottled with light yellowish brown (10YR 6/4–5/4); mottles range from few, fine, and distinct in upper part to many, coarse, and distinct in lower part; calcareous.

The Ap horizon generally ranges from dark grayish brown to brown, though it approaches very dark grayish brown where the Eel soils grade toward the Armiesburg soils. In some places the C1 horizon is of uniform texture, but in others it is stratified, at an average depth of 40 inches, in layers of two or more textures like those in the surface layers. The C2 horizon ranges from loam to light silty clay loam. In some places there are thin strata of fine sandy loam or fine sand at a depth of 20 to 40 inches or more. The A and C horizons range from slightly acid to calcareous. The slightly acid areas are in the southern and southeastern parts of the county. Loam, silt loam, and silty clay loam are the types mapped in this county. The loam is on natural levees, and the other types are likely to occur on back bottoms.

The Eel soils have a high available moisture capacity and are moderately high in natural fertility. During the period from November to June, areas on bottom land are frequently flooded. Most floods occur in the valleys of larger streams during winter and early in spring. Undrained areas are often too wet for efficient tillage.

Eel loam (Ea).—This soil occupies bottom land along the Wabash River and the larger tributary creeks. It developed in coarser textured material than the soil described as representative, but it has a profile similar to the one of that soil. The surface layer is 6 to 8 inches of dark grayish-brown loam that has a relatively high content of organic matter. In a few areas the surface layer is somewhat darker than normal.

Included with this soil are small areas that have a sandy surface layer ranging from 4 to 12 inches in thickness. Tillage tends to mix this sandy layer with material from the layer below it and to form a finer textured plow layer. An example of such mixing is in a field along the old canal site about 2 miles north of Lyford.

A large part of this soil is in narrow, irregularly shaped areas and is wooded or in permanent pasture. The principal crop grown in cultivated areas is corn. (Capability unit I–2, woodland suitability group 8)

Eel loam, high bottom (Eb).—This soil generally occurs on natural levees along old meander channels of the Wabash River and on alluvial fans in the valleys of most large streams. It occupies areas that are 1 to 3 feet higher than the adjoining flood plain and are slightly higher and less frequently flooded than areas of Eel loam.

This soil is similar to the soil described as representative of the series, but its loam surface layer has a more abrupt lower boundary, and its subsoil is slightly brighter in color and may contain a little more clay. In addition, the subsoil is slightly acid and has weak, subangular blocky structure.

Because flooding is less frequent and floodwater recedes more rapidly, the risk of crop loss is lower on this soil than on Eel loam. Consequently, the cropping sequence can safely include small grain and meadow crops. (Capability unit I–2; woodland suitability group 8)

Eel silt loam (El).—This soil has a profile similar to the one described for the Eel series. It lies mainly in the valleys of small streams and in some of the old channels and depressions on the flood plain of the Wabash River.

Because this soil occurs chiefly in narrow valleys that are dissected by winding streams, it is used mostly for permanent pasture and as woodland. About one-third of the acreage is used for general crops, chiefly corn. Rectangular areas are cropped intensively. (Capability unit I–2; woodland suitability group 8)

Eel silt loam, high bottom (Em).—This soil is on bottom land, mainly along Big Raccoon Creek and Little Raccoon Creek but partly along many small streams. It occurs in slightly higher areas than Eel silt loam and is flooded less frequently. Also, it is medium acid or slightly acid and, in some places, has an accumulation of clay in the subsoil.

Where this soil occurs with Shoals silt loam or with Sleeth silt loam, loamy substratum, 0 to 2 percent slopes, it is somewhat grayer, is more poorly drained, and produces lower yields of most crops than the representative soil. (Capability unit I–2; woodland suitability group 8)

Eel silty clay loam (En).—Except for its silty clay loam surface layer and its somewhat finer textured upper subsoil, this soil is similar to Eel silt loam. It occurs chiefly on the flood plain of the Wabash River and is in areas 1 to 3 feet lower than areas of the adjacent Genesee soils. Consequently, it is flooded more frequently and for longer periods than those soils. A few small areas are slightly higher than the flood plain.

In places where this soil grades toward Armiesburg silty clay loam, its surface layer is somewhat darker than normal. Where it grades toward Shoals silt loam, it has a lighter gray surface layer and a more mottled subsoil.

This fertile and productive soil is used chiefly for corn and soybeans. Because it has a higher clay content than other Eel soils, more power is required in tillage and more care is needed in preparing a seedbed and improving tilth. (Capability unit I–2; woodland suitability group 8)

Elston Series

In the Elston series are dark-colored, somewhat excessively drained soils that developed in sand and loamy sand under tall prairie grasses. These soils occur on nearly level valley trains and outwash plains around Lyford and Rosedale. Their surface layer is as much as 20 inches thick and is very dark brown loam to fine sandy loam that grades into a dark-brown sandy clay loam subsoil.

The Elston soils developed in slightly acid or neutral, stratified fine and medium sand containing a small amount of fine gravel. Although they are nearly level, in some places their surface is gently undulating or dunelike because wind has sorted the sandy soil material to a depth of about 1½ feet.

The Elston soils are more sandy throughout than the nearby Warsaw soils, which developed in loamy or silty outwash over calcareous gravel and sand at a depth of about 40 inches. The Elston soils are similar to the Princeton soils, which developed in stratified sand and silt, but Elston soils are darker colored, developed under grass instead of forest, and contain more coarse sand and fine gravel in the profile.

Representative profile of an Elston loam, located in the SW¼SE¼ sec. 34, T. 14 N., R. 8 W.—

Ap—0 to 8 inches, very dark brown (10YR 2/2) loam; weak, medium, granular structure; friable; slightly acid or medium acid; abrupt, smooth boundary.

A12—8 to 18 inches, very dark brown (10YR 2/2) loam; moderate, coarse, granular structure; friable; medium acid; clear to gradual, wavy boundary.

B21t—18 to 27 inches, dark-brown (7.5YR 3/2 to 4/4) sandy clay loam; weak to moderate, medium, subangular blocky structure; friable or firm; strongly acid; clear, wavy boundary.

B22t—27 to 42 inches, dark-brown (7.5Y 3/2) heavy sandy clay loam with a few bands of light sandy clay loam; weak, coarse, subangular blocky structure; friable; strongly acid or medium acid; clear, wavy boundary.

B3—42 to 78 inches, dark-brown (10YR 4/3) sandy loam to loamy sand; weak, coarse, subangular blocky structure; friable; medium acid; clear, wavy boundary.

C—78 inches +, brown (10YR 5/3), stratified sand with some fine gravel; noncalcareous.

The dark-colored surface layer ranges from 12 to 20 inches in thickness. In texture the subsoil ranges from sandy loam to heavy sandy clay loam. The depth to the C horizon ranges from 55 to 80 inches. The underlying material is slightly acid to weakly calcareous. Loam and sandy loam are the types mapped in this county.

The low available moisture capacity is a major limitation to the use of these soils. In addition, natural fertility is low, and fertilization is required for favorable yields. In the sandy areas, wind erosion is a minor problem.

Elston loam, 0 to 3 percent slopes (EoA).—This soil has the profile described as representative of the Elston series. Because the soil generally is nearly level and has a little more clay in the surface layer and subsoil than the Elston sandy loams, it has less rapid internal drainage and higher available moisture capacity.

Included with this soil are a few small areas on slopes of 4 or 5 percent. Some of these included areas are moderately eroded and have a surface layer that is thinner and lighter colored than the one in the typical soil.

This loamy soil is easily tilled, and most of the acreage is cultivated. (Capability unit IIs–2; woodland suitability group 23)

Elston sandy loam, 0 to 3 percent slopes (EsA).—This soil has a thinner surface layer than Elston loam, 0 to 3 percent slopes, and it contains more sand in the surface layer and subsoil. In areas where this soil grades to the Warsaw soils, the content of gravel is higher than normal and interbedding of gravel and sand is common. In these places there is gravel at a depth of 4 to 6 feet.

Most of this soil is on nearly level stream terraces, but near Rosedale are moderately eroded areas that are slightly undulating because their surface is marked by shallow depressions and by dunes of windblown sand 1 to 2 feet high. Mapped with these moderately eroded areas are included areas having slopes of 3 to 5 percent.

This soil is used mainly for cultivated crops. Corn, wheat, soybeans, and alfalfa are the principal crops grown. Because the available moisture is limited in midsummer, wheat and alfalfa are somewhat better suited than corn. Also grown on this soil are sweet corn, strawberries, and other special crops. These crops have a high value per acre and are irrigated in some places, for an adequate supply of water for irrigation is relatively near the surface. (Capability unit IIIs–2; woodland suitability group 23)

Elston sandy loam, 5 to 8 percent slopes, moderately eroded (EsC2).—This soil occurs chiefly on the breaks of high terraces along the Wabash River in the southwestern part of the county. It has a thinner surface layer than Elston sandy loam, 0 to 3 percent slopes, for it has lost 4 to 8 inches of its original surface layer through erosion. Included in mapping are small, moderately eroded areas that occupy slopes of 8 to 15 percent. These areas are on the south side of the former lake, or muck area, west of Rosedale.

This soil is used for most crops commonly grown in the county. The strongly sloping areas included with it are cropped in about the same way, but they are kept in permanent pasture more of the time. (Capability unit IIIe–13; woodland suitability group 23)

Fincastle Series

Soils of the Fincastle series are deep, light colored, silty, and somewhat poorly drained. They occur on flats and gentle slopes, mostly in the northeastern part of the county. These soils have a surface layer that is normally 8 to 12 inches thick and is underlain by an upper subsoil of yellowish-brown light silty clay loam mottled with gray. The main part of the subsoil is yellowish-brown to pale-brown silty clay loam to clay loam mottled with gray. Underlying this layer at a depth of 42 to 70 inches is calcareous, grayish-brown loam, silt loam, or light clay loam till.

The Fincastle soils developed in a mantle of silt, generally 18 to 40 inches thick, over glacial till of Wisconsin age. A deciduous forest of beech, sugar maple, oak, hickory, and other hardwood trees made up the native vegetation.

The Fincastle soils have a thinner mantle of silt than the Reesville soils, which developed in silt 3 to more than 5 feet thick and have a C horizon of neutral or calcareous silt instead of calcareous glacial till. In addition, Fincastle soils are more acid in the surface layer and subsoil and have a more compact subsoil than Reesville soils, and they contain glacial pebbles and rocks fragments in the lower subsoil.

Representative profile of a Fincastle silt loam in a wooded area located in the SW¼NE¼ sec. 31, T. 16 N., R. 6 W.—

O2—¾ inch to 0, very dark grayish-brown (10YR 3/2), granular leaf mold; neutral.

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—3 to 11 inches, very pale brown (10YR 7/3) silt loam mottled with gray (10YR 6/2); weak, fine, granular structure to weak, thin, platy structure; slightly plastic when wet, friable when moist; medium acid; abrupt, smooth boundary.

B1—11 to 14 inches, light brownish-gray (10YR 6/2) heavy silt loam with a few, fine, distinct mottles of yellowish brown (10YR 5/4); moderate, medium, subangular blocky structure; slightly plastic when wet, firm when moist; strongly acid; clear, smooth boundary.

B21t—14 to 33 inches, yellowish-brown (10YR 5/4) silty clay loam with many, medium, distinct mottles of brownish yellow (10YR 6/6 to 6/8) and light brownish gray (10YR 6/2); strong, medium, subangular blocky structure; plastic when wet, firm when moist; medium acid to strongly acid; clear, smooth boundary.

IIB22t—33 to 60 inches, yellowish-brown (10YR 5/6) clay loam that changes to dark yellowish brown (10YR 4/4) in lower part; moderate, medium, subangular blocky structure; plastic when wet, firm when moist; medium acid ranging to neutral near contact with C horizon.

C—60 inches +, light yellowish-brown (10YR 6/4) loam; calcareous.

The plow layer in cultivated fields is thicker than the undisturbed surface soil in wooded areas, but it is not so dark colored. Low-lying to slightly depressional areas are poorly drained and have a surface soil that is lighter gray than the one described as representative. In some areas near the Reesville soils, the silt cap is thicker than 40 inches. The depth to calcareous till normally ranges from 42 to 70 inches and averages 46 inches.

Fincastle soils have slow surface runoff, slow internal drainage, and high available moisture capacity. These soils lie mainly between knolls of the Russell soils and shallow depressions of the dark-colored Ragsdale soils. The difference in elevation between these three kinds of soils rarely exceeds 1 or 2 feet. Most areas have been partly drained by tile lines running through the swales and depressions.

Fincastle silt loam, 0 to 2 percent slopes (FcA).—This light-colored, somewhat poorly drained soil is one of the most extensive in Parke County. It has a profile similar to the one described as representative. Included in areas mapped as this soil are areas of Reesville silt loam, 0 to 2 percent slopes, on flats where the loess mantle is 40 inches or more thick. Also included are small areas of light-gray soils that are leached to a depth of 4 to 6 feet and are poorly drained.

If drained, this soil is suited to all the crops commonly grown in the county. Because it is nearly level, it can be cropped more intensively than the gently sloping Fincastle silt loam. (Capability unit IIw–2; woodland suitability group 5)

Fincastle silt loam, 2 to 5 percent slopes (FcB).—This soil is very gently undulating but has a profile similar to the one described for the Fincastle series. Included with it are moderately well drained areas on side slopes and narrow ridgetops where stream dissection into the broad divides has improved the surface drainage. In these areas the surface layer is browner than that in the representative profile, the upper subsoil is yellowish brown, the subsoil is not mottled with gray above a depth of 15 to 20 inches, and surface runoff and internal movement of water are more favorable than normal. Also included are a few eroded areas where the surface layer is thin or the yellowish-brown subsoil is exposed.

This soil is used in nearly the same way as Fincastle silt loam, 0 to 2 percent slopes, but it is kept in meadow crops or permanent pasture for a greater part of the time and thereby is better protected from erosion. (Capability unit IIw–2; woodland suitability group 5)

Fox Series

The Fox series consists of light-colored, well-drained or somewhat excessively drained soils that developed in silty or loamy outwash material generally underlain by stratified, calcareous gravel and sand at a depth of 24 to 42 inches. These soils are locally called gravelly bench soils, for they occur mostly on alluvial terraces bordering large streams that carried water from melting glaciers.

Although the largest areas of these soils occur on nearly level terraces, some areas are on conical hills, or kames, and others occupy moraines on the upland till plains. In these areas the relief is irregular and is made up of slopes facing several directions. The native vegetation was a forest of mixed hardwoods, dominantly oak and maple.

The Fox soils occur closely with the Ockley soils, especially along the Wabash River. They have a thinner and, in most places, a less silty solum than the Ockley soils, which are underlain by calcareous gravel and sand at a depth of 42 to 66 inches or more. The Fox soils are lighter colored than the Warsaw soils, which developed under prairie grasses.

Representative profile of a Fox loam in woodland located in the SW¼SW¼ sec. 7, T. 16 N., R. 8 W.—

O2—⅛ inch to 0, very dark brown (10YR 2/2) forest litter consisting of decayed leaves, twigs, and other organic material; neutral.

A1—0 to 3 inches, black (10YR 2/1) heavy loam that contains some gravel; weak, medium, granular structure; friable; neutral or slightly acid; abrupt, smooth boundary.

A2—3 to 10 inches, brown (10YR 4/3) loam; weak, coarse, granular structure; friable when moist, slightly hard when dry, slightly plastic when wet; medium acid; clear, smooth boundary.

B1t—10 to 18 inches, brown (10YR 4/3) light clay loam; moderate, medium, subangular blocky structure; aggregates, when crushed, are brown (10YR 4/3); firm when moist, hard when dry, slightly plastic when wet; medium acid; clear, smooth boundary.

IIB21t—18 to 27 inches, brown (7.5YR 4/4) gravelly clay loam; thin to medium clay films on many ped faces; moderate, medium to coarse, subangular blocky structure; firm when moist, hard when dry, slightly plastic when wet; many small pebbles in lower part; medium acid or strongly acid; clear, smooth boundary.

IIB22t—27 to 35 inches, dark reddish-brown (5YR 3/3) gravelly clay loam; weak, coarse, blocky structure; clay films on many faces; firm when moist, hard when dry, sticky when wet; medium acid; clear, smooth boundary.

IIB23t—35 to 38 inches, dark-brown (7.5YR 3/2) gravelly clay loam; massive (structureless); hard when dry, sticky when wet; neutral or slightly acid; abrupt, irregular boundary, with tongues extending 5 to 10 inches or more into the underlying material.

IIIC1—38 inches +, brown (10YR 5/3) to pale-brown (10YR 6/3), poorly sorted gravel and sand; calcareous; the gravel contains a considerable amount of limestone and dolomite fragments and has an acid neutralizing value of about 30 percent.

The Fox soils vary considerably in thickness of horizons and in depth to parent material. In areas where these soils grade to the Ockley soils, the silty or loamy material is thicker than in the profile described and the calcareous material is more sandy and occurs at a greater depth. In these areas the depth to calcareous material commonly exceeds 4 feet. In sloping areas the soils have a thinner profile than the one described and, in some places, are underlain by calcareous gravel and sand within a depth of 24 inches or less. Also, the soils in sloping areas generally are coarser textured and are more gravelly throughout. Tongues in the IIB23t horizon that extend into the IIIC1 horizon are variable in thickness and number. The soil types mapped in this county are loam, sandy loam, and silt loam.

Fox loam, 0 to 2 percent slopes (FmA).—This soil, one of the most extensive of the Fox series, occupies terraces throughout the Wabash River valley and along the larger tributary streams. It has a profile similar to the one described as representative. The surface layer generally is brown, friable loam that is 8 to 10 inches thick and has granular structure. This layer is underlain by a subsoil of dark grayish-brown to reddish-brown silty clay loam to clay loam.

The surface layer of this soil ranges from gritty light silt loam to heavy loam or loose, mellow loam. The amount of gravel in the soil and the underlying material is highly variable. In a few places there is a fairly large amount of coarse gravel on or near the surface. The depth to loose gravel and sand ranges from 24 to 42 inches. The soil is medium acid or slightly acid. The organic-matter content oxidizes rapidly, and in cultivated fields the organic-matter content generally is low.

Included in areas mapped as this soil are small areas that have a surface layer of silt loam or sandy loam.

The native vegetation on Fox loam, 0 to 2 percent slopes, was a forest of hardwoods, but most of the acreage has been cleared and is used for crops and pasture. Corn, soybeans, and wheat are the principal crops grown. The main problems in managing the soil are droughtiness and medium to low fertility. Owing to its low available moisture capacity, the soil is not well suited to oats, and it produces yields of corn that vary with the moisture available. It is best suited to wheat, rye, and other small grains that are seeded in fall and mature before the dry months of summer.

The organic-matter content can be maintained or increased by growing cover crops and by turning under green-manure crops. Also desirable is the use of hay or pasture crops, especially alfalfa and other deep-rooted legumes that can best use the limited moisture. Kentucky bluegrass furnishes excellent pasture but is dormant in July and August. On farms where livestock are raised, therefore, it is well to use a mixture of alfalfa and grass for rotation meadows or to provide supplemental pasture of sudangrass. (Capability unit IIs–1; woodland suitability group 1)

Fox loam, 2 to 5 percent slopes (FmB).—This soil is mainly on short slopes around drainageways and in long, narrow strips above terrace breaks or escarpments. A smaller acreage is in gently undulating areas, and a few areas occupy knolls on the till plain. Where the soil occurs on knolls, it is commonly marked by worked out and abandoned gravel pits.

This soil has a slightly thinner surface layer than Fox loam, 0 to 2 percent slopes. The surface layer generally is 8 to 10 inches thick. Included in mapping are very gently undulating areas on slopes of 1 to 2 percent. Also included are moderately eroded areas where the surface layer is thinner than normal or where a small amount of subsoil is exposed or is mixed into the plow layer.

This soil is used and managed in about the same way as Fox loam, 0 to 2 percent slopes, though it is more susceptible to erosion if cultivated up and down the slope. Droughtiness is the major limitation, especially if rainfall is lost as runoff. Erosion can be controlled and runoff reduced by use of contour tillage. (Capability unit IIe–9; woodland suitability group 1)

Fox loam, 5 to 8 percent slopes, moderately eroded (FmC2).—This soil occurs in sloping areas around drainageways, along the breaks of terraces, and on gravelly knolls on the till plain. Its surface layer ordinarily is only 3 to 8 inches thick and is thinner than that of Fox loam, 0 to 2 percent slopes. In places, however, there are spots where the brown, gravelly subsoil is exposed or where subsoil material has been mixed with remnants of the original surface layer through tillage. The plow layer is lower in fertility, has a lower organic-matter content, and makes a poorer seedbed than the surface layer in noneroded Fox soils. Included in areas mapped as this soil are a few small areas of severely eroded soils or of Fox silt loam.

This soil is better suited to meadow and pasture crops than to clean-tilled crops, especially in areas on gravelly knolls that generally are not suitable for contour tillage. Much of the acreage is tilled with adjoining soils, but crop yields are lower on this soil. (Capability unit IIIe–9; woodland suitability group 1)

Fox loam, 8 to 15 percent slopes, moderately eroded (FmD2).—This soil occurs chiefly in long, narrow strips on the breaks of low and high terraces along the Wabash River and its tributary streams. A few areas occupy conical gravelly knolls on uplands. The soil is coarser textured and more gravelly than Fox loam, 0 to 2 percent slopes, and it is not so deep to calcareous gravel. Also, its surface layer is commonly thinner than the one in that soil, but in other respects the profiles of the two soils are similar.

The brown surface layer of this soil generally is only 3 to 8 inches thick because of erosion. In many small areas that are more severely eroded than typical for this soil, however, the reddish-brown gravelly clay loam subsoil is exposed or is mixed into the plow layer. Included are some severely eroded areas where shallow gullies have been cut into the gravelly lower subsoil. Also included are areas that are only slightly eroded and areas that have a surface layer of silt loam.

Under cultivation, this soil is highly susceptible to further erosion. It can be protected by using it for permanent pasture or timber. Tilling on the contour and growing a high proportion of small grains and hay crops in the rotation will help to control erosion and to maintain yields. But whether contour tillage is practical depends largely on the use of adjacent soils, for tillage implements can easily be used across the short slopes of this soil. Because it is more eroded and has a lower available moisture capacity, this soil produces lower yields than the nearly level Fox loam. (Capability unit IVe–9; woodland suitability group 1)

Fox sandy loam, 0 to 2 percent slopes (FsA).—This soil is chiefly on terraces along the Wabash River. Here, it occurs with Fox loam, 0 to 2 percent slopes, and the Elston soils. The surface layer, to a depth of 12 inches, is light-brown to grayish-brown sandy loam that is relatively low in organic-matter content. This layer is underlain by dark-brown clay loam or gravelly clay loam. Loose, calcareous sand and gravel are at a depth of 35 to 42 inches.

Most areas of this soil have been cleared and are cultivated. The soil is used for about the same crops as the finer textured Fox soils, but yields are lower because less moisture is available. Oats and clover are often damaged severely by drought. Alfalfa seeded alone or in mixture with bromegrass and Ladino clover provides the most satisfactory and most productive hay or rotation pasture. An example of a suitable rotation is 1 year of corn, 1 year of wheat, and 2 or 3 years of alfalfa and bromegrass. (Capability unit IIIs–2; woodland suitability group 2)

Fox sandy loam, 2 to 5 percent slopes (FsB).—This soil occurs closely with Fox loams and other Fox sandy loams. It has a thinner surface layer and is more susceptible to erosion than Fox sandy loam, 0 to 2 percent slopes. The surface layer generally is 4 to 8 inches thick, but in a few spots the finer textured subsoil is exposed. Included in areas mapped as this soil are areas that occupy slopes of 1 to 2 percent and small areas that are moderately eroded.

This soil is used and managed about the same way as the nearly level Fox sandy loam. Most of it is cultivated to the same crops and produces about the same yields. Droughtiness and the erosion hazard are major limitations. (Capability unit IIIe–13; woodland suitability group 2)

Fox sandy loam, 5 to 8 percent slopes (FsC).—This soil is similar to Fox sandy loam, 0 to 2 percent slopes, but its brown surface layer is thinner, especially in areas that are more strongly sloping and somewhat eroded. It occurs with other Fox sandy loams and, in a few places, lies in narrow, elongated areas that border streams or that separate other Fox soils at different levels on terraces. Some moderately eroded areas are included.

In suitability for use, most of this soil is similar to Fox sandy loam, 0 to 2 percent slopes, but yields are somewhat lower because runoff is more rapid and less moisture is available to crops. (Capability unit IIIe-13; woodland suitability group 15)

Fox sandy loam, 8 to 15 percent slopes, moderately eroded (FsD2).—This soil has an original surface layer of sandy loam that, in most places, is thinner than the one in Fox loam, 0 to 2 percent slopes. In addition, this soil generally is not so deep to calcareous sand and gravel. Otherwise, however, the profiles of the two soils are similar.

The light-brown surface layer normally ranges from 3 to 8 inches in thickness, but in many small areas the reddish-brown gravelly clay loam subsoil is exposed. Included in mapping are areas on hillsides where slopes exceed 15 percent and the soil is darker colored and neutral. Also included are some wooded areas that are only slightly eroded.

Most of this soil is used and managed the same as the adjacent soils. The limited supply of available moisture is a critical problem, for runoff is rapid on the steeper slopes and the heavy subsoil is exposed in many places. The soil is susceptible to further erosion if it is cultivated improperly, but it can be protected by permanent pasture or trees. Tilling on the contour and using a rotation that includes a high proportion of small grain and hay crops will help to control erosion and maintain yields. Well suited is a rotation consisting of 1 year of corn, 1 year of wheat, and 2, 3, or more years of alfalfa and bromegrass meadow. (Capability unit IVe-9; woodland suitability group 15)

Fox silt loam, 0 to 2 percent slopes (FtA).—Except for its silt loam surface layer, this soil has a profile similar to the one described for the Fox series. Most of the acreage is in the valley of the Wabash River, but a few areas are along Big Raccoon Creek east of Rosedale. In some areas the upper part of the soil developed in windblown silt as much as 15 inches thick. Calcareous sand and gravel are at a depth ranging from 24 to 42 inches. Because this underlying material is porous, internal drainage is good or somewhat excessive.

This soil varies in sand content and other characteristics. In places where it adjoins Warsaw silt loam, its profile is darker than the one described as representative. Some areas are coarser textured than normal; in these areas there are inclusions of Fox loam.

The larger part of this soil has been cleared and is used for crops and pasture. A grain and livestock system of farming is generally followed. The crops most commonly grown are corn, soybeans, wheat, and grass-legume mixtures for meadow.

This soil can be cultivated early in spring and produces favorable yields of small grain and hay in years when rainfall is a little above average and is well distributed throughout the summer. Alfalfa is a well-suited crop because it can withstand drought late in summer and early in fall. Wheat also is well suited, but the growing season is too hot and too dry for satisfactory yields of oats. (Capability unit IIs-1; woodland suitability group 1)

Fox silt loam, 2 to 5 percent slopes (FtB).—This gently sloping soil occurs around drainageways along the Wabash River and Big Raccoon Creek and in shallow depressions and swales. It is similar to Fox silt loam, 0 to 2 percent slopes, but is more strongly sloping, is somewhat shallower, and contains slightly more gravel throughout. The surface and subsurface layers range from 8 to 12 inches in total thickness. In small eroded areas the plow layer contains material brought up from the reddish-brown silty clay to clay loam subsurface layer through tillage, and it is lighter in color and more cloddy than the original surface layer.

In managing this soil the main problems are the somewhat limited supply of available moisture and the moderate hazard of erosion. The intake of moisture is slower in this soil than in the more sandy Fox soils. Consequently, the erosion hazard is a little greater. Runoff can be reduced and erosion controlled by cultivating on the contour and by keeping the surface protected with vegetation much of the time. Crop rotations should have a higher proportion of meadow crops than of clean-tilled crops. Grassed waterways should be used where feasible. (Capability unit IIe-9; woodland suitability group 1)

Fox silt loam, 8 to 15 percent slopes, moderately eroded (FtD2).—This soil occupies short, steep slopes on the breaks of terraces along Leatherwood Creek and other streams. It occurs with Ockley silt loams.

This Fox soil is similar to Fox silt loam, 0 to 2 percent slopes, but its brown surface layer has been thinned by erosion and is only 3 to 8 inches thick. The reddish-brown subsoil ranges from silty clay loam to sandy clay loam or gravelly clay loam. Calcareous sand or gravel is at a depth of 18 to 42 inches. Included are small areas where erosion has been severe and the reddish-brown subsoil commonly is exposed. Also included are areas that are only slightly eroded.

Of the total acreage, as much as one-third is used for corn, and about one-fourth is wooded. Because erosion is a hazard and moisture is often deficient, the soil is better suited to hay, pasture, and trees than to grain crops. It is moderately productive but produces lower yields than the adjacent Ockley soils. (Capability unit IVe-9; woodland suitability group 1)

Genesee Series

The Genesee series consists of Alluvial soils that are well drained, neutral or mildly alkaline, and very dark grayish brown, dark brown, or brown. These soils occur throughout the overflow bottoms along the Wabash River and tributary streams. They have a dark-colored surface layer but otherwise show little development because they receive fresh deposits of material laid down by floodwater each year.

The alluvial material in which the Genesee soils developed was washed from uplands and terraces of the Wisconsin drift area. From November to June the soils are frequently flooded and are likely to be covered by fresh material. As a result, the texture and other characteristics of the soil materials are changed, sometimes radically during one flood. The extent of these changes depends primarily on the position of the soil, the exposure of the soil to currents, and the speed and carrying power of the floodwater.

Generally, the Genesee soils form definite patterns on the bottom land. The sandier soils—fine sandy loams and loams—developed on natural levees near the streams. The silt loams are likely to occur on back bottoms. A forest of elm, sycamore, ash, silver maple, and yellow-poplar made up the native vegetation.

The Genesee soils are better drained than the nearby Eel soils. Genesee soils are similar to Huntsville and Allison soils in texture, but their surface layer is neither so thick nor so dark. They are similar to the Armiesburg soils in color but are not so fine textured.

Representative profile of Genesee silt loam, located in the SW¼SW¼ sec. 11, T. 14 N., R. 9 W.—

- Ap—0 to 8 inches, dark-brown (10YR 3/3) silt loam; moderate, fine to medium, granular structure; friable; moderately high organic-matter content; neutral; abrupt to clear, smooth boundary.
- C1—8 to 30 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; weak, coarse, granular structure; friable; calcareous.
- C2—30 to 40 inches +, yellowish-brown (10YR 5/4) light silt loam; moderate, medium, subangular blocky structure; friable; seams of sand and sandy loam commonly occur in this horizon; calcareous.

The texture varies markedly throughout the profile and from place to place. It ranges from light silty clay loam to loam. Also, in some areas there are thin strata of fine sand and fine sandy loam in the profile. In places where the Genesee soils grade toward the Allison and Huntsville soils, the surface layer is darker and thicker than normal. In these places the surface layer is 10 to 18 inches thick. Where the Genesee soils grade toward the Eel soils, the material below a depth of 30 inches is faintly mottled with gray.

Some Genesee soils are in higher areas that are flooded less frequently than those at a lower level, and they are not likely to receive so much fresh material each year. These soils, mapped as high bottom phases, show some soil development.

Genesee fine sandy loam (0 to 2 percent slopes) (Gf).—This soil occupies natural levees along the Wabash River and Coal, Mill, and Big Raccoon Creeks. It differs from the soil described for the Genesee series in that it has a surface layer of lighter colored fine sandy loam and is about 18 inches deep to strata consisting chiefly of loam and silt loam.

Representative profile of Genesee fine sandy loam (0 to 2 percent slopes), located in the SE¼SW¼NE¼ sec. 19, T. 17 N., R. 8 W.—

- Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) to brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; slightly calcareous; abrupt to clear, smooth boundary.
- C1—10 to 20 inches, brown (10YR 4/3 to 5/3) fine sandy loam; weak, fine, granular structure; very friable; slightly calcareous; abrupt, wavy boundary.
- IIC2—20 to 40 inches +, yellowish-brown (10YR 5/4) to brown (10YR 5/3) loam with thin strata of silt loam and fine sandy loam interbedded; massive (structureless); friable, slightly calcareous.

The color and thickness of the surface layer are variable, because changing currents have deposited more sandy material in some places than in others. In some places thin strata of fine gravel are interbedded with sand, but in others there are thin strata of loamy or silty material.

Included in areas mapped as this soil are small areas that have a surface layer darker than normal. Also included are a few areas where the sand is deeper than normal and where corn and similar crops may be damaged by drought.

Although flooding is a periodic risk on this soil (fig. 5), floodwater recedes rapidly and crop damage is slight. Corn is the principal crop grown, but alfalfa is well suited, particularly on natural levees that are flooded for only a short time. (Capability unit I-2; woodland suitability group 8)

Figure 5.—**Genesee fine sandy loam on the flood plain of the Wabash River. The old channel meandering across the field has been recently scoured by floodwater.**

Genesee loam (0 to 2 percent slopes) (Gh).—This soil occurs on natural levees, chiefly along the Wabash River and Big and Little Raccoon Creeks. It is similar to the soil described as representative of the series, but it developed in coarser textured material and has a surface layer of loam. The surface layer varies in darkness; it is not so dark in areas near streams where the deposition of fresh material is most recent. The amount and distribution of sand through the soil vary greatly, depending on the severity of flooding. If a stream overflows its banks, floodwater sometimes causes washouts or deposits sand. Sand also is laid down in small, shallow deposits along old meander channels, where flooding may cause erosion.

Because much of this soil lies along large streams, about one-fourth the acreage is covered with trees that help to protect the banks from cutting. Areas along small streams are used for pasture. (Capability unit I-2; woodland suitability group 8)

Genesee loam, high bottom (0 to 2 percent slopes) (Gm).—This soil occupies slightly higher areas than Genesee loam, and it shows more profile development. In many places the surface layer is lighter colored, and the surface layer and subsoil generally are more acid. Included in mapping are small areas where the surface layer is thicker and darker than normal. Also included are areas on slopes of more than 2 percent.

This soil is less likely to be flooded than Genesee loam. It is not so fertile as that soil, however, because it does not receive fresh deposits of rich alluvium every year. (Capability unit I-2; woodland suitability group 8)

Genesee silt loam (0 to 2 percent slopes) (Gn).—This soil has a profile similar to that described for the Genesee series. Almost all the acreage on large bottoms is used for corn. Small, irregular shaped fields on narrow bottoms of tributary streams are kept in trees or pasture because using farm machinery in the fields is difficult.

Cropping this soil is somewhat hazardous because floods occur frequently, some during the growing season from June 1 to November 1. Nevertheless, the soil is high in fertility and is the most productive and most easily managed of the Genesee soils. Both surface drainage and internal drainage are good. (Capability unit I-2; woodland suitability group 8)

Genesee silt loam, high bottom (0 to 2 percent slopes) (Go).—Most of this soil is in the valleys of Little and Big Raccoon Creeks. The soil has a profile similar to the one described as representative, but in some places the subsoil is slightly finer textured, has blocky structure, and is slightly acid, especially in places where this soil adjoins or grades into Camden silt loam. A few included areas are on slopes exceeding 2 percent but otherwise are similar to areas of this soil.

Although row crops are best suited to this soil, small grain and meadow crops are frequently grown because they are subject to only a limited hazard of flooding, and they help to control weeds. (Capability unit I-2; woodland suitability group 8)

Gravel Pits

Gravel pits (Gr) occur throughout the valleys of large streams in the county. The larger pits are along the Wabash River, chiefly in areas of Warsaw and Fox soils. These soils are underlain by loose gravel and sand that are used in building roads and making concrete. Also used are sand and gravel underlying the Ockley soils, but these materials generally are finer. Scattered along streams throughout the county are small Gravel pits that are readily accessible sources of material suitable for maintaining county roads and constructing projects on farms. Abandoned pits are suitable as areas for wildlife, and those containing water can be used for fishing or swimming. (Capability unit VIIe-3; woodland suitability group 16)

Hennepin Series

Soils of the Hennepin series are shallow, moderately dark colored, and neutral. They occupy steep or very steep slopes that are next to deeply entrenched valleys of the Wabash River and tributary streams in the Wisconsin drift area. These soils are in the northern half of the county and along the east side of the Wabash River valley. Here, they are adjacent to the Russell and Alford soils, all of which developed on ridgetops and upper slopes in drift material of Wisconsin age.

The Hennepin soils developed in Wisconsin glacial till. Little development has taken place because it has been limited by geologic erosion and by the stabilizing effect of lime and other bases on the organic matter and clay. The original vegetation was a forest of oak, hickory, ash, maple, and other hardwoods.

The Hennepin soils are thinner, darker, and less acid than the Hickory soils of the Illinoian till area, though both kinds of soils developed on calcareous till that differs chiefly in geological age. Throughout the profile the Hennepin soils are dominantly fined textured than the Rodman soils, which developed in water-sorted gravel and sand instead of loam glacial till.

Representative profile of a Hennepin loam in a wooded area located in the NW¼NW¼ sec. 10, T. 17 N., R. 7 W.—

O2—¼ inch to 0, very dark grayish-brown (10YR 3/2), decomposing forest litter or leaf mold; neutral.

A11—0 to ½ inch, dark grayish-brown (10YR 4/3) loam; moderate, fine, granular structure; friable; neutral or slightly acid; abrupt, smooth boundary.

A12—½ inch to 5 inches, dark grayish-brown (10YR 4/2) loam; moderate, fine to medium, granular structure; friable; neutral; clear, wavy boundary.

B1—5 to 8 inches, dark yellowish-brown (10YR 4/4) heavy loam; weak to moderate, medium, subangular blocky structure; neutral; clear, wavy boundary.

B2t—8 to 16 inches, brown (10YR 4/3) clay loam; weak to moderate, coarse, subangular blocky structure; friable or firm; neutral; clear, wavy boundary.

C1—16 inches +, yellowish-brown (10YR 5/6) coarse clay loam that contains gravel and some stones; calcareous.

The texture of the A horizon ranges from loam or silt loam to clay loam. The B horizon shows the most development in areas where the Hennepin soils grade to the Russell soils, especially on the milder slopes. Horizons above the C horizon range from slightly acid to mildly alkaline. The depth to the calcareous C horizon ranges from 0 to about 18 inches; this horizon is exposed in some eroded areas. In some areas there are stones and boulders on the surface and in the soil.

On these soils surface runoff is rapid, and erosion is a severe hazard if the native trees are removed or if grazing in woodland destroys the natural plant cover.

Hennepin association, 30 to 60 percent slopes (HnF).—The soils in this association are steep or very steep and, in most places, are shallower to parent material than the soil described for the Hennepin series. Their surface layer is silt loam or loam.

More than 85 percent of the acreage is either wooded or is reverting to woodland. The soils are best suited to hardwood trees growing in mixed stands. They are too steep and too shallow for cultivated crops or permanent pasture. (Capability unit VIIe-2; woodland suitability group 4)

Hennepin-Russell complex, 15 to 30 percent slopes, moderately eroded (HrE2).—This complex consists mainly of Hennepin soil on steep slopes, but there are small areas of Russell soil in less sloping areas and on narrow ridgetops that are highly dissected by streams. The Hennepin soil has a profile similar to the one described for the series. The Russell soil has a lighter colored surface layer than the Hennepin soil, and it ranges from 18 to 36 inches in depth over limy parent material.

In areas that have been overgrazed or cleared and cropped, the original surface layer generally has been thinned and lightened in color through erosion. In many places, however, the entire surface layer is gone, the yellowish-brown subsoil is exposed, and shallow gullies have been formed. Included in areas mapped as this complex are some areas on slopes of less than 15 percent and others on slopes exceeding 30 percent.

The soils in this complex are suited mainly to permanent pasture or timber, and more than half their acreage has been kept in trees. Most of the rest is pastured, and less than 10 percent has been cleared and used for crops, which produce low yields. If the less sloping areas are cropped, erosion can be controlled by growing small grains and meadow crops that protect the soil.

As a rule, pasture on these soils is dormant for a longer period during the dry, hot summer than it is on deeper soils with a better supply of available moisture. Kentucky bluegrass used for pasture is most productive in spring, when rainfall is adequate. Grazing should be controlled so that the erosion hazard is reduced and a good cover of plants is maintained. (Capability unit VIIe-2; woodland suitability group 2)

Hickory Series

The Hickory series consists of well-drained, strongly sloping to very steep soils on uplands. These soils have a surface layer of loam or silt loam. They developed in Illinoian till that was originally covered with a thin layer of windblown silt, or loess. The native vegetation was a forest of mixed hardwoods, including oak, hickory, and yellow-poplar.

Hickory silt loams developed in areas that have a thin mantle of loess. Hickory loams occur on very steep slopes where the loess was missing or where the original surface layer developed in loess but has been eroded away. On moderately eroded slopes the clay loam subsoil is exposed, but in some severely eroded areas the material at the surface is calcareous glacial till.

The Hickory soils have a thinner mantle of loess and a thinner solum than the Cincinnati soils, which have a fragipan. In the Hickory soils the solum is thicker, lighter colored, and more acid than it is in the Hennepin soils.

Representative profile of a Hickory silt loam in a wooded area located in the NE¼SE¼ sec. 9, T. 14 N., R. 7 W.—

O2—⅛ inch to 0, very dark grayish-brown (10YR 3/2) forest litter or leaf mold; neutral to acid.

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

A21—2 to 5 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; friable; strongly acid; clear, smooth boundary.

A22—5 to 10 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine, granular structure; friable; very strongly acid; clear, smooth boundary.

B1t—10 to 14 inches, yellowish-brown (10YR 5/8) light silty clay loam; moderate, fine and medium, subangular blocky structure; firm; thin clay films on a few ped faces; very strongly acid; clear, smooth boundary.

IIB21t—14 to 28 inches, yellowish-brown (10YR 5/8) clay loam; moderate, medium, subangular blocky structure; firm; thin clay films on a few ped faces; a few small pebbles; strongly acid; clear, smooth boundary.

IIB22t—28 to 52 inches, yellowish-brown (10YR 5/8) clay loam with a few, medium, distinct mottles of brownish yellow (10YR 6/6); moderate, medium, subangular blocky structure; firm; thin clay films on many ped faces; a few small pebbles; strongly acid.

IIB3—52 to 68 inches, yellowish-brown (10YR 5/4) light clay loam; weak, coarse, subangular blocky structure; firm; thin clay films on a few ped faces; pebbles present; medium acid to neutral.

IIC—68 inches +, grayish-brown (10YR 5/2) loam till; massive (structureless); friable; calcareous.

The mantle of loess ranges from 0 to 20 inches in thickness. The thickness of the solum ranges from 30 to 100 inches but, in most places, averages 60 inches. Underlying the solum is calcareous till made up of loam to light clay loam. On some of the steeper slopes the loess mantle is missing, the soil is less acid than the one described, and the depth to calcareous till ranges from 12 to 35 inches.

Hickory complex, 15 to 30 percent slopes (HsE).—In the soils of this complex the surface layer is chiefly silt loam and the profile is similar to the one described for the series. Where the less sloping areas have been cleared of timber and either grazed or cropped, erosion has thinned the surface layer or has exposed the yellowish-brown subsoil.

This soil complex is more suitable as woodland than for other uses, but the less sloping areas that have been cleared can be renovated for pasture. (Capability unit VIe-1; woodland suitability group 2)

Hickory complex, 30 to 70 percent slopes (HsF).—The soils of this complex are only 12 to 36 inches deep to calcareous till. Except for thickness of the solum, their characteristics in the moderately deep areas are similar to those of the representative soil. But in the shallow areas, which are underlain by calcareous till at a depth of 12 to 18 inches, the soils are nearly neutral, are generally darker than ordinary, and resemble the Hennepin soils. The surface layer is dominantly loam, but it is silt loam in small areas that have a thin cover of loess.

Because the soils of this complex are steep, they should be kept covered with permanent vegetation. They are best suited to trees. (Capability unit VIIe-1; woodland suitability group 4)

Huntsville Series

In the Huntsville series are soils that have a dark-colored, thick or moderately thick surface layer and that formed in alluvium strongly influenced by loess. In this county the alluvium came chiefly from timbered areas of highly calcareous drift materials of Wisconsin age. The soils occur mainly on nearly level flood plains along the Wabash River.

The Huntsville soils have a darker, thicker surface layer than the Genesee soils. They are coarser textured than the Allison soils.

Representative profile of Huntsville silt loam in a cultivated area located in the NE¼SE¼NW¼ sec. 30, T. 17 N., R. 8 W.—

Ap—0 to 10 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A12—10 to 20 inches, very dark grayish-brown (10YR 3/2) silt loam; very weak, coarse, subangular blocky structure; firm; neutral; clear, smooth boundary.

C1—20 to 30 inches, dark yellowish-brown (10YR 3/4) silt loam; weak, coarse, subangular blocky structure; friable or firm; neutral; gradual, wavy boundary.

C2—30 to 40 inches +, dark yellowish-brown (10YR 4/3) to brown (10YR 5/3) silt loam; massive; friable; neutral.

The dark-colored Ap and A12 horizons normally range from 20 to 30 inches in total thickness and from very dark brown (10YR 2/2) to dark brown (10YR 3/3) in color. They are thinner and lighter colored in places where the Huntsville soils grade into or occur with the Genesee soils, and they are somewhat finer textured where the Huntsville soils grade into the Allison soils. Stratified loam and sandy loam may occur below a depth of 40 inches or more. Silt loam is the only type mapped in Parke County.

Huntsville silt loam (Hu).—This is the soil described for the Huntsville series. It is inextensive and occupies only a few small areas in the valleys of the Wabash River and

Big Raccoon Creek. Included with it are small areas of Genesee soils in which the surface layer is not so thick or so dark colored as the one in this soil.

This soil has slow surface runoff and moderate permeability. It is used and managed in about the same way as the Genesee soils, though it is flooded less frequently in areas that occur on high bottoms. Corn and soybeans are well suited crops. Alfalfa can be grown in higher areas, but wheat and other fall-seeded grains are not well suited. (Capability unit I-2; woodland suitability group 23)

Iva Series

The Iva series consists of deep, light-colored, somewhat poorly drained soils that occur on flats or nearly level upland divides, mostly in the southeastern part of the county. These soils have a brownish-gray surface layer, normally 8 to 12 inches thick. The main, or B2, part of the subsoil generally extends to a depth of 38 to 48 inches. The silty parent material is underlain, at a depth of 60 to 90 inches or more, by leached Illinoian till. The soils are in the same catena as the well-drained Alford soils.

Iva soils developed in a mantle of windblown silt, or loess, that averages 70 inches in thickness and, in this county, overlies glacial till of Illinoian age. The loess was blown chiefly from the valley of the Wabash River during the recession of glaciers. It ranges from medium acid to neutral and is leached of carbonates in places where it is thinnest and most remote from the source. Typical Iva soils generally have a B2 horizon of silty clay loam that is prismatic in structure. The native vegetation was a forest of oak, gum, beech, elm, and other hardwoods.

The Iva soils are more acid and lower in bases than the Reesville soils. Their B2 horizon is similar to that of the Reesville soils in clay content, but it lies deeper in the profile in typical Iva soils and coincides with the occurrence of prismatic structure.

Representative profile of an Iva silt loam in a wooded area located in the SW¼NE¼ sec. 19, T. 15 N., R. 7 W. (see table 13 for chemical and physical properties)—

O2—⅛ inch to 0, very dark gray (10YR 3/1), fine, granular mold consisting mostly of decayed leaves and twigs; neutral.

A11—0 to ½ inch, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; neutral; abrupt, smooth boundary.

A12—½ inch to 3 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A2—3 to 9 inches, pale-brown (10YR 6/3) silt loam with a few, medium mottles of brownish yellow (10YR 6/6); moderate, medium, granular structure; friable; very strongly acid; abrupt, smooth boundary.

B1—9 to 13 inches, light yellowish-brown (10YR 6/4) heavy silt loam matrix with many, medium, distinct mottles of light gray (10YR 7/2); light-gray silt coats most of the ped faces; weak, medium, angular blocky structure; firm or friable; very strongly acid; clear, wavy boundary.

B21t—13 to 36 inches, yellowish-brown (10YR 5/4 to 5/6) silty clay loam matrix with many, fine, distinct mottles of light brownish gray (10YR 6/2); weak, medium to coarse, prismatic structure breaking to moderate, coarse, angular blocky structure; most ped faces are coated with light brownish-gray (10YR 6/2) silt and some clay films; firm or very firm; very strongly acid; clear, wavy boundary.

B22t—36 to 48 inches, yellowish-brown (10YR 5/6) light silty clay loam with common, medium, distinct mottles of pale brown (10YR 6/3) and light brownish gray (10YR 6/2); weak, coarse, prismatic structure breaking to moderate, coarse, angular blocky structure; firm; strongly acid; clear, wavy boundary.

B3—48 to 60 inches, yellowish-brown (10YR 5/8) silt loam with common, medium mottles of light yellowish brown (10YR 6/4) and pale brown (10YR 6/3); weak, coarse, subangular blocky structure; medium acid or slightly acid; clear, wavy boundary.

C1—60 to 72 inches, brownish-yellow (10YR 6/8) gritty silt loam with few, medium, distinct mottles of very pale brown (10YR 7/3); weak, coarse, subangular blocky structure; slightly acid.

IIC2—72 to 81 inches, brownish-yellow (10YR 6/6) loam with a few, faint mottles of pale brown (10YR 6/3); massive; slightly acid.

In thickness the A horizon ranges from 10 to 20 inches. It is thickest in Iva soils mapped in the southeastern corner of the county. In some places the B1 horizon is thin or lacking and a strongly developed structural or textural pan is present. The B2 horizon is nearest the surface and has the highest content of clay in the southeastern part of the county. This horizon extends to a depth of more than 48 inches in some places. In the B22t horizon there are thin, patchy clay films on about one-fourth of the ped faces. These films thicken with depth and fill cracks as much as one-half inch wide in some places. In areas where the Iva soils grade into the Reesville soils, the C horizon is neutral or slightly alkaline. Silt loam is the only type mapped in Parke County.

The Iva soils occupy the broad flats and divides between main drainageways on uplands. They generally extend to the breaks, or abrupt steep slopes, that adjoin the drainageways. Surface drainage is slow because the soils are nearly level or gently sloping, and in many places internal drainage is retarded by a compact, very slowly permeable subsoil. These somewhat poorly drained soils are greatly improved by tile drainage. Crops, especially legumes, respond well to liming and liberal fertilization.

Iva silt loam, 0 to 2 percent slopes (IvA).—This soil, which occupies large areas in Parke County, has a profile like the one described as representative. Included with it are small areas of a lighter gray, more poorly drained soil on flats and in slight depressions. The surface layer of this included soil is nearly white when dry, and the subsurface layer is white or light gray. The total thickness of the surface and subsurface layers is greater in this soil than it is in the Iva soil, and the subsoil generally occurs at a depth of about 20 inches. Unless these small areas are drained, crops are frequently drowned by ponded water.

Iva silt loam, 0 to 2 percent slopes, is slowly permeable, has slow internal drainage, is low in natural fertility, and is medium acid or strongly acid unless it has been limed. It is normally wet and cannot be worked until rather late in spring. Nevertheless, about 95 percent of it is cultivated because slopes are favorable and the response to management is good.

This soil is suited to all the crops commonly grown. Unless it is adequately drained, however, it cannot be seeded to oats early in spring and is likely to frost heave and thereby injure alfalfa in winter. Corn, the principal crop, is grown on about 30 percent of the acreage.

This soil must be carefully drained. Land smoothing is useful in eliminating shallow depressions that are ponded in periods of heavy rainfall. Bedding is a common practice, and tiling generally is effective. (Capability unit IIw-2; woodland suitability group 5)

Iva silt loam, 2 to 5 percent slopes (IvB).—This soil has a profile similar to that described for the series. It generally occurs only in small areas along or at the heads of drainageways. In most places the slopes are about 3 percent.

Included in areas mapped as this soil are small areas that have slopes greater than 3 percent and are moderately eroded. In these areas the plow layer contains subsoil material and is lighter brown and slightly finer textured than the original surface layer. Also included are a few areas of a moderately well drained soil that is similar to Alford silt loam, 2 to 5 percent slopes.

Because this soil is slightly susceptible to erosion, it is used less intensively than Iva silt loam, 0 to 2 percent slopes. Nearly one-fourth of it is used for permanent pasture and timber. Of the wooded acreage, less than 5 percent is woodlots. The chief row crop is soybeans. Tilling on the contour and growing grain and meadow crops in the rotation will help to reduce runoff and to control erosion. (Capability unit IIw-2; woodland suitability group 5)

Linwood Series

The Linwood series consists of very poorly drained organic soils that developed in fibrous and woody plant materials. These soils have a surface layer of black muck that grades into very dark brown muck or slightly fibrous peat in which most of the plant remains have disintegrated and few can be recognized. This material is underlain, at a depth of 12 to 42 inches, by mineral material consisting of light brownish-gray sandy loam to light clay loam.

The Linwood soils occupy areas of old marshes and former lakes and ponds where water-loving plants grew and their remains accumulated. As the organic materials decomposed over a period of several thousand years, the soils gradually developed. Among the trees that made up the native vegetation were conifers and such hardwoods as ash, elm, sliver maple, and willow.

Representative profile of Linwood muck in an area one-half mile east-southeast of Rosedale in the NE¼NE¼ sec. 35, T. 14 N., R. 8 W.—

- Ap&O1—0 to 18 inches, black (10YR 2/1) muck; well-decomposed organic material mixed with a small amount of mineral material; moderate, fine, granular structure; very friable; medium acid.
- O2—18 to 24 inches, very dark brown (10YR 2/2), well-disintegrated, mucky peat that contains a few recognizable fibrous and woody organic remains; medium acid.
- IIC-24 to 36 inches, gray (10YR 5/1) heavy silt loam; calcareous.

In these soils there are variations in color, degree of decomposition, and kinds of plant remains in the organic horizons. The thickness of the organic material ranges from 12 to 42 inches, and the texture of the underlying material is sandy loam, loam, silt loam, or light clay loam. A small amount of marl occurs in some places.

Linwood muck (Lm).—All of this inextensive soil occupies one area in an old lakebed east of Rosedale. The original drainage was very poor, but the entire area has been drained by ditching so that it can be cultivated. The ditches are constructed on a low gradient, and they may not be completely effective in periods of heavy rainfall.

Drained areas of this soil are well suited to field corn, sweet corn, potatoes, and soybeans. Excellent stands of bluegrass can be obtained. Fertilizer containing potassium and phosphorous should be applied liberally because these elements are naturally deficient, owing to the low content of mineral matter.

Under intensive use, this soil is compacted by tillage and shrinks in volume. Controlled drainage is needed to keep the muck moist and to reduce the shrinkage that results from excessive drying. This shrinkage, in effect, brings tile lines closer to the surface where they may get out of line or be broken by equipment. Consequently, tiling is not suitable for draining this soil. (Capability unit IIw-10; woodland suitability group 23)

Mine Pits and Dumps

Mine pits and dumps (Mp) occupy areas throughout the coal mining section of the county. These areas mark the sites of active or abandoned coal mines. They are underlain by the Mansfield sandstone, which is at the base of all coal-bearing formations in the State.

The piles of material, or dumps, are of two kinds. The residue from shaft mining consists of low-grade coal or carbonaceous shale that is inert, sterile, low in carbon content, and high in ash. This material is suitable chiefly as wildlife habitat.

The residue from strip mining is in ridges 20 to 40 feet high that were made as coal was uncovered and excavated. Between the ridges are furrows, and in places there are deep cuts, many of them filled with water forming lakes that are fed from springs. In the ridges is material from the original soil, glacial drift that is normally calcareous, and various kinds of rocks, chiefly acid shale and sandstone. Ungraded areas are suitable for pasture or trees or as wildlife habitat, but the amount of plant growth depends largely on the acidity or alkalinity of the material. If pyrites, marcasite, and sulfurous componds are present, the growth of vegetation may be checked for as long as 10 years. In places where sufficient lime occurs, spoil banks can be safely planted to pasture or trees immediately. Moderate grading of spoil banks permits more intensive use for pasture, but leveling seldom brings a return that pays the cost. (Capability unit VIIe-3; woodland suitability group 16)

Negley Series

Soils of the Negley series are moderately deep, light colored, and loamy. They occur in moderately steep to very steep areas and developed on sandy or slightly gravelly drift of Illinoian age. The surface layer of dark-brown loam is underlain by reddish-brown to yellowish-red sandy clay loam that extends to a depth of 3 feet or more. Sandy loam to loose gravelly sand is at a depth of 4 to more than 5 feet.

In some places the Negley soils developed in a mantle of silt, or loess, that is as much as 18 inches thick and overlies water-sorted sand and gravelly sand. This sandy material generally is strongly acid in the upper part but may be neutral at a depth of 10 feet or more. In other places the mantle of silt is missing.

The Negley soils occur with the Parke soils, which are in less sloping areas. The layer of loess in the Negley soils is 0 to 18 inches thick, but it is 18 to 42 inches thick in the Parke soils. In addition, the Negley have a thinner solum than the Parke and are shallower to loose sand. Negley soils also occur with Cincinnati and Hickory soils in steep areas, but they have a redder, more permeable subsoil and parent material.

Representative profile of a Negley loam on a very steep slope in a wooded area located 1½ miles south of Mansfield in the NW¼SE¼SE¼ sec. 18, T. 14 N., R. 6 W.—

- O2—½ inch to 0, patchy covering of moderately decomposed leaves and twigs; slightly acid.
- A1—0 to 2 inches, dark grayish-brown (10YR 4/2) loam; moderate, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary.
- A2—2 to 9 inches, dark yellowish-brown (10YR 4/4) loam; weak, fine, granular structure; friable; strongly acid; clear, wavy boundary.
- B21t—9 to 14 inches, brown (7.5YR 4/4) sandy clay loam with pockets of loose fine sandy loam; weak, medium, angular blocky structure; friable; very strongly acid; clear, wavy boundary.
- B22t—14 to 36 inches, yellowish-red (5YR 5/6) sandy clay loam; moderate, coarse, angular blocky structure; firm; thin clay films cover many ped faces; very strongly acid; clear, wavy boundary.
- B3t—36 to 50 inches, strong-brown (7.5YR 5/6) light sandy clay loam to heavy loam; weak, coarse, subangular blocky structure; firm or friable; very strongly acid, clear, wavy boundary.
- C—50 inches +, brown (7.5YR 5/4) sandy loam; massive; loose; strongly acid.

In texture the surface layer ranges from silt loam to fine sandy loam. The mantle of silt is thickest on the ridgetops, on moderately steep slopes, and in areas where the Negley soils grade into the Parke soils. The soil profile is thinnest and most sandy on the steepest slopes. The underlying layer of loose sand, which is part of the parent material, is thin or lacking in some areas, particularly around Mansfield where slightly mottled, slowly permeable drift materials occur at a depth of 6 to 8 feet.

The Negley soils are well drained to excessively drained, but thev have only moderate available moisture capacity. Because water intake and permeability are rapid, there is relatively little runoff despite the steep slopes. The soils are strongly acid, low in organic-matter content, and medium to low in fertility. They are best suited to trees, but if the less sloping areas are cultivated, crops respond well to lime and fertilizer.

Negley soils, 15 to 60 percent slopes (NsE).—These are the only Negley soils mapped in Parke County. They occur mainly on dissected side slopes and breaks above streams on uplands near Mansfield. Their profile is similar to the one described for the series. Slopes are dominantly 18 to 35 percent, but they are greater than 35 percent along the deep valleys of streams that are tributary to Little Raccoon Creek. In areas that have a mantle of silt, the surface layer is silt loam. Here, the solum is thicker and the available moisture capacity is somewhat higher than in the normal soil. In other areas the mantle of silt is missing and the surface layer generally is loam.

Some areas of Negley soils have been cleared of timber and either cultivated or excessively grazed. These areas are eroded and have a thinner surface layer than the soil described as representative. In small areas the reddish-brown subsoil is exposed, and a few gullies occur in spots that are more severely eroded. Unless gullying is controlled, the gullies widen and deepen after they have been cut through the fine-textured subsoil and into the loose sandy material underlying the soil.

These soils are best suited to trees, and most of the acreage is wooded. Corn, wheat, and similar crops are grown on the milder slopes. The upper slopes adjacent to ridgetops are used for permanent pasture, but the amount of forage produced is limited by erosion and the supply of available moisture. Liming, liberal fertilization, and controlled grazing are needed in areas used for pasture. (Capability unit VIe-1; woodland suitability group 2)

Ockley Series

The Ockley series consists of deep, well-drained soils on alluvial terraces and outwash plains that lie between the uplands and the Fox soils on lower terraces. The surface layer of these soils is dominantly silt loam, but in some places it is loam. This layer is underlain by an upper subsoil of reddish-brown silty clay loam. The lower subsoil is slightly gravelly clay loam that formed in coarser textured material laid down by water. Underlying the subsoil at a depth of 3½ to 6 feet are limy gravel and sand.

The Ockley soils developed in windblown silt as much as 4 feet thick over silty and loamy outwash underlain by calcareous sand and gravel. During the Wisconsin glacial period the sand and gravel were deposited by floodwater on high terraces along the Wabash River and, to a lesser extent, along Big and Little Raccoon Creeks. As the floodwater receded, this material was covered with somewhat finer textured materials, and these were covered, in places, by a mantle of windblown silt.

The Ockley soils are deeper than the Fox soils, which are underlain by sand and gravel at a depth of 24 to 42 inches. In the Ockley soils the silty or loamy material above the lower subsoil is 18 to 36 inches thick, whereas in the Fox soils it is 18 inches thick or less. Furthermore, the lower part of the surface layer is more acid in the Ockley soils, and the subsoil is thicker and more acid.

Representative profile of an Ockley silt loam, located in the SE¼SE¼ sec. 19, T. 16 N., R. 8 W.—

- Ap—0 to 9 inches, dark-brown (10YR 3/4 to 7.5YR 4/2) silt loam; weak, fine, granular structure; friable; strongly acid; abrupt, smooth boundary.
- A2—9 to 13 inches, brown (7.5YR 5/4) to dark-brown (7.5YR 4/4) silt loam; weak, thin, platy structure to weak, coarse, granular structure; friable; medium acid; clear, wavy boundary.
- B1—13 to 20 inches, dark-brown (7.5YR 4/4) light silty clay loam; moderate, fine to medium, angular blocky structure; friable; a few, thin clay coatings on ped faces; medium acid; clear, wavy boundary.
- B21t—20 to 36 inches, reddish-brown (5YR 5/4 to 4/4) silty clay loam; moderate, coarse, subangular blocky structure; friable or firm; a few, reddish-brown (5YR 4/3) clay films on ped faces; a few pebbles in lower part of horizon; medium acid; abrupt to clear, wavy boundary.
- IIB22—36 to 60 inches, reddish-brown (5YR 4/4 to 4/3) clay loam to gravelly clay loam; weak, coarse, subangular blocky structure; firm; a few, reddish-brown (5YR 4/3) to dark reddish-brown (5YR 3/4) clay coatings on ped faces; gravel is common; medium acid; clear, wavy boundary.

IIIB23—60 to 65 inches, reddish-brown (5YR 4/4 to 4/3) sandy clay loam; massive (structureless); friable; medium acid to neutral in lower part; abrupt, irregular boundary.

IVC1—65 inches +, pale-brown (10YR 6/3) sand and gravel; calcareous.

The thickness of the silt cap ranges from 0 to 4 feet but averages about 3 feet. The Ockley soils closely resemble the Camden soils in areas where the silt cap is relatively thick and the underlying layers of stratified material are relatively fine textured. Where the Ockley soils grade toward the Warsaw soils, the surface layer is somewhat darker colored than that in the representative soil. The B2 horizons generally contain more gravel and sand in areas that have a loam surface layer than they do in areas that have a silt loam surface layer. In many places the IIIB23 horizon is darker and more clayey than the one described, and there are tongues extending from that horizon 3 to 8 inches into the limy underlying material. The depth to loose sand or gravel, or both, ranges from 3½ to 6 feet.

The Ockley soils generally have high available moisture capacity and are moderately high in fertility. Surface runoff is slow in nearly level areas but is moderately rapid in sloping ones. Internal drainage is good, and permeability is moderate. The response to lime and fertilizer is good. These soils are best suited to crops grown in a grain-livestock type of farming.

Ockley loam, 0 to 2 percent slopes (OaA).—This soil occupies several small areas along Sugar and Mill Creeks in the northwestern part of the county. It is similar to the soil described in the representative profile, but it lacks a cover of windblown silt, or loess, and has a loam surface layer. The subsoil is clay loam or sandy clay loam that commonly contains more gravel than the subsoil in the representative soil.

The principal crops grown on this soil are corn, soybeans, wheat, and mixed hay. Yields are slightly lower than on the Ockley silt loams. Fertilizer should be applied carefully, for if too much is used, yields of corn may be reduced during dry periods of greater than average length. (Capability unit I–1; woodland suitability group 1)

Ockley loam, 2 to 5 percent slopes (OaB).—This slightly undulating soil occurs principally on the upper part of slopes adjoining drainageways. Included with it are small areas that are moderately eroded and spots where the subsoil is exposed.

This soil is used and managed in about the same way as Ockley loam, 0 to 2 percent slopes, but it is more susceptible to erosion and generally is farmed less intensively. Needed to control erosion are contour tillage, stripcropping, grassed waterways, and cover crops. (Capability unit IIe–3; woodland suitability group 1)

Ockley silt loam, 0 to 2 percent slopes (OcA).—This soil, one of the most extensive and most widely distributed of the Ockley soils, occurs in the valleys of all the larger streams. It has a profile like the one described as representative. Some areas, such as those along Leatherwood Creek, have a thicker silt covering than that described and are underlain by stratified sand and a small amount of silt at a depth of 6 feet or more. Here, the soil grades toward Camden silt loam, a soil that is included with this one in many small areas.

Most of this soil has been cleared and is cultivated Corn is the principal crop and produces well in normal years, but it yields somewhat better in years when rainfall is adequate and is well distributed throughout the growing season. Wheat also is well suited, and there is little winterkilling. Oats produce satisfactory yields if seeded early in spring when moisture is adequate. In areas that are limed, alfalfa grows well and makes hay of high quality, for it uses the available moisture more effectively than plants with shallower fibrous roots. (Capability unit I–1; woodland suitability group 1)

Ockley silt loam, 2 to 5 percent slopes (OcB).—This inextensive soil is similar to Ockley silt loam, 0 to 2 percent slopes, but it occurs on gently sloping ridgetops and upper slopes around drainageways. Included with it in cultivated fields are many areas that are moderately eroded. In these areas the original surface layer is only 3 to 8 inches thick, or even less. In places tillage has mixed subsoil material into the surface layer, and the resulting plow layer is cloddy and in poorer tilth than the surface layer of less eroded areas. In small areas the reddish-brown silty clay loam subsoil is exposed. Also included are areas having a thicker silt covering and a more sandy substratum than the representative soil. Here, tracts of Camden silt loam are included.

This soil is suited to the same crops as Ockley silt loam, 0 to 2 percent slopes. It has higher available moisture capacity than the Ockley loams and produces similar or slightly higher yields. Suitable for controlling erosion and reducing water losses are contour tillage, stripcropping, grassed waterways and cover crops. (Capability unit IIe–3; woodland suitability group 1)

Ockley silt loam, 5 to 8 percent slopes, moderately eroded (OcC2).—This moderately eroded soil has a profile similar to the one described for the series, but only 3 to 8 inches of its original surface layer remain. The present surface layer generally is brown to dark-brown silt loam, though in some places it is dark brown and clayey because it is made up entirely of subsoil material. Runoff is medium, and the available moisture capacity is somewhat limited. Included in areas mapped as this soil are small areas that have a loam surface layer, and spots that are severely eroded.

Ockley silt loam, 5 to 8 percent slopes, moderately eroded, is fair cropland, and most of it is under cultivation. Where the soil is cultivated, however, it is susceptible to further erosion unless it is properly managed. (Capability unit IIIe–3; woodland suitability group 1)

Parke Series

In the Parke series are deep, light-colored, silty soils that are underlain by sandy and gravelly drift of Illinoian age. The upper part of these soils is silt loam to silty clay loam 18 to 40 inches thick. Beneath this layer is sandy loam, sand, or gravelly sand at a depth of 6 to more than 12 feet.

The Parke soils developed partly in a mantle of silt, generally 18 to 42 inches thick, and partly in water-deposited sand and gravelly sand. The depth to neutral or calcareous sand and gravel indicates that these soils are much older and more intensively weathered than soils developed in similar material of Wisconsin age.

The Parke soils generally occur with the Cincinnati soils but are browner and better oxidized. In addition, the Parke soils are underlain by more permeable, better drained materials than the Cincinnati soils, which developed in 18 to 42 inches of silt over loam to light clay loam of Illinoian age. Although the Parke soils are similar to the Negley soils, the mantle of silt is 18 to 42 inches thick in the Parke but is 0 to 18 inches thick in the Negley and is underlain by sandy and somewhat gravelly outwash.

Representative profile of Parke silt loam, 2 to 5 percent slopes, in a cultivated field located in the SE¼SW¼ sec. 32, T. 15 N., R. 7 W.—

- Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.
- A2—10 to 12 inches, grayish-brown (10YR 5/2) to brown (10YR 5/3) silt loam; weak, thin, platy structure; friable; medium acid; clear, wavy boundary.
- B1—12 to 18 inches, brown (7.5YR 4/4) heavy silt loam; moderate, fine to medium, subangular blocky structure; friable or firm when moist, slightly plastic when wet; thin clay films cover many ped surfaces; strongly acid; clear, wavy boundary.
- B21t—18 to 38 inches, dark-brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin clay films on many ped faces; very strongly acid; clear, wavy boundary.
- IIB22t—38 to 60 inches, reddish-brown (5YR 4/4) sandy clay loam to clay loam; weak to moderate, coarse to medium, subangular blocky structure; firm; medium clay films on many ped faces; slightly plastic; strongly acid; gradual, wavy boundary.
- IIB3t—60 to 80 inches, reddish-brown (5YR 4/4) to brown (7.5YR 5/4) loam to gravelly loam; weak, coarse, subangular blocky structure; friable; content of sand increases with depth; medium or strongly acid; clear, wavy boundary.
- IIC1—80 inches +, brown (7.5YR 4/4) light sandy loam to loamy sand and sand; sorted by water and stratified; neutral.

The silty material is nearly as thin as 18 inches in strongly sloping areas and, in some places, is thicker than 42 inches in gently sloping areas. Water-sorted sandy material occurs at a highly variable depth, and in places this layer is thin or is replaced by compact glacial till. In a few places, such as the site of the Mansfield Dam near Ferndale, there is a paleosol, or fossil soil, along the area of contact between the silt mantle and the water-deposited, coarser textured material.

The Parke soils are well drained or somewhat excessively drained, but their available moisture capacity is moderately high. Internal drainage is medium, and permeability is moderate or moderately rapid. The soils are medium to low in natural fertility and are medium acid or strongly acid unless they have been limed. The response to lime and fertilizer is good.

Parke silt loam, 2 to 5 percent slopes (PaB).—This gently sloping soil has the profile described for the series. It lies in scattered areas and occupies only a small total acreage. Because of erosion, the surface layer on some of the stronger slopes is thinner than that described.

Included in mapping are a few small areas that are nearly level and have a silt mantle 4 to 6 feet thick. Also included, near the dune belt west of Catlin, are small areas of Parke fine sandy loam, 2 to 5 percent slopes. This included soil has a profile similar to the one of the silt loam, but it has been covered by 12 to 18 inches of windblown fine sand.

Most of this soil has been cleared and is cropped. The soil is well suited to all the common farm crops, including corn, small grain, and hay. It is especially well suited to alfalfa because it is well aerated and permeable. If the soil is improperly managed, however, it is susceptible to erosion. (Capability unit IIe–1; woodland suitability group 1)

Parke silt loam, 5 to 8 percent slopes, moderately eroded (PaC2).—This soil occurs on rolling slopes and, in cultivated areas, has lost 25 to 75 percent of its original surface layer through erosion. In many cultivated fields the surface layer is less than 7 inches thick. Otherwise, the soil is similar to Parke silt loam, 2 to 5 percent slopes. Included are severely eroded spots on some of the stronger slopes, especially around drainageways, where most of the surface layer is gone and the yellowish-brown subsoil is exposed.

This soil is suited to corn, soybeans, small grain, hay crops, and pasture. The severely eroded spots are less productive than other areas, but the ones large enough are used mainly for hay or pasture. (Capability unit IIIe–1; woodland suitability group 1)

Parke silt loam, 8 to 15 percent slopes, moderately eroded (PaD2).—This soil is similar to Parke silt loam, 2 to 5 percent slopes, but it occupies steeper slopes where the mantle of silt is thinner and the total thickness of the soil is somewhat less than in gently sloping areas. In many fields that now are cultivated, or formerly were cultivated, the original surface layer has been thinned by erosion and is only 3 to 7 inches thick. In spots the subsoil is exposed.

Included in areas mapped as this soil are small areas adjoining drainageways that have slopes exceeding 15 percent; forested areas that are noneroded or only slightly eroded; and a few areas that are severely eroded and marked by gullies 2 to 3 feet deep. Because the underlying material is loose and sandy, gullies quickly deepen after they are cut through the compact silty subsoil.

About half of this soil is forested, and the rest is cleared and used mainly for permanent pasture. If the soil is cropped, it should be tilled on the contour and protected from rainfall and further erosion by use of a rotation that includes a row crop only occassionally. (Capability unit IVe–1; woodland suitability group 1)

Princeton Series

The Princeton series consists of well-drained or somewhat excessively drained soils that developed in sandy material deposited by wind. During the last glacial period, this material probably was blown from the flood plains, chiefly along the Wabash River but also along Big and Little Raccoon Creeks. The sand is coarsest in areas nearest the river, indicating that wind sorted the material according to particle size. The native vegetation on Princeton soils was a forest of white and black oaks, hickory, walnut, and other deciduous hardwoods.

The surface layer of these soils is dark grayish-brown fine sandy loam 6 to 10 inches thick that is underlain by a subsurface layer of dark yellowish-brown fine sandy loam. At a depth of 18 inches, this layer grades to reddish-brown sandy clay loam that extends to a depth of 36 to 40 inches or more.

These soils are in the same catena as the somewhat poorly drained Ayrshire soils and the poorly or very poorly drained Ragsdale soils.

The Princeton soils developed in much coarser materials and generally are less leached than the Alford, Russell, and

Cincinnati soils. In the Princeton soils the textural B horizon is continuous, whereas in the Chelsea soils it consists of thin, wavy bands of fine sandy loam to sandy clay loam at a depth of 30 inches or more.

Of the soils in the Princeton series, those mapped in Parke County are leached to a greater depth and are more acid throughout the profile than those in other parts of the State. In only a few places are the Princeton soils in this county underlain by calcareous sand.

Representative profile of a Princeton fine sandy loam in a grassy roadcut located in the SW¼SE¼ sec. 17, T. 15 N., R. 8 W.—

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable when moist, nonsticky when wet; slightly acid; clear, wavy boundary.

A2—10 to 14 inches, light yellowish-brown (10YR 6/4) fine sandy loam; weak, medium, granular structure; very friable when moist, nonsticky when wet; medium or slightly acid; clear, wavy boundary.

B1t—14 to 30 inches, brown (7.5YR 5/4) to reddish-brown (7.5YR 6/6) light sandy clay loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky when wet; very strongly acid; clear, wavy boundary.

B21t—30 to 45 inches, reddish-brown (7.5YR 6/6) sandy loam to sandy clay loam; moderate to weak, medium, subangular blocky structure; friable when moist, slightly sticky when wet; very strongly or strongly acid; clear, wavy boundary.

B22t—45 to 70 inches, reddish-brown (7.5YR 6/6) sandy clay loam; weak, medium, subangular blocky structure; friable when moist, sticky when wet; strongly acid; clear, wavy boundary.

B23t—70 to 83 inches, yellowish-brown (10YR 5/6) sandy loam; weak, medium to coarse, subangular blocky structure; friable when moist, sticky when wet; strongly acid; clear, wavy boundary.

B3—83 to 102 inches, yellowish-brown (10YR 5/6) light sandy loam; massive to single grain (structureless); friable to loose when moist, nonsticky when wet; slightly acid; clear, wavy boundary.

C1—102 inches +, brownish-yellow (10YR 6/6) loose sand; slightly acid or neutral.

The thickness of the A horizon ranges from 12 to 18 inches. The acid textural B horizon extends to a depth ranging from 24 to 42 inches but averaging about 36 inches. In many places below the finest textured part of the B horizon, there are bands of sandy clay loam and sandy loam interbedded with loose fine sand. The profile ranges from strongly acid to neutral. The substratum in areas of dunes west of Tangier commonly consists of stratified, strongly acid sands. In many areas on terraces, sand is stratified with thin layers of silt and a small amount of coarse material below a depth of 3 feet. This stratified material generally is calcareous at a depth of 4 to 6 feet.

In the southwestern and south-central parts of the county, where the Princeton soils occur with the Cincinnati soils, the sandy soil is 1½ to 4 feet thick and is underlain by strongly acid, moderately compact till of Illinoian age. On the east side of dunes in the northwestern part of the county, the sand deposits are shallow and overlie silty clay loam or smooth silt loam accumulated through wind action. Fine sandy loam is the only type mapped in this county.

The Princeton soils have slow or medium surface runoff and medium or rapid internal drainage. They are relatively low in organic-matter content and, in most places, are strongly acid. They are low in plant nutrients, especially in available nitrogen and phosphorus. The supply of moisture available for crops such as soybeans and corn is fairly small. Nevertheless, the soils respond well to liming, fertilizing, and other good management.

210-405—67——7

Princeton fine sandy loam, 0 to 2 percent slopes (PrA).—Although this soil has a profile similar to the one described as representative, the upper 3 feet of it developed in fine sandy materials that were laid down and rather uniformly sorted by wind or water. The surface layer ranges from light fine sandy loam in areas near dunes to very fine sandy loam in places where the Princeton soil grades toward the Camden or Ockley soils. In most areas the lower part of this soil developed in stratified sandy material, which is interbedded in places where the Princeton soil grades toward the Camden soils, or it contains a variable amount of gravel where the Princeton soil grades toward the Ockley soils.

On high terraces the solum generally is thicker, higher in clay content, and more strongly developed than that in the normal soil. In lower areas near stream bottoms, the profile is thinner, more sandy, and more weakly developed. In general, the stratified parent material is calcareous at a depth of 5 to 7 feet.

The available moisture capacity in this soil is variable. Sandy areas that have the least depth are somewhat droughty, especially for corn and soybeans. In addition, the soil is low in organic-matter content and in available potassium.

Most of this soil has been cleared. From one-fourth to one-half of it is in permanent pasture, and the rest is used for general field crops. The crops most commonly grown are corn, wheat and other small grain, soybeans, and mixed hay. Where droughtiness is a problem, the limited moisture is best used by wheat, rye, and alfalfa. (Capability unit IIs-5; woodland suitability group 2)

Princeton fine sandy loam, 2 to 5 percent slopes (PrB).—This soil has a profile like that described for the series. It generally occupies areas of undulating dunes where slopes face several directions, but areas on terraces face only one direction, toward the drainageway. Included are eroded areas that have a thinner surface layer than the one in the representative soil, and there are small tracts in which the reddish-brown subsoil is exposed.

In general, this soil is only fair for general farming because most of it is somewhat droughty for such crops as corn and soybeans. It is low in fertility, too, and is subject to both wind and water erosion. On the other hand, the soil is well suited to fall-seeded small grain and alfalfa and to melons, berries, and other special crops. (Capability unit IIe-11; woodland suitability group 2)

Princeton fine sandy loam, 5 to 8 percent slopes, moderately eroded (PrC2).—Except for its stronger slopes and thinner surface layer, this soil is similar to Princeton fine sandy loam, 0 to 2 percent slopes. The brownish-yellow to yellowish-brown surface layer is only 3 to 8 inches thick and, in many places, contains some of the upper subsoil. Fertility and the organic-matter content are lower than in uneroded Princeton soils.

This soil is used and managed in about the same way as Princeton fine sandy loam, 2 to 5 percent slopes, but it should be protected by practices that control erosion. (Capability unit IIIe-15; woodland suitability group 2)

Princeton fine sandy loam, 8 to 15 percent slopes, moderately eroded (PrD2).—This sloping soil is in small areas surrounded by other Princeton soils. It is moderately eroded and has a plow layer consisting of the remaining dark-brown surface layer mixed with material from the brownish-yellow to yellowish-brown subsoil. Otherwise, the soil is similar to Princeton fine sandy loam, 0 to 2 percent slopes.

This soil is used and managed in much the same way as the adjacent soils. Wheat, rye, and alfalfa-grass mixtures are best suited, but corn can be safely grown every 3 to 5 years. (Capability unit IVe-15; woodland suitability group 2)

Princeton fine sandy loam, 15 to 30 percent slopes (PrE).—This soil occurs chiefly around the heads of drainageways and along river bluffs. It has a profile similar to the one described for the series.

Most of this soil is either wooded or cleared and grazed. In most cleared areas, erosion has thinned the original surface layer or exposed the brown subsoil. The soil is best kept in permanent cover, for if it is cropped, yields are lower than on other Princeton fine sandy loams. (Capability unit VIe-1; woodland suitability group 2)

Ragsdale Series

The Ragsdale series is made up of deep, dark-colored, poorly drained soils that occupy shallow, irregularly shaped depressions on the silt-mantled till plains of Wisconsin and Illinoian ages. These soils are closely intermingled with the Alford, Fincastle, and Reesville soils. The native vegetation was marsh grasses and a deciduous swamp forest consisting mainly of elm, maple, and ash.

The surface layer is very dark grayish-brown to black silty clay loam to silt loam 7 to 9 inches thick. It is underlain by silty clay loam that is dark grayish brown mottled with yellowish brown. The subsoil becomes lighter colored with depth. About 32 inches below the surface, the subsoil is light brownish-yellow silty clay loam mottled with gray, but it grades to brownish-yellow to yellowish-brown silt loam below a depth of 50 inches.

The Ragsdale soils have a siltier B horizon and contain less sand in the underlying material than those Westland soils that have a loamy substratum.

Representative profile of Ragsdale silty clay loam, located in the SE¼SE¼ sec. 13, T. 17 N., R. 8 W.—

A1—0 to 2 inches, black (10YR 2/1) silty clay loam; weak, medium, granular structure; slightly firm; medium acid or slightly acid; clear, wavy boundary.

A12—2 to 16 inches, black (10YR 2/1) silty clay loam; moderate, medium, angular blocky structure; firm; slightly acid; clear, wavy boundary.

B1g—16 to 24 inches, dark-gray (10YR 4/1) silty clay loam; a few, fine, distinct mottles of brownish yellow (10YR 6/6); moderate, medium, subangular blocky structure; firm; slightly acid; clear, wavy boundary.

B21tg—24 to 32 inches, grayish-brown (10YR 5/2) silty clay loam; common, fine, distinct mottles of brownish yellow (10YR 6/8); weak, coarse, angular blocky structure; firm; slightly acid; clear, wavy boundary.

B22tg—32 to 50 inches, yellowish-brown (10YR 5/8) silty clay loam; common, medium, distinct mottles of light gray (10YR 7/2); weak, medium to coarse, angular blocky structure; firm; slightly acid.

B3g—50 to 68 inches, brownish-yellow (10YR 6/5) heavy silt loam; common, medium, distinct mottles of pale brown (10YR 6/3); weak, coarse, subangular blocky structure; firm; slightly acid or neutral; clear, wavy boundary.

C1—68 to 75 inches, light yellowish-brown (10YR 6/6) silt loam; few, fine, distinct mottles of brownish yellow (10YR 6/8); weak, coarse, blocky structure; friable; some grit in this layer; calcareous.

IIC2—75 to 84 inches, yellowish-brown (10YR 5/4) sandy clay loam till; few, medium, distinct mottles of brownish yellow (10YR 6/6); structureless; calcareous.

The surface layer ranges from heavy silt loam to light silty clay loam or silty clay loam in texture and from black to dark grayish brown in color. The total thickness of the A horizon ranges from 10 to 17 inches. In the deeper, more poorly drained depressions, the upper part of the B horizon is dominantly gray. Silt loam and silty clay loam are the types mapped in this county.

The Ragsdale soils are medium to high in fertility, but they are naturally wet and must be drained if they are cultivated. Removing excess water through tile drains requires that tile lines be kept in good repair and, where necessary, extended into low-lying depressions that have no natural outlet.

Ragsdale silty clay loam (Rc).—This soil generally occupies small areas that are intermingled with light-colored soils. In the northeastern part of the county, there are larger areas that occur with the Fincastle and Russell soils.

Most of this soil has been cleared and is cultivated, mainly under a grain and livestock type of farming. Although the soil can be used for wheat, hay, and some special crops, it is best suited to corn and soybeans. If tile lines can be placed on sufficient grade, drainage is improved by tiling, but artificial drainage is not feasible in some depressional areas that are low lying and enclosed. (Capability unit IIw-1; woodland suitability group 11)

Ragsdale silt loam (Ra).—Except for its silt loam surface layer, this soil generally is similar to Ragsdale silty clay loam. Where it occurs near the Reesville or the Iva soils, it occupies small areas that are grayer than ordinary and are somewhat acid. Included are small areas of Ragsdale silty clay loam and of other silty clay loam soils.

This soil is used and managed about the same way as Ragsdale silty clay loam, and it produces similar yields. However, it is more easily cultivated and kept in good tilth. Fields consisting largely of this soil can be cropped to corn 2 or more years in succession. The principal problem is drainage. (Capability unit IIw-1; woodland suitability group 11)

Reesville Series

The Reesville series consists of deep, light-colored, silty soils that occupy level or slightly undulating areas of the glacial till plains. These soils developed in a mantle of dolomitic silt, 3 to more than 5 feet thick, underlain by calcareous glacial till. It is likely that wind carried the silt from flood plains along the Wabash River as the last glacier receded. The native vegetation was a forest of hardwoods, including sugar maple, beech, walnut, and oaks.

The surface layer of Reesville soils is grayish-brown to dark grayish-brown, friable silt loam 9 to 12 inches thick. The main part of the subsoil is silty clay loam that is yellowish brown mottled with gray and has a low clay content. At a depth of 30 to 36 inches is silt loam that generally is calcareous below a depth of 36 inches.

These somewhat poorly drained soils are in the same catena as the poorly drained Ragsdale soils.

The Reesville soils generally are not so deep as the nearby Fincastle soils. They developed entirely in a thick mantle of silt and, consequently, lack the zone of weathered till that occurs in the lower part of Fincastle soils. The Reesville soils are not so acid as the Iva soils, and they do not have the layer of medium acid to neutral silt that underlies the Iva soils at a depth of about 5 feet.

Representative profile of a Reesville silt loam in a wooded area located in the SW¼SW¼ sec. 32, T. 17 N., R. 7 W. (see table 13 for chemical and physical properties)—

- O1—¼ inch to 0, very dark grayish-brown (10YR 3/2) leaf mold mixed with partly decayed leaves and twigs; neutral; abrupt, smooth boundary.
- A11—0 to ¾ inch, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; permeated by a mat of fine roots; medium acid; abrupt, smooth boundary.
- A12—¾ inch to 2 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; friable; very strongly acid; abrupt, smooth boundary.
- A2—2 to 9 inches, light yellowish-brown (10YR 6/4) silt loam; a few, fine, faint mottles of brownish yellow (10YR 6/6); weak, fine, granular structure; very strongly acid; clear, wavy boundary.
- B1—9 to 13 inches, brownish-yellow (10YR 6/6) heavy silt loam with many, medium, distinct mottles of light brownish gray (10 YR 6/2); weak, fine to medium, subangular blocky structure; firm; very strongly acid; clear, wavy boundary.
- B21t—13 to 27 inches, yellowish-brown (10YR 5/6) light silty clay loam; many medium, distinct mottles of grayish brown (10YR 5/2); moderate, medium to coarse, angular and subangular blocky structure; most peds are coated with light brownish-gray silt (10YR 6/2) and some clay films; firm; very strongly acid; clear, wavy boundary.
- B22t—27 to 36 inches, yellowish-brown (10YR 5/8) light silty clay loam; common, distinct mottles and ped coatings of brownish gray (10YR 6/3) and dark grayish brown (10YR 4/2); weak, coarse, blocky structure; friable; neutral; abrupt, wavy boundary.
- C1—36 to 54 inches, yellowish-brown (10YR 5/4) silt loam; few, fine, faint mottles of brownish yellow (10YR 6/6); slightly calcareous.
- IIC2—54 to 62 inches, yellowish-brown (10YR 5/6) loam till; massive (structureless); calcareous.

The thickness of the silt mantle ranges from 36 to 100 inches and is greatest in areas on the Illinioan till plain. In cultivated fields the plow layer is lighter colored and lower in organic-matter content than the original surface layer in wooded areas. Where the Reesville soils adjoin the Princeton soils, the surface layer in small areas is loam to fine sandy loam 12 to 18 inches thick. Areas that occupy shallow depressions and small flats have a lighter gray A horizon and a finer textured, less permeable subsoil than representative areas. In places where the Reesville soils grade toward gently sloping Alford soils, the A2 horizon is browner and less mottled than the one in the representative soil.

The C horizon is leached of free carbonates and is neutral or slightly acid in some areas, especially in places where Reesville soils adjoin or grade into Fincastle soils. Calcareous silt generally occurs at an average depth of 36 inches, but it commonly is at a depth of 24 inches on the Wisconsin till plain. The carbonate equivalent ranges from a few percent to 27 percent. Silt loam is the only type mapped in this county.

Compared with Reesville soils in the northern part of the county, those in the southern part differ in the following ways: (1) the surface layer has a more abrupt lower boundary and the subsoil is more clayey (parts of the subsoil range from 33 to 40 percent clay), (2) the structure is coarse prismatic and the aggregates are larger, (3) the solum is thicker; on the average it is 4 feet thick over calcareous silt, and (4) the silt mantle is thicker and averages from 6 to 9 feet in thickness.

In addition, areas of Reesville soils on the Illinoian till plain south of Rockville are larger and more nearly level than those elsewhere in the county, and they are intermingled with a smaller acreage of the dark-colored Ragsdale soils, which occupy depressions. The acreage of sloping Reesville soils is small in southern Parke County because, here, the breaks are rather abrupt between nearly level divides and stronger slopes along drainageways.

The Reesville soils are easily drained, and they respond well to lime and fertilizer. Practically all the acreage has been cleared and is used intensively. All the common crops are grown, but corn is the most important one.

Reesville silt loam, 0 to 2 percent slopes (ReA).—This soil is one of the most extensive in the county. It commonly has blocky structure in the subsoil, but in many places the subsoil has weak, prismatic structure. Included in mapping are small areas of a lighter gray soil that has a slowly permeable subsoil. This included soil generally occurs on flats or in shallow depressional areas adjoining the Ragsdale soils.

The use of this soil is limited mainly by inadequate drainage. Areas on the Wisconsin till plain generally are drained satisfactorily by random tiling throughout the swales of the adjoining Ragsdale soils. Areas on the Wisconsin till plain are drained by placing the tile at a depth of 3½ feet and in lines 3 to 4 rods apart. Corn, soybeans, and other row crops are well suited, but a crop rotation that includes legumes is commonly followed. (Capabilty unit IIw–2; woodland suitability group 5)

Reesville silt loam, 2 to 5 percent slopes (ReB).—This soil occurs on long, gentle slopes and around the heads of drainageways where surface drainage is better than that of Reesville silt loam, 0 to 2 percent slopes. In fields that are cultivated intensively, this soil has more rapid runoff and, through erosion, has lost more of its original surface layer than the nearly level Reesville silt loam. In many places tillage has mixed subsoil material with the remaining 3 to 8 inches of the surface layer, and the dark yellowish-brown plow layer is more cloddy and in poorer tilth than the original surface layer. In places the subsoil is exposed.

Included with this soil in mapping are small areas of a moderately well drained soil that has a yellowish-brown upper subsoil and is mottled with gray at a depth of about 20 inches. If this included soil occurred in areas large enough to be mapped separately, it would be given the name Iona silt loam.

Drainage and erosion are the main problems in managing this soil. Internal drainage is slow, and tiling may be needed in small areas that have poor surface drainage. Contour tillage, terracing, and use of a rotation that includes more meadow crops than clean-tilled crops are suitable ways of controlling further erosion. Waterways should be protected by grading and then by establishing a cover of grass. (Capability unit IIw–2; woodland suitability group 5)

Rodman Series

Soils of the Rodman series are strongly sloping to very steep and are shallow, dark colored, and gravelly. These soils occur on the breaks of alluvial terraces. They generally developed in gravelly and sandy materials that are not so coarse textured as the gravelly substratum. These materials consist of deposits made by streams flowing from retreating glaciers of Wisconsin age. The deposits contain a high proportion of material from crystalline rocks that occurred outside the county, but this material was mixed with limestone, sandstone, and shale of local origin. In the underlying horizon of gravel and sand, the content of lime carbonate ranges from 20 to 40 percent. The soils developed under a forest of mixed hardwoods, including hackberry, oak, and hickory.

The surface layer of the Rodman soils is neutral gravelly loam 6 to 10 inches thick. This layer generally is dark brown but is slightly lighter brown in the lower part. It is underlain by gray, limy gravel and sand at a depth of 10 to 20 inches.

The Rodman soils occur with the Fox soils on the lower terraces and, on a few knolls or kames, on the upland till plains. They also occur with the Ockley soils on the high terraces. On the lower slopes of high terraces where the gravel deposits are thin, glacial till commonly crops out. Here, the Rodman soils occur with the Hennepin soils, which developed in compact, limy glacial till that was not sorted by water. The Rodman soils resemble the Hennepin soils in color and reaction, but they are much coarser textured.

Representative profile of a Rodman gravelly loam in pastured woodland located 1 mile northeast of Guion in the NE¼SE¼NW¼ sec. 8, T. 16 N., R. 6 W.—

A1—0 to 2 inches, dark-brown (10YR 3/3) gravelly loam; moderate, fine, granular structure; friable; slightly plastic and sticky; neutral; abrupt, smooth boundary.

A2—2 to 3 inches, dark-brown to brown (10YR 4/3) gravelly loam; weak, fine granular structure; friable; neutral; abrupt, smooth boundary.

B21t—3 to 5 inches, brown (7.5YR 5/4) to dark yellowish-brown (10YR 3/4) gravelly clay loam; weak, fine, subangular blocky structure to very coarse, granular structure; firm; neutral; clear, wavy boundary.

B22t—5 to 7½ inches, dark-brown (7.5YR 3/2) gravelly clay loam; weak, medium, angular blocky structure; friable when moist, sticky when wet; neutral, but a few relict calcareous pebbles are embedded in the clay; clear, wavy boundary.

IIC1—7½ to 10 inches, brown (10YR 5/3) fine gravel and sand; very friable; weakly calcareous.

IIC2—10 to 20 inches +, light yellowish-brown (10YR 6/4) fine gravel and sand; loose; moderately calcareous; material consists chiefly of quartz, granite, and feldspar pebbles and other crystalline igneous rocks, but there are a small number of limestone pebbles.

The surface layer varies in texture and, in some areas, contains less gravel than the one described. The dark-colored A horizon generally ranges from 3 to 10 inches in thickness but is commonly 5 to 8 inches thick; the A2 horizon is commonly missing; and, in many places, the B horizon is weakly developed or lacking. In strongly sloping or moderately steep areas where the Rodman soils adjoin or grade to the Fox soils, the profile is thicker, lighter colored, and more acid than normal. On the steeper slopes the A1 horizon is thicker and the B horizon is lacking.

The Rodman soils are high in fertility and organic-matter content but are droughty. Runoff and permeability are rapid, and the available moisture capacity is very low.

Rodman gravelly soils, 15 to 30 percent slopes (RoE).—The profile of these soils is similar to the one described for the series, especially in somewhat eroded areas, but the A horizon generally is thicker and darker in areas that have a dense cover of trees and a good understory. The surface layer ranges from loam to sandy loam or gravelly sandy loam. In less sloping areas the soils grade toward the Fox soils.

Included in mapping are a few areas that are covered by a thin layer of fine sandy loam. These areas occur along the valley of the Wabash River, where sand has been deposited in dunes. Also included are small areas of Fox soils; and a few small areas of Camden loam in which the profile is light colored, free of gravel, and more sandy throughout than is the profile described.

If these soils are cleared and left unprotected, they are susceptible to erosion. Because they have low available moisture capacity, they are best suited to trees. In the less sloping areas where the soils are not so shallow, however, they can be used for permanent pasture or meadow crops if deep-rooted, drought-resistant grasses and legumes are grown and if grazing is carefully controlled. (Capability unit VIIs-1; woodland suitability group 19)

Rodman gravelly soils, 30 to 70 percent slopes (RoF).—These soils have a profile similar to that described for the series, but they are generally thicker and darker in the A horizon and are more likely to lack a brown subsoil. Included in mapping are a few areas of Camden loam that have a yellowish-brown subsoil and are relatively free of gravel throughout.

Because these soils are steep and have rapid runoff, they are best used as woodland. The lower slopes produce trees of better quality and at a faster rate than the upper slopes, for they are less droughty and have higher available moisture capacity. (Capability unit VIIs-1; woodland suitability group 19)

Russell Series

Soils of the Russell series are deep, light colored, and well drained. In some areas these soils occur on low knolls and morainic ridges that slope gently in several directions to the nearby level till plain. In other areas they are on dissected ridges between drainageways and on strong slopes along streams. Russell soils developed in a mantle of silt, 18 to 36 inches thick, over medium-textured, highly calcareous glacial till that is leached of free lime to a depth of 42 to more than 70 inches. A forest of black walnut, sugar maple, black oak, white oak, beech, American elm, and ash made up the original plant cover.

Undisturbed areas have a surface layer of dark grayish-brown silt loam, 3 inches thick, that is underlain by a subsurface layer of yellowish-brown silt loam to light silty clay loam 9 inches or more thick. The subsoil is yellowish-brown silty clay loam that is very plastic when wet. It is underlain by material that is increasingly light textured with depth. This material is loam, silt loam, or light clay loam at a depth of 42 inches or more.

The Russell soils occur with the Alford soils, which developed entirely in 4 to 6 feet of windblown silt, or loess, that overlies calcareous loam till.

Representative profile of a Russell silt loam in a wooded area located in the SE¼NW¼ sec, 26, T. 17 N., R. 8 W.—

- O2—¼ inch to 0, very dark gray (10YR 3/1) leaf mold and some roots; leaves and twigs in all stages of decomposition; neutral; abrupt, smooth boundary.
- A11—0 to ¼ inch, dark-gray (10YR 4/1) silt loam; contains decayed organic material; weak, fine, granular structure; a few worm casts visible; very friable; slightly acid; abrupt, smooth boundary.
- A12—¼ inch to 2 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; medium acid; abrupt, smooth boundary.
- A21—2 to 6 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; only a few stains of organic matter; friable; strongly acid; clear wavy boundary.
- A22—6 to 12 inches, yellowish-brown (10YR 5/8) silt loam; weak, thin, platy structure; friable; strongly acid; clear, wavy boundary.
- B1t—12 to 17 inches, yellowish-brown (10YR 5/8) light silty clay loam; moderate, medium, subangular blocky structure; friable; plastic; strongly acid; clear, wavy boundary.
- B21t—17 to 35 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, medium to coarse, subangular blocky structure; firm; medium clay films on many ped faces; strongly acid; clear, wavy boundary.
- IIB22t—35 to 52 inches, dark yellowish-brown (10YR 4/4) clay loam; weak, coarse, subangular blocky structure; medium clay films on many ped faces; firm; many rounded pebbles of igneous rock; medium acid; clear, wavy boundary.
- IIB3—52 to 60 inches, dark yellowish-brown (10YR 4/4) light clay loam; weak, coarse, subangular blocky structure; friable or firm; medium acid or slightly acid; clear, smooth boundary.
- IIC1—60 inches +, yellowish-brown (10YR 5/4) loam and some stones; massive; calcareous.

The thickness of the silt mantle varies within short distances. In areas where the Russell soils grade toward the Alford soils, the silt mantle is thicker than normal and that part of the B2 horizon developed from till is thin. The plow layer in cropped areas is lighter colored and lower in organic-matter content than the undisturbed surface layer in wooded areas. In some severely eroded places the present surface layer is as fine textured as silty clay loam. Below the surface layer the texture ranges from silty clay loam in the B21t and IIB22t horizons to light clay loam in the IIB3 horizon and to loam, silt loam, or light clay loam in the IIC1 horizon. In many small areas there is a thin sandy layer between the silt mantle and the underlying till. The depth to calcareous till ranges from 42 to 72 inches. The reaction ranges from medium acid in the A horizon and strongly acid or medium acid in the B horizon to calcareous in the C horizon. Silt loam is the dominant soil type mapped in this county, but there are small areas of loam.

The well-drained Russell soils are in areas scattered throughout the northern half of the county. They occur with the light-colored, somewhat poorly drained Fincastle soils and the dark-colored, very poorly drained Ragsdale soils.

Russell loam, 2 to 5 percent slopes (RsB).—Most of this soil is in the northwestern part of the county, where it occurs with Princeton fine sandy loams. Southward along the Wabash River valley, however, a smaller acreage is in areas where a thin layer of sand has been deposited on the Wisconsin till plain.

This soil has a profile similar to the one described for the series, but the upper part of this soil developed in a cover of windblown fine sandy loam and loam as much as 18 inches thick. The lower part, like that of Russell silt loams, developed in leached loam till that is calcareous at a depth of 3½ to 5 feet. Included in mapping are a few moderately eroded tracts in which the original surface layer is thin or the brown subsoil is exposed.

Corn is the chief crop grown on this soil, generally in rotation with wheat, oats, and grass-legume meadow. The soil also is well suited to soybeans and, if properly limed and fertilized, to alfalfa. It has lower available moisture capacity than uneroded areas of Russell silt loams and consequently, produces slightly lower yields of corn and soybeans. (Capability unit IIe-3; woodland suitability group 1)

Russell loam, 5 to 8 percent slopes (RsC).—This is the more extensive of the Russell loams. It occurs around the heads of drainageways and on narrow ridges and hillsides along drainageways. Included in areas mapped as this soil are small areas on slopes exceeding 8 percent. Also included are small, moderately eroded areas in which the surface layer is thinner than typical for this soil or, in places, the yellowish-brown subsoil is exposed.

Much of this soil has been kept wooded or is used for permanent pasture. As a result, it has been little affected by erosion. The soil is best suited to alfalfa, grass-legume mixtures used for meadow, and fall-seeded small grain. If it is intensively row cropped, it should be protected by use of contour tillage, grassed waterways, and other practices. (Capability unit IIIe-3; woodland suitability group 1)

Russell silt loam, 2 to 5 percent slopes, moderately eroded (RtB2).—This soil occupies gently undulating knolls and narrow ridgetops between streams. The profile is similar to the one described as representative, but the original surface layer of silt loam has been thinned by erosion. In most places the surface layer is only 8 inches thick, though in spots all of it has been removed and the yellowish-brown silty clay loam subsoil is exposed. In a few areas the soil is moderately shallow to bedrock; here, it is underlain by sandstone at a depth of about 3 feet.

This soil has been excessively used for clean-tilled crops. As a result, the organic matter is depleted, the fertility is lowered, and the available moisture capacity is reduced. Further erosion can be controlled by terracing, tilling on the contour, and growing cover crops. The soil responds well to fertilizer and lime. (Capability unit IIe-3; woodland suitability group 1)

Russell silt loam, 5 to 8 percent slopes, moderately eroded (RtC2).—This is the most extensive of the Russell soils. It has a profile similar to the one described for the series, but it has thinner horizons and is shallower to glacial till. The surface layer varies in color and texture, depending on the degree of erosion. It ranges from grayish-brown silt loam to yellowish-brown light silty clay loam.

Excessive use of this soil for clean-tilled crops has lowered the organic-matter content, depleted fertility, reduced the moisture-absorbing capacity, impaired tilth, and accelerated the loss of surface soil. Erosion is the main problem in management. Crop yields can be increased by regular additions of organic matter; by adding lime, fertilizer, and manure; and by row cropping less intensively. The steeper and more eroded areas can best be used for meadow or permanent pasture. (Capability unit IIIe-3; woodland suitability group 1)

Russell silt loam, 8 to 15 percent slopes, moderately eroded (RtD2).—This soil has a profile similar to the one described for the series, but it has lost more of its original surface layer through erosion. The silt loam surface layer generally is only 3 to 8 inches thick, though in places that are more severely eroded, this layer has been mixed with subsoil material through tillage. Shallow gullies are common.

A few small areas that are shallow to bedrock make up a small acreage of this soil. Included in mapping are a few small areas of Russell loam.

Because erosion is a serious hazard, this soil should be cropped less intensively and protected more carefully than less strongly sloping Russell silt loams. (Capability unit IVe-3; woodland suitability group 1)

Russell soils, 2 to 5 percent slopes, severely eroded (RuB3).—These soils are mainly in many small areas around drainageways. The original surface layer is generally silt loam and is thin in most areas, but the yellowish-brown subsoil is exposed on a large part of the total acreage. The plow layer consists of the remaining surface layer mixed with some of the upper subsoil. It is cloudy, is in poor tilth, and makes a poor seedbed. Included in mapping are small areas that are shallow and gullied. Also included are small areas that have a loam surface layer.

From 90 to 95 percent of the acreage has been used intensively for clean-tilled crops. This use has accelerated erosion, impaired tilth, lowered the organic-matter content, depleted the supply of plant nutrients, and reduced the capacity of the soil to absorb moisture. Although crop yields are lower now than in the past, they can be increased by adding organic matter and by applying lime and fertilizer. (Capability unit IIIe-3; woodland suitability group 1)

Russell soils, 5 to 8 percent slopes, severely eroded (RuC3).—These soils, the most extensive of the severely eroded Russell soils, occupy many small areas in the county. They generally have lost more than three-fourths of their original surface layer through erosion, and in some places part of their subsoil is gone. The present surface layer is 6 to 7 inches thick and ranges from light yellowish-brown silt loam to brownish-yellow silty clay loam. Many areas are marked by shallow gullies. In places where these soils occur with Russell loams, they are more sandy than the soil described as representative.

Most of the acreage of these Russell soils is used for permanent pasture. (Capability unit IVe-3; woodland suitability group 1)

Russell soils, 8 to 15 percent slopes, severely eroded (RuD3).—These soils occur mostly in many small areas around drainageways. Their original surface layer normally is silt loam and is less than 3 inches thick in most places, but on a large part of the acreage the yellowish-brown subsoil is exposed. In a few places where erosion has removed all of the original silt mantle, many glacial pebbles and small stones are on the surface. Gullies are common. Included in areas mapped as these soils are small, severely gullied areas that are too small to be mapped separately.

From 80 to 90 percent of the total acreage is, or has been, used for crops and pasture, but yields are too low for profitable farming. The best use is permanent pasture (fig. 6) or woodland. (Capability unit VIe-1; woodland suitability group 1)

***Figure 6.*—A small area of Russell soils, 8 to 15 percent slopes, severely eroded, that could be improved and used for permanent pasture.**

Shoals Series

The Shoals series consists of light-colored, somewhat poorly drained soils that developed in medium-textured or moderately fine textured, neutral or slightly calcareous alluvium washed from drift of Wisconsin age. These soils occur mainly on flats and in swales of the flood plain along the Wabash River, but there are areas widely scattered along tributary streams. Originally, the soils were covered with a dense forest of willow, silver maple, sycamore, elm, ash, and other water-tolerant trees.

These soils have a grayish-brown surface layer, generally about 9 inches thick, and a grayish-brown subsoil that is mottled with yellowish brown. The texture of the underlying material is about the same as that of the surface layer, but mottling increases with depth.

The Shoals soils are in the same catena as the well drained Genesee soils and the moderately well drained Eel soils.

Representative profile of Shoals silt loam, located in the NW¼SW¼ sec. 29, T. 17 N., R. 8 W.—

Ap—0 to 9 inches, grayish-brown (10YR 5/2) silt loam; moderate, fine to medium, granular structure; friable; neutral; abrupt, smooth boundary.

B—9 to 18 inches, grayish-brown (10YR 5/2) silt loam to light silty clay loam with a few, fine, faint mottles of yellowish brown (10YR 5/4); weak, medium to coarse, subangular blocky structure; friable; neutral; clear, wavy boundary.

C1—18 to 40 inches +, dark-gray (10YR 4/1) and dark grayish-brown (10YR 4/2) silt loam with thin lenses of sand; many, medium, distinct mottles of yellowish brown (10YR 5/6) and dark reddish brown (2.5YR 3/4); weak, coarse, subangular blocky structure; friable; calcareous.

The A horizon ranges from 3 to 12 inches in thickness and is thinnest in wooded areas. The color of the A horizon ranges from very dark grayish brown (10YR 3/2) to light gray (10YR 6/1) and is lighter in cultivated areas. Strata making up the C horizon vary in texture and thickness; they normally range from sandy loam to silty clay loam, but there are thin strata of sand in many places. Silt loam is the only type mapped in Parke County.

Before crops can be successfully grown on the Shoals soils, artificial drainage and protection from overflow generally are required. Some of the lowest areas are subject to frequent and prolonged flooding. Unless these areas are protected, replanting is often necessary and crops may be completely lost because of flooding late in spring.

Shoals silt loam (Sb).—This soil occupies broad flats, swales, old meander channels, oxbows, and high bottoms along flood plains, chiefly in the valley of the Wabash River. Included with it are small areas that have a surface layer of silty clay loam or loam. These included areas, and also the areas on high bottoms, are subject to less frequent flooding than most areas of Shoals silt loam. In addition, they are slightly more acid throughout the profile and contain an accumulation of clay in the subsoil.

Most of the lower areas of this soil are covered with swamp forest or are used for permanent pasture. The higher and better drained areas are used in the same way as the nearby Eel soils. Sorghum, soybeans, and buckwheat are short-season crops commonly planted at times that are too late for planting corn. The chief problems in managing the soil are poor drainage and, in many places, the difficulty in locating suitable outlets for tile. (Capability unit IIw-7; woodland suitability group 13)

Sleeth Series

In this county the Sleeth series consists of nearly level, medium-textured, somewhat poorly drained soils that occupy glaciofluvial terraces, which are terraces formed by streams flowing from glaciers. These soils developed from stratified silt, sand, and sandy clay loam of Wisconsin glacial age. A deciduous forest of oak, hickory, maple, ash, and elm made up the native vegetation.

The Sleeth soils in Parke County are in the same catena as the well-drained Camden soils and the very poorly drained, dark-colored Westland soils that have a loamy substratum.

Sleeth soils in this county are similar in color and drainage to those mapped elsewhere as typical Sleeth soils, but they developed on sand and silts instead of on stratified sand and gravel. The Sleeth soils have a finer textured solum than the Ayrshire soils, and they are not so sandy.

Representative profile of Sleeth silt loam, loamy substratum, 0 to 2 percent slopes, located in the NE¼NE¼ sec. 3, T. 15 N., R. 7 W.—

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; fine to medium, granular structure; very friable; organic-matter content is moderately high; slightly acid; abrupt, smooth boundary.

A2—3 to 8 inches, grayish-brown (10YR 5/2) silt loam; weak, thin, platy structure to fine and medium, granular structure; low organic-matter content; friable; medium acid or slightly acid; clear, wavy boundary.

B1tg—8 to 14 inches, yellowish-brown (10YR 5/6) light silty clay loam with many, medium, distinct mottles and ped coatings of light brownish gray (10YR 6/2); moderate, medium, subangular blocky structure; friable; medium acid or strongly acid; clear, wavy boundary.

B21tg—14 to 32 inches, yellowish-brown (10YR 5/6) to brownish-yellow (10YR 6/6) silty clay loam with many, medium, distinct mottles and ped coatings of light gray (10YR 7/2); strong, medium subangular blocky structure; firm; thin clay films on many ped faces; strongly acid; clear, wavy boundary.

B22tg—32 to 52 inches, brownish-yellow (10YR 6/6) sandy clay loam to light clay loam that is mottled with very pale brown (10YR 7/3) and light gray (10YR 7/2); sand and few pebbles in lower part; moderate, medium, subangular blocky structure; firm; medium acid; clear, wavy boundary.

IIB3t—52 to 72 inches, dark yellowish-brown (10YR 4/4) light sandy clay loam that is mottled with dark brown (10YR 4/3); weak to moderate, medium, subangular blocky structure; slightly firm; neutral; clear, wavy boundary.

IIC—72 inches +, gray (10YR 6/1) and yellow (10YR 7/6), stratified silts and fine sand with a small amount of gravel; calcareous.

There is considerable variation in the depth to calcareous material and in the sequence of stratified material in the C horizon. Some areas have a small amount of gravel in the lower subsoil and the substratum. In places where the Sleeth soils occur with better drained soils, they are somewhat browner, are mottled at a greater depth, and have better drainage than normal. Loam and silt loam are the types mapped in Parke County.

These soils have slow surface runoff. Under natural conditions, internal drainage is slow, mainly because the water table is high.

Sleeth loam, loamy substratum, 0 to 2 percent slopes (ShA).—This soil has a profile similar to the one described, but it is not so fine textured, and there are fewer strata of silty material in the solum and parent material. In most places the subsoil is clay loam or sandy clay loam.

This nearly level soil occupies flat or slightly depressional areas. Included in mapping, however, are a few areas having slopes of 2 to 4 percent. In these areas surface drainage is better than on this soil, though internal movement of water is slow. Also included are a few slightly eroded areas where the original surface layer has been thinned or, in spots, the mottled subsoil has been exposed.

In addition, small areas of other soils are included in areas mapped as this soil. South of Rosedale there are a few areas that have a dark grayish-brown (10YR 3/2) surface layer 10 to 12 inches thick, and a subsoil that is somewhat more sandy than that of typical Sleeth loam, loamy substratum. Also included are a few areas that have a gravelly clay loam subsoil and are underlain by calcareous gravel and sand; a few areas that have a fine sandy loam surface layer and are little more sandy throughout the profile; and a few areas west of Tangier, and to the north and south, that have acid, stratified sandy material extending to a depth of 7 feet or more.

Maintaining the organic-matter content requires greater care on this soil than on the Sleeth silt loam. Furthermore, on this soil ponding in winter is less likely, the water table falls more rapidly after rain, and the available moisture capacity is a little lower.

Adequate drainage is needed if crops are grown in a regular rotation, but productivity is favorable if drainage is improved and fertility is increased. Drained areas are best suited to a mixed grain and livestock type of farming in which corn, soybeans, small grain, and grass-legume mixtures are grown in rotation. In areas that are not adequately drained, corn and soybeans are the most common crops. Because the soil generally is medium acid or strongly acid, liming helps in obtaining good stands of clover and other legumes. (Capability unit IIw-2; woodland suitability group 5)

Sleeth silt loam, loamy substratum, 0 to 2 percent slopes (SmA).—This soil has the profile described for the series. It occurs in areas widely scattered throughout the county, but most of its lies on bottom land along Big Raccoon Creek.

In the valley of Little Raccoon Creek north of Nyesville, there are small areas of this soil that developed in silty clay loam. These areas are finer textured and have a higher content of clay than other areas, and they are less permeable and more poorly drained.

Included with this soil, in areas where it occurs with the Ockley soils, are small areas of a soil that developed in a silt mantle as much as 6 feet thick over stratified sand and silt. Also included, in areas near the Fox soils, are small areas of a somewhat poorly drained soil that has a gravely clay loam subsoil at a depth of about 18 inches and is underlain by calcareous gravel and sand at a depth of about 3½ feet. Open ditches will readily drain this somewhat poorly drained soil, but tile lines require frequent repairs because they are likely to be filled with sand.

This Sleeth soil is suited to the same crops as Sleeth loam, loamy substratum, 0 to 2 percent slopes, and it is used and managed in about the same way. (Capability unit IIw-2; woodland suitability group 5)

Steep Stony and Rocky Land

Steep stony and rocky land (St) consists of bluffs, rocky crags, and small areas of shallow, stony soils on very steep hillsides that are highly dissected by drainageways cut through the bedrock. In most places the mapping unit is chiefly hard, thick-bedded acid sandstone and small outcrops of shale and limestone.

This land is so steep that soil development generally has not kept pace with geological erosion. Between the rocks and outcrops, however, there are small areas of soils that have a thin, light-colored surface layer over a thin subsoil that contains many fragments of shale and sandstone and is underlain by weathered bedrock. The native vegetation is a mixed forest of deciduous trees, dominantly oak and hickory. Remnants of an earlier forest of hemlock, white pine, and jack pine occur in Sugar Creek valley.

This land type is suitable mainly as woodland. It is too steep for cropping and generally is too infertile and too steep for grazing. (Capability unit VIIe-2; woodland suitability group 12)

Warsaw Series

In the Warsaw series are dark-colored, well-drained to excessively drained loams and silt loams that lie on terraces and outwash plains. These soils developed in 24 to 43 inches of loamy or silty outwash underlain by calcareous gravel and sand. Prairie grasses made up most of the original vegetation, but oak and hickory gradually encroached on the prairie.

The dark-colored surface layer is normally 10 inches or more thick and is underlain by a dark-brown, loamy subsurface layer. The subsoil is dark-brown to dark reddish-brown gravelly clay loam that extends to a depth of 24 to 42 inches. Here, it is underlain by light yellowish-brown, calcareous gravel and sand.

The Warsaw soils are similar to the Fox soils, but their surface layer and subsoil are much darker colored and have a higher content of organic matter. Warsaw soils have a somewhat finer textured, or more clayey, solum than the Elston soils.

Representative profile of a Warsaw loam, located in the SW¼SE¼ sec. 6, T. 15 N., R. 8 W.—

A11—0 to 3 inches, very dark brown (10YR 2/2) loam; weak, fine, granular structure; friable; a little fine gravel; neutral; clear, wavy boundary.

A12—3 to 8 inches, very dark grayish-brown (10YR 3/2) loam; weak, fine, granular structure; friable; neutral; clear, wavy boundary.

IIA3—8 to 11 inches, dark-brown (10YR 3/3) heavy gravelly loam; weak, medium, granular structure; friable; slightly acid; clear, wavy boundary.

IIB21t—11 to 18 inches, dark-brown (7.5YR 3/2) gravelly clay loam; weak, coarse to medium, subangular blocky structure; firm when moist, slightly sticky when wet; medium acid; clear, wavy boundary.

IIB22t—18 to 42 inches, dark reddish-brown (5YR 3/3) gravelly clay loam; weak, coarse, blocky structure; slightly sticky when wet; several large pebbles; medium acid to neutral; abrupt, irregular boundary but with wedge-shaped tongues that project 3 to 12 inches into the underlying gravel and that are 6 to 24 inches apart.

IIIC—42 inches +, light yellowish-brown (10YR 6/4) fine gravel and sand; calcareous; rock fragments consist of light- and dark-colored crystalline minerals that contain a variable amount of limestone of local origin.

Loam and silt loam are the soil types mapped in this county. In areas that have a silt loam surface layer, the soil developed in a cover of loess about 15 inches thick, and the upper B horizon generally is silty clay loam. In the B2 horizon the texture ranges from heavy loam to clay loam in the upper part and is gravelly clay loam or sandy clay loam in the lower part. Stratified, calcareous sand and gravel are typically at a depth ranging from 24 to 42 inches, but in many areas they lie at a depth of 4 feet or more. In places where the Warsaw soils grade to the Elston soils, the profile is more sandy and the solum is thicker and more acid than in the soil described as representative. Where the Warsaw soils grade to the Fox soils, the profile is lighter colored than the one described.

Surface drainage is slow in level areas of these soils, but internal drainage is moderately rapid through the gravelly substratum. In years when rainfall is average or below, the soils are somewhat droughty, particularly for oats and corn, though the available moisture capacity is medium.

Warsaw loam, 0 to 2 percent slopes (WbA).—This soil, which has the profile described for the Warsaw series, occurs mainly on terraces along the Wabash River. Included with it are a few areas of Warsaw sandy loam and of Elston loam that are too small to be mapped separately.

Corn is the main crop grown on this soil, but soybeans, wheat, and hay also are important. Soybeans, fall-seeded small grain, and deep-rooted legumes, such as alfalfa and sweetclover, make more effective use of the available moisture than corn, oats, and other spring-seeded crops. In farming the soil the principal problem is the limited supply of moisture. (Capability unit IIs–2; woodland suitability group 23)

Warsaw loam, 2 to 5 percent slopes (WbB).—In most places this soil is slightly shallower to calcareous gravel than Warsaw loam, 0 to 2 percent slopes, but in other respects the profiles of the two soils are nearly alike. Included in mapping are a few small areas of a soil that is similar to this soil but has a thicker solum. Also included are a few moderately eroded areas in which the surface layer is thinner than normal and is slightly gravelly.

This soil is used in about the same way as Warsaw loam, 0 to 2 percent slopes. If clean-tilled crops are grown on this soil, however, practices are needed that conserve moisture, reduce runoff, and control erosion. (Capability unit IIe–8; woodland suitability group 23)

Warsaw loam, 5 to 8 percent slopes, moderately eroded (WbC2).—This moderately eroded soil is more sloping than Warsaw loam, 0 to 2 percent slopes, and it has a thinner surface layer that is somewhat gravelly and clayey or cloddy. The soil is inextensive and occurs in long, narrow areas that are so small that they are farmed in fields with other soils. Included are small areas on slopes exceeding 8 percent.

This soil is used and managed like the surrounding soils. Because it is susceptible to further erosion and generally produces low yields, it is best suited to meadow crops. (Capability unit IIIe–14; woodland suitability group 23)

Warsaw silt loam, 0 to 2 percent slopes (WcA).—This soil is similar to Warsaw loam, 0 to 2 percent slopes, but it has a surface layer of silt loam and, in most places, an upper subsoil of silty clay loam that extends to a depth of about 18 inches.

Most of this soil is cultivated. Use and management are similar to those of Warsaw loam, 0 to 2 percent slopes, but this soil is better suited to corn because it has higher available moisture capacity. (Capability unit IIs–2; woodland suitability group 23)

Warsaw silt loam, 2 to 5 percent slopes (WcB).—This soil is more susceptible to erosion, and, in some places, has a thinner surface layer than Warsaw silt loam, 0 to 2 percent slopes. In a few areas there are small spots where the subsoil is exposed.

Because most areas of this soil are small, use is generally the same as that of adjacent soils. A common crop rotation consists of corn, soybeans, wheat, and hay. (Capability unit IIe–8; woodland suitability group 23)

Westland Series

In the Westland series are dark-colored, poorly or very poorly drained soils that lie in shallow, nearly level depressions on alluvial terraces and in valley trains. These depressions formerly were streambeds, and they are narrow and winding. The Westland soils developed in silty and loamy outwash that is underlain by stratified, calcareous gravel and sand at a depth of 42 to 60 inches. Swamp forest and marsh grasses made up the native vegetation.

Westland soils are in the same catena as the well-drained Ockley soils.

The typical Westland soils have more gravel in the Bg horizon than the Westland soils with a a loamy substratum, which are in the same catena as the well-drained Camden soils and the somewhat poorly drained Sleeth soils. In addition, typical Westland soils are underlain by gravel and sand instead of by fine sand and silt.

Representative profile of Westland silty clay loam, located in the SW¼NE¼ sec. 13, T. 15 N., R. 9 W.—

Ap—0 to 8 inches, very dark brown (10YR 2/2) to very dark gray (10YR 3/1) silty clay loam; moderate, medium, subangular blocky structure; firm to slightly friable; some gritty material in surface; neutral or slightly acid; abrupt, smooth boundary.

A12—8 to 11 inches, very dark gray (10YR 3/1) to very dark brown (10YR 2/2) silty clay loam; weak to moderate, medium, subangular blocky structure; firm; neutral or slightly acid; gradual, wavy boundary.

B21g—11 to 20 inches, dark-gray (10YR 4/1) silty clay loam mottled with yellowish brown (10YR 5/4); firm; moderate, medium and coarse, subangular blocky structure; slightly acid or neutral; gradual, wavy boundary.

IIB22tg—20 to 55 inches, yellowish-brown (10YR 5/6) gravelly clay loam mottled with grayish brown (10YR 4/1); mottles are common, medium, and distinct; firm; moderate, medium and coarse, angular and subangular blocky structure; content of sand and gravel increases in lower part; neutral.

IIIC—55 inches +, gray (10YR 6/1 to 5Y 5/1), stratified sand and gravel with a few, fine, distinct mottles of yellowish brown (10YR 5/6); loose; calcareous.

The total thickness of the Ap and the A12 horizons ranges from 10 to about 15 inches. In lower depressions the A horizon is thicker, the organic-matter content is higher, and the subsoil is grayer than normal. The average thickness of the solum is somewhat greater in areas where the Westland soils occur closely with the Ockley and related soils than it is in areas where they occur with the Fox and related soils. Where the typical Westland soils grade toward the Westland soils that have a loamy substratum, the subsoil is less gravelly than normal and the underlying material consists of interbedded sand, silt, and a small amount of gravel.

Westland silty clay loam (Wp).—Most areas of this soil are on high alluvial terraces along the Wabash River, but a few small areas occur with the Fox soils on lower terraces. Included in mapping are small areas of Westland soils that have a loamy substratum. Also included are small areas of a silty clay loam that is somewhat similar to this soil but is darker colored and more poorly drained.

This Westland soil is fertile and, if properly drained, produces favorable yields. It can be easily drained by either tiling or ditching, though draining the included Westland soils generally requires closer spacing of tile, for their subsoil is finer textured and less permeable to water than the one in this soil.

This soil is best suited to corn, soybeans, and other row crops. It produces satisfactory yields of corn, the principal crop, but tilth may be impaired and the supply of organic matter depleted if corn or other row crops are grown excessively. Wheat, red clover, and alfalfa are frequently injured by ponded water. (Capability unit IIw–1; woodland suitability group 11)

Westland silt loam (Wo).—This soil has a slightly coarser textured subsoil than Westland silty clay loam. In many places the silty surface layer consists of deposits washed from adjacent soils on higher terraces or uplands.

In areas where this soil occurs with the Warsaw soils, the surface layer is thicker and darker than that of typical Westland soils. Included in mapping are a few areas that have a loam surface layer and are somewhat more sandy throughout.

This soil produces yields similar to those of Westland silty clay loam, and it requires similar management. Tilth is more easily maintained, however, and the power needed for tillage is somewhat less. The principal problem is poor drainage. Because the soil commonly occurs in small areas near the Ockley and the Fox soils, its use is determined mainly by the use of those soils. Many of the larger areas are cropped continuously to corn or to soybeans. (Capability unit IIw-1; woodland suitability group 11)

Westland silty clay loam, loamy substratum (Wr).—This inextensive soil occupies small, scattered areas in the Wabash River valley, chiefly the northwestern part, and along tributary streams. In most places it occurs with the Camden soils and with the Sleeth soils that have a loamy substratum.

This soil is poorly drained and resembles the typical Westland silty clay loam in color and drainage, but it has little or no gravel in the subsoil and is underlain mainly by stratified fine sand and silt instead of loose gravel and coarse sand. The underlying material includes a few thin strata of fine gravel and clay.

Representative profile of Westland silty clay loam, loamy substratum, located in the SE¼NW¼ sec. 7, T. 17 N., R. 8 W.—

Ap—0 to 7 inches, very dark gray (10YR 3/1) light silty clay loam; moderate, medium, granular structure; high in organic-matter content; friable when moist, sticky when wet; neutral; abrupt, smooth boundary.

A12—7 to 13 inches, very dark gray (10YR 3/1) silty clay loam; moderate, medium, subangular blocky structure; firm when moist, sticky when wet, hard when dry; slightly acid; clear, wavy boundary.

B21g—13 to 24 inches, very dark gray (10YR 4/1) silty clay loam with few to common, distinct mottles of dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/8); moderate, medium and fine, subangular blocky structure; firm when moist, slightly sticky when wet, hard when dry; slightly acid; clear, wavy boundary.

B22g—24 to 36 inches, yellowish-brown (10YR 5/6) silty clay loam with many, medium, prominent mottles of gray (10YR 5/1); weak, fine, subangular blocky structure; a few, small pebbles and some sand; slightly acid or neutral; clear, wavy boundary.

IIB3g—36 to 55 inches, gray (10YR 5/1) to grayish-brown (10YR 5/2) sandy clay loam with many, medium, distinct mottles of yellowish brown (10YR 5/6); weak, coarse, subangular blocky structure; neutral or mildly alkaline; clear, wavy boundary.

IIC—55 inches +, gray (10YR 6/1) stratified silt and fine sand with thin strata of fine gravel and clay; calcareous.

The total thickness of the solum ranges from 3 to 5 feet. The A horizon ranges from 12 to 18 inches in thickness and is thickest in the deeper depressions.

Included in mapping are small areas of Westland silt loam, loamy substratum, that are more easily tilled than this soil but are similar in use and produce similar yields. Also included are small areas of a soil that is similar to this soil but developed over heavier silty clay loam that extends to a depth of 3 to 5 feet or more. This included soil occurs mainly in the valley of Little Raccoon Creek northeast of Rockville. It has a higher content of clay than Westland silty clay loam, loamy substratum, and it is more slowly permeable and more difficult to drain. It also is more difficult to till but, if properly managed, is about the same in productivity.

In addition, there are included areas in the Wabash River valley that are subject to flooding. These areas have received a layer of lighter colored silty material that makes the plow layer a little lighter colored and more easily tilled.

Westland silty clay loam, loamy substratum, has very slow runoff. Under natural conditions, areas in the deeper depressions were covered by standing water for considerable periods. Except in small depressions that have no outlet, however, most of the soil has been adequately drained with tile and is used for crops. Because the substratum is slowly permeable, large areas cannot be effectively drained by use of widely spaced ditches. The soil is used chiefly for corn and soybeans. It is well suited to these crops and to tomatoes, sweetcorn, and other special crops. (Capability unit IIw-1; woodland suitability group 11)

Westland loam, loamy substratum (Wd).—This soil lies on terraces, mainly along the Wabash River. Most of the acreage is in the northwestern part of the county. The soil is similar to Westland silty clay loam, loamy substratum, but it has more sand in both the surface layer and the subsoil.

Included in mapping are a few small areas that occur with the Chelsea and Elston soils and that have a fine sandy loam surface layer and are more sandy throughout than this soil. Also included are areas of similar dark-colored, depressional soils that are underlain by acid, stratified sandy materials. These included soils occupy the upland area between Mill Creek and Sugar Creek, where they occur with the Princeton and related soils. In addition, there are a few included areas of darker and deeper, sandy soils of the marshland southeast of Rosedale. These sandy soils, which occur with the Elston soils, developed in alluvial deposits of noncalcareous sandy material.

Westland loam, loamy substratum, is almost all cultivated. It produces slightly lower yields than Westland silty clay loam, loamy substratum. (Capability unit IIw-1; woodland suitability group 11)

Whitson Series

The Whitson series consists of grayish, poorly drained soils that developed in a mantle of calcareous silt 4 to more than 8 feet thick. These soils occur mainly in small, level areas or in shallow depressions on the silt-mantled Illinoian till plain, chiefly in the southern part of the county.

The surface layer is silt loam, generally about 9 inches thick, and is grayish when moist and almost white when dry. The underlying layer is higher in clay content than the surface layer and has many yellowish-brown mottles. The clay content in the subsoil ranges from 33 to 43 percent but averages 35 to 40 percent in the upper 20 inches. Lime is at a depth of about 48 inches.

The Whitson soils occur with the somewhat poorly drained Reesville soils and the poorly drained, dark-colored Ragsdale soils. The Whitson soils are less permeable than the Reesville soils, and their subsoil is more clayey, is prismatic in structure, and has tongues or fingers of gray silt loam from the surface layer. Whitson soils have a more clayey subsoil and are less acid than the Iva soils.

Representative profile of Whitson silt loam, located in the NE¼SE¼SW¼NW¼ sec. 35, T. 15 N., R. 8 W.—

Ap—0 to 9 inches, dark-gray (10YR 4/0) silt loam; moderate, fine, granular structure; friable; strongly acid; abrupt, smooth boundary.

B21t—9 to 22 inches, olive (5Y 5/3) silty clay with many, fine, distinct mottles of yellowish brown (10YR 5/6 to 5/8); strong, very coarse, prismatic structure; very firm; peds are coated with clay 1 to 2 millimeters thick, and some cracks are filled with light-gray (10YR 7/1) silt; medium acid; clear, wavy boundary.

B22t—22 to 38 inches, pale-brown (10YR 6/3) fine silty clay loam to silty clay loam with common, coarse, distinct mottles of yellowish brown (10YR 6/4) and pale olive (5Y 6/4); weak, medium to coarse, prismatic structure breaking to strong, coarse, blocky structure; very firm; dark-gray (10YR 4/1 to 5/1) clay 1 to 2 millimeters thick covers many of the vertical ped faces, many fine roots extend from surface into this horizon; slightly acid.

B3t—38 to 46 inches, pale-olive (5Y 6/3) light silty clay loam with many, medium, distinct, gray (5Y 5/1 to 6/1) mottlings and coatings of clay on vertical faces of peds and channels; weak, coarse, subangular blocky structure; friable; neutral; clear, wavy to gradual, irregular boundary with tongues of silty clay loam extending 5 inches or more into the C horizon.

C—46 to 89 inches, brownish-yellow (10YR 6/6 to 6/8) silt loam with many, fine, distinct, pale-brown (10YR 6/3) and gray (10YR 5/1) mottlings and crack fillings of clay and silt in upper part of horizon; massive; very friable; very slowly effervescent; dolomitic.

IIC2—89 to 100 inches +, brownish-yellow (10YR 6/6) clay loam with many, medium, distinct mottles of gray (10YR 5/1); massive; very firm; grains of sand and fragments of chert and crystalline rock, mostly siliceous, are dispersed through the mass; leached till of Illinoian age.

In some areas the A horizon is thicker than the one described. A few areas have a thin A2 horizon and a B1 horizon above the prismatic B21t horizon. In some places the underlying layer of calcareous silt loam is lacking, and in some places it is nearer the surface than in the profile described. Silt loam is the only type mapped in Parke County.

Whitson silt loam (Ww).—This soil has the profile described for the series. It occupies small areas and generally is used like the adjoining soils. The crops commonly grown are corn, soybeans, wheat, and mixed hay, but fall-seeded legumes and small grain are often damaged or drowned out by excess water. Because internal drainage is slow and some areas are in shallow enclosed depressions, tillage is frequently delayed until the soil is dry enough to be worked.

This soil is only moderately productive, but it responds to improved drainage, liming, and adequate fertilization. Although surface drainage is satisfactory in most level areas, ditching or tiling is needed in some areas, especially those in depressions. (Capability unit IIIw-2; woodland suitability group 11)

Zipp Series

In the Zipp series are dark-gray, very poorly drained soils that have a high content of clay and are difficult to manage. These soils occur in swales and bayous on back bottoms and low terraces. They developed in thick alluvium consisting of neutral montmorillonitic clay. In most places the soils are subject to infrequent flooding, but they remain highly clayey, for the floodwater lays down only a little fresh alluvium. The native vegetation was cottonwood, aspen, red maple, willows, reeds, and marsh grasses.

Zipp soils have a thin surface layer of dark-gray fine silty clay loam or clay and a subsoil of gray silty clay. Because the soils are very plastic and sticky when wet and are very hard when dry, they can be tilled within only a narrow range of moisture content.

These soils are finer textured and are much more difficult to keep in good tilth than the somewhat similar Bonpas, Ragsdale, and Westland soils. The Zipp soils developed in alluvial clay, whereas the Bonpas soils and the Westland soils that have a loamy substratum developed in stratified sand and silt; the Ragsdale soils developed in windblown silt, or loess; and the typical Westland soils developed in silty and loamy outwash over stratified sand and gravel.

Representative profile of Zipp silty clay loam, located in the SW¼SW¼SE¼ sec. 11, T. 14 N., R. 9 W.—

Ap—0 to 9 inches, dark-gray (10YR 4/1) to olive-gray (5Y 4/2) heavy silty clay loam; weak to moderate, very fine and fine, granular structure; firm when moist, plastic when wet; neutral; abrupt, smooth boundary.

B21g—9 to 19 inches, very dark grayish-brown (10YR 3/2) to dark-gray (10YR 4/1) silty clay; moderate, very thick, platy structure in upper 4 to 6 inches (traffic pan) grading to strong, coarse, subangular blocky structure; firm; neutral; gradual, smooth boundary.

B22g—19 to 40 inches, gray (N 5/0) to dark-gray (10YR 4/1) silty clay with a few, fine, distinct mottles of dark grayish brown (10YR 4/2) and brown (7.5YR 4/2); weak to moderate, very coarse, prismatic structure breaking to moderate, fine, angular blocky structure; very firm; neutral; olive (5Y 4/4) mottles increase with depth; clear, wavy boundary.

B3—40 to 48 inches, gray (5Y 5/1) fine silty clay loam with common, medium, distinct mottles of dark yellowish brown (10YR 4/4); massive; plastic and sticky; neutral.

Some areas have been covered by 1 to 6 inches of grayish-brown (10YR 5/2) to dark grayish-brown (10YR 4/2) silty clay loam laid down by floodwater. The color of the surface layer ranges to very dark brown (10YR 2/2) in places that are flooded least often and have the thinnest layer of fresh alluvium. In areas where the Zipp soils grade into the Eel or the Westland soils, they are not so highly gleyed, do not have so high a clay content, are not so plastic and sticky, and are not so difficult to till as typical Zipp soils.

The Zipp soils are naturally wet, are very slowly permeable, and must be artificially drained before they can be cultivated.

Zipp silty clay loam (Zc).—Most areas of this soil are level or slightly depressional and have been drained by open ditches. Some areas are in deep depressions that have no natural outlet. A few of these low-lying areas are so difficult to drain that they remain in trees or marsh grasses.

Corn and soybeans are the main crops grown on this soil and are the ones best suited to it. Corn responds well to row fertilization.

In addition to drainage, a major problem is poor tilth. As the soil dries, it gets granular at the surface but remains wet below it. Plowing and planting in one operation and using minimum tillage are effective in reducing compaction and maintaining favorable tilth. For working the soil, crawler-type tractors are better than those with rubber tires because their weight is less per square inch of tread. Because of compaction, the soil should not be grazed or tilled when it is wet. (Capability unit IIIw-2; woodland suitability group 11)

Formation and Classification of Soils

This section was written for soil scientists and others interested in the nature and origin of the soils in Parke County. The section consists of three main parts. The first part discusses the factors of soil formation and how they affect the formation of soils in Parke County. In the second part the system for classifying soils is described and the soils are placed in the system. The third part gives laboratory data for two selected soils in the county.

Factors of Soil Formation

The soil at any given place is a product of its environment—the combined effect 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 climate while the soil material was accumulating and the soil was developing.
2. The living organisms, plant and animal life, on and in the soil while the soil was developing.
3. The physical and mineralogical composition of the parent material.
4. The relief or lay of the land.
5. The length of time that each of these forces has been acting on the parent material.

Climate and living organisms are the active forces in soil formation. Their action on the accumulated 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. Relief, including the direction of slope, increases or decreases the effect of temperature and moisture. The length of time a soil has been developing is reflected in the depth of soil and in differences in the layers of the profile. The initial development of a soil generally is rapid, but a long time is needed for the full effect of weathering to produce distinct differences in layers of the soil profile.

Climate

The climate of Parke County is of the humid, temperate, continental type that is common in the midwestern United States. Rainfall averages 38 inches annually and is well distributed throughout the year. Because rainfall is ample, the soils are leached of bases and are acid. In winter the temperature is so low that the soils are frozen to a depth of 1 foot or more, and in summer it is so high that the soils dry out to a similar depth. Soil development, particularly the weathering of minerals and the effects of living organisms, is greatly retarded in winter and is intensified in summer.

Living organisms

Trees and small areas of grass made up the original plant cover in most of the area that is now Parke County. These higher plants produced litter, roots, and other organic material that was changed to humus, or organic matter, through the action of micro-organisms, earthworms, and other forms of life. The organic matter was gradually mixed with mineral soil by earthworms and various other animals.

Although Parke County lies near the eastern edge of a former prairie that extended westward across the midwest, the only areas of the county that had a cover of prairie grasses were some of the relatively dry, sandy and gravelly terraces along the Wabash River. The plant cover on these terraces was mainly big bluestem, little bluestem, indiangrass, goldenrod, and sunflower. By far the larger part of the county was covered with a mixed forest of deciduous hardwoods. The stands were of three principal types—oak and hickory in well-drained areas; beech and maple in moist or somewhat poorly drained areas; and beech, elm, hickory, ash, and other hardwoods on the flood plains of streams. Remnants of a coniferous forest of hemlock, yew, and white pine occur on the steep slopes along Sugar Creek.

Different kinds of vegetation play an important role in forming different kinds of soils. Trees deposit twigs and leaves only on the surface and have comparatively few roots; therefore, they add little organic matter to the soils. Soils formed under forest have a thin, dark, nonacid surface layer and a thicker, light-colored, acid subsurface layer.

In contrast, grasses add a large amount of organic matter that comes from the leaves and from the well-distributed, fibrous roots. Because much of the year is cold, microbial activity is arrested, the organic matter does not decompose excessively, and much of it accumulates in the soils. Consequently, prairie soils have a thick, very dark brown, less acid surface layer.

In ponded or wet areas, the soils are dark colored and rich in organic matter because the organic material from plants decomposes slowly and much of it accumulates.

Man's past use of the land has brought about striking changes in the soils of this area. Clearing and cultivating the soils have depleted the original supply of organic matter and readily available plant nutrients. Because of tillage, soils in many sloping areas are eroded. In such places the subsoil is commonly exposed and the soils are difficult to till. However, many farmers are now increasing the fertility of their soils by regular additions of organic matter, by adding lime and fertilizer liberally, and by using other practices of good management.

Parent material

Almost all of the soils in Parke County formed in mixed mineral material of glacial origin. This material, or glacial drift, was transported long distances by ice and later was sorted and transported further by water and wind. The parent material was of three kinds: (1) ice-laid, nonsorted, compact material called till; (2) stratified material deposited by glacial meltwater along streams and in small ponds; and (3) wind-deposited material consisting of fine sand along the Wabash River and, back from the river, silt resembling dust, or loess, that covered the uplands.

Contributing to soil formation, as part of the glacial drift, was the underlying bedrock. This consists chiefly of sandstone, shale, and a small amount of limestone of Pennsylvanian age. Recent alluvium occurs on bottom land along the major streams. Fresh deposits are made each time an area is flooded. Streams such as Sugar Creek have stripped away the glacial drift and, cutting deeply into bedrock, have left steep walls and bluffs that generally are too steep for a normal soil to form. In one area of the county an organic soil is forming.

Continental glaciers were of great importance in changing and creating soil-forming material and in reshaping the landscape. Glacial drift, 20 to 150 feet or more deep, accumulated during the advance and retreat of the great ice sheets (*15*). These huge sheets of ice, hundreds of miles wide and thousands of feet thick, moved slowly southward across the countryside. As they moved, valleys were filled, hills were leveled, and new hills were left where none had been before.

As the glaciers advanced they picked up masses of rock, sand, silt, and clay weathered from the bedrock; ground it together; and thus formed rock flour and boulder clay. Although most of the materials came from outside the area, local materials such as limestone, sandstone, and shale also were important. Because the glacial drift contained many kinds of rocks and minerals, the soils formed in it generally are productive. In contrast, soils formed in material weathered from bedrock contain only the minerals found in that rock.

Glaciers of at least three different ages—the Kansan, the Illinoian, and the Wisconsin—deposited till in Parke County. Because most of the till was later covered with loess, the soils that formed in till are mainly on hillsides adjoining stream valleys, where the loess is very thin or absent.

Each glacial stage was an advance and a retreat of ice. When the ice melted in summer, it caused floods that covered large areas in the valleys of the Wabash River and its tributaries. The floodwater deposited gravel, sand, and silt. In fall and winter the melting ceased; the areas first became mud flats and then dried out. Northwest winds sweeping across the flats picked up the larger, heavier sand particles and deposited them in dunes on the terraces and uplands along the east side of the valley, such as in the on Lodi-Howard area. The finer particles of loess were blown on the uplands behind the dunes. Here, the deposits decreased in thickness and the particles decreased in size with increasing distance from the valley (*5*). The upland flats were covered with loess that is thickest on the Illinoian till plain and near the valley. The thickness ranges from 15 to 20 feet in the southwestern part of the county to 5 or 6 feet in the southeastern part and 3 to 4 feet in the northeastern part. In most of the level areas the soils have formed entirely in loess. Such soils are smooth and silty rather than gritty or slightly gravelly as are soils that developed in till or in outwash material.

Soils formed in water-laid or alluvial materials vary in characteristics according to the texture of the materials. The alluvium on flood plains is mainly silt loam and loam in texture, but it is silty clay loam in many places on back bottoms throughout the Wabash River valley. The soils on terraces are older than those on flood plains; they formed in deposits from glacial meltwater of both Illinoian and Wisconsin ages. The materials of Illinoian age are deeply leached, strongly acid gravelly sands, whereas those of Wisconsin age are coarse textured to fine textured and generally are calcareous at a depth ranging from 3½ to 5 feet. Coarser textured materials occur chiefly in the valleys of the Wabash River and Sugar Creek. The material in which the Elston soils formed is noncalcareous gravelly sand, but Elston soils are not so acid or so strongly developed as soils developed in similar deposits of Illinoian age. The medium-textured materials, chiefly silt and fine sand, occur mainly in the valleys of Leatherwood and Big Raccoon Creeks where the stream outlets were blocked. At Rosedale is an area called The Lake that is unique in Parke County because the soils formed in fine silty clay loam and in organic materials that accumulated when the outlet of Big Raccoon Creek was blocked to the southwest.

Relief

The relationship of relief to the soils and the position of typical soils in relation to their parent material is shown in figure 7. This schematic cross section of Parke County shows natural drainage and indicates the kind of vegetation under which the soils formed.

Relief influences soil formation by affecting drainage, soil temperature, runoff, and erosion. In areas where the parent material and climate are the same, less strongly developed soil profiles have formed on steep slopes than on more nearly level ones.

Figure 7 shows some effects of relief on soil formation. Fox loam, for example, is a well-drained, somewhat droughty soil that occurs on level terraces underlain by freely permeable gravel and sand. The deposition of these coarse, stratified materials by glacial meltwater was partly caused by relief.

The Reesville, Iva, and Fincastle soils formed in level areas underlain by slowly permeable loess or compact glacial till. Partly because of flatness, these soils are somewhat poorly drained.

The Westland and Ragsdale soils formed on depressional flats or in wet depressions that are poorly drained. The dark-colored Westland soils occur on flats that have a perched water table and are underlain by calcareous sand and gravel. Ragsdale soils formed in slowly permeable, silty material in ponded areas where organic material accumulated but decomposed slowly. Consequently, the Ragsdale soils are dark colored and have a high content of organic matter.

Where slopes are steep, such as in areas of Hennepin soils, soil material is moved downhill almost as rapidly as it forms, and the soils are shallow and poorly developed. On slopes of similar gradient, soils tend to be deeper and more strongly developed on slopes facing south or west than they do on slopes facing north or east.

Time

Most soils of the county are intermediate in age; that is, they developed chiefly in materials of Wisconsin glacial age or younger. The oldest soils formed in glacial till of Illinoian age that was exposed on slopes in the southern part of the county. These soils, mainly the Cincinnati soils and the less sloping Hickory soils, have been in place long enough for well-defined horizons and a strongly acid profile to develop. On steeper slopes the Hickory soils are not so acid or so deep.

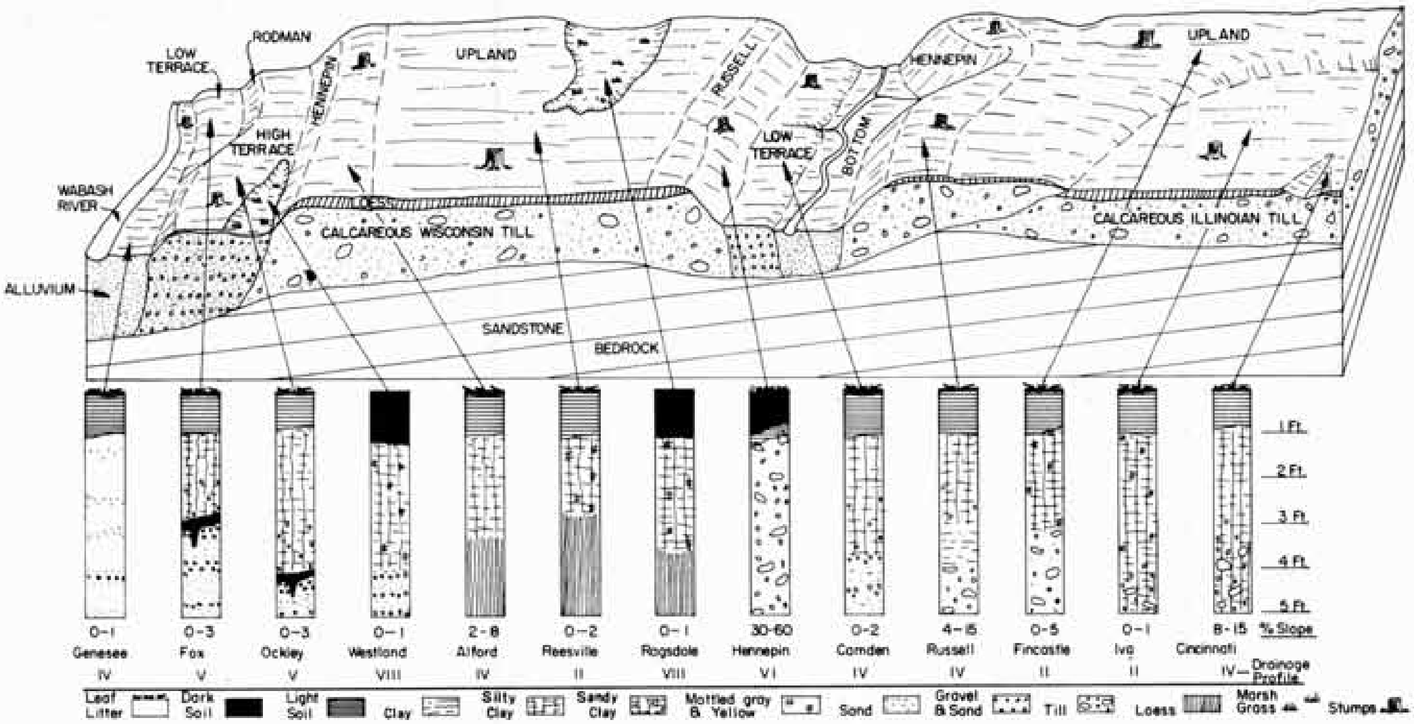

Figure 7.—**Schematic cross section of Parke County showing representative soil series, their topographic position, parent material, native vegetation, natural drainage, and profile characteristics. Drainage is shown below each profile as follows: II, somewhat poor; III, moderately good; IV, good; V, somewhat excessive; VI, excessive; VII, poor; and VIII, very poor.**

Soils formed on the flood plains of streams are young because the streams overflow their banks from time to time and deposit fresh material in which the soil-forming process starts anew. The Genesee and Eel soils are examples of such soils. On high bottoms, where flooding is less frequent, a weak profile has developed in such soils as Eel silt loam, high bottom.

Classification of Soils

Soils are classified so that we may more easily remember their significant characteristics, assemble knowledge about them, see their relationships to one another and to the whole environment, and develop principles that help us understand their behavior and response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The system of classification described in this section of the report is the 1938 system (*3*), with later revisions, of Baldwin, Kellogg, Thorp, and Smith. Effective January 1, 1965, however, a new system of classification was adopted as standard for all soil surveys in the United States (*11, 13*). In table 12 the soils of Parke County are classified according to the old and the new systems.

In the 1938 system of classification, soil series are classified into great soil groups. A great soil group consists of soils that have similar major profile characteristics. Their horizons are arranged in the same way, although the soils may differ in such features as thickness of profile and degree of development in the different horizons.

The great soil groups in this county are (1) Gray-Brown Podzolic soils, (2) Red-Yellow Podzolic soils, (3) Brunizems, (4) Planosols, (5) Humic Gley soils, (6) Organic soils, (7) Regosols, and (8) Alluvial soils (*1*). The miscellaneous land types are not classified by great soil groups.

In the highest category of classification, the great soil groups have been placed in three orders, zonal, intrazonal. and azonal. The zonal order is made up of soils with evident, genetically related horizons that reflect the predominant influence of climate and living organisms in their formation. The intrazonal order consists of soils with evident, genetically related horizons that reflect the dominant influence of a local factor, such as relief or parent material, over the effects of climate and living organisms. The azonal order is made up of soils that lack distinct, genetically related horizons, commonly because of youth, resistant parent material, or steep slopes.

In the following paragraphs each great soil group is discussed, and the soil series in each are listed. Some soils in some of the great soil groups intergrade toward other great soil groups. That is, they have characteristics of two groups.

Gray-Brown Podzolic soils

The Gray-Brown Podzolic soils formed under a mixed deciduous forest in a humid, temperate climate. These soils are well drained and occupy level to rolling relief. In undisturbed areas they have a thin organic horizon (O2) that is ⅛ to ¾ inch thick and consists of partly decomposed forest litter. This is underlain by an organic-mineral horizon (A1) 2 to 4 inches thick that has a weak granular structure. These horizons, generally neutral in reaction, are continuously recharged with bases through the decomposition and mineralization of leaves that fall each year.

TABLE 12.—*Soil series classified according to the new and the old systems of classification*

Series	New classification				Old classification	
	Family	Subgroup	Suborder	Order	Great soil group	Order
Alford	Fine silty, mixed, mesic	Typic Normudalfs	Udalfs	Alfisols	Gray-Brown Podzolic	Zonal.
Allison	Fine silty, mixed, mesic	Cumulic Hapludolls	Udolls	Mollisols	Alluvial	Azonal.
Armiesburg	Fine silty, mixed, mesic	Typic Hapludolls	Udolls	Mollisols	Alluvial	Azonal.
Ayrshire	Fine loamy, mixed, mesic.	Aeric Ochraqualfs	Aqualfs	Alfisols	Gray-Brown Podzolic (intergrading toward Low-Humic Gley).	Zonal.
Bonpas	Fine silty, mixed, mesic	Cumulic Haplaquolls	Aquolls	Mollisols	Humic Gley	Intrazonal.
Camden	Fine silty, mixed, mesic	Typic Normudalfs	Udalfs	Alfisols	Gray-Brown Podzolic	Zonal.
Chelsea	Sandy, siliceous, mesic	Alfic Normipsamments	Psamments	Entisols	Gray-Brown Podzolic (intergrading toward Regosol).	Zonal.
Cincinnati	Fine silty, mixed, mesic	Typic Fragiudalfs	Udalfs	Alfisols	Red-Yellow Podzolic (intergrading toward Gray-Brown Podzolic).	Zonal.
Eel	Fine loamy, mixed, nonacid, mesic.	Aquic Cumulic Haplorthents.	Orthents	Entisols	Alluvial	Azonal.
Elston	Fine loamy, mixed, mesic.	Typic Argiudolls	Udolls	Mollisols	Brunizems	Zonal.
Fincastle	Fine silty, mixed, mesic	Aeric Ochraqualfs	Aqualfs	Alfisols	Gray-Brown Podzolic (intergrading toward Low-Humic Gley).	Zonal.
Fox	Fine loamy, mixed, mesic.	Typic Normudalfs	Udalfs	Alfisols	Gray-Brown Podzolic	Zonal.
Genesee	Fine loamy, mixed, nonacid, mesic.	Cumulic Haplorthents	Orthents	Entisols	Alluvial	Azonal.
Hennepin	Fine loamy, mixed, mesic.	Alfic Eutrochrepts	Ochrepts	Inceptisols	Regosol (intergrading toward Gray-Brown Podzolic).	Azonal.
Hickory	Fine loamy, mixed, mesic.	Typic Normudults	Udults	Ultisols	Red-Yellow Podzolic (intergrading toward Gray-Brown Podzolic).	Zonal.
Huntsville	Fine silty, mixed, mesic	Cumulic Hapludolls	Udolls	Mollisols	Alluvial	Azonal.
Iva	Fine silty, mixed, mesic	Aeric Ochraqualfs	Aqualfs	Alfisols	Gray-Brown Podzolic (intergrading toward Low-Humic Gley).	Zonal.
Linwood	(1)	(1)	(1)	Histosols	Organic	Intrazonal.
Negley	Fine loamy, siliceous, mesic.	Typic Normudults	Udults	Ultisols	Red-Yellow Podzolic (intergrading toward Gray-Brown Podzolic).	Zonal.
Ockley	Fine silty, mixed, mesic.	Typic Normudalfs	Udalfs	Alfisols	Gray-Brown Podzolic	Zonal.
Parke	Fine silty, mixed, mexic.	Typic Normudults	Udults	Ultisols	Red-Yellow Podzolic (intergrading toward Gray-Brown Podzolic).	Zonal
Princeton	Fine loamy, siliceous, mesic.	Typic Normudalfs	Udalfs	Alfisols	Gray-Brown Podzolic	Zonal.
Ragsdale	Fine silty, mixed, mesic.	Typic Argiaquolls	Aquolls	Mollisols	Humic Gley	Intrazonal.
Reesville [2]	Fine silty, mixed, mesic.	Aeric Ochraqualfs	Aqualfs	Alfisols	Gray-Brown Podzolic (intergrading toward Low-Humic Gley).	Zonal.
Rodman [3]					Regosol (intergrading toward Brown Forest).	Azonal.
Russell	Fine silty, mixed, mesic.	Typic Normudalfs	Udalfs	Alfisols	Gray-Brown Podzolic	Zonal.
Shoals	Fine loamy, mixed, nonacid, mesic.	Aeric Cumulic Normaquepts.	Aquepts	Inceptisols	Alluvial (intergrading toward Low-Humic Gley).	Azonal.
Sleeth	Fine silty, mixed, mesic.	Aeric Ochraqualfs	Aqualfs	Alfisols	Gray-Brown Podzolic (intergrading toward Low-Humic Gley).	Zonal.
Warsaw	Fine loamy, mixed, mesic.	Typic Argiudolls	Udolls	Mollisols	Brunizems	Zonal.
Westland	Fine loamy, mixed, mesic.	Typic Haplaquolls	Aquolls	Mollisols	Humic Gley	Intrazonal.
Whitson	Fine, mixed, mesic	Typic Albaqualfs	Aqualfs	Alfisols	Planosol	Intrazonal.
Zipp	Fine, montmorillonitic, mesic.	Typic Normaquepts	Aquepts	Inceptisols	Humic Gley	Intrazonal.

[1] Linwood soils have not been placed in a family, a subgroup, or a suborder.
[2] Reesville soils on the Illinoian till plain are dominantly Typic Ochraqualfs in a fine, mixed, mesic family that borders a fine silty, mixed, mesic family.
[3] The Rodman soils are not classified in the higher categories, because the series likely will be redefined, and its new definition and classification are not known.

The underlying eluvial horizon (A2) is lighter in color, is platy in structure, and ranges from 4 to 10 inches in thickness. There is a relative increase in quartz and a decrease in sesquioxides, chiefly iron. The horizon is somewhat coarser textured because of the loss and translocation of clay. It is generally acid and strongly leached.

The illuvial (B) horizon is a zone where silicate clay and sesquioxides of iron and aluminum have accumulated. In well-drained areas the color of this horizon is yellowish and reddish brown. The structure is predominantly moderate, medium to coarse, subangular and angular blocky, and thin clay films are commonly present on most ped faces. The solum ranges from 3 to 4 feet or more in thickness, and the zone of maximum clay accumulation normally extends to a depth of about 3 feet. The thickness, texture, structure, and consistence of the various parts of the B horizon are largely dependent on the texture and amount of weatherable minerals in the parent material and on the degree of soil development. The base saturation ranges from about 40 to 75 percent, with the minimum in the B1 and the maximum in the B3 horizon. The calcium-magnesium ratios—an index of weathering intensity—is 2 to 1 or higher, especially in the A1 and B3 horizons.

The chief soil-forming processes have been the addition of organic material in the O to A1 horizons, the removal of soluble materials such as carbonates and exchangeable bases from the solum, the formation of silicate clays and other silicates, and the movement of silicate clays and associated sesquioxides from the A horizon and their accumulation in the B horizon. These processes have been accompanied by the development of granular structure in the A1 horizon, platy structure in the A2 horizon, and blocky structure in the B horizon.

The typical Gray-Brown Podzolic soils in this county are of the Alford, Camden, Fox, Ockley, Princeton, and Russell series. All of these soils are well and moderately well drained. The ones that developed in silty materials derived from mixed rocks are the Alford soils, which developed entirely in loess; and the Camden, Ockley, and Russell soils, which developed chiefly in loess overlying coarser textured materials. The Fox soils developed in fine loamy materials over calcareous gravel and sand. Princeton soils developed in medium to moderately coarse, loamy, calcareous (siliceous) materials of eolian origin. All the soils in this group have a profile similar to the one described as representative of Gray-Brown Podzolic soils, but the Fox and Ockley soils developed over calcareous gravel and sand. Both kinds of soils have a darker, neutral gravelly clay horizon, called a beta B horizon, immediately above the calcareous gravel. This horizon commonly occurs as tongues or wedges that extend into the underlying gravel.

The Gray-Brown Podzolic soils that intergrade toward Low-Humic Gley soils are the light-colored, somewhat poorly drained Ayrshire, Fincastle, Iva, Reesville, and Sleeth soils. These soils developed under deciduous forest, chiefly beech and maple. They have a lighter gray A2 horizon than the well-drained Gray-Brown Podzolic soils, and their subsoil is mottled gray and yellowish brown. Where they intergrade toward Planosols, they have characteristics of either a claypan or a fragipan. The Reesville soils on the Illinoian till plain commonly have a silty clay loam B2 horizon of prismatic structure that occurs within 12 to 15 inches of the surface, frequently without an intervening B1 horizon. The solum of these Reesville soils generally is thicker and more acid than that of Reesville soils on the Wisconsin till plain.

The Chelsea soils are Gray-Brown Podzolic soils that intergrade toward Regosols. These soils developed in loose, eolian fine sand that has a high content of quartz and normally is not calcareous. The B horizon consists of wavy, discontinuous bands of reddish-brown iron clay that vary in thickness and are separated by bands of loose, grayer sand.

Red-Yellow Podzolic soils

The Red-Yellow Podzolic soils in this county are well drained and developed under a cover of trees in a warm, temperate climate. These soils are characterized by a low organic-matter content, strong acidity (pH generally below 5.0), intensive leaching, low base saturation (generally below 35 percent through the B horizon, or low and decreasing with depth), and little or no weatherable minerals. The soils in this great soil group have a very thin organic horizon (O), a thin organic-mineral horizon (A1), and a subsurface horizon (A2 or A3) that is yellowish and is more highly oxidized than that of the Gray-Brown Podzolic soils. In addition, the subsoil in better drained areas is more yellowish or reddish and has a higher clay content; it generally is friable and brittle in consistence and has a network of gray streaks and veins in the lower part.

The Cincinnati, Negley, Hickory, and Parke soils are the Red-Yellow Podzolic soils in this county, and they intergrade toward the Gray-Brown Podzolic soils. They have the sequence of A1, A2, and textural B horizons and the degree of structural development characteristic of Gray-Brown Podzolic soils.

The Cincinnati soils developed in a mantle of loess, 18 to 40 inches thick, underlain by leached Illinoian till that is clay loam in the upper part. Calcareous loam makes up the till horizon at a depth of 9 to 12 feet, depending on the degree of slope. Cincinnati soils have a dark yellowish-brown A2 or A3 horizon, a thick but weakly to moderately expressed fragipan, and a very strongly acid solum that normally is most acid at the top of the fragipan. Data on the profile of a Cincinnati soil east of Parke County indicates the base saturation of the B horizon into the top of the fragipan is 36 percent or less, and the ratio of exchangeable calcium to magnesium is less than 1 to 1 to a depth of 6 feet (*16*).

In contrast to the Cincinnati soils, the Negley, Hickory, and Parke soils lack a fragipan. The Negley soils developed in moderately coarse textured outwash of Illinoian age that was covered with little or no loess. Negley soils have a highly oxidized, strongly acid solum 4 feet or more thick. They developed in loamy sand that was leached of carbonates to a depth of 15 feet or more.

The Hickory soils closely resemble the Cincinnati soils, but they developed in a thinner mantle of loess, lack a fragipan, and have a strongly acid solum in which the base saturation probably is closely related to thickness of the solum. Calcareous till of Illinoian age is the underlying material.

The Parke soils developed both in loess of Peorian age and in moderately coarse textured outwash of Illinoian age. Although the soils are highly oxidized and strongly acid, available data indicates that, in areas developed in loess, the base saturation of the solum generally is higher than 40 percent, and the ratio of exchangeable calcium to magnesium normally exceeds 1 to 1.

Brunizems

The Brunizems of Parke County are well-drained soils that developed under tall prairie grasses. These soils have a very dark brown A1 horizon 12 to 18 inches thick, a dark-brown textural B horizon, and a brown to yellowish-brown sand or gravelly C horizon that may be calcareous. The horizons are not sharply differentiated, particularly in the upper part of the solum. The organic matter ranges from 4 to 7 percent or more and gradually decreases with depth. Brunizems are medium acid, have base saturation ranging from 50 to 70 percent or more, and have an exchangeable calcium-magnesium ratio of 2 to 5 or more.

The soil-forming process is characterized by (1) an accumulation of organic matter, (2) moderate leaching of bases and moderate acidity, (3) development of relatively high cation exchange capacity, and (4) moderate accumulation of clay in the B horizon.

The Elston and Warsaw soils are Brunizems that developed in moderately coarse materials on glaciofluvial terraces of Wisconsin age. An accumulation of clay increases gradually through the lower A to the B horizon. In the Warsaw soils, which developed in calcareous gravel and sand, the clay content is highest in the beta B, or lower part of the B horizon. This horizon consists of dark-colored tongues and wedges that extend into the brown, calcareous gravel and sand.

Planosols

Planosols are soils having an eluviated surface horizon underlain by a strongly illuviated, cemented or compacted B horizon. Caps and fingers from the light-colored A2 horizon extend into the B horizon. There are two kinds of Planosols: those that have a claypan and those that have a fragipan. Strictly speaking, neither kind occurs in Parke County.

The Whitson soils, though classified as Planosols with a claypan, have some characteristics of the Gray-Brown Podzolic soils. They occupy level or slightly depressional areas where the natural drainage is poor, and they developed in 4 to 8 feet of loess under water-tolerant trees. The A1 and A2 horizons have a combined thickness of generally less than 12 inches, and there is a rather abrupt change to a thin B horizon of fine silty clay loam or light silty clay that has many polygonal cracks filled with gray silt and clay. Only the A horizon and the upper B horizon are medium acid to strongly acid; as a consequence, base saturation likely is relatively high.

Humic Gley soils

Humic Gley soils occur in depressional and flat areas and are poorly drained or very poorly drained. They formed under water-tolerant trees and marsh grasses in material that was well supplied with bases. These soils have a black to very dark grayish-brown organic-mineral (A1) horizon that is 12 to 18 inches or more thick and is underlain by a bluish-gray or mottled olive-yellow and gray Bg horizon. The organic-matter content gradually decreases from the A to the B horizon, but coatings of organic matter and mineral clay are on the prismatic or angular blocky aggregate of the Bg horizon.

The soil-forming process is characterized by (1) the accumulation of organic matter, (2) the leaching of bases and soluble material but maintenance of a high degree of base saturation, (3) the reduction of iron compounds to soluble (ferrous) forms that result in low chroma and mottling of the Bg and Cg horizons, and (4) the development of clay that mostly remains in place.

The Humic Gley soils in this county are the Bonpas, Ragsdale, Westland, and Zipp soils. Most of these soils formed in medium- to fine-textured materials that are neutral to highly calcareous, but the Westland soils developed in coarser textured materials. The Zipp soils have a lighter colored, thinner A1 horizon than the other soils, and their solum is higher in clay content throughout.

Organic soils

Organic soils consist of more than 30 percent organic matter that is more than 12 inches thick. These soils formed in organic materials that accumulated in ponds and in other areas saturated with water nearly all the time. The materials have been preserved because the water retarded their decomposition or oxidation. Organic soils range from well-decomposed muck to raw peat.

Linwood muck is the only Organic soil in Parke County. It has a black, well-decomposed organic surface layer 12 to 18 inches thick and a dark-brown mucky or peaty subsurface layer. These organic layers are underlain by gray, gleyed, loamy mineral material that is moderately permeable.

Regosols

Regosols are soils that developed in deep, unconsolidated deposits in which there are no clearly expressed soil characteristics. No true Regosols occur in Parke County.

The Hennepin and Rodman soils are classified in this great soil group, though the Hennepin soils intergrade toward Gray-Brown Podzolic soils, and the Rodman soils intergrade toward Brown Forest soils. Hennepin and Rodman soils developed on steep slopes under a forest cover. Their solum generally is neutral, and it overlies calcareous parent material at a depth of 12 to 18 inches. The A1 horizon is relatively thick and dark colored; an A2 horizon may be lacking; but a textural B horizon is present in most places.

Alluvial soils

Alluvial soils are young soils that developed in material recently deposited by streams. Except for an accumulation of organic matter, these soils show little or no profile development because they receive fresh sediments during each flood. Coarse materials are laid down on natural levees and in entrances to meander channels. Finer sediments are deposited on back bottoms, though some scouring may occur there. In those places the accumulation of organic matter commonly is greater, weak blocky structure may develop, and there may be organic-mineral stains and coatings on peds. Some of the high bottoms have a color B horizon, or a weak textural B horizon, that is slightly acid.

The Alluvial soils in this county developed chiefly in neutral to calcareous sediments washed from timbered areas of Wisconsin glacial drift. But along the smaller streams and in the southern part of the county, Alluvial soils formed in materials washed from areas of Illinoian

TABLE 13.—*Physical and chemical*

[Analyses by Soil Survey Laboratory, Beltsville,

Soil type and location	Horizon	Depth	Particle-size distribution in millimeters: Total sand (2 to 0.05)	Silt (0.05 to 0.002)	Clay (less than 0.002)	0.2 to 0.02	0.02 to 0.002	Particles larger than 2 mm.
		Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Iva silt loam: SW¼NE¼ sec. 19, T. 15 N., R. 7 W. (a wooded area 1½ miles south of Rockville).	A0	⅛–0	---	---	---	---	---	---
	A11	0–½	[1] 10.1	76.7	13.2	32.4	48.2	0
	A12	½–3	[1] 7.1	79.4	13.5	32.4	49.7	0
	A2	3–9	6.1	80.0	13.9	32.1	50.3	<1
	B1	9–12	4.1	77.8	18.1	32.8	46.9	0
	B21t	12–36	1.8	68.6	29.6	27.0	42.6	0
	B22t	36–48	1.9	68.7	29.4	29.2	40.8	0
	B3	48–60	6.8	73.9	19.3	40.2	37.1	0
	C1	60–72	16.9	63.6	19.5	38.2	32.1	0
	IIC2	72–81	33.1	46.9	20.0	31.1	27.5	0
Reesville silt loam: SW¼SW¼ sec. 32, T. 17 N., R. 7 W. (a wooded area ½ mile northeast of Annapolis).	A0	¼–0	---	---	---	---	---	---
	A11	0–¾	[1] 5.3	79.9	14.8	35.0	47.4	0
	A12	¾–2	[1] 3.9	81.7	14.4	35.9	47.9	0
	A2	2–9	[1] 3.6	82.0	14.4	34.3	49.6	0
	B1	9–13	2.4	74.1	23.5	33.0	42.6	0
	B21t	13–27	1.9	69.4	28.7	32.6	38.1	0
	B22t	27–36	3.4	68.9	27.7	37.4	34.3	0
	C1	36–54	11.1	69.9	19.0	47.4	29.4	0
	IIC2	54–62	46.8	40.6	12.6	35.2	23.0	16

[1] Undecomposed organic matter in very fine sand fraction. [2] pH value for this horizon was determined in a 1:4 suspension.

glacial drift that are thickly mantled with Peorian loess. These Illinoian drift areas were covered by deciduous forest at the time the county was settled.

In Parke County the Alluvial soils are in the Allison, Armiesburg, Eel, Genesse, Huntsville, and Shoals series. The Shoals soils intergrade toward the Low-Humic Gley soils.

Alluvial soils can be grouped according to color. The Genesee and Eel soils are brown to dark brown (10YR 5/3, 4/3, and 3/3); they are well drained or moderately well drained and developed in moderately coarse textured to moderately fine textured sediments that are neutral to calcareous. Genesee and Eel soils on high bottoms have a weakly developed B horizon.

The Huntsville soils are black to very dark grayish-brown (10YR 2/1 to 3/2), medium-textured soils that generally occupy areas on back bottoms. The Allison and Armiesburg soils are black to very dark grayish brown (10YR 2/1 to 3/2). These well drained or moderately well drained soils developed in neutral, moderately fine textured material, generally on high bottoms and back bottoms. Allison and Armiesburg soils both have a weakly developed B horizon, but laboratory data indicate no translocation of clay to the B horizon.

The light-colored Shoals soils are somewhat poorly drained and have a mottled gray and yellowish-brown subsoil. The soils developed in bayous, along old meander channels, and on back bottoms, where ponding is frequent after heavy rains and floods.

Laboratory Data

In table 13 are physical and chemical properties of two selected soils in Parke County. The profiles of these soils are described in the section "Descriptions of the Soils."

The data in table 13 are useful to soil scientists in classifying soils and in developing concepts of soil formation. They are also helpful in estimating water-holding capacity, fertility, tilth, and other characteristics that affect soil management.

Field and laboratory methods

All samples used to obtain the data in table 13 were collected from carefully selected pits. The samples are considered representative of the soil material that is made up of particles less than three-fourths inch in diameter. The samples were rolled, crushed, and sieved by hand to remove rock fragments larger than 2 millimeters in diameter. The fraction that consists of particles between 2 millimeters and ¾ inch in diameter is recorded in table 13 as the percentage greater than 2 millimeters. Unless otherwise noted, all laboratory analyses are made on material that passes the 2-millimeter sieve and are reported on an oven-dry basis.

Particle-size analyses were made by the pipette method (*6*, *7*, *8*). The soil pH was measured with a glass electrode. Organic carbon was determined by wet combustion, using a modification of the Walkley-Black method *properties of selected soils*

Maryland. Dashed lines indicate absence of data]

Textural class	pH 1:1	Organic carbon	Cation exchange capacity	Extractable cations (meq. per 100 gm.)					Base saturation
				Ca	Mg	H	Na	K	
		Percent	*Meq. per 100 gm.*						*Percent*
----	[2] 6.3	----	----	----	----	----	----	----	----
Silt loam	6.0	6.70	34.2	19.4	4.5	9.8	<0.1	0.5	71
Silt loam	5.7	2.08	17.7	7.9	2.4	7.1	<.1	.3	60
Silt loam	4.9	.30	10.1	1.6	1.1	7.2	<.1	.2	29
Silt loam	4.8	.12	10.9	1.8	1.7	7.2	<.1	.2	34
Silty clay loam	4.6	.06	19.1	4.3	4.5	9.8	<.1	.4	49
Silty clay loam	5.4	.08	21.0	7.7	7.5	5.2	.2	.4	75
Silt loam	6.0	.04	14.9	6.4	5.6	2.5	.2	.2	83
Silt loam	6.0	.03	16.1	6.4	6.8	2.5	.2	.2	84
Loam	6.2	.02	14.0	6.4	5.4	1.8	.2	.2	87
----	[2] 6.0	----	----	----	----	----	----	----	----
Silt loam	5.6	3.90	22.8	10.9	3.1	8.4	<.1	.4	63
Silt loam	4.5	2.57	15.3	2.8	1.7	10.5	<.1	.3	31
Silt loam	4.4	1.26	12.5	1.2	.8	10.3	<.1	.2	18
Silt loam	4.6	.28	15.4	2.7	2.3	10.2	<.1	.2	34
Silty clay loam	4.7	.18	20.1	4.2	4.0	11.6	<.1	.3	42
Silty clay loam	6.5	.11	23.7	11.4	9.2	2.6	.2	.3	89
Silt loam	7.4	.09	16.5	8.5	6.3	1.3	.2	.2	92
Loam	8.0	.08	----	----	----	----	----	----	----

(*9*). The cation-exchange capacity was determined by sum of the cations (*9*). To determine the extractable calcium and magnesium, calcium was separated as calcium oxalate and magnesium as magnesium ammonium phosphate (*9*). Extractable sodium and potassium were determined with a flame spectrophotometer.

Literature Cited

(1) Aandahl, A. R., and Others.
1961. Soils of the North Central Region of the United States. Wisc. Agri. Expt. Sta., North Central Reg. Pub. 76, 192 pp., illus.

(2) American Association of State Highway Officials.
1961. Standard specifications for highway materials and methods of sampling and testing. Ed. 8, 2 v., illus. Washington, D.C.

(3) Baldwin, M., Kellogg, C. E., and Thorp, James.
1938. Soil classification. U.S. Dept. Agr. Ybk.: 979–1001, illus.

(4) Barger, G. L., Shaw, R. H., and Dale, R. F.
1959. Chances of receiving selected amounts of precipitation in the North Central Region of the United States. Agr. Expt. Sta., Iowa State University, 47 pp.

(5) Caldwell, R. E., and White, J. L.
1956. A study of the origin and distribution of loess in southern Indiana. Soil Sci. Soc. Amer. Proc. 20 (2); 258–263 pp.

(6) Kilmer, V. J., and Alexander, Lyle T.
1949. Methods of making mechanical analyses of soils. Soil Sci. 68: 15–24 pp.

(7) ——— and Mullins, J. F.
1954. Improved stirring and pipetting apparatus for mechanical analysis of soils. Soil Sci. 77: 437–441 pp., illus.

(8) Olmstead, L. B., Alexander, L. T., and Middleton, H. E.
1930. A pipette method of mechanical analysis of soils based on improved dispersion procedure. U.S. Dept. Agr. Tech. Bul. 170, 22 pp., illus.

(9) Peech, Michael, Alexander, L. T., Dean, L. A., and Reed, J. Fielding.
1947. Methods of soil analysis for soil-fertility investigations. U.S. Dept. Agr. Cir. 757, 25 pp.

(10) Schaal, L. A., Newman, J. E., and Emerson, F. H.
1961. Risks of freezzing temperatures—spring and fall in Indiana. Purdue University Research Bul. No. 721, 20 pp., illus.

(11) Simonson, Roy W.
1962. Soil classification in the United States. Sci. 137: 1027–1034.

(12) United States Department of Agriculture.
1951. Making land produce useful wildlife. Bul. 2035, 22 pp., illus.

(13) ———
1960. Soil classification, a comprehensive system. Soil Survey Staff, 265 pp., illus.

(14) Waterways Experiment Station, Corps of Engineers.
1953. The unified soil classification system. Tech. Memo. No. 3-357, 2 v. and appendix. 44 pp., illus.

(15) Wayne, William J.
1956. Thickness of drift and bedrock physiography of Indiana north of the Wisconsin glacial boundary. Ind. Dept. of Conserv., Geol. Survey Rpt. of Progress No. 7, 70 pp., illus.

(16) Weaver, Roy A., Bushnell, T. M., and Scarseth, George D.
1948. Correlative studies of Indiana soils: some physical and chemical characteristics of seven major soil types. Soil Sci. Soc. Amer. Proc. 13: 484–493 pp.

(17) Wier, C. E., and Wayne, W. J.
1957. An introduction to the geology of Parke County, Indiana. Ind. Dept. Conserv., Geol. Survey Circ No. 2, 35 pp. illus.

Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

Available moisture capacity. The difference between the amount of water in a soil at field capacity and the amount in the same soil at the permanent wilting point. Commonly expressed as inches of water per inch depth of soil.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate, to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Catena, soil. A sequence, or "chain," of soils on a landscape, developed from one kind of parent material but having different characteristics because of differences in relief and drainage.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay loam. Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; soil does not hold together in a mass.

Friable.—When moist, soil crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, soil crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, soil readily deformed by moderate pressure but can be pressed into lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, soil adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, soil is moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, soil breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; soil is little affected by moistening.

Deep soil. Generally, a soil that is more than 42 inches deep to rock or other contrasting material.

Diversion. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from such runoff.

Drainage, soil. The relative rapidity and extent of removal of water, under natural conditions, from on and within the soil. Terms commonly used to describe drainage are as follows:

Very poorly drained.—Water is removed so slowly that the soil remains wet most of the time, and water ponds on the surface frequently. The water table is at the surface most of the time.

Poorly drained.—Water is removed so slowly that the soil remains wet for much of the time. The water table is at or near the surface during a considerable part of the year.

Somewhat poorly drained.—Water is removed so slowly that the soil is wet for significant periods but not all the time.

Moderately well drained.—Water is removed somewhat slowly and the soil is wet for a small but significant part of the time.

Well drained.—Water is removed readily but not rapidly. A well-drained soil has good drainage.

Somewhat excessively drained.—Water is removed so rapidly that only a small part is available to plants. Only a narrow range of crops can be grown, and yields are usually low unless the soil is irrigated.

Excessively drained.—Water is removed very rapidly. Enough precipitation commonly is lost to make the soil unsuitable for ordinary crops.

Drift (or glacial drift). Rock and earth material transported by ice sheets. Unsorted drift—sand, clay, silt, and boulders left in place as the ice melted—is called glacial till.

Escarpment. A long, steep ridge of land or rock that resembles a cliff. It faces in one general direction and separates two areas of more nearly level land.

Gleization. The reduction, translocation, and segregation of soil compounds, notable of iron, generally in the subsoil or substratum, as a result of poor aeration and drainage; indicated in the soil by mottles of dominantly gray. The soil-forming processes leading to the development of a gley soil.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes and that differs in one or more ways from adjacent horizons in the same profile. These are the major soil horizons:

O horizon.—Organic horizon of mineral soils.

A horizon.—The mineral horizon at the surface. It contains an accumulation of organic matter, has been leached of soluble minerals and clay, or shows the effects of both.

B horizon.—The horizon in which clay minerals or other materials have accumulated, that has developed a characteristic blocky or prismatic structure, or that shows the characteristics of both processes.

C horizon.—The unconsolidated material immediately under the true soil. In chemical, physical, and mineral composition it is presumed to be similar to the material from which at least part of the overlying solum has developed, unless the C designation is preceded by a Roman numeral.

R horizon.—Rock underlying the C horizon, or the B horizon if no C horizon is present.

Roman numerals are prefixed to the master horizon or layer designations (O, A, B, C, R) to indicate lithologic discontinuities either within or below the solum. The first, or uppermost, material is not numbered, for the Roman numeral I is understood; the second, or contrasting, material is numbered II, and others are numbered III, IV, and so on, consecutively downward. Thus for example, a sequence from the surface downward might be A2, B1, IIB2, IIB3, IIC1, IIIC2.

Following are the symbols used in this report with those letters that designate the master horizons:

g—strong gleying.
p—plow layer.
t—illuvial clay.

Immature soil. A soil lacking clearly defined horizons because the soil-forming forces have acted on the parent material for only a relatively short time after it was deposited or exposed.

Intercrop. A grass-legume or other crop that is seeded in small grain and plowed under the following spring before the succeeding crops are planted.

Internal drainage. The movement of water through the soil profile. The rate of movement is affected by the texture, structure, and other characteristics of the surface soil and subsoil, and by the height of the water table, either permanent or perched. Terms for expressing internal drainage are as follows:

None.—No free water passes through the soil mass.

Very slow.—Water moves through the soil much too slowly for good growth of most important crops.

Slow.—Water moves through the soil faster than in very slow drainage but not so fast as in medium drainage.

Medium.—Water moves through the soil at a rate that is about right for good growth of most of the important crops.

Rapid.—Water moves through the soil somewhat faster than is best for the growth of most important crops.

Very rapid.—Water moves through the soil too rapidly for good growth of most of the important crops.

Leaching, soil. The removal of materials in solution by percolating water.

Loam. Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Loess. A fine-grained windblown deposit consisting dominantly of silt-sized particles.

Mapping unit. Any soil, miscellaneous land type, soil complex, or undifferentiated soil group shown on the detailed soil map and identified by a letter symbol.

Marl. An earthy, unconsolidated deposit formed in fresh-water lakes that consists chiefly of calcium carbonate mixed with various amounts of clay or other impurities.

Mature soil. Any soil that is in near equilibrium with its environment and has well-developed soil horizons produced by the natural processes of soil formation.

Maximum dry density. The highest density obtained in the compaction test.

Mineral soil. Soil consisting mainly of inorganic (mineral) material and containing only a small amount of organic material. Its bulk density is greater than that of organic soil.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier.

Moisture density. The density to which a soil can be compacted with various moisture contents and forces of compaction. The greatest density obtained in the test is termed "maximum density," and the corresponding moisture content is termed "optimum moisture."

Morphology soil. The makeup of the soil, including the texture, structure, consistence, color, and other physical, chemical, mineralogical, and biological properties of the various horizons that make up the soil profile.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: *Abundance*—few, common, and many; *size*—fine, medium, and coarse; and *contrast*—faint, distinct, and prominent. The size measurements are these: *Fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Muck. An organic soil consisting of fairly well decomposed organic material that is relatively high in mineral content, finely divided, and dark in color.

Nutrient, plant. Any element that is taken in by a plant, is essential to its growth, and is used by the plant in producing food and tissue. Important plant nutrients obtained from the soil are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps others. Those obtained from the air are carbon, hydrogen, and oxygen.

Outwash. Crossbedded gravel, sand, and silt deposited by melt water as it flowed from the ice.

Parent material, soil. The horizon of weathered rock or partly weathered soil material from which soil presumably has formed; horizon C in the soil profile.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *Very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

pH. See Reaction.

Phase, soil. A subdivision of a soil type, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects management.

Plastic (soil consistence). Capable of being deformed without being broken.

Plastic limit (soil engineering). The moisture content at which a soil changes from a semisolid to a plastic state.

Plasticity index (soil engineering). The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See Horizon, soil.

Reaction, soil. The degree of acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. In words the degree of acidity or alkalinity is expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relative humidity. The ratio of the mass of moisture actually present in any volume of air of a given temperature to the maximum amount possible at that temperature and pressure, usually expressed in percentage.

Rill erosion. The removal of soil through the cutting of many small but conspicuous water channels or by tiny rivulets that are minor concentrations of runoff.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 millimeter to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Second bottom. The first terrace above the normal flood plain of a stream.

Shrink-swell potential (engineering). Amount that soil expands when wet or contracts when dry. Indicates kinds of clay in soil.

Silting. Settling of waterborne sediments, chiefly silt, in lakes, reservoirs, stream channels, or overflow areas.

Silt loam. Soil material that contains 50 percent or more silt and 12 to 27 percent clay; or soil material that contains 50 to 80 percent silt and less than 12 percent clay.

Silty clay. Soil material that contains 40 percent or more clay and 40 percent or more silt.

Silty clay loam. Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Solum, soil. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soils includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological material. Layers in soils that result from the processes of soil formation are called horizons: Those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. Structureless soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. In many soils, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer beneath the solum, or true soil; the C or R horizon.

Subsurface layer. The part of the soil between the surface soil and the subsoil.

Surface layer. A term used in nontechnical soil descriptions or one or more upper layers of soil. It may include all or only part of the A horizon, and it has no depth limit.

Terrace, agricultural. An embankment or ridge constructed across sloping soils, on or approximately on contour lines, at specified intervals. The terrace intercepts runoff and holds it so that it soaks into the soil or it conducts the excess water to an outlet.

Terrace, geological. An old alluvial plain, often called a second bottom, that now lies above the present first bottom as a result of entrenchment of the stream; seldom subject to flooding.

Texture, soil. The relative proportion of the various size groups of individual soil grains in a mass of soil. A coarse-textured soil is high in content of sand; a fine-textured soil has a large proportion of clay. The textural names of the soils in this county are listed in this Glossary in alphabetic order and defined.

Till (or glacial till). An unstratified deposit of earth, sand, gravel, and boulders transported by glaciers.

Till plain. A level or undulating land surface that was formed when glaciers deposited their till.

GUIDE TO MAPPING UNITS

[See table 7, p. 25, for predicted yields of principal crops and table 11, p. 54 for approximate acreage and proportionate extent of the soils. See section beginning on p. 24 for discussion on the use of the soils as woodland, and see section beginning on p. 30 for information on engineering uses of the soils]

Map symbol	Soil	Described on page	Capability unit: Symbol	Capability unit: Page	Woodland suitability group: Number
AfB2	Alford silt loam, 2 to 5 percent slopes, moderately eroded	55	IIe-3	11	1
AfC2	Alford silt loam, 5 to 8 percent slopes, moderately eroded	55	IIIe-3	16	1
AhC3	Alford soils, 5 to 8 percent slopes, severely eroded	55	IVe-3	20	1
Al	Allison silty clay loam	56	I-2	11	23
Ar	Armiesburg silty clay loam	57	I-2	11	23
As	Ayrshire fine sandy loam	57	IIw-11	14	5
Bp	Bonpas silty clay loam	58	IIw-1	13	11
CaA	Camden loam, 0 to 2 percent slopes	58	I-1	10	1
CaB	Camden loam, 2 to 5 percent slopes	59	IIe-3	11	1
CdA	Camden silt loam, 0 to 2 percent slopes	59	I-1	10	1
CdB	Camden silt loam, 2 to 5 percent slopes	59	IIe-3	11	1
CdC2	Camden silt loam, 5 to 8 percent slopes, moderately eroded	59	IIIe-3	16	1
ChB	Chelsea loamy fine sand, 2 to 5 percent slopes	60	IIIs-1	19	17
ChC	Chelsea loamy fine sand, 5 to 8 percent slopes	60	IIIe-12	17	17
ChD	Chelsea loamy fine sand, 8 to 15 percent slopes	60	IVe-12	21	17
ChF	Chelsea loamy fine sand, 15 to 40 percent slopes	60	VIe-3	22	17
CnD2	Cincinnati-Hickory complex, 8 to 15 percent slopes, moderately eroded	61	IVe-1	20	9
CnD3	Cincinnati-Hickory complex, 8 to 15 percent slopes, severely eroded	61	VIe-1	22	9
Cp	Clay pits	61	VIIe-3	23	16
Ea	Eel loam	62	I-2	11	8
Eb	Eel loam, high bottom	62	I-2	11	8
El	Eel silt loam	62	I-2	11	8
Em	Eel silt loam, high bottom	62	I-2	11	8
En	Eel silty clay loam	62	I-2	11	8
EoA	Elston loam, 0 to 3 percent slopes	63	IIs-2	15	23
EsA	Elston sandy loam, 0 to 3 percent slopes	63	IIIs-2	19	23
EsC2	Elston sandy loam, 5 to 8 percent slopes, moderately eroded	63	IIIe-13	17	23
FcA	Fincastle silt loam, 0 to 2 percent slopes	63	IIw-2	13	5
FcB	Fincastle silt loam, 2 to 5 percent slopes	64	IIw-2	13	5
FmA	Fox loam, 0 to 2 percent slopes	64	IIs-1	14	1
FmB	Fox loam, 2 to 5 percent slopes	65	IIe-9	12	1
FmC2	Fox loam, 5 to 8 percent slopes, moderately eroded	65	IIIe-9	16	1
FmD2	Fox loam, 8 to 15 percent slopes, moderately eroded	65	IVe-9	20	1
FsA	Fox sandy loam, 0 to 2 percent slopes	65	IIIs-2	19	2
FsB	Fox sandy loam, 2 to 5 percent slopes	65	IIIe-13	17	2
FsC	Fox sandy loam, 5 to 8 percent slopes	65	IIIe-13	17	15
FsD2	Fox sandy loam, 8 to 15 percent slopes, moderately eroded	66	IVe-9	20	15
FtA	Fox silt loam, 0 to 2 percent slopes	66	IIs-1	14	1
FtB	Fox silt loam, 2 to 5 percent slopes	66	IIe-9	12	1
FtD2	Fox silt loam, 8 to 15 percent slopes, moderately eroded	66	IVe-9	20	1
Gf	Genesee fine sandy loam	67	I-2	11	8
Gh	Genesee loam	67	I-2	11	8
Gm	Genesee loam, high bottom	67	I-2	11	8
Gn	Genesee silt loam	67	I-2	11	8
Go	Genesee silt loam, high bottom	68	I-2	11	8
Gr	Gravel pits	68	VIIe-3	23	16
HnF	Hennepin association, 30 to 60 percent slopes	68	VIIe-2	23	4
HrE2	Hennepin-Russell complex, 15 to 30 percent slopes, moderately eroded	68	VIIe-2	23	2
HsE	Hickory complex, 15 to 30 percent slopes	69	VIe-1	22	2
HsF	Hickory complex, 30 to 70 percent slopes	69	VIIe-1	23	4
Hu	Huntsville silt loam	69	I-2	11	23
IvA	Iva silt loam, 0 to 2 percent slopes	70	IIw-2	13	5
IvB	Iva silt loam, 2 to 5 percent slopes	71	IIw-2	13	5
Lm	Linwood muck	71	IIw-10	14	23
Mp	Mine pits and dumps	71	VIIe-3	23	16
NsE	Negley soils, 15 to 60 percent slopes	72	VIe-1	22	2
OaA	Ockley loam, 0 to 2 percent slopes	73	I-1	10	1
OaB	Ockley loam, 2 to 5 percent slopes	73	IIe-3	11	1
OcA	Ockley silt loam, 0 to 2 percent slopes	73	I-1	10	1
OcB	Ockley silt loam, 2 to 5 percent slopes	73	IIe-3	11	1
OcC2	Ockley silt loam, 5 to 8 percent slopes, moderately eroded	73	IIIe-3	16	1
PaB	Parke silt loam, 2 to 5 percent slopes	74	IIe-1	11	1
PaC2	Parke silt loam, 5 to 8 percent slopes, moderately eroded	74	IIIe-1	16	1
PaD2	Parke silt loam, 8 to 15 percent slopes, moderately eroded	74	IVe-1	20	1
PrA	Princeton fine sandy loam, 0 to 2 percent slopes	75	IIs-5	15	2
PrB	Princeton fine sandy loam, 2 to 5 percent slopes	75	IIe-11	13	2
PrC2	Princeton fine sandy loam, 5 to 8 percent slopes, moderately eroded	75	IIIe-15	18	2
PrD2	Princeton fine sandy loam, 8 to 15 percent slopes, moderately eroded	75	IVe-15	21	2
PrE	Princeton fine sandy loam, 15 to 30 percent slopes	76	VIe-1	22	2
Ra	Ragsdale silt loam	76	IIw-1	13	11
Rc	Ragsdale silty clay loam	76	IIw-1	13	11
ReA	Reesville silt loam, 0 to 2 percent slopes	77	IIw-2	13	5
ReB	Reesville silt loam, 2 to 5 percent slopes	77	IIw-2	13	5
RoE	Rodman gravelly soils, 15 to 30 percent slopes	78	VIIs-1	23	19
RoF	Rodman gravelly soils, 30 to 70 percent slopes	78	VIIs-1	23	19
RsB	Russell loam, 2 to 5 percent slopes	79	IIe-3	11	1
RsC	Russell loam, 5 to 8 percent slopes	79	IIIe-3	16	1
RtB2	Russell silt loam, 2 to 5 percent slopes, moderately eroded	79	IIe-3	11	1
RtC2	Russell silt loam, 5 to 8 percent slopes, moderately eroded	79	IIIe-3	16	1
RtD2	Russell silt loam, 8 to 15 percent slopes, moderately eroded	80	IVe-3	20	1
RuB3	Russell soils, 2 to 5 percent slopes, severely eroded	80	IIIe-3	16	1
RuC3	Russell soils, 5 to 8 percent slopes, severely eroded	80	IVe-3	20	1
RuD3	Russell soils, 8 to 15 percent slopes, severely eroded	80	VIe-1	22	1
Sb	Shoals silt loam	81	IIw-7	14	13
ShA	Sleeth loam, loamy substratum, 0 to 2 percent slopes	81	IIw-2	13	5
SmA	Sleeth silt loam, loamy substratum, 0 to 2 percent slopes	82	IIw-2	13	5
St	Steep stony and rocky land	82	VIIe-2	23	12
WbA	Warsaw loam, 0 to 2 percent slopes	82	IIs-2	15	23
WbB	Warsaw loam, 2 to 5 percent slopes	83	IIe-8	12	23
WbC2	Warsaw loam, 5 to 8 percent slopes, moderately eroded	83	IIIe-14	18	23
WcA	Warsaw silt loam, 0 to 2 percent slopes	83	IIs-2	15	23
WcB	Warsaw silt loam, 2 to 5 percent slopes	83	IIe-8	12	23
Wd	Westland loam, loamy substratum	84	IIw-1	13	11
Wo	Westland silt loam	83	IIw-1	13	11
Wp	Westland silty clay loam	83	IIw-1	13	11
Wr	Westland silty clay loam, loamy substratum	84	IIw-1	13	11
Ww	Whitson silt loam	85	IIIw-2	19	11
Zc	Zipp silty clay loam	85	IIIw-2	18	11

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