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SOIL SURVEY

Wabash County Illinois

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

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY of Wabash County will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid foresters in managing woodland; and add to our knowledge of soil science.

In making this survey soil scientists covered most of the land on foot. They examined surface soils and subsoils, measured slopes with a hand level, noticed differences in the growth of crops, weeds, and brush, and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming, trees, wildlife, and related uses.

The scientists plotted the boundaries of the soils on aerial photographs. Then, cartographers prepared from the photographs the detailed soil map in the back of this report. Fields, woods, roads, streams, and many other landmarks can be seen on the map.

Locating the soils

Use the index to map sheets at the back of this report to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map is found, it will be seen that boundaries of the soils are outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. Suppose, for example, an area located on the map has the symbol 1482. The legend for the detailed map shows that this symbol identifies Ava silt loam, 2 to 4 percent slopes, moderately eroded. The number 2 after the letter in the symbol indicates that the remaining A horizon is 3 to 7 inches thick. The number 3, shown as the last figure in some symbols, indicates that the soil is severely eroded, or that the remaining A horizon is less than 3 inches thick. The soils mapped in the county are described in the section "Descriptions of the Soils."

Finding Information

Special sections of the report will interest different groups of readers. The section "General Soil Areas" and the one entitled "General Features of the County" will be of interest mainly to those not familiar with the county.

Farmers and those who work with farmers can learn about the soils in the section "Descriptions of the Soils" and then turn to the section "Use of Soils for Crops, Pasture, and Wildlife." In this way they first identify the soils on their farm and then learn how these soils can be managed and what yields can be expected under two different levels of management. The "Guide to Mapping Units, Management Groups, and Woodland Suitability Groups" at the back of the report will simplify use of the map and report. This guide lists each soil and land type mapped in the county, and the page where each is described. It also lists, for each soil and land type, the management group and woodland suitability group, and the pages where each of these is described.

Foresters and others interested in woodland can refer to the section "Use of Soils for Woodland." In this section the soils are grouped according to their suitability for trees, and factors affecting the management of woodland are explained. Also, some yield data are given.

Engineers will want to refer to the section "Engineering Applications." Tables in that section show characteristics of the soils that affect engineering.

Persons interested in science will find information about how the soils were formed and how they were classified in the section "Formation and Classification of Soils."

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending upon their particular interest.

Technical Assistance

Farmers in the county have organized the Wabash County Soil Conservation District. The district, through its district directors, arranges for farmers to receive technical help from the Soil Conservation Service in planning good use and conservation of the soils on their farms. The soil survey is part of the technical assistance furnished by the Soil Conservation Service and the Illinois Agricultural Experiment Station.

Specific conservation plans should be made for each farm. Assistance in the use or interpretation of information in this published soil survey is available from either the Soil Conservation District or the Extension Service. Information on varieties of crops, kinds and amounts of fertilizer needed, soil conservation practices, and livestock management can be obtained from the Wabash County farm adviser and from the Soil Conservation Service work unit conservationist.

When fieldwork for this soil survey was completed in 1957, a Soil Management Guide (*11*)[1] was prepared, which describes the soils in a general way and suggests suitable management practices. This guide is also available, in sections, to farmers and others who are interested in the soils of Wabash County. Information about the guide can be secured from the office of the local Soil Conservation District or from the local farm adviser's office.

[1] Italic numbers in parentheses refer to Literature Cited, p. 80.

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SOIL SURVEY OF WABASH COUNTY, ILLINOIS

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

WABASH COUNTY is located in southeastern Illinois (fig. 1). It is bounded on the east and south by the Wabash River, which is also the boundary between Illinois and Indiana. Mount Carmel, the county seat, is located on the Wabash River near the mouth of the White River, which flows in from Indiana. Bonpas Creek forms the western boundary of the county and separates it from Edwards County. Lawrence and Richland Counties lie immediately to the north of Wabash County.

General Features of the County

Wabash County is one of the smaller counties in Illinois. It occupies a total of 221 square miles, or about 141,440 acres. The land surface of Wabash County is generally moderately sloping. The elevations above sea level at a few locations in the county are Mount Carmel, 465 feet; Allendale, 557 feet; Bellmont, 431 feet; Cowling, 397 feet; and Keensburg, 430 feet.

The county lies within the drainage basin of the Wabash River. The western part of the county drains into the Wabash River indirectly through Bonpas Creek.

This is mainly an agricultural county, although oil is an important industry. Oil wells are scattered throughout the various townships. The production of oil has become a vital factor in the county during the last 20 years. The development is recent enough, however, that all pumps, except in the Allendale pool, are served individually by either gas engine or electricity. This gives little interference with farming operations, but the disposal of salt water may present a problem on some farms.

The development of oil in the county has resulted in an additional rise in the prices of land above the market value for agricultural use. Oil prospects also tend to keep land in the hands of absentee owners. Often when land is sold, the mineral rights are not transferred with the land.

Mixed farming is the common type of farming in the county. Cash-grain farming is predominant, however, in the areas of bottom lands and terraces. Some irrigation systems have been installed in the county.

Mount Carmel is the main trading center. Most grain is sold at local elevators, and most livestock is shipped by truck to the market at Evansville, Ind.

The county is served by two railroads, one of which runs north-south and the other, east-west. State Highways No. 1 and No. 15 go through the county.

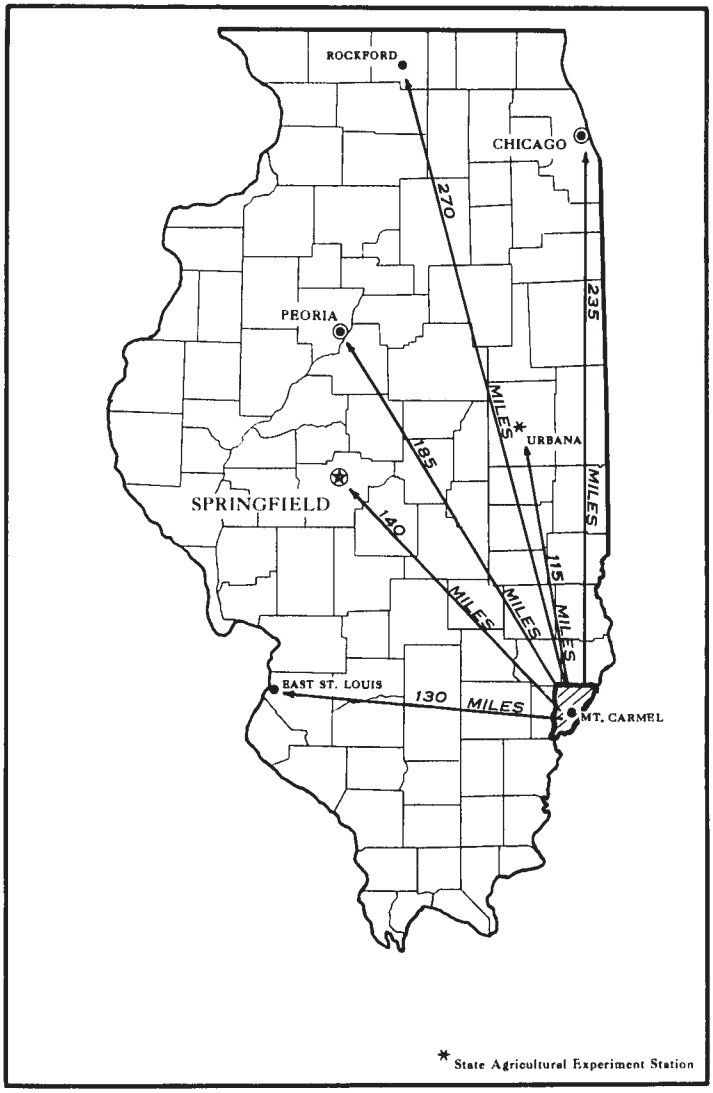

Figure 1.—Location of Wabash County in Illinois.

[2] In charge of the field party part time.

Geology

Wabash County lies within the physiographic division known as Mt. Vernon Hill Country, which is a subdivision of the Till Plains section of the Central Lowland province. The Central Lowland province includes the low midwestern basin that is also commonly called the Illinoian Basin. Included in the Till Plains section are all parts of the Illinoian Basin that were covered by Illinoian and Early Wisconsin glacial deposits.

The Mt. Vernon Hill Country is characterized by mature topography of low relief with restricted upland prairies and broad, alluvial valleys along the larger streams (*21*). The topography of this area is more hilly and rolling than that farther north. Farther north, the Illinoian drift area is fairly flat, except where streams have dissected it. The Mt. Vernon Hill Country was covered by the Illinoian glacier, but the underlying bedrock controls the topography to a great extent. The bedrock is buried to a depth ranging from a few feet to nearly 100 feet and is composed of Pennsylvanian limestone, sandstone, shale, and some coal of the upper McLeansboro group.

The soils of Wabash County are modified by a deposit of loess, which was blown from the valley of the Wabash River. The loess is especially thick in a belt 1 to 2 miles wide near the bluff along the river.

Outwash from calcareous Wisconsin drift has been carried down by the Wabash River and deposited in the stream valleys. Several glacial lakes were formed in Wabash County, where the sediments settled in low-lying areas. Glacial Lake Allendale, an early Wisconsin silt plain, lies at an altitude of about 430 feet. It occupies a small tributary valley near the northeastern corner of the county just north of Allendale. Glacial Lake Patton lies at an altitude ranging from 415 to 425 feet. It occupies the lacustrine flats of the valley of Crawfish Creek near Patton. Glacial Lake Bonpas lies at an altitude of about 415 feet and occupies the lacustrine flats in the valleys of Bonpas and Coffee Creeks (*12*). The soils formed from these sediments are neutral to mildly alkaline. Bonpas Creek and other streams arising on the Illinoian till plain, however, deposit material that is acid.

The valley of the Wabash River has an average width of 5 miles. It is eroded so that it is 150 to 250 feet lower than the uplands. The average gradient is 9 inches per mile, compared to 7 inches per mile in the Mississippi Valley. The deposits in the Wabash Valley are 100 to 150 feet thick and consist of sand, gravel, silt, and clay in that order of abundance. The stratified sediments are good sources of water. The preglacial channel of the Wabash River was east of the present one in this area and is now totally obscured (*14*).

Climate[3]

Wabash County has a continental climate typical of Illinois. The temperature varies widely. It often drops below zero in winter and rises higher than 100 degrees in summer. Low pressure areas, or storm centers, and the associated weather fronts bring frequent changes in temperature, humidity, cloudiness, and wind direction, which last for only a short time. Such changes are less frequent in summer, when a high temperature during the day, and often high humidity, may persist for a longer period.

Table 1 gives the average monthly and yearly temperatures and precipitation at Mt. Carmel, as well as the probabilities of receiving a specified amount of precipitation 1 year in 10. Table 2 gives figures that indicate, for the period March 1 through November 21, the chances of receiving specified amounts of precipitation during 1-week periods and during 2-week periods.

[3] By W. L. DENMARK, Illinois State climatologist, U.S. Weather Bureau.

TABLE 1.—*Temperature and precipitation at Mt. Carmel, Ill.*

Month	Temperature				Precipitation			
	Average daily maximum	Average daily minimum	Highest	Lowest	Average monthly total	One year in 10 will have—		Average monthly snowfall
						Less than—	More than—	
	°F	°F	°F	°F	*Inches*	*Inches*	*Inches*	*Inches*
January	44	26	77	−14	3. 9	0. 9	7. 1	2. 6
February	47	28	78	−12	3. 0	. 9	5. 6	3. 0
March	56	35	84	−2	4. 2	1. 3	6. 7	2. 2
April	69	45	90	23	4. 6	1. 9	8. 2	0
May	79	55	98	33	4. 3	1. 9	8. 2	0
June	88	64	105	41	4. 3	2. 4	6. 6	0
July	91	68	112	48	3. 9	1. 8	6. 7	0
August	89	66	106	45	3. 4	1. 0	7. 5	0
September	81	58	104	29	3. 5	1. 4	6. 7	0
October	73	47	96	24	3. 0	. 6	5. 7	0
November	56	35	82	2	3. 7	1. 3	6. 9	. 8
December	46	28	74	−3	3. 3	1. 5	6. 4	2. 3
Year	68	46	112	−14	45. 1	33. 0	56. 8	10. 9

TABLE 2.—*Chances of receiving selected amounts of precipitation in Wabash County, Ill.*[1]

Period	During 1-week period				During 2-week period		
	Chance of trace or less	Chance of 0.40 inch or more	Chance of 1 inch or more	Chance of 2 inches or more	Chance of trace or less	Chance of 1 inch or more	Chance of 2 inches or more
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
March 1–7	11	55	25	6	2	66	31
March 8–14	15	63	37	14			
March 15–21	11	64	29	7	4	64	33
March 22–29	6	64	36	13			
March 30–April 4	9	62	31	9	0	71	37
April 5–11	8	76	43	13			
April 12–18	13	61	34	13	0	66	36
April 19–25	9	62	35	14			
April 26–May 2	13	71	43	16	0	71	40
May 3–9	8	68	35	10			
May 10–16	15	57	34	15	2	64	37
May 17–23	8	66	36	12			
May 24–30	19	59	32	11	0	61	35
May 31–June 6	11	62	37	16			
June 7–13	17	69	43	16	4	67	38
June 14–20	15	60	32	11			
June 21–27	11	62	36	14	2	62	32
June 28–July 4	19	50	26	9			
July 5–11	35	47	25	8	6	51	24
July 12–18	19	54	27	8			
July 19–25	26	42	20	6	6	44	19
July 26–August 1	13	49	22	6			
August 2–8	8	59	29	9	0	63	34
August 9–15	15	60	36	15			
August 16–22	13	62	38	17	8	62	34
August 23–29	26	51	27	8			
August 30–September 5	26	56	34	14	8	60	31
September 6–12	19	58	27	6			
September 13–19	32	53	32	13	8	56	32
September 20–26	20	55	32	13			
September 27–October 3	32	49	29	12	11	56	32
October 4–10	28	51	32	15			
October 11–17	33	46	23	7	17	51	24
October 18–24	32	51	27	8			
October 25–31	33	44	28	14	11	52	30
November 1–7	32	53	31	12			
November 8–14	22	52	20	3	8	53	27
November 15–21	26	54	33	14			

[1] Adapted from tables published in "First Report to the North Central Regional Technical Committee on Weather Information for Agriculture."

The average yearly precipitation is approximately 45 inches. About 24 inches, or 53 percent of the yearly total, can be expected during the growing season, or from April through September. Spring is the wet season; the average monthly precipitation from March through June is more than 4 inches. In February more snow is normally received than in any other month, but the total yearly average of nearly 11 inches is fairly evenly distributed from December through March. The average yearly snowfall is less than 3 percent of the total precipitation.

Precipitation in summer occurs generally as showers of short duration or as thunderstorms. Two or three hailstorms usually occur each year. Crops are most likely to be damaged if hail falls in June, July, and August. For these months the average number of hailstorms has been no more than one hailstorm per year. According to a study of hailstorms in this county, most hailstorms occur between 2 and 8 p.m. (*9*). In some of them the stones are not large enough to cause extensive damage.

A field crop that is growing vigorously can consume 6 inches of water from the soil in a single month in midsummer. The average rainfall in this county during July is slightly less than 4 inches. Thus, for best crop production, moisture must be stored in the subsoil during the previous spring and winter. Major droughts are uncommon. However, prolonged dry periods that cause a reduction in the yields of crops commonly occur during the growing season (*18*).

July is normally the warmest month. An official reading of 112 degrees was recorded in July 1936. Each month from June through September, however, has occasionally had days warmer than 100 degrees. January is normally the coldest month. In 1940 a low of 14 degrees below zero occurred in January. The average daily temperature rises rapidly after mid-March. Table 1 shows the highest and lowest temperatures recorded at Mt. Carmel, as well as the average daily maximum and average daily minimum temperatures.

Table 3 gives the probability of the last freezing temperatures in spring and the first in fall. The date of the last freezing temperature in spring is around April 17. October 20 is the average date of the first freeze in fall. Thus, the intervening period, or average growing season, is 186 days. All freeze data are based on temperatures taken at a standard U.S. Weather Bureau shelter approximately 5 feet above the ground and in a representative location. At times the temperature is colder near the ground or in locations that are not representative.

TABLE 3.—*Probability of last freezing temperatures in spring and first in fall at Mt. Carmel, Wabash County, Ill.*

Probability	Dates for given probability and temperature				
	16° F.	20° F.	24° F.	28° F.	32° F.
Spring:					
1 year in 10 later than	Mar. 13	Mar. 25	Apr. 2	Apr. 16	Apr. 25
2 years in 10 later than	Mar. 10	Mar. 16	Mar. 28	Apr. 13	Apr. 19
5 years in 10 later than [1]	Feb. 27	Mar. 8	Mar. 20	Apr. 1	Apr. 17
Fall:					
1 year in 10 earlier than	Nov. 22	Nov. 11	Oct. 31	Oct. 25	Oct. 8
2 years in 10 earlier than	Nov. 27	Nov. 20	Nov. 6	Oct. 31	Oct. 14
5 years in 10 earlier than [1]	Dec. 4	Nov. 25	Nov. 14	Nov. 3	Oct. 20

[1] Information from Illinois Agr. Expt. Sta. Bul. 650 (*19*).

General Soil Areas

Most of the soils in Wabash County have been strongly influenced by sediments brought down from the north by the Wabash River during glacial times. The sediments were left on the flood plains of the river. They not only influenced the soils on the terraces and bottom lands, but, as the result of wind action, they also contributed material to the uplands. Loess, a silty, dustlike material, was picked up by wind from the flood plains during the drier periods and was deposited on the nearby uplands. It is the material from which most of the upland soils developed.

Differences in the sediments are responsible for some of the differences in the soils. Factors such as relief, drainage, and vegetation, however, have also influenced soil characteristics. Within any given area, the patterns of soils, or combination of various soil types, are generally repeated over and over, depending on the slope, drainage, vegetation, parent material, and other factors. The main patterns of soil, however, are uniform enough that they can be shown on a generalized map. The main patterns of soils are frequently called soil associations. The nine soil associations in Wabash County are shown on the general soil map at the back of this report. They are discussed in the following pages.

A. Alford-Iona Association

Light-colored, nearly level to very steep, moderately well drained to well drained, upland soils developed in thick loess and till

This soil association occurs as a discontinuous belt on the uplands. It is immediately west of the terraces and bottom lands of the Wabash River. Relief varies greatly throughout the association; it ranges from nearly level to very steep. Most of the nearly level areas are small and are farmed with the surrounding sloping soils. This association makes up about 6 percent of the total area of the county.

The Alford, Iona, and Hickory soils make up this association. All of these soils developed under forest and are light colored. The Alford and Iona soils developed in a thick layer of loess and have a subsoil of silty clay loam. The Alford soils are naturally well drained, and the Iona are moderately well drained. The soils of both series are permeable to water and to plant roots. If they

are limed and properly fertilized, they are among the most productive upland soils in the county.

The Hickory soils developed in glacial till of Illinoian age. They are steeper than the other soils of the association, and they occur in areas where the loess is thin or absent. Soils of the Hickory-Alford complex are on many of the steeper slopes. In areas of the Hickory-Alford complex, the Hickory soils generally are on the lower parts of the slopes and the Alford soils are on the upper parts. The Hickory soils contain more sand and gravel than the Alford and Iona soils, and they are generally less productive. Drainage is required on some of the nearly level areas in this association. Practices to control erosion are needed on all the sloping areas.

General farming predominates in the association. Corn, soybeans, wheat, and hay are the major crops. The steeper slopes are used mainly for pasture or as woodland.

B. Hosmer-Stoy Association

Light-colored, nearly level to steep, poorly drained to moderately well drained, upland soils developed in moderately thick loess and till

This association is on nearly level to steep uplands, just west of association A. It occupies about 11 percent of the county.

The Hosmer, Stoy, and Weir soils make up a large part of the association, but Hickory soils occupy part of the acreage. The Hosmer, Stoy, and Weir soils developed in loess under the influence of forest vegetation. They are light colored and are low in organic matter. Their subsoil is silty clay loam, and, where they are not eroded, their A horizon is silt loam. These soils are less productive than the soils that formed in loess in association A, but they respond well to good management.

The Hosmer soils are naturally moderately well drained, the Stoy soils are imperfectly drained, and the Weir soils are poorly drained. The Hosmer soils have a slightly to moderately developed fragipan or siltpan in the lower part of the subsoil, and this fragipan restricts the penetration of roots. The Weir soils have a claypan subsoil, which is less fine textured and less strongly developed than that in the Wynoose soils of association C. The characteristics of the Stoy soils are intermediate, in many respects, between those of the Hosmer and Weir soils.

The Hickory soils developed in glacial till of Illinoian age. They are steep and are in areas where the loess is thin or absent. The subsoil of the Hickory soils is clay loam, and these soils have more sand, pebbles, and rocks throughout than the soils formed in loess. In many areas where Hickory soils are shown on the soil map, some areas of Hosmer soils are on the upper parts of the slopes.

Drainage is needed in the nearly level areas of this association where the Weir soils occur. Because of the very slow permeability of the subsoil in the Weir soils, tile draw too slowly to be of much use. Therefore, surface ditches should be used to provide drainage. Practices to control erosion are needed on the sloping areas. Many areas have already lost much, if not all, of their surface layer, and intensive practices are needed to control erosion so that further damage will be prevented.

Farms where general crops are grown, as well as livestock farms, are common in this soil association. Corn, soybeans, wheat, and hay are the main crops. The Hickory soils are most suitable for pasture or woodland. Some of the steeper, eroded areas of the Hosmer soils, as well as many areas of the Hickory soils, have been abandoned to weeds, briers, and brush. Many of these areas could be made moderately productive for pasture or woodland if they were properly renovated and managed.

C. Ava-Bluford Association

Light-colored, nearly level to steep, poorly drained to moderately well drained, upland soils developed in thin loess and till

Association C is on the uplands in the northwestern part of the county. Relief ranges from nearly level to steep. This association makes up about 13 percent of the county.

The Ava, Bluford, and Wynoose soils make up a large part of the association, but Blair and Hickory soils also occupy part of the acreage. The Ava, Bluford, and Wynoose soils developed in a thin layer of loess over glacial till of Illinoian age. The lower part of their subsoil formed in till. The Ava soils are naturally moderately well drained and have a slightly developed to moderately developed fragipan (dense, brittle layer) in the lower part of their subsoil. The Wynoose soils are poorly drained and have a claypan subsoil in which permeability is very slow. The Bluford soils are imperfectly drained. Many of their characteristics are intermediate between those of the Ava and Wynoose soils.

The Blair and Hickory soils developed in till in sloping areas where little or no loess remains. They have a subsoil of clay loam. The Blair soils are imperfectly drained, and the Hickory are moderately well drained.

All of the soils of this association formed under the influence of forest vegetation. They are light colored, low in organic matter, and strongly acid. The supply of most plant nutrients is low. In general, the soils are more strongly weathered than the soils of associations A and B, and they are slightly less productive. They respond reasonably well, however, if they are fertilized properly and if good management is used.

Surface ditches should be used to drain the Wynoose soils and some of the more nearly level areas of the Bluford soils. Tile do not function satisfactorily in these slowly permeable soils. Erosion needs to be controlled on all sloping areas, many of which are moderately to severely eroded at the present time.

In most of association C, general farming or mixed farming predominates. Corn, soybeans, wheat, and hay are the main crops, and some livestock are kept on most farms. Some of the steeper, eroded areas of Ava soils, as well as many eroded areas of Hickory soils, have been left idle and allowed to grow up in brush. Many of these areas could be renovated for pasture or reforested, which would add materially to the farm income.

D. Hoyleton-Cisne Association

Moderately dark, nearly level to strongly sloping, poorly drained to imperfectly drained, upland soils developed in thin loess

This soil association is made up of nearly level to strongly sloping soils in the northwestern part of the

county. The soils are intermingled to some extent with the soils of association C. The association occupies about 6 percent of the total area of the county.

The Hoyleton, Cisne, Chauncey, and Lukin soils, developed under grass, make up association D. In general, their surface layer is darker and thicker than that of the soils in association C that developed under forest. The Cisne and Chauncey soils are the most nearly level, and they are poorly drained. The soils of both series have a very slowly permeable claypan subsoil, but the claypan in the Cisne soils is nearer the surface than that in the Chauncey soils. Most areas of the Hoyleton and Lukin soils are gently sloping to moderately sloping and are imperfectly drained. The subsoil in the Hoyleton soils is nearer the surface than that in the Lukin soils. The Cisne soils are considered to be the prairie counterparts of the Wynoose soils, and the Hoyleton soils are considered to be the prairie counterparts of the Bluford soils. The Wynoose and Bluford soils developed under forest and are in association C.

The soils of association D are strongly acid and are generally low in plant nutrients. They respond well if fertilizer is added and good management is used. In general, they are somewhat more productive than the soils of association C.

The more nearly level areas need to be drained by surface ditches because tile do not function satisfactorily. The sloping areas require measures to control erosion. These include contour farming, grassed waterways, and crop rotations in which sod crops are grown a large part of the time.

Mixed or general farming predominates in association D, as in association C. Management problems are similar in these two soil associations. In association D, however, erosion control is less of a problem than in association C and drainage is needed in more areas where the topography is smooth. The major crops grown on the soils of association D are corn, soybeans, wheat, and hay. Livestock are raised on most of the farms.

E. Alvin-Roby Association

Light- and dark-colored, sandy soils of the Wabash River terraces and nearby uplands

The soils of this association are on terraces along the Wabash River and on the nearby uplands. Relief varies greatly, ranging from nearly level to steep. Some of the more sandy, lighter colored soils are on ridges that resemble dunes. Association E occupies about 5 percent of Wabash County.

Alvin, Roby, Bloomfield, Orio, and Sumner soils make up this association. Among these are both light- and dark-colored soils and soils that have a weakly or moderately developed subsoil. All of these soils developed in sandy material that was left on the Wabash River terraces during the Wisconsin glacial age.

The Alvin, Roby, and Bloomfield soils developed under forest and are light colored. The Alvin and Bloomfield soils are well drained, but the Alvin soils have more clay throughout than do the Bloomfield soils. The Alvin soils have a surface layer of sandy loam and a subsoil of clay loam or sandy clay loam. The Bloomfield soils have a surface layer of loamy sand, and their subsoil contains bands that are slightly enriched with clay and iron. The Roby soils are imperfectly drained sandy loams and have a subsoil of clay loam.

The Orio and Sumner soils are dark colored. The Orio soils are poorly drained and have a moderately to strongly developed subsoil. In contrast, the Sumner soils are well drained and have a weakly developed subsoil of loam to sandy loam.

Because of their slow permeability and the sandy underlying material, the Orio soils cannot be tiled to advantage. Open ditches are generally the best for drainage if suitable outlets are available. Ditches should also be used on the more nearly level areas of the Roby soils that require drainage. The Alvin, Roby, Sumner, and Bloomfield soils are permeable. Erosion is generally not a serious problem, although there is some wind erosion on unprotected areas. The soils of this association are acid and have varying fertility needs.

On most farms in association E, grain farming and livestock raising are combined. The sandy Bloomfield soils are generally used for pasture or hay. Corn, wheat, soybeans, and hay are the main crops grown in this area.

F. Selma-Camden Association

Light- and dark-colored, nearly level to strongly sloping, poorly drained to well-drained, medium-textured soils of terraces or benchlands

Soil association F is on terraces or benchlands along the Wabash River. It makes up about 6 percent of the county.

The Selma, Camden, Worthen, Starks, and Sexton soils make up the association. The Selma and Worthen soils are dark colored. The Selma soils are poorly drained, and they have a loam surface layer and a subsoil of clay loam. They are moderately permeable and can be tile drained in areas where pockets of sand do not interfere with the tile lines. The Worthen soils are generally well drained. They are silty throughout and have little subsoil development. The Selma and Worthen soils are highly productive under proper management. They are used mainly for corn and soybeans.

The Camden, Starks, and Sexton soils developed under forest and are light colored. They vary in natural drainage. The Camden soils are moderately well drained or well drained, the Starks are imperfectly drained, and the Sexton are poorly drained. These soils contain more sand, especially in the lower part of their subsoil, than the silty upland soils that developed in loess. They do not contain enough sand, however, to be droughty, and they are productive and responsive to good management.

Drainage is needed on the poorly drained Sexton soils and on some of the more nearly level areas of Starks soils. Ordinarily, ditches are the best means of providing drainage on these soils. Erosion needs to be controlled on the sloping areas of the Starks and Camden soils. The steeper slopes are generally short, and it is difficult to use practices, such as contouring and terracing, to control erosion.

The Camden, Starks, and Sexton soils are used for corn, soybeans, wheat, and hay. Generally, they are used less intensively for grain crops than are the Selma and Worthen soils, and they are less productive than those soils.

G. Bonpas-McGary Association

Light- and dark-colored, nearly level to strongly sloping, poorly drained to imperfectly drained soils of lacustrine or slack-water terraces

Association G is along Bonpas Creek and the Wabash River. The Bonpas and McGary soils make up most of the association, but there is a smaller acreage of Patton and Marissa soils. The association occupies side valleys that extend outward from the main valley of the Wabash River. In those areas streamflow was sluggish or glacial lakes stood during the period when Wisconsin glacial ice was melting. Most soil areas in this association are level or nearly level, but a few strongly sloping areas of McGary soils border the streams. This association makes up about 11 percent of the total area of the county.

The Bonpas soils are very dark colored, moderately fine textured, and poorly drained. They can be tile drained and are highly productive. The McGary soils are light colored and imperfectly drained. They are less productive than the other soils in the association. Permeability is slow or very slow in the McGary soils. As a result, open ditches, rather than tile, are generally used for drainage.

The Patton soils are lighter colored and somewhat less permeable than the Bonpas soils, but they can be tile drained satisfactorily. They have a more clayey subsoil than the Bonpas soils, and they are less productive. The Marissa soils are moderately dark colored. Their natural drainage ranges from poor to imperfect, and they are less productive than the Bonpas and Patton soils. Some areas can be tile drained, but in others, where permeability is slow, tile are of questionable value.

Except for a few sloping areas of McGary soils, erosion is not a problem on the soils of this association. Although the soils are not strongly weathered and leached, they generally require some soil treatment for the best growth of crops.

Corn and soybeans are the main crops, but some wheat and clover are grown. Grain farming predominates in association G. The farms are somewhat larger than those in the more rolling uplands.

H. Sharon-Belknap Association

Light-colored, nearly level to gently sloping, poorly drained to well-drained, strongly acid to moderately acid soils of bottom lands and terraces

This association is on bottom lands and colluvial areas in the northwestern and central parts of the county. It occupies about 9 percent of the total area of the county.

The Sharon, Belknap, Bonnie, and Racoon soils make up the association. The Sharon, Belknap, and Bonnie soils are light-colored, strongly to moderately acid silt loams and are on bottom lands. The Sharon soils are naturally moderately well drained to well drained, the Belknap are imperfectly drained, and the Bonnie are poorly drained or very poorly drained. These soils generally have a texture of silt loam to a depth of more than 40 inches. In some areas, however, lenses of loam and sandy loam are at a depth of less than 40 inches. These lenses are most numerous in the Sharon soils.

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The Racoon soils are poorly drained silt loams and are generally in colluvial positions. They have a thick A horizon and a subsoil of silty clay loam that begins at a depth below 24 inches.

All of the soils, except the Sharon, need drainage, which is best provided by surface ditches. Erosion is seldom a problem.

Lime and fertilizer are needed in varying amounts on nearly all the untreated fields in association H. The soils, however, are responsive, and they are productive under good management.

Most of this association is used for corn and soybeans. Some wheat is grown, however, in areas where the soils are protected from overflow or where overflow is not a serious hazard. The wet areas are commonly used for pasture. On many of the farms on uplands in the northwestern and central parts of the county, there are small areas of bottom lands that contain some acreage of soils in this association.

J. Haymond-Allison Association

Light-colored and moderately dark colored, poorly drained to well-drained soils of bottom lands near the Wabash River

The soils of this association are nearer the Wabash River than are the bottom-land soils of association H. Except for a few ridges and slopes into old channels, this area is nearly level to gently sloping. Association J makes up nearly 33 percent of the county.

The Haymond, Allison, Wakeland, Birds, Tice, Beaucoup, Darwin, Petrolia, and Landes soils are in this association, and there are some areas of Riverwash. These soils are slightly acid to neutral, and they contain more plant nutrients than the soils of association H. In Riverwash and in the Landes and Allison soils, there are some weakly calcareous areas.

The Wakeland, Birds, Tice, Beaucoup, Darwin, and Petrolia soils need drainage. Tile function satisfactorily in all of these soils, except the Darwin. In many areas of these soils, open ditches as well as tile are used to supply drainage.

Corn and soybeans are the main crops grown on association J, especially in areas where the hazard of flooding is not serious. Much of the acreage is not protected by levees.

Descriptions of the Soils

The soil scientists who prepared this survey went over each farm at appropriate intervals and examined the soils by digging with a spade or soil auger. They examined the different layers, or horizons, in each boring, and they compared the different borings. By such comparison, they determined the different kinds of soils in the area.

The soil scientists then described the various soils and drew boundaries on aerial photographs to separate them. The soils are described in the following pages. Their approximate acreage and proportionate extent are given in table 4, and their location is shown on the detailed map at the back of this report.

TABLE 4.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Alford silt loam, 2 to 4 percent slopes	907	0. 6	Camden soils, 7 to 12 percent slopes, severely eroded	57	(1)
Alford silt loam, 2 to 4 percent slopes, moderately eroded	162	. 1	Chauncey silt loam	954	0. 7
Alford silt loam, 4 to 7 percent slopes	751	. 5	Cisne silt loam	91	. 1
Alford silt loam, 4 to 7 percent slopes, moderately eroded	1, 210	. 9	Darwin silty clay	185	. 1
Alford silt loam, 4 to 7 percent slopes, severely eroded	395	. 3	Darwin silty clay, wet	120	. 1
Alford silt loam, 7 to 12 percent slopes, moderately eroded	236	. 2	Haymond silt loam	2, 433	1. 7
Alford silt loam, 7 to 12 percent slopes, severely eroded	597	. 4	Hickory loam, 4 to 7 percent slopes, moderately eroded	67	(1)
Alford silt loam, 12 to 18 percent slopes, moderately eroded	61	(1)	Hickory soils, 4 to 7 percent slopes, severely eroded	67	(1)
Alford silt loam, 12 to 18 percent slopes, severely eroded	257	. 2	Hickory loam, 7 to 12 percent slopes	266	. 2
Alford silt loam, 18 to 30 percent slopes	233	. 2	Hickory loam, 7 to 12 percent slopes, moderately eroded	406	. 3
Alford silt loam, 18 to 30 percent slopes, severely eroded	345	. 2	Hickory soils, 7 to 12 percent slopes, severely eroded	4, 448	3. 1
Allison silt loam, overwash, 0 to 2 percent slopes	3, 903	2. 7	Hickory loam, 12 to 18 percent slopes	323	. 2
Allison silty clay loam, 0 to 2 percent slopes	2, 285	1. 6	Hickory loam, 12 to 30 percent slopes, moderately eroded	889	. 6
Allison silty clay loam, 2 to 4 percent slopes	411	. 3	Hickory soils, 12 to 30 percent slopes, severely eroded	2, 160	1. 5
Allison silty clay loam, 4 to 7 percent slopes	112	. 1	Hickory-Alford complex, 4 to 7 percent slopes, moderately eroded	58	(1)
Allison silty clay loam, 0 to 2 percent slopes, wet	91	. 1	Hickory-Alford complex, 7 to 12 percent slopes, moderately eroded	174	. 1
Alvin fine sandy loam, 0 to 2 percent slopes	869	. 6	Hickory-Alford complex, 7 to 12 percent slopes, severely eroded	154	. 1
Alvin fine sandy loam, 2 to 4 percent slopes	1, 430	1. 0	Hickory-Alford complex, 12 to 30 percent slopes, severely eroded	379	. 3
Alvin fine sandy loam, 4 to 7 percent slopes	866	. 6	Hosmer silt loam, 2 to 4 percent slopes	1, 604	1. 1
Alvin fine sandy loam, 4 to 7 percent slopes, moderately eroded	268	. 2	Hosmer silt loam, 2 to 4 percent slopes, moderately eroded	269	. 2
Alvin fine sandy loam, 7 to 12 percent slopes	260	. 2	Hosmer silt loam, 4 to 7 percent slopes	1, 224	. 9
Alvin fine sandy loam, 7 to 12 percent slopes, moderately eroded	182	. 1	Hosmer silt loam, 4 to 7 percent slopes, moderately eroded	3, 003	2. 1
Alvin soils, 7 to 12 percent slopes, severely eroded	168	. 1	Hosmer soils, 4 to 7 percent slopes, severely eroded	1, 397	1. 0
Alvin fine sandy loam, 12 to 18 percent slopes	100	. 1	Hosmer silt loam, 7 to 12 percent slopes, moderately eroded	641	. 5
Alvin fine sandy loam, 12 to 18 percent slopes, moderately eroded	97	. 1	Hosmer soils, 7 to 12 percent slopes, severely eroded	1, 022	. 7
Alvin soils, 12 to 18 percent slopes, severely eroded	213	. 1	Hosmer soils, 12 to 18 percent slopes, severely eroded	155	. 1
Ava silt loam, 2 to 4 percent slopes	1, 780	1. 3	Hoyleton silt loam, 0 to 2 percent slopes	2, 190	1. 5
Ava silt loam, 2 to 4 percent slopes, moderately eroded	400	. 3	Hoyleton silt loam, 2 to 4 percent slopes	2, 343	1. 7
Ava silt loam, 4 to 7 percent slopes	373	. 3	Hoyleton silt loam, 2 to 4 percent slopes, moderately eroded	419	. 3
Ava silt loam, 4 to 7 percent slopes, moderately eroded	1, 575	1. 1	Hoyleton silt loam, 4 to 7 percent slopes, moderately eroded	447	. 3
Ava soils, 4 to 7 percent slopes, severely eroded	442	. 3	Iona silt loam, 0 to 2 percent slopes	1, 259	. 9
Beaucoup gravelly clay loam	217	. 2	Iona silt loam, 2 to 4 percent slopes	2, 173	1. 5
Beaucoup silt loam, overwash	477	. 3	Iona silt loam, 2 to 4 percent slopes, moderately eroded	430	. 3
Beaucoup silty clay loam	5, 332	3. 7	Iona silt loam, 4 to 7 percent slopes, moderately eroded	251	. 2
Beaucoup silty clay loam, wet	495	. 3	Landes silt loam, overwash, 0 to 2 percent slopes	431	. 3
Belknap silt loam, 0 to 2 percent slopes	9, 210	6. 5	Landes fine sandy loam, 0 to 2 percent slopes	1, 142	. 8
Belknap silt loam, 2 to 4 percent slopes	302	. 2	Landes fine sandy loam, 2 to 4 percent slopes	282	. 2
Birds silt loam	1, 152	. 8	Landes fine sandy loam, 4 to 7 percent slopes	132	. 1
Blair silt loam, 4 to 7 percent slopes, moderately eroded	186	. 1	Lukin silt loam, 0 to 2 percent slopes	2, 932	2. 1
Blair soils, 4 to 7 percent slopes, severely eroded	1, 340	. 9	Lukin silt loam, 2 to 4 percent slopes	457	. 3
Bloomfield fine sand, 18 to 30 percent slopes	267	. 2	Marissa silt loam, 0 to 2 percent slopes	2, 217	1. 6
Bluford silt loam, 0 to 2 percent slopes	4, 593	3. 2	Marissa silt loam, 2 to 4 percent slopes	224	. 2
Bluford silt loam, 2 to 4 percent slopes	2, 484	1. 8	McGary silt loam, 0 to 2 percent slopes	2, 289	1. 6
Bluford silt loam, 2 to 4 percent slopes, moderately eroded	582	. 4	McGary silt loam, 2 to 4 percent slopes	224	. 2
Bluford silt loam, 4 to 7 percent slopes, moderately eroded	315	. 2	McGary silt loam, 2 to 4 percent slopes, moderately eroded	257	. 2
Bonnie silt loam	6, 746	4. 8	McGary silt loam, 4 to 7 percent slopes, moderately eroded	75	. 1
Bonpas silt loam, overwash	1, 987	1. 4	McGary soils, 4 to 7 percent slopes, severely eroded	99	. 1
Bonpas silty clay loam	6, 716	4. 7			
Camden silt loam, 0 to 2 percent slopes	818	. 6			
Camden silt loam, 2 to 4 percent slopes	487	. 3			
Camden silt loam, 4 to 7 percent slopes, moderately eroded	70	(1)			
Camden silt loam, 7 to 12 percent slopes, moderately eroded	84	. 1			

See footnote at end of table.

TABLE 4.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
McGary soils, 7 to 12 percent slopes, severely eroded	222	0.2	Stoy silt loam, 0 to 2 percent slopes	4,134	2.9
McGary soils, 12 to 18 percent slopes, severely eroded	114	.1	Stoy silt loam, 2 to 4 percent slopes	6,090	4.3
Orio sandy loam	143	.1	Stoy silt loam, 2 to 4 percent slopes, moderately eroded	1,209	.9
Patton silty clay loam	2,108	1.5	Stoy silt loam, 4 to 7 percent slopes	249	.2
Petrolia silty clay loam	361	.3	Stoy silt loam, 4 to 7 percent slopes, moderately eroded	438	.3
Racoon silt loam	1,950	1.4	Stoy soils, 4 to 7 percent slopes, severely eroded	70	(1)
Riverwash	165	.1	Sumner sandy loam	72	(1)
Roby fine sandy loam, 0 to 2 percent slopes	3,421	2.4	Tice silty clay loam	1,051	.7
Roby fine sandy loam, 2 to 4 percent slopes	523	.4	Wakeland silt loam, 0 to 2 percent slopes	2,282	1.6
Roby fine sandy loam, 4 to 7 percent slopes, moderately eroded	75	.1	Wakeland silt loam, 2 to 4 percent slopes	123	.1
Selma loam	2,195	1.6	Wakeland silt loam, 0 to 2 percent slopes, wet	219	.2
Sexton silt loam	861	.6	Weir silt loam	555	.4
Sharon silt loam	1,047	.7	Worthen silt loam, 0 to 2 percent slopes	958	.7
Starks silt loam, 0 to 2 percent slopes	454	.3	Worthen silt loam, 2 to 4 percent slopes	299	.2
Starks silt loam, 2 to 4 percent slopes, moderately eroded	349	.2	Worthen silt loam, 4 to 7 percent slopes	103	.1
Starks silt loam, 4 to 7 percent slopes, moderately eroded	195	.1	Wynoose silt loam	978	.7
Starks soils, 4 to 7 percent slopes, severely eroded	98	.1	Gravel pit	51	(1)
			Wabash River	620	.5
			Total	141,440	100.0

[1] Less than 0.1 percent.

Each soil series is made up of a group of soils that are much alike, except for differences in the texture of the surface soil. The series are described in alphabetical order. Within each series, the individual soil mapping units are named and briefly described. Following the name of each soil mapping unit is a set of symbols in parentheses. These identify the soil on the detailed map. The management group is also given for each soil, and the woodland suitability group is given for the soils that have been placed in a woodland suitability group. The management groups are discussed in the section "Use of Soils for Crops, Pasture, and Wildlife," and the woodland suitability groups are described in the section "Use of Soils for Woodland."

Where two or more soils are so intricately mixed or in such small or narrow areas that they cannot be shown separately on a soil map, they are mapped together and are called a soil complex. An example is the Hickory-Alford complex, in which the Alford soil occupies the upper parts of slopes where the loess is thick and the Hickory occupies the lower parts of slopes where Illinoian till is exposed.

An important part of each series description is a description of a typical profile, a record of what the soil scientist saw and learned when he examined the soil. All the soils of one series have essentially the same kind of profile. The variations, if any, are explained in the description of the soil series or are indicated in the discussion of the mapping unit. For example, a profile is described in detail for the Alford series, and the reader is to conclude that all the soils in the Alford series have essentially that kind of profile.

In describing the soils the soil scientists frequently assign a symbol, for example, A1, B1, or B2, to the various layers. These symbols have special meanings that concern soil scientists and others who desire to make a special study of soils. Most readers will need to remember only that all symbols beginning with "A" are surface soil or subsurface soil; those beginning with "B" are usually subsoil; and those beginning with "C" are substratum, or parent material.

Sometimes boundaries between horizons are also described so as to indicate their thickness. The terms for thickness are *abrupt* if the boundary is less than 1 inch thick, *clear* if it is about 1 to 2½ inches thick, *gradual* if it is 2½ to 5 inches thick, and *diffuse* if it is more than 5 inches thick.

The color of a soil can be described in words, such as yellowish brown, or can be indicated by symbols for the hue, value, and chroma, such as 10YR 5/4. These symbols, called Munsell color notations, are used by soil scientists to evaluate soil colors precisely. All colors are for moist soils unless otherwise stated.

The texture of the soil refers to the content of sand, silt, and clay. It is determined by the way the soil feels when it is rubbed between the fingers, and samples are checked by laboratory analysis. Most soils are identified by a textural name, such as fine sandy loam, silt loam, or silty clay loam. This name refers to the texture of the surface layer unless otherwise designated.

The structure of the soil is indicated by the way individual soil particles are arranged in larger aggregates and by the amount of pore space. The structure of a soil is determined by the strength or grade, the size, and the shape of aggregates. For example, a horizon may have strong, coarse, subangular blocky structure.

Consistence is the tendency of a soil to crumble or stick together. Terms used to describe consistence in moist soils are *loose*, *very friable*, *friable*, *firm*, *very firm*, and *extremely firm*.

For definitions of other terms used in describing the soils, refer to the Glossary at the back of this report.

Alford Series

The Alford series consists of light-colored, deep, well-drained Gray-Brown Podzolic soils of the uplands. The soils developed in silty material (loess) that is more than 6 feet thick. The native vegetation was a hardwood forest consisting of oak, tulip-poplar, maple, and hickory.

These gently sloping to steep soils are in the Alford-Iona soil association. They are silty and erode readily unless measures are used to control runoff.

The Alford soils are moderately permeable and have high available moisture capacity. Natural fertility is medium. The soils are acid, but in some fields the plow layer has been made less acid by adding lime.

The Alford soils have slopes similar to those of the Hosmer soils, but they are better drained and more permeable than the Hosmer soils.

Profile description of an Alford silt loam:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, crumb structure; very friable; strongly acid.

A2—6 to 11 inches, brown (10YR 5/3) silt loam; weak, medium, platy structure; very friable; strongly acid.

B1—11 to 17 inches, strong-brown (7.5YR 4/8) light silty clay loam; moderate, medium, subangular blocky structure; firm; strongly acid.

B21t—17 to 28 inches, strong-brown (7.5YR 4/8) silty clay loam; strong, medium, subangular blocky structure; firm; peds coated with dark reddish-brown (5YR 3/4) clay films; strongly acid.

B22t—28 to 37 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate to strong, medium and coarse, subangular blocky structure; firm; peds coated with dark reddish-brown (5YR 3/3) clay films; strongly acid.

B3—37 to 58 inches, dark-brown (7.5YR 3/3) heavy silt loam; moderate, coarse, subangular blocky structure; firm; peds coated with dark-brown (7.5YR 3/3) clay films; strongly acid.

C—58 to 96 inches, dark-brown (7.5YR 4/4) silt loam; medium acid.

The thickness of the A horizon ranges from about 14 inches to less than 3 inches. The maximum amount of clay in the B horizon ranges from about 27 to 35 percent. The reaction ranges from slightly acid to strongly acid in the A horizon, from medium acid to strongly acid in the B horizon, and from medium acid to neutral in the C horizon.

Alford silt loam, 2 to 4 percent slopes (308B).—The profile of this soil is similar to the one described for the series, but the A horizon is 7 to 14 inches thick. The soil is on gently sloping ridgetops that have a convex shape and are easily contoured. It is suitable for cultivated crops, and most of it is cultivated. A small acreage of Alford silt loam, 0 to 2 percent slopes, is included in the mapped areas of this soil. (Management group IIe–2; woodland suitability group 6.)

Alford silt loam, 2 to 4 percent slopes, moderately eroded (308B2).—The profile of this soil is similar to the one described for the series, except that the remaining A horizon is only 3 to 7 inches thick. In some places part of the subsoil is mixed with the A horizon. Some small areas that are only slightly eroded and other small areas that are severely eroded are included in the mapped areas of this soil. (Management group IIe–2; woodland suitability group 6.)

Alford silt loam, 4 to 7 percent slopes (308C).—This soil has a profile similar to the one described for the series. The A horizon is generally 7 to 14 inches thick, but in a small acreage it is thicker. (Management group IIe–2; woodland suitability group 6.)

Alford silt loam, 4 to 7 percent slopes, moderately eroded (308C2).—The A horizon of this soil is only 3 to 7 inches thick. The present plow layer is somewhat finer textured and less porous than that of an uneroded Alford soil. Therefore, runoff is more rapid than on an uneroded soil, and the hazard of further erosion is greater. Most of this soil is cultivated. (Management group IIe–2; woodland suitability group 6.)

Alford silt loam, 4 to 7 percent slopes, severely eroded (308C3).—The remaining A horizon of this soil is less than 3 inches thick. The present plow layer is yellowish-brown heavy silt loam to light silty clay loam. Runoff is rapid, and the hazard of further erosion is serious. There are occasional gullies in this soil. (Management group IIIe–4; woodland suitability group 6.)

Alford silt loam, 7 to 12 percent slopes, moderately eroded (308D2).—The remaining A horizon of this soil is only 3 to 7 inches thick. The present plow layer is finer textured and less porous than that of an uneroded Alford soil. Therefore, runoff is more rapid than on an uneroded Alford soil, and the hazard of further erosion is greater. A small acreage of a slightly eroded Alford soil is included in the mapped areas of this soil. (Management group IIIe–4; woodland suitability group 6.)

Alford silt loam, 7 to 12 percent slopes, severely eroded (308D3).—The remaining A horizon of this soil is less than 3 inches thick. The present plow layer is yellowish-brown to brown heavy silt loam to light silty clay loam. Runoff is rapid, and the hazard of further erosion is serious. A small acreage of a gullied Alford soil is included in the mapped areas of this soil. (Management group IVe–1; woodland suitability group 6.)

Alford silt loam, 12 to 18 percent slopes, moderately eroded (308E2).—The remaining A horizon of this soil is 3 to 7 inches thick. Runoff is rapid, and the hazard of further erosion is serious. A small acreage of a slightly eroded Alford soil is included in the mapped areas of this soil. (Management group IVe–1; woodland suitability group 6.)

Alford silt loam, 12 to 18 percent slopes, severely eroded (308E3).—The remaining A horizon of this soil is less than 3 inches thick. In cultivated areas the present plow layer consists of soil material that is mainly from the original B horizon. Its texture is heavy silt loam to light silty clay loam, which makes the soil somewhat difficult to work. Runoff is rapid.

Included in the mapped areas of this soil are small areas that have calcareous silt loam at a depth somewhat less than 60 inches. The mapped areas also include a small acreage of gullied soils. The included areas are too small to be mapped separately. (Management group VIe–2; woodland suitability group 6.)

Alford silt loam, 18 to 30 percent slopes (308F).—The A horizon of this soil is 7 to 14 inches thick. Most of the acreage is covered by forest. A small acreage of a moderately eroded soil is included in the mapped areas of this soil. (Management group VIe–2; woodland suitability group 6.)

Alford silt loam, 18 to 30 percent slopes, severely eroded (308F3).—The remaining A horizon of this soil is less than 3 inches thick. The present plow layer consists

of soil material that is mainly from the B horizon. It is less porous than that of an uneroded Alford soil. Runoff is rapid. In some places gullies have formed.

Small areas that have carbonates at a depth of less than 60 inches are included in the mapped areas of this soil. Also included is a small acreage where slopes are greater than 30 percent. (Management group VIe–2; woodland suitability group 6.)

Allison Series

Moderately dark colored, deep, moderately well drained or well drained Alluvial soils make up the Allison series. These soils developed in moderately fine textured to fine textured water-laid sediments. The native vegetation was mainly grasses but included scattered trees and brush.

These nearly level to moderately sloping soils are mainly along the Wabash River and are in the Haymond-Allison soil association. If they are not protected by levees, they are subject to damage from overflow.

These soils are moderately permeable. Their available moisture capacity is high. The soils are slightly acid to neutral and are high in natural fertility.

The Allison soils are similar to the Tice soils, but they are better drained.

Profile description of an Allison silty clay loam:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) silty clay loam; granular structure; friable; slightly acid to neutral; clear boundary.

2—6 to 20 inches, dark grayish-brown (10YR 4/2) silty clay loam; granular to weak, fine, blocky structure; firm; slightly acid to neutral; gradual boundary.

3—20 to 40 inches, grayish-brown (10YR 5/2) to yellowish-brown (10YR 5/4) silty clay loam; fine, blocky structure; firm; neutral.

Allison silt loam, overwash, 0 to 2 percent slopes (306A+).—Recent deposits of medium-textured sediments overlie the original silty clay loam surface layer of this soil. Otherwise, the profile is simliar to the one described for the series. This soil is easy to till, and crops grown on it respond well if fertilizer is added. The areas that are protected from overflow are in management group I–2. Those that are not protected are in management group IIw–1. (Woodland suitability group 1.)

Allison silty clay loam, 0 to 2 percent slopes (306A).—This soil has a profile similar to the one described for the series. Crops grown on it respond well if fertilizer is added. Where this soil is protected by levees, it offers few, if any, problems. The areas that are protected from overflow are in management group I–1. Those not protected are in management group IIw–1. (Woodland suitability group 1.)

Allison silty clay loam, 2 to 4 percent slopes (306B).—This soil has a profile similar to the one described for the series. Crops grown on it respond well if fertilizer is added. The areas mapped include a small acreage that is covered by recent deposits of dark- and light-colored, silty sediments. Also included are small areas that show evidence of erosion. (Management group IIw–1; woodland suitability group 1.)

Allison silty clay loam, 4 to 7 percent slopes (306C).—This soil has a profile similar to the one described for the series. Crops grown on it respond well if fertilizer is added. The areas mapped include a small acreage of an Allison silty clay loam that shows the effects of recent erosion in the plow layer. Also included are areas of Allison silt loam, 7 to 12 percent slopes. (Management group IIw–1; woodland suitability group 1.)

Allison silty clay loam, 0 to 2 percent slopes, wet (W306A).—This soil is outside the levees and is frequently covered by floodwaters. It is seldom cultivated. The areas mapped include a small acreage that has silty sediments on the surface. (Management group Vw–1; woodland suitability group 1.)

Alvin Series

The Alvin series consists of light-colored, deep, moderately well drained or well drained Gray-Brown Podzolic soils. The soils are on high terraces and uplands along the Wabash River. They developed in sand deposited by wind and water. Their B horizon is sandy clay loam to clay loam that is 10 to 30 inches thick. The native vegetation was a hardwood forest consisting chiefly of oak and hickory.

These nearly level to very strongly sloping soils are in the Alvin-Roby soil association. They are better drained than the Roby soils.

The A and B horizons of the Alvin soils are moderately permeable, but the substratum is rapidly permeable. The available moisture capacity is moderate, and natural fertility is low. These soils are strongly acid, except in some fields where the plow layer has been made less acid by adding lime. The soils are subject to wind erosion. On the more sloping areas, water erosion may be a problem unless measures are used to control runoff.

Profile description of an Alvin fine sandy loam:

Ap—0 to 6 inches, yellowish-brown (10YR 5/4) fine sandy loam; single grain; slightly acid; diffuse, smooth boundary.

A2—6 to 18 inches, brownish-yellow (10YR 6/6) fine sandy loam; single grain; strongly acid; diffuse, irregular boundary.

Bt—18 to 30 inches, strong-brown (7.5YR 5/6) sandy clay loam; weak, medium, subangular blocky structure; strongly acid; diffuse, irregular boundary.

C—30 inches—, very pale brown (10YR 7/3), loose sand; occasional stratified thin lenses of silt loam or clay; medium acid.

Alvin fine sandy loam, 0 to 2 percent slopes (131A).—The A horizon of this soil is generally more than 14 inches thick, but in some areas it is slightly thinner than 14 inches. (Management group IIs–1; woodland suitability group 7.)

Alvin fine sandy loam, 2 to 4 percent slopes (131B).—In most places the A horizon of this soil is 7 to 14 inches thick. In some small areas, however, it is thinner than 7 inches, and in other areas it is thicker than 14 inches. (Management group IIe–5; woodland suitability group 7.)

Alvin fine sandy loam, 4 to 7 percent slopes (131C).—The profile of this soil is similar to the one described for the series. The A horizon is 7 to 14 inches thick. (Management group IIIe–5; woodland suitability group 7.)

Alvin fine sandy loam, 4 to 7 percent slopes, moderately eroded (131C2).—The remaining A horizon of this soil is 3 to 7 inches thick. The areas mapped include a small acreage that is severely eroded. (Management group IIIe–5; woodland suitability group 7.)

Alvin fine sandy loam, 7 to 12 percent slopes (131D).—The A horizon of this soil is generally 7 to 14 inches thick, but in a small acreage it is thicker. Runoff is medium. (Management group IIIe–5; woodland suitability group 7.)

Alvin fine sandy loam, 7 to 12 percent slopes, moderately eroded (131D2).—The remaining A horizon of this soil is 3 to 7 inches thick. Runoff is medium to rapid. (Management group IIIe–5; woodland suitability group 7.)

Alvin soils, 7 to 12 percent slopes, severely eroded (131D3).—The remaining A horizon of these soils is less than 3 inches thick. The surface layer is finer textured than that of an uneroded soil. Runoff is rapid. (Management group IVe–2; woodland suitability group 7.)

Alvin fine sandy loam, 12 to 18 percent slopes (131E).—The A horizon of this soil is 7 to 14 inches thick. Unless this soil is protected, it erodes readily. (Management group IVe–2; woodland suitability group 7.)

Alvin fine sandy loam, 12 to 18 percent slopes, moderately eroded (131E2).—The remaining A horizon of this soil is between 3 and 7 inches thick. Runoff is medium to rapid. Erosion is a hazard. (Management group IVe–2; woodland suitability group 7.)

Alvin soils, 12 to 18 percent slopes, severely eroded (131E3).—The remaining A horizon of these soils is less than 3 inches thick. Their surface layer is finer textured than that in the uneroded Alvin soils. The areas mapped include a small acreage of severely eroded Alvin soils that have slopes of 18 to 30 percent. (Management group VIe–2; woodland suitability group 7.)

Ava Series

The soils of this series are light colored and moderately well drained. They are Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils. The soils are on uplands, where they developed in 20 to about 50 inches of loess on weathered Illinoian till. The subsoil extends downward to the underlying glacial till. In the lower part of the profile is a compacted, dense layer, or fragipan. The native vegetation was a hardwood forest, chiefly oak and hickory.

These gently sloping to moderately sloping soils are in the Ava-Bluford soil association. They erode readily unless measures are used to control runoff.

The Ava soils are very slowly permeable because of the compacted, dense layer, or fragipan, in the lower part of the subsoil. The available moisture capacity is moderate, and natural fertility is low. The soils are medium to strongly acid, except where the plow layer has been made less acid by adding lime.

The Ava soils are similar to the Hosmer, but they developed in shallower loess, and their profile extends downward into the underlying till. The Hosmer soils developed in loess.

Profile description of an Ava silt loam:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, crumb structure; friable; medium acid; clear, smooth boundary.

A2—7 to 18 inches, brown (10YR 5/3) silt loam; moderate, fine, granular structure; friable; strongly acid; clear, smooth boundary.

B2t—18 to 25 inches, yellowish-brown (10YR 5/6) silty clay loam with pale-brown (10YR 6/3) and reddish-brown (5YR 4/3) mottles; medium and fine, subangular blocky structure; firm; strongly acid; clear, smooth boundary.

A'2x—25 to 28 inches, gray (10YR 6/1) silty clay loam with many, distinct mottles of yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4); moderate, medium, subangular blocky structure; firm; very strongly acid; clear, smooth boundary.

B'2x—28 to 35 inches, yellowish-brown (10YR 5/4) silty clay loam with many, medium, distinct mottles of light brownish gray (10YR 6/2); strong, medium, blocky structure; firm; strongly acid; gradual, smooth boundary.

IIB'3x—35 to 46 inches, yellowish-brown (10YR 5/8) clay loam with few, fine, distinct mottles of pale brown (10YR 6/3); weak, coarse, blocky structure to massive; firm; occasional till pebbles; strongly acid.

Ava silt loam, 2 to 4 percent slopes (14B).—The A horizon of this soil is 7 to 14 inches thick, except in a small acreage, where it is thicker than 14 inches. The profile is similar to the profile described for the Ava series. (Management group IIe–4; woodland suitability group 5.)

Ava silt loam, 2 to 4 percent slopes, moderately eroded (14B2).—In most places the remaining A horizon of this soil is between 3 and 7 inches thick, but in a few small areas it is thinner than 3 inches. In some places finer textured material from the B horizon is mixed with the material in the A horizon, and this causes the plow layer to be somewhat finer textured than that of the uneroded soils. (Management group IIe–4; woodland suitability group 5.)

Ava silt loam, 4 to 7 percent slopes (14C).—The profile of this soil is similar to the one described for the series. The A horizon is between 7 and 14 inches thick. (Management group IIIe–2; woodland suitability group 5.)

Ava silt loam, 4 to 7 percent slopes, moderately eroded (14C2).—The profile of this soil differs from the one described for the series in that the A horizon is thinner and the plow layer is somewhat finer textured. (Management group IIIe–2; woodland suitability group 5.)

Ava soils, 4 to 7 percent slopes, severely eroded (14C3).—In most places the A horizon of these soils is less than 3 inches thick and the present plow layer is mixed soil material from the A and B horizons. The compact layer, or fragipan, is somewhat closer to the surface in these soils than in the uneroded Ava soils. (Management group IVe–1; woodland suitability group 5.)

Beaucoup Series

The Beaucoup series consists of moderately dark colored, deep, poorly drained or very poorly drained Humic Gley soils that are intergrading toward Alluvial soils. These soils are generally on the flood plains of the Wabash River. They formed in deep, fine-textured, slackwater sediments. The native vegetation was a forest consisting mainly of cottonwood, soft maple, sweetgum, sycamore, elm, ash, pin oak, bur oak, and white swamp oak.

These soils are in nearly level areas or in depressions. They are in the Haymond-Allison soil association. The soils have moderately slow permeability, and their available moisture capacity is high. If the soils are well managed, plant roots can penetrate them readily. The natural fertility is medium to high. These soils are slightly acid.

They can be tile drained if suitable outlets are available. Surface drainage ditches can also be used.

The Beaucoup soils resemble the Tice and Allison soils with which they are associated. The Beaucoup soils, however, are more poorly drained than those soils.

Profile description of a Beaucoup silty clay loam:

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) light silty clay loam; weak, fine and medium, granular structure; friable; slightly acid; clear, smooth boundary.

A1—5 to 15 inches, very dark gray (10YR 3/1) to very dark grayish-brown (10YR 3/2) silty clay loam; occasional brown (7.5YR 4/4), soft, iron accumulations; weak, fine, subangular blocky structure; firm; slightly acid; gradual, smooth boundary.

B1g—15 to 24 inches, dark-gray (2.5Y 4/1) silty clay loam with a few, fine, distinct mottles of yellowish brown (10YR 5/6) and a few dark-brown (10YR 3/3) coatings; moderate, fine, angular blocky structure; firm; slightly acid; gradual, smooth boundary.

B2g—24 to 47 inches, dark-gray to gray (N 4/0 to N 5/0) heavy silty clay loam with many, medium, prominent mottles of yellowish brown (10YR 5/8) and a few dark-brown (10YR 3/3) coatings; strong, fine and very fine, angular blocky structure; firm; slightly acid; clear, smooth boundary.

IICg—47 to 60 inches +, gray (N 5/0) heavy clay loam to sandy clay loam with a few, fine, prominent mottles of yellowish brown (10YR 5/8) and brown (7.5YR 4/4); also a few, medium, faint mottles of dark grayish brown (10YR 4/2); massive; firm; slightly acid to neutral.

Beaucoup silt loam, overwash (70+).—The profile of this soil is similar to the one described for the series, but deposits of light- or dark-colored, silty material, 7 to 14 inches thick, overlie the silty clay loam. This soil has slopes of 0 to 2 percent. It is in management group I–2 if it is drained and protected from overflow and in management group IIw–1 if it is not drained or protected. (Woodland suitability group 2.)

Beaucoup silty clay loam (70).—The profile of this soil is similar to the one described for the series. Slopes are between 0 and 2 percent. The areas mapped include a small acreage where there are deposits of light-colored, silty material and a small acreage where slopes are between 2 and 4 percent. Beaucoup silty clay loam is in management group I–1 if it is adequately drained and protected from overflow and in management group IIw–1 if it is not drained or protected from overflow. (Woodland suitability group 2.)

Beaucoup silty clay loam, wet (W70).—This soil is similar to the other Beaucoup soils. It is flooded frequently, however, or has ponded water standing on it for such long periods that it is not suited to cultivated crops. It has slopes of 0 to 2 percent. (Management group Vw–1; woodland suitability group 2.)

Beaucoup gravelly clay loam (124).—The profile of this soil is similar to the one described for the series, but the soil material is gravelly. This soil has slopes of 0 to 2 percent. Included in the mapped areas are small areas of a soil that is covered by dark, silty deposits 7 to 14 inches thick.

Where Beaucoup gravelly clay loam is adequately drained and protected from overflow, it is in management group I–1. Where it is not drained and protected, it is in management group IIw–1. (Woodland suitability group 2.)

Belknap Series

The Belknap series consists of light-colored, deep, imperfectly drained Alluvial soils. The soils formed in water-deposited, silty material that was washed from the uplands. In most areas their texture is silt loam throughout the profile, but in places thin layers of loam and sandy loam are at various depths. At a depth ranging from 8 to 30 inches, the color is grayer and the mottling is more intense than in the upper part of the profile. The native vegetation was principally maple, gum, and sycamore trees.

The Belknap soils are nearly level to gently sloping. They are on narrow bottom lands where wetness may be a problem if ditches and diversions have not been installed. The soils are predominantly in the Sharon-Belknap soil association, but to a lesser extent, they are on small bottoms in the Hosmer-Stoy and Ava-Bluford soil associations. The Belknap soils are in positions similar to those occupied by the Sharon, Bonnie, and Wakeland soils, but they are somewhat wetter than the Sharon soils and are less wet than the Bonnie soils. They are more acid than the Wakeland soils.

The Belknap soils are slowly permeable and have high available moisture capacity. Natural fertility is low. Lime and fertilizer are needed for satisfactory production of crops.

Profile description of a Belknap silt loam:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine and medium, crumb structure; friable; medium to strongly acid.

1—6 to 13 inches, dark grayish-brown (10YR 4/2) silt loam with a few, medium, faint, brown (10YR 5/3) mottles and a few, fine, distinct mottles of yellowish brown (10YR 5/6); weak, thin, platy structure to massive; friable; medium to strongly acid.

2—13 to 23 inches, dark grayish-brown (10YR 4/2) silt loam with a few, medium, faint mottles of light brownish gray (10YR 6/2) and a few, fine, distinct mottles of yellowish brown (10YR 5/6); massive to weak, subangular blocky structure; friable; few iron and manganese concretions; medium acid.

3—23 to 27 inches, variegated grayish-brown (10YR 5/2) and brown (10YR 5/3) silt loam with a few, medium, faint mottles of light brownish gray (10YR 6/2) and a few, fine, distinct mottles of yellowish brown (10YR 5/6); massive; friable; few iron and manganese concretions; medium to strongly acid.

4—27 to 59 inches, light brownish-gray (10YR 6/2) silt loam with common, fine, prominent mottles of dark reddish brown (2.5YR 3/4) and yellowish brown (10YR 5/8); massive; friable; many iron and manganese concretions that increase in number and size with increasing depth; medium to strongly acid.

5—59 inches +, dark-gray (10YR 4/1) coarse silt loam with common, medium, distinct, light-gray (10YR 6/1) mottles and few, medium, distinct, brown (7.5YR 5/4) mottles; massive; friable; many iron and manganese concretions; medium to slightly acid.

Belknap silt loam, 0 to 2 percent slopes (382A).—The profile of this soil is similar to the one described for the series. This soil is generally on small bottoms along creeks, and it is sometimes covered with water from flash floods. Small areas where there are recent deposits of light-colored silt and silty colluvial material on the surface are included in the mapped areas of this soil. Also included are small areas that are subject to frequent overflow or ponding. (Management group IIw–3; woodland suitability group 1.)

Belknap silt loam, 2 to 4 percent slopes (382B).—Most of this soil is at the base of slopes that are steeper than 4 percent. Small areas that are slightly to moderately eroded are included in the mapped areas of this soil. (Management group IIw–3; woodland suitability group 1.)

Birds Series

The Birds series is made up of poorly drained, silty, light-colored Alluvial soils developed in silty sediments that are slightly acid to mildly alkaline. The soils are silt loam to a depth below 40 inches. They are dominantly gray but are highly mottled. The native vegetation was a deciduous forest, mainly of oak, maple, elm, and gum.

The Birds soils are nearly level. They are on rather narrow bottoms along the smaller streams and on wide bottoms along the major streams in the Haymond-Allison soil association. Drainage is a major problem. The most satisfactory system of drainage is open ditches. Where the Birds soils are along small streams, diversion ditches may be needed to protect these soils from the water from nearby hillsides.

Natural fertility is low, but in many places lime is not needed. Applications of phosphate, potash, and nitrogen increase yields. The Birds soils are less acid than the Bonnie soils, but they are similar in other characteristics.

Profile description of Birds silt loam:

1p—0 to 6 inches, gray (10YR 5/1), dark-gray (10YR 4/1), and dark yellowish-brown (10YR 3/4) silt loam; weak, crumb to weak, thin and medium, platy structure; friable; slightly acid; abrupt boundary.

2—6 to 14 inches, gray to light-gray (10YR 6/1) silt loam with common, faint, grayish-brown (10YR 5/2) mottles; massive; friable; numerous iron concretions; slightly acid.

3—14 to 36 inches +, gray to light-gray (10YR 6/1) silt loam with common, fine, distinct, white (10YR 8/1), and brownish-yellow (10YR 6/6) mottles and many, fine, distinct mottles of yellowish brown (10YR 5/6); massive; friable; slightly acid to neutral.

Birds silt loam (334).—This is the only Birds soil mapped in the county. Its profile is similar to the profile described for the series. Surface drainage is essential for the best use of this soil. The areas mapped include a small acreage that is subject to frequent overflow and to ponding of water. (Management group IIIw-2; woodland suitability group 2.)

Blair Series

This series is made up of light-colored, imperfectly drained Gray-Brown Podzolic soils of the uplands. The soils developed in Illinoian till that is covered with less than 20 inches of loess. The native vegetation was a hardwood forest, chiefly of oak and hickory.

These soils are in the Ava-Bluford and Hoyleton-Cisne associations. They are moderately sloping and erosion is a major hazard.

The Blair soils are slowly permeable and have a high available moisture capacity. Natural fertility is low to medium.

These soils are similar to the Hickory soils, but they are less well drained.

Profile description of a Blair silt loam:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) to dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; medium to strongly acid.

A2—6 to 10 inches, pale-brown (10YR 6/3) silt loam; granular to thin, platy structure; friable; medium to strongly acid.

B1—10 to 20 inches, light brownish-gray (10YR 6/2) silty clay loam with few, distinct mottles of yellowish brown (10YR 5/6); weak to moderate, medium, subangular blocky structure; firm; coatings of light-gray (10YR 7/1) silt; medium to strongly acid.

B2t—20 to 38 inches, yellowish-brown (10YR 5/4) silty clay loam to clay loam containing some grit; few, medium, faint mottles of yellowish brown (10YR 5/6); moderate, medium, angular blocky structure; firm; coatings of gray (10YR 6/1); strongly acid.

C—38 inches +, mottled, yellowish-brown (10YR 5/6), dark yellowish-brown (10YR 3/4 to 4/4), and light-gray (10YR 6/1) gritty silty clay loam to clay loam; weak, coarse, blocky structure; strongly acid.

The thickness of the loess ranges from 0 to 20 inches. The intensity of mottling varies.

Blair silt loam, 4 to 7 percent slopes, moderately eroded (5C2).—The profile of this soil is similar to the one described for the series. In most places the A horizon is 3 to 7 inches thick, but in a small acreage it is thicker than 7 inches. (Management group IIIe–1; woodland suitability group 4.)

Blair soils, 4 to 7 percent slopes, severely eroded (5C3).—The A horizon of these soils is less than 3 inches thick, but other characteristics are similar to those of the profile described for the Blair series. The areas mapped include a small acreage in which slopes are between 7 and 12 percent. (Management group IVe–1; woodland suitability group 4.)

Bloomfield Series

The Bloomfield series consists of well-drained or somewhat excessively drained Gray-Brown Podzolic soils intergrading toward Regosols. The soils developed in fine sand deposited by water and wind. They consist of loamy fine sand to fine sand to a depth of 24 to 55 inches. Below are bands or lenses of sandy loam to sandy clay loam that contain iron. These bands or lenses are less than 10 inches thick. In most places they begin at a depth of 36 to 55 inches and constitute the subsoil (fig. 2). In places, however, thin, faint lenses are at a depth of 24 to 36 inches. The lenses alternate with layers of fine sand like those in the surface layer. The native vegetation was a deciduous forest, chiefly of oak.

The Bloomfield soils are strongly sloping to steep. They are on the breaks of stream terraces and on windblown deposits on uplands in the Alvin-Roby association.

Natural fertility is low. If the small, moderately sloping, included areas are used for cultivated crops, lime, phosphate, potash, and nitrogen should be applied according to the needs of the particular crop. Practices ought to be applied to control wind erosion. Most of the Bloomfield soils in Wabash County are in trees.

Profile description of a Bloomfield fine sand:

A1—0 to 5 inches, very dark gray (10YR 3/1) fine sand; single grain; slightly acid.

A21—5 to 15 inches, dark grayish-brown (10YR 4/2) fine sand; single grain; loose; medium acid.

A22—15 to 36 inches, dark yellowish-brown (10YR 4/4) fine sand; single grain; loose; medium acid.

Figure 2.—**A profile of a Bloomfield fine sand showing thin bands or lenses below a depth of 3½ feet. These bands or lenses contain a considerable amount of iron or clay in comparison to that in adjacent layers.**

A2B2—36 to 42 inches, alternating layers of dark-brown (7.5 YR 4/4) fine sandy loam and yellowish-brown (10YR 5/4) loamy fine sand to fine sand; the fine sandy loam has weak, medium, subangular blocky structure and is slightly firm; the loamy fine sand to fine sand is structureless (single grain) and loose; medium acid.

B2A2—42 to 48 inches, dark-brown (7.5YR 4/4) bands of slightly firm fine sandy loam to sandy clay loam alternating with layers of yellowish-brown (10YR 5/4), loose fine sand.

The A1 horizon of the Bloomfield soils in this county is somewhat darker than that in a profile typical for this series. In a typical profile the A1 horizon is generally yellowish brown (10YR 5/4 to 5/6). Calcareous sand is at a depth of about 8 feet.

Bloomfield fine sand, 18 to 30 percent slopes (53F).—This is the only Bloomfield soil mapped in the county. In most places it has an A1 horizon that is 3 to 7 inches thick. It is limited in acreage. This soil is droughty. The steeper areas are not suitable for cultivated crops, but the small areas that are less sloping than the typical soil are sometimes cultivated. The areas mapped include a small acreage of a slightly to severely eroded Bloomfield fine sand and blown-out areas. They also include small areas where the slope ranges from 7 to 18 percent or is steeper than 30 percent. (Management group VIIs–2; woodland suitability group 8.)

Bluford Series

The Bluford series consists of light-colored, imperfectly drained Gray-Brown Podzolic soils intergrading toward Planosols. The soils are on the uplands. They developed in 20 to 50 inches of loess over weathered glacial drift. The native vegetation was a hardwood forest consisting mainly of oak and hickory.

These nearly level to moderately sloping soils are in the Ava-Bluford soil association. The moderately sloping areas erode readily unless measures are used to control runoff.

These soils are slowly permeable because of a fine-textured and somewhat dense subsoil. The available moisture capacity is adequate for plants. If the soil is well managed, roots can penetrate the subsoil. The soils are low in natural fertility. In most areas they are strongly to very strongly acid, but in some fields the plow layer has been made less acid by adding lime.

Although these soils are in positions similar to those occupied by the Stoy soils, they developed in loess and glacial drift, and the Stoy soils developed entirely in loess.

Profile description of a Bluford silt loam:

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; weak, crumb structure; friable; medium acid; abrupt, smooth boundary.

A2—7 to 16 inches, yellowish-brown (10YR 5/6) silt loam with brown (10YR 5/3) mottles; crumb structure; friable; medium acid; clear, smooth boundary.

B1—16 to 20 inches, yellowish-brown (10YR 5/6) light silty clay loam with light brownish-gray (10YR 6/2), silty coatings; moderate, fine, subangular blocky structure; firm; very strongly acid; clear, smooth boundary.

B2t—20 to 27 inches, brown (10YR 5/3) heavy silty clay loam to silty clay with common, fine, faint mottles of light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6); strong, medium, subangular blocky structure; firm; light-gray (10YR 7/1), silty coatings; strongly acid; abrupt, smooth boundary.

IIB3—27 to 35 inches, brown (10YR 5/3) silty clay loam with some grit; faint, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; firm; strongly acid.

IIC—35 to 40 inches, brown (10YR 5/3) silt loam with some grit; mottles of light brownish gray (10YR 6/2) and light reddish brown (5YR 6/3); massive; very strongly acid.

Bluford silt loam, 0 to 2 percent slopes (13A).—The profile of this soil is similar to the one described for the series. The A horizon is more than 14 inches thick. On this soil, water disposal is a problem in places. The areas mapped include some areas of slightly and moderately eroded soils, as well as a small acreage of moderately well drained soils. (Management group IIw–5; woodland suitability group 4.)

Bluford silt loam, 2 to 4 percent slopes (13B).—The A horizon of this soil is 7 to 14 inches thick. Runoff is medium. A small acreage of Blair silt loam, 2 to 4 percent slopes, is included in the mapped areas of this soil. (Management group IIe–3; woodland suitability group 4.)

Bluford silt loam, 2 to 4 percent slopes, moderately eroded (13B2).—The remaining A horizon of this soil is 3 to 7 inches thick. Part of the finer textured subsoil is mixed with the surface soil in the present plow layer.

Controlling erosion is a problem. A small acreage of slightly and severely eroded soils is included in the mapped areas of this soil. (Management group IIe–3; woodland suitability group 4.)

Bluford silt loam, 4 to 7 percent slopes, moderately eroded (13C2).—In most places the remaining A horizon of this soil is 3 to 7 inches thick. The areas mapped, however, include small areas where the A horizon is more than 7 inches thick, as well as small areas where the A horizon is less than 3 inches thick. Finer textured material from the subsoil is mixed into the plow layer in many places. (Management group IIIe–1; woodland suitability group 4.)

Bonnie Series

This series is made up of light-colored, grayish, poorly drained Alluvial soils. The soils formed in water-deposited, silty material from the surrounding uplands. In most places their texture is silt loam throughout the profile, but in some places there are thin layers of loam and sandy loam at various depths. The native vegetation was a deciduous forest of gum, pin oak, and other trees that tolerate water.

The Bonnie soils are primarily on the nearly level bottom lands that drain into Bonpas Creek, mainly in the west-central and northwestern parts of the county. Smaller areas are on the upper end of the bottom lands along streams that drain eastward into the Wabash River.

These soils have very slow permeability because the soil material is predominantly dense and structureless. The available moisture capacity is high.

These soils are not suitable for tiling, and, therefore, a complete system of surface ditches is needed to remove excess surface water. Otherwise, the soils remain wet for long periods. Natural fertility is low. The soils are medium to very strongly acid, except in fields where the plow layer has been made less acid by adding lime.

The Bonnie soils are more acid than the Birds soils, but they are similar in other characteristics.

Profile description of Bonnie silt loam:

Ap—0 to 6 inches, gray (10YR 5/1) to dark-gray (10YR 4/1) and dark-brown to brown (10YR 4/3) silt loam; weak, crumb structure; friable; contains iron concretions; strongly acid.

1—6 to 14 inches, gray to light-gray (10YR 6/1) silt loam with common, fine, faint mottles of grayish brown (10YR 5/2); weak, thick, platy structure; friable; numerous iron concretions and stains; strongly acid.

2—14 to 35 inches, gray to light-gray (10YR 6/1) silt loam with common, fine, faint, white (10YR 8/1) mottles; massive; friable; numerous iron concretions; strongly acid.

3—35 inches +, gray to light-gray (10YR 6/1) silt loam with common, fine, faint, white (10YR 8/1) mottles and many, fine, distinct mottles of yellowish brown (10YR 5/6); massive; friable; strongly acid.

Bonnie silt loam (108).—This is the only Bonnie soil mapped in the county. Its profile is like the one described for the series. In most places this soil has slopes of 0 to 2 percent. The areas mapped, however, include a small acreage in which slopes are 2 to 7 percent. (Management group IIIw–2; woodland suitability group 2.)

Bonpas Series

Dark-colored, deep, poorly drained Humic Gley soils on terraces made up this series. The soils developed in stratified sediments deposited by water. The native vegetation was prairie grasses that grew in wet areas.

The Bonpas soils are nearly level. They are on low terraces in the Bonpas-McGary soil association.

These soils are moderate to moderately slow in permeability, and they have high available moisture capacity. If tile are properly installed and have suitable outlets, they function well in these soils.

Natural fertility is high; seldom do these soils need lime or potash. Phosphate and nitrogen, however, need to be applied to obtain high crop yields.

These soils are in positions similar to those occupied by the Selma and Patton soils, but they are less sandy than those soils. The aggregates in their subsoil have fewer clay coatings than those in the Patton subsoil, and the Bonpas soils have a darker surface layer than do the Patton soils.

Profile description of Bonpas silty clay loam:

Ap—0 to 9 inches, black (10YR 2/1) to very dark gray (10YR 3/1) silty clay loam; weak, fine, granular structure; friable; neutral.

A1—9 to 16 inches, black (10YR 2/1) silty clay loam; weak, fine, granular structure; friable; neutral.

B1g—16 to 22 inches, dark grayish-brown (2.5Y 4/2) silty clay loam with few, fine, distinct mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; firm; faces of peds coated with distinct, black (10YR 2/1) organic matter and clay; few iron concretions; neutral to mildly alkaline.

B2g—22 to 42 inches, gray (10YR 5/1 to N 5/0) silty clay loam with many, fine, distinct mottles of yellowish brown (10YR 5/6); moderate, medium, angular blocky structure; sticky when wet; mildly alkaline.

C—42 to 60 inches, yellowish-brown (10YR 5/8) light silty clay loam with some thin layers of silt loam, clay loam, and, in some places, sandy loam; common, medium, distinct mottles of light gray to gray (10YR 6/1); calcareous.

Black (10YR 2/1) krotovinas are common in the Bg horizons of these soils.

Bonpas silt loam, overwash (126+).—In this soil 7 to 11 inches of dark, silty material has been deposited over the original surface layer of silty clay loam. In most places slopes are between 0 and 4 percent, but there is only a small acreage where they are more than 2 percent. This soil is in management group I–2 if it is adequately drained and protected from overflow. If it is not adequately drained or protected, it is in management group IIw–1.

Bonpas silty clay loam (126).—This soil has slopes of 0 to 2 percent, and its A horizon is generally 14 inches or more thick. The profile is similar to the one described for the series. It is in management group I–1 if it is adequately drained and protected from overflow. If it is not adequately drained or protected, it is in management group IIw–1.

Camden Series

This series is made up of moderately well drained and well drained, deep Gray-Brown Podzolic soils formed in silty sediments over stratified outwash. The native vegetation was deciduous forest, chiefly oak and hickory.

The Camden soils are nearly level to strongly sloping and are on stream terraces and outwash plains. They are in the Selma-Camden soil association. On the sloping areas practices are needed to control erosion.

Natural fertility is medium. Applications of lime, phosphate, and nitrogen increase yields.

Profile description of a Camden silt loam:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, granular structure; friable; slightly acid.

A2—7 to 12 inches, grayish-brown (10YR 5/2) heavy silt loam; very weak, thin, platy structure but breaks to weak, fine and medium, crumb structure; friable; slightly acid.

B1—12 to 15 inches, dark-brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; medium acid.

B2t—15 to 35 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate to strong, fine and medium, subangular blocky structure; firm; strongly acid.

B3—35 to 40 inches, yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/4) heavy sandy clay loam; weak, fine, subangular blocky structure; firm; strongly acid.

C—40 to 45 inches, stratified dark yellowish-brown (10YR 4/4) heavy sandy loam, fine sand, silt, and clay; medium to slightly acid.

Camden silt loam, 0 to 2 percent slopes (134A).—In most places the A horizon of this soil is 7 to 14 inches thick, but in a small acreage it is thicker than 14 inches. (Management group I–3; woodland suitability group 6.)

Camden silt loam, 2 to 4 percent slopes (134B).—The A horizon of this soil is more than 7 inches thick, except in a small acreage, where this soil is moderately eroded. (Management group IIe–2; woodland suitability group 6.)

Camden silt loam, 4 to 7 percent slopes, moderately eroded (134C2).—The remaining A horizon of this soil is 3 to 7 inches thick, except in a small acreage where it is thicker than 7 inches. (Management group IIe–2; woodland suitability group 6.)

Camden silt loam, 7 to 12 percent slopes, moderately eroded (134D2).—The remaining A horizon of this soil is 3 to 7 inches thick, except in a small acreage where it is thicker than 7 inches. The areas mapped include a small acreage of an imperfectly drained soil that is similar to the Starks soils. This included soil has slopes of 7 to 18 percent. (Management group IIIe–4; woodland suitability group 6.)

Camden soils, 7 to 12 percent slopes, severely eroded (134D3).—The remaining A horizon of these soils is less than 3 inches thick. The present plow layer is a mixture of soil material from the surface layer and the subsoil. Runoff is rapid, and the hazard of further erosion is serious. A small acreage of moderately eroded and of severely eroded soils that have a slope of 12 to 18 percent is included in the mapped areas of these soils. (Management group IVe–1; woodland suitability group 6.)

Chauncey Series

Poorly drained, moderately deep, moderately dark colored Planosols that developed on stream terraces and low-lying uplands make up this series. The surface layer is silt loam that is more than 24 inches thick. The subsoil is heavy silty clay loam and begins at a depth of 24 to 40 inches. In many places the subsoil extends downward to the Illinoian till or is underlain by layers of silty and sandy material. The native vegetation was predominantly grass but included scattered hardwood trees.

The Chauncey soils are nearly level and are predominantly on the uplands in the Hoyleton-Cisne soil association. Drainage is needed in many places, and open ditches are the best method of removing excess water. Where water from hillsides is a problem, diversions may be needed.

Natural fertility is low. Applications of lime, phosphate, potash, and nitrogen increase yields.

The Chauncey soils are in positions similar to those occupied by the Racoon soils, but they have a darker colored surface layer than those soils. The profiles of the Chauncey and Cisne soils have approximately the same color, but the A horizon in the Chauncey soils is thicker than 24 inches, and that in the Cisne soils is thinner than 24 inches.

Profile description of Chauncey silt loam:

Ap—0 to 7 inches, dark gray (10YR 4/1) to very dark gray (10YR 3/1) silt loam; weak to moderate, fine, crumb structure; friable; slightly acid; abrupt, smooth boundary.

A1—7 to 12 inches, dark gray (10YR 4/1) to very dark gray (10YR 3/1) silt loam; weak, medium and fine, crumb structure; friable; medium acid; clear, smooth boundary.

A2—12 to 26 inches, gray (10YR 5/1) to dark-gray (10YR 4/1) silt loam with weak, thin, platy structure; friable; few, fine, distinct mottles of very dark grayish brown (10YR 3/2) and yellowish brown (10YR 5/8); strongly acid; clear, smooth boundary.

B21t—26 to 38 inches, gray (10YR 5/1) heavy silty clay loam with common, medium, distinct mottles of dark yellowish brown (10YR 3/4); weak, coarse, prismatic structure but breaks to moderate, medium, angular blocky; firm; very dark gray (10YR 3/1), organic clay coatings on peds; strongly acid; clear, smooth boundary.

B22t—38 to 46 inches, gray (10YR 5/1) to grayish-brown (10YR 5/2), plastic silty clay loam with many, fine, distinct mottles of dark yellowish brown (10YR 3/4) and yellowish brown (10YR 5/8); weak, medium, blocky structure; sticky when wet; medium acid; clear, smooth boundary.

B3—46 to 50 inches +, grayish-brown (10YR 5/2) to dark-gray (10YR 4/1) silty clay loam with common, medium, distinct mottles of yellowish brown (10YR 5/8) and dark yellowish brown (10YR 3/4); numerous manganese and iron concretions; weak, coarse and medium, angular blocky structure; firm; slightly acid.

Chauncey silt loam (287).—This is the only Chauncey soil mapped in this county. Its profile is similar to the one described for the series. The A horizon is 24 inches or more thick. The areas mapped include a small acreage where there are recent deposits of light-colored, silty material on the surface. (Management group IIIw–4.)

Cisne Series

The Cisne series consists of light-colored to moderately dark colored, shallow, poorly drained Planosols. The soils developed in 20 to 50 inches of loess on weathered Illinoian till of the uplands. The surface layer is silt loam, and the subsoil is heavy silty clay loam to silty

clay. The subsoil is a compacted claypan. The native vegetation was grass, chiefly bluestem, and scattered trees.

These soils are nearly level. They are in the Hoyleton-Cisne soil association.

Drainage and low fertility are the major problems in managing these soils, but erosion is not a problem. The soils are low in natural fertility and are very slowly permeable. The available moisture capacity is high in areas where the fertility has been made high by adding plant nutrients. It is moderate where the natural fertility is low. Generous additions of lime, potash, nitrogen, and phosphate are needed if crops are to make satisfactory yields.

The Cisne soils are in positions similar to those occupied by the Wynoose soils, but their A1 or Ap horizon is somewhat darker colored than that of the Wynoose soils.

Profile description of Cisne silt loam:

A1p—0 to 8 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) and very dark gray (10YR 3/1) silt loam; moderate, fine, crumb structure; friable; medium acid; abrupt, smooth boundary.

A21—8 to 13 inches, grayish-brown (10YR 5/2) to dark grayish-brown (10YR 4/2) silt loam; weak, medium, platy structure; friable; hole fillings of gray (10YR 5/1) silt loam are mottled with fine, distinct, yellowish-brown (10YR 5/8) mottlings of iron; strongly acid; clear, smooth boundary.

A22—13 to 17 inches, light-gray (10YR 7/2) and some light brownish-gray (10YR 6/2) silt loam; weak, medium, platy structure; friable; strongly acid; abrupt, smooth boundary.

A–B—17 to 19 inches, gray (10YR 6/1) light silty clay loam; common, medium, prominent, yellowish-red (5YR 4/6) mottles and thick, light-gray (10YR 7/1) silt coatings; moderate, medium and fine, angular blocky structure; friable to firm; strongly acid; clear, smooth boundary.

B21t—19 to 28 inches, grayish-brown (10YR 5/2) heavy silty clay loam; common, medium, prominent, yellowish-red (5YR 4/6) mottles and gray (10YR 5/1) clay films; strong, fine, prismatic structure but breaks to strong, fine and medium, angular blocky; firm; strongly acid; clear, smooth boundary.

B22t—28 to 37 inches, gray (10YR 5/1) to grayish-brown (10 YR 5/2) heavy silty clay loam; common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles and few gray (10YR 5/1) clay coatings; moderate, medium, angular blocky structure; firm; strongly acid; clear, smooth boundary.

IIC1—37 to 43 inches, light brownish-gray (2.5Y 6/2) heavy silty clay loam with some grit; common, medium and coarse, prominent, dark yellowish-brown (10YR 4/4) mottles and occasional gray (10YR 5/1) clay films; weak, coarse, angular blocky structure; firm; strongly acid to medium acid; gradual, smooth boundary.

IIC2—43 to 60 inches, light brownish-gray (2.5Y 6/2) heavy silty clay loam with some grit; common, coarse, prominent, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, angular blocky structure to massive; firm; some sand in the lower part of horizon; medium acid.

Cisne silt loam (2).—This is the only Cisne soil mapped in the county. Its profile is described as typical of the series. In most places this soil has slopes of 0 to 2 percent, but in a small acreage the slopes are between 2 and 4 percent. (Management group IIIw–4.)

Darwin Series

The Darwin series consists of moderately dark colored, very poorly drained Humic Gley soils intergrading toward Alluvial soils. These soils developed in very fine textured, slack-water alluvial sediments. The native vegetation was scattered trees and grasses.

These soils are in nearly level areas or in depressions. They are in the Haymond-Allison soil association.

These soils are very slowly permeable because of their high content of clay. Tiling is questionable, but a system of surface ditches is needed to remove excess surface water. The available moisture capacity is high, and natural fertility is medium. These soils are slightly acid to neutral.

The Darwin soils are finer textured than the Beaucoup soils, which are also in the Haymond-Allison soil association.

Profile description of a Darwin silty clay:

A1—0 to 10 inches, very dark gray (10YR 3/1) silty clay to clay; fine, subangular blocky structure; very sticky and plastic when wet; slightly acid; clear, smooth boundary.

Bg—10 to 47 inches, dark grayish-brown (2.5Y 4/2) silty clay with a few, fine, prominent mottles of dark red (2.5YR 3/6); moderate, medium, blocky structure; sticky and plastic when wet; faces of peds are very shiny; neutral; gradual boundary.

Cg—47 to 60 inches, dark-gray (N 4/0) silty clay with common, medium, faint mottles of olive brown (2.5Y 4/4); weak, angular blocky structure; plastic when wet; medium acid.

In places the Cg horizon begins at a depth of 40 to 60 inches, and below this are stratified sands, silts, and clays.

Darwin silty clay (71).—This soil has slopes of 0 to 2 percent. Its profile is similar to the one described for the series. The soil is subject to overflow if it is not protected by levees. The areas mapped include a small acreage of Darwin silty clay, 2 to 4 percent slopes. (Management group IIIw–3; woodland suitability group 2.)

Darwin silty clay, wet (W71).—This soil has slopes of 0 to 2 percent. It is generally in depressions and is subject to ponding. (Management group Vw–1; woodland suitability group 2.)

Haymond Series

This series is made up of moderately well drained or well drained, silty, light-colored Alluvial soils. The soils developed in silty sediments that are slightly acid to neutral. The native vegetation was a deciduous forest, predominantly oak, maple, elm, and tulip-poplar.

The Haymond soils are nearly level. They are on fairly narrow bottom lands along small streams and on wide bottom lands along the major streams in the Haymond-Allison association. Where these soils are along small streams in the uplands, diversions may be needed to protect them from water from the adjacent hillsides.

Natural fertility is medium. In places applications of lime are needed, and phosphate, potash, and nitrogen increase the yields of crops.

The Haymond soils have relief similar to that of the Sharon soils, which are also moderately well drained or well drained. They are less acid than the Sharon soils.

Profile description of Haymond silt loam:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) to dark-brown (10YR 4/3) silt loam; weak, medium, crumb structure; friable; slightly acid to neutral.

1—6 to 16 inches, dark yellowish-brown (10YR 4/4) silt loam with dark yellowish-brown (10YR 3/4) stains from organic matter; weak, fine, crumb structure; slightly acid to neutral.

2—16 to 32 inches, dark yellowish-brown (10YR 4/4) to brown (10YR 4/3) silt loam; weak, fine and medium, crumb structure; friable; slightly acid to mildly alkaline.

3—32 to 40 inches +, variegated brown (10YR 5/3 and dark yellowish-brown (10YR 4/4) silt loam with a few, fine, prominent mottles of yellowish red (5 YR 4/8); weak, fine, subangular blocky structure to massive; slightly acid to mildly alkaline.

The color of the surface layer ranges from dark grayish brown to dark yellowish brown. All of the layers shown in the profile described vary in thickness. In places layers that are coarser textured than those shown are at a depth below 30 inches.

Haymond silt loam (331).—This is the only Haymond soil mapped in the county. Its profile is similar to the one described for the series. This soil has slopes of 0 to 2 percent. The areas mapped include small areas where there are recent deposits of light-colored soil material from the adjacent uplands. They also include small areas where the slopes are steeper than 2 percent. The acreage of included soils is too small for the areas to be mapped separately.

Small areas of Haymond silt loam on the bottom lands are covered occasionally by water from flash floods, but the floodwaters remain only for short periods. The areas that are protected from overflow are in management group I–3; those not protected are in management group IIw–3. (Woodland suitability group 1.)

Hickory Series

The Hickory series is made up of light-colored, moderately well drained or well drained Gray-Brown Podzolic soils of the uplands. The soils developed in Illinoian till that is covered with less than 20 inches of loess. The native vegetation was a hardwood forest consisting chiefly of oak and hickory.

These moderately sloping to steep soils are in the Ava-Bluford and Hosmer-Stoy soil associations. Erosion is a major hazard. Forest is the best use for these soils.

Permeability is moderately slow to moderate, the available moisture capacity is high, and natural fertility is low to medium. The Hickory soils have better internal drainage than the Blair soils.

Profile description of a Hickory loam to silt loam:

A1—0 to 3 inches, brown to dark-brown (10YR 4/3) loam to silt loam; weak, thin, platy structure that breaks to moderate, very fine crumb; friable; strongly acid; clear, smooth boundary.

A2—3 to 9 inches, yellowish-brown (10YR 5/4) loam; fine, granular structure; friable; strongly acid; abrupt, smooth boundary.

B1—9 to 18 inches, yellowish-brown (10YR 5/6) loam to clay loam with many, light yellowish-brown (10YR 6/4) coatings of silt; weak, fine, subangular blocky structure; firm; strongly acid; gradual, smooth boundary.

B2t—18 to 29 inches, brownish-yellow (10YR 6/6) to yellowish-brown (10YR 5/6) clay loam with grayish-brown (2.5Y 5/2) coatings of silt and some reddish-brown (5YR 4/4), discontinuous coatings of clay; moderate, medium and coarse, subangular blocky structure; firm; strongly acid; gradual, smooth boundary.

B3—29 to 42 inches, yellowish-brown (10YR 5/6) loam to light clay loam with fine, medium, distinct mottles of reddish brown (2.5YR 5/4); moderate, medium and coarse, angular blocky structure; firm; many pebbles; medium acid; gradual, smooth boundary.

C—42 inches +, yellowish-brown (10YR 5/4) loam with a few, medium, distinct mottles of reddish brown (2.5YR 5/4); massive; medium acid.

Hickory loam, 4 to 7 percent slopes, moderately eroded (8C2).—The profile of this soil is similar to the one described for the series. Included in some of the mapped areas are narrow strips of soils that resemble those of the Ava and Hosmer series. These included areas are on the upper parts of the slopes. (Management group IIe–2; woodland suitability group 6.)

Hickory soils, 4 to 7 percent slopes, severely eroded (8C3).—In these soils the profile is similar to the one described for the series, but the A horizon is generally less than 3 inches thick. The plow layer is a mixture of soil material from the original surface layer and the subsoil. The texture of the plow layer is somewhat finer than that in the corresponding layer of an uneroded Hickory soil, and the color is more yellowish. Runoff is rapid. Included in the mapped areas of these soils are narrow strips of soils that resemble those of the Ava or Hosmer series. These included soils are on the upper parts of the slopes. (Management group IIIe–4; woodland suitability group 6.)

Hickory loam, 7 to 12 percent slopes (8D).—The profile of this soil resembles the one described for the series. Included in the mapped areas are narrow strips of soils that resemble the soils of the Ava or Hosmer series. These included soils are on the upper parts of the slopes. (Management group IIIe–4; woodland suitability group 6.)

Hickory loam, 7 to 12 percent slopes, moderately eroded (8D2).—This soil is similar to Hickory loam, 7 to 12 percent slopes, but the A horizon is only 3 to 7 inches thick. Also, part of the subsoil is generally mixed with the plow layer. (Management group IIIe–4; woodland suitability group 6.)

Hickory soils, 7 to 12 percent slopes, severely eroded (8D3).—In these soils the profile is similar to the profile described for the Hickory series, but the A horizon is less than 3 inches thick. The present surface layer is a mixture of soil material from the original A and B horizons. Its texture is somewhat finer than that in the corresponding layer in an uneroded Hickory soil, and its color is more yellowish. Runoff is rapid, and the hazard of further erosion is serious. Narrow strips of severely eroded soils that resemble soils of the Ava or Hosmer series are included in the mapped areas of these soils. The included areas are on the upper parts of the slopes. (Management group IVe–1; woodland suitability group 6.)

Hickory loam, 12 to 18 percent slopes (8E).—The profile of this soil is similar to the one described for the Hickory series. This soil is generally on the lower parts of the slopes. Narrow strips of soils that resemble soils of the Ava or Hosmer series are on the upper parts of the slopes and are included in the mapped areas of this soil. (Management group IVe–1; woodland suitability group 6.)

Hickory loam, 12 to 30 percent slopes, moderately eroded (8E2).—The profile of this soil is similar to the one described for the Hickory series, except that the A horizon is generally 3 to 7 inches thick. Small areas in which the A horizon is thicker than 7 inches are included in the mapped areas. Areas of soils that resemble soils of the Ava or Hosmer series are also included. The included

areas are on the upper parts of the slopes. (Management group IVe–1; woodland suitability group 6.)

Hickory soils, 12 to 30 percent slopes, severely eroded (8E3).—In each of these soils the profile is similar to the one described for the series, but the A horizon is less than 3 inches thick. The present surface layer consists of a mixture of soil material from the original A and B horizons. Therefore, it is finer textured and more yellowish than the surface layer of an uneroded Hickory soil. Included in the mapped areas of these soils are narrow strips of soils that resemble those of the Ava or Hosmer series. These included areas are on the upper parts of the slopes. Small, gullied areas are also included. (Management group VIe–2; woodland suitability group 6.)

Hickory-Alford complex, 4 to 7 percent slopes, moderately eroded (999C2).—The profile of each soil in this complex resembles the one described for its series. In most places the A horizon is 3 to 7 inches thick. In some small areas, however, it is less than 3 inches thick, and in other areas it is thicker than 7 inches. (Management group IIe–2; woodland suitability group 6.)

Hickory-Alford complex, 7 to 12 percent slopes, moderately eroded (999D2).—In the soils of this complex, the profiles are similar to the ones described for the Hickory and Alford series. In most places the A horizon is 3 to 7 inches thick. In some small areas, however, it is less than 3 inches thick, and in other areas it is more than 7 inches thick. (Management group IIIe–4; woodland suitability group 6.)

Hickory-Alford complex, 7 to 12 percent slopes, severely eroded (999D3).—The profile of the soils in this complex is similar to the profile described for the Hickory or the Alford series, but the A horizon is less than 3 inches thick. The plow layer is a mixture of soil material from the A and B horizons. It has a somewhat finer texture than the plow layer of an uneroded soil. Runoff is rapid, and the hazard of further erosion is serious. (Management group IVe–1; woodland suitability group 6.)

Hickory-Alford complex, 12 to 30 percent slopes, severely eroded (999E3).—The profile of the soils in this complex is similar to the one described for the Hickory or for the Alford series. In these soils, however, the remaining A horizon is less than 3 inches thick. Included in the mapped areas of these soils are some small areas where the A horizon is thicker than 3 inches. (Management group VIe–2; woodland suitability group 6.)

Hosmer Series

The soils of this series are light colored, moderately deep, and moderately well drained. They are Gray-Brown Podzolic soils of the uplands, but they are intergrading toward Red-Yellow Podzolic soils. These soils developed in 50 inches or more of loess. In most places the loess is underlain by glacial drift, but in places it is underlain by sandstone, siltstone, or shale. The native vegetation was a hardwood forest consisting mainly of oak, hickory, and maple.

These gently sloping to very strongly sloping soils are in the Hosmer-Stoy soil association. They are silty and erode readily unless measures are used to control runoff.

The Hosmer soils are very slowly permeable because of a dense, compact layer, or fragipan, in the lower part of the subsoil. Their available moisture capacity is only moderate because of the dense layer. The dense layer also limits the depth to which roots can penetrate. Natural fertility is medium. The soils are medium to very strongly acid, except in some fields where the plow layer has been made less acid by adding lime.

The Hosmer soils resemble the Ava soils of the Ava-Bluford association. The Hosmer and Ava soils have similar relief, but the Hosmer soils developed entirely in loess, and the Ava soils developed in loess and glacial drift.

Profile description of a Hosmer silt loam:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, crumb structure; friable; slightly acid.

A2—6 to 10 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure; friable; dark grayish-brown (10YR 4/2) worm casts and root channels; slightly acid.

B1—10 to 14 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; moderate, fine, subangular blocky structure; slightly firm; dark yellowish-brown (10YR 3/4) worm casts; slightly acid.

B2t—14 to 27 inches, strong-brown (7.5YR 5/6) silty clay loam with a few, fine, faint mottles of yellowish brown (10YR 5/8); strong, fine and medium, subangular blocky structure; firm; medium to strongly acid.

A'2x—27 to 31 inches, pale-brown (10YR 6/3) heavy silt loam with a few, fine, distinct mottles of strong brown (7.5YR 5/8); weak, fine, subangular blocky structure; friable; fragile when dry; strongly to very strongly acid.

B'21x—31 to 38 inches, strong-brown (7.5YR 5/6) light silty clay loam with many, coarse, distinct, gray (10YR 6/1) mottles; moderate, coarse, blocky structure to slightly prismatic; firm; strongly to very strongly acid.

B'22x—38 to 60 inches, strong-brown (7.5YR 5/8) silt loam with many, coarse, distinct, light-gray (10YR 6/1 to 7/1) mottles; large polygonal blocks with gray streaks; very firm; fragipan is most strongly expressed in this horizon; strongly to very strongly acid.

C'x—60 to 68 inches, strong-brown (7.5YR 5/6) silt loam with many, common, distinct, light-gray (10YR 7/1) mottles; dark reddish-brown (5YR 3/3) iron and manganese concretions; weak fragipan; medium to strongly acid.

Hosmer silt loam, 2 to 4 percent slopes (214B).—The profile of this soil closely resembles the one described for the series. The A horizon is generally 7 to 14 inches thick. Small areas of Hosmer silt loam, 0 to 2 percent slopes, in which the A horizon is more than 14 inches thick, are included in the mapped areas of this soil. (Management group IIe–4; woodland suitability group 5.)

Hosmer silt loam, 2 to 4 percent slopes, moderately eroded (214B2).—The remaining A horizon of this soil is 3 to 7 inches thick. In some places dark yellowish-brown soil material from the B horizon has been mixed into the plow layer. In those areas the plow layer is finer textured than that of an uneroded Hosmer soil. The areas mapped include a small acreage of a severely eroded soil. (Management group IIe–4; woodland suitability group 5.)

Hosmer silt loam, 4 to 7 percent slopes (214C).—The profile of this soil is similar to the profile described for the series. The A horizon is 7 to 14 inches thick. (Management group IIIe–2; woodland suitability group 5.)

Hosmer silt loam, 4 to 7 percent slopes, moderately eroded (214C2).—The remaining A horizon of this soil is 3 to 7 inches thick. The present plow layer is slightly finer textured and less porous than that of an uneroded

Hosmer soil. Runoff is rapid, and the hazard of further erosion is serious. (Management group IIIe–2; woodland suitability group 5.)

Hosmer soils, 4 to 7 percent slopes, severely eroded (214C3).—The plow layer of these soils consists of a mixture of soil material from the original A horizon and the upper part of the B horizon. Therefore, its texture is heavy silt loam to light silty clay loam. Runoff is rapid, and the hazard of further erosion is serious. (Management group IVe–1; woodland suitability group 5.)

Hosmer silt loam, 7 to 12 percent slopes, moderately eroded (214D2).—The remaining A horizon of this soil is only 3 to 7 inches thick. The present plow layer is finer textured and less porous than that of an uneroded Hosmer soil. Runoff is rapid and erosion is a major hazard. Included in the mapped areas of this soil is a small acreage of an uneroded Hosmer soil and of a slightly eroded Hosmer soil. Also included is a small acreage of a moderately eroded, imperfectly drained soil that resembles the soils of the Stoy series. (Management group IIIe–2; woodland suitability group 5.)

Hosmer soils, 7 to 12 percent slopes, severely eroded (214D3).—In these soils the remaining A horizon is less than 3 inches thick. The plow layer is made up mostly of soil material from the B horizon. Its texture is heavy silt loam to light silty clay loam, which makes the soils somewhat difficult to work. The fragipan is generally nearer the surface than in the less eroded Hosmer soils. A small acreage of a gullied Hosmer soil and of a severely eroded, imperfectly drained soil, similar to the Stoy soils, is included in the mapped areas of these soils. (Management group IVe–1; woodland suitability group 5.)

Hosmer soils, 12 to 18 percent slopes, severely eroded (214E3).—The remaining A horizon of these soils is less than 3 inches thick. The present plow layer is mostly soil material from the B horizon. It has a texture of heavy silt loam to light silty clay loam. The fragipan in these soils is nearer the surface than in the less eroded or less steep Hosmer soils. The areas mapped include a small acreage of slightly eroded and of moderately eroded Hosmer soils. (Management group VIe–2; woodland suitability group 5.)

Hoyleton Series

The soils of the Hoyleton series are moderately dark colored, deep, imperfectly drained Brunizems that are intergrading toward Planosols. These soils are on uplands and developed in 20 to 50 inches of loess over weathered glacial drift. The native vegetation was mainly prairie grasses, chiefly little bluestem, but in places it included scattered brush and trees.

These nearly level to moderately sloping soils are in the Hoyleton-Cisne association. Where their slope is greater than 2 percent, the soils erode easily unless measures are used to control runoff.

The Hoyleton soils are slowly permeable because their subsoil is fine textured and somewhat dense. If the soils are well managed, however, roots can penetrate the subsoil. The available moisture capacity is high. These soils are low in natural fertility. They are strongly acid to very strongly acid, except in fields where the plow layer has been made less acid by adding lime.

The Hoyleton soils are darker colored than the Bluford, which are in the Ava-Bluford association.

Profile description of a Hoyleton silt loam:

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

A2—10 to 17 inches, dark yellowish-brown (10YR 4/4) silt loam with a few, medium, prominent, yellowish-red and red mottles; weak, medium, platy structure that breaks to medium, granular; friable; very strongly acid; clear, wavy boundary.

B1—17 to 20 inches, dark yellowish-brown (10YR 4/4) light silty clay loam with common, medium, distinct, brown (10YR 5/3) mottles and many, fine, prominent, red (2.5YR 4/8) mottles; strong, fine and medium, subangular blocky structure; firm; strongly to very strongly acid; clear, smooth boundary.

B2t—20 to 30 inches, pale-brown (10YR 6/3) silty clay loam with common, medium, faint, gray (10YR 5/1) mottles and distinct, strong-brown (7.5YR 5/8) splotches; moderate, medium, subangular blocky structure; firm; strongly to very strongly acid; clear, smooth boundary.

IIB3—30 to 40 inches, pale-brown (10YR 6/3) gritty silty clay loam with common, medium, distinct mottles of yellowish brown (10YR 5/8); weak, medium, blocky structure; firm; strongly to very strongly acid; clear, smooth boundary.

IIC—40 inches +, yellowish-brown (10YR 5/4) gritty silt loam to light silty clay loam with common, medium, faint mottles of grayish brown (10YR 5/2); massive; friable; slightly to medium acid.

The B horizon is at a depth of less than 24 inches. It generally extends downward into the till, which is below the loess.

The Hoyleton soils are fairly uniform, but they vary, to some extent, in the degree of mottling and in the brightness of the mottling. The A and B horizons vary in thickness.

Hoyleton silt loam, 0 to 2 percent slopes (3A).—The profile of this soil is similar to the one described for the series. Included in the mapped areas are some areas of a slightly eroded Hoyleton soil. (Management group IIw–5.)

Hoyleton silt loam, 2 to 4 percent slopes (3B).—This soil generally has an A horizon that is 7 to 14 inches thick. The areas mapped, however, include small areas in which the A horizon is thicker than 14 inches. (Management group IIe–3.)

Hoyleton silt loam, 2 to 4 percent slopes, moderately eroded (3B2).—The remaining A horizon of this soil is 3 to 7 inches thick. In some places the lighter colored soil material from the A2 horizon has been mixed with the A1 horizon by plowing. In a few places the upper part of the B horizon makes up part of the plow layer. Further erosion is a hazard. The areas mapped include a small acreage of a severely eroded Hoyleton soil. They also include areas of a soil that is moderately well drained. (Management group IIe–3.)

Hoyleton silt loam, 4 to 7 percent slopes, moderately eroded (3C2).—The profile of this soil is similar to the one described for the series, but the remaining A horizon is only 3 to 7 inches thick. The present plow layer is slightly finer textured than the original one because it consists partly of material from the B horizon. Runoff is rapid, and the hazard of further erosion is serious. The areas mapped include a small acreage of a slightly eroded and of a severely eroded Hoyleton soil. (Management group IIIe–1.)

Iona Series

The Iona soils are light colored, deep, and silty. They are Gray-Brown Podzolic soils of the uplands. These soils developed in loess that is more than 6 feet thick. The native vegetation was a hardwood forest consisting mainly of oak, gum, ash, maple, and basswood.

These nearly level to moderately sloping soils are in the Alford-Iona soil association. In sloping areas they erode readily unless measures are used to control runoff.

The Iona soils are moderately permeable and are moderately well drained. They have high available moisture capacity. Natural fertility is medium. The soils are acid to a depth ranging from 36 to 50 inches. Below that depth, they are first mildly alkaline and then calcareous. In some fields the plow layer has been made less acid by adding lime.

Although the Iona soils are associated with the Alford soils, they are not so well drained nor so deeply leached as those soils.

Profile description of an Iona silt loam:

Ap—0 to 6 inches, dark-brown (10YR 3/3) to dark grayish-brown (10YR 4/2) silt loam; crumb structure; friable; slightly acid.

A2—6 to 14 inches, dark grayish-brown (10YR 4/2) silt loam with few, fine, faint coatings of light brownish gray (10YR 6/2); weak, thin, platy structure but breaks to granular; friable; medium acid.

B1—14 to 18 inches, dark yellowish-brown (10YR 4/4) light silty clay loam with common, fine, distinct coatings of light brownish gray (10YR 6/2); weak, medium, subangular blocky structure; firm; medium acid.

B2t—18 to 28 inches, yellowish-brown (10YR 5/6) silty clay loam with light brownish-gray (10YR 6/2) mottles and black (10YR 2/1) manganese concretions; moderate, medium, subangular blocky structure; firm; medium acid.

B3—28 to 36 inches, yellowish-brown (10YR 5/4) light silty clay loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles and a few manganese concretions; weak, medium, subangular blocky structure; firm; slightly acid.

C1—36 to 42 inches, yellowish-brown (10YR 5/4) heavy silt loam; common, medium, distinct mottles of light brownish gray (10YR 6/2); very weak, subangular blocky structure; friable; slightly acid to neutral.

C2—42 inches +, yellowish-brown (10YR 5/6) silt loam with common, light-gray (10YR 7/2) mottles; friable; mildly alkaline to calcareous.

In a few places the soils have been leached to a depth greater than 60 inches.

Iona silt loam, 0 to 2 percent slopes (307A).—The profile of this soil is similar to the one described for the series. This soil is easy to till. The areas mapped include a small acreage of a slightly eroded soil. (Management group I–3; woodland suitability group 6.)

Iona silt loam, 2 to 4 percent slopes (307B).—In most places the A horizon of this soil is 7 to 14 inches thick, but in a small acreage it is thicker than 14 inches. This soil is easy to till, but there is some hazard of erosion because of the slopes. (Management group IIe–2; woodland suitability group 6.)

Iona silt loam, 2 to 4 percent slopes, moderately eroded (307B2).—The remaining A horizon of this soil is generally between 3 and 7 inches thick. Part of the finer textured material from the subsoil is mixed with the surface soil. Runoff is rapid. Most of this soil is cultivated. The mapped areas include a small acreage in which the soil is severely eroded. (Management group IIe–2; woodland suitability group 6.)

Iona silt loam, 4 to 7 percent slopes, moderately eroded (307C2).—The remaining A horizon of this soil is generally between 3 and 7 inches thick. The present plow layer consists of a mixture of soil material from the original surface layer and the subsoil. Runoff is rapid, and the hazard of further erosion is serious. A small acreage in which the soil is not eroded is included in the mapped areas of this soil. Also included is a moderately eroded soil that has slopes of 7 to 12 percent. (Management group IIe–2; woodland suitability group 6.)

Landes Series

This series is made up of well-drained, light-colored Alluvial soils that formed in sandy sediments of the flood plains. Because these soils formed in recent sediments, no specific kind of native vegetation is typical.

The Landes soils are nearly level to moderately sloping. They are on bottom lands in the Haymond-Allison soil association. Unless they are protected by levees, flooding is usually a problem.

These soils are rapidly permeable and have low available moisture capacity. Natural fertility is medium, but phosphate, potash, and nitrogen increase the yields of crops. Applications of lime are generally not needed.

Profile description of a Landes fine sandy loam:

1—0 to 10 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) fine sandy loam; single grain; friable; neutral.

2—10 to 26 inches, dark grayish-brown (10YR 4/2) sandy loam; single grain; loose; neutral.

3—26 to 36 inches, grayish-brown (10YR 5/2) to brown (10YR 5/3) sandy loam to loamy sand; single grain; loose; neutral.

4—36 to 45 inches, grayish-brown (10YR 5/2) to light brownish-gray (10YR 6/2) loamy sand; single grain; loose; neutral.

5—45 to 50 inches +, grayish-brown (10YR 5/2) to light brownish-gray (10YR 6/2) fine sand; single grain; loose; neutral.

The color of the surface layer ranges from very dark grayish brown to grayish brown.

Landes silt loam, overwash, 0 to 2 percent slopes (304A+).—In this soil recent deposits of light-colored silt loam, 8 to 15 inches thick, cover the original sandy surface layer. This soil is easy to till, and crops grown on it respond well if fertilizer is added. The soil has to be protected by levees, however, to be cultivated safely. In an extremely dry season it may be droughty. (Management group IIIw–1; woodland suitability group 1.)

Landes fine sandy loam, 0 to 2 percent slopes (304A).—The profile of this soil is similar to the one described for the series. This soil needs to be protected by levees. In extremely dry years crops may be damaged by drought. A small acreage of a Landes fine sandy loam in which the present plow layer shows the effects of erosion is included in the mapped areas of this soil. Also included are areas that are subject to frequent flooding. (Management group IIIw–1; woodland suitability group 1.)

Landes fine sandy loam, 2 to 4 percent slopes (304B).—The profile of this soil is similar to the one described for the series. This soil is easy to till, but it needs to be pro-

tected by levees. In an extremely dry season, crops grown on it are damaged because the soil is droughty. (Management group IIIw–1; woodland suitability group 1.)

Landes fine sandy loam, 4 to 7 percent slopes (304C).—The profile of this soil is similar to the one described for the series. The soil is easy to till, but it needs to be protected by levees if it is to be cultivated safely. In dry seasons crops may be damaged because this soil is droughty. Small areas in which the slope is between 7 and 12 percent are included in the mapped areas. Also included are some areas in which the present plow layer shows the effects of erosion caused by overflow. (Management group IIIw–1; woodland suitability group 1.)

Lukin Series

The Lukin series is made up of imperfectly drained, deep, moderately dark colored Brunizems that are intergrading toward Planosols. The soils developed in 25 to 50 inches of loess over Illinoian till. The surface layer is silt loam and is more than 24 inches thick. The subsoil is silty clay loam and generally begins at a depth of 24 to 32 inches. The native vegetation was predominantly grass, but it included scattered hardwood trees.

These nearly level to gently sloping soils are on the uplands in the Hoyleton-Cisne soil association. On the nearly level slopes, drainage may be a problem. Where water from hillsides is a problem, diversion ditches may be needed.

The available moisture capacity is high. Natural fertility is medium, but applications of lime, potash, phosphate, and nitrogen increase crop yields.

In some places the Lukin and Hoyleton soils have similar relief, but the A horizon of the Lukin soils is considerably thicker than that of the Hoyleton.

Profile description of a Lukin silt loam:

A1—0 to 10 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) silt loam with weak, medium, crumb structure; friable; strongly acid.

A2—10 to 24 inches, dark yellowish-brown (10YR 4/4) silt loam with a few, medium, prominent mottles of yellowish red and red; weak, medium, and platy structure that breaks to medium, granular; friable; very strongly acid.

B1—24 to 30 inches, light brownish-gray (10YR 6/2) heavy silt loam to light silty clay loam with moderate, medium, subangular blocky structure; strongly acid to very strongly acid.

B2t—30 to 38 inches, dark yellowish-brown (10YR 4/4) and light brownish-gray (10YR 6/2) silty clay loam with strong-brown (7.5YR 5/8) splotches; moderate, medium, subangular blocky structure; firm when moist, and sticky when wet; strongly to very strongly acid.

C—38 inches +, yellowish-brown (10YR 5/4) silt loam with many, medium, distinct mottles of light brownish gray (10YR 6/2) and dark grayish brown (10YR 4/2); massive; firm; strongly acid.

The Lukin soils are fairly uniform, but they vary, to some extent, in degree and brightness of mottling. In many places the B horizon extends downward to the Illinoian till.

Lukin silt loam, 0 to 2 percent slopes (167A).—The profile of this soil is similar to the one described for the series, except that in most places the A horizon is thicker than 24 inches. In places this soil needs surface drainage that protects it from runoff from surrounding higher areas. (Management group IIw–5.)

Lukin silt loam, 2 to 4 percent slopes (167B).—The profile of this soil is similar to the one described for the series. The A horizon is 24 inches or more thick. This soil is subject to some erosion. (Management group IIe–3.)

Marissa Series

The Marissa series consists of moderately dark colored, deep, imperfectly drained Gray-Brown Podzolic soils that are intergrading toward Brunizems. The soils developed in sediments deposited by water. The native vegetation was grasses and scattered trees.

The Marissa soils are level to gently sloping. They are on stream terraces along Bonpas Creek and the Wabash River in the Bonpas-McGary soil association.

Permeability is moderately slow to moderate, and the available moisture capacity is high. Tile function well in these soils.

Natural fertility is medium to high. Lime, phosphate, and nitrogen are generally needed for high yields of crops.

The Marissa soils are in positions similar to those occupied by the Bonpas and Patton soils, but they have a lighter textured surface layer than those soils. The lower part of their surface layer also is grayer than that in the Bonpas and Patton soils.

Profile description of a Marissa silt loam:

A1—0 to 10 inches, very dark gray (10YR 3/1) to dark gray (10YR 4/1) silt loam; weak, fine, crumb structure; friable; slightly to medium acid.

A2—10 to 16 inches, dark-gray (10YR 4/1) to grayish-brown (10YR 5/2) silt loam; weak, fine, crumb structure; friable; slightly acid.

B2t—16 to 28 inches, grayish-brown (10YR 5/2) to dark-gray (10YR 4/1) heavy silty clay loam mottled with light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/4 and 5/8); strong, fine and medium, subangular blocky structure; firm; manganese concretions; slightly acid to neutral.

B3—28 to 36 inches, dark-gray (N 4/0) light silty clay loam with common, medium mottles of reddish yellow; moderate, medium, subangular blocky structure; firm; slightly acid to neutral.

C—36 to 42 inches, olive (5Y 5/4) silt loam with olive-yellow (5Y 6/8) mottles; has thin layers of loam, sandy loam, or clay loam in some places; massive; slightly alkaline.

Marissa silt loam, 0 to 2 percent slopes (176A).—This soil has a profile similar to the one described for the series. The A horizon is 14 inches or more thick. Small areas that have recent deposits of light- and dark-colored soil material from adjacent higher areas are included in the mapped areas of this soil. Also included are small areas of a slightly eroded soil. (Management group I–2.)

Marissa silt loam, 2 to 4 percent slopes (176B).—The profile of this soil is similar to the profile described for the series. The A horizon ranges from 7 to 18 inches in thickness. This soil is subject to erosion. Small areas where there are deposits of silty overwash are included in the mapped areas of this soil. (Management group IIe–1.)

McGary Series

The soils of the McGary series are light colored and moderately deep. They are Gray-Brown Podzolic soils, but they are intergrading toward Low-Humic Gley soils. The soils are underlain by calcareous clay deposited by water. In uneroded areas the calcareous clay is generally 24 to 45 inches below the surface. The native vegetation was mainly hardwoods, such as oak and hickory, but it included some beech and maple.

These nearly level to very strongly sloping soils are in the Bonpas-McGary association. The sloping areas erode readily unless measures are used to control runoff.

These soils are very slowly permeable and are imperfectly drained. The available moisture capacity is moderate, and natural fertility is low. The soils are acid to a depth ranging from 24 to 45 inches, but they are calcareous below that depth. In some fields the plow layer has been made less acid by adding lime.

Profile description of a McGary silt loam:

A1—0 to 9 inches, brown (10YR 5/3) silt loam; fine, granular structure; friable; medium acid.

A2—9 to 13 inches, yellowish-brown (10YR 5/4 and 5/8) silt loam; weak, thin, platy structure; friable; slightly acid.

B1—13 to 21 inches, grayish-brown (10YR 5/2) light silty clay loam; medium, subangular blocky structure with a tendency toward prismatic; firm; thin coatings of light brownish gray (10YR 6/2) on peds; medium to slightly acid.

B2—21 to 30 inches, mixed yellowish-brown (10YR 5/8), dark yellowish-brown (10YR 4/4), and gray (10YR 5/1) heavy silty clay loam to silty clay; strong, medium and coarse, angular blocky structure; very firm; slightly acid.

C—30 inches +, dark yellowish-brown (10YR 4/4) silty clay to clay with common, distinct mottles of yellowish brown (10YR 5/8); moderately to strongly alkaline.

In uneroded areas the A horizon ranges from 7 to 20 inches in thickness. Below a depth of about 30 inches, the soils are increasingly calcareous and there are concretions of calcium carbonate. Iron concretions are present throughout the upper part of the profile.

McGary silt loam, 0 to 2 percent slopes (173A).—The profile of this soil is similar to the one described for the series. The A horizon is generally between 7 and 14 inches thick. The areas mapped include a limited acreage of a moderately eroded soil. They also include small areas in which the A horizon is thicker than 14 inches. (Management group IIIw–4; woodland suitability group 11.)

McGary silt loam, 2 to 4 percent slopes (173B).—The profile of this soil is similar to the one described for the series. The A horizon is between 7 and 14 inches thick. This soil erodes easily. (Management group IIIe–3; woodland suitability group 11.)

McGary silt loam, 2 to 4 percent slopes, moderately eroded (173B2).—The profile of this soil differs from the one described for the series in that the remaining A horizon is only 3 to 7 inches thick. Part of the B horizon, which is finer textured than the A, is mixed with the silt loam in the present plow layer. Runoff is fairly rapid, and the hazard of further erosion is serious in places. This soil is low in organic matter. The areas mapped include a small acreage of a severely eroded soil. (Management group IIIe–3; woodland suitability group 11.)

McGary silt loam, 4 to 7 percent slopes, moderately eroded (173C2).—The remaining A horizon of this soil is 3 to 7 inches thick. In some places soil material from both the surface layer and the subsoil is mixed in the plow layer. As a result, the texture of the plow layer is finer than that in the less eroded soils, runoff is more rapid, and the hazard of further erosion is increased. (Management group IIIe–3; woodland suitability group 11.)

McGary soils, 4 to 7 percent slopes, severely eroded (173C3).—The remaining A horizon of these soils is less than 3 inches thick. In the plow layer fine-textured soil material from the B horizon is well mixed with that in the remaining A horizon. (Management group VIe–1; woodland suitability group 11.)

McGary soils, 7 to 12 percent slopes, severely eroded (173D3).—In most places the remaining A horizon of these soils is less than 3 inches thick, but in a small acreage it is 3 to 7 inches thick. Soil material from the fine-textured B horizon is well mixed with that in the remaining A horizon. Runoff is rapid because of the fine texture of the surface layer. (Management group VIe–1; woodland suitability group 11.)

McGary soils, 12 to 18 percent slopes, severely eroded (173E3).—These soils have been exposed to runoff and have not been protected by grasses or trees. Their remaining A horizon is generally less than 3 inches thick, and the hazard of further erosion is severe. The areas mapped include a small acreage of a moderately eroded soil. Also included is a small acreage of a severely eroded soil that has slopes of 18 to 30 percent. (Management group VIe–1; woodland suitability group 11.)

Orio Series

Poorly drained, moderately dark colored soils make up the Orio series. These soils are Planosols. They developed in 24 to 50 inches of moderately coarse textured (sandy), water-laid material over loose sand. The native vegetation was grasses and sedges that tolerate water.

The Orio soils are nearly level. They are on stream terraces and on outwash plains in the Alvin-Roby soil association.

Drainage is a problem on these soils. In places surface ditches can be used with good results. Tile will function, but the underlying sand can enter the tile and makes tiling hazardous. Natural fertility is low. Applications of lime, phosphate, potash, and nitrogen are needed to increase the yields of crops.

The Orio soils have relief similar to that of the Selma soils. They contain more sand than the Selma soils, however, and they have a lighter colored surface layer and subsurface layer.

Profile description of Orio sandy loam:

A1—0 to 8 inches, very dark gray (10YR 3/1) sandy loam; weak, crumb structure; very friable; medium acid.

A2—8 to 20 inches, gray (10YR 5/1) to dark-gray (10YR 4/1) sandy loam with very weak, granular structure; very friable when moist, loose when dry; medium to strongly acid.

B2t—20 to 35 inches, dark-gray (10YR 4/1) clay loam with common, medium, distinct mottles of yellowish brown (10YR 5/4); moderate, medium, subangular blocky structure; slightly sticky when wet; medium to strongly acid.

C—35 inches +, gray (10YR 5/1), stratified sand and silt; friable.

Orio sandy loam (200).—This is the only Orio soil mapped in Wabash County. Its A horizon is more than 14 inches thick. Some areas are wet and require surface drainage. Tiling is questionable because in places there are pockets of sand at tile depth. This sandy soil is seldom, if ever, excessively droughty. (Management group IIw–4.)

Patton Series

The soils of the Patton series are moderately dark, deep, and poorly drained or very poorly drained. They are Humic Gley soils developed in moderately fine textured to fine textured, slack-water deposits or in sediments laid down in lakes. The native vegetation was mainly swamp grasses, but forest encroached in some areas.

These soils are on low terraces. They occur in the Bonpas-McGary association.

These soils have moderate to moderately slow permeability. They can be tiled when suitable outlets are available. The available moisture capacity is high. If the soils are well managed, roots can penetrate the subsoil readily. Natural fertility is high. The soils are slightly acid to neutral.

The Patton and Bonpas soils have similar relief. The surface layer of the Patton soils is lighter colored, however, and the peds in the subsoil of the Patton soils have more clay coatings.

Profile description of Patton silty clay loam:

Ap—0 to 7 inches, dark gray (10YR 4/1) to very dark gray (10YR 3/1) silty clay loam; weak, medium, granular structure; firm; slightly acid.

A1—7 to 15 inches, dark gray (10YR 4/1) to very dark gray (10YR 3/1) silty clay loam with a few, fine, distinct mottles of yellowish brown (10YR 5/8); moderate, fine, subangular blocky structure; firm; slightly acid.

Bg1—15 to 20 inches, very dark grayish-brown (2.5Y 3/2) silty clay loam with a few, medium, distinct mottles of yellowish brown (10YR 5/6); moderate, fine and medium, subangular blocky structure; firm; dark grayish-brown, thick, continuous clay films on peds; slightly acid.

Bg2—20 to 35 inches, light olive-brown (2.5Y 5/4) heavy silty clay loam with distinct, very dark gray (10YR 3/1) mottles; strong, medium, subangular blocky structure; firm; grayish-brown clay films on peds; slightly acid to neutral.

C—35 inches +, light olive-brown (2.5Y 5/4) light silty clay loam with many, distinct mottles of yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8); weak, fine, angular blocky structure to massive; firm; neutral to slightly alkaline.

Patton silty clay loam (142).—This is the only Patton soil mapped in this county. Its profile is similar to the one described for the series. This soil has slopes of 0 to 2 percent. Its A horizon is generally more than 14 inches thick. If suitable outlets are available, this soil can be tiled. It presents few problems, and crops grown on it respond well if fertilizer is added. The areas mapped include small areas of a soil on light-colored colluvial material that accumulated from adjacent higher areas. They also include small areas of a soil that has a dark, medium-textured surface layer, and small areas of a slightly eroded soil. Patton silty clay loam is in management group I–1 if it is drained and protected from overflow. It is in management group IIw–1 if it is not drained or protected.

Petrolia Series

The Petrolia series consists of poorly drained, light-colored Low-Humic Gley soils intergrading toward Alluvial soils. These soils developed in alluvial deposits that are slightly acid to mildly alkaline. They are moderately fine textured; their texture is silty clay loam throughout. These soils are in positions where water is ponded for long periods of time. The native vegetation was a deciduous forest of mixed hardwoods of the bottom lands.

These nearly level soils are in areas in the Haymond-Allison and Bonpas-McGary soil associations. Because of their slow permeability and high water table, drainage is generally needed. In areas where surface ditches can be used to provide adequate drainage, tiling is usually not recommended. Tile will function slowly if outlets can be provided.

Natural fertility is low. When the soils are not too wet, applications of phosphate, potash, and nitrogen increase crop yields.

The Petrolia and Beaucoup soils have similar relief and are poorly drained, but the Petrolia soils are lighter colored than the Beaucoup.

Profile description of Petrolia silty clay loam:

Ap—0 to 7 inches, gray (10YR 5/1) to dark grayish-brown (10YR 4/2) silty clay loam with a few, distinct mottles of dark reddish brown (5YR 3/4); moderate, fine, granular structure; firm; slightly acid.

A1g—7 to 18 inches, gray (N 5/0) silty clay loam with a few, medium, distinct mottles of yellowish brown (10YR 5/8) and many, fine, distinct mottles of dark brown (7.5YR 4/4); very weak, fine, blocky structure; firm; slightly acid to neutral.

B1g—18 to 39 inches, olive-brown (2.5Y 4/4) to gray (10YR 5/1) silty clay loam with few, medium, distinct mottles of yellowish brown (10YR 5/8) and few, fine, distinct mottles of very dark brown (10YR 2/2); weak, fine, blocky structure; firm; slightly acid to neutral.

B2g—39 to 50 inches +, gray (2.5Y 5/1) silty clay loam with mottles of yellowish brown (10YR 5/6); moderate, fine, blocky structure; neutral.

Petrolia silty clay loam (288).—This is the only Petrolia soil mapped in this county. It has a profile similar to the one described for the series. A small acreage that has on the surface, recent deposits of light-colored, silty material less than 15 inches thick, is included in the mapped areas of this soil. (Management group IIw–2; woodland suitability group 2.)

Racoon Series

The Racoon soils are light-colored, moderately deep, poorly drained Planosols developed on stream terraces. Their surface layer is silt loam and is 24 to 40 inches thick. Their subsoil is heavy silty clay loam. The native vegetation was a hardwood forest consisting mainly of oak and hickory.

These nearly level soils are in the Sharon-Belknap association. They are on colluvial terraces adjacent to the uplands. Unless practices are used to carry off excess water, these soils remain wet longer than desirable.

These soils have a claypan subsoil. As a result, permeability is slow or very slow. Available moisture capacity is only moderate because of the fine-textured subsoil, which limits the penetration of roots to some extent.

Natural fertility is low. The soils are strongly acid, except in fields where the plow layer has been made less acid by adding lime.

The Racoon soils resemble the Chauncey, but they have a lighter colored surface layer. They are similar to the Wynoose soils, but they have a thicker surface layer.

Profile description of Racoon silt loam:

Ap—0 to 7 inches, gray (10YR 5/1) to dark grayish-brown (10YR 4/2) silt loam with many yellowish-brown (10YR 5/8) mottles; moderate, medium, crumb structure; friable; medium acid; clear, smooth boundary.

A21—7 to 13 inches, grayish-brown (10YR 5/2) to brown (10YR 5/3) silt loam with many, fine mottles of gray (10YR 6/1) and reddish yellow (5YR 6/6); medium, granular and weak, platy structure; friable; medium to strongly acid; clear, smooth boundary.

A22—13 to 25 inches, light brownish-gray (10YR 6/2) silt loam with common, fine, distinct mottles of strong brown (7.5YR 5/8) and yellowish red (5YR 4/8); weak, platy structure that breaks to weak, granular; friable; strongly acid; abrupt, smooth boundary.

B2t—25 to 36 inches, dark-gray (10YR 4/1) heavy silty clay loam to light silty clay with common, fine, prominent mottles of yellowish red (5YR 5/8); strong, medium, subangular blocky structure; sticky when wet; very strongly acid; clear, smooth boundary.

B3—36 to 43 inches, gray (10YR 5/1) silty clay loam with common, faint, dark mottles of yellowish brown (10YR 4/4); weak, medium, subangular blocky structure; sticky when wet; strongly acid; clear, smooth boundary.

C—43 inches +, variable layers of water-laid silt loam and silty clay loam.

Racoon silt loam (109).—This is the only Racoon soil mapped in the county. Its profile is the one described for the series. (Management group IIIw–4; woodland suitability group 3.)

Riverwash (123)

This miscellaneous land type consists of coarse, loose, gravelly material along the banks of the Wabash River. It also occurs just inside the levees, in front of old levee breaks. Most areas of this land type along the riverbanks lie only a few feet above the level of the water when the river is at its normal stage. A single flood may change the size or shape of an area or may wash the gravel away entirely. Riverwash consists of gray to yellowish-brown, gravelly deposits, and it has no soil profile.

Willows are among the first plants to grow on these areas. They commence growing after an area gets high enough to be above the normal level of the water for an extended period of time.

Riverwash has no agricultural value. If accessible, it may be a source of gravel for local farmers or for others. A small acreage of fine-textured sand mixed with gravel is included in this mapping unit. (Management group VIIs–1; woodland suitability group 9.)

Roby Series

This series is made up of light-colored, deep, imperfectly drained Gray-Brown Podzolic soils. These soils developed in 24 to 40 inches of medium-textured to moderately coarse textured material that was deposited by wind and water. The material in which they formed is underlain by noncalcareous loamy fine sand to sand that extends to a depth of more than 60 inches. The native vegetation was a hardwood forest, principally oak and hickory.

The Roby soils are on stream terraces, on outwash plains, and on windblown deposits on the uplands in the Alvin-Roby soil association. They are less well drained than the Alvin soils.

These soils are nearly level to moderately sloping. On the sloping areas practices need to be used to control erosion. Natural fertility is low. If high yields of crops are to be obtained, lime, phosphate, potash, and nitrogen need to be applied for each crop.

Profile description of a Roby fine sandy loam:

Ap—0 to 7 inches, dark-brown to brown (10YR 4/3) fine sandy loam to sandy loam; single grain; friable; neutral to slightly acid.

A2—7 to 17 inches, yellowish-brown (10YR 5/4) to brown (10YR 4/3) fine sandy loam; weak, fine, subangular blocky and weak, thin, platy structure; friable; many dark grayish-brown (10YR 4/2) worm casts; medium to slightly acid.

B1—17 to 22 inches, brownish-yellow (10YR 6/6) coarse gritty silty clay loam with common, medium, distinct mottles of very pale brown (10YR 7/3) and a few, fine, distinct mottles of dark yellowish brown (10YR 4/4); weak, medium, subangular blocky structure; firm; slightly acid.

B2t—22 to 35 inches, yellowish-brown (10YR 5/4) silty clay loam to clay loam with many, medium, distinct mottles of pale brown (10YR 6/3); moderate, medium, subangular blocky structure; firm; strongly acid.

C1—35 to 55 inches, brown to dark-brown (7.5YR 4/4) medium sand with very pale brown (10YR 8/3) mottles; single grain; loose; slightly acid.

C2—55 inches +, brown to dark-brown (7.5YR 4/4) loamy sand with common, medium, distinct mottles of very pale brown (10YR 7/4); single grain; loose; slightly acid.

Roby fine sandy loam, 0 to 2 percent slopes (184A).—The profile of this soil is similar to the one described for the series. The A horizon is more than 12 inches thick. This soil is low in organic matter. Crops grown on it respond well if fertilizer is added. The soil is easy to till. (Management group IIs–1; woodland suitability group 7.)

Roby fine sandy loam, 2 to 4 percent slopes (184B).—This soil has a profile similar to the one described for the series. Its A horizon is generally 7 to 14 inches thick. This soil is suitable for cultivated crops, but it is subject to erosion. The areas mapped include a small acreage of a moderately eroded soil and of a severely eroded soil. (Management group IIe–5; woodland suitability group 7.)

Roby fine sandy loam, 4 to 7 percent slopes, moderately eroded (184C2).—The remaining A horizon of this soil is generally 3 to 7 inches thick. The soil is subject to erosion. Part of the present plow layer is a mixture of soil material from the original surface layer and the subsoil. This soil is low in organic matter. Crops grown on it respond well if fertilizer is added. The areas mapped include small areas of an uneroded soil and of a slightly eroded soil. (Management group IIIe–5; woodland suitability group 7.)

Selma Series

The Selma series consists of dark, deep, poorly drained Humic Gley soils of stream terraces. The soils developed in stratified sediments deposited by water. Their

surface layer has a loam texture and is about 17 inches thick. The subsoil is clay loam to sandy clay loam and is about 25 to 30 inches thick. The subsoil is underlain by layers of sand, loamy sand, and, in some places, thin, silty material at a depth of 40 to 60 inches. The native vegetation was grasses, reeds, and sedges that tolerate water.

The Selma soils are in nearly level areas or in depressions. They are on sandy outwash plains, stream terraces, or shallow glacial lakes in the Selma-Camden association. Wetness may be a problem if ditches and tile are not properly installed.

These soils are moderately permeable and have high available moisture capacity. Natural fertility is high. In most places the soils do not need lime or potash, but they need phosphate and nitrogen for high yields of crops.

The Selma soils are in positions similar to those occupied by the Bonpas soils. They have more sand throughout the profile than the Bonpas soils, and they are underlain by more sandy material.

Profile description of Selma loam:

Ap—0 to 8 inches, black (10YR 2/1) loam; weak, fine, granular structure; friable; numerous unstained sand grains; common, fine roots; slightly acid to neutral; abrupt, smooth boundary.

A1—8 to 13 inches, black (10YR 2/1) heavy loam; moderate, fine and medium, granular structure; friable; numerous unstained sand grains; common, fine roots; slightly acid to neutral; gradual, smooth boundary.

A3—13 to 17 inches, very dark gray (10YR 3/1) light clay loam; weak, fine, subangular blocky structure; friable to slightly firm; many worm casts of black material from the horizons above and occasional chunks of material from horizon just below; few, fine roots; slightly acid to neutral; gradual, smooth boundary.

B1g—17 to 22 inches, dark grayish-brown (2.5Y 4/2) to very dark gray (2.5Y 3/1) light clay loam with a few, fine, distinct mottles of yellowish brown (10YR 5/4); weak, fine, subangular blocky structure; slightly firm; occasional, thin, dark-colored organic coatings; few chunks of material from horizon just above intermixed; few, fine roots; few, dark-colored concretions; slightly acid to neutral; gradual, smooth boundary.

B2g—22 to 37 inches, dark-gray (2.5Y 4/1) to olive-gray (5Y 4/2) clay loam to sandy clay loam with common, medium, distinct mottles of light olive brown (2.5Y 5/4); few, fine, prominent mottles of yellowish brown (10YR 5/6) oriented around small, soft, iron concretions; weak to moderate, medium, subangular blocky structure with tendency toward prismatic orientation of peds, particularly in the lower part; slightly firm; few, fine roots; occasional krotovina filled with very dark gray material from layers above; few, hard, black concretions; slightly acid to neutral; gradual, wavy boundary.

B3gCg—37 to 44 inches, grayish-brown (2.5Y 5/2) heavy loam to fine sandy loam with few, medium, prominent mottles of yellowish brown (10YR 5/6); very weak, coarse, subangular blocky structure to single grain; friable; krotovinas end in this horizon; few concretions; slightly acid to neutral; clear, wavy boundary.

Cg—44 to 60 inches, gray (10YR 5/1) to brown (10YR 5/3) sand to loamy sand with a few, coarse, faint streaks of yellowish brown (10YR 5/4 to 5/6); occasional thin strata of coarse sand to fine gravel; single grain; loose; slightly acid to neutral but is more alkaline with increasing depth; in most places noncalcareous to a depth below 60 inches.

Selma loam (125).—This is the only Selma soil mapped in the county. Its profile is similar to the profile described for the series. This soil has slopes of 0 to 2 percent. Its A horizon is generally 14 inches or more thick. Small areas of Selma loam, 2 to 4 percent slopes, on which there are recent deposits of lighter colored soil material from adjacent higher areas are included in the mapped areas of this soil. Also included are small areas in which the surface layer is thinner than that in the profile described as typical for the series. Selma loam is in management group I–2 if it is adequately drained and protected from overflow. It is in management group IIw–1 if it is not adequately drained or protected.

Sexton Series

The soils of this series are light-colored, shallow to moderately deep, poorly drained Planosols. They formed partly in silty sediments and partly in the underlying stratified outwash. The surface layer is 15 to 24 inches of silt loam. The subsoil is mottled heavy silty clay loam to light silty clay and is underlain by stratified, silty, sandy, and gravelly sediments deposited by water. The native vegetation was deciduous forest, chiefly oak and hickory.

The Sexton soils are nearly level and are on stream terraces and outwash plains in the Selma-Camden soil association. Drainage is generally needed, and open ditches are the best method of removing excess water.

Available moisture is limited because of the claypan subsoil. The claypan also restricts the development of roots. Natural fertility is low. Applications of lime, phosphate, potash, and nitrogen increase the yields of crops.

The Sexton soils have a thinner surface layer and a coarser textured substratum than the Racoon soils. The soils of both series are in areas of similar relief.

Profile description of Sexton silt loam:

A1—0 to 8 inches, grayish-brown (10YR 5/2) to dark grayish-brown (10YR 4/2) silt loam; weak, fine, crumb structure; friable; medium to strongly acid.

A2—8 to 20 inches, light-gray (10YR 6/1) to pale-brown (10YR 6/3) silt loam; moderate, thin, platy structure; friable; medium to strongly acid.

B2t—20 to 40 inches, brown (10YR 5/3) to yellowish-brown (10YR 5/4) heavy silty clay loam with gray (10YR 6/1) mottles; moderate, medium, prismatic structure that breaks to blocky structure; firm; strongly acid.

C—40 to 50 inches, stratified, silty, sandy, and gravelly sediments.

Sexton silt loam (208).—This is the only Sexton soil mapped in the county. Its profile is similar to the one described for the series. Generally, the A horizon is more than 14 inches thick. This soil has very slow surface drainage. Surface ditches are most economical for providing drainage because tiling is generally unsatisfactory. Included in the mapped areas of this soil are small areas in which the surface layer is less than 14 inches thick. Small areas that have gentle slopes are also included. (Management group IIIw–4; woodland suitability group 10.)

Sharon Series

Light-colored, deep, moderately well drained or well drained Alluvial soils make up this series. The soils developed in medium-textured material washed by water from the upland soils. The native vegetation was a deciduous forest, predominantly maple, gum, sycamore, cottonwood, and tulip-poplar.

These nearly level soils are in the Sharon-Belknap soil association. In general, they occur in the smaller areas of bottom lands or in better drained areas along the larger streams. These soils are subject to flash floods of short duration.

The Sharon soils are moderately permeable and have high available moisture capacity. Natural fertility is low to medium. The soils are medium to strongly acid, except in fields where the plow layer has been made less acid by adding lime.

The Sharon soils are better drained than the Belknap and Bonnie soils. They are more acid than the Haymond soils.

Profile description of Sharon silt loam:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) to yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; friable; slightly acid.

1—8 to 24 inches, brown (10YR 4/3) to dark grayish-brown (10YR 4/2) silt loam; weak, granular structure to massive; friable; medium to strongly acid.

2—24 to 35 inches, dark yellowish-brown (10YR 3/4) silt loam; massive; friable; common, fine pores; medium to strongly acid.

3—35 to 55 inches +, yellowish-brown (10YR 5/4) silt loam with common, fine and medium, faint mottles of pale brown (10YR 6/3) to light yellowish brown (10YR 6/4); massive; friable; medium to strongly acid.

In most places the mottles are more than 30 inches below the surface, but in places faint mottles are at a depth between 24 and 35 inches. In many places at a depth of 35 to 50 inches, the soil material is more grayish than the material at the same depth in the profile described.

Sharon silt loam (72).—This is the only Sharon soil mapped in the county. Its profile is similar to the one described for the series. Where it is protected from overflow, this soil is in management group I–3. Where it is not protected from overflow, it is in management group IIw–3. (Woodland suitability group 1.)

Starks Series

Light-colored, imperfectly drained, deep Gray-Brown Podzolic soils make up the Starks series. These soils formed partly in silty sediments and partly in the underlying stratified outwash. The surface layer is silt loam and is 12 to 20 inches thick in uneroded areas. The subsoil is mottled silty clay loam and is underlain by stratified silty, sandy, and gravelly, water-laid sediments at a depth of less than 40 inches. The native vegetation was a deciduous forest consisting chiefly of oak and hickory.

These soils are nearly level to moderately sloping. They are on stream terraces and on outwash plains in the Selma-Camden association. In level or nearly level areas, open ditches are the best method of draining these soils. The sloping areas need practices that control erosion.

Natural fertility is medium. Applications of lime, phosphate, and nitrogen increase the yields of crops grown on these soils.

Profile description of a Starks silt loam:

Ap—0 to 5 inches, grayish-brown (10YR 5/2) to dark grayish-brown (10YR 4/2) silt loam; weak, fine, crumb structure; friable; slightly acid; abrupt, smooth boundary.

A2—5 to 14 inches, grayish-brown (10YR 5/2) to light-gray (10YR 5/1) silt loam with few, fine, faint mottles of dark grayish brown (10YR 4/2); weak, platy and weak, fine, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B1—14 to 20 inches, mottled brown (10YR 5/3), yellowish-brown (10YR 5/4), and light brownish-gray (10YR 6/2) light silty clay loam; moderate, very fine, subangular blocky structure; firm; strongly acid; clear, smooth boundary.

B2t—20 to 30 inches, gray (10YR 5/1) to grayish-brown (10YR 5/2) silty clay loam with dark yellowish-brown (10YR 4/4) mottles; moderate, fine and medium, subangular blocky structure; firm; some silt coatings of pale brown (10YR 6/3); medium to strongly acid; clear, smooth boundary.

B3—30 to 40 inches, grayish-brown (10YR 5/2) to light brownish-gray (10YR 6/2) gritty light silty clay loam with distinct mottles of yellowish brown (10YR 5/6 to 5/8); weak, medium, subangular blocky structure; slighty firm; medium acid; clear, smooth boundary.

C—40 inches +, dark-brown (7.5YR 4/4) sandy clay loam with common, medium, distinct mottles of light brownish gray (2.5Y 6/2); massive; contains thin layers of silt, sand, and clay, and some gravel in places.

The Starks soils in Wabash County are fairly uniform, but they vary in the degree of mottling. Also, the B horizon varies in thickness, and the C horizon varies in depth to stratified sand, silt, and clay.

Starks silt loam, 0 to 2 percent slopes (132A).—The profile of this soil is similar to the one described for the series. In most places the A horizon is 7 to 14 inches thick, but there are some areas in which it is more than 14 inches thick. There are also a few small areas in which it is less than 7 inches thick. If drainage is needed, tile will function in areas where proper outlets are available. (Management group IIw–5; woodland suitability group 10.)

Starks silt loam, 2 to 4 percent slopes, moderately eroded (132B2).—The remaining A horizon of this soil is normally 3 to 7 inches thick. In some places part of the soil material from the finer textured B horizon is mixed with the silt loam A horizon in the plow layer. Small areas of uneroded, slightly eroded, and severely eroded soils are included in the mapped areas of this soil. (Management group IIe–3; woodland suitability group 10.)

Starks silt loam, 4 to 7 percent slopes, moderately eroded (132C2).—In most places the remaining A horizon of this soil is between 3 and 7 inches thick, but in a small acreage it is thicker. The soil is low in organic matter. Crops grown on it respond well if fertilizer is added. Nearly all of the acreage is cultivated. (Management group IIIe–1; woodland suitability group 10.)

Starks soils, 4 to 7 percent slopes, severely eroded (132C3).—The remaining A horizon of these soils is less than 3 inches thick in most places. In the present plow layer, material from the A and B horizons is mixed. As a result, the texture of the present surface layer is finer than that in the original surface layer, runoff has increased, and the hazard of further erosion is serious. Limited areas of very severely gullied land and small areas of a poorly drained soil are included in the mapped areas of these soils. (Management group IVe–1; woodland suitability group 10.)

Stoy Series

Light-colored, deep, imperfectly drained Gray-Brown Podzolic soils of the uplands make up this series. These soils developed in 50 inches or more of loess over weathered

glacial drift. The native vegetation was a hardwood forest consisting mainly of oak, hickory, and maple.

These nearly level to moderately sloping soils are in the Hosmer-Stoy association. The sloping areas erode readily unless measures are used to control runoff.

The soils are slowly permeable because they have a fine-textured and somewhat dense subsoil. The available moisture capacity is high. If the soils are well managed, roots can penetrate the subsoil. Natural fertility is low. The soils are medium to strongly acid, except in some fields where the plow layer has been made less acid by adding lime.

The Stoy soils resemble the Bluford, which are in the Ava-Bluford association. They are in areas of similar relief. The Stoy soils developed entirely in silty loess, however, and the Bluford developed partly in loess and partly in glacial drift.

Profile description of a Stoy silt loam:

Ap—0 to 5 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, crumb structure; friable; slightly acid; abrupt, smooth boundary.

A2—5 to 14 inches, brown (10YR 5/3) silt loam with common, faint, mottles of light gray (10YR 6/1); moderate, thin, platy structure; friable; few iron concretions; medium acid; clear, smooth boundary.

B1—14 to 19 inches, brown (10YR 5/3) to yellowish-brown (10YR 5/4) silty clay loam with common, fine, faint mottles of light brownish gray (10YR 6/2); moderate, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B2t—19 to 28 inches, gray (10YR 5/1) silty clay loam with medium, distinct mottles of yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4); some silt coatings of pale brown (10YR 6/3); moderate, medium, subangular blocky structure; firm; medium acid; clear, smooth boundary.

B3—28 to 38 inches, light brownish-gray (10YR 6/2) to light-gray (10YR 7/2) heavy silt loam with common, distinct mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; friable to firm; medium acid; clear, smooth boundary.

C—38 inches +, gray (10YR 5/1) silt loam; nearly massive; friable; medium acid.

Stoy silt loam, 0 to 2 percent slopes (164A).—The profile of this soil is similar to the one described for the series. In most places the A horizon is more than 14 inches thick, but in a small acreage it is only 7 to 14 inches thick. The areas mapped include a limited acreage of an uneroded or slightly eroded, moderately well drained soil. (Management group IIw–5; woodland suitability group 4.)

Stoy silt loam, 2 to 4 percent slopes (164B).—The A horizon of this soil is generally between 7 and 14 inches thick. The areas mapped include small areas of soils that have an A horizon more than 14 inches thick. They also include a small acreage in which the B horizon contains more clay than the B horizon in the typical soil. In places there is enough clay to restrict the development of roots. (Management group IIe–3; woodland suitability group 4.)

Stoy silt loam, 2 to 4 percent slopes, moderately eroded (164B2).—The remaining A horizon of this soil is only 3 to 7 inches thick in most places. Finer textured soil material from the B horizon has been mixed with that in the A horizon in the plow layer. Small areas that are severely eroded are included in the mapped areas of this soil. (Management group IIe–3; woodland suitability group 4.)

Stoy silt loam, 4 to 7 percent slopes (164C).—The profile of this soil is similar to the one described for the series. The A horizon is 7 to 14 inches thick. (Management group IIIe–1; woodland suitability group 4.)

Stoy silt loam, 4 to 7 percent slopes, moderately eroded (164C2).—The remaining A horizon of this soil is 3 to 7 inches thick. The present plow layer is a mixture of soil material from the A and B horizons. It is somewhat finer textured than that in an uneroded Stoy soil. (Management group IIIe–1; woodland suitability group 4.)

Stoy soils, 4 to 7 percent slopes, severely eroded (164C3).—The remaining A horizon of these soils is less than 3 inches thick. The present plow layer is a mixture of soil material from the surface layer and the subsoil and is finer textured than the original A horizon. Runoff is rapid, and the hazard of further erosion is serious. (Management group IVe–1; woodland suitability group 4.)

Sumner Series

The soils of this series are dark to moderately dark, deep Brunizems that are well drained or moderately well drained. These soils developed in sand deposited by wind and water. The native vegetation was prairie grasses.

These nearly level soils are on stream terraces along the Wabash River. They are in the Alvin-Roby association.

Permeability is rapid, and the available moisture capacity is low. Natural fertility is low to medium. These soils are slightly acid to neutral. Droughtiness and wind erosion are the main hazards.

Profile description of Sumner sandy loam:

A1—0 to 11 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

A3—11 to 15 inches, dark-brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) sandy loam; weak, fine, granular structure; very friable; slightly acid to neutral; clear, smooth boundary.

B2t—15 to 23 inches, dark yellowish-brown (10YR 4/4) coarse loam; weak, medium, subangular blocky structure; friable; slightly acid to neutral; gradual, smooth boundary.

B3—23 to 30 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4), friable coarse sandy loam that contains bands of dark-brown (7.5YR 4/3), firm sandy clay loam; slightly acid to neutral; clear, smooth boundary.

C—30 inches +, reddish-brown (5YR 4/4) to yellowish-brown (10YR 5/6), loose loamy sand that contains layers of fine gravel and sand; slightly acid.

Sumner sandy loam (87).—This is the only Sumner soil mapped in the county. It has a profile similar to the one described for the series. The A horizon is about 14 inches thick. In most places this soil has slopes of 0 to 2 percent, but in small areas the slopes are slightly stronger. Droughtiness is a definite hazard. (Management group IIIs–1.)

Tice Series

The Tice series consists of imperfectly drained, deep, moderately dark Alluvial soils that are intergrading toward Humic Gley soils. The soils developed chiefly in moderately fine textured (silty clay loam), slack-water sediments that are slightly acid to neutral. The native vegetation was trees and grasses that tolerate water.

These nearly level soils occupy low areas in the Haymond-Allison association. Tile that are properly installed and that have a good outlet will function well in the soils, but surface ditches generally provide adequate drainage.

Natural fertility is high. In most places lime is not needed on these soils. Some increase in crop yields can be obtained by applying phosphate and nitrogen.

The Tice soils are in areas where the relief is similar to that where the Beaucoup and Petrolia soils occur, but they have better natural drainage than those soils.

Profile description of Tice silty clay loam:

Ap—0 to 6 inches, very dark gray (10YR 3/1) to very dark grayish-brown (10YR 3/2) silty clay loam; weak, granular structure; slightly acid to neutral.

1—6 to 20 inches, very dark grayish-brown (10YR 3/2) silty clay loam with very dark gray (10YR 3/1) coatings; weak, fine and medium, blocky structure; slightly acid to neutral.

2—20 to 30 inches, dark grayish-brown (10YR 4/2) to gray (10YR 5/1) heavy silty clay loam with many, fine, distinct mottles of yellowish brown (10YR 5/6) and black (10YR 2/1); slightly acid to neutral.

3—30 to 42 inches +, dark grayish-brown (10YR 4/2) to brown (10YR 4/3) and gray (10YR 5/1) gritty silty clay loam with mottles of yellowish brown (10YR 5/8) and dark reddish brown (5YR 3/4); slightly acid to neutral.

Tice silty clay loam (284).—This is the only Tice soil mapped in the county. Its profile is similar to the one described for the series. Included in the areas mapped is a small acreage in which a thin layer of mixed dark- and light-colored, silty material has been deposited on the surface. Also included is a small acreage of a soil that has slopes of 2 to 4 percent. In Wabash County some areas of Tice silty clay loam are protected by levees. Where this soil is protected from overflow, it is in management group I–1. Where it is not protected, it is in management group IIw–1. (Woodland suitability group 1.)

Wakeland Series

Imperfectly drained, deep, silty, light-colored Alluvial soils make up this series. The soils developed in material weathered from silty sediments that are slightly acid to neutral. The native vegetation was deciduous forest, predominantly oak, maple, gum, and elm.

Some areas of these nearly level to gently sloping soils are on relatively narrow bottoms along small streams. Other areas are on wide bottoms along the major streams. The soils are in the Haymond-Allison soil association. Where the Wakeland soils are along the small streams, diversions may be needed to protect them from water from the adjacent hillsides. Open ditches satisfactorily drain these soils.

These soils have high available moisture capacity and slow permeability. Natural fertility is low, and phosphate, potash, and nitrogen will increase the yields of crops. Lime is not needed in most places.

The Wakeland soils are less acid than the Belknap, but the soils of both series are imperfectly drained. In places they occur on similar topography.

Profile description of a Wakeland silt loam:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, crumb structure; friable; few iron concretions; slightly acid to neutral; abrupt, smooth boundary.

1—7 to 15 inches, dark grayish-brown (10YR 4/2) to brown (10YR 4/3) silt loam; weak, fine, crumb structure; friable; slightly acid to neutral; gradual, smooth boundary.

2—15 to 35 inches, grayish-brown (10YR 5/2) silt loam with common, medium, faint, light brownish-gray (10YR 6/2) and distinct, very dark grayish-brown (10YR 3/2) mottles; weak, fine, crumb structure; friable; common iron concretions; slightly acid to neutral; gradual, smooth boundary.

3—35 inches +, grayish-brown (10YR 5/2) to brown (10YR 5/3) silt loam with common, medium mottles that are very dark grayish brown (10YR 3/2) and light brownish gray (10YR 6/2); weak, fine, crumb structure to massive; friable; common iron concretions; neutral to mildly alkaline.

Wakeland silt loam, 0 to 2 percent slopes (333A).—The profile of this soil is similar to the one described for the series. This soil is on small bottoms and is occasionally covered by floodwaters when a flash flood occurs. It can be tile drained, but securing an adequate outlet is a problem in many places. (Management group IIw–3; woodland suitability group 1.)

Wakeland silt loam, 2 to 4 percent slopes (333B).—This soil is at the base of hills adjacent to the level bottom lands. It has steeper slopes than the soils on the bottom lands. Its profile is similar to the one described for the series. Included in the areas mapped is a small acreage where recent deposits of light-colored, silty material are on the surface. (Management group IIw–3; woodland suitability group 1.)

Wakeland silt loam, 0 to 2 percent slopes, wet (W333A).—The profile of this soil is similar to the one described for the series. This soil remains wet for long periods. Frequent flooding makes it impractical to use the soil for cultivated crops. (Management group Vw–1; woodland suitability group 1.)

Weir Series

The soils of this series are light-colored, shallow, poorly drained Planosols of the uplands. They developed in 50 inches or more of loess over weathered glacial drift. The native vegetation was a hardwood forest consisting mainly of oak and hickory.

These nearly level soils are in the Hosmer-Stoy association. Unless practices are used to carry off excess water, the soils remain wet longer than desirable.

The Weir soils are very slowly permeable because they have a claypan subsoil. Because of the claypan, the available moisture capacity is only moderate and the penetration of roots is limited. Natural fertility is low. If the soils are made highly fertile by adding plant nutrients so that roots enter the claypan, their moisture capacity is high. These soils are strongly acid, except in fields where the plow layer has been made less acid by adding lime.

These soils resemble the Wynoose soils of the Ava-Bluford soil association. The Weir and Wynoose soils are in areas of similar relief. The Weir soils developed entirely in loess, however, and the Wynoose developed in shallow loess over glacial drift. In addition, the B horizon of the Wynoose soils extends downward into the glacial material in most areas.

Profile description of Weir silt loam:

A1—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, crumb structure; friable; iron concretions present; medium acid.

A2—8 to 15 inches, light brownish-gray (10YR 6/2) silt loam; weak, thin and medium, platy structure; friable; contains iron concretions; strongly acid.

B1—15 to 21 inches, gray (10YR 5/1) silty clay loam with mottles of light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4); moderate, fine and medium, prismatic structure that breaks to blocky; firm; iron concretions present; strongly acid.

B2t—21 to 35 inches, gray (10YR 5/1) silty clay loam to heavy silty clay loam; light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/4) mottles; moderate, coarse, blocky structure; sticky when wet; very strongly acid.

C—35 inches +, gray (10YR 6/1) silt loam with brownish-yellow (10YR 6/6) and yellowish-brown (10YR 5/4) specks.

Light-gray silica coatings are normally on the peds in the B1 and B2 horizons.

Weir silt loam (165).—This is the only Weir soil mapped in the county. Its profile is similar to the one described for the series. Small areas where colluvial material from higher areas has accumulated are included in the mapped areas of this soil. Also included are areas that have a slightly thinner A horizon than that in the profile described. (Management group IIIw–4; woodland suitability group 3.)

Worthen Series

The soils of this series are moderately dark to dark, deep, well drained or moderately well drained Brunizems that are intergrading toward Alluvial soils. These soils are on terraces made up of fairly recent sediments along the Wabash River. They are predominantly in the southern part of the county. The soils developed in silt that was deposited by water. The native vegetation was prairie grasses.

These nearly level to moderately sloping soils are in the Selma-Camden soil association. They are in areas that are only slightly higher than the surrounding bottom lands. The moderately sloping areas consist of short breaks between the terraces and the bottom lands and are in colluvial areas at the base of steep slopes. These sloping areas are subject to erosion.

These soils are moderately permeable, and plant roots can penetrate readily. Natural fertility is medium to high, but crops grown on these soils respond well if fertilizer is added. These soils are slightly acid to neutral.

Profile description of a Worthen silt loam:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; friable; slightly acid to neutral.

A1—8 to 16 inches, black (10YR 2/1) to very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; many worm casts and holes; slightly acid to neutral.

A3—16 to 22 inches, very dark gray (10YR 3/1) to dark yellowish-brown (10YR 4/4) silt loam with smears of very dark grayish brown (10YR 3/2); weak, fine, granular and subangular blocky structure; friable; slightly acid to neutral.

B—22 to 34 inches, yellowish-brown (10YR 5/6) heavy silt loam; weak, medium, subangular blocky structure; firm; organic coatings of very dark gray (10YR 3/1); many wormholes; slightly acid to neutral.

C—34 inches +, yellowish-brown (10YR 5/6) silt loam; massive; friable; slightly acid to neutral.

The organic coatings are carried down into the B horizon through numerous wormholes. As a result, there are two distinct colors (10YR 3/1 and 10 YR 5/6) in the B horizon.

Worthen silt loam, 0 to 2 percent slopes (37A).—The profile of this soil is similar to the profile described for the series. The A horizon is 14 inches or more thick. (Management group I–2.)

Worthen silt loam, 2 to 4 percent slopes (37B).—The profile of this soil is similar to the one described for the series. The A horizon is generally 14 inches or more thick, except where a small acreage of slightly eroded and moderately eroded Worthen soils is included in the mapped areas of this soil. (Management group IIe–1.)

Worthen silt loam, 4 to 7 percent slopes (37C).—The A horizon of this soil is generally 7 to 14 inches thick. A small acreage of a moderately eroded Worthen soil and a small acreage in which the slopes are greater than 7 percent are included in the mapped areas of this soil. (Management group IIe–1.)

Wynoose Series

The Wynoose series consists of light-colored, shallow, poorly drained Planosols. The soils developed in 20 to 50 inches of loess underlain by weathered Illinoian till. Their surface layer has a texture of silt loam. A claypan of very dense fine silty clay loam to clay makes up the subsoil. The native vegetation was hardwood forest, chiefly oak and hickory.

These soils are nearly level. They are in the Ava-Bluford soil association.

Wetness and low fertility are major problems in managing these soils. Permeability is very slow. Therefore, surface ditches should be used to provide drainage. Available moisture is moderate. Natural fertility is low.

The Wynoose soils are in areas where the relief is similar to that of the Cisne soils, but they have a somewhat lighter colored A1 or Ap horizon than the Cisne soils.

Profile description of Wynoose silt loam:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) silt loam; weak, medium, granular structure; friable; few to many iron concretions on the surface; medium to strongly acid; abrupt, smooth boundary.

A2—6 to 17 inches, light brownish-gray (10YR 6/2) to white (10YR 8/2) silt loam; weak to moderate, thin, platy structure; friable; few to many iron concretions; strongly to very strongly acid; clear, wavy boundary.

AB—17 to 19 inches, light brownish-gray (10YR 6/2) to white (10YR 8/2) heavy silt loam or mixed silt loam and light silty clay loam; weak to moderate, medium, subangular blocky structure; firm; very strongly acid; abrupt, smooth boundary.

B21t—19 to 25 inches, grayish-brown (10YR 5/2) silty clay loam to light silty clay with a few, fine, yellowish-brown (10YR 5/6) mottles and common, fine, light-gray (10YR 7/2) streaks; moderate, medium, prismatic structure that breaks to weak, medium, blocky; firm; very strongly acid; clear, wavy boundary.

B22t—25 to 33 inches, grayish-brown (10YR 5/2) heavy silty clay loam to silty clay with a few, fine, faint mottles of yellowish brown (10YR 5/6); weak, medium, prismatic structure that breaks to very weak, angular blocky; firm; very plastic when wet; very strongly acid; clear, wavy boundary.

B31—33 to 40 inches, grayish-brown (10YR 5/2) silty clay loam with many, fine, strong-brown (7.5YR 5/6) mottles; massive; firm; very plastic when wet; very strongly acid; gradual, wavy boundary.

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B32—40 to 45 inches, light brownish-gray (10YR 6/2) gritty silt loam with common, medium mottles of yellowish red (5YR 5/6); massive; friable; very strongly acid.

IIC—45 inches +, mottled light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/8) silt loam with some sand grains and pebbles; glacial till; massive; friable; medium to strongly acid.

In many places the B horizon extends downward into the underlying glacial till.

Wynoose silt loam (12).—This is the only Wynoose soil mapped in the county. Its profile is similar to the profile described for the series. The areas mapped include some small areas in which the A horizon is thinner than that in the profile described. (Management group IIIw–4; woodland suitability group 3.)

Formation and Classification of Soils

Factors of Soil Formation

Soils are developed primarily by the action of climate and of plants and animal life upon parent material. Relief indirectly affects the formation of soils by influencing drainage. The time during which the parent material has been subjected to these forces partly determined the degree to which the present soils have developed. Figure 3 shows the relationship of some Wabash County soils to these forces of soil formation.

Table 5 groups the soils according to their parent material, physiography, or relief, and native vegetation. It also shows the degree to which the profile has developed, the natural soil drainage class for each series, and the soil association in which the soils of each series chiefly occur. The location of the soil associations in this county is shown on the general soil map at the back of the report, and each association is described in the section "General Soil Areas." How the five major factors of soil development—parent material, climate, vegetation, relief, and time—have influenced the soils of Wabash County and their distribution is discussed in the following pages.

Parent material.—This is formed mainly from the weathering of rock, but glaciers, wind, and water may have moved the material from place to place and may have sorted it. The soils in Wabash County developed mainly in glacial till that was deposited by glacial ice, in loess that was deposited by the wind, or in alluvium and lake-bed sediments that were deposited by water.

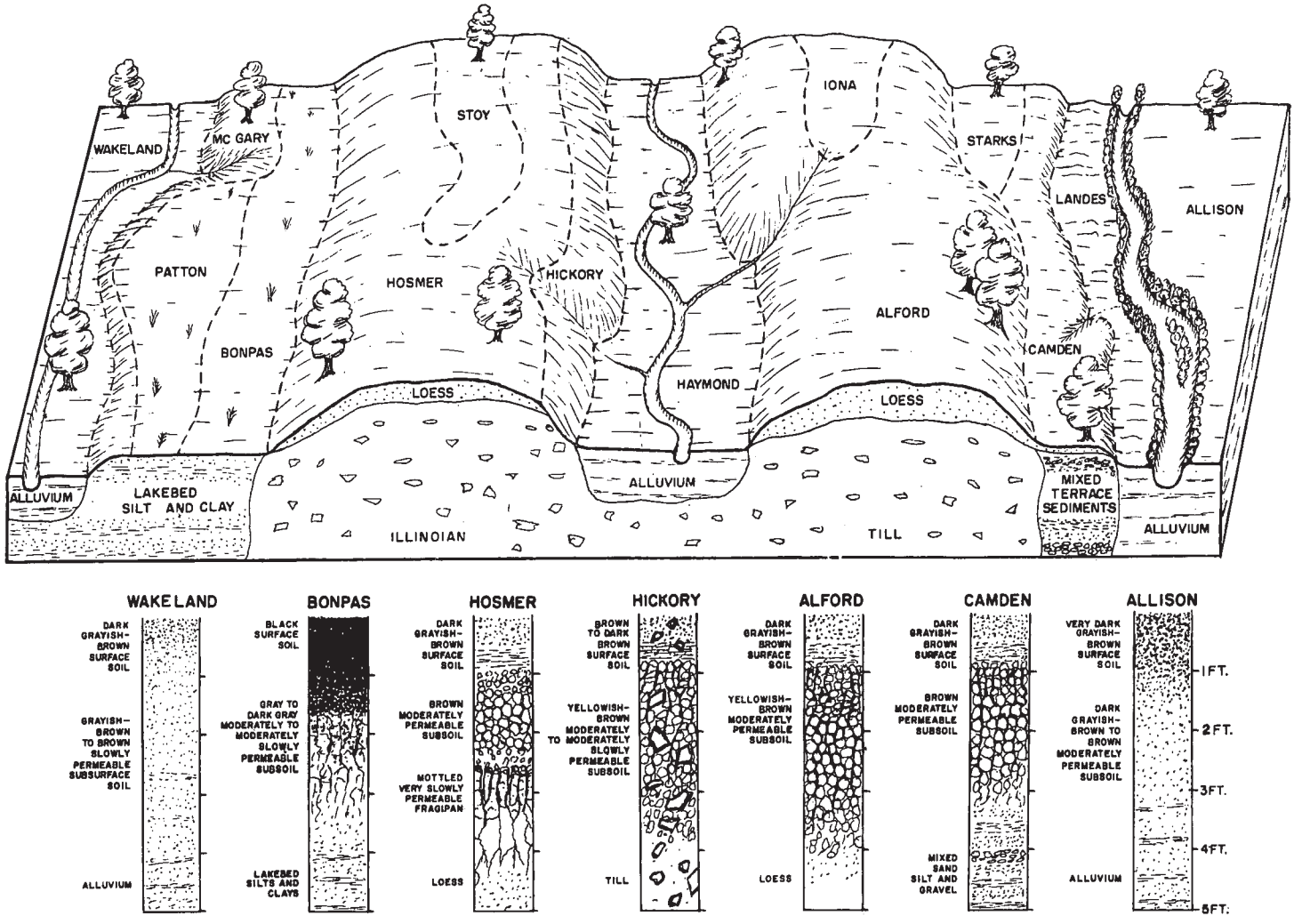

Figure 3.—General relationship of some Wabash County soils to physiographic position, relief, parent material, and native vegetation.

TABLE 5.—*Wabash County soils classified according to parent material, native vegetation, degree of development, and natural soil drainage*

Soil association and physiography	Parent material	Native vegetation	Degree of development	Natural soil drainage class			
				Poorly to very poorly drained	Imperfectly drained	Moderately well drained	Well drained
Association A: Uplands	Loess 80 to 150 inches thick	Forest	Moderate			Iona	Alford.
	Illinoian till on steep slopes	Forest	Moderately strong.			Hickory	Hickory.
Association B: Uplands	Loess 50 to 80 inches thick	Forest	Moderately strong.	Weir	Stoy	Hosmer	
	Illinoian till on steep slopes	Forest	Moderately strong.			Hickory	Hickory.
Association C: Uplands	Loess 30 to 50 inches thick over Illinoian till.	Forest	Strong	Wynoose	Bluford	Ava	
	Illinoian till on slopes	Forest	Strong		Blair	Hickory	Hickory.
Association D: Uplands	Loess 30 to 50 inches thick over Illinoian till.	Grass	Strong; less than 24 inches to B horizon.[1]	Cisne	Hoyleton		
			Strong; more than 24 inches to B horizon.[1]	Chauncey	Lukin		
Association E: Terraces and uplands	Sandy sediments deposited by water and wind.	Forest	Very weak				Bloomfield.
			Moderate		Roby	Alvin	Alvin.
		Grass	Weak			Sumner	Sumner.
			Moderate	Orio			
Association F: Terraces	Silt, less than 40 inches thick, deposited by wind and water on stratified material. The Worthen soils generally have more than 50 to 60 inches of silty material.	Forest	Moderate	Sexton	Starks	Camden	Camden.
		Grass	Weak			Worthen	Worthen.
			Moderate	Selma			
Association G: Terraces	Lacustrine, or water-deposited, silts and clays laid down in the beds of lakes.	Forest	Moderate		McGary		
		Forest-grass.[2]	Moderate		Marissa		
		Grass	Moderate	Patton			
			Weak	Bonpas			
Association H: Bottom lands (acid)	Light-colored, silt loam sediments.	Forest	Very weak	Bonnie	Belknap	Sharon	Sharon.
Terraces	Silt loam, colluvial sediments	Forest	Moderate to strong.	Racoon			
	Light-colored, gravelly sediments.	Forest	Very weak				Riverwash.
	Light-colored, sandy sediments.	Forest	Very weak			Landes	Landes.
Association J: Bottom lands (slightly acid to neutral).	Light-colored, silt loam sediments.	Forest	Very weak	Birds	Wakeland	Haymond	Haymond.
	Light-colored, silty clay loam sediments.	Forest	Very weak	Petrolia			
	Moderately dark colored silty clay loam.	Grass	Very weak	Beaucoup	Tice	Allison	Allison.
	Moderately dark colored silty clay to clay.	Grass	Very weak	Darwin			

[1] The depth to the B horizon, or the total thickness of the A horizon, assumes that little or no erosion has taken place. The depth to the B horizon is not necessarily associated with the degree of development but is included here to indicate one of the important differences between certain groups of soils.

[2] The description "forest-grass" indicates that forest has invaded an area of grassland but has not yet entirely changed the features of the soils developed under grass.

Glacial till, most of which has a loam texture, is the parent material of the Hickory loams in soil associations A, B, and C on the steeper slopes of the uplands in the county. Some of these slopes were probably once covered with loess, which has since been removed by erosion. The sand and pebbles in the Hickory soils are similar to those in the original glacial till. The soil-forming processes have removed clay from the surface layer and deposited it in the B horizon, or subsoil. As a result, the texture of the subsoil is clay loam.

Both the glacial till and loess were calcareous when they were deposited in Wabash County, that is, they contained a large amount of lime. Originally, the soils that developed in glacial till and loess were probably well supplied with plant nutrients. Over a long period of time, however, the action of climate and of plants and animals has, in varying degrees, leached the plant nutrients from the parent material. As a result of the leaching, the soils generally require large applications of lime and fertilizer for good growth of crops.

The thickness of the loess in nearly level, uneroded areas of the uplands ranges from about 150 inches near the Wabash Valley to about 30 inches in the northwestern part of the county. It is apparently related to the degree of leaching and to the degree of profile development. Upland soils in soil associations C and D, which developed in the thinnest layer of loess in the county, are more highly leached of plant nutrients and have a more strongly developed profile than those in soil associations A or B, which developed in a thicker layer of loess.

In the area where the layer of loess is thin, the amount of loess deposited each year was small and considerable leaching probably occurred during each year that the loess was deposited. Many of the readily soluble minerals were removed almost as fast as they were deposited. In the soils formed in thicker deposits, lime carbonates and other minerals may have accumulated more rapidly than they were leached out. Thus, during the same period of time, soils formed in a thick layer of loess will be less deeply leached or have less movement of clay from the A horizon to the B horizon than soils formed in a thinner layer of loess.

When the loess was deposited, the particles were predominantly of silt size. This is reflected in the silt loam texture of the A horizon in soils formed in loess. Weathering and the downward movement of fine material in the soils have caused the content of clay in the B horizon to be greater than that in the parent loess.

In Wabash County the Alluvial soils of association H developed in sediments washed from acid soils of the uplands. They are, therefore, acid and are fairly low in plant nutrients. The main soils that have these characteristics are the Sharon, Belknap, and Bonnie silt loams. The Alluvial soils of association J are less acid and less strongly leached than are those of association H. Soils of association J formed in sediments left by the Wabash River. Many of these soils, unless protected from flooding by levees, are still receiving sediments.

Soils of associations E, F, and G developed mainly in sediments left by the Wabash River during glacial times, although some areas receive sediments at the present time during high floods. The sandy soils of association E formed in sandy sediments that were probably reworked by wind to some extent after they were deposited by water. Some of these soils are on uplands as well as on terraces.

The soils of terraces in associations E, F, and G generally are at an elevation intermediate between those of the bottom lands and uplands. These soils show more variation in the profile than the soils of the bottom lands or other soils formed in alluvium. They are not so highly leached nor do they have such strong horizonation as most of the upland soils in the county.

Climate and vegetation.—Climate is important in the development of soils because it largely determines the type of weathering that takes place, and it also influences the type of vegetation that grows on the soils. The humid, temperate climate of Wabash County is conducive to the growth of forest, although prairie grasses were still growing on the soils of association D and on some soils of associations F, G, and J at the time the county was settled.

In general, soils developed under grass are darker colored and contain more organic matter than those developed under forest. Soil development proceeds somewhat more rapidly under forest vegetation than under prairie, but the kind of weathering is essentially similar under both. With either type of vegetation, under a humid, temperate climate, clay and some iron and aluminum are removed from the A horizon and carried down into the B horizon. As a result, the soil eventually is strongly horizonated. This translocation of material is particularly pronounced in the more nearly level areas, where there is no permanently high water table, and eventually a very fine textured B horizon, or claypan, develops.

The poorly drained soils of Wabash County under both types of vegetation contain either a claypan or the beginning of one. A fragipan or siltpan is developing in the lower part of the profile of some other soils. These soils in which a fragipan or siltpan is developing are moderately well drained. They formed under forest and are undergoing a somewhat secondary stage of weathering. The Hosmer and Ava soils have a fragipan in varying degrees of development. The results of recent studies on fragipan soils in Illinois (*13*) have been published in the Proceedings of the Soil Science Society of America and give general characteristics, field relationships, mineralogy, and micromorphology of the Hosmer soils.

The formation of the fragipan in the Hosmer and Ava soils is believed to be related to the stage of weathering, the texture of the parent material, and the depth to a temporary or perched water table. The fragipan is very slowly permeable to water and restricts the growth of roots. When it is dry, it is very hard and brittle and appears to be cemented. When it is wet, it loses this hard, brittle consistence. If the fragipan is thoroughly wet, it slakes down to a nonsticky or only slightly sticky mass. Whether the hardness and brittleness are a result of cementation by some chemical agent or merely a result of dehydration of small amounts of clay between closely packed silt particles is not definitely known. In the fragipan are very coarse, prismatic structural blocks bounded by gray streaks or channels of silty and clayey material 1 to 2 inches wide. On a horizontal plane cut through the fragipan, the large blocks bounded by the gray streaks form a polygonal pattern.

Relief.—Under given climatic conditions and in uniform parent material, relief largely controls the amount of moisture in the soil. It influences the amount of runoff,

the infiltration, the amount of drainage water, and the degree of erosion. The direction of slope is of some importance. Because slopes that face south receive direct rays from the sun, they lose more moisture by evaporation and are generally drier than slopes that face north.

In Wabash County many of the level or nearly level areas receive runoff from higher slopes. This runoff, combined with the water from the normal rainfall, has caused the soils to have unusually strong horizonation. In addition, much of the clay originally in the A horizon has moved to the B horizon, where a claypan has formed. On the more sloping areas, part of the rainfall runs off, and with less water passing through the profile, soil development has not proceeded so far as in the more nearly level areas. In the sloping soils, horizons are not so strongly differentiated and chemical weathering has been less severe. On fairly steep slopes, where runoff is very rapid, geologic erosion, or the removal of soil material under natural conditions, almost keeps pace with soil development. The steep soils are generally thin, and their horizons are weakly expressed.

Time.—The length of time necessary for a given soil to develop depends upon the other factors of soil formation. An acid soil, for example, develops much faster from parent material low in lime than from material very high in lime. Other things being equal, fine-textured parent material, which impedes the downward movement of water, is leached free of lime much more slowly than coarse-textured material.

In general, soils form faster in a humid climate that supports a good growth of vegetation than in a dry climate that supports little vegetation. On slopes where geologic erosion is rapid, soils may be in the early stages of development, even though the slopes have been exposed to weathering for thousands of years.

Classification of the Soils

The national system of soil classification in the United States (*6*, *25*) can be used to show the relationship of the soils in Wabash County to each other as well as their relationship to the soils of other areas. In the national system of soil classification, soils are grouped according to such properties as color, texture, chemical and mineral composition, thickness, and arrangement of the horizons.

The soil series is a group of soils that have similar characteristics except for the texture of their surface layer. Most soil series have a geographic name, such as that of a town near where they were first identified and mapped.

Soil types are subdivisions of the soil series based on the texture of the surface layer. For example, a single soil series may consist of both a silt loam type and of a silty clay loam type. In Illinois, most soil series contain only one soil type. Each soil type can be subdivided into phases that show additional features, such as the slope and class of erosion, which are important in managing the soils. The soil series, types, and slope and erosion phases in this county are described in the section "Descriptions of the Soils."

Soil series in which the profile has similar characteristics are classified into great soil groups that show the relationship of the soils of one area to those of other areas. In some places soils have characteristics that are similar to those of two great soil groups. These soils are shown as intergrading from one great soil group to another. The great soil groups in Wabash County are Alluvial soils, Brunizems, Gray-Brown Podzolic soils, Humic Gley soils, Low-Humic Gley soils and Planosols. The soil series of this county are classified into the following great soil groups:

Great soil group	*Soil series*
Alluvial soils (central concept).	Allison, Belknap, Birds, Bonnie, Haymond, Landes, Sharon, Wakeland.
Alluvial soils intergrading toward Humic Gley soils.	Tice.
Brunizems (central concept).	Sumner.
Brunizems intergrading toward Alluvial soils.	Worthen.
Brunizems intergrading toward Planosols.	Hoyleton, Lukin.
Gray-Brown Podzolic soils (central concept).	Alford, Alvin, Blair, Camden, Hickory, Iona, Roby, Starks, Stoy.
Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.	Ava, Hosmer.
Gray-Brown Podzolic soils intergrading toward Brunizems.	Marissa.
Gray-Brown Podzolic soils intergrading toward Planosols.	Bluford.
Gray-Brown Podzolic soils intergrading toward Low-Humic Gley soils.	McGary.
Gray-Brown Podzolic soils intergrading toward Regosols.	Bloomfield.
Humic Gley soils (central concept).	Bonpas, Patton, Selma.
Humic Gley soils intergrading toward Alluvial soils.	Beaucoup, Darwin.
Low-Humic Gley soils	No soils in which the profile is like the central concept of this great soil group are mapped in Wabash County.
Low-Humic Gley soils intergrading toward Alluvial soils.	Petrolia.
Planosols (central concept).	Chauncey, Cisne, Orio, Racoon, Sexton, Weir, Wynoose.

The Alluvial great soil group consists of soils formed in recent sediments deposited by streams. The sediments have not been in place long enough for the soils to show significant horizons or profile development.

The Brunizem great soil group is composed of soils that developed under grass. The Brunizems have a dark A horizon, high in content of organic matter. The content of organic matter in the profile decreases gradually with increasing depth. The B horizon is grayish brown to yellowish brown, and it generally contains more clay than the A horizon. The Worthen soils, however, show only a slight accumulation of clay in the B horizon. They

TABLE 6.—*Chemical and physical properties of selected soils*

Soil type and location	Horizon	Depth	pH	Organic carbon [1]	Exchangeable cations [2]			Cation exchange capacity	Base saturation	Particle-size distribution		
					Ca	Mg	K			Sand (2–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)
		Inches		*Percent*	*Meq. per 100 g.*	*Meq. per 100 g.*	*Meq. per 100 g.*	*Meq. per 100 g.*	*Percent*	*Percent*	*Percent*	*Percent*
Alford silt loam:												
T. 1 N., R. 12 W., sec. 14,	Ap	0–6	6.6	0.73	6.3	1.6	0.2	8.0	100	1.9	86.3	11.8
NE 160, NE 40, NW 10	A2	6–11	6.4	.28	7.7	2.6	------	12.8	87	1.5	76.8	21.7
acres(Wabash County).	B21	11–18	6.2	.33	10.1	6.2	------	20.5	82	1.8	69.8	28.4
	B22	18–28	6.2	.25	8.5	7.5	------	19.4	86	2.6	72.9	24.5
	B3	28–40	6.5	.20	7.8	7.2	------	19.6	81	2.9	74.8	22.3
Alford silt loam:												
T. 3 N., R. 11 W., sec. 18,	A1	0–6	5.4	.73	3.0	.6	.4	9.9	41	2.0	85.9	12.1
SE 160, NW 40, SW 10	A2	6–12	5.4	.36	4.2	.9	.2	10.6	51	1.8	82.1	16.1
acres (Lawrence County).	B1	12–17	5.2	.24	7.4	2.3	.3	16.9	60	1.3	73.6	25.1
	B2	17–25	5.2	.22	10.0	3.9	.4	22.9	63	.8	67.3	31.9
	B3	25–36	5.0	.12	8.3	4.0	.3	21.3	60	1.2	71.0	27.8
	C1	36–42+	5.1	.09	5.9	3.4	.3	17.0	57	2.6	74.4	23.0
Hosmer silt loam:												
T. 3 N., R. 12 W., sec. 2,	A1	0–9	5.4	.63	2.0	1.1	.3	9.8	35	2.3	86.0	11.7
NW 160, NW 40, SW 10	A2	9–15	4.6	.25	2.4	1.8	.4	13.6	34	1.3	78.1	20.6
acres (Lawrence County).	B1	15–23	4.6	.12	3.1	3.9	.3	19.7	38	1.4	72.2	26.4
	A'2	23–26	4.8	.21	3.2	4.4	.3	--------	54	2.2	71.4	26.4
	B'2	26–35	4.9	.09	3.2	4.6	.3	--------	52	1.7	75.0	23.3
	C1	35–50	4.6	.03	4.8	5.9	1.2	19.1	64	2.6	76.8	20.6
Weir silt loam:												
T. 3 N., R. 12 W., sec. 2,	A1	0–8	6.2	.70	6.8	2.1	.3	13.6	69	7.5	79.3	13.2
NW 160, NW 40, NW 10	A2	8–17	4.6	.07	2.6	1.0	.3	11.1	37	7.6	77.8	14.6
acres (Lawrence County).	B1	17–21	4.4	.05	4.3	4.0	.5	23.2	39	4.7	65.1	30.2
	B2	21–39	4.6	.08	10.7	3.7	.5	32.4	48	3.1	58.7	38.2
	B3	39–46	4.8	.02	7.0	6.7	.4	24.3	60	2.7	70.7	26.6
Camden silt loam:												
T. 4 N., R. 12 W., sec. 21,	A2	5½–12	6.8	.60	4.9	1.8	.2	10.2	70	15.5	60.5	12.0
SE 160, NE 40, NW 10	B21	18–23	4.9	.12	5.0	2.1	.3	16.6	45	15.3	29.9	27.4
acres (Lawrence County).	B22	23–30	4.8	.13	4.7	2.7	.3	17.8	43	21.0	23.0	28.0
	B23	30–40	4.8	.14	5.7	3.6	.3	20.4	47	10.1	31.1	29.4
	B3	40–48	4.8	.10	5.8	3.7	.3	21.3	46	4.3	37.3	29.2
	C1	48–60	4.6	.07	5.0	3.4	.3	18.2	48	19.5	29.9	25.3
Darwin silty clay:												
T. 2 N., R. 12 W., sec. 8,	A1	0–15	6.5	1.30	29.5	10.1	.6	47.0	88	.8	42.1	57.1
SW 160, NE 40, NE 10	Bg1	15–25	7.0	.92	30.2	11.6	.4	48.0	90	.6	41.4	58.0
acres (Lawrence County).	Bg2	25–32	7.4	.67	30.0	12.2	.4	46.5	94	.6	42.1	57.3
	Bg3	32–44	7.5	.52	29.7	12.5	.4	46.1	95	.6	42.6	56.8
	Cg	44–55	7.8	.41	34.3	12.4	.4	49.6	98	.5	43.3	56.2
Alvin fine sandy loam:												
T. 2 N., R. 12 W., sec. 26,	Ap	0–9	6.8	.44	3.3	1.0	.1	5.9	74	54.7	39.2	6.1
SE 160, NW 40, NE 10	A2	9–18	5.2	.08	1.6	.8	.1	4.4	57	54.2	37.5	8.3
acres (Lawrence County).	B1	18–22	5.2	.11	3.6	1.4	.2	7.9	66	49.4	36.8	13.8
	B21	22–30	5.0	.08	5.3	2.1	.2	11.4	67	57.0	23.8	19.2
	B22	30–37	5.4	.08	4.9	1.9	.2	10.4	67	62.0	21.1	16.9
	B3	37–44	5.3	.06	3.9	1.6	.1	8.4	67	59.6	27.8	12.6
	C1	44–54	5.6	.05	3.1	1.6	.1	6.9	70	69.9	19.7	10.4

[1] The percentage of organic carbon times 1.724 equals the percentage of organic matter.

[2] One milliequivalent of calcium (Ca) per 100 grams of soil material equals 400 pounds per acre or per 2 million pounds of soil material; one milliequivalent of magnesium (Mg) per 100 grams of soil material equals 240 pounds per acre or per 2 million pounds of soil material; one milliequivalent of potassium (K) per 100 grams of soil material equals 780 pounds per acre or per 2 million pounds of soil material.

are considered to be very young Brunizems and have some characteristics of Alluvial soils.

The Gray-Brown Podzolic soils developed under forest. In areas that have not been cultivated, the A1 horizon is fairly dark, but it is generally only 3 to 5 inches thick. In cultivated areas the plow layer is grayish brown, and compared to the color of the surface layer of the Brunizems, it is considered light colored. The A2 horizon is brownish or yellowish brown, but it is generally lighter colored than the B horizon. The B horizon is brown, grayish brown, or yellowish brown, depending on natural drainage or oxidation, and it may or may not be mottled. The B horizon is normally higher in content of clay than the A or C horizons. The pH value and base saturation are generally somewhat lower in Gray-Brown Podzolic soils than in their Brunizem counterparts. This indicates that weathering is somewhat more rapid under forest than under grass. The Ava and Hosmer soils, which are in the Gray-Brown Podzolic great soil group, have a fragipan in the lower part of their B horizon. Their B horizon also has fairly low base saturation.

Humic Gley soils, which developed in wet areas under grass, are dark colored and high in content of organic matter. They have only a slight accumulation of clay in the B horizon. The B horizon is grayish and mottled. Generally, the lower part of the B horizon and the C horizon are partly gleyed, or poorly oxidized, and in many places they are mottled. The Low-Humic Gley soils are lighter colored and contain much less organic matter than the Humic Gley soils.

The Planosol great soil group consists of soils that developed under poor drainage and either forest or grass. Those soils that developed under grass have a somewhat darker and thicker A1 horizon and a much darker B horizon than those formed under forest. Planosols have a gray, silty A2 horizon and a mottled, gray B horizon high in clay. The A and B horizons are of distinctly different textures, and the boundary between the two horizons is rather abrupt. The soils of this county in the Planosol great soil group are often called claypan soils.

Chemical and Physical Characteristics of Selected Soils

Laboratory analyses are available for only one profile of Alford silt loam in Wabash County. Data for another Alford profile, however, as well as for profiles for the Alvin, Hosmer, Camden, Darwin, and Weir series, are available from Lawrence County, which is just north of Wabash County. The data for these soils in Lawrence County are applicable to the same soils in Wabash County. The data for the chemical and physical properties of the selected soils are given in table 6.

Use of Soils for Crops, Pasture, and Wildlife

In the first part of this section, the capability grouping of soils is described and the management groups are discussed. In the second part, estimated acre yields of the crops commonly grown are given and facts about crop adaptability are discussed. Then, the general management of soils used for cultivated crops and pasture is described, and, finally, facts are given about the management of the soils for wildlife.

Capability Groups of Soils

The capability classification is a grouping of soils that shows, in a general way, how suitable the soils are for most kinds of farming. It is a practical grouping based on the limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and management group. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products. Soils of all of these classes, except class VIII, occur in Wabash County.

The subclasses indicate major kinds of limitations within the classes. In Wabash County, within most of the classes, there can be as many as three subclasses. In class I there are no subclasses, because the soils of this class have few or no limitations. The subclass is indicated by adding a small letter, *e*, *w*, or *s*, 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* means that water in or on the soil will interfere with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s*, shows that the soil is limited mainly because it is shallow, droughty, or stony.

Within the subclasses are the management groups, also called capability units, composed of soils 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 management group is a convenient grouping for making many statements about the management of soils. Management groups are identified by numbers, for example, IIe–1 or IIIe–2.

Soils are classified in capability classes, subclasses, and management groups in accordance with the degree and kind of their permanent limitations; but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soil; and without consideration of possible, but unlikely, major reclamation projects.

Management Groups of Soils

In the following pages the classes and subclasses in the capability system are described. Each management group is also discussed.

Class I

Soils that have a few limitations that restrict their use (no subclasses)

MANAGEMENT GROUP I–1

This group consists of deep, nearly level, moderately dark to dark, clayey soils of the bottom lands and low terraces. These soils have moderately slow to moderate permeability and high available moisture capacity. They are well suited to crops because they are high in natural fertility and are not likely to erode. Areas of the following soils that are adequately drained and protected from overflow are in this management group. Other areas of these soils that are subject to occasional overflow or that are inadequately drained are in management group IIw–1.

70	Beaucoup silty clay loam.
124	Beaucoup gravelly clay loam.
126	Bonpas silty clay loam.
142	Patton silty clay loam.
284	Tice silty clay loam.
306A	Allison silty clay loam, 0 to 2 percent slopes.

These soils are well suited to corn, soybeans, and small grains. They are seldom used for hay or pasture because of their high productivity for cash grain crops. Yields are also high, however, in areas that are used for hay or pasture. Row crops can be grown intensively if good management is used. A green-manure crop should be plowed under at least once every 4 years to maintain good tilth in the surface layer.

These soils are slightly acid to neutral and seldom need lime. They are medium to high in available phosphorus and potassium. Applications of nitrogen and other kinds of fertilizer need to be made according to current recommendations based on the results of soil tests and on the requirements of the crop to be grown.

If practicable, these soils should be plowed in fall so that freezing and thawing will break up large clods. If the large clods are broken up, preparation of the seedbed is easier for spring planting.

Where these soils are used for pasture, a mixture of adapted grasses and legumes, such as redtop, orchardgrass, tall fescue, ladino clover, alsike clover, and alfalfa, is suitable. These soils are not ordinarily used as woodland, but open areas in existing woodland can be planted to pecan, sycamore, cottonwood, sweetgum, and ash.

MANAGEMENT GROUP I–2

Deep, nearly level, moderately dark to dark, silty soils of the bottom lands and low terraces make up this group. These soils have moderately slow to moderate permeability and high available moisture capacity. Natural fertility is high. The soils are not subject to erosion. Areas of the following soils that are adequately drained and protected from overflow are in this management group. Other areas of the Allison, Bonpas, Beaucoup, and Selma soils that are subject to occasional overflow or that are inadequately drained are in management group IIw–1.

37A	Worthen silt loam, 0 to 2 percent slopes.
70+	Beaucoup silt loam, overwash.
125	Selma loam.
126+	Bonpas silt loam, overwash.
176A	Marissa silt loam, 0 to 2 percent slopes.
306A+	Allison silt loam, overwash, 0 to 2 percent slopes.

These soils are well suited to corn, soybeans, and small grains, and yields of hay and pasture crops grown on them are also high. The soils are seldom used for hay and pasture, however, because of their high productivity for cash-grain crops. Row crops can be grown intensively if a high level of management is used. If good tilth is to be maintained in the surface layer, a green-manure crop should be plowed under at least once every 4 years.

These soils are slightly acid to neutral and seldom need lime. They are medium to high in available phosphorus and potassium. Nitrogen and other kinds of fertilizer need to be applied according to current recommendations based on the results of soil tests and on the requirements of the crop to be grown.

These soils are easier to till than the soils of management group I–1 because of the lighter texture of their surface layer. They can ordinarily be plowed in spring so that a good seedbed can be prepared.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as redtop, orchardgrass, tall fescue, ladino clover, alsike clover, and alfalfa, is suitable for seeding. These soils are not ordinarily used as woodland, but open areas of existing woodland can be planted to pecan, sycamore, cottonwood, sweetgum, and ash.

MANAGEMENT GROUP I–3

This group consists of deep, nearly level, light-colored, silty soils of the bottom lands, high terraces, and uplands. The Sharon and Haymond soils are on the bottom lands, the Camden soil is on high terraces, and the Iona soil is on the uplands. The soils of this group have moderately slow to moderate permeability and moderate to high available moisture capacity. They are low to medium in natural fertility. Except for some areas of the Iona soil, which is imperfectly drained, the soils are moderately well drained to well drained. The soils of this group are not subject to erosion. Most areas of the following soils are in this group, but areas of the Sharon and Haymond soils that are not protected from overflow are in management group IIw–3.

72	Sharon silt loam.
134A	Camden silt loam, 0 to 2 percent slopes.
307A	Iona silt loam, 0 to 2 percent slopes.
331	Haymond silt loam.

These soils are well suited to corn, soybeans, and small grains, as well as to hay and pasture. If these soils are used for row crops, a green-manure crop should be plowed under at least once every 3 years or the grasses and legumes should be allowed to stand longer than 1 year in 4.

The Haymond soil is slightly acid to neutral and seldom needs lime. The other soils are medium to strongly acid and need to have lime added periodically. The soils of this group are low to medium in available phosphorus and are low in content of organic matter. Heavy applications of nitrogen are required to obtain maximum crop yields. Applications of other kinds of fertilizer should be made according to current recommendations based on the results of soil tests and on the requirements of the crop to be grown.

If these soils are used for pasture, a mixture of adapted legumes and grasses, such as alfalfa, red clover, ladino clover, alsike clover, redtop, tall fescue, bromegrass, and orchardgrass, is suitable for seeding. These soils are not ordinarily used as woodland. Open areas in existing woodland on the soils of the bottom lands, however, can

be planted to cottonwood, sycamore, yellow-poplar, and ash. Open areas in existing woodland on soils of the terraces and uplands can be planted to yellow-poplar, ash, and oak.

Class II

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

Subclass IIe.—Soils subject to moderate erosion if they are not protected

MANAGEMENT GROUP IIe–1

This group consists of deep, gently to moderately sloping, moderately dark to dark, silty soils on terraces. These soils have moderately slow to moderate permeability and high available moisture capacity. They are high in natural fertility. The Marissa soil is imperfectly drained, and the Worthen soils are moderately well drained or well drained. The soils of this group are subject to some erosion unless they are protected. The following soils are in this group:

37B Worthen silt loam, 2 to 4 percent slopes.
37C Worthen silt loam, 4 to 7 percent slopes.
176B Marissa silt loam, 2 to 4 percent slopes.

These soils are well suited to corn, soybeans, and small grains. If they are protected from erosion, they can be used intensively for cultivated crops. Because of their high productivity, the soils are generally used for cash crops, but they are also well suited to grasses and legumes grown for hay and pasture.

In some places the Worthen soils have short slopes, where contouring and other conservation practices are difficult to establish. Erosion can be controlled on these slopes by growing grasses and legumes 2 years out of 5. Where conservation practices can be used, erosion is easy to control.

The Worthen soils are slightly acid to neutral and seldom need lime, but the Marissa soil needs lime frequently. The soils of this group are high in available phosphorus and potassium. Because of the intensive cropping, soil tests should be made. Fertilizer needs to be applied according to current recommendations based on the results of these tests and on the requirements of the crop to be grown.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as redtop, orchardgrass, tall fescue, ladino clover, alsike clover, and alfalfa, is suitable. These soils are not ordinarily used as woodland.

MANAGEMENT GROUP IIe–2

Deep, gently to moderately sloping, light-colored, silty soils on high terraces and uplands are in this group. The soils have moderately slow to moderate permeability and high available moisture capacity. They are medium in natural fertility and are moderately well drained. Some of the soils are moderately eroded. The following soils are in this management group:

8C2 Hickory loam, 4 to 7 percent slopes, moderately eroded.
134B Camden silt loam, 2 to 4 percent slopes.
134C2 Camden silt loam, 4 to 7 percent slopes, moderately eroded.
307B Iona silt loam, 2 to 4 percent slopes.
307B2 Iona silt loam, 2 to 4 percent slopes, moderately eroded.
307C2 Iona silt loam, 4 to 7 percent slopes, moderately eroded.

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Figure 4.—**Soybeans planted on the contour in a field of Alford silt loam, 2 to 4 percent slopes. The field has been terraced.**

308B Alford silt loam, 2 to 4 percent slopes.
308B2 Alford silt loam, 2 to 4 percent slopes, moderately eroded.
308C Alford silt loam, 4 to 7 percent slopes.
308C2 Alford silt loam, 4 to 7 percent slopes, moderately eroded.
999C2 Hickory-Alford complex, 4 to 7 percent slopes, moderately eroded.

These soils, especially the uneroded phases, are well suited to corn, soybeans, small grains, and meadow. They are also well suited to pasture grasses and legumes grown for pasture.

Where no other conservation practices are used, erosion can be controlled by growing grasses and legumes at least half the time. If crops are planted and cultivated on the contour (fig. 4), grasses and legumes should be grown 1 year in 4. If these soils are terraced, erosion can be controlled by growing grasses and legumes as a standover crop and by plowing them under as a green-manure crop 1 year in 5.

Where these soils have not been treated, they are acid, low to medium in available phosphorus, and generally high in available potassium. Lime and fertilizer should be applied according to current recommendations based on the results of soil tests and on the requirements of the crop to be grown. For high yields of corn and wheat, apply commercial nitrogen as needed to supplement other sources of nitrogen.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as redtop, southern bromegrass, orchardgrass, tall fescue, ladino clover, alsike clover, and alfalfa, is suitable. Because these soils are suited to cultivated crops, most areas have been cleared of trees. Where there are stands of trees, however, the trees should be managed properly. For information about the management and planting of trees, refer to the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIe–3

This group consists of deep, gently sloping, light-colored to moderately dark colored, silty soils on high terraces and uplands. These soils are slowly permeable and have high available moisture capacity. They are low to

medium in natural fertility, imperfectly drained, and slightly to moderately eroded. The following soils are in this management group:

- 3B Hoyleton silt loam, 2 to 4 percent slopes.
- 3B2 Hoyleton silt loam, 2 to 4 percent slopes, moderately eroded.
- 13B Bluford silt loam, 2 to 4 percent slopes.
- 13B2 Bluford silt loam, 2 to 4 percent slopes, moderately eroded.
- 132B2 Starks silt loam, 2 to 4 percent slopes, moderately eroded.
- 164B Stoy silt loam, 2 to 4 percent slopes.
- 164B2 Stoy silt loam, 2 to 4 percent slopes, moderately eroded.
- 167B Lukin silt loam, 2 to 4 percent slopes.

These soils are well suited to small grains and to cultivated crops, such as corn and soybeans. They are also suited to grasses and legumes grown for hay or pasture and to upland hardwoods.

Erosion and low fertility are major problems. Some practices are necessary to help prevent serious losses of soil and water. Contouring, contour stripcropping, and terraces can be used, along with a crop rotation that includes grasses and legumes grown for meadow. For example, if the land is terraced, grass needs to be grown 1 year in 4. Grass should be grown 2 years in 4 if no other practices are used to protect the soils from erosion.

These soils are likely to be wet for long periods during rainy seasons. If they are tilled when they are wet, the soils puddle and become compact, and their structure is likely to be damaged. This also happens if cattle are allowed to graze during wet periods. Diversion terraces are needed to protect some areas of the Lukin soil from water that runs off the adjacent higher soils.

Where soils of this management group have not been treated, they are acid, generally low in available phosphorus, and low to medium in available potassium. Lime and fertilizer should be applied according to current recommendations based on the results of soil tests and the requirements of the crop to be grown. For high yields of corn and wheat, commercial nitrogen should be used, as needed, to supplement other sources of nitrogen.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as redtop, orchardgrass, tall fescue, ladino clover, red clover, and alfalfa, can be grown. For information about the management of wooded areas of these soils, see the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIe–4

Moderately deep, gently sloping, light-colored, silty, very slowly permeable soils of the uplands make up this group. The soils have a very slowly permeable layer, or fragipan, at a depth of 25 to 35 inches. Because of this layer, the available moisture supply is somewhat limited. These soils are moderately well drained. Natural fertility is low to medium. The soils are slightly to moderately eroded. The following soils are in this management group:

- 14B Ava silt loam, 2 to 4 percent slopes.
- 14B2 Ava silt loam, 2 to 4 percent slopes, moderately eroded.
- 214B Hosmer silt loam, 2 to 4 percent slopes.
- 214B2 Hosmer silt loam, 2 to 4 percent slopes, moderately eroded.

These soils are suited to cultivated crops, such as corn, soybeans, and small grains. They are also well suited to grasses and legumes grown for hay or pasture, and to upland hardwoods.

Erosion is a major problem on the cultivated areas, and some practices are necessary to help prevent serious losses of soil and water. Contouring, contour stripcropping, and terraces can be used, along with a crop rotation that includes grasses and legumes grown for meadow. If terraces or contouring are used, grasses and legumes can be grown 1 year in 4. If no mechanical practices are used, however, grasses and legumes need to be grown 1 year in 3. All crop residues should be returned to the soil.

Where these soils have not been treated, they are acid, low in available phosphorus, and low to medium in available potassium. Soil tests ought to be made to determine the amounts of lime and fertilizer to be applied. For high yields of corn and wheat, commercial nitrogen should be used, as needed, to supplement other sources.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as redtop, orchardgrass, southern bromegrass, tall fescue, ladino clover, alsike clover, and alfalfa, can be grown. Information about the management of wooded areas of these soils is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIe–5

This group consists of deep, gently sloping, light-colored, sandy soils on high terraces. The surface layer of these soils is fine sandy loam, and their subsoil is sandy clay loam to clay loam. These soils have moderately slow to moderate permeability. They are imperfectly drained to well drained and have moderate available moisture capacity. Because of the sandy texture of the soils, crops are sometimes damaged by drought. Natural fertility is low. The following soils are in this management group:

- 131B Alvin fine sandy loam, 2 to 4 percent slopes.
- 184B Roby fine sandy loam, 2 to 4 percent slopes.

These soils are well suited to small grains and to such cultivated crops as corn, soybeans, and melons. They are also suited to grasses and legumes grown for hay or pasture, as well as to different kinds of trees.

Because these soils are sandy, erosion by wind and water is a problem where the land is bare. The most effective method of controlling erosion is to provide a good cover of vegetation as much of the year as practicable. Contouring and planting shelterbelts are also effective.

If wind erosion is controlled, a suitable cropping system is one in which grasses and legumes are grown 1 year in 3 without contouring or terracing. If the soils are contoured or terraced, grasses and legumes need to be grown 1 year in 4 and a cover crop ought to be grown after the first row crop has been harvested. All crop residues should be returned to the soils.

If these soils have not been treated, they are acid and are low to medium in available phosphorus and potassium. Soil tests should be made. Moderate amounts of lime and fertilizer need to be applied according to the requirements of the crop to be grown, rather than in large amounts. Nitrogen fertilizer is required for high yields of corn, wheat, and grass.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as tall fescue, southern bromegrass, red clover, and alfalfa, can be grown. Information about the management of wooded areas of these soils and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

Subclass IIw.—Soils that have moderate limitations because of excess water

MANAGEMENT GROUP IIw–1

This group consists of deep, nearly level to moderately sloping, moderately dark to dark, loamy to clayey soils of the bottom lands and low terraces. Some areas of these soils need protection from overflow, and others need drainage. Permeability is moderately slow to moderate. The soils are poorly drained to well drained, and they have high available moisture capacity. Natural fertility is medium to high. The soils in this group are not likely to erode. The areas that are adequately drained and protected from overflow are in management group I–1 or I–2. The following soils are in this management group:

70	Beaucoup silty clay loam.
70+	Beaucoup silt loam, overwash.
124	Beaucoup gravelly clay loam.
125	Selma loam.
126	Bonpas silty clay loam.
126+	Bonpas silt loam, overwash.
142	Patton silty clay loam.
284	Tice silty clay loam.
306A+	Allison silt loam, overwash, 0 to 2 percent slopes.
306A	Allison silty clay loam, 0 to 2 percent slopes.
306B	Allison silty clay loam, 2 to 4 percent slopes.
306C	Allison silty clay loam, 4 to 7 percent slopes.

These soils are suited to corn, soybeans, and other cultivated crops and to occasional crops of small grains, grasses, and legumes. Because of wetness or the hazard of flooding, growing small grains and meadow crops is risky. If grasses and legumes can be grown, a green-manure crop should be plowed under at least once every 4 years to maintain good tilth in the surface soil.

Surface ditches generally provide adequate drainage for all the soils in this group. If suitable outlets can be obtained, however, tile function well and may be needed in some areas. The Allison soils seldom need drainage because they are naturally moderately well drained to well drained.

These soils are slightly acid to neutral, and they seldom need lime. They are medium to high in available phosphorus and potassium. Nitrogen and other kinds of fertilizer ought to be applied where needed. The amount to use depends on current recommendations based on the results of soil tests and on the requirements of the crop to be grown.

Because of their wetness or the hazard of flooding, these soils are seldom used for pasture. Information about managing wooded areas and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIw–2

Petrolia silty clay loam (288) is the only soil in this group. It is deep, light colored, and nearly level, and it is on the bottom lands. This soil is slowly permeable, but it has high available moisture capacity. It is poorly drained. In some places it is protected from overflow, but in other places it is not protected. The soil is not likely to erode. Natural fertility is low.

If this soil is adequately drained and protected from overflow, it is suited to small grains and to corn, soybeans, and other cultivated crops. It is also suited to grasses and legumes grown for hay and pasture, as well as to different kinds of bottom-land hardwoods. If the soil is not adequately drained or protected from overflow, growing such crops as small grains and meadow crops is risky. Using diversion ditches to protect the soils from water from the nearby hills and keeping drainage ditches free of brush will help reduce the hazard of overflow.

Figure 5.—**An open ditch used to drain a large area of Petrolia silty clay loam.**

In many places there is a high water table, and in some places wetness is a serious hazard. Tile function slowly, but they can be used if adequate outlets can be obtained. Surface ditches are effective for carrying off excess water (fig. 5). Where surface ditches can be used to provide adequate drainage, tiling is not usually recommended.

This soil is generally slightly acid to neutral, and most areas do not need large amounts of lime. The soil is low to medium in available phosphorus and is medium to high in available potassium. Soil tests should be made, and lime and fertilizer applied according to current recommendations based on the results of these tests.

After this soil has been adequately drained and protected from overflow, a green-manure crop ought to be plowed under at least once every 3 years to maintain good tilth in the surface soil. The soil should be plowed in fall, if practicable, so that freezing and thawing will break up the large clods and make the preparation of the seedbed easier for spring planting.

If this soil is used for pasture, a mixture of adapted grasses and legumes, such as tall fescue, orchardgrass, ladino clover, red clover, alsike clover, and alfalfa, is suitable for seeding. If drainage is not adequate, tall fescue and ladino clover or alsike clover will survive better than the other plants named. This soil is not ordinarily used as woodland, but open areas in existing woodland can be planted to pecan, sycamore, cottonwood, sweetgum, and ash.

MANAGEMENT GROUP IIw–3

Deep, nearly level to gently sloping, light-colored, silty, moderately and slowly permeable soils of the bottom lands are in this group. Some areas are protected from overflow, but some are not protected. The Sharon and Haymond soils are well drained to moderately well drained

and are moderately permeable; the Belknap and Wakeland soils are imperfectly drained and slowly permeable. All of these soils have high available moisture capacity and are low to medium in natural fertility. Erosion is not a problem in most areas. Areas of the Sharon and Haymond soils that are protected from overflow are in management group I–3. The areas of Sharon and Haymond soils that are not protected are in group IIw–3, along with the following Wakeland and Belknap soils:

72 Sharon silt loam.
331 Haymond silt loam.
333A Wakeland silt loam, 0 to 2 percent slopes.
333B Wakeland silt loam, 2 to 4 percent slopes.
382A Belknap silt loam, 0 to 2 percent slopes.
382B Belknap silt loam, 2 to 4 percent slopes.

The soils of this group are well suited to corn, soybeans, and similar cultivated crops. The hazard of overflow makes the growing of small grains and grasses and legumes for hay and pasture risky.

Diversion ditches help to intercept water from the nearby hills. Keeping drainage ditches free of brush helps to speed the removal of excess water.

Drainage is a problem on many areas of imperfectly drained Belknap and Wakeland soils. Because of the slowly permeable subsurface soil, tile carry off excess water slowly. Surface ditches generally give adequate drainage. Tile are not needed in most areas.

The Haymond and Wakeland soils are slightly acid to neutral, and most areas do not need lime. The Sharon and Belknap soils are medium to strongly acid and need periodic applications of lime. The soils of this group are generally low in available phosphorus and available potassium. Lime and fertilizer should be applied according to current recommendations based on the results of soil tests.

If these soils have been adequately drained and protected from overflow, and if fertilizer has been applied, satisfactory yields of small grains, grasses and legumes, and corn and soybeans can be obtained.

Where these soils are used for pasture, a mixture of adapted grasses and legumes, such as redtop, tall fescue, ladino clover, alsike clover, red clover, and alfalfa, is suitable. Information about the management of wooded areas of these soils and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIw–4

Orio sandy loam (200) is the only soil in this group. It is a deep, nearly level, moderately dark colored, sandy soil on low terraces. This soil is poorly drained and has moderate available moisture capacity. It has slow permeability and is low in natural fertility. Erosion is not a problem.

This soil is suited to corn, soybeans, and other cultivated crops. If the soil is adequately drained, it is also suited to small grains, and grasses and legumes can be grown for hay and pasture. In addition to plowing under the residue from cultivated crops, a green-manure crop should be plowed under at least once every 3 years.

Drainage is a major problem. If suitable outlets can be obtained, tile can be used satisfactorily. Surface ditches, however, can also be used with good results. In some areas loose sand below the subsoil makes tiling hazardous.

This soil is medium acid and is generally low in available phosphorus and available potassium. Soil tests should be made. Apply lime and fertilizer according to current recommendations based on the results of these tests.

If this soil is used for pasture, a mixture of adapted grasses and legumes, such as tall fescue, orchardgrass, timothy, ladino clover, red clover, alsike clover, and alfalfa, can be grown. This soil is seldom used as woodland.

MANAGEMENT GROUP IIw–5

This group consists of deep, nearly level, light-colored to moderately dark colored, silty soils on high terraces and uplands. These soils are imperfectly drained and slowly permeable, and they remain wet for a long time after rains. Natural fertility is low to medium. The available moisture capacity is high. In most areas erosion is not a problem. The following soils are in this management group:

3A Hoyleton silt loam, 0 to 2 percent slopes.
13A Bluford silt loam, 0 to 2 percent slopes.
132A Starks silt loam, 0 to 2 percent slopes.
164A Stoy silt loam, 0 to 2 percent slopes.
167A Lukin silt loam, 0 to 2 percent slopes.

These soils are suited to small grains and to corn, soybeans, and other cultivated crops. They are also suited to trees and to grasses and legumes grown for hay and pasture.

Surface drainage is needed in many places, but surface ditches and furrows generally remove excess water adequately. Tile function slowly; therefore, tiling is not practical in most areas.

Where these soils have not been treated, they are acid, generally low in available phosphorus, and low to medium in available potassium. Lime and fertilizer should be applied according to current recommendations based on the results of soil tests.

If these soils are cultivated, a cropping system in which grasses and legumes are grown 1 year in 4 can be used. The grasses and legumes should be turned under as green manure.

Subclass IIs.—Soils that have moderate limitations of moisture capacity

MANAGEMENT GROUP IIs–1

Deep, nearly level, light-colored, sandy soils on high terraces are in this group. These soils have a surface layer of fine sandy loam to sandy loam and a subsoil of sandy clay loam to clay loam. They have moderately slow to moderate permeability, are imperfectly drained to well drained, and have moderate available moisture capacity. Because of the sandy texture of these soils, crops are sometimes damaged by drought. Natural fertility is low. The following soils are in this management group:

131A Alvin fine sandy loam, 0 to 2 percent slopes.
184A Roby fine sandy loam, 0 to 2 percent slopes.

These soils are suited to small grains and to cultivated crops, such as corn, soybeans, and melons. They are also suited to grasses and legumes grown for hay and pasture, as well as to different kinds of trees.

Lack of available moisture and low fertility are major problems. Regular additions of organic matter and nitrogen help to conserve moisture and to increase yields of crops.

Generally these soils are acid and are low to medium in available phosphorus and potassium. Because the soils are sandy, moderate amounts of lime and fertilizer should be applied according to the needs of the crop to be grown. Applying moderate amounts frequently is better than applying large amounts occasionally. The lime and fertilizer ought to be applied according to current recommendations for sandy soils, as based on the results of soil tests.

When these soils are bare, wind erosion is a problem. Wind erosion is most severe on bare ground that has been plowed in fall. Therefore, plowing in fall needs to be avoided. The most effective method of controlling wind erosion is to provide a good cover of vegetation as much of the year as practicable. Rye and other cover crops ought to be grown in winter to add organic matter and to help reduce wind erosion. All crop residues should be returned to the soil.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as tall fescue, southern bromegrass, red clover, and alfalfa, can be grown. Regular topdressings of nitrogen fertilizer are needed to increase the yields of grass. Information about the management of wooded areas of these soils and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

Class III

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

Subclass IIIe.—Soils subject to severe erosion if they are cultivated and not protected

MANAGEMENT GROUP IIIe–1

Deep, moderately sloping, light-colored to moderately dark colored, silty soils on high terraces and uplands make up this group. The soils are slowly permeable and have high available moisture capacity. They are imperfectly drained and are low to medium in natural fertility. These soils are moderately eroded. The following soils are in this management group:

3C2	Hoyleton silt loam, 4 to 7 percent slopes, moderately eroded.
5C2	Blair silt loam, 4 to 7 percent slopes, moderately eroded.
13C2	Bluford silt loam, 4 to 7 percent slopes, moderately eroded.
132C2	Starks silt loam, 4 to 7 percent slopes, moderately eroded.
164C	Stoy silt loam, 4 to 7 percent slopes.
164C2	Stoy silt loam, 4 to 7 percent slopes, moderately eroded.

These soils are suited to cultivated crops, such as corn and soybeans, but they are also suited to small grains, to grasses and legumes grown for pasture, and to different kinds of hardwoods and conifers. They require more intensive conservation practices than do the soils of class II.

If these soils are used to grow cultivated crops, grasses and legumes need to be grown for a longer time in the rotation than on the less sloping soils of class II. When no other practices are used to conserve the soils, a cropping system in which grasses and legumes are grown 4 years in 6 is suitable. If the soils are contoured, a suitable cropping system is one in which grasses and legumes are grown 3 years in 5. If terraces are used, meadow crops should be grown 2 years in 5.

Areas of these soils that have not been treated are acid, generally low in available phosphorus, and low to medium in available potassium. Lime and fertilizer should be applied according to current recommendations based on the results of soil tests and on the requirements of the crop to be grown. For high yields of corn and wheat, commercial nitrogen should be added, as needed, to supplement that from other sources.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as tall fescue, orchardgrass, timothy, redtop, alsike clover, and ladino clover, is suitable. Information about the management of wooded areas and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIIe–2

This group consists of moderately deep, moderately sloping to strongly sloping, light-colored, silty soils of the uplands. These soils are moderately well drained and have moderate available moisture capacity. They have a very slowly permeable fragipan at a depth ranging from 20 to 35 inches. Natural fertility is medium. Erosion is a major problem. The following soils are in this management group:

14C	Ava silt loam, 4 to 7 percent slopes.
14C2	Ava silt loam, 4 to 7 percent slopes, moderately eroded.
214C	Hosmer silt loam, 4 to 7 percent slopes.
214C2	Hosmer silt loam, 4 to 7 percent slopes, moderately eroded.
214D2	Hosmer silt loam, 7 to 12 percent slopes, moderately eroded.

These soils are suited to small grains and to cultivated crops, such as corn and soybeans. Meadow crops must be grown more often, however, or more intensive conservation practices need to be used than on the soils of class II. The soils of group IIIe–2 are also suited to grasses and legumes grown for hay or pasture, as well as to different kinds of hardwoods and conifers.

If these soils are used for cultivated crops, erosion is a major problem. If no other practices are used to control erosion, a cropping system in which grasses and legumes are grown 3 years in 5 is suitable. If contouring is used, the cropping system should provide for grasses and legumes to be grown at least 1 year in 3. Where these soils are terraced, the cropping system needs to provide for grasses and legumes 1 year in 4.

Areas of these soils that have not been treated are acid, low in available phosphorus, and low to medium in available potassium. Soil tests need to be made to determine the amounts of lime and fertilizer to apply. A commercial fertilizer that is high in nitrogen often increases yields, especially of corn and wheat. Crop residues should be left on the land.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as redtop, timothy, tall fescue, orchardgrass, southern bromegrass, ladino clover, red clover, and alfalfa, is suitable. Information about the management of wooded areas and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIIe–3

Moderately deep, gently to moderately sloping, light-colored, very slowly permeable soils of the high terraces are in this group. These soils have a silty surface layer and a subsoil of heavy silty clay loam to silty clay. The substratum is highly calcareous. The soils are imperfectly drained and have a low to moderate available moisture capacity. Natural fertility is low to medium, and erosion is a major problem. The following soils are in this management group:

173B McGary silt loam, 2 to 4 percent slopes.
173B2 McGary silt loam, 2 to 4 percent slopes, moderately eroded.
173C2 McGary silt loam, 4 to 7 percent slopes, moderately eroded.

These soils are suited to small grains and to cultivated crops, such as corn and soybeans. They are also suited to grasses and legumes grown for hay and pasture and to different kinds of trees.

If these soils are used for cultivated crops, they erode readily unless conservation practices are applied. If no other practices are used, a suitable cropping system is one in which grasses and legumes are grown 4 years in 6. Where contouring is used, grasses and legumes should be grown 2 years in 4. Where terraces are used, grasses and legumes should be grown 1 year in 3, and these crops should be plowed under as green manure.

In areas of these soils that have not been treated, the surface layer is acid, low in available phosphorus, and medium to high in available potassium. Soil tests should be made. Then, apply lime and fertilizer according to current recommendations based on the results of these tests. Nitrogen needs to be added regularly to maintain good yields of crops.

These soils crust over if row crops are grown for several years in succession. Growing grasses and legumes in the crop rotation helps to eliminate this problem. These soils are likely to remain wet for a long time after rains. They should not be cultivated or plowed when they are wet.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as tall fescue, orchardgrass, timothy, alsike clover, and ladino clover, can be grown. Information about managing existing woodland and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIIe–4

This group consists of deep, moderately sloping, and severely eroded soils or of strongly sloping, moderately eroded, light-colored soils. These soils are moderately well drained or well drained and are on high terraces and uplands. A soil complex, in which the soils formed in deep loess on the upper part of the slope and in Illinoian till on the lower part, is in this group. All of the soils in this group are moderately permeable and have high available moisture capacity. Natural fertility is low to medium. The following soils are in this management group:

8C3 Hickory soils, 4 to 7 percent slopes, severely eroded.
8D Hickory loam, 7 to 12 percent slopes.
8D2 Hickory loam, 7 to 12 percent slopes, moderately eroded.
134D2 Camden silt loam, 7 to 12 percent slopes, moderately eroded.
308C3 Alford silt loam, 4 to 7 percent slopes, severely eroded.
308D2 Alford silt loam, 7 to 12 percent slopes, moderately eroded.
999D2 Hickory-Alford complex, 7 to 12 percent slopes, moderately eroded.

These soils are suited to small grains and to cultivated crops, such as corn and soybeans. They need crops grown for meadow more often than do the soils of class II. The soils of group IIIe–4 are also suited to grasses and legumes grown for hay and pasture, as well as to different kinds of hardwoods and conifers.

If these soils are used for cultivated crops, erosion is a major problem. Where no mechanical practices are used, a cropping system in which grasses and legumes are grown 3 years in 5 is needed. Where contouring is used, grasses and legumes need to be grown 2 years in 5. Where these soils are terraced, grasses and legumes should be grown 1 year in 4.

If these soils have not been treated, they are acid, low to medium in available phosphorus, and generally high in available potassium. Lime and fertilizer should be applied according to current recommendations based on the results of soil tests.

If the soils in this group are used for pasture, a mixture of adapted grasses and legumes, such as southern bromegrass, tall fescue, timothy, ladino clover, red clover, and alfalfa, is suitable. Information about the management of wooded areas and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIIe–5

This group consists of deep, moderately to strongly sloping, light-colored, sandy soils on high terraces. Permeability is moderately slow to moderate. These soils are imperfectly drained to well drained and have low to moderate available moisture capacity. They are low in natural fertility. The following soils are in this management group:

131C Alvin fine sandy loam, 4 to 7 percent slopes.
131C2 Alvin fine sandy loam, 4 to 7 percent slopes, moderately eroded.
131D Alvin fine sandy loam, 7 to 12 percent slopes.
131D2 Alvin fine sandy loam, 7 to 12 percent slopes, moderately eroded.
184C2 Roby fine sandy loam, 4 to 7 percent slopes, moderately eroded.

These soils are suited to small grains and to corn, soybeans, melons, and similar cultivated crops. Meadow crops need to be grown on them more often than on the soils of class II. The soils of group IIIe–5 are also suited to grasses and legumes grown for hay and pasture, as well as to different kinds of hardwoods and conifers.

In places erosion by wind is a problem on these sandy soils, and erosion by water is a problem. The most effective method of controlling wind and water erosion is to provide a good cover of vegetation as much of the year as practicable. Such conservation practices as contouring and planting shelterbelts are also effective.

If wind erosion is controlled, a suitable cropping system is one in which grasses and legumes are grown 3 years in 5 without contouring or terracing. If the soils are contoured or terraced, grasses and legumes ought to be grown at least 1 year in 4, and a cover crop should be grown in winter after the first row crop is harvested. Return all crop residues to the soils.

If such special crops as melons are grown, a mulch that consists of about 2 tons of straw per acre, spread uniformly, conserves moisture and helps to prevent the soils from blowing.

Where these soils have not been treated, they are generally acid and low to medium in available phosphorus and potassium. Soil tests should be made. Lime and fertilizer ought to be applied in moderate amounts, according to the needs of the crop, rather than in large amounts.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as tall fescue, orchardgrass, and alfalfa, can be grown. Regular topdressings of nitrogen fertilizer are needed to increase the yield of grasses. Information about the management of wooded areas and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

Subclass IIIw.—Soils that have severe limitations because of excess water

MANAGEMENT GROUP IIIw-1

The soils in this group are generally subject to overflow. They are deep, nearly level to moderately sloping, light-colored, sandy soils of the bottom lands. These soils are well drained and have low available moisture capacity and rapid permeability. Natural fertility is low. The following soils are in this group:

304A Landes fine sandy loam, 0 to 2 percent slopes.
304A+ Landes silt loam, overwash, 0 to 2 percent slopes.
304B Landes fine sandy loam, 2 to 4 percent slopes.
304C Landes fine sandy loam, 4 to 7 percent slopes.

In general, these soils are suited to small grains and to cultivated crops, such as corn, soybeans, and melons. Because of the hazard of overflow, however, the growing of small grains is risky.

A suitable cropping system is one in which row crops are grown for 2 years and a small grain for 1 year, with a legume crop seeded in the small grain. The legume ought to be plowed under for green manure. A mulch that consists of about 2 tons of straw per acre helps to conserve moisture in areas where special crops are grown. It also adds organic matter to the soil.

Most areas of these soils are neutral to slightly calcareous and do not need lime. The soils are medium in available phosphorus and potassium. Soil tests should be made. Then, fertilizer ought to be applied according to current recommendations based on the results of these tests and on the needs of the crop to be grown. Superphosphate generally gives better results than rock phosphate. Nitrogen needs to be added to increase the yields of crops.

These soils are seldom used for pasture. Information about the management of wooded areas and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIIw-2

Deep, nearly level, light-colored, silty soils of the bottom lands are in this management group. Permeability is very slow. The soils are poorly drained, and most areas are subject to overflow. They have high available moisture capacity. Natural fertility is low. The following soils are in this management group:

108 Bonnie silt loam.
334 Birds silt loam.

If these soils are adequately drained and protected from overflow, they are suited to small grains and to cultivated crops, such as corn and soybeans. They are also suited to grasses for hay and pasture. If the soils are not protected from overflow or are not adequately drained, growing small grains, grasses, and legumes is risky. These soils are suited to several kinds of trees that tolerate water.

Because water moves through the soils very slowly, tile do not provide adequate drainage but surface ditches are generally satisfactory. Keeping the ditches free of brush helps speed the removal of excess water. Diversion ditches help to intercept water from the adjacent hills.

If these soils are adequately drained and protected from overflow, a suitable cropping system is one in which grasses and legumes are grown 1 year in 4. If the soils are too wet for standover legumes, a green-manure crop should be plowed under at least once every 3 years.

Bonnie silt loam is strongly acid, low in available phosphorus, and low to medium in available potassium. Birds silt loam is slightly acid, low in available phosphorus, and medium in available potassium. Lime and fertilizer should be applied according to current recommendations based on the results of soil tests. Regular additions of nitrogen fertilizer increase the yields of crops. All crop residues ought to be returned to the soil. Every effort should be made to avoid plowing or cultivating when these soils are wet.

If these soils are used for pasture, grasses and legumes, such as reed canarygrass, tall fescue, timothy, alsike clover, and ladino clover, can be used. Information about the management of wooded areas and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIIw-3

Darwin silty clay (71) is the only soil in this group. It is on bottom lands and is deep, nearly level, and moderately dark colored. This soil is moderately high in available moisture capacity. It is very poorly drained and is very plastic when wet. Natural fertility is medium. Wetness and overflow are severe hazards.

If this soil is adequately drained and protected from overflow, it is suited to small grains and to corn, soybeans, and other cultivated crops. It is also suitable for hay and pasture, but grasses and legumes that tolerate wetness should be seeded. This soil is also suited to different kinds of bottom-land hardwoods.

Because this soil is in low areas, suitable outlets for drainage are hard to find. The soil contains a large amount of clay, and water passes through it very slowly. Therefore, tiling is impractical. In most areas surface ditches can be used to remove excess water so that corn and soybeans can be grown.

In cultivated areas a cropping system in which a leguminous, green-manure crop is seeded in the small grain should be used 1 year in 3.

If this soil is used for pasture, a mixture of reed canarygrass, sudangrass, tall fescue, ladino clover, alsike clover, and other adapted grasses and legumes is suitable for seeding. Information about the management of wooded areas

and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IIIw–4

This group consists of shallow to moderately deep, nearly level, light-colored to moderately dark colored, very slowly permeable soils on high terraces and uplands. These soils have a silt loam surface layer and a subsoil of fine silty clay loam to silty clay. They are poorly drained, except for the McGary soil, which is imperfectly drained. Available moisture capacity is generally low to moderate, but it is high when the level of fertility is high. Natural fertility is low. Erosion is not a problem on these soils. The following soils are in this management group:

2	Cisne silt loam.
12	Wynoose silt loam.
109	Racoon silt loam.
165	Weir silt loam.
173A	McGary silt loam, 0 to 2 percent slopes.
208	Sexton silt loam.
287	Chauncey silt loam.

These soils are suited to small grains and to cultivated crops, such as corn and soybeans. They are also suited to grasses and legumes grown for hay and pasture, as well as to different kinds of trees.

Drainage is a major problem. Because the subsoil is very slowly permeable, tile do not function satisfactorily. Surface ditches and furrows will generally remove excess water. These soils often become dry during the growing season, and crops sometimes are damaged by lack of moisture.

Low fertility is a major problem. Where these soils have not been treated, they are acid. Lime needs to be applied so that deep-rooting legumes can be grown. These soils are generally low to very low in available phosphorus and low to medium in available potassium. These nutrients ought to be applied according to the needs indicated by soil tests. Nitrogen ought to be applied regularly to increase crop yields. If the level of fertility is high, corn roots will penetrate the subsoil. This permits the corn plants to draw upon a much larger volume of soil for nutrients and water than if the roots were confined to the upper layer of soil material (*10*).

If these soils are used for cultivated crops, a cropping system in which grasses and legumes are grown at least 1 year in 4 is needed. A part of the grass and legume crop should be plowed under for green manure.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as tall fescue, timothy, redtop, ladino clover, alsike clover, and alfalfa, can be used. Information about the management of wooded areas and the kinds of trees to plant is given in the section "Use of Soils for Woodland."

Subclass IIIs.—Soils that have severe limitations of moisture capacity

MANAGEMENT GROUP IIIs–1

Sumner sandy loam (87) is the only soil in this group. It is deep, nearly level, and moderately dark colored, and it is on high terraces. This soil is well drained, rapidly permeable, and droughty, and it has low available moisture capacity. Natural fertility is low to medium.

This soil is suited to small grains and to corn, soybeans, melons, and other cultivated crops. It is also suited to grasses and legumes grown for hay and pasture.

Erosion by wind is a problem in places. Unless adequate cover is maintained, some loss of soil material can be expected from strong winds. Cover crops and shelterbelts help to protect the soil from blowing.

If this soil is cultivated and wind erosion is controlled, a cropping system can be used in which grasses and legumes are grown 1 year in 3 and a cover crop is grown in winter after the row crop is harvested. If grasses and legumes are not included in the cropping system, a winter cover crop should be used after each row crop that is grown 2 years in succession and after a small grain crop. If such special crops as melons are grown, a mulch that consists of about 2 tons of straw per acre, spread uniformly, conserves moisture and helps to prevent the soil from blowing.

If this soil has not been treated, it is medium acid and is low to medium in available phosphorus and potassium. Lime and fertilizer should be applied according to current recommendations based on the results of soil tests and according to the needs of the crop to be grown.

If this soil is used for pasture, a mixture of adapted grasses and legumes, such as orchardgrass, tall fescue and alfalfa, is suitable. Overgrazing ought to be avoided. Grasses need to be topdressed annually with nitrogen fertilizer. This soil is seldom used as woodland.

Class IV

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

Subclass IVe.—Soils subject to very severe erosion if they are cultivated and not protected

MANAGEMENT GROUP IVe–1

This group consists of moderately deep to deep, moderately sloping to very strongly sloping, light-colored, silty and loamy soils on high terraces and uplands. These soils are imperfectly drained to well drained and have moderate to very slow permeability. The surface layer is silt loam or loam, and the subsoil is silty clay loam or clay loam. The subsoil of the Blair, Stoy, and Starks soils is slowly permeable; that of the Camden, Alford, and Hickory soils is moderately permeable. A very slowly permeable, brittle, fragile layer, or fragipan, is in the lower part of the subsoil of the Ava and Hosmer soils. The moderately and strongly sloping soils are severely eroded, and the very strongly sloping soils are slightly to moderately eroded. A soil complex in which the Alford soils formed in deep loess on the upper parts of the slopes and the Hickory soils formed in till on the lower parts of the slopes is included in this group. Erosion is a major problem. The following soils are in this management group:

5C3	Blair soils, 4 to 7 percent slopes, severely eroded.
8D3	Hickory soils, 7 to 12 percent slopes, severely eroded.
8E	Hickory loam, 12 to 18 percent slopes.
8E2	Hickory loam, 12 to 30 percent slopes, moderately eroded.
14C3	Ava soils, 4 to 7 percent slopes, severely eroded.
132C3	Starks soils, 4 to 7 percent slopes, severely eroded.
134D3	Camden soils, 7 to 12 percent slopes, severely eroded.

164C3 Stoy soils, 4 to 7 percent slopes, severely eroded.
214C3 Hosmer soils, 4 to 7 percent slopes, severely eroded.
214D3 Hosmer soils, 7 to 12 percent slopes, severely eroded.
308D3 Alford silt loam, 7 to 12 percent slopes, severely eroded.
308E2 Alford silt loam, 12 to 18 percent slopes, moderately eroded.
999D3 Hickory-Alford complex, 7 to 12 percent slopes, severely eroded.

These soils are suited to small grains, to grasses and legumes used for hay and pasture, and to different kinds of trees. Corn or soybeans can be grown occasionally.

If no mechanical practices are used to protect the soils from erosion, a cropping system in which grasses and legumes are grown 3 years out of 4 can be used. A small grain can be grown 1 year in 4. If these soils are contoured, grasses and legumes should be grown 4 years out of 6. Then, corn or soybeans can be grown for 1 year, and a small grain for 1 year. If the soils are terraced or stripcropped on the contour, a cropping system that provides for 1 year of corn or soybeans, 1 year of a small grain, and 2 years of grasses and legumes is needed to control erosion.

Lime and fertilizer ought to be applied according to the needs indicated by soil tests. All crop residues should be returned to the soil.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as tall fescue, timothy, southern bromegrass, orchardgrass, ladino clover, red clover, lespedeza, and alfalfa, is suitable. Information about the management of wooded areas and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP IVe-2

Deep, strongly sloping to very strongly sloping light-colored, sandy soils on high terraces make up this management group. These soils are moderately permeable and well drained, and they have moderate available moisture capacity. Natural fertility is low. The strongly sloping soils are severely eroded, and the very strongly sloping soils are slightly to moderately eroded. Erosion is a major problem. The following soils are in this management group:

131D3 Alvin soils, 7 to 12 percent slopes, severely eroded.
131E Alvin fine sandy loam, 12 to 18 percent slopes.
131E2 Alvin fine sandy loam, 12 to 18 percent slopes, moderately eroded.

These soils are suitable for an occasional crop that requires cultivation, such as corn or soybeans and small grains. They are best suited to grasses and legumes for hay and pasture and to different kinds of trees.

Unless contour stripcropping is used, growing such row crops as corn and soybeans results in an excessive amount of erosion. If contour stripcropping is practiced, the cropping system may consist of 1 year of a row crop, 1 year of a small grain, and 2 years of a meadow crop. Terraces can be used on slopes of 7 to 12 percent with this cropping system.

Because these soils are sandy, moderate amounts of fertilizer and lime need to be applied frequently rather than large amounts occasionally. The applications should be based on the results of soil tests and on the needs of the crop to be grown.

If these soils are used for pasture, a mixture of adapted grasses and legumes, such as tall fescue, orchardgrass, southern bromegrass, red clover, ladino clover, lespedeza, and alfalfa, is suitable. Information about the management of wooded areas and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

Class V

Soils not likely to erode but that have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife food and cover

Subclass Vw.—Soils too wet for cultivation; drainage or protection not feasible

MANAGEMENT GROUP Vw-1

This group consists of deep, nearly level, light-colored to moderately dark colored silt loams to silty clays of the bottom lands. These soils are wet for long periods of time. They have a high water table and are subject to frequent overflow. The following soils are in this management group:

W70 Beaucoup silty clay loam, wet.
W71 Darwin silty clay, wet.
W306A Allison silty clay loam, 0 to 2 percent slopes, wet.
W333A Wakeland silt loam, 0 to 2 percent slopes, wet.

These soils are too wet or they are flooded too frequently for cultivated crops to be grown. They are suitable for pasture, woodland, or wildlife.

Pastures can be improved by seeding adapted grasses and legumes, such as tall fescue, reed canarygrass, ladino clover, and alsike clover. Adding fertilizer also helps to improve the pastures. Information about the management of wooded areas is given in the section "Use of Soils for Woodland." Information about managing the soils for wildlife is given in the section "General Management of Soils Used for Wildlife."

Class VI

Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture, woodland, or wildlife food and cover

Subclass VIe.—Soils severely limited, chiefly by risk of erosion, if protective cover is not maintained

MANAGEMENT GROUP VIe-1

Shallow, moderately sloping to very strongly sloping, light-colored, clayey soils on high terraces are in this group. The soils are imperfectly drained and very slowly permeable. In most areas the original silt loam surface layer has been lost through erosion; the present surface layer is silty clay loam to silty clay from the subsoil. Below the subsoil, at a depth of 14 to 30 inches, is calcareous soil material that may limit the development of roots. The soils are low in available moisture capacity, and natural fertility is low. The following soils are in this management group:

173C3 McGary soils, 4 to 7 percent slopes, severely eroded.
173D3 McGary soils, 7 to 12 percent slopes, severely eroded.
173E3 McGary soils, 12 to 18 percent slopes, severely eroded.

These severely eroded soils need to be kept in permanent vegetation. If practicable, disk instead of plowing

when preparing the seedbed. Lime and fertilizer ought to be applied according to the needs indicated by soil tests. Reseed with adapted grasses and legumes, such as tall fescue, orchardgrass, alsike clover, red clover, lespedeza, and alfalfa. Control grazing to maintain the stand of legumes. Weeds can be controlled by clipping.

Native trees do not grow on most areas of these soils. Information about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

MANAGEMENT GROUP VIe–2

This group consists of moderately deep or deep, very strongly sloping to steep, light-colored, sandy to clayey soils on high terraces and uplands. Most of the soils are moderately permeable. The Hosmer soils, however, have a very slowly permeable, compacted layer, or fragipan, at a depth of 15 to 30 inches.

The soils of this group are moderately well drained or well drained. The available moisture capacity is moderate to high, but natural fertility is low. Included in this group is a soil complex composed of Hickory and Alford soils. In this complex the soils formed in silty loess on the upper parts of slopes and in gritty till on the lower parts of the slopes. The following soils are in this management group:

8E3	Hickory soils, 12 to 30 percent slopes, severely eroded.
131E3	Alvin soils, 12 to 18 percent slopes, severely eroded.
214E3	Hosmer soils, 12 to 18 percent slopes, severely eroded.
308E3	Alford silt loam, 12 to 18 percent slopes, severely eroded.
308F	Alford silt loam, 18 to 30 percent slopes.
308F3	Alford silt loam, 18 to 30 percent slopes, severely eroded.
999E3	Hickory-Alford complex, 12 to 30 percent slopes, severely eroded.

The hazard of erosion on these soils is severe. The soils are probably best suited to permanent vegetation, such as hay, pasture, or trees (fig. 6). If they are used for hay or pasture, lime and fertilizer need to be applied according to the results of soil tests. Old sod can be broken up by plowing, field cultivating, or disking. Adapted grasses and legumes, such as tall fescue, orchardgrass, timothy, ladino clover, red clover, lespedeza, and alfalfa need to be reseeded. Clipping controls weeds and helps to promote uniform grazing. Overgrazing should be avoided. Information about the management of wooded areas and about the kinds of trees to plant is given in the section "Use of Soils for Woodland."

Figure 6.—**Pasture in a field consisting of a Hickory-Alford complex. The Hickory soil occupies the lower parts of the slopes, and the Alford soil is on ridgetops and on the upper parts of the side slopes.**

Class VII

Soils that have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to grazing, woodland, or wildlife

Subclass VIIs.—Soils very severely limited by low moisture capacity, stones, or other soil features

MANAGEMENT GROUP VIIs–1

This management group is made up of only one miscellaneous land type, Riverwash (123). It consists of deep, light-colored, coarse-textured, loose, gravelly deposits on bottom lands. This land type is nearly level. It is along the edges of the larger streams and is subject to flooding. A few areas are around breaks in old levees, and they are flooded less frequently than the areas along the edges of streams.

This land type is best suited to trees. Sweetgum, sycamore, and cottonwood should be favored in the existing stands. Mature, defective, and less desirable trees, such as willow and honeylocust, need to be cut, and sycamore and cottonwood should be planted.

MANAGEMENT GROUP VIIs–2

Bloomfield fine sand, 18 to 30 percent slopes (53F), is the only kind of soil in this group. It consists of deep, light-colored, steep, sandy soils on high terraces. Permeability is rapid. The surface layer is fine sand and is 35 to 55 inches thick. The subsoil is fine sand and contains bands of iron or lenses of sandy loam to sandy clay loam less than 10 inches thick. Natural fertility and available moisture capacity are very low. Although most areas of this soil have slopes between 18 and 30 percent, some small areas have slopes of less than 18 percent, and some have slopes greater than 30 percent.

Because this soil is very low in available moisture capacity and has steep slopes, it is best suited to trees. In managing the wooded areas, harvest mature, defective, and less desirable treees, such as hickory, maple, and elm, unless they are needed to provide a cover of vegetation. Oak and ash should be favored. The areas need to be protected from grazing. Shortleaf and loblolly pines are the most favorable kinds of trees to plant, but Scotch pine can be planted for Christmas trees.

Estimated Yields

Table 7 gives estimated average acre yields of the principal crops for the soils of Wabash County. In columns A are yields to be expected under a moderately high level of management, and in columns B are yields to be expected under a high level of management.

The moderately high level of management consists of using a good crop rotation, applying manure, returning crop residues to the soil, adding commercial fertilizer and lime according to the results of soil tests, and applying the necessary practices for improving drainage and controlling erosion. For the corn yields obtained under a moderately high level of management, 100 pounds of nitrogen (N) per acre is applied in the current year or is

supplied from either legumes grown the previous year or a source other than legumes applied in the previous year; 40 pounds per acre each of phosphate (P_2O_5) and potash (K_2O) is applied each year, or the same amount is estimated to have been left as residue from previous applications. For soybeans and small grains, the corresponding requirements are approximately 70 percent of those given for corn (*27*).

Under a high level of management, fertilizer is applied more intensively, or the amount is 30 to 40 percent greater than that used under a moderately high level of management. Cultural practices that maintain good soil tilth and control erosion are also used more intensively. Such practices as minimum tillage, growing the proper number of plants per acre, and control of weeds are included in the high level of management.

TABLE 7.—*Estimated average acre yields of principal crops*

[Yields in columns A are those to be expected under a moderately high level of management; yields in columns B are those to be expected under a high level of management. The absence of figures indicates that the crop is not well suited to the soil or that it is not commonly grown]

Map symbol	Soil	Corn		Soybeans		Wheat		Mixed hay [1]		Rotation pasture	
		A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Animal-unit days* [2]	*Animal-unit days* [2]
308B	Alford silt loam, 2 to 4 percent slopes	79	88	29	32	34	38	3. 1	3. 4	150	165
308B2	Alford silt laom, 2 to 4 percent slopes, moderately eroded	73	81	26	29	29	32	2. 8	3. 1	135	150
308C	Alford silt loam, 4 to 7 percent slopes	76	85	28	31	29	32	2. 8	3. 1	135	150
308C2	Alford silt loam, 4 to 7 percent slopes, moderately eroded	70	78	25	28	27	30	2. 7	3. 0	130	145
308C3	Alford silt loam, 4 to 7 percent slopes, severely eroded	63	71	23	26	25	28	2. 5	2. 8	120	135
308D2	Alford silt loam, 7 to 12 percent slopes, moderately eroded	67	73	23	26	25	28	2. 6	2. 9	125	140
308D3	Alford silt loam, 7 to 12 percent slopes, severely eroded	59	66	22	24	23	26	2. 4	2. 7	115	130
308E2	Alford silt loam, 12 to 18 percent slopes, moderately eroded	61	68	22	24	24	27	2. 4	2. 7	115	130
308E3	Alford silt loam, 12 to 18 percent slopes, severely eroded [3]							2. 2	2. 5	105	120
308F	Alford silt loam, 18 to 30 percent slopes [3]							2. 5	2. 8	120	135
308F3	Alford silt loam, 18 to 30 percent slopes, severely eroded [3]							2. 0	2. 3	95	110
306A+	Allison silt loam, overwash, 0 to 2 percent slopes	88	98	33	37	34	38	3. 2	3. 5	155	170
306A	Allison silty clay loam, 0 to 2 percent slopes	88	98	33	37	34	38	3. 2	3. 5	155	170
306B	Allison silty clay loam, 2 to 4 percent slopes	87	97	33	37	34	38	3. 1	3. 4	150	165
306C	Allison silty clay loam, 4 to 7 percent slopes	86	96	33	37	34	38	3. 0	3. 3	145	160
W306A	Allison silty clay loam, 0 to 2 percent slopes, wet [3]										
131A	Alvin fine sandy loam, 0 to 2 percent slopes	65	72	24	27	26	29	2. 8	3. 1	135	150
131B	Alvin fine sandy loam, 2 to 4 percent slopes	60	67	21	23	23	26	2. 6	2. 9	125	140
131C	Alvin fine sandy loam, 4 to 7 percent slopes	57	63	19	21	19	21	2. 4	2. 7	115	130
131C2	Alvin fine sandy loam, 4 to 7 percent slopes, moderately eroded	50	56	18	20	17	19	2. 3	2. 6	110	125
131D	Alvin fine sandy loam, 7 to 12 percent slopes	54	60	17	19	20	22	2. 2	2. 5	105	120
131D2	Alvin fine sandy loam, 7 to 12 percent slopes, moderately eroded	49	54	16	18	16	18	2. 1	2. 4	100	115
131D3	Alvin soils, 7 to 12 percent slopes, severely eroded	44	49	14	16	16	18	1. 9	2. 2	90	105
131E	Alvin fine sandy loam, 12 to 18 percent slopes	50	56	17	19	19	21	2. 0	2. 3	95	110
131E2	Alvin fine sandy loam, 12 to 18 percent slopes, moderately eroded	45	50	16	18	17	19	1. 9	2. 1	90	100
131E3	Alvin soils, 12 to 18 percent slopes, severely eroded [3]							1. 8	2. 0	85	95
14B	Ava silt loam, 2 to 4 percent slopes	54	64	20	24	23	27	2. 3	2. 5	110	120
14B2	Ava silt loam, 2 to 4 percent slopes, moderately eroded	44	52	16	19	19	22	2. 0	2. 3	95	110
14C	Ava silt loam, 4 to 7 percent slopes	53	62	19	23	23	27	2. 1	2. 4	100	115
14C2	Ava silt loam, 4 to 7 percent slopes, moderately eroded	42	50	15	18	18	21	1. 8	2. 1	85	100
14C3	Ava soils, 4 to 7 percent slopes, severely eroded	30	35	10	13	13	15	1. 6	1. 9	75	90
124	Beaucoup gravelly clay loam	76	85	31	34	27	30	2. 5	2. 8	120	135
70+	Beaucoup silt loam, overwash	76	85	31	34	27	30	2. 5	2. 8	120	135
70	Beaucoup silty clay loam	76	85	31	34	27	30	2. 5	2. 8	120	135
W70	Beaucoup silty clay loam, wet [3]										
382A	Belknap silt loam, 0 to 2 percent slopes	67	75	30	33	31	34	2. 4	2. 8	115	135
382B	Belknap silt loam, 2 to 4 percent slopes	66	73	29	32	30	33	2. 3	2. 7	110	130
334	Birds silt loam	50	75	24	31	19	28	2. 3	2. 7	110	130
5C2	Blair silt loam, 4 to 7 percent slopes, moderately eroded	42	50	17	20	19	22	2. 0	2. 3	95	110

See footnotes at end of table.

TABLE 7.—*Estimated average acre yields of principal crops*—Continued

Map symbol	Soil	Corn		Soybeans		Wheat		Mixed hay [1]		Rotation pasture	
		A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Animal-unitdays* [2]	*Animal-unitdays* [2]
5C3	Blair soils, 4 to 7 percent slopes, severely eroded	30	35	12	14	13	16	1. 8	2. 1	85	100
53F	Bloomfield fine sand, 18 to 30 percent slopes [3]							. 8	1. 1	35	50
13A	Bluford silt loam, 0 to 2 percent slopes	64	75	25	30	29	34	2. 3	2. 6	110	125
13B	Bluford silt loam, 2 to 4 percent slopes	54	64	21	25	25	29	2. 2	2. 5	105	120
13B2	Bluford silt loam, 2 to 4 percent slopes, moderately eroded	28	52	13	21	14	25	1. 9	2. 2	95	105
13C2	Bluford silt loam, 4 to 7 percent slopes, moderately eroded	42	50	17	20	19	22	1. 8	2. 1	90	100
108	Bonnie silt loam	61	68	24	27	23	26	2. 0	2. 5	95	120
126+	Bonpas silt loam, overwash	87	97	35	39	31	34	4. 2	4. 5	205	220
126	Bonpas silty clay loam	87	97	35	39	31	34	4. 2	4. 5	205	220
134A	Camden silt loam, 0 to 2 percent slopes	76	85	28	31	31	35	3. 2	3. 5	155	170
134B	Camden silt loam, 2 to 4 percent slopes	69	77	25	28	29	32	3. 1	3. 4	150	165
134C2	Camden silt loam, 4 to 7 percent slopes, moderately eroded	62	69	22	25	25	28	2. 6	2. 9	125	140
134D2	Camden silt loam, 7 to 12 percent slopes, moderately eroded	58	64	21	23	23	26	2. 5	2. 8	120	135
134D3	Camden soils, 7 to 12 percent slopes, severely eroded	52	58	19	21	22	24	2. 3	2. 6	110	125
287	Chauncey silt loam	66	78	27	32	29	34	2. 4	2. 8	115	135
2	Cisne silt loam	64	75	26	31	29	34	2. 3	2. 5	110	120
71	Darwin silty clay	61	72	25	29	22	26	2. 4	2. 5	115	120
W71	Darwin silty clay, wet [3]										
331	Haymond silt loam	85	95	32	36	31	34	2. 9	3. 2	140	155
999C2	Hickory-Alford complex, 4 to 7 percent slopes, moderately eroded	42	50	15	18	18	71	2. 0	2. 3	95	110
999D2	Hickory-Alford complex, 7 to 12 percent slopes, moderately eroded	41	47	14	17	17	20	1. 9	2. 2	90	105
999D3	Hickory-Alford complex, 7 to 12 percent slopes, severely eroded	36	40	14	16	17	19	1. 7	2. 0	80	95
999E3	Hickory-Alford complex, 12 to 30 percent slopes, severely eroded [3]							1. 0	1. 3	50	65
8C2	Hickory loam, 4 to 7 percent slopes, moderately eroded	42	50	15	18	18	21	1. 9	2. 2	90	105
8C3	Hickory soils, 4 to 7 percent slopes, severely eroded	30	35	12	14	13	16	1. 7	2. 0	80	95
8D	Hickory loam, 7 to 12 percent slopes	28	42	15	17	16	18	1. 8	2. 1	85	100
8D2	Hickory loam, 7 to 12 percent slopes, moderately eroded	36	41	14	16	15	17	1. 6	1. 9	75	90
8D3	Hickory soils, 7 to 12 percent slopes, severely eroded	27	32	10	12	12	14	1. 4	1. 7	65	80
8E	Hickory loam, 12 to 18 percent slopes	34	38	14	16	14	16	1. 7	2. 0	80	95
8E2	Hickory loam, 12 to 30 percent slopes, moderately eroded [3]							1. 5	1. 8	70	85
8E3	Hickory soils, 12 to 30 percent slopes, severely eroded [3]							1. 3	1. 6	60	75
214B	Hosmer silt loam, 2 to 4 percent slopes	58	68	21	25	25	29	2. 0	2. 7	95	130
214B2	Hosmer silt loam, 2 to 4 percent slopes, moderately eroded	47	55	18	21	20	23	1. 7	2. 6	80	120
214C	Hosmer silt loam, 4 to 7 percent slopes	56	66	21	25	24	28	1. 8	2. 8	85	130
214C2	Hosmer silt loam, 4 to 7 percent slopes, moderately eroded	45	53	17	20	19	22	1. 6	2. 5	75	120
214C3	Hosmer soils, 4 to 7 percent slopes, severely eroded	31	37	13	14	15	16	1. 4	2. 4	65	115
214D2	Hosmer silt loam, 7 to 12 percent slopes, moderately eroded	38	49	15	18	18	21	1. 4	2. 4	65	115
214D3	Hosmer soils, 7 to 12 percent slopes, severely eroded	27	32	10	12	12	14	1. 2	2. 3	55	110
214E3	Hosmer soils, 12 to 18 percent slopes, severely eroded [3]							. 8	1. 6	40	75
3A	Hoyleton silt loam, 0 to 2 percent slopes	67	79	28	33	31	36	2. 4	2. 7	115	130
3B	Hoyleton silt loam, 2 to 4 percent slopes	57	67	24	28	27	31	2. 3	2. 6	110	125
3B2	Hoyleton silt loam, 2 to 4 percent slopes, moderately eroded	47	55	20	23	21	25	2. 1	2. 4	100	11
3C2	Hoyleton silt loam, 4 to 7 percent slopes, moderately eroded	45	53	19	22	20	24	1. 9	2. 2	90	105
307A	Iona silt loam, 0 to 2 percent slopes	85	95	31	34	35	39	2. 9	3. 2	140	155
307B	Iona silt loam, 2 to 4 percent slopes	77	86	28	31	31	35	2. 8	3. 1	135	150
307B2	Iona silt loam, 2 to 4 percent slopes, moderately eroded	71	79	25	28	29	32	2. 7	3. 0	130	145
307C2	Iona silt loam, 4 to 7 percent slopes, moderately eroded	49	77	25	28	29	32	2. 4	2. 7	115	130

See footnotes at end of table.

TABLE 7.—*Estimated average acre yields of principal crops*—Continued

Map symbol	Soil	Corn		Soybeans		Wheat		Mixed hay [1]		Rotation pasture	
		A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Animal-unit days*[2]	*Animal-unit days*[2]
304A	Landes fine sandy loam, 0 to 2 percent slopes	61	68	22	25	25	28	2.7	3.0	130	145
304B	Landes fine sandy loam, 2 to 4 percent slopes	59	66	22	24	24	27	2.5	2.8	120	135
304C	Landes fine sandy loam, 4 to 7 percent slopes	58	65	22	24	24	27	2.3	2.6	110	125
304A+	Landes silt loam, overwash, 0 to 2 percent slopes	61	68	22	25	25	28	2.7	3.0	130	145
167A	Lukin silt loam, 0 to 2 percent slopes	74	82	31	35	34	38	2.7	3.0	130	145
167B	Lukin silt loam, 2 to 4 percent slopes	72	80	31	34	33	37	2.6	2.9	125	140
176A	Marissa silt loam, 0 to 2 percent slopes	81	90	31	34	31	35	2.6	3.2	125	155
176B	Marissa silt loam, 2 to 4 percent slopes	79	88	30	33	32	36	2.5	3.1	120	150
173A	McGary silt loam, 0 to 2 percent slopes	50	59	20	23	18	21	2.2	2.5	105	120
173B	McGary silt loam, 2 to 4 percent slopes	49	58	19	22	18	21	2.1	2.4	100	115
173B2	McGary silt loam, 2 to 4 percent slopes, moderately eroded	36	42	14	16	14	17	1.9	2.2	90	105
173C2	McGary silt loam, 4 to 7 percent slopes, moderately eroded	35	41	14	16	14	17	1.5	1.8	70	85
173C3	McGary soils, 4 to 7 percent slopes, severely eroded [3]							1.3	1.6	60	75
173D3	McGary soils, 7 to 12 percent slopes, severely eroded [3]							1.2	1.5	55	70
173E3	McGary soils, 12 to 18 percent slopes, severely eroded [3]							1.0	1.2	50	60
200	Orio sandy loam	59	70	24	28	22	26	2.2	2.5	105	120
142	Patton silty clay loam	78	87	31	35	30	33	4.1	4.4	200	215
288	Petrolia silty clay loam	68	80	28	33	25	30	2.2	2.6	105	125
109	Racoon silt loam	58	68	24	28	25	30	2.3	2.6	110	125
123	Riverwash										
184A	Roby fine sandy loam, 0 to 2 percent slopes	67	75	27	30	29	32	2.2	2.5	105	120
184B	Roby fine sandy loam, 2 to 4 percent slopes	65	72	26	29	28	31	2.1	2.4	100	115
184C2	Roby fine sandy loam, 4 to 7 percent slopes, moderately eroded	56	62	20	22	23	26	1.7	2.0	80	95
125	Selma loam	84	93	34	38	35	39	2.8	3.1	130	150
208	Sexton silt loam	58	68	26	31	25	28	2.2	2.5	105	120
72	Sharon silt loam	81	90	24	35	25	34	2.6	3.2	125	155
132A	Starks silt loam, 0 to 2 percent slopes	69	81	28	33	27	32	2.4	2.6	115	125
132B2	Starks silt loam, 2 to 4 percent slopes, moderately eroded	48	56	28	33	19	22	2.4	2.7	115	130
132C2	Starks silt loam, 4 to 7 percent slopes, moderately eroded	46	54	19	22	18	21	1.9	2.2	90	105
132C3	Starks soils, 4 to 7 percent slopes, severely eroded	32	38	14	16	13	15	1.7	2.0	80	95
164A	Stoy silt loam, 0 to 2 percent slopes	68	80	26	31	30	35	2.5	2.7	120	130
164B	Stoy silt loam, 2 to 4 percent slopes	58	68	22	26	25	30	2.4	2.6	115	130
164B2	Stoy silt loam, 2 to 4 percent slopes, moderately eroded	47	55	18	21	20	24	2.2	2.4	105	115
164C	Stoy silt loam, 4 to 7 percent slopes	56	66	22	26	25	30	2.3	2.5	110	120
164C2	Stoy silt loam, 4 to 7 percent slopes, moderately eroded	46	54	18	21	20	23	2.0	2.2	95	105
164C3	Stoy soils, 4 to 7 percent slopes, severely eroded	32	38	13	15	14	16	1.8	2.0	85	95
87	Sumner sandy loam	59	70	20	24	23	27	2.1	2.4	100	115
284	Tice silty clay loam	81	90	32	36	31	35	2.7	3.0	130	145
333A	Wakeland silt loam, 0 to 2 percent slopes	76	85	31	34	31	35	2.8	3.1	135	150
W333A	Wakeland silt loam, 0 to 2 percent slopes, wet [3]										
333B	Wakeland silt loam, 2 to 4 percent slopes	75	83	30	33	31	34	2.7	3.0	130	145
165	Weir silt loam	56	66	24	28	23	27	2.2	2.5	105	120
37A	Worthen silt loam, 0 to 2 percent slopes	89	99	33	37	36	40	4.3	4.5	210	220
37B	Worthen silt loam, 2 to 4 percent slopes	87	97	32	36	35	39	4.3	4.5	210	220
37C	Worthen silt loam, 4 to 7 percent slopes	80	89	30	33	32	36	4.1	4.4	200	215
12	Wynoose silt loam	53	62	22	26	24	28	2.0	2.4	95	115

[1] For the kinds of hay and pasture crops to grow, see the local work unit conservationist or farm adviser.

[2] Animal-unit days are the number of days 1 acre would carry one animal unit, such as one cow. They are calculated from the ratio that 2.5 tons of mixed hay equals 120 animal-unit days.

[3] Soil should be in permanent vegetation.

Estimated yields of crops are based on data from experiments made by the Illinois Agricultural Experiment Station; on records kept by farmers in cooperation with the Department of Agricultural Economics, University of Illinois; and on the experience of agronomists and conservationists. Yields listed for corn, soybeans, and wheat grown on the less extensive areas were calculated by using a formula in which the effects of erosion and slope were considered.[4] Differences in weather cause annual variations in crop yields of as much as 20 percent from those listed in table 7.

[4] SOIL CONSERVATION SERVICE. SOILS. Ill. Tech. Note No. 10. 11 pp. 1960. [Processed.]

TABLE 8.—*Rating of soil management groups for adaptability to crops*

Management group	Row crops		Small grains			Grasses					Legumes					
	Corn	Soybeans	Rye	Winter wheat	Winter barley	Reed canary	Southern brome	Fescue	Timothy and orchard	Redtop	Alfalfa	Red clover	Alsike clover	Ladino clover	Lespedeza	Trefoil
I-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
I-2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
I-3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IIe-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IIe-2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IIe-3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IIe-4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IIe-5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IIw-1	1	1	2	2	2	1	2	1	2	1	2	2	1	1	2	1
IIw-2	1	1	2	2	2	1	2	1	2	1	2	2	1	1	2	1
IIw-3	1	1	2	2	2	1	2	1	2	1	2	2	1	1	2	1
IIw-4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IIw-5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IIs-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IIIe-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IIIe-2	2	2	1	1	1	2	1	1	1	2	1	1	1	1	1	1
IIIe-3	2	2	1	1	1	2	1	1	1	2	1	1	1	1	1	1
IIIe-4	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1
IIIe-5	1	1	1	1	1	2	1	1	1	2	1	1	1	2	1	1
IIIw-1	1	1	2	2	2	2	1	1	1	2	2	2	1	2	1	1
IIIw-2	1	1	2	2	2	1	2	1	1	1	2	2	1	1	2	1
IIIw-3	1	1	2	2	2	1	2	1	1	1	2	2	1	1	2	1
IIIw-4	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1
IIIs-1	1	1	2	2	2	2	1	1	1	2	1	1	2	2	1	1
IVe-1	2	2	1	1	1	2	1	1	1	2	1	1	1	1	1	1
IVe-2	2	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1
Vw-1	3	3	3	3	3	2	3	2	3	2	3	3	2	2	3	3
VIe-1	3	3	2	2	2	3	3	1	2	3	1	1	1	2	1	1
VIe-2	3	3	2	2	2	2	1	1	1	2	1	1	1	1	1	1
VIIs-1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
VIIs-2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Crop Adaptability

Table 8 gives the relative suitability of the soil management groups for 16 crops, not including woodland crops, that are adapted to the climate of this county. The degree of suitability of a soil management group for the particular crop is expressed by index numbers. Number 1 indicates that the soils in the group are well suited, number 2 indicates that the soils are less well suited or marginal, and number 3 indicates that the soils are not suited.

The soils in management groups that have index number 1 are the most desirable for a given crop. For those soils, yields are more dependable than on other soils in the county, hazards are less serious, and the least intensive management is required. Soils in management groups that have index number 2 are less well suited to the crop because of a limiting characteristic, such as excess water; lack of moisture; shallow root zone; low fertility; unfavorable soil, air, and moisture relationships; or some other factor. Crops on the soils of group 2 cannot be expected to yield as well as crops on the soils of group 1, unless intensive management is used.

General Management of Cultivated Soils

Soils used for cultivated crops need management practices that will maintain or improve their natural fertility, remove excess water without damaging the soils, give protection from erosion, conserve moisture where it is needed, and maintain good tilth.

Fertility.—Some soils in the county, unless they have been treated, do not have enough available phosphorus and available potassium to allow crops to make high yields. Nitrogen is also deficient in eroded soils and in sandy soils, light-colored soils, and soils where corn, soybeans, and small grains have been grown year after year. Yields can be increased by applying a fertilizer high in nitrogen, especially in years of more-than-average rainfall. Legumes grown frequently in the cropping system supply a part of the nitrogen needed by other crops.

Many of the soils in the county are too acid for legumes to make good yields. Unless they were treated previously, the acid soils need from 2 to 5 tons of lime per acre. The lime should be worked into the soil well in advance of seeding the legumes. The soils ought to be tested, and

lime and other fertilizer should be applied according to recommendations based on the results of these tests. Consult your farm adviser or a technician of the Soil Conservation Service about taking samples for testing and about the recommendations for applying lime and fertilizer.

Alfalfa, sweetclover, and other deep-rooted legumes, can be used in the cropping sequence to add organic matter and nitrogen, to improve the structure of the soils, and to increase the penetration of water. Alfalfa is commonly grown for pasture or hay. Generally, alfalfa is more profitable grown as part of a livestock enterprise than as a cash crop. For pasture or hay, a grass-alfalfa mixture can be planted.

A catch crop, such as sweet clover, mammoth clover, red clover, or lespedeza, can be seeded with oats or wheat in spring. The catch crop can be used in the cropping sequence in several ways. As a green-manure crop, it can be plowed under the second spring before corn is planted, or it can be plowed under early in summer before wheat is planted. If it is left to mature, hay, or sometimes, seed can be harvested in the second summer. If it is grazed carefully, it can be grazed late in fall and again early in spring of the succeeding year.

Crop residues should not be burned. Burning destroys organic matter, which, if returned to the soil, would improve the fertility and tilth, help to maintain the structure, and keep the soil porous and permeable.

Making use of available manure for control of erosion, especially when establishing vegetation in waterways and in eroded areas, is extremely important. In addition to supplying nutrients, manure acts as a mulch and improves the physical condition of the soil.

Excess water.—Excess water is a problem on several of the soils in the county. Some of the soils need tile, and others need surface ditches that provide good drainage. Soils differ in response to tile and to surface ditches. Some soils are more permeable than others. Before wet areas are drained, consult a technician of the Soil Conservation Service or the farm adviser about suitable drainage methods.

Controlling and conserving moisture.—Erosion by water is a serious problem, especially on sloping soils. Runoff can cause either sheet erosion or gully erosion. Erosion by wind is also a problem on sandy soils.

When wind blows the soils, the particles of silt and clay are the first to be moved, and the sand grains are left. To control wind erosion, a growing crop or crop residues should be kept on the soil at all times. Using rough tillage in unprotected fields also helps hold the soil.

The loss of the surface soil reduces the supply of organic matter and plant nutrients. It also makes the soil less absorbent; consequently, more water runs off the surface and less is conserved for crops, the rate of erosion increases, and the available moisture capacity decreases.

The rate of erosion depends on the amount and intensity of rainfall, and on the length and steepness of the slopes. It also depends on the kind and amount of vegetation and on the texture, structure, and permeability of the soils. Because sandy soils are eroded readily by wind, they should be plowed in spring instead of fall. Then they will not be left bare in winter.

***Figure 7.*—A properly designed waterway that has been seeded to adapted grasses to help prevent gullying. The grass can be mowed and used for hay.**

Practices that control water erosion are (1) using a suitable rotation; (2) terracing cropland if the slope does not exceed 12 percent; (3) establishing suitable grasses in waterways and outlets (fig. 7); (4) diverting water that runs off higher areas; (5) tilling and planting on the contour or parallel to the terraces; (6) keeping tillage to a minimum; (7) making use of crop residues; and (8) installing dams, grade stabilization structures, or other structures if they are needed.

Tillage practices.—Frequent tillage destroys the structure of the soil. It results in a powdery surface layer that does not absorb water readily and therefore erodes easily. It also destroys organic matter. Tillage should be kept to a minimum so that a good seedbed can be prepared, weeds can be controlled, and the growth of volunteer plants can be encouraged. When chemicals are used to control weeds, the necessity for tillage is reduced.

General Management of Soils Used for Pasture

Described in the following paragraphs are general management practices suitable for areas to be used for pasture. The practices do not apply to any particular group of soils, but are basic practices that can be applied to all soils.

Soils to be improved for pasture by reseeding need to be cleared of stumps, brush, and other obstructions that interfere with the use of farm equipment. The soils should be tested to determine the need for lime and fertilizer. Lime ought to be applied about 6 months before seeding time. A good seedbed needs to be prepared. The soils that have slopes of less than 18 percent need to be plowed on the contour. Those that have slopes steeper than 18 percent ought to be worked so as to leave a mulch on the surface without plowing. Preparation of the seedbed on these slopes needs to be started several weeks before seeding time so that weeds can be eliminated by harrowing or disking. Using chemical sprays often helps to eradicate weeds.

Phosphate and potash should be applied at seeding time in the amounts indicated by the results of soil tests. If the phosphate and potash are broadcast, they ought to be worked into the soil before seeding.

Adapted legumes and grasses should be seeded for pasture (fig. 8). The seeds of the legumes need to be inoculated. The pasture mixture can be seeded in a companion crop of small grain that controls erosion. Cover the seed lightly. If the seed is broadcast, a cultipacker will help to cover the seed and will help to make the seedbed firm.

When the companion crop of small grain is 8 to 10 inches high, it needs to be grazed. Grazing it keeps it from competing too vigorously with the young pasture plants. Pastures should be managed to avoid overgrazing. Delay grazing in spring until the ground is firm and growth is well started. Rest the pastures during the latter part of September and during the month of October to assure adequate growth to carry them through the winter. Weeds and brush need to be controlled by mowing or spraying.

To keep the soil in a high state of fertility, topdress with lime and fertilizer when needed and apply nitrogen in spring. This increases the yield and improves the content of protein in the plants. Applying nitrogen repeatedly may encourage the grasses so that the legumes are forced out of the mixture.

General Management of Soils Used for Wildlife

Wildlife inhabit all parts of Wabash County. On almost every farm there are areas, such as the banks of drainage ditches, fence rows, ponds, hedgerows, marshes, streambanks, and field borders, that are suitable as habitats for wildlife. Fields where crops are grown provide food and cover for some species of wildlife part of the year.

Using soils for wildlife food and cover provides an alternative to other uses. Steep or severely eroded upland soils and wet soils of the bottom lands are especially well suited to wildlife. On steep or severely eroded soils, landowners may well consider improving the existing stand of trees or planting kinds of vegetation favorable to wildlife. On wet soils of the bottom lands, water can be impounded for waterfowl, muskrats, and other animals that live in and around water. Providing food and cover for wildlife can be considered a secondary use for soils used primarily for growing the common agricultural crops. Therefore, using land for wildlife does not always require that definite areas on the farm be set aside.

Figure 8.—Cattle grazing on an improved pasture consisting of a mixture of alfalfa and bromegrass.

Figure 9.—A fence of multiflora rose that provides food and cover for wildlife.

A number of practices associated with good management of soil and water contribute to the welfare of wildlife. The principal needs for wildlife are food, cover, and water. These needs can be met by following a number of different practices.

On sloping areas, hedgerows or fences of living plants can be established on contour guidelines and on field boundaries (fig. 9). They can also be established on level areas as the boundaries of fields. Field border plantings of grasses, legumes, and other perennial plants offer excellent food and cover for bobwhite quail, cottontail rabbits, songbirds, and a number of other kinds of wildlife. These borders are especially effective between cultivated fields and areas of woodland.

There are many sites in the county favorable for constructing ponds. Establishing perennial vegetation around ponds not only prevents silting but also offers good food, cover, and water for wildlife. These areas should be protected from grazing. Rabbits, quail, songbirds, migratory birds, and fur-bearing animals are readily attracted to such areas. The ponds can be stocked with fish for food and for recreation. Perennials, biennials, or annuals planted in odd areas or in severely eroded areas also provide food and cover for wildlife.

Food for wildlife is usually adequate late in spring, when insects are abundant, and in summer, when insects, wild fruit, and green plants are available. It is also adequate in fall because insects, wild fruit, weed seeds, nuts, waste grain, and green plants are all available. Winter is the critical season because there are no insects, wild fruit, or green plants, and snow and ice cover the waste grain. Also in winter, the amount of cover diminishes and some food becomes unavailable, because it is too far from adequate cover. The early part of spring is often just as critical as winter. Well-planned wildlife areas provide food near cover during these critical periods.

Wildlife is an important resource of the county. Although the soils cannot be correlated to wildlife specifi-

Figure 10.—**A forest that has been overcut. Many undesirable species are competing with the desirable species.**

cally, an indirect relationship does exist. For example, migratory waterfowl, wild ducks, and geese are associated with the bottom-land soils along the Wabash River and Bonpas Creek. The raccoon, cottontail rabbit, red fox, gray fox, opossum, bobwhite quail, mourning dove, gray squirrel, fox squirrel, and white-tailed deer are associated with all the soils in the county that provide food and cover.

The animals that live in the county provide recreation for many people and game for hunters. Birds are helpful to farmers because they destroy insects and weed seeds and are enemies of mice, rats, and gophers. The fish in farm ponds provide game for fishermen, as well as food.

Management of wildlife is easily adapted to the conservation system of land management. Therefore, it should receive a great deal of consideration from landowners and others who plan the use of soils.

Use of Soils for Woodland [5]

Most of the upland and much of the bottom land in Wabash County was in forest at the time settlement began in this area. Fairly large areas of dark-colored, wet soils are in the south-central and western parts of the county, where it is believed trees have never grown. In the forested areas of the uplands and terraces were excellent stands of mixed oaks, hickory, and soft maple with some tulip-poplar and other hardwoods. Sycamore, cottonwood, pecan, and mixed hardwoods grew on the bottom lands. Cypress, once an important species on the poorly drained bottom lands, still grows in some areas.

Clearing land for agriculture has removed the timber from most of the better sites in the uplands. Thus, the present forests are on land that was unsuitable for agriculture, because of the steepness of slope, inaccessibility, or other limiting features. The average stand of timber in southern Illinois, or in 16 counties in the southern part of the State, contained about 2,500 board feet of sawtimber per acre in 1948. Three-fourths of this sawtimber was of low quality (*20*). Understocked stands of trees of poor quality are a result of poor cutting practices (fig. 10), fire (fig. 11), and grazing. They are typical of the stands in Wabash County.

In addition to providing wood that is used in many different ways in the home and in industry, forests are invaluable for watershed protection, as a cover for wildlife, and for recreational purposes. They also provide profitable employment for local residents. Eighty acres of a well-managed forest, with all activities associated with growing and harvesting the crop, provides continuous, profitable employment for one man (*24*). In this county the relatively small acreage now in forest provides for only a few forest-product industries.

According to a study of conservation needs conducted in this county in 1958, the total land in timber at that time was about 8,720 acres. By 1975, it is estimated that about 600 acres of this land will have been cleared for other uses and that approximately 2,180 acres, not now in forest, will have been planted to trees. Thus, by 1975, about 10,300 acres of land in Wabash County may be used for trees. Table 10 shows the estimated acreage in woodland for each woodland suitability group for the years 1958 and 1975.

Interest in the development of woodland is increasing. The need for reforestation is greater than ever, especially

Figure 11.—**A tree that is worthless because it has been damaged by fire.**

[5] W. R. Boggess, Professor of Forestry, University of Illinois, helped prepare this section of the report. I. H. Jorgensen, soil scientist, Soil Conservation Service, Effingham, Ill., and R. Thom, district forester, Illinois State Department of Conservation, Olney, Ill., also helped.

TABLE 9.—*Site index measurements for different kinds of trees on some soils in Wabash County*

Woodland suitability group [1]	Soil type [2]	Species measured	Site index: Number of measurements	Site index: Site index	Site index: Average site index for group [3]
Group 1: Deep, imperfectly drained to well-drained soils.	Belknap silt loam	Cherrybark oak, white oak, southern red oak.	1	87	97±8.0
	Belknap silt loam	Tulip-poplar, pin oak, ash	3	102	
	Sharon silt loam	Ash	1	90	
	Sharon silt loam	Cottonwood	1	[4] 92	
Group 2: Deep, moderately slowly permeable to very slowly permeable soils.	Beaucoup silty clay loam	Soft maple	1	76	84+4.6
	Beaucoup silty clay loam	Pecan	1	82	
	Bonnie silt loam	Soft maple, elm, sweetgum, pin oak, ash.	5	87	
	Bonnie silt loam	Sycamore	1	87	
	Darwin silty clay	Ash	1	82	
	Darwin silty clay	Cottonwood	1	[4] 62	
Group 3: Very slowly permeable soils that have a claypan subsoil.	Racoon silt loam	Ash	1	64	61±8.2
	Racoon silt loam	Hickory	1	57	
	Wynoose silt loam	Post oak, black oak	2	51	
	Wynoose silt loam	White oak, red oak, hickory	1	74	
Group 4: Imperfectly drained, slowly permeable soils.	Blair silt loam	White oak, red oak, hickory	2	65	64±8.6
	Blair silt loam	White oak	1	60	
	Bluford silt loam	White oak, red oak, hickory	4	65	
	Bluford silt loam	White oak	3	63	
	Stoy silt loam	White oak	1	62	
Group 5: Moderately well drained, very slowly permeable soils that have a fragipan subsoil.	Ava silt loam	Post oak, black oak	2	60	65±10.0
	Ava silt loam	White oak, red oak, hickory	2	68	
	Ava silt loam	White oak	2	61	
	Hosmer silt loam	White oak, red oak, hickory	3	67	
	Hosmer silt loam	White oak	2	59	
	Hosmer silt loam	White oak, red oak, ash	2	75	
Group 6: Light-colored, deep, moderately permeable soils formed in deep loess on uplands and terraces.	Alford silt loam	White oak, red oak, hickory	2	72	60±8.6
	Alford silt loam	White oak	1	57	
	Iona silt loam	White oak, red oak, hickory	1	60	
	Hickory loam	White oak, red oak, hickory	5	56	
	Hickory loam	White oak	3	62	
Group 7: Imperfectly drained to well-drained, sandy soils.	Alvin fine sandy loam	White oak, black oak	3	61	
Group 8: Light-colored, sandy, rapidly permeable soils.	Bloomfield fine sand	Hackberry, white oak, red oak, white ash, hickory.	3	66	67±8.8
	Bloomfield fine sand	Black walnut	1	68	
Group 10: Imperfectly drained or poorly drained, light-colored soils on terraces.	Sexton silt loam	Shingle oak, black oak, hickory, white oak, black walnut.	3	77	79±7.0
	Starks silt loam	White oak, black oak	1	74	
	Starks silt loam	Sweetgum	1	86	
Group 11: Imperfectly drained, slowly permeable or very slowly permeable soils on lacustrine terraces.	McGary silt loam	Black oak, bur oak, hickory, white oak, ash.	2	59	

[1] No measurements were taken on the soils of group 9.

[2] Slope, degree of erosion, and position were not distinguished.

[3] Standard deviations were calculated from original figures, not averages.

[4] Site index at 30 years of age; not included in standard deviation.

on badly eroded areas that should be taken out of cultivation or that are now idle. Recognizing the need for reforestation, the Illinois Department of Conservation, Division of Forestry, has developed two large tree nurseries capable of producing 15 million trees annually for reforestation and erosion control. These trees can be obtained from the State by farmers and other landowners. They must be used only for reforestation and for the control of erosion and not for landscape or ornamental plantings (*15*).

Different kinds of trees vary in their requirements. Black oak, for example, grows well on areas where yellow-poplar would fail. Pine and redcedar generally grow on drier, shallower, more compact soils, and in more exposed areas than do hardwoods. Even conifers, however, do not grow so well on these poorer sites as they do on better ones. The most important factors affecting the productive capacity of a soil for growing trees are those that affect the availability of moisture and the development of an adequate root system. These factors are related to some of the major soil characteristics, such as the texture, natural supply of plant nutrients, consistence, aeration, drainage, depth to water table, and depth of permeable soil material. On the bottom lands, where available moisture is plentiful, trees have grown to mammoth size. It has been reported that sycamore and tulip trees once attained a height of 200 feet and a diameter, at breast height, of 5 to 7 feet on the bottom-land soils in the valley of the Wabash River (*22*). Stumps of cypress trees in the Little Cypress Swamp, in Indiana, just across the Wabash River from Mount Carmel, are 9 to 10 feet in diameter.

Soil-Woodland Interpretations

Information in this section of the soil survey report was obtained from many sources, partly from technicians who study the relationship of the growth of trees to the soils.[6] Information from two publications by the Illinois Technical Forestry Association has also been used extensively (*16*, *17*). Information about the volume yield and other facts concerning the growth of trees was available from 96 forest stands throughout the State studied by the University of Illinois Extension Service in Forestry. Soils on which these stands grew were identified by the Soil Conservation Service, and the data were analyzed to determine the relationship between groups of similar soils and the growth of trees.[6] Facts about those plots on soils mapped in Wabash County are used in this report. An additional 33 forest sites on soils of 16 series in the county were measured to provide more information.

Site-index measurements for different woodcrops on some soils in the county are summarized in table 9. In general, the site index is the average height, at 50 years of age, of the tallest trees in a naturally occurring, well-stocked stand or of those that have been consistently in a dominant or codominant crown position (*23*). The exception to this rule is the site index for cottonwood, for which an age of 30 years is used (*8*). Site-index curves are used to determine the site index from height and age measurements of trees in any qualifying stand, regardless of their age.

[6] WALKER, G. O. GROWTH OF NATIVE FOREST ON SELECTED ILLINOIS SOILS. (Unpublished master's thesis). Univ. of Ill. 1959.

Foresters have found that the site index is closely related to the volume yield from well-stocked, unmanaged stands. They have developed yield tables that give approximate information that can be used as a measure of potential soil productivity. Site-index information is not adequate, however, to supply potential soil productivity information for all the soils in the county. For that reason, table 10 shows the potential annual rate of growth per acre of Illinois hardwood timber, as supplied by the Illinois Technical Forestry Association. It also shows yields taken from published yield tables where sufficient data were available to correlate the site index with the soil.

Some data on soils from western Kentucky, which are similar to soils in Wabash County, are shown in table 11. These data are listed for the woodland suitability group and soil type in Wabash County that closely resembles the soils in western Kentucky from which the site index data came. Comparisons of site indexes from the soils in western Kentucky can be made with similar soils in Wabash County by checking the site indexes as reported in tables 9 and 11.

Woodland Suitability Groups

The soils of Wabash County have been placed in 11 woodland suitability groups on the basis of detailed studies of their characteristics and on less complete information about their responses to woodland use and management. (See table 10.) Each group is made up of soils that require similar management practices and that have about the same potential soil productivity for wood crops. The soils of the Bonpas, Cisne, Chauncey, Patton, Sumner, Marissa, Hoyleton, Lukin, Orio, Worthen, and Selma series, however, were not placed in these groups, because the native vegetation was grass instead of trees. Trees grow on them in only a few places.

In table 10 the estimated potential productivity for broadly defined Illinois hardwood timber is given in terms of the potential annual rate of growth per acre for each group of soils. The kinds of trees to favor in managing existing stands on each group of soils and the species suitable to plant for reforestation, for streambank protection, and for erosion control are also listed for each group. Important limitations and hazards involved in woodland uses of each group of soils have been given a rating of *slight*, *moderate*, or *severe*. This is done in such a way as to direct attention to the different kinds and intensities of conservation practices that should be considered in managing woodland. The limitations and hazards are defined in the following paragraphs. Then, each woodland group is discussed.

Plant competition, or brush encroachment, refers to the degree of competition from undesirable species that invade a site when openings are made in the canopy, as for the purpose of regenerating the stand. The ratings are based on the assumption that the stand is well stocked and that associated species normally grow in it. A rating of *slight* means that competition from other plants, is no special problem; of *moderate*, that plant competition develops but generally does not prevent an adequate stand from becoming established; and of *severe*, that plant competition prevents trees from restocking naturally.

TABLE 10.—*Woodland suitability*

Woodland suitability group and soil mapping symbol [1]	Potential annual rate of growth per acre [2]	Suitable species—	
		To favor in managing existing stands	To plant
	Board feet		
Group 1: 72, 284, 304A+, 304A, 304B, 304C, W306A, 306A+, 306A, 306B, 306C, 331, 333A, 333B, W333A, 382A, 382B,	375 to 720; average, 600	Water oak, cherrybark oak, swamp white oak, swamp red oak, ash, yellow-poplar, sycamore, cottonwood, sweetgum, and cypress.	Cottonwood, sweetgum, sycamore, ash, and yellow-poplar.
Group 2: 70+, 70, W70, 71, W71, 108, 124, 288, 334.	330 to 435; average, 380	Water oak, cherrybark oak, swamp white oak, swamp red oak, ash, sycamore, cottonwood, sweetgum, cypress, and pin oak.	Cottonwood, sweetgum, sycamore, and pin oak.
Group 3: 12, 109, 165	170 to 270; average, 215	Black oak, white oak, post oak, red oak, and pin oak.	Shortleaf pine, loblolly pine, and Scotch pine. [4]
Group 4: 5C2, 5C3, 13A, 13B, 13B2, 13C2, 164A, 164B, 164B2, 164C, 164C2, 164C3.	180 to 300; average; 235	Black oak, bur oak, basswood, black cherry, white oak, and swamp red oak.	Loblolly pine, shortleaf pine, black walnut, red oak, Scotch pine, [4] and white oak.
Group 5: 14B, 14B2, 14C, 14C2, 14C3, 214B, 214B2, 214C, 214C2, 214C3, 214D2, 214D3, 214E3.	180 to 310; average, 240	Black oak, white oak, and red oak	Loblolly pine, shortleaf pine, black walnut, swamp red oak, white oak, black locust, white pine, and Scotch pine.[4]
Group 6: 8C2, 8C3, 8D, 8D2, 8D3, 8E, 8E2, 8E3, 134A, 134B, 134C2, 134D2, 134D3, 307A, 307B, 307B2, 307C2, 308B, 308B2, 308C, 308C2, 308C3, 308D2, 308D3, 308E2, 308E3, 308F, 308F3, 999C2, 999D2, 999D3, 999E3.	150 to 270; average, 210	Yellow-poplar, white oak, swamp red oak, black oak, black walnut, white ash, and sweetgum.	Black walnut, yellow-poplar, swamp red oak, black locust, loblolly pine, shortleaf pine; white pine, willow, and Scotch pine.[4]
Group 7: 131A, 131B, 131C, 131C2, 131D, 131D2, 131D3, 131E, 131E2, 131E3, 184A, 184B, 184C2.	100 to 350 (estimated)	White oak, black oak, and red oak	Shortleaf pine, loblolly pine, black locust, and Scotch pine.[4]
Group 8: 53F	50 to 150 (estimated)	Black oak, white oak, swamp red oak.	Loblolly pine, shortleaf pine, and Scotch pine.[4]
Group 9: 123	(5)	Cottonwood, sycamore, and sweetgum.	Cottonwood and sycamore
Group 10: 132A, 132B2, 132C2, 132C3, 208.	300 to 390; average, 345	Black oak, white oak, swamp red oak, and pin oak.	Shortleaf pine, loblolly pine, black walnut and Scotch pine.[4]
Group 11: 173A, 173B, 173B2, 173C2, 173C3, 173D3, 173E3.	100 to 300 (estimated)	Black oak, white oak, red oak, and pin oak.	Shortleaf pine, loblolly pine, and red cedar.[6]

[1] Soils of the Bonpas, Cisne, Chauncey, Patton, Sumner, Marissa, Hoyleton, Lukin, Orio, Worthen, and Selma series were not placed in woodland suitability groups, because the native vegetation is grass, and trees seldom grow on them.

[2] Estimated figures are from studies made by the Illinois Technical Forestry Association; the ranges are from the poorest sites to the best sites and from minimum management to optimum management. Where sufficient measurements were available to correlate the site index with the soil, the yield is taken from yield tables.

Seedling mortality, the regeneration potential, refers to the expected degree of mortality of naturally occurring or planted tree seedlings. It is influenced by the kinds of soil or position of the soil on the landscape when plant competition is not a limiting factor. The ratings are based on the assumption that there is an adequate supply of seed for naturally occurring seedlings, good stock and proper planting for plantations, and normal environmental factors. A rating of *slight* indicates that ordinary losses are not more than 25 percent of the planted stock. A rating of *moderate* indicates that the losses are between 25 and 50 percent of the planted stock, and of *severe*, that more than half of the planted stock is likely to die.

Equipment limitation refers to the characteristics of a soil and its relief that restrict or prohibit the use of equipment commonly used in tending crops and harvesting trees. A rating of *slight* indicates that there is no restriction in the kind of equipment or in the time of year it is used; by *moderate* is meant that there is a seasonal restric-

grouping of soils of Wabash County

Plant competition	Seedling mortality	Equipment limitation	Erosion hazard	Estimated acres in woodland [3]	
				1958	1975
Moderate to severe	Slight	Slight to moderate	Slight	2, 597	3, 145
Moderate to severe	Slight	Severe	Slight	1, 391	1, 511
Moderate	Slight	Moderate	Slight	648	818
Slight to moderate	Slight	Slight	Slight	1, 194	1, 319
Moderate	Slight	Slight	Moderate	2, 110	2, 646
Moderate to severe	Slight	Slight	Moderate	283	388
Moderate	Slight to moderate	Slight	Slight to moderate	136	111
Moderate to severe	Moderate to severe	Moderate	Slight	105	105
Slight	Severe	Severe	Slight	95	95
Moderate	Slight	Moderate	Slight	165	165
Slight to moderate	Slight to moderate	Slight to moderate	Slight to moderate	(7)	(7)

[3] From an inventory of conservation needs made in 1958 by the Soil Conservation Service.
[4] For Christmas trees only.
[5] Variable.
[6] Applies to the severely eroded McGary soils only.
[7] Information not available.

tion of less than 3 months in using the equipment and that the equipment can be expected to damage the roots of the trees to some extent; and by *severe* is meant that there is a seasonal restriction of more than 3 months in the use of equipment and that the equipment can be expected to cause severe damage to the roots of the trees.

Erosion hazard refers to the potential risk of erosion when the area is managed according to acceptable standards for woodland use. Factors that influence these risks are steepness and length of slope and soil profile characteristics. The ratings *slight*, *moderate*, and *severe* are based on the increasing risk of erosion.

WOODLAND GROUP 1

All of the soils in this group, but the Landes, are deep, imperfectly drained to well-drained silt loams and silty clay loams. The soils are on flood plains or formed in other areas where alluvium has accumulated. If they are not protected, they are generally subject to overflow. Their natural supply of plant nutrients for tree growth is

TABLE 11.—*Site index measurements for different kinds of trees on some soils in western Kentucky that are similar to some soils in Wabash County*

Woodland suitability group and soil type	Species	Site index		
		Number of measurements	Site index	Average site index [1]
Group 1:				
Belknap silt loam	Bottom-land hardwoods	5	102	95 ± 13. 3
Wakeland silt loam.	Bottom-land hardwoods.	2	77	
Group 2:				
Bonnie silt loam	Cottonwood	5	100	104 ± 8. 3
	Bottom-land hardwoods.	5	108	
	Sweetgum	2	100	
Birds silt loam	Cottonwood	4	104	
Group 5:				
Hosmer silt loam	Yellow-poplar	1	92	90
	Upland hardwoods	1	88	
Group 6:				
Alford silt loam	Upland hardwoods	3	87	85
	Yellow-poplar	1	81	

[1] Standard deviations were calculated from original data, not averages.

medium to high, and the content of organic matter is medium. The color of the surface layer in these soils is light to moderately dark. Permeability is moderate to slow.

The Landes soils are also light colored, but they are sandy and have rapid permeability. In most areas their surface layer is fine sandy loam, but in some areas silt loam has been deposited over the original surface layer. The available moisture capacity of the Landes soils is limited in some areas because of the high content of sand. The following soils are in this group:

72	Sharon silt loam.
284	Tice silty clay loam.
304A+	Landes silt loam, overwash, 0 to 2 percent slopes.
304A	Landes fine sandy loam, 0 to 2 percent slopes.
304B	Landes fine sandy loam, 2 to 4 percent slopes.
304C	Landes fine sandy loam, 4 to 7 percent slopes.
306A+	Allison silt loam, overwash, 0 to 2 percent slopes.
306A	Allison silty clay loam, 0 to 2 percent slopes.
306B	Allison silty clay loam, 2 to 4 percent slopes.
306C	Allison silty clay loam, 4 to 7 percent slopes.
W306A	Allison silty clay loam, 0 to 2 percent slopes, wet.
331	Haymond silt loam.
333A	Wakeland silt loam, 0 to 2 percent slopes.
W333A	Wakeland silt loam, 0 to 2 percent slopes, wet.
333B	Wakeland silt loam, 2 to 4 percent slopes.
382A	Belknap silt loam, 0 to 2 percent slopes.
382B	Belknap silt loam, 2 to 4 percent slopes.

The Sharon and Haymond soils are moderately well drained to well drained silt loams. The Wakeland and Belknap soils are imperfectly drained silt loams, the Allison soils are moderately well drained to well drained silty clay loams, and the Tice soil is an imperfectly drained silty clay loam.

Plant competition ranges from moderate, where there is occasional overflow, to severe, where overflow is frequent and the soils remain wet for long periods. Moderate plant competition delays the natural regeneration of trees and slows their initial growth, but generally it does not prevent an adequate stand of desirable trees from becoming established. An exception is cottonwood, which has difficulty in becoming established if it has to compete with other trees. Where plant competition is severe, clearing, disking, spraying with chemicals, and other prescribed methods of preparing a seedbed help to provide restocking of desirable trees. Less desirable species, such as elm, boxelder, willow, hickory, and blackgum, should be eliminated wherever more desirable species can be favored.

Seedling mortality is slight for most forest species that are adapted to the area.

Generally, machinery can be used 9 months of the year on the Sharon, Haymond, and Allison soils without serious damage to the roots of the trees or to the structure of the soils and without affecting the stability of the soils. Because the Allison soils contain more clay than the Sharon and Haymond soils, the use of equipment may be delayed somewhat longer on the Allison soils. This difference in time, however, is relatively small. The Belknap, Wakeland, and Tice soils are sometimes wet for periods lasting longer than 3 months. Equipment should not be used on these soils when they are wet.

The soils of this group have no hazard of erosion if they are used for trees. They are the most productive soils for woodcrops in the county.

The Sharon, Haymond, and Allison soils are the most productive of the soils in this group. Under good management, as much as 700 to 800 board feet per acre of mixed bottom-land hardwoods should be produced per year on these soils.

Cottonwood, which in some areas grows in pure stands on the Sharon, Haymond, and Allison soils, makes the most rapid growth of any of the bottom-land hardwoods. In places its growth exceeds 800 board feet per acre in a year.

WOODLAND GROUP 2

The soils in this group are deep and have moderately slow to very slow permeability. They are light-colored to moderately dark colored, medium-textured (silt loam) to fine-textured (silty clay) soils that formed in alluvium. The supply of plant nutrients is medium to high, and the available moisture capacity is high. The following soils are in this group:

70+	Beaucoup silt loam, overwash.
70	Beaucoup silty clay loam.
W70	Beaucoup silty clay loam, wet.
71	Darwin silty clay.
W71	Darwin silty clay, wet.
108	Bonnie silt loam.
124	Beaucoup gravelly clay loam.
288	Petrolia silty clay loam.
334	Birds silt loam.

Beaucoup silt loam, overwash, Bonnie silt loam, and Birds silt loam are the only silt loams in this group. The Bonnie and Birds soils are silty throughout their profile. In Beaucoup silt loam, overwash, only a few inches of

silt loam overlies the natural silty clay loam profile. Beaucoup silty clay loam, Darwin silty clay, and Petrolia silty clay loam are fine textured or very fine textured throughout their profile. They are commonly in large, low-lying areas of bottom lands.

Plant competition ranges from moderate on the Bonnie and Birds soils to severe on the other soils of this group. In some areas, especially in areas of the finer textured soils, a very high water table permits the rapid growth and development of many undesirable plants. These plants compete severely and prevent the more desirable species of trees from becoming established. Special management and preparation of the site are necessary to assure adequate regeneration and growth of the desirable trees. Less desirable species of trees, such as elm, willow, hickory, and soft maple, should be eliminated wherever more desirable species can be favored.

Seedling mortality is slight on the soils of this group. It is difficult, however, for cottonwood and sycamore to become established unless other naturally occurring species are eliminated.

Equipment limitations are severe. These soils are naturally wet, and because of this, there are usually periods of more than 3 months each year when equipment should not be used. If equipment is used on these soils when they are wet, the trees and the soils will be damaged.

Erosion is not a problem on areas used as woodland. These soils are moderately productive of woodcrops. The growth rate of pin oak, which in places occurs in nearly pure stands, is favorable. On a favorable site, pin oak frequently attains a height of 70 to 90 feet. It sometimes attains a height of more than 100 feet and a diameter of as much as 24 inches.

WOODLAND GROUP 3

The soils in this group are very slowly permeable. Their surface layer is light colored and medium textured (silt loam), and they have a claypan subsoil. Their subsoil is moderately fine textured or fine textured (silty clay loam to silty clay). These soils are poorly drained and wet. The penetration of roots is generally fairly limited because of the tight subsoil. The available moisture capacity is somewhat limited because of the restricted root zone. The following soils are in this group:

12 Wynoose silt loam.
109 Racoon silt loam.
165 Weir silt loam.

Plant competition is moderate. However, it does not prevent an adequate stand of desirable species from becoming established.

Seedling mortality is generally slight. Ordinarily, adequate natural regeneration takes place.

Equipment limitation is moderate. In times of abnormally high rainfall, there may be periods that exceed 3 months during which equipment should not be used.

Erosion is not a problem on these soils.

WOODLAND GROUP 4

This group consists of imperfectly drained and slowly permeable soils. These soils have a light-colored, medium-textured surface layer and a moderately fine textured subsoil. Their available moisture capacity is moderately high to high. Roots can penetrate deeply. The following soils are in this group:

5C2 Blair silt loam, 4 to 7 percent slopes, moderately eroded.
5C3 Blair soils, 4 to 7 percent slopes, severely eroded.
13A Bluford silt loam, 0 to 2 percent slopes.
13B Bluford silt loam, 2 to 4 percent slopes.
13B2 Bluford silt loam, 2 to 4 percent slopes, moderately eroded.
13C2 Bluford silt loam, 4 to 7 percent slopes, moderately eroded.
164A Stoy silt loam, 0 to 2 percent slopes.
164B Stoy silt loam, 2 to 4 percent slopes.
164B2 Stoy silt loam, 2 to 4 percent slopes, moderately eroded.
164C Stoy silt loam, 4 to 7 percent slopes.
164C2 Stoy silt loam, 4 to 7 percent slopes, moderately eroded.
164C3 Stoy soils, 4 to 7 percent slopes, severely eroded.

Plant competition generally does not prevent desirable species from becoming established on these soils. It may, however, delay the natural regeneration of desirable trees and slow their initial growth.

Seedling mortality is slight, and, ordinarily, adequate natural regeneration will take place. Less desirable trees, such as hickory, maple, blackgum, blackjack, scarlet oak, sassafras, and persimmon, should be eliminated wherever more desirable species can be favored.

Equipment limitation is slight. Except for relatively short periods after rains, work can be done at any time during the year.

The hazard of further erosion is moderate on eroded slopes if there is no woodland cover. After woodland cover is established, however, it is slight.

WOODLAND GROUP 5

The soils of this group are moderately well drained and are very slowly permeable. They have a brittle, very slowly permeable fragipan 25 to 35 inches below the surface. These soils are light colored. Their A horizon is medium textured (silt loam), and their B horizon is moderately fine textured (silty clay loam). The available moisture capacity is moderate because the fragipan limits the depth to which roots can penetrate and slows the downward movement of water. The following soils are in this group:

14B Ava silt loam, 2 to 4 percent slopes.
14B2 Ava silt loam, 2 to 4 percent slopes, moderately eroded.
14C Ava silt loam, 4 to 7 percent slopes.
14C2 Ava silt loam, 4 to 7 percent slopes, moderately eroded.
14C3 Ava soils, 4 to 7 percent slopes, severely eroded.
214B Hosmer silt loam, 2 to 4 percent slopes.
214B2 Hosmer silt loam, 2 to 4 percent slopes, moderately eroded.
214C Hosmer silt loam, 4 to 7 percent slopes.
214C2 Hosmer silt loam, 4 to 7 percent slopes, moderately eroded.
214C3 Hosmer soils, 4 to 7 percent slopes, severely eroded.
214D2 Hosmer silt loam, 7 to 12 percent slopes, moderately eroded.
214D3 Hosmer soils, 7 to 12 percent slopes, severely eroded.
214E3 Hosmer soils, 12 to 18 percent slopes, severely eroded.

Plant competition is moderate, but it generally does not prevent an adequate stand from becoming established. The initial growth of desirable species may be retarded, however, because of competition from other plants.

Seedling mortality is slight; ordinarily, adequate natural regeneration takes place on areas that are not badly eroded. On severely eroded, sloping areas, care must be

taken in preparing a seedbed for planting. The building of roads on downslopes, clearing for firebreaks, and other activities that remove the natural cover must be avoided. On severely eroded areas, pine seedlings should be planted first because they are better adapted than hardwoods and their rate of survival is better.

Generally, there is no problem in the use of equipment on these soils. Common machinery can be used any time of the year, except for short periods after heavy rains or during thawing.

Erosion is not a serious hazard on the gentle slopes. On the steeper slopes, however, the hazard of erosion is greater. Therefore, care should be taken in logging operations and in road construction.

WOODLAND GROUP 6

This group consists of light-colored, deep, moderately permeable soils of the uplands and terraces. These soils were formed in deep loess, in Illinoian till, and in silty sediments deposited by water. Their surface layer is medium textured (silt loam or loam), and their subsoil is moderately fine textured (clay loam to silty clay loam). The soils are moderately well drained to well drained, and they allow deep penetration of roots.

The available moisture capacity is high. Soil complexes consisting of soils formed in till and of soils formed in loess are also included in this group. They consist of areas where soils that formed in loess occupy the upper parts of the slopes and soils that formed in till occupy the lower parts. Thus, mapping the soils separately is impractical. The following soils are in woodland group 6:

- 8C2 Hickory loam, 4 to 7 percent slopes, moderately eroded.
- 8C3 Hickory soils, 4 to 7 percent slopes, severely eroded.
- 8D Hickory loam, 7 to 12 percent slopes.
- 8D2 Hickory loam, 7 to 12 percent slopes, moderately eroded.
- 8D3 Hickory soils, 7 to 12 percent slopes, severely eroded.
- 8E Hickory loam, 12 to 18 percent slopes.
- 8E2 Hickory loam, 12 to 30 percent slopes, moderately eroded.
- 8E3 Hickory soils, 12 to 30 percent slopes, severely eroded.
- 134A Camden silt loam, 0 to 2 percent slopes.
- 134B Camden silt loam, 2 to 4 percent slopes.
- 134C2 Camden silt loam, 4 to 7 percent slopes, moderately eroded.
- 134D2 Camden silt loam, 7 to 12 percent slopes, moderately eroded.
- 134D3 Camden soils, 7 to 12 percent slopes, severely eroded.
- 307A Iona silt loam, 0 to 2 percent slopes.
- 307B Iona silt loam, 2 to 4 percent slopes.
- 307B2 Iona silt loam, 2 to 4 percent slopes, moderately eroded.
- 307C2 Iona silt loam, 4 to 7 percent slopes, moderately eroded.
- 308B Alford silt loam, 2 to 4 percent slopes.
- 308B2 Alford silt loam, 2 to 4 percent slopes, moderately eroded.
- 308C Alford silt loam, 4 to 7 percent slopes.
- 308C2 Alford silt loam, 4 to 7 percent slopes, moderately eroded.
- 308C3 Alford silt loam, 4 to 7 percent slopes, severely eroded.
- 308D2 Alford silt loam, 7 to 12 percent slopes, moderately eroded.
- 308D3 Alford silt loam, 7 to 12 percent slopes, severely eroded.
- 308E2 Alford silt loam, 12 to 18 percent slopes, moderately eroded.
- 308E3 Alford silt loam, 12 to 18 percent slopes, severely eroded.
- 308F Alford silt loam, 18 to 30 percent slopes.
- 308F3 Alford silt loam, 18 to 30 percent slopes, severely eroded.
- 999C2 Hickory-Alford complex, 4 to 7 percent slopes, moderately eroded.
- 999D2 Hickory-Alford complex, 7 to 12 percent slopes, moderately eroded.
- 999D3 Hickory-Alford complex, 7 to 12 percent slopes, severely eroded.
- 999E3 Hickory-Alford complex, 12 to 30 percent slopes, severely eroded.

The Hickory soils developed in Illinoian till on the uplands. The moderately well drained Iona soils and the well drained Alford soils occur in areas of deep loess on the uplands. The moderately well drained to well drained Camden soils are on alluvial terraces.

Plant competition is moderate to severe, but it generally does not prevent an adequate stand from becoming established (fig. 12). Competition from less desirable species, such as hickory, sassafras, and persimmon, may be severe on areas that have been heavily cut or that have a thin stand. Satisfactory restocking on these soils can usually be obtained; the loss of seedlings is slight. The first plantings on abandoned, eroded areas should be made with pine rather than with hardwood seedlings.

There is no restriction in the use of equipment on these soils. During abnormally wet seasons, however, there may be short periods of time when machinery should not be used on the level areas of Iona and Camden soils.

Erosion is not a serious hazard on the gentle slopes, but as the slope increases, the hazard of erosion also increases. On steep slopes care should be taken in logging operations and in constructing roads.

Under optimum stocking and good management, the timber in mixed stands of hardwoods on these soils should approach 500 board feet per acre each year.

WOODLAND GROUP 7

Imperfectly drained to well-drained, sandy soils of the terraces make up this group. They formed in sandy sediments deposited by water and wind. These soils are deep,

Figure 12.—**A forest that has been managed wisely. Because the forest has been well managed, desirable tree species can regenerate and compete with undesirable species. Plenty of sunlight reaches the vegetation in the understory. Forests such as these also help to protect the soils from erosion and provide a good environment for wildlife.**

have a moderately developed profile, and are moderate in permeability. They are light colored and have a surface layer of sandy loam to fine sandy loam and a subsoil of sandy clay loam to clay loam. The subsoil is underlain by loamy sand to sand, generally at a depth of 35 to 45 inches. The available moisture capacity is moderately high. The following soils are in this group:

131A Alvin fine sandy loam, 0 to 2 percent slopes.
131B Alvin fine sandy loam, 2 to 4 percent slopes.
131C Alvin fine sandy loam, 4 to 7 percent slopes.
131C2 Alvin fine sandy loam, 4 to 7 percent slopes, moderately eroded.
131D Alvin fine sandy loam, 7 to 12 percent slopes.
131D2 Alvin fine sandy loam, 7 to 12 percent slopes, moderately eroded.
131D3 Alvin soils, 7 to 12 percent slopes, severely eroded.
131E Alvin fine sandy loam, 12 to 18 percent slopes.
131E2 Alvin fine sandy loam, 12 to 18 percent slopes, moderately eroded.
131E3 Alvin soils, 12 to 18 percent slopes, severely eroded.
184A Roby fine sandy loam, 0 to 2 percent slopes.
184B Roby fine sandy loam, 2 to 4 percent slopes.
184C2 Roby fine sandy loam, 4 to 7 percent slopes, moderately eroded.

Plant competition is moderate, but it generally does not prevent an adequate stand from becoming established. Satisfactory restocking on these soils can usually be obtained, but initial growth of seedlings may be retarded by lack of sufficient moisture. Undesirable trees, such as hickory, sassafras, and persimmon, should be eliminated wherever more desirable species can be favored.

There is no restriction in the use of equipment on these soils. Machinery can be used any time during the year.

Generally, erosion is no problem. However, good harvest practices ought to be used on sloping areas so that gullies will not form.

WOODLAND GROUP 8

Bloomfield fine sand, 18 to 30 percent slopes (53F), is the only soil in this group. It is light colored, sandy, and rapidly permeable, and it has low available moisture capacity. The surface layer is fine sand as thick as 36 to 40 inches. Thin bands of sandy loam to sandy clay loam occur between a depth of 40 and 60 inches.

Plant competition is moderate. Good stands are difficult to establish because of droughtiness and competition from undesirable trees. On the steeper slopes adequate restocking of desirable trees cannot be relied upon. Because of the low moisture-supplying capacity, seedling mortality is moderate to severe. When rainfall is adequate, good stands of seedlings can be established. The initial growth is usually retarded, however, because of lack of water. It may be necessary to plant shortleaf or loblolly pine in the open spaces. Plantings of coniferous species are easily established.

The greatest problem in using equipment on this soil is caused by the steepness of the slope. Logging operations are difficult in some areas.

Where there are fairly good stands of trees, erosion is not a problem. Rainfall soaks into this soil rapidly, and there is little runoff. Careful consideration should be given to logging methods, however, so that gullies will not form.

WOODLAND GROUP 9

This woodland group contains only Riverwash (123). This land type is composed of a number of different soil materials, including silty material, sandy material, finer textured material (silty clay loam), and gravel. Most areas are gravelly, and many of them occur where levees have broken during floods. These areas are subject to overflow, and only a few species of trees grow on them.

Plant competition is slight. Because of the hazard of overflow, the only trees adapted to this land type are cottonwood, sycamore, sweetgum, and willow. Where good stands of willow have become established, cottonwood and sycamore can rarely get started. Therefore, seedling mortality is severe for cottonwood and sycamore. Sweetgum will compete if an adequate number of seedlings can get started.

Because of flooding, the use of equipment is limited. When the river is low and during dry seasons, equipment can be used for harvesting and planting.

The hazard of erosion is slight. In some areas, during high floods, rapidly flowing water may remove some of the finer textured soil material.

WOODLAND GROUP 10

Imperfectly drained or poorly drained, light-colored soils of the terraces make up this group. Their surface layer is medium textured (silt loam), and their subsoil is moderately fine textured (silty clay loam). These soils are slowly permeable, and they have high available moisture capacity. Their moisture-tree growth relations are probably better than those soils in woodland group 4. The following soils are in this group:

132A Starks silt loam, 0 to 2 percent slopes.
132B2 Starks silt loam, 2 to 4 percent slopes, moderately eroded.
132C2 Starks silt loam, 4 to 7 percent slopes, moderately eroded.
132C3 Starks soils, 4 to 7 percent slopes, severely eroded.
208 Sexton silt loam.

Plant competition is moderate. However, it does not prevent an adequate stand of desirable species from becoming established.

Seedling mortality is slight. Ordinarily, adequate natural regeneration will take place. Less desirable trees, such as hickory, maple, scarlet oak, sassafras, and persimmon should be eliminated wherever more desirable species can be favored.

Equipment limitation is moderate. In times of abnormally high rainfall, however, there may be periods longer than 3 months during which equipment should not be used.

Erosion is a problem only on the sloping areas. If good harvesting methods are used, the hazard of erosion is slight.

WOODLAND GROUP 11

The soils in this group are imperfectly drained and have slow or very slow permeability. They are light-colored soils on lacustrine terraces. Where uneroded, they have a medium-textured (silt loam) surface layer and a moderately fine textured to fine textured (silty clay loam to silty clay) subsoil. In uneroded areas the subsoil is underlain by calcareous, water-laid, fine-textured sediments at a depth of 30 to 45 inches, but in eroded areas the cal-

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careous material is nearer the surface. The available moisture capacity of these soils is moderate, and root penetration is moderately deep. The following soils are in this group:

173A McGary silt loam, 0 to 2 percent slopes.
173B McGary silt loam, 2 to 4 percent slopes.
173B2 McGary silt loam, 2 to 4 percent slopes, moderately eroded.
173C2 McGary silt loam, 4 to 7 percent slopes, moderately eroded.
173C3 McGary soils, 4 to 7 percent slopes, severely eroded.
173D3 McGary soils, 7 to 12 percent slopes, severely eroded.
173E3 McGary soils, 12 to 18 percent slopes, severely eroded.

Plant competition is slight to moderate and usually does not prevent desirable species from becoming established. It may, however, delay the natural regeneration of desirable trees and slow their initial growth.

Seedling mortality is slight to moderate. In uneroded to moderately eroded areas, natural regeneration ordinarily takes place. In severely eroded areas, natural regeneration is limited because of lack of moisture and the presence of calcareous material near the surface.

Generally, equipment can be used throughout the year on sloping areas. The nearly level areas, however, remain wet for long periods and the use of heavy equipment is sometimes limited for periods of 3 months or more.

There is no problem of erosion on the nearly level to moderately sloping areas. On the steeper slopes care should be taken in logging and in road construction so that gullies will not form.

Pine Plantations

Poor agricultural practices have made many acres in southern Illinois no longer suitable for growing field crops. These areas ought to be returned to some type of forest cover. On many of these sites, hardwood species do poorly, and it has been necessary to find species of conifers that are more tolerant of poor conditions. Shortleaf pine and loblolly pine have been planted widely and seem to be well adapted to conditions in southern Illinois, although they are growing near the northern limit of their natural range. Growth and yield data from plantations of these species are encouraging, and pine will probably play an important part in the future forest economy of the area. Table 12 gives growth and yield data for pine plantations on 11 soils in southern Illinois.

An example of yields that can be expected from shortleaf pine is illustrated by results of a thinning study (7) made of a plantation established in 1937. The plantation was made on a slightly eroded Grantsburg silt loam, a soil that is not mapped in Wabash County but that is similar to the Hosmer soils, which are in woodland group 5.

The total yield for both thinned and unthinned stands was 2,775 cubic feet, or 30.9 cords per acre. This represents an average annual growth during the last 8 years of nearly 2½ cords per acre or an annual growth of about 1½ cords per acre throughout the entire life of the plantation. Although thinning has had little effect on the total yield, trees on the thinned check plots are larger and of better quality than those on the unthinned check plots.

Comparable yields were realized in a similar study for a plantation of shortleaf pine of the same age growing on Robbs silt loam, a soil similar to Stoy silt loam of woodland group 4. Yields, however, were about one-third less for a plantation of the same species and the same age growing on a severely eroded Grantsburg silt loam. Even on the poorer site, yields are favorable from the standpoint of pulpwood production.

Pine plantations in Wabash County are subject to a number of hazards. Loblolly pine is particularly likely to be damaged by severe glaze storms such as those that occurred in 1950 and 1952. This risk, however, is not peculiar to southern Illinois but is fairly common throughout the range of loblolly pine. Shortleaf pine is also subject to damage from glaze storms, but not to the same extent as loblolly pine.

Shortleaf pine is extremely susceptible to attack by the Nantucket pine tip moth. These insects seldom kill

TABLE 12.—*Growth and yield data for pine plantations in southern Illinois* [1]

Woodland group and soil	Species of pine	Age	Height of dominant trees	Average diameter	Basal area	Volume
		Years	*Feet*	*Inches*	*Sq. ft. per acre*	*Cords per acre*
Group 4:						
Bluford silt loam, 2 to 4 percent slopes	Shortleaf	12	22	4. 5	97	21
	Loblolly	24	43	6. 8	198	28
Bluford silt loam, 4 to 7 percent slopes, moderately eroded	Loblolly	18	31	6. 1	156	21
Group 5:						
Ava silt loam, 2 to 4 percent slopes	Loblolly	14	36	6. 1	130	17
Ava silt loam, 2 to 4 percent slopes, moderately eroded	Shortleaf	20	31	6. 2	150	16
Ava silt loam, 4 to 7 percent slopes	Loblolly	28	50	10. 6	253	43
Ava silt loam, 4 to 7 percent slopes, moderately eroded	Loblolly	16	36	7. 4	117	16
Ava soils, 4 to 7 percent slopes, severely eroded	Shortleaf	24	32	5. 9	194	19
Ava silt loam, 7 to 12 percent slopes, moderately eroded	Loblolly	19	36	6. 1	163	21
Ava soils, 7 to 12 percent slopes, severely eroded	Loblolly	26	38	5. 9	211	27
Hosmer silt loam, 7 to 12 percent slopes, moderately eroded	Loblolly	15	32	5. 2	151	14
Group 6:						
Alford silt loam, 4 to 7 percent slopes, moderately eroded	Shortleaf	23	41	7. 2	209	28

[1] From unpublished data taken at the Dixon Springs Experiment Station, University of Illinois.

trees, but they may retard height growth and cause stem deformities. In particularly bad years trees have been observed where no net height growth was made, because of the continual killing back of the terminal shoots. Outbreaks of such defoliators as the pine sawfly have occurred but have not represented a serious threat to plantations in the county.

Engineering Applications

This section points out the principal characteristics of soils that are likely to affect engineering practices. It should help engineers interpret, for engineering purposes, the soil survey information in this report. *It is not intended that this report will eliminate the need for sampling and testing for design and construction of specific engineering works.*

Information in this report can be used for—

1. Making soil and land use studies that will aid in planning and developing sites for agricultural structures, industries, businesses, residences, and recreational purposes.
2. Making preliminary estimates of the engineering properties of the soils, to be used in planning measures for flood prevention, systems to provide agricultural drainage, farm ponds, irrigation systems, diversion terraces, and waterways.
3. Making preliminary evaluations of soils and sites that will aid in selecting locations for highways and airports and in planning detailed investigations of the selected locations.
4. Locating probable sources of gravel, sand, limestone, and other construction materials.
5. Correlating performance of engineering structures with soil mapping units and developing information that will be useful in designing and maintaining such structures.
6. Determining the suitability of soil units for cross-country movement of vehicles and construction equipment.
7. Supplementing information obtained from other published maps, reports, and aerial photographs for the purpose of making maps and reports that can be used readily by engineers.

Some terms used in this report are used primarily by soil scientists, and some terms are used primarily by engineers. Definitions of selected terms are given in the Glossary.

Engineering Classification Systems

AASHO system.—The system approved by the American Association of State Highway Officials (AASHO) for classifying soils is based on the field performance of soils (*1*). It groups soils of the same general physical properties together into seven basic soil groups designated as A–1 through A–7. Groups A–1 through A–3 consist predominantly of stone fragments, gravel, and sand; A–4 consists of nonplastic to moderately plastic, silty soils. The soils in group A–5 are similar to those in A–4, except that they include poorly graded soils that contain material such as mica and diatoms. Group A–6 consists of medium-plastic clays, and group A–7 consists of highly plastic clays.

Three of the basic groups are divided into two or more subgroups so that the physical properties of the material can be more closely identified. For example, A–1–a consists of material that is predominantly stone fragments or gravel and A–1–b consists of material that is predominantly coarse sand.

Evaluation of soils within each group or subgroup is made by means of a group index. The group index is a value calculated by means of an empirical formula based on the percentage of soil material passing a No. 200 sieve (*2*), on the liquid limit (*3*), and on the plasticity index (*4*) of the soil material. Under average conditions where the soil material is drained and thoroughly compacted, its supporting value as subgrade (*5*) may be assumed to be in inverse ratio to its group index. That is, a group index of 0 indicates a good subgrade material, and a group index of 20 indicates a very poor subgrade material. The group index number is shown in parentheses following the soil group symbol, for example, A–4(8).

Unified system.—This system (*28*) is based on the identification of soils according to their texture, plasticity, and grouping with respect to behavior. In this system a letter symbol and a descriptive name are used to indicate the principal characteristics of a given soil group. The symbols and their meanings are G, gravel; S, sand; M, silt; C, clay; O, organic silts or clays; Pt, peat and other highly organic soils; W, well-graded material; P, poorly graded material; L, material that has a low liquid limit; and H, material that has a high liquid limit.

Thus, a soil that has a Unified classification of GP is a poorly graded gravel. A soil that has a classification of ML is a silty soil with a low liquid limit. A soil that has a classification of CH is a clayey soil with a high liquid limit, and so on.

The arbitrary grouping of soils used in this system places the soils in three groups—coarse grained, fine grained, and highly organic. The coarse-grained soils are subdivided into two groups—gravels (G) and sands (S). Both the gravels and sands are still further divided into four secondary groups—GW, GP, GM, and GC for the gravels, and SW, SP, SM, and SC for the sands.

The fine-grained soils are subdivided into silts (M) and clays (C), depending upon the relationship between their liquid limit and plasticity index. They are further divided according to their liquid limit. A soil that has a liquid limit of 50 or less is given the symbol L to indicate a low liquid limit. A soil that has a liquid limit of more than 50 is given the symbol H to indicate a high liquid limit. Silts and clays that contain a significant amount of organic matter are classified as OL or OH, depending upon their liquid limit. They are identified by their dark color, by their odor, or by both.

The highly organic soils are easy to compress and are generally undesirable for construction material. For this reason, they are not subdivided but are classified under one group with the symbol Pt. Peat, humus, and organic soils, which normally contain leaves, grass, and other fibrous vegetable material, are typical of this group.

[7] P. W. Koch, agricultural engineer, and I. H. Jorgensen, soil scientist, helped prepare this section of the report. T. H. Thornburn, Professor of Civil Engineering, University of Illinois, also assisted in the preparation of the section. The data given in table 13 were supplied by the Division of Physical Research of the Bureau of Public Roads and by the Soil Conservation Service. The data used in table 14 were provided by the Materials Section of District 7, Illinois Division of Highways.

TABLE 13.—*Engineering test data for*

Soil type and location	Parent material	Bureau of Public Roads report No.	Depth	Horizon
			Inches	
Alford silt loam:				
50 ft. W. of cemetery and 156 ft. N. of ½ sec. line; SE 10, SE 40, NW 160, sec. 36, T. 1 N., R. 11 W. (Modal profile).	Deep loess.	S 31066	0–6	Ap
		S 31067	17–37	B21 and B22
		S 31068	37–58	B3
NW 1, SE 10, NW 40, SE 160, sec. 2, T. 1 N., R. 12 W. (Low, well drained).	Loess.	S 31069	0–9	Ap
		S 31070	12–17	B21
		S 31071	45–65	C1
NW 10, NE 40, NW 160, sec. 24, T. 1 N., R. 12 W.	Shallow loess over Illinoian till.	S 31072	0–12	A1 and A2
		S 31073	18–32	B2
		S 31074	44–57	D2
Belknap silt loam:				
NE 10, SW 40, NE 160, sec. 33, T. 2 N., R. 12 W. (Modal profile).	Alluvium.	S 31075	0–6	Ap
		S 31076	6–23	1 and 2
		S 31077	27–59	4
NW 1, NW 10, SE 40, NW 160, sec. 6, T. 1 N., R. 12 W. (Low, imperfectly drained).	Alluvium.	S 31078	0–7	Ap
		S 31079	7–17	1
		S 31080	17–40	2
NE 10, SE 40, NE 160, sec. 6, T. 1 N., R. 13 W. (High, imperfectly drained).	Alluvium.	S 31081	0–15	A11 and A12
		S 31082	15–30	1 and 2
		S 31083	30–50	3
Bonpas silty clay loam:				
SW 1, SW 10, NW 40, SW 160, sec. 2, T. 2 S., R. 14 W. (Modal profile).	Water-laid silts and clays.	S 31084	0–16	Ap and A1
		S 31085	16–22	Bg1
		S 31086	22–30	Bg2
NW 1, NE 10, NE 40, NW 160, sec. 26, T. 1 S., R. 14 W. (Lighter colored side).	Water-laid silts and clays.	S 31087	0–9	Ap
		S 31088	14–28	Bg2
		S 31089	28–36	Bg3
NE 10, NW 40, NE 160, sec. 8, T. 2 S., R. 13 W. (Lighter textured side).	Water-laid silts and clays.	S 31090	9–21	A1
		S 31091	21–28	Bg1
Hosmer silt loam:				
NE 1, NE 10, NE 40, NW 160, sec. 9, T. 1 N., R. 12 W. (Modal profile).	Loess over Illinoian till.	S 31101	0–6	Ap
		S 31102	14–27	B2
		S 31103	38–60	B'3
SE 1, NE 10, NE 40, NW 160, sec. 15, T. 1 N., R. 12 W. (Low, moderately well drained).	Moderately deep loess.	S 31104	0–6	Ap
		S 31105	20–34	B22
		S 31106	34–43	C'1
NE 1, NW 10, NW 40, SW 160, sec. 33, T. 2 N., R. 12 W. (Shallow to till side).	Shallow loess (27 inches) over Illinoian till.	S 31107	0–5	Ap
		S 31108	5–15	B21
		S 31109	35–45	D2
Roby fine sandy loam:				
SE 1, SW 10, SW 40, SW 160, sec. 13, T. 2 S., R. 14 W. (Modal profile).	Water-laid silts and sands.	S 31092	0–11	Ap
		S 31093	22–35	B2
		S 31094	35–55	C1
NW 1, NW 10, NE 40, NW 160, sec. 20, T. 2 S., R. 13 W. (High, imperfectly drained).	Water-laid sands, silts, and clays.	S 31095	0–8	Ap
		S 31096	20–32	B2
		S 31097	38–46	C1
20 ft, S. of ½ sec. line; SE ¼ sec. 30, T. 2 S., R. 13 W. (Low, imperfectly drained).	Water-laid and windblown sands and silts.	S 31098	8–21	A2
		S 31099	34–46	B22
		S 31100	54+	C

[1] Tests performed by Bureau of Public Roads in accordance with standard procedures of the American Association of State Highway Officials (AASHO) (*1*).

[2] Mechanical analyses according to the hydrometer method. Results by this procedure frequently may differ somewhat from results that would have been obtained by the pipette method. Mechanical analyses in this table are not suitable for use in naming textural classes for soils.

[3] Based on total material. One-hundred percent passed the No. 10 (2.0 mm.) sieve.

samples taken from 15 soil profiles [1]

Moisture-density		Mechanical analysis [2]						Liquid limit	Plasticity index	Classification	
		Percentage passing sieve—[3]		Percentage smaller than—[3]							
Maximum dry density	Optimum moisture	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO [4]	Unified [5]
Pounds per cu. ft.	*Percent*										
103	17	100	98	91	57	20	13	27	2	A–4(8)	ML.
106	18	100	100	98	65	32	27	41	18	A–7–6(11)	CL.
109	17	100	100	96	58	25	23	36	13	A–6(9)	ML–CL.
104	16	99	97	93	54	16	9	(6)	(6)	A–4(8)	ML.
105	19	100	100	98	70	38	31	46	22	A–7–6(14)	CL.
108	18	100	99	96	65	30	24	38	17	A–6(11)	CL.
110	16	100	98	95	60	26	21	29	6	A–4(8)	ML–CL.
108	17	99	91	87	61	35	28	39	18	A–6(11)	CL.
113	15	98	86	80	58	34	28	36	19	A–6(12)	CL.
104	17	100	92	88	63	17	12	25	2	A–4(8)	ML.
108	15	100	89	85	57	20	15	24	3	A–4(8)	ML.
111	15	99	86	83	53	17	12	22	1	A–4(8)	ML.
111	14	96	79	75	48	18	13	23	2	A–4(8)	ML.
115	14	97	78	73	51	23	17	24	5	A–4(8)	ML–CL.
114	13	97	67	59	34	13	9	(6)	(6)	A–4(6)	ML.
108	15	99	87	82	49	19	14	25	4	A–4(8)	ML–CL.
107	16	100	96	94	60	20	15	27	4	A–4(8)	ML–CL.
108	17	97	85	80	55	27	19	30	8	A–4(8)	ML–CL.
109	14	100	74	68	54	32	26	34	15	A–6(10)	CL.
113	15	100	74	70	52	32	27	37	20	A–6(12)	CL.
113	14	100	76	70	57	34	28	37	21	A–6(12)	CL.
106	17	100	88	80	63	36	29	36	15	A–6(10)	CL.
111	15	100	89	83	61	39	32	40	22	A–6(13)	CL.
111	16	100	89	84	64	39	31	41	22	A–7–6(13)	CL.
117	13	100	46	44	33	24	20	27	11	A–6(2)	SC.
114	14	100	48	45	35	25	21	30	14	A–6(4)	SC.
105	16	99	96	93	62	18	9	26	4	A–4(8)	ML–CL.
103	20	100	99	96	70	38	31	45	19	A–7–6(13)	ML–CL.
109	17	100	99	97	64	27	21	34	12	A–6(9)	ML–CL.
105	15	98	92	90	53	17	12	33	1	A–4(8)	ML.
105	19	100	97	95	68	38	32	50	29	A–7–6(18)	CL.
109	17	99	96	94	64	33	27	40	20	A–6(12)	CL.
107	16	100	97	94	65	26	20	30	8	A–4(8)	ML–CL.
104	20	100	99	98	71	38	32	45	21	A–7–6(13)	CL.
119	12	98	82	79	50	27	23	24	10	A–4(8)	CL.
117	10	98	52	49	34	16	9	17	2	A–4(3)	ML.
110	16	99	81	78	50	32	26	37	17	A–6(11)	CL.
113	13	100	18	15	11	9	7	(6)	(6)	A–2–4(0)	SM.
117	11	99	54	45	30	13	8	16	0	A–4(4)	ML.
120	12	99	57	51	36	21	16	22	7	A–4(4)	ML–CL.
117	13	100	49	39	26	18	16	24	7	A–4(3)	SM–SC.
117	10	100	53	35	22	9	6	(6)	(6)	A–4(4)	ML.
115	14	100	66	58	43	25	21	33	17	A–6(9)	CL.
112	12	100	32	19	11	9	8	(6)	(6)	A–2–4(0)	SM.

[4] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (pt. 1, ed. 7): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes. AASHO Designation M 145–149 (*1*).

[5] Based on the Unified Soil Classification System, Tech. Memo. No. 3–357, v. 1, Waterways Expt. Sta., Corps of Engin., U.S. Army, March 1953 (*28*).

[6] Nonplastic.

Soil Test Data

Three profiles from each of five extensive soil series in Wabash County were sampled at representative locations by the Soil Conservation Service and by the Illinois Agricultural Experiment Station. These samples were tested in accordance with the standard procedures of AASHO to help evaluate the soils for engineering purposes. The results of these tests and the classification of each soil sample according to both the AASHO and the Unified systems are given in table 13.

Another 19 samples from soil series were tested by the Illinois Division of Highways, in their work on various highways in Wabash County. These samples were tested by standard procedures and were classified according to the AASHO system. The results are shown in table 14.

TABLE 14.—*Engineering test data for soil samples taken from sites along Wabash County highways* [1]

Soil type and location	Depth	Mechanical analysis [2]					Liquid limit	Plasticity index	Classification	
		Percentage passing sieve—				Percentage of particle size smaller than 0.005 mm.				
		No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 100 (0.15 mm.)	No. 200 (0.074 mm.)				AASHO [3]	Unified
	Feet									
Alford silt loam: SE¼SE¼NW¼, sec. 8, T. 1 S., R. 12 W.	3. 5–7. 0	93	92	90	90	22	30. 6	16	A–6(10)----	CL
Alford silt loam: SE¼SE¼NW¼, sec. 1, T. 1 N., R. 12 W.	2. 0–6. 0	100	100	94	85	26	31. 0	16	A–6(10)----	CL
Alvin fine sandy loam: SE¼SE¼NW¼, sec. 1, T. 1 N., R. 12 W.	2. 0–7. 0	100	100	81	42	13	18. 2	1	A–4(1)-----	SM
Alvin fine sandy loam: SE¼SE¼SE¼, sec. 17, T. 2 S., R. 13 W.	0. 5–5. 0	100	88	34	29	11	13. 4	2	A–2–4(0)---	SM.
Alvin fine sandy loam: NW¼NE¼NW¼, sec. 20, T. 2 S., R. 13 W.	0–1. 5	100	100	83	79	12	18. 5	1	A–4(8)-----	ML
Ava silt loam: NW¼SW¼SE¼, sec. 6, T. 1 N., R. 13 W.	4. 5–7. 0	100	95	80	75	22	29. 1	16	A–6(10)----	CL
Bluford silt loam: NW¼SW¼SE¼, sec. 6, T. 1 N., R. 13 W.	0–2. 0	100	97	93	91	20	22. 4	12	A–6(9)-----	CL
Bluford silt loam, grading toward Wynoose silt loam: SE¼SE¼SW¼, sec. 6, T. 1 N., R. 13 W.	1. 0–4. 5	100	99	96	94	41	43. 0	26	A–7–6(15)--	CL
Bonpas silty clay loam: SW¼SE¼SW¼, sec. 12, T. 2 S., R. 14 W.	0–1. 0	100	99	98	95	34	38. 5	20	A–6(12)----	CL
	1. 0–2. 5	100	99	98	94	34	37. 2	19	A–6(12)----	CL
	2. 5–3. 5	100	99	98	96	31	36. 6	19	A–6(12)----	CL
Chauncey silt loam: SW¼SE¼SW¼, sec. 7, T. 1 N., R. 13 W.	0–2 0	100	98	93	91	23	29. 1	9	A–4(8)-----	CL

See footnotes at end of table.

TABLE 14.—*Engineering test data for soil samples taken from sites along Wabash County highways*—Continued

Soil type and location	Depth	Mechanical analysis [2]					Liquid limit	Plasticity index	Classification	
		Percentage passing sieve—				Percentage of particle size smaller than 0.005 mm.				
		No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 100 (0.15 mm.)	No. 200 (0.074 mm.)				AASHO [3]	Unified
	Feet									
Hosmer silt loam: NE¼NE¼NE¼, sec. 9, T. 1 N., R. 12 W.	1. 5–5. 5	100	95	77	68	18	19. 8	7	A–4(7)	ML–CL
Hoyleton silt loam: SE¼SW¼SW¼, sec. 7, T. 1 N., R. 13 W.	1. 0–3. 0	100	98	94	92	38	45. 1	27	A–7–6(16)	CL
Iona silt loam: NW corner NE¼NE¼, sec. 13, T. 2 S., R. 14 W.	0. 25–2. 5	98	95	93	92	21	24. 8	6	A–4(8)	ML–CL
Lukin silt loam: SW¼SW¼SW¼, sec. 7, T. 1 N., R. 13 W.	3. 5–7. 0	100	97	88	84	26	32. 4	19	A–6(12)	CL
Marissa silt loam: NE¼NE¼NE¼, sec. 14, T. 2 S., R. 14 W.	0. 25–1. 0	99	98	90	80	12	20. 4	3	A–4(8)	ML
	1. 0–2. 5	100	98	93	89	28	33. 8	18	A–6(11)	CL
	2. 5–3. 5	100	99	97	94	38	44. 5	29	A–7–6(17)	CL
	3. 5–6. 5	100	99	97	84	22	28. 7	14	A–6(10)	CL
Roby fine sandy loam: NW¼NW¼SW¼, sec. 16, T. 2 S., R. 13 W.	3. 5–6. 5	100	97	39	17	7	[4]	[4]	A–2–4(0)	SM
Stoy silt loam: SW¼SW¼NW¼, sec. 10, T. 1 N., R. 12 W.	0–1. 0	100	97	95	94	17	25. 4	3	A–4(8)	ML
Wakeland silt loam: SE¼SE¼NW¼, sec. 1, T. 1 N., R. 12 W.	0–3. 0	100	99	92	84	25	23. 1	8	A–4(8)	CL
Weir silt loam: NE¼NE¼NE¼, sec. 9, T. 1 N., R. 12 W.	4. 5–7. 5	100	97	87	82	22	24. 4	10	A–4(8)	CL

[1] Samples taken and laboratory tests made by Materials Section, Illinois Division of Highways, District No. 7.

[2] Mechanical analysis according to the hydrometer method. Results by this procedure frequently may differ somewhat from results that would have been obtained by the pipette method. Mechanical analyses in this table are not suitable for use in naming textural classes for soils.

[3] Group index values shown in this column were obtained by actual test. However, variations in these values for other samples of the same soil can be expected.

[4] Nonplastic.

The samples tested do not represent the entire range of soil characteristics in Wabash County, or even within the soil series sampled. The results of the tests, however, can be used as a general guide in estimating the physical properties of these soils in the county.

Table 15 lists estimated physical properties of the most important horizons, or layers, of each soil series in Wabash County. Some of the properties given in table 15 are estimated from field examination. Others, however, were determined from actual tests, as reported in tables 13 and 14. Each soil sample is classified according to the AASHO or Unified system, or both. The depth and thickness of layers given in table 15 are estimated, and at a particular site they may differ from those given. Eroded soils have lost part or most of the soil material from the original upper layer or layers. In eroded areas the underlying material is therefore closer to the eroded surface than is indicated in table 15.

TABLE 15.—*Brief description of the soils and estimated properties significant to engineering*

Soil type and mapping symbol	Depth to seasonally high water table	Soil description	Depth (typical profile)	Estimated classification		Permeability	Available water capacity	Reaction	Shrink-swell potential [1]
				AASHO	Unified				
	Feet		*Inches*			*Inches per hr.*	*Inches per inch of soil*	*pH*	
Alford silt loam (308)	10+	1 foot of silt loam over 2 to 3 feet of silty clay loam. In places the silty clay loam is underlain by several feet of silt loam or by glacial till of Illinoian age.	0–12	A–4	ML or CL	0. 80–2. 50	0. 23	5. 1–6. 5	Moderate.
			12–42	A–6 or A–7	CL	0. 80–2. 50	. 21	5. 0–6. 0	Moderate.
			42–75	A–6	ML or CL	0. 80–2. 50	. 30	5. 5–6. 2	Moderate.
			75+	A–6	CL	0. 20–0. 80		5. 0–6. 0	Moderate.
Allison silty clay loam (306).	3–5	2 feet of brown silty clay loam over 3 or more feet of silty clay loam. In places subject to occasional flooding.	0–24	A–6	CL	0. 80–2. 50	. 24	6. 1–7. 3	Moderate.
			24–40+	A–6 or A–7.	CL	0. 80–2. 50	. 22	6. 1–7. 3	Moderate.
Alvin fine sandy loam (131).	10+	1½ feet of fine sandy loam over 1 foot of fine sandy clay loam; underlain by 3 feet of loose sand.	0–18	A–4	ML	0. 80–2. 50	. 12	5. 1–5. 5	Moderate.
			18–30	A–6	CL	0. 80–2. 50	. 16	5. 1–5. 5	Moderate.
			30–60	A–2–4	SM	2. 5 –5. 0	. 03	5. 6–6. 0	Low.
Ava silt loam (14)	10+	1½ feet of silt loam over ½ foot of silty clay loam; underlain by 1½ feet of silt loam. These layers overlie 2 or more feet of silty clay loam glacial till.	0–18	A–4	ML or CL	0. 80–2. 50	. 26	5. 1–6. 0	Moderate.
			18–24	A–7	ML or CL	0. 05–0. 20	. 27	5. 1–5. 5	Moderate.
			24–40	A–6	ML or CL	0. 20–0. 80	. 26	4. 5–5. 0	Moderate.
			40–60	A–6	CL	0. 20–0. 80	. 22	5. 1–6. 0	Moderate.
Beaucoup silty clay loam (70).	3–5	Silty clay loam to a depth of several feet. In places this soil is in depressions and is subject to ponding.	0–12	A–7	CH	0. 20–0. 80	. 20	6. 1–7. 3	High.
			12–60	A–7	CH	0. 20–0. 80	. 19	6. 1–7. 3	High.
Belknap silt loam (382).	0–3	Silt loam to a depth of 5 feet.	0–60	A–4	ML	0. 05–0. 20	. 30	5. 1–6. 0	Moderate.
Birds silt loam (334)	0–3	Silt loam to a depth of 5 feet.	0–12	A–4	ML	0. 05–0. 20	. 30	6. 1–6. 5	Moderate.
			12–60	A–4	ML	0. 05–0. 20	. 30	6. 1–7. 3	Moderate.
Blair silt loam (5)	5–10	1 foot of silt loam over 4 feet of silty clay loam.	0–12	A–4	ML–CL	0. 20–0. 80	. 27	5. 1–6. 0	Moderate.
			12–30	A–7	CL	0. 05–0. 20	. 22	5. 1–6. 0	Moderate.
			30–60	A–6	CL	0. 20–0. 80	. 22	5. 1–6. 0	Moderate.
Bloomfield fine sand (53).	10+	3 feet of fine sand over 3 feet of alternating layers of fine sandy loam and fine sand.	0–36	A–2 or A–3.	SP or SM	5. 0–10. 0	. 03	5. 6–6. 5	Low.
			36–60	A–2 or A–3.	SP or SM	2. 5–5. 0	. 09	5. 6–6. 0	Low.
Bluford silt loam (13)	5–10	1½ feet of silt loam over 1 foot of silty clay loam. These layers are underlain by 1 foot of silt loam that, in turn, is underlain by more than 2 feet of silty clay loam glacial till.	0–18	A–4	ML or CL	0. 80–2. 50	. 26	5. 1–6. 0	Moderate.
			18–30	A–7	ML or CL	0. 05–0. 20	. 27	5. 1–5. 5	Moderate.
			30–42	A–6	ML or CL	0. 20–0. 80	. 26	4. 5–5. 0	Moderate.
			42–60	A–6	CL	0. 20–0. 80	. 24	5. 1–6. 0	Moderate.
Bonnie silt loam (108).	0–3	Silt loam to a depth of 5 feet.	0–60	A–4	ML	0–0. 05	. 30	5. 1–5. 5	Moderate.
Bonpas silty clay loam (126).	0–3	Silty clay loam to a depth of 5 feet.	0–18	A–6	CL	0. 20–0. 80	. 22	6. 6–7. 3	Moderate.
			18–42	A–6	CL	0. 20–0. 80	. 24	6. 6–7. 8	Moderate.
			42–60	A–6	CL	0. 20–0. 80	. 23	(2)	Moderate.

See footnotes at end of table.

TABLE 15.—*Brief description of the soils and estimated properties significant to engineering*—Continued

Soil type and mapping symbol	Depth to seasonally high water table	Soil description	Depth (typical profile)	Estimated classification		Permeability	Available water capacity	Reaction	Shrink-swell potential [1]
				AASHO	Unified				
	Feet		*Inches*			*Inches per hr.*	*Inches per inch of soil*	*PH*	
Camden silt loam (134).	10+	1 foot of silt loam over 2 feet of silty clay loam; underlain by 3 feet of stratified sands and silts.	0–12	A–4	ML or CL	0. 80–2. 50	0. 24	6. 1–6. 5	Moderate.
			12–36	A–7–6	ML or CL	0. 20–0. 80	. 23	5. 1–6. 0	Moderate.
			36–60	A–1 to A–4.	SM or SP	(3)	. 16	4. 5–6. 0	Low to moderate.
Chauncey silt loam (287).	0–3	2 to 3 feet of silt loam over 3 feet or more of silty clay loam.	0–30	A–4	ML or CL	0. 20–0. 80	. 28	5. 1–6. 0	Moderate.
			30–60	A–7–6	MH or CH	0–0. 05	. 26	5. 1–6. 5	High.
Cisne silt loam (2)	0–3	1½ feet of silt loam over 2 feet of silty clay loam; underlain by 1 foot of silt loam. These layers overlie silty clay loam glacial till.	0–18	A–4	ML or CL	0. 20–0. 80	. 28	4. 5–5. 0	Moderate.
			18–36	A–7–6	MH or CH	0–0. 05	. 28	4. 5–5. 0	High.
			36–48	A–7–6	CL	0. 20–0. 80	. 26	5. 1–5. 5	Moderate.
			48–60	A–6	CL	0. 20–0. 80	. 24	5. 1–6. 0	Moderate.
Darwin silty clay (71)	0–3	Silty clay to clay to a depth of at least 5 feet.	0–12	A–7	CH	0–0. 05	. 19	6. 1–6. 5	High.
			12–48	A–7	CH	0–0. 05	. 20	6. 6–7. 3	High.
			48–60	A–7	CH	0–0. 05	. 19	5. 6–6. 0	High.
Haymond silt loam (331).	5–10	Silt loam to a depth of 5 feet.	0–18	A–4	ML	0. 80–2. 50	. 28	5. 6–6. 5	Moderate.
			18–60	A–4	ML	0. 80–2. 50	. 26	6. 1–7. 8	Moderate
Hickory loam (8)	10+	Less than 1 foot of loam to silt loam over 1 foot of loam to clay loam; underlain by several feet of loam till.	0–10	A–4	ML or CL	0. 80–2. 50	. 24	4. 5–5. 0	Moderate.
			10–24	A–6 or A–7.	CL	0. 80–2. 50	. 22	4. 5–5. 5	Moderate.
			24–60	A–4 or A–6.	CL	0. 80–2. 50	. 22	5. 6–7. 8	Moderate.
Hosmer silt loam (214).	10+	1 foot of silt loam over 1 foot of silty clay loam. These layers overlie 3½ to 4 feet of compact heavy silt loam to silty clay loam, which is a fragipan.	0–12	A–4	ML or CL	0. 80–2. 50	. 24	6. 1–6. 5	Moderate.
			12–24	A–7–6	ML or CL	0. 20–0. 80	. 27	5. 1–6. 0	Moderate.
			24–60	A–6	ML or CL	0–0. 05	. 28	4. 5–5. 5	Moderate.
Hoyleton silt loam (3).	5–10	1½ feet of silt loam over 1 foot of silty clay loam, which overlies 1 foot of silt loam; underlain by 2 or more feet of silty clay loam glacial till.	0–18	A–4	ML or CL	0. 80–2. 50	. 26	4. 5–5. 0	Moderate.
			18–30	A–7	ML or CL	0. 05–0. 80	. 27	4. 5–5. 5	Moderate.
			30–42	A–6	ML or CL	0. 20–0. 80	. 26	6. 1–7. 3	Moderate.
			42–60	A–6	CL	0. 20–0. 80	. 24	6. 1–7. 3	Moderate.
Iona silt loam (307)	5–10	1 to 1½ feet of silt loam over 1½ feet of silty clay loam; underlain by silt loam.	0–18	A–4	ML	0. 80–2. 50	. 23	5. 6–6. 5	Moderate.
			18–36	A–7–6	CL	0. 20–0. 80	. 23	5. 6–6. 5	Moderate.
			36–60	A–6	ML or CL	0. 80–2. 50	. 30	6. 1–7. 3	Moderate.
Landes fine sandy loam (304).	5–10	1½ feet of fine sandy loam over 1½ feet of sandy loam; underlain by more than 2½ feet of loamy sand to fine sand.	0–18	A–4	ML	2. 50–5. 0	. 10	6. 6–7. 3	Moderate.
			18–36	A–2	SM	5. 0–10. 0	. 08	6. 6–7. 3	Low.
			36–60	A–2 or A–3.	SP or SM	5. 0–10. 0	. 06	6. 6–7. 3	Low.
Lukin silt loam (167)	5–10	2 feet of silt loam over 1 foot of heavy silt loam to silty clay loam; underlain by 3 or more feet of silt loam.	0–24	A–4	ML or CL	0. 80–2. 50	. 26	4. 5–5. 5	Moderate.
			24–36	A–6	CL	0. 05–0. 20	. 26	4. 5–5. 5	Moderate.
			36–60	A–4	ML or CL	0. 80–2. 50	. 26	5. 1–5. 5	Moderate.

See footnotes at end of table.

TABLE 15.—*Brief description of the soils and estimated properties significant to engineering*—Continued

Soil type and mapping symbol	Depth to seasonally high water table	Soil description	Depth (typical profile)	Estimated classification		Permeability	Available water capacity	Reaction	Shrink-swell potential [1]
				AASHO	Unified				
	Feet		*Inches*			*Inches per hr.*	*Inches per inch of soil*	*PH*	
Marissa silt loam (176).	3–5	1½ feet of silt loam over 1½ feet of silty clay loam; underlain by 2 or more feet of silt loam.	0–18 18–36 36–60	A–4 A–7–5 A–6	ML or CL MH or CH ML or CL	0. 80–2. 50 0. 20–0. 80 0. 80–2. 50	0. 28 . 26 . 28	5. 6–6. 5 6. 1–7. 3 7. 4–7. 8	Moderate. High. Moderate.
McGary silt loam (173).	3–5	1 foot of silt loam over 1½ feet of silty clay loam to silty clay; underlain by 3 or more feet of silty clay.	0–12 12–30 30–60	A–4 A–7 A–7	ML or CL CH CH	0. 80–2. 50 0–0. 05 0–0. 05	. 26 . 24 . 22	5. 6–6. 5 5. 6–6. 5 7. 4–8. 4	Moderate. High. High.
Orio sandy loam (200).	0–3	1½ feet of sandy loam over 1½ feet of clay loam; underlain by 2 or more feet of stratified sands and silts.	0–18 18–36 36–60	A–2 A–6 [3]	SM or SG SC or CL [3]	2. 5 –5. 0 0. 20–0. 80 [3]	. 16 . 14 . 10	5. 1–6. 0 5. 1–6. 0 5. 1–6. 0	Low. Moderate. [3].
Patton silty clay loam (142).	0–3	Silty clay loam to a depth of 5 feet or more.	0–18 18–36 36–60	A–6 A–6 A–6	CL CL CL	0. 20–0. 80 0. 20–0. 80 0. 20–0. 80	. 22 . 23 . 25	6. 1–6. 5 5. 6–7. 3 6. 6–7. 8	Moderate. Moderate. Moderate.
Petrolia silty clay loam (288).	0–3	Silty clay loam to a depth of 5 feet or more.	0–6 6–36 36–60	A–6 A–6 A–7–6	CL CL CL	0. 05–0. 20 0–0. 05 0–0. 05	. 21 . 20 . 20	6. 1–6. 5 6. 1–7. 3 6. 6–7. 3	Moderate. Moderate. Moderate.
Racoon silt loam (109).	0–3	2 feet of silt loam over 1½ feet of silty clay loam; underlain by stratified silt loam and silty clay loam.	0–24 24–42 42–60	A–4 A–7–6 [3]	ML or CL MH or CH [3]	0. 20–0. 80 0–0. 05 [3]	. 27 . 29 . 26	5. 1–6. 0 4. 5–5. 5 4. 5–5. 5	Moderate. High. Moderate.
Riverwash (123)	0–3	River sand and gravel to a variable depth.	0–60	A–1	GW or GP	[3]	[3]	[3]	Low.
Roby fine sandy loam (184).	3–5	1½ feet of fine sandy loam over 1½ feet of clay loam; underlain by 3 or more feet of stratified medium sands and loamy sands.	0–18 18–36 36–60	A–4 A–6 A–2–4	ML CL SM	0. 80–2. 50 0. 20–0. 80 0. 80–2. 50	. 12 . 10 . 09	5. 6–6. 5 5. 6–6. 5 6. 1–7. 3	Moderate. Moderate. Low.
Selma loam (125)	3–5	1½ feet of loam to sandy loam over 1 foot of sandy clay loam; underlain by stratified alluvial sands, silts, and clays.	0–18 18–30 30–60	A–4 A–4 [3]	ML ML or CL [3]	0. 80–2. 50 0. 80–2. 50 0. 80–2. 50	. 20 . 20 . 18	6. 6–7. 3 7. 4–7. 8 7. 4–7. 8	Moderate. Moderate. [3].
Sexton silt loam (208)	3–5	1½ feet of silt loam over 2½ feet of silty clay loam; underlain by stratified silts and sands.	0–18 18–48 48–60	A–4 A–7 A–1 to A–4.	ML or CL CL or CH SM or SP	0. 20–0. 80 0. 05–0. 20 2. 5 –5. 0	. 24 . 29 . 16	5. 1–6. 0 5. 1–5. 5 6. 1–7. 3	Moderate. High. Low to moderate.
Sharon silt loam (72)	5–10	Silt loam to a depth of 5 feet or more.	0–36 36–60	A–4 A–4	ML ML	0. 80–2. 50 0. 80–2. 50	. 28 . 26	5. 1–6. 0 5. 1–6. 0	Moderate. Moderate.
Starks silt loam (132)	5–10	1 foot of silt loam over 2½ feet of silty clay loam; underlain by stratified sands and silts.	0–12 12–42 42–60	A–4 A–6 A–1 to A–4.	ML CL SM or SP	0. 80–2. 50 0. 20–0. 80 2. 5 –5. 0	. 23 . 28 . 16	5. 6–6. 5 5. 1–5. 5 6. 6–7. 3	Moderate. Moderate. Low to moderate.

See footnotes at end of table.

TABLE 15.—*Brief description of the soils and estimated properties significant to engineering*—Continued

Soil type and mapping symbol	Depth to seasonally high water table	Soil description	Depth (typical profile)	Estimated classification		Permeability	Available water capacity	Reaction	Shrink-swell potential [1]
				AASHO	Unified				
	Feet		*Inches*			*Inches per hr.*	*Inches per inch of soil*	*PH*	
Stoy silt loam (164)	5–10	1½ feet of silt loam over 1½ feet of silty clay loam; underlain by 2 or more feet of silt loam.	0–18	A–4	ML	0. 20–0. 80	0. 26	5. 6–6. 5	Moderate.
			18–36	A–7–6	CH	0. 05–0. 20	. 28	5. 6–6. 0	High.
			36–60	A–6	CL	0. 20–0. 80	. 30	5. 6–6. 0	Moderate.
Sumner sandy loam (87).	5–10	1½ feet of sandy loam over 1 foot of loam to sandy clay loam; underlain by stratified loamy sand and sand.	0–18	A–2–4	SM or SC	2. 5 –5. 0	. 09	6. 1–7. 3	Low.
			18–30	A–2–4	SM or SC	2. 5 –5. 0	. 08	6. 6–7. 3	Low.
			30–60	A–1 to A–3.	SW, SP, or SM.	5. 0 –10. 0	. 03	6. 1–6. 5	Low.
Tice silty clay loam (284).	0–3	Silty clay loam to a depth of 5 feet.	0–6	A–7–6	CH	0. 20–0. 80	. 23	5. 1–7. 3	High.
			6–30	A–7–6	CH	0. 20–0. 80	. 26	6. 1–7. 3	High.
			30–60	A–7–6	CH	0. 20–0. 80	. 24	6. 1–7. 3	High.
Wakeland silt loam (333).	5–10	Silt loam to a depth of 5 feet or more.	0–18	A–4	ML	0. 20–0. 80	. 28	6. 1–6. 5	Moderate.
			18–36	A–4	ML	0. 20–0. 80	. 30	6. 1–6. 5	Moderate.
			36–60	A–4	ML	0. 20–0. 80	. 28	6. 1–6. 5	Moderate.
Weir silt loam (165)	0–3	1½ feet of silt loam over 1½ feet of silty clay loam to silty clay; underlain by 3 or more feet of silt loam.	0–18	A–4	ML or CL	0. 20–0. 80	. 28	5. 1–6. 0	Moderate.
			18–36	A–7–6	ML or CL	0–0. 05	. 28	4. 5–5. 5	Moderate.
			36–60	A–6 or A–4.	ML or CL	0. 20–0. 80	. 30	6. 1–6. 5	Moderate.
Worthen silt loam (37).	5–10	2 feet of silt loam over 1 foot of silt loam to silty clay loam; underlain by 2 feet or more of silt loam.	0–24	A–4 or A–6.	ML or CL	0. 80–2. 50	. 24	6. 1–7. 3	Moderate.
			24–36	A–4, A–6 or A–7–6.	ML or CL	0. 80–2. 50	. 24	6. 1–7. 3	Moderate.
			36–60	A–4 or A–6.	ML	0. 80–2. 50	. 22	6. 1–7. 3	Moderate.
Wynoose silt loam (12).	0–3	1½ feet of silt loam over 1½ feet of silty clay; underlain by 1 foot of silt loam over many feet of silty clay loam glacial till.	0–18	A–4	ML or CL	0. 05–0. 20	. 26	4. 5–6. 0	Moderate.
			18–36	A–7–6	MH or CH	0–0. 05	. 28	4. 5–5. 0	High.
			36–48	A–7–6	CL	0. 05–0. 20	. 26	4. 5–5. 0	Moderate.
			48–60	A–6	CL	0. 05–0. 20	. 24	5. 1–6. 0	Moderate.

[1] General indication of the change in volume of a soil material that can be expected as a result of changes in moisture content. This rating is an arbitrary one and is based on the classification of the soil under the Unified system. The following ratings were used for the soil groups indicated: *Low*—SC, SM, SM–SP, SM–SC, SW, SP, SW–SM, GP, GW, GM, GC, and GW–GP; *moderate*—ML, CL, MH, ML–CL, and SC–CL; *high*—CH and MH–CH. Obviously some variation from this rating can be expected. It is probable that with a low plasticity index an ML soil would rate *low* in shrink-swell potential. With a high plasticity index, an ML, CL, or MH soil could have a *high* shrink-swell potential.

[2] Calcareous.

[3] Variable.

Engineering Practices

Table 16 lists specific features of the soils in each series that might affect the selection, design, and application of various engineering structures. These features are evaluated from test data and from field performance. Some features of a soil may be helpful 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 make the soil much more suitable for artificial drainage.

Soil features that affect the installation of water management structures are shown in table 16. These features are evaluated on the basis of data taken from tables 13 and 14 and from estimates given in table 15. The water management structures used most frequently in this county are farm ponds, terraces, diversions, grass waterways (fig. 13), ditches and tile that provide drainage, and structures that control erosion.

TABLE 16.—*Features of soils*

Soil type and mapping symbol	Removal of topsoil needed in nearly level areas to be used for shallow grading sections for highways [1]	Surface drainage needed in nearly level areas to be used for highways	Subject to overflow	Suitability as source of material for—	
				Topsoil [2]	Sand and gravel
Alford silt loam (308)	(4)	No	No	Good	Not suitable
Allison silty clay loam (306)	No	Yes	Yes	Good	Not suitable
Alvin fine sandy loam (131)	No	No	No	Poor	Sand below a depth of 4 feet.
Ava silt loam (14)	(4)	No	No	Fair	Not suitable
Beaucoup silty clay loam (70)	No	Yes	Yes	Good	Not suitable
Belknap silt loam (382)	(5)	Yes	Yes	Good	Not suitable
Birds silt loam (334)	(5)	Yes	Yes	Good	Not suitable
Blair silt loam (5)	(4)	No	No	Fair	Not suitable
Bloomfield fine sand (53)	(4)	No	No	Poor	Sand
Bluford silt loam (13)	Yes	Yes	No	Fair	Not suitable
Bonnie silt loam (108)	(5)	Yes	Yes	Good	Not suitable
Bonpas silty clay loam (126)	No	Yes	Yes	Good	Not suitable
Camden silt loam (134)	Yes	No	No	Good	Not suitable
Chauncey silt loam (287)	Yes	Yes	No	Good	Not suitable
Cisne silt loam (2)	Yes	Yes	No	Good	Not suitable
Darwin silty clay (71)	No	Yes	Yes	Poor	Not suitable
Haymond silt loam (331)	(5)	No	Yes	Good	Not suitable
Hickory loam (8)	(4)	No	No	Fair	Not suitable
Hosmer silt loam (214)	Yes	Yes	No	Fair	Not suitable
Hoyleton silt loam (3)	Yes	Yes	No	Good	Not suitable
Iona silt loam (307)	Yes	Yes	No	Good	Not suitable

See footnotes at end of table.

that affect engineering

Suitability of soil material for—					Intake rate for sprinkler irrigation	
Embankments of farm ponds	Reservoir areas	Disposal fields for septic tanks [3]	Drainage	Terraces and diversions	For bare soil	For soil that has cover
					Inches per hour	*Inches per hour*
Fair to good	Good, but sand pockets in places.	Suitable	Well drained	Applicable if topography is suitable.	0. 2–0. 8	0. 7–1. 1
Good	Good	Suitable where protected from overflow, except in low areas.	Moderately well drained to well drained; subject to overflow in unprotected areas; can be tiled.	Normally not needed	0. 4–1. 0	0. 8–1. 2
Fair, but has piping hazard.	Poor	Suitable	Well drained	Applicable if topography is suitable.	0. 8+	1. 0+
Fair to good	Good	Not suitable	Well drained	Generally needed	0. 1–0. 5	0. 3–0. 7
Poor, except in core or blanket.	Good	Not suitable	Poorly drained; tilable; subject to overflow or ponding.	Not needed	0. 1–0. 3	0. 2–0. 4
Poor; usable if compacted with sheepsfoot or pneumatic-tire roller.	Poor; sand pockets below a depth of 5 feet.	Not suitable	Imperfectly drained; tilable.	Diversions needed in some places to divert runoff from uplands.	0. 1–0. 5	0. 3–0. 7
Poor; usable if compacted with sheepsfoot or pneumatic-tire roller.	Poor; sand pockets below a depth of 5 feet.	Not suitable	Poorly drained; tiling questionable; use surface drains.	Diversions needed in places to divert runoff from uplands.	0. 1–0. 5	0. 3–0. 7
Good	Good	Not suitable	Imperfectly drained; not tilable.	Adapted if topography is suitable.	0–0. 2	0. 1–0. 3
Not suitable	Not suitable	Suitable	Excessively drained	Not adapted	1. 0+	1. 5+
Fair to good	Good	Not suitable	Imperfectly drained; not tilable.	Adapted if topography is suitable.	0–0. 2	0. 1–0. 3
Poor; usable if compacted with sheepsfoot or pneumatic-tire roller.	Poor; sand pockets below a depth of 5 feet.	Not suitable	Poorly drained; not tilable; use surface drainage.	Diversions may be needed in some places to divert runoff from uplands.	0. 1–0. 5	0. 3–0. 7
Good	Good	Not suitable	Poorly drained; tilable.	Not needed	0. 2–0. 8	0. 5–0. 9
Fair to a depth of 3 feet.	Not suitable; sand pockets below a depth of 3½ feet.	Suitable	Moderately well drained to well drained; tilable.	Adapted if topography is suitable.	0. 2–0. 8	0. 7–1. 1
Poor, except in core or blanket.	Good	Not suitable	Poorly drained; not tilable; use surface drainage.	Not needed	0–0. 2	0. 1–0. 3
Good below a depth of 3 feet.	Good	Not suitable	Poorly drained; not tilable.	Not needed	0–0. 2	0. 1–0. 3
Poor, except in cores and blankets.	Good	Not suitable	Very poorly drained; not tilable; use surface drainage.	Not needed	0. 1–0. 3	0. 2–0. 4
Poor; usable if compacted with sheepsfoot or pneumatic-tire roller.	Poor	Suitable, except where subject to overflow.	Well drained; surface drainage needed in some places to drain depressions.	Diversions needed in places to divert runoff from uplands.	0. 2–0. 8	0. 7–1. 1
Good	Good	Suitable	Well drained	Diversions needed in places.		
Fair	Good	Not suitable	Well drained	Adapted if topography is suitable.	0. 1–0. 5	0. 3–0. 7
Fair to good	Good	Not suitable	Imperfectly drained; not tilable.	Adapted if topography is suitable.	0–0. 2	0. 1–0. 3
Fair to good	Fair to good	Suitable	Moderately well drained to imperfectly drained.	Adapted if topography is suitable.	0. 2–0. 8	0. 7–1. 1

TABLE 16.—*Features of soils*

Soil type and mapping symbol	Removal of topsoil needed in nearly level areas to be used for shallow grading sections for highways [1]	Surface drainage needed in nearly level areas to be used for highways	Subject to overflow	Suitability as source of material for—	
				Topsoil [2]	Sand and gravel
				Inches per hour	*Inches per hour*
Landes fine sandy loam (304)	No	No	No	Poor	Sand
Lukin silt loam (167)	Yes	Yes	No	Good	Not suitable
Marissa silt loam (176)	Yes	Yes	No	Good	Not suitable
McGary silt loam (173)	Yes	Yes	No	Fair	Not suitable
Orio sandy loam (200)	Yes	Yes	No	Fair	Not suitable
Patton silty clay loam (142)	No	Yes	No	Good	Not suitable
Petrolia silty clay loam (288)	No	Yes	Yes	Good	Not suitable
Racoon silt loam (109)	Yes	Yes	No	Good	Not suitable
Riverwash (123)	(5)	No	Yes	Very poor	Not suitable, because of small extent.
Roby fine sandy loam (184)	No	No	No	Poor	Sand below a depth of 4 feet.
Selma loam (125)	No	Yes	No	Good	Not suitable
Sexton silt loam (208)	Yes	Yes	No	Fair	Not suitable
Sharon silt loam (72)	(5)	No	Yes	Good	Not suitable
Starks silt loam (132)	Yes	Yes	No	Fair	Not suitable
Stoy silt loam (164)	Yes	Yes	No	Fair	Not suitable
Sumner sandy loam (87)	No	No	No	Fair	Sand
Tice silty clay loam (284)	No	Yes	Yes	Good	Not suitable
Wakeland silt loam (333)	(5)	Yes	Yes	Good	Not suitable
Weir silt loam (165)	Yes	Yes	No	Fair	Not suitable
Worthen silt loam (37)	(5)	No	No	Good	Not suitable
Wynoose silt loam (12)	Yes	Yes	No	Fair	Not suitable

[1] Shallow grading is done only in nearly level areas.
[2] Refers to the A horizon.
[3] Ratings based on characteristics of the soils as they apply to sewage disposal systems as discussed in U.S. Dept. of Health, Education, and Welfare Manual of Septic Tank Practice. Pub. No. 526 (*26*).

that affect engineering—Continued

Suitability of soil material for—					Intake rate for sprinkler irrigation	
Embankments of farm ponds	Reservoir areas	Disposal fields for septic tanks [3]	Drainage	Terraces and diversions	For bare soil	For soil that has cover
					Inches per hour	*Inches per hour*
Not suitable	Not suitable	Suitable if protected from overflow.	Excessively drained	Not needed	0. 8+	1. 0+
Fair	Good	Not suitable	Imperfectly drained; not tilable.	Diversions needed in places to intercept runoff from adjacent higher areas.	0–0. 2	0. 1–0. 3
Fair below a depth of 3 feet.	Fair; sand pockets below a depth of 5 feet.	Not suitable	Imperfectly drained; tilable.	Adapted if topography is suitable.	0. 2–0. 8	0. 5–0. 9
Poor, except for core or blanket.	Good	Not suitable	Imperfectly drained; not tilable.	Adapted if topography is suitable.	0–0. 2	0. 1–0. 3
Good above a depth of 3 feet.	Not suitable	Not suitable	Poorly drained; not tilable; use surface drainage.	Not needed	0. 1–0. 5	0. 2–0. 8
Good	Good	Not suitable	Poorly drained; tilable.	Not needed	0. 1–0. 3	0. 2–0. 4
Good	Good	Not suitable	Poorly drained; not tilable.	Not needed	0. 1–0. 5	0. 3–0. 7
Poor	Fair to good	Not suitable	Poorly drained; not tilable.	Not needed	0–0. 2	0. 1–0. 3
Not suitable	Not suitable	Not suitable	Excessively drained	Not needed	1. 0+	1. 0+
Fair, but has piping hazard.	Not suitable	Suitable on sloping areas.	Imperfectly drained; tile not recommended; use surface drainage.	Adapted if topography is suitable; level terraces adapted.	0. 1–0. 5	0. 2–0. 8
Poor	Not suitable	Questionable because of seasonal high water table.	Poorly drained; tilable; may have sand pockets.	Not needed	0. 2–0. 8	0. 5–0. 9
Not suitable	Not suitable	Not suitable	Poorly drained; not tilable; use surface drainage.	Adapted if topography is suitable.	0–0. 2	0. 1–0. 3
Poor; usable if compacted with sheepsfoot or pneumatic-tire roller.	Fair; possibility of sand pockets.	Suitable; questionable where flooding is a problem.	Well drained	Diversions needed in places to divert runoff from uplands.	0. 2–0. 8	0. 7–1. 1
Not suitable below a depth of 3½ feet.	Not suitable	Suitable; questionable where not protected by levees.	Imperfectly drained	Adapted if topography is suitable.	0–0. 2	0. 1–0. 3
Poor	Good	Not suitable	Imperfectly drained; can use random tile lines with surface drainage.	Adapted if topography is suitable.	0–0. 2	0. 1–0. 3
Not suitable	Not suitable	Suitable	Well drained	Not needed	1. 0+	1. 5+
Poor, except for cores and blankets.	Good	Not suitable	Imperfectly drained; tilable.	Not needed	0. 2–0. 8	0. 5–0. 9
Poor	Fair	Not suitable	Imperfectly drained; tilable.	Diversions needed in places to divert runoff from uplands.	0. 1–0. 5	0. 3–0. 7
Fair	Fair to poor	Not suitable	Poorly drained; not tilable.	Not needed	0–0. 2	0. 1–0. 3
Poor to fair; must use sheepsfoot or pneumatic-tire roller.	Fair	Suitable	Well drained	Not needed	0. 4–1. 0	0. 8–1. 2
Good below a depth of 3 feet.	Good	Not suitable	Poorly drained; not tilable.	Not needed	0–0. 2	0. 1–0. 3

[4] In Wabash County this soil generally has slopes greater than 2 percent.

[5] Variable. If this soil is used for subgrade, performance is fair; an embankment is generally required to prevent flooding of the pavement. If a high embankment is to be built, the strength of the embankment foundation should be investigated.

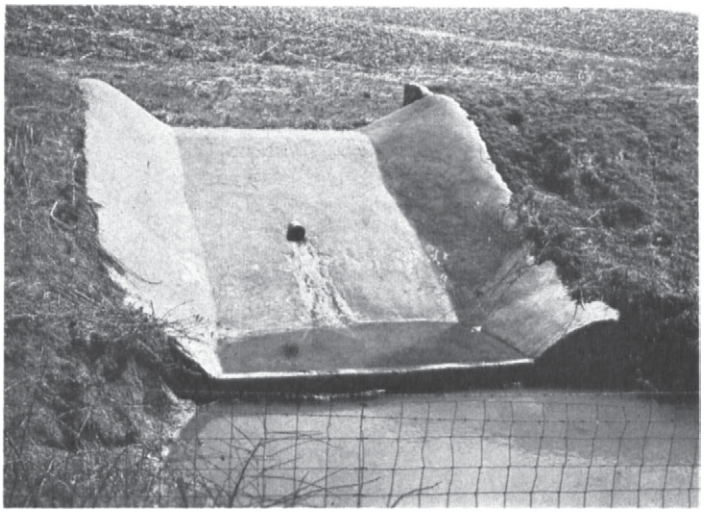

Figure 13.—**A grassed waterway protected from gullying by a flume. The flume safely lowers the water from a higher elevation.**

Farm ponds can be built on soils of the uplands and on some of the soils of the terraces. Those soils that are unsuitable as a site for a pond or that are less desirable than some other soils are indicated in table 16. The least permeable soils are the most suitable for the reservoir area of farm ponds, as well as for the embankments. The ratings given in table 16 with regard to the use of the various soils for embankments for farm ponds are based on the permeability of the soil material, as well as on the strength, the content of sand, and the ease of compaction. Piping is a hazard in sandy soils, where the finer particles of soil material are washed out when there is seepage through the embankment. Where such seepage occurs, small channels that resemble tubes are formed in the embankment.

Several soils that have a high content of clay are rated as poor for most purposes other than for a core or blanket. They are not suitable for use in embankments. These soils have relatively slow permeability, but they are somewhat difficult to compact. They tend to flow out from under any appreciable weight placed upon them unless they are well confined by more stable soil material.

Other soils are rated as poor as a source of material for embankments unless a special effort is made to obtain a high degree of compaction. These soils are high in silt. If they are compacted by ordinary methods, the embankment is likely to be porous and rather rapid seepage takes place. As a result, the soil material on the downstream side of the fill holding the pond will be wet and unstable.

Many of the soils in the county need drainage. Draining the level or nearly level soils is accomplished by installing tile or shallow surface drains or ditches that can be crossed with farm machinery, and by providing deep outlet ditches.

The determination of whether tile can be used in given soil types depends upon the characteristics of the soil material and their affect upon the movement of water through the soil profile. Because water moves slowly or very slowly through the Birds, Bonnie, Blair, Bluford, Chauncey, Cisne, Darwin, Hoyleton, Lukin, McGary, Racoon, Sexton, Stoy, Weir, and Wynoose soils, tiling is not recommended for those soils or is recommended with considerable limitations.

In table 17 the soils are grouped according to their characteristics that affect drainage, and information is given about their need for tile drainage and surface drainage. For detailed information on the depth and spacing of tile, see the local work unit conservationist or the farm adviser. Plans for installing a tile system should be developed with the aid of a competent engineer. Of particular concern in planning a tile system is the availability of an adequate outlet. The best drainage of soils suitable for tile can often be accomplished by using a combination of surface drains to remove the excess surface water, and tile to remove excess free water from within the soil.

Surface drains are needed on almost all of the level or nearly level soils. These drains are shallow channels, generally 9 to 18 inches deep, constructed in such a way that they can be crossed easily in farming operations. For soils not suitable for tiling, the best drainage can be obtained by using a carefully planned system of surface drains. Obtain competent engineering assistance to insure that the main and lateral channels are placed properly and that the spoil material is disposed of properly. Check the channel into which the surface drain empties to determine if it will carry the flow necessary to provide good drainage.

For sewage disposal the soil must have an acceptable percolation rate without interference from ground water or impervious strata. Some soils meet these requirements but are subject to overflow. These hazards are noted in table 16. If the soil does not meet the requirements, it is listed as not suitable for disposal fields for septic tanks.

In many places surface drains can be made to function much more effectively by doing a good job of land smoothing. The land smoothing consists of removing small ridges and high points and of filling small, low areas. This makes the surface reasonably uniform, and, as a result, water moves readily into surface drains.

Deep outlet ditches generally receive the flow from surface drains, tile, or other outlet ditches and carry it to a larger stream. Problems encountered in planning and constructing these ditches include identifying an adequate outlet and determining the capacity of bridges and culverts. Other problems may arise because of the presence of layers of sand below the surface. When this sand is exposed in a ditch it either flows out into the ditch and erodes away, allowing the bank to slough, or it contributes to the tendency of some soils to slough to a vertical position. Gully heads, which develop at a point where surface water enters a deep ditch from an elevation considerably above the bottom of the ditch, also present a problem. To cope with these problems and to insure that a proposed outlet ditch will have adequate capacity for its drainage, the person planning the drainage should consult with a qualified engineer who will develop the plans and specifications for the ditch and the necessary structures.

Sloughing, caused by a layer of sand that erodes or flows, can best be controlled by excavating approximately 1 foot deeper than the designed elevation and by making plans for a regular maintenance cleanout. For an entire soil profile that tends to slough to a vertical position, it is generally advisable to construct the ditchbanks as steep

TABLE 17.—*Soil interpretations for drainage*

Drainage group and soil series	Tile drainage	Surface drainage	Remarks
Group 1: 2—Cisne. 12—Wynoose. 109—Racoon. 165—Weir. 208—Sexton. 287—Chauncey.	Not recommended	Needed in level or nearly level areas.	Water moves through soil very slowly.
Group 2: 3—Hoyleton. 5—Blair. 13—Bluford. 164—Stoy. 167—Lukin.	Complete system not recommended.	Needed in level or nearly level areas.	Random tile for wet spots.
Group 3: 70—Beaucoup silty clay loam. 124—Beaucoup gravelly clay loam. 284—Tice. 333—Wakeland. 382—Belknap.	Recommended	Needed in level or nearly level areas.	Tiling is desirable. Securing suitable outlets may be a problem.
Group 4: 71—Darwin.	Questionable; generally not recommended.	Needed in level or nearly level areas.	Water moves very slowly to tile.
Group 5: 108—Bonnie. 334—Birds.	Not recommended	Needed in level or nearly level areas.	
Group 6: 125—Selma. 126—Bonpas. 142—Patton.	Recommended	Needed in level or nearly level areas.	May contain pockets of sand.
Group 7: 132—Starks. 307-Iona	Recommended	Needed in level or nearly level areas.	Complete tiling system not necessary in all places. Random tile may be adequate.
Group 8: 173—McGary.	Not recommended	Needed in level or nearly level areas. Waterways and drainage terraces are needed in some eroded areas.	Water moves through soil very slowly.
Group 9: 176—Marissa.	Recommended	Needed in level or nearly level areas. Waterways and drainage terraces are needed in some areas.	Small areas may be drained by using random lines with open inlets.
Group 10: 184—Roby. 200—Orio.	Not recommended	Needed in level or nearly level areas.	
Group 11: 288—Petrolia.	Recommended	Needed in level or nearly level areas.	Water moves through soil slowly

as practicable—in some places 1:1—and then plan for a maintenance cleanout as needed. Where an appreciable amount of surface water enters a deep ditch from an elevation appreciably above the bottom of the ditch, an erosion control structure should be installed to prevent cutting.

Terraces and diversions help control erosion on the sloping soils. A large system of terraces is difficult to install in some areas because of the short, choppy slopes that are characteristic of much of the relief. In many places it is necessary to construct more than one diversion to correct an erosion problem in a given area.

Grass waterways serve as outlets for the diversions and terraces, and they otherwise prevent gullying in the natural drainageways. The waterways need to be well shaped and reasonably deep. Establishing vegetation in these channels is often difficult. This is because in many places making the waterway deep enough to provide good drainage requires excavation into the subsoil or substratum. The soil material in the subsoil and substratum is generally

low in fertility and in organic matter. Air and water do not move readily through it. In addition, the long, hot, dry periods in summer and fairly heavy rains in winter and early in spring make it somewhat difficult to establish a new seeding of grass. Establishing vegetation in the waterways is likely to succeed if a good mulch is used in addition to normal tillage practices and if a fairly large amount of fertilizer is applied.

Literature Cited

(1) American Association of State Highway Officials.
1961. standard specifications for highway materials and methods of sampling and testing: the classification of soils and soil-aggregate mixtures for highway construction purposes. AASHO Designation: M145–49. 8th Ed., Pt. 1: 45–51, illus.

(2) ———
1961. standard specifications for highway materials and methods of sampling and testing: mechanical analysis of soils. AASHO Designation: T88–57. 8th Ed., Pt. 2: 273–283.

(3) ———
1961. standard specifications for highway materials and methods of sampling and testing: determining the liquid limit of soils. AASHO Designation: T89–60. 8th Ed., Pt. 2: 284–291.

(4) ———
1961. standard specifications for highway materials and methods of sampling and testing: calculating the plasticity index of soils. AASHO Designation: T91–54. 8th Ed., Pt. 2: 294.

(5) ———
1961. standard specifications for highway materials and methods of sampling and testing: terms relating to subgrade, soil-aggregates, and fill materials. AASHO Designation: M146–60. 8th Ed., Pt. 1: 52.

(6) Baldwin, Mark, Kellogg, Charles E., and Thorp, James.
1938. soil classification. U.S. Dept. Agr. Ybk. 1938: 979–1001.

(7) Boggess, W. R.
1958. growth and third thinning yields in a 21-year-old shortleaf pine plantation in southern illinois. Ill. Agr. Expt. Sta. Forestry Note 79. 4 pp.

(8) Broadfoot, W. M.
1960. field guide for evaluating cottonwood sites. USDA South. Forest Expt. Sta. Occas. Paper 178, 6 pp., illus.

(9) Changnon, Stanley A., jr.
1961. annual and seasonal hail days distribution in illinois, missouri, and iowa. Appendix A: Summary of Research on Hailstorms in Illinois During 1961. Crop-Hail Insurance Actuarial Assn. Res. Rept. No. 11, 22 pp.

(10) Fehrenbacher, J. B., and Snider, H. J.
1954. corn root penetration in muscatine, elliott, and cisne soils. Soil Sci. 77: 281–291.

(11) ———, Jorgensen, I. H., and Cleveland, F. W.
1957. wabash county, illinois, soil management guide, your personal guide to better understand and manage your soils. Agr. Expt. Sta. Ext. Serv. in Agr. and Home Econ. in coop. with SCS, 63 pp., illus.

(12) Fidlar, M. M.
1948. physiography of the lower wabash valley. Ind. Dept. of Cons., Div. of Geol., Bul. No. 2, 112 pp., illus.

(13) Grossman, R. B., Fehrenbacher, J. B., and Beavers, A. H.
1959. fragipan soils of illinois: I, II, III. Soil Sci., Soc. Amer. Proc. 23: 65–75.

(14) Horberg, Leland.
1950. bedrock topography of illinois. Ill. State Geol. Survey, Bul. No. 73, 111 pp., illus.

(15) Illinois Department of Conservation, Division of Forestry.
(n.d.) elements of forestry with special reference to illinois. Rev. 1955. 35 pp. Springfield, Ill.

(16) Illinois Technical Forestry Association.
1952. forest planting practices for illinois. Rev. 1957. 35 pp., illus.

(17) ———
1956. recommended forest practices for illinois hardwood timber types. Rev. 1957. 16 pp.

(18) Joos, L. A.
1959. climate of the states, illinois. U.S. Dept. Com. Weather Bur. Climatology of the U.S. No. 60–11, 16 pp., illus.

(19) ———
1960. freeze probabilities in illinois. Ill. Agr. Expt. Sta. in coop. with U.S. Weather Bur. Bul. 650, 16 pp., illus.

(20) King, D. B., and Winters, R. K.
1952. forest resources and industries of illinois. Ill. Agr. Expt. Sta. Bul. No. 562, 95 pp., illus.

(21) Leighton, M. M., Ekblaw, George E., and Horberg, Leland.
1948. physiographic divisions of illinois. Ill. State Geol. Survey, Dept. of Invest., No. 129, 33 pp., illus.

(22) Lindsey, A. A., Petty, R. O., Sterling, D. K., and Van Asdall, Willard.
1961. vegetation and environment along the wabash and tippecanoe rivers. Ecol. Mono. v. 31, No. 2: 105–156, illus.

(23) Schnur, G. L.
1937. yield, stand, and volume tables for even-aged upland oak forests. USDA Tech. Bul. 560, 88 pp., illus.

(24) Spaeth, J. N.
1948. forests of southern illinois. South. Ill. Booklet No. 4, 17 pp., illus.

(25) Thorp, James, and Smith, Guy D.
1949. higher categories of soil classification: order, suborder, and great soil groups. Soil Sci. 67: 117–126.

(26) United States Department of Health, Education, and Welfare.
[1958]. manual of septic-tank practice. Public Health Serv. Pub. No. 526, 85 pp., illus.

(27) University of Illinois.
1956. the productivity of dark, till-derived soils in northeastern illinois. Univ. of Ill. Agron. Facts. SP–11, 2 pp.

(28) Waterways Experiment Station, Corps of Engineers.
1953. the unified soil classification system. Tech. Memo. 3–357, 2 v.

Glossary

Aggregate, soil. A cluster, such as a clod, crumb, block, or prism, made up of many single particles of soil.

Alluvium. Soil material that has been transported and deposited by water.

Available moisture capacity. The capacity of a soil to hold water that can be used by plants. Water held between the wilting point (15 atmospheres of tension) and the field capacity (1/3 atmosphere). Classes of available moisture capacity in this report are the following (to a depth of 60 inches):

Very high—12 inches or more.	*Moderate*—6 to 9 inches.
High—9 to 12 inches.	*Low*—3 to 6 inches.
	Very low—less than 3 inches.

Calcareous soil. A soil that contains enough lime to form bubbles when treated with cold, dilute hydrochloric acid.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. Two or more kinds of soil that occur together in a more or less regular pattern, and that are so intricately associated geographically that they cannot be shown separately on a soil map at the scale used.

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; will not hold together in a mass.

Friable. When moist, crushes easily under gentle to moderate pressure between thumb and forefinger and can be pressed together into a lump.

Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic. When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a wire when rolled between thumb and forefinger.

Sticky. When wet, adheres to other material; tends to stretch somewhat and pull apart, rather than pull free from other material.

Hard. When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft. When dry, breaks into powder or individual grains under very slight pressure.

Cemented. Hard and brittle; little affected by moistening.

Depth of soil. Thickness of soil over a specified layer, generally one that does not permit the growth of roots. Classes used in this report are—

Deep—36 inches or more.
Moderately deep—20 to 36 inches.
Shallow—10 to 20 inches.
Very shallow—less than 10 inches.

Drainage, soil. Internal soil drainage is that quality of a soil that permits the downward flow of water through it. On the basis of runoff, permeability, and internal soil drainage, the following relative soil-drainage classes are described.

Very poorly drained. The water table remains at or near the surface most of the time.

Poorly drained. Water is removed so slowly that the soil remains wet much of the time.

Imperfectly drained. Water is removed slowly enough so that the soil is periodically wet and periodically dry. Mottling is commonly present below a depth of 6 to 16 inches in the lower A horizon and in the B and C horizons.

Moderately well drained. Water is removed somewhat slowly so that the soil is wet for short periods. The soils have uniform color in the A and upper B horizons and have mottling in the lower B and in the C horizons.

Well drained. Water is removed readily but not rapidly. The soils are nearly free from mottling and are commonly of intermediate texture.

Somewhat excessively drained. Water is removed rapidly. The soils are very permeable and are free from mottling throughout their profile.

Excessively drained. The soils are commonly very porous and rapidly permeable, and they have low water-holding capacity.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors, such as light, moisture, temperature, and the physical condition, or tilth, of the soils, are favorable. Terms to describe natural fertility in this report are—

Low. Fertilizer applied results in a distinct, visual response for a given crop.

Medium. Fertilizer applied results in a definite increase in yield, but response might not be visible.

High. Fertilizer applied results in no definitely measurable increase in yield.

Fragipan. A dense and brittle pan, or layer, that owes its hardness mainly to extreme density or compactness rather than to content of much clay or cementation. Fragments that are removed are friable, but the material in place is so dense that roots cannot penetrate it and water moves through it very slowly by following vertical channels and cleavage planes.

Glacial drift. Material deposited by a glacier or glacial waters. Glacial till is unstratified, unsorted drift deposited directly by ice. Glacial outwash is stratified, sorted drift deposited by meltwater from glaciers.

Leached. Dissolved and washed out of or down through the soil.

Liquid limit (soil engineering). The moisture content at which the soil passes from a plastic to a liquid state. In engineering, a high liquid limit indicates that the soil has a high content of clay and a low capacity for supporting loads.

Loess. A uniform, silty material transported by wind and deposited on the land.

Maximum density. The greatest amount of soil that can be compacted into any unit of volume; expressed as pounds of dry soil material per cubic foot.

Mechanical analysis. Measurement of the amounts of various size classes of soil grains (sand, silt, clay) in a sample. Proportions of the size classes determine the textural class of the material. Names used by engineers for various size classes of particles differ from those used by soil scientists. For example, fine sand in engineering terminology consists of particles 0.42 to 0.074 millimeter in diameter, whereas fine sand as determined by the soil scientist consists of particles 0.25 to 0.10 millimeter in diameter.

Optimum moisture content. The water content, expressed in percentages, at which a soil can be compacted to its maximum dry density by a given compactive effort.

Parent material (soil). The horizon of weathered rock or partly weathered soil material from which soil 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. Classes of permeability used in this report refer to the following percolation rates:—

Very slow—less than 0.05 inch per hour.
Slow—0.05 inch to 0.2 inch per hour.
Moderately slow—0.2 to 0.8 inch per hour.
Moderate—0.8 inch to 2.5 inches per hour.
Moderately rapid—2.5 to 5.0 inches per hour.
Rapid—5.0 to 10.0 inches per hour.
Very rapid—More than 10.0 inches per hour.

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.

Poorly graded sands (soil engineering). Sands that are either predominantly one size material or that have limited material in one or more size ranges.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Siltpan. A compact soil horizon high in silt and relatively low in clay. When dry, it is very hard and brittle. When moist, the apparent cementation disappears. (See also Fragipan.)

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 adhere together without any regular cleavage).

Subgrade. The soil material prepared and compacted to support a structure or pavement.

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer beneath the solum, or true soil; the C or D horizon.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil. Includes the A horizon and in places part of the B horizon; has no depth limit.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. Stream terraces are frequently called *second bottoms*, as contrasted to *flood plains*, and are seldom subject to overflow.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The soil textural classes are made up of the following:

Sand. Generally composed of 85 percent or more of sand, the remainder being silt and clay.

Sandy loam. Generally composed of more than 50 percent sand, less than 50 percent silt, and less than 20 percent clay.

Loam. Contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Silt loam. Generally composed of more than 50 percent silt, 12 to 27 percent clay, and the rest, sand.

Clay loam. Contains 27 to 40 percent clay, 20 to 45 percent sand, and the rest, silt.

Silty clay loam. Contains 27 to 40 percent clay and less than 20 percent sand; the rest is silt.

Clay. Contains 40 percent or more of clay, less than 45 percent sand, and less than 40 percent silt.

Upland. Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Wilting point. The moisture content of soil, on an oven-dry basis, at which plants wilt so much that they do not recover when placed in a dark, humid atmosphere. At wilting point the percentage of water available to plants approximates the minimum content of moisture in the soil at a depth below that affected by surface evaporation.

GUIDE TO MAPPING UNITS, MANAGEMENT GROUPS, AND WOODLAND SUITABILITY GROUPS

[See table 4, p. 8, for the approximate acreage and proportionate extent of the soils; see table 7, p. 49, for estimated average acre yield of field crops. For information about woodland, see p. 55, and for information significant to engineering, see p. 65]

Map symbol	Mapping unit	Page	Management group		Woodland suitability group	
			Symbol [1]	Page	Number	Page
2	Cisne silt loam	18	IIIw-4	46	(2)	--
3A	Hoyleton silt loam, 0 to 2 percent slopes	21	IIw-5	42	(2)	--
3B	Hoyleton silt loam, 2 to 4 percent slopes	21	IIe-3	39	(2)	--
3B2	Hoyleton silt loam, 2 to 4 percent slopes, moderately eroded	21	IIe-3	39	(2)	--
3C2	Hoyleton silt loam, 4 to 7 percent slopes, moderately eroded	21	IIIe-1	43	(2)	--
5C2	Blair silt loam, 4 to 7 percent slopes, moderately eroded	14	IIIe-1	43	4	61
5C3	Blair soils, 4 to 7 percent slopes, severely eroded	14	IVe-1	46	4	61
8C2	Hickory loam, 4 to 7 percent slopes, moderately eroded	19	IIe-2	39	6	62
8C3	Hickory soils, 4 to 7 percent slopes, severely eroded	19	IIIe-4	44	6	62
8D	Hickory loam, 7 to 12 percent slopes	19	IIIe-4	44	6	62
8D2	Hickory loam, 7 to 12 percent slopes, moderately eroded	19	IIIe-4	44	6	62
8D3	Hickory soils, 7 to 12 percent slopes, severely eroded	19	IVe-1	46	6	62
8E	Hickory loam, 12 to 18 percent slopes	19	IVe-1	46	6	62
8E2	Hickory loam, 12 to 30 percent slopes, moderately eroded	19	IVe-1	46	6	62
8E3	Hickory soils, 12 to 30 percent slopes, severely eroded	20	VIe-2	48	6	62
12	Wynoose silt loam	32	IIIw-4	46	3	61
13A	Bluford silt loam, 0 to 2 percent slopes	15	IIw-5	42	4	61
13B	Bluford silt loam, 2 to 4 percent slopes	15	IIe-3	39	4	61
13B2	Bluford silt loam, 2 to 4 percent slopes, moderately eroded	15	IIe-3	39	4	61
13C2	Bluford silt loam, 4 to 7 percent slopes, moderately eroded	16	IIIe-1	43	4	61
14B	Ava silt loam, 2 to 4 percent slopes	12	IIe-4	40	5	61
14B2	Ava silt loam, 2 to 4 percent slopes, moderately eroded	12	IIe-4	40	5	61
14C	Ava silt loam, 4 to 7 percent slopes	12	IIIe-2	43	5	61
14C2	Ava silt loam, 4 to 7 percent slopes, moderately eroded	12	IIIe-2	43	5	61
14C3	Ava soils, 4 to 7 percent slopes, severely eroded	12	IVe-1	46	5	61
37A	Worthen silt loam, 0 to 2 percent slopes	31	I-2	38	(2)	--
37B	Worthen silt loam, 2 to 4 percent slopes	31	IIe-1	39	(2)	--
37C	Worthen silt loam, 4 to 7 percent slopes	31	IIe-1	39	(2)	--
53F	Bloomfield fine sand, 18 to 30 percent slopes	15	VIIs-2	48	8	63
70+	Beaucoup silt loam, overwash	13	I-2 or IIw-1	38 or 41	2	60
70	Beaucoup silty clay loam	13	I-1 or IIw-1	38 or 41	2	60
W70	Beaucoup silty clay loam, wet	13	Vw-1	47	2	60
71	Darwin silty clay	18	IIIw-3	45	2	60
W71	Darwin silty clay, wet	18	Vw-1	47	2	60
72	Sharon silt loam	28	I-3 or IIw-3	38 or 41	1	59
87	Sumner sandy loam	29	IIIs-1	46	(2)	--
108	Bonnie silt loam	16	IIIw-2	45	2	60
109	Racoon silt loam	26	IIIw-4	46	3	61
123	Riverwash	26	VIIs-1	48	9	63
124	Beaucoup gravelly clay loam	13	I-1 or IIw-1	38 or 41	2	60
125	Selma loam	27	I-2 or IIw-1	38 or 41	(2)	--
126+	Bonpas silt loam, overwash	16	I-2 or IIw-1	38 or 41	(2)	--
126	Bonpas silty clay loam	16	I-1 or IIw-1	38 or 41	(2)	--
131A	Alvin fine sandy loam, 0 to 2 percent slopes	11	IIs-1	42	7	62
131B	Alvin fine sandy loam, 2 to 4 percent slopes	11	IIe-5	40	7	62
131C	Alvin fine sandy loam, 4 to 7 percent slopes	11	IIIe-5	44	7	62
131C2	Alvin fine sandy loam, 4 to 7 percent slopes, moderately eroded	11	IIIe-5	44	7	62
131D	Alvin fine sandy loam, 7 to 12 percent slopes	12	IIIe-5	44	7	62
131D2	Alvin fine sandy loam, 7 to 12 percent slopes, moderately eroded	12	IIIe-5	44	7	62
131D3	Alvin soils, 7 to 12 percent slopes, severely eroded	12	IVe-2	47	7	62
131E	Alvin fine sandy loam, 12 to 18 percent slopes	12	IVe-2	47	7	62
131E2	Alvin fine sandy loam, 12 to 18 percent slopes, moderately eroded	12	IVe-2	47	7	62
131E3	Alvin soils, 12 to 18 percent slopes, severely eroded	12	VIe-2	48	7	62
132A	Starks silt loam, 0 to 2 percent slopes	28	IIw-5	42	10	63
132B2	Starks silt loam, 2 to 4 percent slopes, moderately eroded	28	IIe-3	39	10	63
132C2	Starks silt loam, 4 to 7 percent slopes, moderately eroded	28	IIIe-1	43	10	63
132C3	Starks soils, 4 to 7 percent slopes, severely eroded	28	IVe-1	46	10	63
134A	Camden silt loam, 0 to 2 percent slopes	17	I-3	38	6	62
134B	Camden silt loam, 2 to 4 percent slopes	17	IIe-2	39	6	62
134C2	Camden silt loam, 4 to 7 percent slopes, moderately eroded	17	IIe-2	39	6	62
134D2	Camden silt loam, 7 to 12 percent slopes, moderately eroded	17	IIIe-4	44	6	62
134D3	Camden soils, 7 to 12 percent slopes, severely eroded	17	IVe-1	46	6	62
142	Patton silty clay loam	25	I-1 or IIw-1	38 or 41	(2)	--
164A	Stoy silt loam, 0 to 2 percent slopes	29	IIw-5	42	4	61
164B	Stoy silt loam, 2 to 4 percent slopes	29	IIe-3	39	4	61
164B2	Stoy silt loam, 2 to 4 percent slopes, moderately eroded	29	IIe-3	39	4	61
164C	Stoy silt loam, 4 to 7 percent slopes	29	IIIe-1	43	4	61
164C2	Stoy silt loam, 4 to 7 percent slopes, moderately eroded	29	IIIe-1	43	4	61

See footnote at end of table.

GUIDE TO MAPPING UNITS, MANAGEMENT GROUPS, AND WOODLAND SUITABILITY GROUPS—Continued

Map symbol	Mapping unit	Page	Management group		Woodland suitability group	
			Symbol [1]	Page	Number	Page
164C3	Stoy soils, 4 to 7 percent slopes, severely eroded	29	IVe-1	46	4	61
165	Weir silt loam	31	IIIw-4	46	3	61
167A	Lukin silt loam, 0 to 2 percent slopes	23	IIw-5	42	[2]	--
167B	Lukin silt loam, 2 to 4 percent slopes	23	IIe-3	39	[2]	--
173A	McGary silt loam, 0 to 2 percent slopes	24	IIIw-4	46	11	63
173B	McGary silt loam, 2 to 4 percent slopes	24	IIIe-3	44	11	63
173B2	McGary silt loam, 2 to 4 percent slopes, moderately eroded	24	IIIe-3	44	11	63
173C2	McGary silt loam, 4 to 7 percent slopes, moderately eroded	24	IIIe-3	44	11	63
173C3	McGary soils, 4 to 7 percent slopes, severely eroded	24	VIe-1	47	11	63
173D3	McGary soils, 7 to 12 percent slopes, severely eroded	24	VIe-1	47	11	63
173E3	McGary soils, 12 to 18 percent slopes, severely eroded	24	VIe-1	47	11	63
176A	Marissa silt loam, 0 to 2 percent slopes	23	I-2	38	[2]	--
176B	Marissa silt loam, 2 to 4 percent slopes	23	IIe-1	39	[2]	--
184A	Roby fine sandy loam, 0 to 2 percent slopes	26	IIs-1	42	7	62
184B	Roby fine sandy loam, 2 to 4 percent slopes	26	IIe-5	40	7	62
184C2	Roby fine sandy loam, 4 to 7 percent slopes, moderately eroded	26	IIIe-5	44	7	62
200	Orio sandy loam	25	IIw-4	42	[2]	--
208	Sexton silt loam	27	IIIw-4	46	10	63
214B	Hosmer silt loam, 2 to 4 percent slopes	20	IIe-4	40	5	61
214B2	Hosmer silt loam, 2 to 4 percent slopes, moderately eroded	20	IIe-4	40	5	61
214C	Hosmer silt loam, 4 to 7 percent slopes	20	IIIe-2	43	5	61
214C2	Hosmer silt loam, 4 to 7 percent slopes, moderately eroded	20	IIIe-2	43	5	61
214C3	Hosmer soils, 4 to 7 percent slopes, severely eroded	21	IVe-1	46	5	61
214D2	Hosmer silt loam, 7 to 12 percent slopes, moderately eroded	21	IIIe-2	43	5	61
214D3	Hosmer soils, 7 to 12 percent slopes, severely eroded	21	IVe-1	46	5	61
214E3	Hosmer soils, 12 to 18 percent slopes, severely eroded	21	VIe-2	48	5	61
284	Tice silty clay loam	30	I-1 or IIw-1	38 or 41	1	59
287	Chauncey silt loam	17	IIIw-4	46	[2]	--
288	Petrolia silty clay loam	25	IIw-2	41	2	60
304A	Landes fine sandy loam, 0 to 2 percent slopes	22	IIIw-1	45	1	59
304A+	Landes silt loam, overwash, 0 to 2 percent slopes	22	IIIw-1	45	1	59
304B	Landes fine sandy loam, 2 to 4 percent slopes	22	IIIw-1	45	1	59
304C	Landes fine sandy loam, 4 to 7 percent slopes	23	IIIw-1	45	1	59
306A+	Allison silt loam, overwash, 0 to 2 percent slopes	11	I-2 or IIw-1	38 or 41	1	59
306A	Allison silty clay loam, 0 to 2 percent slopes	11	I-1 or IIw-1	38 or 41	1	59
W306A	Allison silty clay loam, 0 to 2 percent slopes, wet	11	Vw-1	47	1	59
306B	Allison silty clay loam, 2 to 4 percent slopes	11	IIw-1	41	1	59
306C	Allison silty clay loam, 4 to 7 percent slopes	11	IIw-1	41	1	59
307A	Iona silt loam, 0 to 2 percent slopes	22	I-3	38	6	62
307B	Iona silt loam, 2 to 4 percent slopes	22	IIe-2	39	6	62
307B2	Iona silt loam, 2 to 4 percent slopes, moderately eroded	22	IIe-2	39	6	62
307C2	Iona silt loam, 4 to 7 percent slopes, moderately eroded	22	IIe-2	39	6	62
308B	Alford silt loam, 2 to 4 percent slopes	10	IIe-2	39	6	62
308B2	Alford silt loam, 2 to 4 percent slopes, moderately eroded	10	IIe-2	39	6	62
308C	Alford silt loam, 4 to 7 percent slopes	10	IIe-2	39	6	62
308C2	Alford silt loam, 4 to 7 percent slopes, moderately eroded	10	IIe-2	39	6	62
308C3	Alford silt loam, 4 to 7 percent slopes, severely eroded	10	IIIe-4	44	6	62
308D2	Alford silt loam, 7 to 12 percent slopes, moderately eroded	10	IIIe-4	44	6	62
308D3	Alford silt loam, 7 to 12 percent slopes, severely eroded	10	IVe-1	46	6	62
308E2	Alford silt loam, 12 to 18 percent slopes, moderately eroded	10	IVe-1	46	6	62
308E3	Alford silt loam, 12 to 18 percent slopes, severely eroded	10	VIe-2	48	6	62
308F	Alford silt loam, 18 to 30 percent slopes	10	VIe-2	48	6	62
308F3	Alford silt loam, 18 to 30 percent slopes, severely eroded	10	VIe-2	48	6	62
331	Haymond silt loam	19	I-3 or IIw-3	38 or 41	1	59
333A	Wakeland silt loam, 0 to 2 percent slopes	30	IIw-3	41	1	59
W333A	Wakeland silt loam, 0 to 2 percent slopes, wet	30	Vw-1	47	1	59
333B	Wakeland silt loam, 2 to 4 percent slopes	30	IIw-3	41	1	59
334	Birds silt loam	14	IIIw-2	45	2	60
382A	Belknap silt loam, 0 to 2 percent slopes	13	IIw-3	41	1	59
382B	Belknap silt loam, 2 to 4 percent slopes	14	IIw-3	41	1	59
999C2	Hickory-Alford complex, 4 to 7 percent slopes, moderately eroded	20	IIe-2	39	6	62
999D2	Hickory-Alford complex, 7 to 12 percent slopes, moderately eroded	20	IIIe-4	44	6	62
999D3	Hickory-Alford complex, 7 to 12 percent slopes, severely eroded	20	IVe-1	46	6	62
999E3	Hickory-Alford complex, 12 to 30 percent slopes, severely eroded	20	VIe-2	48	6	62

[1] Where two management groups are shown for a single soil, the first group refers to areas of the soil that are drained or protected from overflow, and the second, to areas that are not drained or protected.

[2] Not placed in a woodland suitability group.

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