Soil Region J includes major areas of alluvial soils, peat and muck soils (Histosols), and poorly drained mineral soils (Figs. 2-50, 16-1, 16-2). The areas shown on the soil map (Plate 1) total approximately 2,850,000 acres, or about 8.2% of Wisconsin's land area. The actual area on the land may be nearly double that; many small areas of these soils cannot be shown on the soil map because of its scale. These areas include thousands of kettle-hole wetlands and numerous colluvial deposits on footslopes, in small intermittent drainageways, and in overwash deposits on the edges of wetlands (areas of discharge of water by through-flow of water and by evaporation).

Vegetative growth is vigorous on alluvial soils of floodplains. Recurrent floods may damage plant cover, especially immediately adjacent to rivers and streams, but they also add new soil material that is usually fertile and of a medium texture that is favorable to plant growth. Plant species range from the scarce sagebrush to the abundant ragweed, willow, and silver maple. Marshland cover includes the cattail and bulrush, which together are probably more productive in terms of mass of vegetative growth per acre than any other plant community of Wisconsin. Natural vegetation of muck and peat bogs is characterized by slowly growing black spruce and shrubby leatherleaf, sedge, and sphagnum moss. Soils of Region J thus have a wide range in productivity, from about the lowest to the highest in the state. These are among the least studied of Wisconsin soils. They comprise areas in which modern zoning ordinances prohibit the building of many kinds of permanent structures, but permit recreational, wildlife, and flood-control uses. Much can be learned from future investigations of interaction of these soils with the environment.

![Index map showing the geographic relationship of Soil Region J to major glacial boundaries.](image)

**Alluvial Soils**

All soils that have formed in alluvium (stream deposits), or colluvium (soil material transported down-slope by gravity and/or slope-wash) are commonly called alluvial soils even though they may vary widely in color, texture, and other characteristics. The chief diagnostic characteristic is irregularity in content of organic matter from horizon to horizon with depth, although there is a general vertical decrease within each A1 and A1b horizon. Alluvial soils in Wisconsin are composed of relatively young sediments and have not been stable long enough for distinctive subsoil horizons to form, with few exceptions. Alluvial soils that are fairly uniform in composition and natural drainage have been classified as soil series and given names such as Arenzville and Orion. Others, particularly those formed in heterogeneous deposits, are classified as undifferentiated land classes. The latter term indicates that the soils present are extremely variable within short distances, or that they are unstable and may change from year to year as flood waters erode them and deposit new sediments. The generally low value of such lands makes detailed classification and mapping unprofitable.

Two major associations of alluvial soils are recognized in Region J. The first is J1, dominated by soils of the Arenzville, Orion, and Etrick series (Figs. 2-51, 7-9, 7-10). The second is J2, a land class called "wet alluvial soils, undifferentiated" (Figs. 11-6, 16-2, 16-4). The largest mappable areas of J2 are along the lower reaches of the Wisconsin and Chippewa rivers, and along the Mississippi River.

### J1. Arenzville, Orion, and Etrick silt loam.

Arenzville and Orion soils (Figs. 2-50, 2-51, 7-9, 7-10) consist of silty, light-colored alluvial sediments 40 inches or more in thickness over a dark buried presettlement soil that resembles the Etrick (see below). Arenzville soils (Typic Udifluvents) are well to moderately well drained. Orion soils (Aquic Udifluvents) are somewhat poorly drained, being mottled and drab in color at depth. In both soils the A horizon is granular or subangular blocky in structure and slightly darker in color than subsoil horizons. There is, however, very little soil development below the A1 or Ap horizon. Crude stratification or laminarion is common in subsurface layers; thin lenses of sand or gravel may be present but are not common. These two soils are asso-
Figure 16-2. Sequence of maps showing distribution of soil associations in Soil Region J.
ciated in the Chippewa River valley in Pepin County, but are most extensive in southwestern Wisconsin. Sixty-two thousand acres are shown on the map and there are many additional areas too small to delineate.

Ettrick silt loam (Typic Argiaquoll) is a poorly drained associate of Arensville and Orion. It is an older soil with a higher content of clay in the subsoil. A less well developed, poorly drained, alluvial soil is Otter, a Cumulic Haplauquoll. Millington, also dark colored and poorly drained (Cumulic Haplauquoll), is found in loamy alluvium.

Other common alluvial soils in southwestern counties are Huntsville (well drained) and Lawson (somewhat poorly drained). Both are deep, silty, dark-colored soils classified as Cumulic Hapludolls.

Akan silt loam, a somewhat poorly drained soil formed in silty alluvium over lacustrine silts and clays, and Boaz silt loam, also somewhat poorly drained, and formed in deep silts, are, like the Ettrick, somewhat older alluvial soils. They have been on stable surfaces for long enough periods to have developed cambic (Juvenile) B horizons. These soils are classified as Mollic and Aeric Haplauquolls, respectively. Where undisturbed they support sedge meadows that include numerous composites and the bottle gentian.

Well-drained, loamy soils formed in alluvium include Terril and Ankeny (both Cumulic Hapludolls), Kickapoo (Typic Udifluvent), and Caryville (Fluventic Hapludoll). The latter is formed in 10 to 20 inches of loamy alluvium over sand and has lower soil temperatures than the other soils mentioned in this paragraph.

Accelerated erosion in some parts of southwestern Wisconsin has resulted in local washing of cherty rubble from steep stony lands onto silty bottomlands. The detailed pattern of soils of alluvial fans has not yet been mapped.

Alluvial soils formed in slope-wash on footslopes of cultivated fields include dark-colored soils such as Worthen (well drained) and Littleton (somewhat poorly drained), both Cumulic Hapludolls; the light-colored, well-drained Chaseburg (Typic Udifluvent); Orion (formerly called Osseo), somewhat poorly drained (Aquic Udifluvent); and the poorly drained Sawmill (Cumulic Haplauquoll). The Cumulic Hapludolls of the Worthen and Littleton series (formerly called Judson) are darker equivalents of Chaseburg and Orion.

In southeastern Wisconsin, silty alluvial soils, which formed mainly on footslopes from post-agricultural colluvial sediments over older soils, include dark-colored, well-drained soils such as Troxel (Typic Argiudoll), Worthen (Cumulic Hapludoll), and Radford (somewhat poorly drained, Aquic, Fluventic Hapludoll), and light-colored soils such as Juneau (well drained, Typic Udifluvent) and Pistakee (somewhat poorly drained, Aquic Udifluvent) formed in silty alluvial and colluvial deposits. Poorly drained associates include Washtenaw (Typic Hapluaquent), formed in colluvial silts, and Walkill (Thoroto Histic Fluvaquent; Fig. 8-7), formed in colluvial silts over peat or muck deposits.

Some soil scientists observe that the Arensville has no detectable B horizon but that older colluvial soils, such as Chaseburg, may have cambic or even weak argillic horizons. The difference will probably be of less interest in the future, if accelerated deposition causes Arensville-like soils to be formed over Chaseburg and Juneau soils.

Caryville fine sandy loam, a Fluventic Hapludoll, is the principal alluvial soil in Soil Region C, on high bottoms along the Wisconsin River in Portage County and the Chippewa River in Dunn County.

In Soil Region E, DePere (Typic Udifluvent, well drained, mesic); Jump River (Typic Udifluvent, well drained, frigid); and Stinson (Aquic Udifluvent, somewhat poorly drained) are formed in reddish silt loam to silty clay alluvium. In north-central and far northern Wisconsin (Soil Regions F and G mainly) Brule (Typic Udifluvent), a well-drained soil formed in loamy alluvial sediments, has been recognized, along with several other unnamed series.

Numerous small bodies of valley bench soils such as Dakota and Bertrand are included in soil association J1 on the soil map (Plate 1).

Alluvial soils of the Arensville, Orion, Ettrick, or similar associations, along streams, are subject to frequent flooding or ponding, unless protected by structures such as dams or levees.

Less well drained members of the association have high water tables. These factors severely limit their use for many purposes.

1. The native forest on the “Jump River Bottom” was notable because of the abundance of species of the southern mesic forest. In 1973 a virgin stand of 210 acres was still present in Price County.
In the southern part of the state, well- or somewhat poorly drained alluvial soils that are not flooded too frequently and that occur in areas large enough to cultivate are commonly used for corn. Because of the great productivity of these soils, high-value crops such as tobacco are grown in some places. Poorly drained soils may also be cropped if they are artificially drained and protected from flooding. Otherwise, wet and frequently flooded alluvial soils are set aside for pasture, parks, and other nonintensive uses.

Zoning ordinances recognize that alluvial soils are not well suited for homesites or other uses where flooding would easily cause property damage or hazard to life. The use of soil maps to delineate alluvial soils and adjacent low, poorly drained soils as flood-hazard zones for regulatory purposes has been shown to be feasible in many rural areas (Lee, Parker, and Yanggen, 1972).

Alluvial soils formed from colluvium on footslopes ordinarily are not flooded. However, poorly drained members have a high water table, may be ponded at times, and usually require artificial drainage in order to be cropped. Seepage in subsurface layers often occurs in moderately well and somewhat poorly drained alluvial soils on footslopes. These well- to moderately well drained colluvial soils are among the most productive soils in the landscape, being deep and friable, and having a good moisture supply. They are usually present in small bodies, however, and, except where small acreage crops such as tobacco are grown, are included in the cropping system of larger fields.

J2. Wet alluvial soils, undifferentiated.

These J2 soils (Figs. 7-4, 11-6, 16-3, 16-4) are characterized by a high water table and are subject to frequent overflow. As a result they are variable in composition and wet much of the time. Texture depends on the source of the sediment and on stream characteristics and may include strata of sand, silt, and clay, and, in some places, mucky or peaty layers. Some large areas of marsh and other land that is periodically inundated are also included in this unit. Altogether, 200,000 acres are shown on the map. Many other areas are too small to be included.

Because of the hazards of frequent flooding, these soils have severe limitations for most uses except as wildlife and recreational areas or for pasture and certain forest crops.

Weidman (1914) reported 15 to 20 square miles of a light loam soil suitable for truck crops between Caryville and Meredith in Dunn County, in the midst of sandy loam alluvial soils of the Chippewa River bottom.

MAJOR WETLANDS

The largest continuous areas of wetlands (Fig. 16-1; Plate 1) (Whitson and Ullsperger, 1919) are in the central part of the state, in low-lying portions of the bed of glacial Lake Wisconsin (Wood, Jackson, Monroe, and Juneau counties). In nearby Portage and Adams counties wetlands are in kettles and other depressions of the outwash plain that lies just west of the north-trending Woodfordian moraine on the west. In eastern and southeastern Wisconsin, wet soils are in enclosed glacial depressions such as kettles or in lowlands between drumlins and morainal ridges. Some of them are on footslopes below ledges, or cuestas. For example, just east of Waupun in Dodge and Fond du Lac counties, relatively soft Maquoketa Shale was deeply eroded by glacial ice and meltwaters at the foot of the Silurian Escarpment, forming the large depression containing the Horicon Marsh.

Wetlands in northeastern Wisconsin are also in depressions in glacial drift. Sphagnum bogs are mainly in kettles. Many bodies of other wet soils are scattered throughout the region.

In the southwestern part of the state, the well-developed dendritic drainage system, which was not disrupted by recent
glaciation, allows for few wetland sites. Most are in oxbows of meandering streams on bottomlands, at seepage sites on footslopes, marshlands of flood plains, and in tributary valleys that were blocked at the confluence by massive deposits of outwash in the Wisconsin or Mississippi River valleys. A few wet mineral soils are on broad uplands.

On the soil map, wetlands are divided into two general classes. One of these, the wet mineral soils, includes soil associations J3 through J11 (Fig. 16-2). The other, consisting primarily of organic soils (peat and muck), includes soil associations J12 through J15 (Fig. 16-2).

**Wet Mineral Soils**

13. Granby, Shawano, and Emmet loamy sand and sandy loam, and shallow peat.

The wet Granby loamy sand (Typic Hapludalf) predominates, and is associated with Shawano loamy sand (Typic Udipsamment) and Emmet sandy loam (Alfic Haplorthod) on rises and with shallow peat in depressions.

These soils occur principally along the southwest shore of Green Bay in areas formerly occupied by Lake Michigan at higher water levels following glaciation. Water tables are generally high and the soils have deep, mottled subsoils as a result. The soils are only slightly acid in reaction in the solum and they support a good growth of coniferous and hardwood vegetation.


Between the wet Newton (Typic Humapraept) and excessively drained Plainfield (Typic Udipsamment) lies the less extensive Morocco (Aquia Udipsamment) sand.

This group of sandy soils, which range from very wet to excessively drained and include areas of shallow peat, occurs in Portage County (near the Buena Vista Marsh) and in Adams and Juneau counties. It occurs in a landscape with only a few feet of microrelief. Small ridges are occupied by the excessively drained Plainfield (Typic Udipsamment) soils and the moderately well drained Nekoosa soils, while at slightly lower elevations somewhat poorly drained Morocco (Aquia Udipsamment) and Newton (Typic Humaupraept) soils occur on nearly level slopes. Numerous shallow depressions are filled with 1 to 2 feet of acid peat formed from reed and sedge materials (Adrian peat, Terric Medisaprism). The mineral soils in this association are extremely sandy. They have no visible textural B horizon and the chief variations are in the amount of organic matter which is accumulated in the surface and the degree of gleying and mottling of the subsoil. Some are used for cranberry production.

15. Newton, Morocco, and Au Gres sands, and shallow peat.

The sands are Typic Humaupraqists (Newton), Aquic Udipsammentes (Morocco), and Entic Hapludalquods (Au Gres). There are a variety of Histosols (peats).

These soils occupy wet plains and shallow bogs in central Wisconsin. Morocco and Au Gres soils are somewhat poorly drained, Newton soils are poorly drained, and peat is saturated with water for most of each year. All of the mineral soils are very sandy. Morocco soils have a thick black A horizon on mottled sand. The Bir and A2 horizons of Au Gres are distinctive. All horizons are acid and pH values may be as low as 4.0 in some horizons of Au Gres sand and peat. The peat is formed mostly from remains of reed and sedge materials. Included in the area are small islands of sandy soils, such as Nekoosa, which are less affected by ground water than are the major soils. The poor soil drainage severely limits farming.

On the shore of Lake Michigan in Sheboygan County this soil association includes sand dunes, both stabilized and active.

16. Cable, Monico, Auburndale, and Freer loams and silt loam, and peat.

These silty soils are Typic Haplaquoquests (Cable, Warman), Aquic Dystrochrepts (Monico), Typic Glossaqualfs (Auburndale), and Aeric Ochraqualfs (Freer); they are associated with Hemists (peat).

These wet soils occupy depressions in glacial drift in a broad belt across northern Wisconsin. Several other loamy or sandy soils with restricted drainage are associated. Many bodies too small to show on the soil map occur in this region. All of these soils are somewhat poorly, poorly, or very poorly drained. Peats are acid and may vary considerably in depth and degree of decomposition. Most peat consists of remains of reeds and sedges with some included wood.

17. Wauseon, Keowns, Tustin, and Rimer loams and sandy loam.

The wet Wauseon (Typic Hapludalf) and Keowns (Mollis Haplaquod) soils predominate over the better drained Tustin (Arenic Hapludalf) and Rimer (Arenic Ochraqualf). These soils are in wetlands scattered from Shawano to Sauk counties.

The soils have formed in stratified lake sediments of silt to sand texture. Among associated soils are the Shiocton, Salter, and Seward. Shiocton and Keowns soils are coarse silts with weak horizonation and drab mottled colors. They liquify easily and cannot be drained with tile. Tustin, Rimer, and Wauseon soils consist of sandy loam or loam upper strata over clay loam strata of variable thickness. Tustin is well drained, Rimer somewhat poorly drained, and Wauseon poorly drained.

In Columbia County, Granby sandy loam and some alluvial lands are included in this unit (McColley, 1971).

18. Pella, Brookston, and Virgil silt loam and silty clay loam.

These are the predominant black silty wetland soils of southeastern Wisconsin. The naturally poorly drained Pella (formerly called Kokomo and Elba) is a Hapludalf and Brookston is a Tyic Argiaquod. The Virgil (Mollis Ochraqualf) and associated Kendall and Lamartine soils are somewhat poorly drained under natural conditions.

These soils occur in depressions of glacial uplands in southeastern and south-central Wisconsin (Fig. 8-13). The depressions differ from those described in J15 principally by being occupied largely by mineral soils rather than by muck and peat. The Pella and Brookston soils have thick black A1 horizons and dark gray B horizons of silty clay loam texture. Brookston soils have poorly sorted gravelly drift at depths of 2 or 3 feet, while Pella soils consist of moderately fine sediments throughout. Virgil soils are silty throughout and occur at the up-slope.
margins of the depressions occupied by Brookston and Pella soils. Artificial drainage of the latter two soils may favor development of mottling in the gleyed horizon.

In Waukesha County this soil association also includes Montgomery (Typic Haplauquoll), Martinton (Aquic Argudoll), and Hebron and Saylesville (both Typic Hapludalfs) soils, formed from lacustrine deposits.


In wet glacial outwash areas of southeastern Wisconsin are found the somewhat poorly drained Matherton (Udolic Ochraqualf) silt loam, and the poorly drained Will and Pella (both Typic Haplauquolls) silt loams (Fig. 2-6).

Except for Pella these soils developed in loamy sediments and are underlain by coarse glacial outwash. Pella soils differ by being underlain by moderately fine lake sediments. Other associated soils are two Typic Haplauquolls, the Montgomery silt clay loam on lacustrine silts and clays and the Marshall silt loam over outwash deposits.


The numerous wet places in glacial lake beds of loamy, siltly, and clayey texture in southeastern Wisconsin contain the wet Navan (Typic Argiaquoll) and Pella (Typic Haplauquoll) soils, and associated better drained Aztalan (Aquic Argudoll) and Hebron (Typic Hapludalf) soils.

Navan, Hebron, and Aztalan soils have formed in loamy deposits which are 18 to 36 inches thick over silt clay loam lake sediments. Hebron soils are moderately well drained, Aztalan and the related Mosel series soils are somewhat poorly drained, and Navan soils are very poorly drained. Pella soils are formed primarily in silt clay lake sediments and are very poorly drained.


These wet silt and clayey soils are found in ancient glacial lake beds of the red drift region of northeastern Wisconsin.

They are predominantly fine textured with sand and gravel beds at 3 feet or more in many places. Poygan soils (Typic Haplauquolls) have formed on very thick clayey deposits; Zittau (Aquoll Hapludalf), Borth (Typic Hapludalf), and Poy (Typic Haplauquoll) have formed in clayey sediments only 20 to 40 inches thick over calcareous sand and gravel. The sola are generally no more than 30 inches thick over calcareous materials. These soils are associated with areas of moderately well drained fine-textured soils such as Oshkosh and Winneconne.

Organic Soils

Histosols (peats and mucks) occur in thousands of bogs, large and small, profusely dotting Wisconsin landscapes (except in Soil Regions A and D) (Figs. 2-52, 8-7, 8-8, 9-4, 9-5, 14-5). A bog represents a stage in wetland succession from a clear lake to a eutrophied ("dead") lake, to a marsh, and finally to a bog. If allowed to proceed for many thousands of years, natural processes will convert all the remaining lakes of the state into Histosols.

2. The "humus soils" of Chamberlin (1883).

The accumulation of organic materials at wet sites is considered geogenetic rather than pedogenetic. The layers of organic matter reflect the vegetation patterns (Grittenger, 1971) and the plant succession in each bog. Drainage, cultivation, and consequent aeration of a peat deposit initiates pedogenetic processes (Isirimah, 1969) called ripening (soil formation). Ripening includes (1) physical disintegration of plant parts (the transformation from peaty material to muck), and (2) biochemical decomposition, called moulding, by which surface horizons are converted to a sawdust-like moder material (by mites, insects, and small worms) or to a crumb-like mull material (by earthworms) (Langton and Lee, 1964; Lee and Manoch, 1974). Plate structure may be either geogenetic or pedogenetic in origin, but blocky and prismatic structures result from drying and wetting cycles during ripening. The presence of muck horizons buried under peat may record ponding of water behind beaver dams.

Many bogs are wildlife refuges; some of them are officially designated as scientific areas for research on flora and fauna.

Several thousand acres of sphagnum peat in Jackson and Juneau counties are used for sustained-yield sphagnum production. The sphagnum is harvested about every fifth year for sale for horticultural uses.

Drainage and agricultural development of peats and mucks has been greatest in southeastern Wisconsin, moderate in the central sandy plain, and least in northern counties (Albert, 1945, 1951). In southeastern counties muck farms have produced head lettuce, carrots, onions, mint oil, lawn sod, and other special crops (Albert and Zeasman, 1953). Cranberry culture is practiced on about 6,000 acres in central and northern counties.

Present areas of agriculturally developed organic soils are estimated by J. A. Schoenemann (personal communication, 1972) to be 24,000 acres in southeastern counties, 21,000 in central counties, 500 in southwestern counties, and 8,000 in northern counties, for a total of 53,500 acres in the state, or about 2% of the total area of peats and mucks in the state.

Burning of peat in connection with forest fires in "cutover country" had already destroyed considerable volumes of organic soils by 1903, when Weidman made a reconnaissance soil survey of north-central Wisconsin. Uncontrolled fires continue to be a problem in bogs. Some areas mapped as peat in early surveys in Price County are wet mineral soils today. This probably indicates loss of shallow peat in the interim by slow oxidation or burning after drainage.

Early in this century, some Wisconsin bogs were used as disposal basins for effluent such as that from cheese factories. Although this practice has been discontinued, the enormous absorptive capacity of peat and muck may be utilized in the future in a variety of specially designed systems for handling liquid wastes.

Bogs cause problems for highway construction in that emplacement of large fills of stable material is usually necessary.

3. Potatoes, celery, cabbage, sweet corn, peas, and lima beans are also reported by Professor J. A. Schoenemann, Horticulture Department, College of Agricultural and Life Sciences, University of Wisconsin-Madison.
J12. Moss peat and acid sedge and woody peats, Au Gres sand, and Cable loams.

The organic soils and associated sandy and loamy wet mineral soils of soil association J12 occur in depressions within the sandy drift region of northern Wisconsin. Organic deposits may range in depth from 1 or 2 feet to 40 feet or more. Deep bogs may be occupied by a succession of peat deposits which reflect changes in past climates and vegetation. Substrata of these organic soils are usually loamy or sandy; pH values of the organic deposits may be as low as 3.6 to 4.0. Vegetative cover on these bogs includes open meadows of sedges, and black spruce and tamarack stands which may vary in quality from a few sparse, stunted trees to reasonably good stands.

Associated with the “Manitowish marshes” in eastern Iron County are several square miles of level wet Au Gres sand (Whitson et al., 1916).

In Bayfield County Typic and Hemic Borosaprist and Typic Borohemists are prominent in bogs.

J13. Raw acid sedge and woody peats with thin moss covering, and Cable and Freer silt loam.

These soils occur in landscape positions similar to those of association J12 but are bordered by silty or loamy glacial drift rather than sandy drift. Physical and chemical properties and land-use limitations and hazards of the organic deposits are similar to those described for J12.

Dawson peat (Terric Borosaprist; Fig. 1-8) has been reported from Taylor County. Houghton (Typic Medisaprist) and Coudery (Hemic Borofibrirt) series are represented in Rusk County. A Rifle peat (Typic Borohemist, euc) of Bayfield County is illustrated in Fig. 14-5.

A study in Oneida County showed that partial or complete cutting of spruce and balsam fir lowland forest admits light to the ground cover and permits live sphagnum moss (“S-horizon,” 0 to 7 inches thick) to expand from nearby peat bogs, causing site quality deterioration as much as fourfold with respect to tree growth (Keller and Watterston, 1962). The moss insulates the soil and keeps it cool, increases soil acidity, promotes saturation of the soil with water, and impoverishes the soil by holding plant nutrients in unavailable forms in the moss itself.

A detailed study of a Fibrist in the Bogus Marsh of Langlade County (T.33N., R.10E.; see Frazier and Lee, 1971) reported a vegetative cover of black spruce, tamarack, sphagnum moss, leatherleaf, and labrador tea. The peat was extremely acid (pH 3.2-4.2) with low ash content (2.1-6.4%, whole dry soil) and high carbon/nitrogen ratio (C/N = 37-61).


These soils occur extensively in Adams, Portage, Juneau, and Wood counties in central Wisconsin. Peat and muck deposits are usually shallow and are interspersed with “islands” of wet sandy soils. The peat and muck may vary locally in degree of decomposition, acidity, and thickness. Au Gres, Newton, and Morocco soils are all sandy and wet. Au Gres and Morocco soils are somewhat poorly drained; Newton soils are poorly drained. Also present in the association are Dillon, Nekoosa, and occasional tracts of Plainfield soils. In Monroe County Saugatuck sand (Aeric Hapludult) is associated with these soils.

In Pepin and adjacent counties deep peats (Hemists) commonly consist of 40 inches of black peat overlying less oxidized brown peat. Deep Houghton (Typic Medisaprist; Figs. 3-7, 9-4, 9-5) and shallow Adrian (Terric Medisaprist) mucks are found in Pepin, Buffalo, and Portage counties. Parts of the Mondovi Marsh in Buffalo County are drained and used for special crops, including horseradish.

Over considerable areas of J14 near Babcock, City Point, and other parts of the central sandy region, a layer of sphagnnum peat is maintained about a foot deep by slow growth of sphagna moss, except where harvesting, burning, and artificial drainage have interfered with the process. Under the sphagna are layers of woody and sedge peat resting on gray siliceous sand (Catenhusen, 1950).

In eastern Jackson County there are sphagna and cranberry bogs with borders of swamp forest. Even though these bogs are abundantly watered, the high acidity and the coldness of the water (insulated from the heat of the sun by layers of peat) so hinder water uptake that for plants the habitat is physiologically dry. Leaves of many species of Heath family—cranberry, labrador tea, and leatherleaf—bear some resemblance to leaves of certain desert plants. The carnivorous sundew and pitcher plant have evolved in these bogs because of lack of available nitrogen and other nutrients.

Greenwood and Spalding peats (Typic Borohemists, dysic) are reported from Menominee Indian lands (Milford, Olson, and Hole, 1967); Carlisle muck (Typic Medisaprist) has been reported from Monroe County. In northern Oconto County (T.31N., R.17, 18E.) there is a vast wetland locally called the Brazeean Swamp. Construction of State Highway 64 in 1926 raised the water table despite twelve culverts under the road; killing a large “deer yard” of white cedar and other swamp conifers north of the highway. In 1962 the Wisconsin Department of Natural Resources began construction of a drainage ditch, now nearly 2 miles long, to lower the water table to its original level of 1926. These changes in the water table and the vegetative cover are bound to be reflected in the horizons of the peats, as are the various natural events that have occurred during the 10,000 years since glaciation. The Tawas mucky peat (Terric Borosaprist) and Lupton mucky peat (Typic Borosaprist) have been described in the area.

J15. Slightly acid to alkaline sedge and woody peats and mucks and Pella, Pouyan, and Brookston silt loam and silty clay loam.

These soils occur in many depressions throughout glacialized portions of eastern and southern Wisconsin. These depressions range from a few acres to several square miles in size. Only a few of the largest (such as the Horicon and Theresa marshes) can be shown on the generalized soil map. The proportion of organic soils and mineral soils varies greatly from depression to depression. Some contain little peat, while others have only a thin border of mineral soils at the edges of large areas of peat. A variety of mineral soils occur in these depressions. In addition to the soils already named, Pella, Colwood, Keowns, Saylesville, Ashkum, Abington, Angelica, Roscommon, Wau-
seon, and Navan soils are common. The organic soils, such as Chippeny, Tawas, Carbondale, and Lupton peats, and Edwards and Suamico mucks, consist of partially to highly decomposed reed and sedge materials, with occasional fragments of wood. The deposits are often stratified and range from 1 to 40 feet or more in thickness. The mineral soils are all characterized by thick black A horizons and gray or mottled underlying horizons. Most are medium or fine textured and are calcareous at shallow depths.

Houghton (Fig. 8-7), Adrian, Palms, and Willett peats and mucks are reported from Trempealeau, Waukesha, and Columbia counties. Some small bodies of calcareous Edwards muck over marl (not shown on the map) occur in soil association F5 in northern Florence County (Hole et al., 1962). A mastodon skeleton was found in this soil association near Deerfield in Dane County (Dallman, 1968). A detailed study of a Hemist (33 cm of sapric horizons over hemic soil) in the Middleton Marsh in Dane County (T.7N., R.8E.; see Frazier and Lee, 1971; Lee and Manoch, 1974) reports a cover of grasses and sedges, medium to slight acidity (pH 5.8-6.1) and low carbon/nitrogen ratio (11-16). A Saprist in the University Marsh in Dane County (T.7N., R.9E.) originally supported arrowhead and bulrushes, and was moderately acid, with a moderate carbon/nitrogen ratio. Organic coatings had formed on prismatic and subangular blocky pedds in the subsoil. Sheboygan (Hemic Medisaprist) is present in Sheboygan County under sedges, reeds, and grasses. Ogden (Terric Medisaprist) and Houghton (Typic Medisaprist) are present in Fond du Lac County.
Part III

Properties and Occurrence of Major Soil Series in Wisconsin Landscapes