Soils formed on abandoned Lake Warren beach ridge (Charles E. Herdendorf).

Chapter 3. Soil Science

Pedology, one of the disciplines of soil science, includes the study of soil morphology, properties, genesis, and classification. Agronomy is another branch of soil science that deals with soil management and crop-producing characteristics. Both of these aspects of soil science are important in understanding the natural setting and land use patterns in Old Woman Creek watershed as well as the impact of soils on the ecology of the estuary. Soil surveys of the watershed have been included in surveys of Erie County (Redmond et al. 1971, Martin and Prebonick 1994) and Huron County (Ernst and Martin 1994). In addition, a survey of adjacent Lorain County (Ernst et al. 1976) provides further insight to soil characteristics of the region.

Soil Maps

The soils in the watershed occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular landscape or segment of the landscape. The soil surveys referenced above were used to compile a soil map of Old Woman Creek watershed plotted on aerial photographs (Figure 3.1; see Table 3.1 for soil names). For mapping purposes, soils were classified or grouped together if they have similar profile horizons. A total of 67 different kinds of soils have been mapped in the 7,032 hectares that comprise the Old Woman Creek watershed (Table 3.1). Of these, only 10 soil types account for nearly 60% of the watershed area (see below).

Top 10 Soils of Old Woman Creek Watershed

	Hectares	Watershed
Bennington silt loam (BgA)	1,306	18.6%
Cardington silt loam (CaB)	413	5.9%
Haskins loam (HkA)	349	5.0%
Condit silt loam (Co)	328	4.7%
Bennington silt loam (BgB)	327	4.7%
Mermill silty clay loam (Me)	315	4.5%
Elnora loamy fine sand (EnA)	312	4.4%
Bixler loamy fine sand (BkA)	295	4.2%
Kibbie fine sandy loam (KbA)	265	3.8%
Holly silt loam (Ho)	263	3.7%
TOTAL	4,173	59.5%

Soil Formation

Factors that determine the kinds of soils that formed in the Old Woman Creek watershed are (1) composition of the parent material, (2) climate under which the soil material accumulated or weathered, (3) relief of the terrain, (4) plants and animals on and in the soil, and (5) length of time the forces of soil development have acted on the soil material (Jenny 1941). The variety of soils found in the watershed resulted from variations in one or more of these factors (Redmond et al. 1971).

Parent Material

The underlying material is a dominant factor in the formation of most of the watershed soils, largely determining the chemical nature and mineral composition of the soil. Parent materials in the watershed are sedimentary bedrock, glacial till, glacial outwash, ancient lake deposits, recent stream alluvium, and organic material (Figure 3.2). The various types of parent material in the watershed are associated with specific soils as shown, generally from oldest to youngest material, on the following page.

The watershed was covered by glaciers during the Pleistocene epoch. Thus, glacial till is the major parent material of the soils. Bennington, Cardington, and Condit are examples of soils that formed in glacial till (Figure 3.3). Beach ridges and deltas formed along the edges of a series of glacial lakes. Elnora, Oshtemo, and Spinks are examples of soils that formed in these deposits. Outwash of silt, sand, and gravel was deposited by meltwater along glacial streams. Chili and Jimtown soils formed in glacial outwash. Lacustrine material consisting of loamy to clayey sediment was deposited in glacial lakes in the northern part of the watershed. Kibbie, Shinrock, and Tuscola soils formed in lake and outwash deposits (Figure 3.4).

Climate

Old Woman Creek watershed has a humid, temperate continental climate (see Climatology chapter of this profile). Soils in the watershed formed under the influence of this type of climate. Important climatic factors such as temperature, precipitation, and the evaporation ratio are closely related to the biotic

SEE MAP TO RIGHT

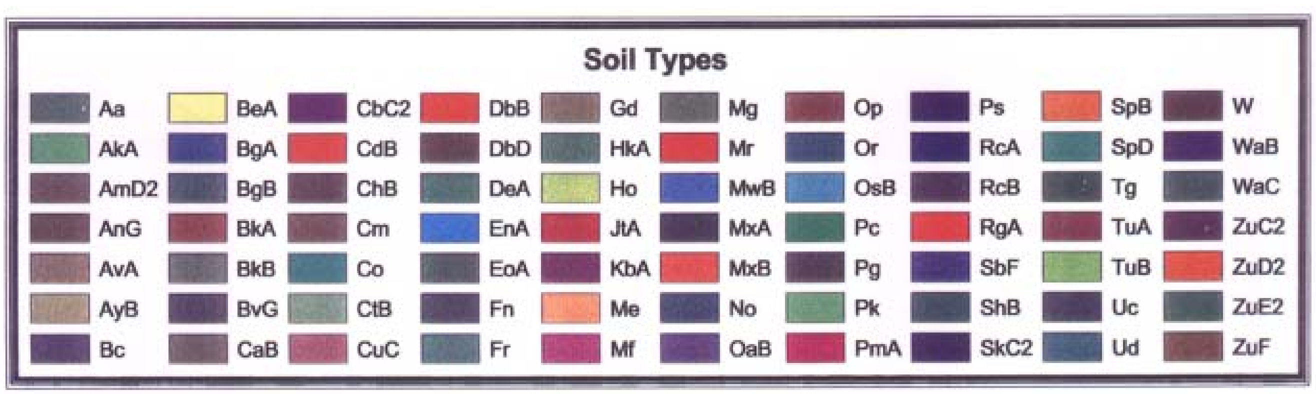
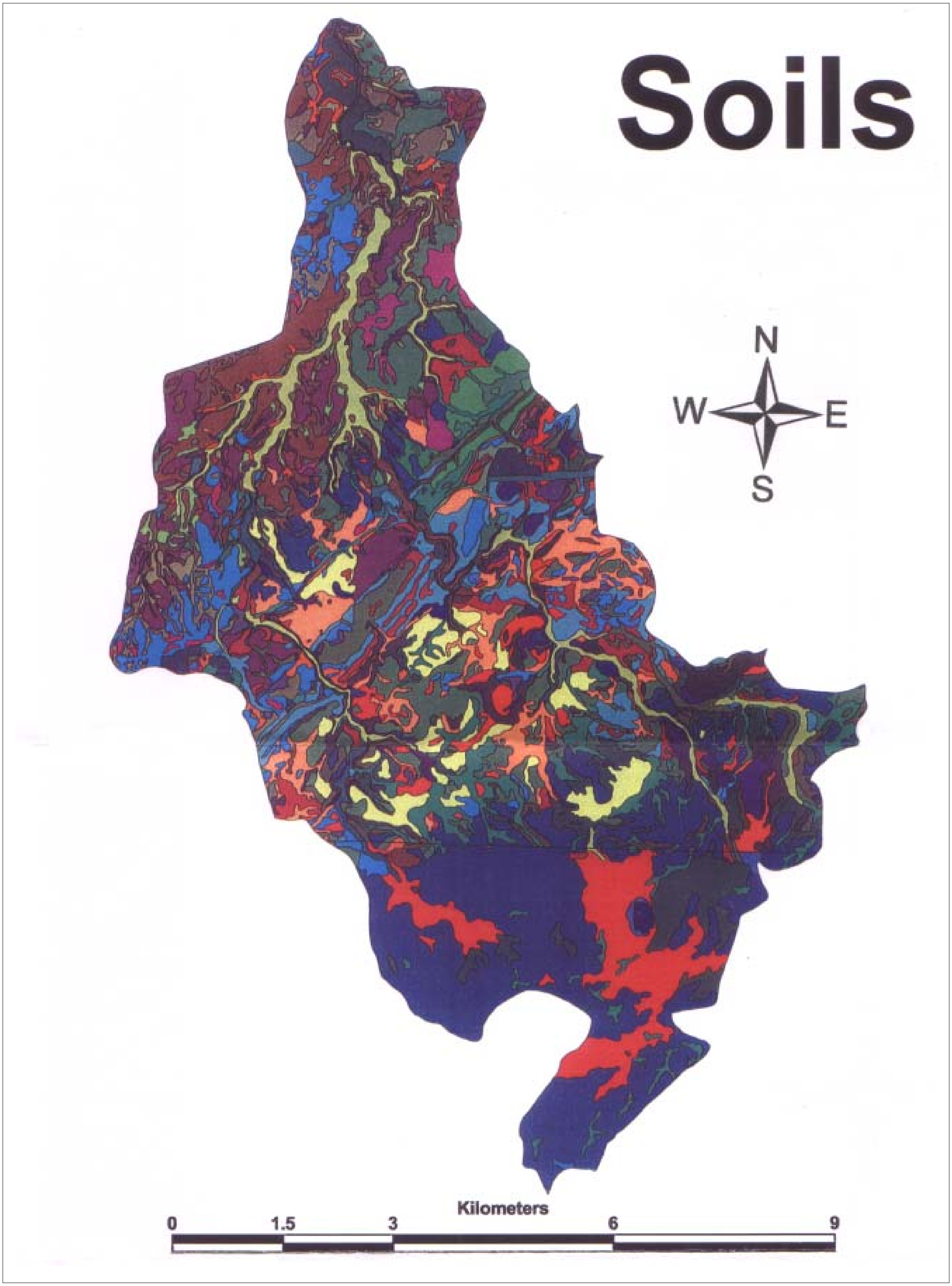


Figure 3.1. Fold-out soil map of Old Woman Creek watershed, Erie and Huron Counties, Ohio; Tables 3.1 through 3.4 contain explanations of map symbols, characteristics, properties, limitations, and erodibility of Old Woman Creek watershed soils (Ohio Department of Natural Resources).


Soils
N
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9

PARENT MATERIALS FOR OLD WOMAN CREEK WATERSHED SOILS

<u>Bedrock controlled knolls & side slopes</u>
- Amanda-Dekalb rock outcrop assoc. (An) —residuum
- Brecksville silt loam (Bv)
- Dekalb channery loam (Db)

<u>Bedrock controlled Till Plains & Lake Plains</u>
- Allis silty clay loam (Ak)
- Fries silty clay loam (Fr)
- Mitiwanga silt loam (Mx)

<u>Bedrock controlled Outwash Plains & Beach Ridges</u>
- Wakeman sandy loam (Wa)

<u>Till Plains</u>
- Amanda loam (Am)—side slopes
- Cardington silt loam (Ca) & silty clay loam (Cb)
- Condit silt loam (Co)

<u>Till Plains & Outwash Plains</u>
- Haskins loam (Hk)
- Rawson sandy loam (Rc)
- Rimer loamy fine sand (Rg)

<u>Outwash Plains</u>
- Millgrove loam (Mg)

<u>Outwash Plains & Beach Ridges</u>
- Oshtemo loamy sand (Os)
- Spinks loamy fine sand (Sp)

<u>Till Plains & Lake Plains</u>
- Bennington loam (Be) & silt loam (Bg)
- Gilford fine sandy loam (Gd)
- Mermill silty clay loam (Me)
- Miner silty clay loam (Mr)
- Pewamo silty clay loam (Pc)
- Rawson sandy loam (Rc)
- Rimer loamy fine sand (Rg)

<u>Lake Plains & Outwash Plains</u>
- Adrian muck (Aa)—former bogs
- Kibbie fine loamy sand (Kb)
- Ogontz (Avery) fine sandy loam (Og or Av) & silt loam (Oh or Ay)

<u>Lake Plains & Outwash Plains (cont'd)</u>
- Oakville loamy fine sand (Oa)
- Plumbrook fine sandy loam (Pm)
- Rawson sandy loam (Rc)
- Rimer loamy fine sand (Rg)
- Tuscola fine sandy loam (Tu)

<u>Lake Plains</u>
- Del Ray silt loam (De)
- Milford silty clay loam (Mf)
- Saylesville silt loam (Sb)—side slopes
- Shinrock silt loam (Sh)—knolls
- Shinrock silty clay loam (Sk)—side slopes
- Zurich silt loam (Zu)—side slopes

<u>Lake Plains & Deltas</u>
- Elnora loamy fine sand (En)
- Elnora loamy fine sand (Eo) —on bedrock substratum
- Gilford fine sandy loam (Gd)
- Kibbie fine loamy sand (Kb)
- Oakville loamy fine sand (Oa)

<u>Lake Plains & Beach Ridges</u>
- Bixler loamy fine sand (Bk)
- Oakville loamy fine sand (Oa)
- Rawson sandy loam (Rc)

<u>Beach Ridges</u>
- Conotton loam (Ct) & gravelly loam (Cu)
- Udipsamments-Spinks sand (Uc)—excavations

<u>Alluvial Terraces, Beach Ridges, & Outwash Plains</u>
- Chili loam (Ch)
- Jimtown loam (Jt)

<u>Alluvial Floodplains</u>
- Holly silt loam (Ho)
- Nolin (No)
- Orrville silt loam (Op & Or)
- Tioga loam (Tg)

<u>Organic Material</u>
- Marsh (Mn)

Figure 3.2. Parent materials of the soils mapped in the Old Woman Creek watershed (after Redmond et al. 1971; Ernst and Martin 1994; Martin and Prebonick 1994).

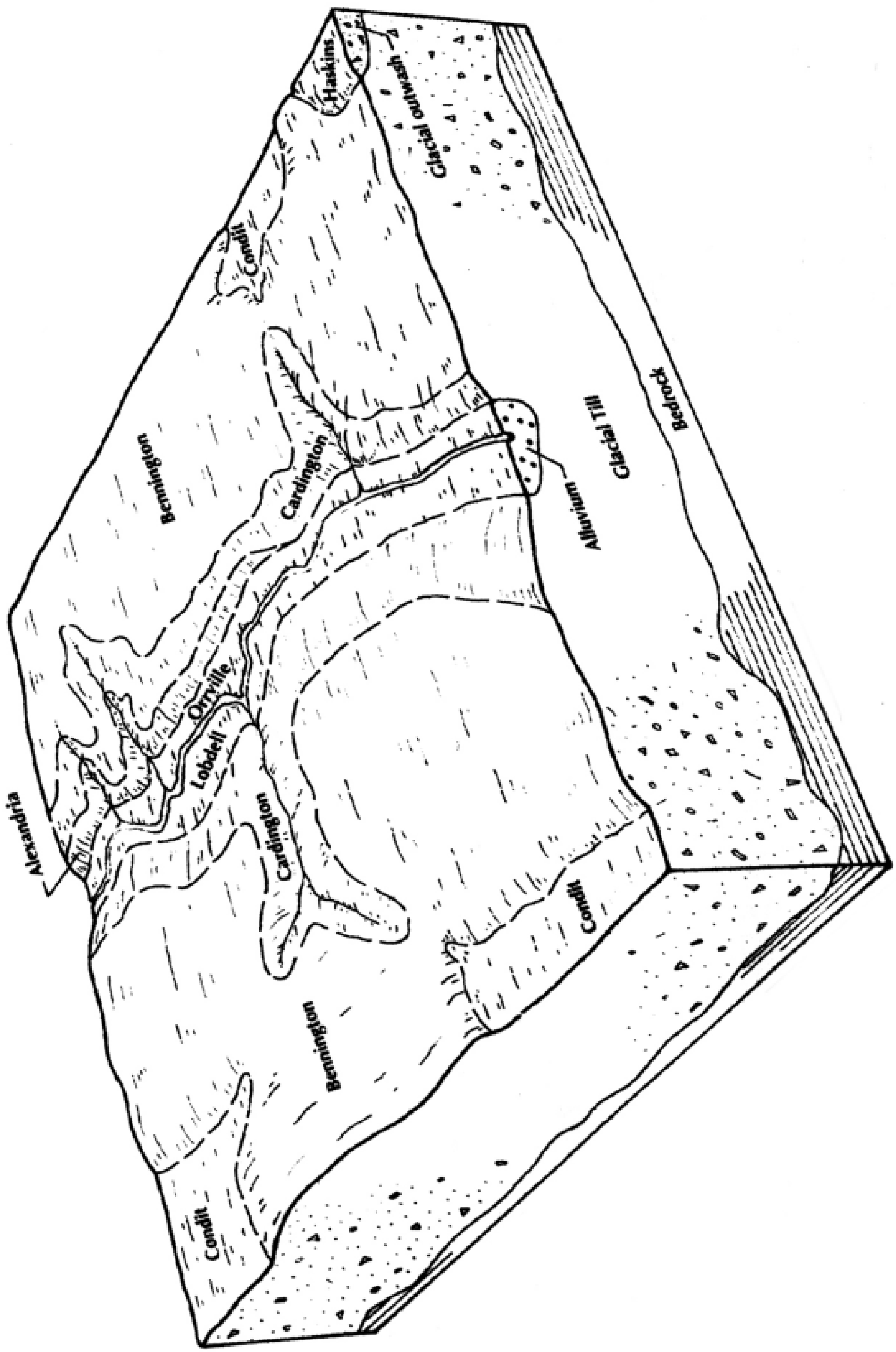

Figure 3.3. Typical soils developed on glacial till parent material in Old Woman Creek watershed (from Ernst and Martin 1994).

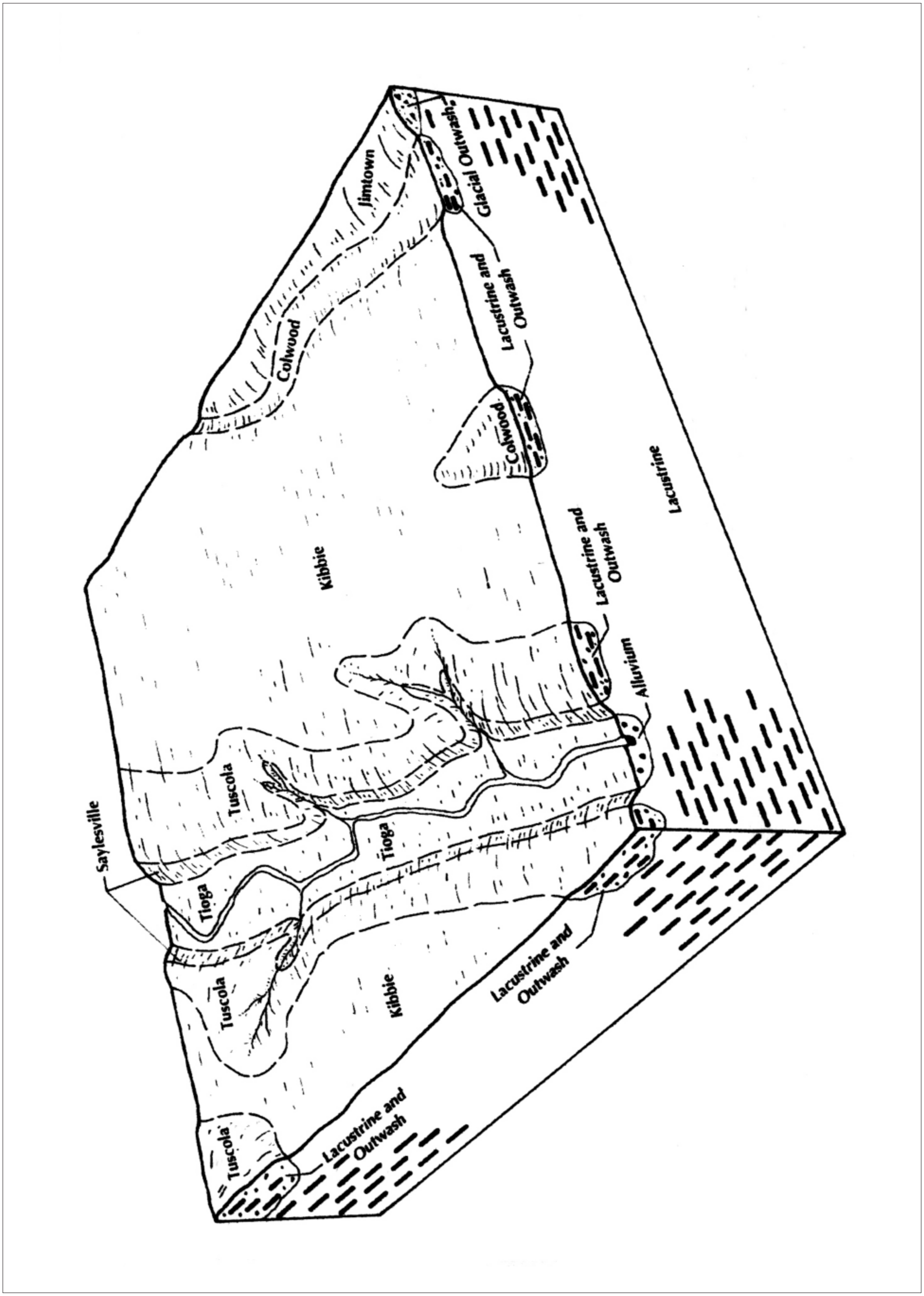

Figure 3.4. Typical soils developed on lacustrine and glacial outwash parent material in Old Woman Creek watershed (from Ernst and Martin 1994).

communities and determine the types of soils that form. Climate regulates the rate of weathering and decomposition of minerals and influences the removal of materials by leaching. The climate is essentially uniform throughout the watershed and does not directly account for differences among the soils.

RELIEF

Soil formation is influenced by relief (variations in height and slope or irregularities of the land surface) which controls the movement of water in the watershed. Runoff, ponding, depth to water table, internal drainage, and accumulation or removal of organic matter are affected by relief. Relief can account for the development of different types of soils from the same kind of parent material. For example, Chili and Millgrove soils both form in porous gravelly outwash deposits. Chili soil is well drained because they are on ridges high above the water table (such as the ancient beaches in the vicinity of Berlin Heights), whereas Millgrove soil is very poorly drained because they are in low areas where the water table is close to the surface (such as the flat land at the base of the Berea Escarpment).

LIVING ORGANISMS

All living organisms are important to soil formation, including plants, animals, fungi, and bacteria. Plants are generally responsible for the amount of organic material, color of the surface layer, and the amount of nutrients in the soil. Animals such as earthworms, cicadas, and other burrowers tend to keep soil open and porous. Fungi and bacteria decompose the vegetation, releasing nutrients for plant assimilation. Most of the soils of the watershed were formed under hardwood forests. For example, Shinrock soil (typical of the side slopes of Old Woman Creek) formed under forests of red oak, white oak, black oak, and other hardwoods. In contrast, Miner soil formed in poorly drained depressions under swamp forests, such as near the headwaters of Old Woman Creek southwest of Berlin Heights. Sisson soil formed on low, dry knolls at the southern end of the estuary, presumably under prairie vegetation. In these sites, the thick, dark-colored surface layer indicates that the native forest was thin enough to permit the growth of a dense stand of prairie grasses.

TIME

For the foregoing soil-forming factors to produce their effects, duration is an important consideration. The length of time that parent material has been exposed to the process of soil formation affects the nature of the soil that forms. Thus, the age of a soil is indicated by the degree of profile development. In general, the longer the time that climate and organisms have acted upon the parent material, the more distinct are the horizons in the profile. The soils in the watershed formed since the last glaciation (about 12,000 years ago). All are approximately the same age, except for the soils formed in recent alluvium. In areas with steep slopes, geological erosion has nearly kept pace with soil formation resulting in a very thin soil layer. Similarly, soils formed in recent alluvium lack well-defined horizons. In flat or gently rolling areas the horizons are much thicker, generally greater than 0.6 m.

SOIL PROFILE

As mentioned above, most soils in the Old Woman Creek watershed have a profile—a series of two or more layers lying one below the other and extending down to unbroken bedrock. These layers, known as horizons, differ from one another in color, texture, structure, and composition (Soil Survey Division Staff 1993). The majority of soil profiles in Old Woman Creek watershed have three principle horizons, identified as A, B, and C (Figure 3.5) and a few have additional layers or horizons, named O, E, and R. The A horizon is a zone of mixed mineral and humified organic material which is undergoing leaching, whereas the B horizon is a zone of mineral and humus accumulation. The A and B horizons together constitute the true soil (solum)—material capable of supporting plants where soil-forming processes occur. In certain soils, above the A horizon is a layer of organic matter, known as the O layer or A_o and A_{oo} horizon, consisting of leaves and decaying plant residue. Much of the watershed has been farmed, thus plowing has tended to mix the O and A horizons into a layer commonly known as topsoil. The B horizon, often called the subsoil, is typically below the plowzone. Between the A and B horizons, a mineral layer (E horizon) can occur in which the main feature is the loss of silicate clay, iron, and/or aluminum, leaving a concentration of sand and silt particles. The C horizon consists of weathered rock material and is

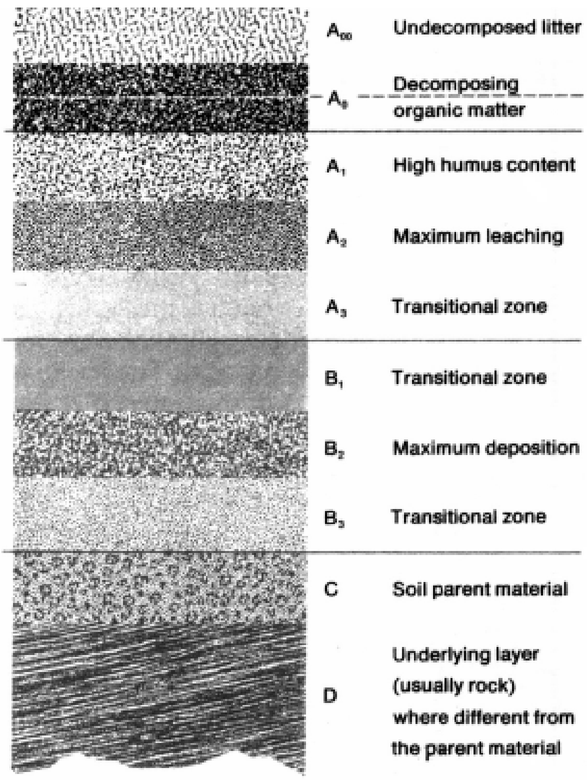

Figure 3.5. Generalized soil profile for Old Woman Creek watershed (from Andrews 1973).

considered to be the parent material for the overlying solum. Because the watershed was glaciated, the last retreating ice sheet left behind massive deposits of till, particularly south of the Berea Escarpment, resulting in a very thick C horizon. The same can be said of the glacial lake deposits in the vicinity of the estuary. Below the C horizon is the R layer or D horizon which is consolidated bedrock.

Each of the principle horizons has subdivisions (layers) designated by numbers and lowercase suffixes (descriptive modifiers) which represent specific features (Figure 3.6). The A horizon is where most living organisms are active. Layer A_1 consists of organic humus and is usually very dark in color, whereas A_2 is lighter in color and is the zone where leaching (eluviation) takes place, continually removing both humus and minerals. A_p is used to indicate a disturbance of the surface layer by pasturing, tillage, or other mechanical means. The transition from horizon A to B is a gradual one, sometimes designated A_3, BE, or B_1. The B_2 layer is usually redder or deeper in color,

DESCRIPTIVE MODIFIERS FOR SOIL HORIZONS

Suffix Modifers
- a Highly decomposed organic material
- b Buried mineral soil horizon; burial took place after onset of soil formation processes
- c Concretions or nodules
- d Physical restriction to root penetration
- e Organic material of intermediate decomposition
- f Frozen soil; permanent ice, not seasonally frozen layer or "dry permafrost"
- g Strong gleying; poor drainage resulting in iron reduction (gray soil colors and mottles)
- h Illuvial accumulation of organic matter leaching from an upper layer
- i Slightly decomposed organic material
- k Accumulation of carbonates
- m Cementation or induration; cementing agent: carbonate (km), silica (qm), iron (sm); gypsum (ym), lime and silica (kqm), salts more soluble than gypsum (zm)
- n Accumulation of sodium
- o Residual accumulations of sesquioxides; particularly iron and aluminum clay oxides
- p Tillage or other disturbance
- q Accumulation of silica
- r Weathered or soft bedrock
- s Illuvial accumulation of sesquioxides and organic material
- ss Presence of slickensides; resulting from swelled clay minerals and shear failure of soil
- t Accumulation of silicate clay
- v Plinthite; iron-rich, humus-poor, reddish material that is irreversibly hard when dried
- w Development of color or structure with no apparent illuvial accumulation of material
- x Fragipan character; development of firm, brittle layers between softer, less dense ones
- y Accumulation of gypsum
- z Accumulation of salts more soluble than gypsum
- 1,2,3…Vertical subdivisions into layers; higher the number the deeper in the profile; follows letter suffix

Prefix Modifers
- 2,3… Indicates discontinuities; uppermost material understood to be 1 (number omitted); numbering starts with second layer (generally a contrasting parent material)

Figure 3.6. Symbols and their meanings used to designate subordinate features within soil horizons (after Soil Survey Division Staff 1993).

the result of iron and manganese oxides deposition (illuvation) that have been leached from the A horizon by groundwater. In certain soils, humus, clay, and calcium also accumulate in the B_2 layer. The B_3 or BC layer is a transition zone to the parent material, C horizon, which contains no humus and is lighter in color than the B horizon.

SOIL CHARACTERISTICS AND LIMITATIONS

The varying properties and limitations of the soils in Old Woman Creek watershed influence the types of land use activity found in the watershed (see Land Use chapter of this profile). Table 3.2 provides a summary of texture, hydrology, slope, land capability, and crop productivity for each of the 67 soil types in the watershed. A total of 38 of the soil types are considered prime farmland, accounting for 82% of the land surface. Table 3.3 lists the properties and limitations of the various soils in the watershed, including parent material, slope, drainage, water capacity, water table, depth to bedrock, and hazards. Flooding is the most common soil hazard, but only four soils (Holly, Nolin, Orrville, and Tioga) are susceptible to serious problems. These soils occupy about 4% of the watershed's area. Table 3.4 gives rainfall and wind erosion factors for each of the soils in the watershed. Most soils have low- to moderate-erosion factors.

SOIL EROSION AND SEDIMENT YIELD

Soil erosion and resultant sediment yields in the watershed have a potential impact on the water quality and infilling of Old Woman Creek estuary (Figure 3.7). Soil erosion is the rate of removal of soil particles from a specified area per unit time, either measured in soil mass or soil thickness, whereas, sediment yield refers to the rate at which sediment passes a particular point in a drainage basin per unit time. While soil erosion values can be used to document the annual soil loss at a specific location, sediment yield values provide a measure of the flow of sediment through a drainage basin. Sediment yield depends on: (1) input functions including soil erosion, mass wasting, and, atmospheric fallout, (2) interbasinal storage such as deposition in stream valleys and upland gullies or rills, and (3) output function comprised of stream sediment load and wind erosion. Stream sediment loads are typically divided into three components: (1) bedload (particles that slide, roll, or saltate along the steam bed), (2) suspended load (particles that are carried in the water column, generally by turbulence), and (3) dissolved load (chemicals in solution or adsorbed to colloids).

Using a Geographical Information System (GIS) based model, Evans and Seamon (1997) found that soil erosion within the Old Woman Creek watershed varied from 1.6 to 97.3 metric tons/ha/yr depending on soil type, topography, rainfall, and land use practices. Using a basin-wide average of 7.3 metric tons/ha/yr, this equates to a total soil loss of 50,484 metric tons/yr for the entire Old Woman Creek watershed. These values compare reasonably well with corrected calculations made by Buchanan (1982) using the Universal Soil Loss Equation (USLE) – average soil loss of 5.8 metric tons/ha/yr. The higher values obtained by Evans and Seamon (1997) are most likely a consequence of their greater sampling density and the use of the Revised Universal Soil Loss Equation (RUSLE).

The Universal Soil Loss Equation (Wischmeier and Smith 1965) determines soil erosion loss (A) as a function of rainfall energy and intensity (R), soil erodibility (K), slope length (L), slope gradient (S) soil cover (C), and conservation practices (P). The Revised Universal Soil Loss Equation (Renard et al. 1993) has the same form, but includes revisions for: (1) slope length and slope gradient calculations, (2) more elaborate calculations for soil cover and conservation practices, and (3) and new terms to account for freeze-thaw effects and rill formation on erosion. Thus, the RUSLE/USLE values for soil erosion (loss in mass/area/unit time) are the product of these factors which can be expressed as: $A=RKLSCP$. Determining the total soil loss for a heterogeneous drainage basin, such as Old Woman Creek, required summation of losses for nearly 5,000 polygons (120-m grid spacing).

The southeastern portion of Old Woman Creek watershed appears to be the most significant in terms of soil erosion, sediment yield, and resultant loadings. This region is characterized by Bennington-Cardington-Condit association soils (Ernst and Martin 1994, Martin and Prebonick 1994) which have the highest erodibility in the watershed ($K=0.37–0.43$). This region also lies at the transition from till plain to escarpment where slopes are greatest.

Extrapolation of soil loss data to sediment yields requires the calculation of delivery ratios, or inversely, interbasin storage ratios, for the watershed. Delivery ratios refer to the percentage of eroded sediment that is transported to a specified point in the watershed, essentially the amount of soil erosion less redeposited sediment in the form of storage. Evans and Seamon (1997) calculated sediment delivery ratios for the watershed above the estuary (84% of basin) using three hydrological data sets from earlier studies (Buchanan 1982, Woods 1987, Krieger 1993). These studies indicated that the annual suspended sediment load (approximately 3,400 metric tons/yr) is 30-35% of the total average annual stream sediment load (approximately 10,500 metric tons/yr). The calculated delivery ratios ranged from 21–25%, indicating interbasin storage between 75-79% of the soil eroded within the drainage basin. Figure 3.8 illustrates the annual rate of soil loss (tons/hectares) for 4,834 polygons created by a 120-meter grid spacing over the entire Old Woman Creek drainage basin using the RUSLE method.

Thus, on the average it takes four to five years for soil eroded in the watershed to make its way to the estuary. Considering that at Ordinary High Water level (174.77 m, IGLD 1985 or 1.28 m above Low Water Datum) the estuary has a volume of approximately 342,000 m^3 (Herdendorf and Hume 1991) and using a specific gravity of about 2.0 for compacted sediment (Lyon and Buckman 1943), the annual sediment load to the estuary of 10,500 metric tons (equivalent to 5,250 m^3) would completely fill the estuary in some 65 years if sediment was not passed through to Lake Erie. Fortunately for the estuary, a good deal of the annual sediment load is eventually resuspended and carried to the lake. The sediment balance in the estuary appears to be at a near steady-state condition. Bathymetric surveys of Old Woman Creek estuary were made in 1977 (Buchanan 1982) and 1990 (Herdendorf and Hume 1991). During the 1977 survey the mean water level in the estuary was 0.9 m above LWD and the mean water depth was 0.3 m; whereas in 1990 the mean estuary level was 1.0 m above LWD and the mean depth was 0.37 m. Given the differences in survey methods, these findings are extremely close, indicating that the estimated 68,000 m^3 of sediment delivered to the estuary in the 13-year period (1977–1990) could not be accounted for by shoaling of the bottom. Evenly distributing 68,000 m^3 of sediment on the bottom of the estuary would have resulted in a shallowing of approximately 0.3 m, a situation that did not occur.

Figure 3.7. Aerial view of lake plain soils in Old Woman Creek valley immediately upstream of the estuary (Linda Feix).

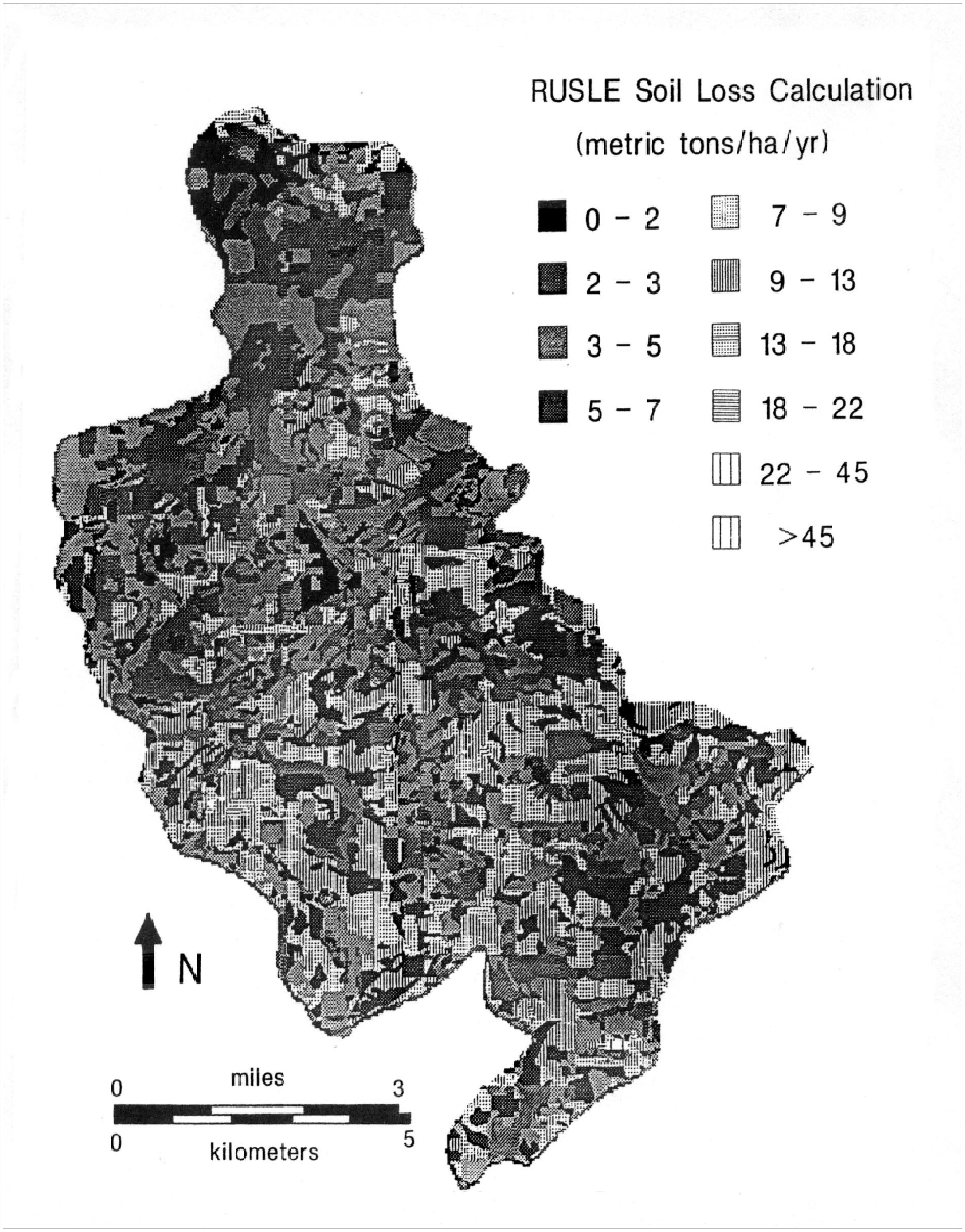

Figure 3.8. Calculation of soil loss for Old Woman Creek watershed expressed in tons per hectare for polygons created by a 120-meter grid spacing (1.44 ha/grid cell) using the RUSLE method (from Evans and Seamon 1997).

TABLE 3.1. OLD WOMAN CREEK WATERSHED SOILS: SUMMARY OF AREAS IN HECTARES BY TOWNSHIP

Map Symbol	Soil Series	Berlin Twp	Florence Twp	Huron Twp	Milan Twp	Erie Co.	Townsend Twp	Wakeman Twp	Huron Co.	TOTAL
Aa	Adrian	4.2				4.2				4.2
AkA	Allis	73.5				73.5				73.5
AmD2	Amanda	8.6				8.6				8.6
AnG	Amanda-Dekalb	41.7				41.7				41.7
AvA (OgA)	Avery (Ogontz)	51.1		16.9	2.0	70.0				70.0
AyB (OhB)	Avery (Ogontz)	53.6		4.6	10.5	68.7				68.7
Bc	Beaches	1.0				1.0				1.0
BeA	Bennington	218.0	2.4			220.4				220.4
BgA	Bennington	301.1	55.7			356.8	940.7	8.3	949.0	1,305.8
BgB	Bennington	156.8	21.2			178.0	147.8		147.8	325.8
BkA	Bixler	249.7	3.8	28.5	12.7	294.7	0.1		0.1	294.8
BkB	Bixler	24.8	2.0	2.6	1.4	30.8				30.8
BvG	Brecksville	10.9				10.9				10.9
CaB (CdB)	Cardington	51.7	25.6			77.3	336.0		336.0	413.3
CbC2	Cardington	32.2				32.2				32.2
ChB	Chili	22.9	0.2			23.1				23.1
Cm	Colwood	33.3		26.8	24.9	85.0	0.5		0.5	85.5
Co	Condit	218.9	36.5			255.4	69.2	3.3	72.5	327.9
CtB	Conotton	16.3				16.3				16.3
CuC	Conotton	16.5				16.5				16.5
DbB	Dekalb	42.7				42.7				42.7
DbD	Dekalb	10.1				10.1				10.1
DeA	Del Rey	184.7		0.3	2.1	187.1				187.1
EnA	Elnora	226.4		33.3	36.8	296.5	15.0		15.0	311.5
EoA	Elnora	1.9				1.9				1.9
Fn	Fluvaquents	63.7		0.1		63.8				63.8
Fr	Fries	14.5				14.5				14.5
Gd	Gilford	60.9		2.8	17.7	81.4				81.4
HkA	Haskins	327.6	10.1			337.7	11.6		11.6	349.3
Ho	Holly	243.7	17.6			261.3	1.2		1.2	262.5
JtA	Jimtown	196.4	1.6			198.0	3.2		3.2	201.2
KbA	Kibbie	240.4		3.8	20.7	264.9				264.9
Me	Mermill	314.7				314.7				314.7
Mf	Milford	65.3		1.7	0.2	67.2				67.2

(CdB, MwB, OgA, OhB, Ps)—designates corresponding soil names in Huron County

TABLE 3.1. OLD WOMAN CREEK WATERSHED SOILS: SUMMARY OF AREAS IN HECTARES BY TOWNSHIP (cont'd)

Map Symbol	Soil Series	Berlin Twp	Florence Twp	Huron Twp	Milan Twp	Erie Co.	Townsend Twp	Wakeman Twp	Huron Co.	TOTAL
Mg	Millgrove	121.5				121.5				121.5
Mr	Miner	1.3				1.3				1.3
MxA	Mitiwanga	78.3	0.6			78.9				78.9
MxB (MwB)	Mitiwanga	23.8				23.8	15.1		15.1	38.9
No	Nolin	1.2				1.2				1.2
OaB	Oakville	49.3	2.9	1.0		53.2				53.2
Op	Orrville	34.3				34.3				34.3
Or	Orrville	28.7				28.7	5.3		5.3	34.0
OsB	Oshtemo	253.0			1.1	254.1	0.4		0.4	254.5
Pc	Pewamo	11.8				11.8				11.8
Pg (Ps)	Pits	3.6				3.6				3.6
Pk	Pits (quarry)	0.1				0.1	8.4		8.4	8.5
PmA	Plumbrook	21.9			3.3	25.2				25.2
RcA	Rawson	15.6	1.7			17.3				17.3
RcB	Rawson	108.4	9.8			118.2				118.2
RgA	Rimer	64.5				64.5				64.5
SbF	Saylesville	7.6				7.6				7.6
ShB	Shinrock	9.5				9.5				9.5
SkC2	Shinrock	4.3				4.3				4.3
SpB	Spinks	38.4		0.2	0.1	38.7	0.7		0.7	39.4
SpD	Spinks	26.7				26.7				26.7
Tg	Tioga	5.9				5.9				5.9
TuA	Tuscola	22.6				22.6				22.6
TuB	Tuscola	32.4			3.1	35.5				35.5
Uc	Udipsamments-Spinks	40.5				40.5				40.5
Ud	Udorthents	34.6		10.8	2.1	47.5				47.5
W	Water body	27.0				27.0	1.2		1.2	28.2
WaB	Wakeman	72.3				72.3	6.9		6.9	79.2
WaC	Wakeman	14.4				14.4				14.4
ZuC2	Zurich	38.4		4.6	3.3	46.3				46.3
ZuD2	Zurich	32.6		1.4		34.0				34.0
ZuE2	Zurich	29.1				29.1				29.1
ZuF	Zurich	150.4				150.4				150.4
TOTAL		4,983.8	191.7	139.4	142.0	5,456.9	1,563.3	11.6	1,574.9	7,031.8

TABLE 3.2. CHARACTERISTICS OF OLD WOMAN CREEK WATERSHED SOILS

Soil Series	Map Symbol	Texture	Hydric	Slope	Land Capability	Prime Farmland	Relative Productivity	Hazard/ Limitation	Area within Watershed (ha)
Adrian	Aa	muck	yes	0-2%	Vw	no	—	subsidence	4.2
Allis	AkA	silty clay loam	yes	0-2%	IVw	no	48	poor drainage	73.5
Amanda	AmD2	loam	no	12-18%	IVe	no	52	eroded	8.6
Amanda-Dekalb	AnG	rocky	no	40-70%	VIIe	no	—	bedrock outcrop	41.7
Avery (Ogontz)	AvA (OgA)	fine sandy loam	no	0-2%	I	yes	79	slight	70.0
Avery (Ogontz)	AyB (OhB)	silt loam	no	2-6%	IIe	yes	76	seasonal HWT	68.7
Beaches	Bc	sand & fine gravel	no	0-12%	—	no	—	wave action	1.0
Bennington	BeA	loam	no	0-2%	IIw	yes*	73	poor drainage	220.4
Bennington	BgA	silt loan	no	0-2%	IIw	yes*	73	poor drainage	1,305.8
Bennington	BgB	silt loam	no	2-6%	IIe	yes*	70	poor drainage	325.8
Bixler	BkA	loamy fine sand	no	0-2%	IIw	yes*	67	poor drainage	294.8
Bixler	BkB	loamy fine sand	no	2-6%	IIe	yes*	67	poor drainage	30.8
Brecksville	BvG	silt loam	no	40-70%	VIIe	no	—	slippage	10.9
Cardington	CaB	silt loam	no	2-6%	IIe	yes	70	seasonal HWT	413.3
Cardington	CbC2	silty clay loam	no	6-12%	IIIe	no	64	eroded	32.2
Chili	ChB	loam	no	2-6%	IIe	yes	67	slight	23.1
Colwood	Cm	loam	yes	0-2%	IIw	yes*	100	poor drainage	85.5
Condit	Co	silt loam	yes	0-2%	IIIw	yes*	61	poor drainage	327.9
Conotton	CtB	loan	no	2-6%	IIIs	yes	52	droughty	16.3
Conotton	CuC	gravelly loam	no	6-12%	IVe	no	48	erosion risk	16.5
Dekalb	DbB	channery loam	no	2-6%	IIe	no	52	sandstone slabs	42.7
Dekalb	DbD	channery loam	no	12-18%	IVe	no	45	sandstone slabs	10.1
Del Rey	DeA	silt loam	no	0-2%	IIw	yes*	73	poor drainage	187.1
Elnora	EnA	loamy fine sand	no	0-4%	IIw	no	55	rapid permeability	311.5
Elnora	EoA	loamy fine sand/rock	no	0-4%	IIw	no	55	rapid permeability	1.9
Fluvaquents	Fn	silty	yes	0-2%	—	no	—	frequent floods	63.8
Fries	Fr	silty clay loam	yes	0-2%	IIIw	yes*	48	poor drainage	14.5
Gilford	Gd	fine sandy loam	yes	0-2%	IIw	yes*	91	poor drainage	81.4
Haskin	HkA	loam	no	0-2%	IIw	yes*	76	poor drainage	349.3
Holly	Ho	silt loam	yes	0-2%	IIIw	yes*	36	occasional floods	262.5
Jimtown	JtA	loam	no	0-2%	IIw	yes*	76	poor drainage	201.2
Kibbie	KbA	fine sandy loam	no	0-2%	IIw	yes*	85	poor drainage	264.9
Mermill	Me	silty clay loam	yes	0-2%	IIw	yes*	97	poor drainage	314.7
Milford	Mf	silty clay loam	yes	0-2%	IIw	yes*	91	poor drainage	67.2
Millgrove	Mg	loam	yes	0-2%	IIw	yes*	100	poor drainage	121.5
Miner	Mr	silty clay loam	yes	0-2%	IIIw	yes*	79	poor drainage	1.3

TABLE 3.2. CHARACTERISTICS OF OLD WOMAN CREEK WATERSHED SOILS (cont'd)

Soil Series	Map Symbol	Texture	Hydric	Slope	Land Capability	Prime Farmland	Relative Productivity	Hazard/ Limitation	Area within Watershed (ha)
Mitiwanga	MxA	silt loam	no	0-2%	IIw	yes*	67	poor drainage	78.9
Mitiwanga	MxB	silt loam	no	2-6%	IIe	yes*	64	shallow bedrock	38.9
Nolin	No	silt loam	no	0-2%	IIw	yes	85	occasional floods	1.2
Oakville	OaB	loamy fine sand	no	0-6%	IVs	no	45	droughty	53.2
Orrville	Op	silt loam/bedrock	no	0-2%	IIw	yes*	73	occasional floods	34.3
Orrville	Or	silt loam/bedrock	no	0-2%	IIw	yes**	67	frequent floods	34.0
Oshtemo	OsB	loamy sand	no	0-6%	IIIs	yes	55	droughty	254.5
Pewamo	Pc	silty clay loam	yes	0-2%	IIw	yes*	91	poor drainage	11.8
Pits	Pg	sand & gravel	no	—	—	no	—	excavation	3.6
Pits (quarry)	Pk	sandstone bedrock	no	—	—	no	—	exposed bedrock	8.5
Plumbrook	PmA	fine sandy loam	no	0-2%	IIw	yes*	97	seasonal HWT	25.2
Rawson	RcA	sandy loam	no	0-2%	I	yes	76	slight	17.3
Rawson	RcB	sandy loam	no	2-6%	IIe	yes	73	seasonal HWT	118.2
Rimer	RgA	loamy fine sand	no	0-2%	IIw	no	73	poor drainage	64.5
Saylesville	SbF	silt loam	no	25-40%	VIIe	no	—	erosion risk	7.6
Shinrock	ShB	silt loam	no	2-6%	IIe	yes	70	seasonal HWT	9.5
Shinrock	SkC2	silty clay loam	no	6-12%	IIIe	no	64	eroded	4.3
Spinks	SpB	loamy fine sand	no	0-6%	IIIs	no	48	droughty	39.4
Spinks	SpD	loamy fine sand	no	12-18%	IVe	no	42	erosion risk	26.7
Tioga	Tg	loam	no	0-2%	IIw	yes	79	occasional floods	5.9
Tuscola	TuA	fine sandy loam	no	0-2%	I	yes	79	slight	22.6
Tuscola	TuB	fine sandy loam	no	2-6%	IIe	yes	76	seasonal HWT	35.5
Udipsam.-Spinks	Uc	sandy	no	0-6%	—	no	36	excavation	40.5
Udorthents	Ud	loamy; mixed fill	no	—	—	no	—	fill material	47.5
Wakeman	WaB	sandy loam	no	2-6%	IIe	yes	67	shallow bedrock	28.2
Wakeman	WaC	sandy loam	no	6-12%	IIIe	no	61	shallow bedrock	79.2
Water	W	sediment	yes	—	—	no	—	water saturated	14.4
Zurich	ZuC2	silt loam	no	6-12%	IIIe	no	70	eroded	46.3
Zurich	ZuD2	silt loam	no	12-18%	IVe	no	64	eroded	34.0
Zurich	ZuE2	silt loam	no	18-25%	VIIe	no	52	erosion risk	29.1
Zurich	ZuF	silt loam	no	25-40%	VIIe	no	—	erosion risk	150.4
									7,031.8

TABLE 3.2. CHARACTERISTICS OF OLD WOMAN CREEK WATERSHED SOILS (cont'd)

LEGEND:

Soil Series – group of soils with similar subsurface profiles; series have horizons that are nearly consistant in composition, thickness, and arrangement.

Special Soils:

Beaches – material, mainly sand and gravel, heaped up the action of waves, currents, and wind on the shore of a glacial or modern large lake; beach ridges are low, somewhat continuous mounds of beach and dune material.

Fluvaquents – taxonomic group of soils with a seasonal high water table that formed in recent alluvium; found near the mouth of Old Woman Creek where flooding is controlled by the level of Lake Erie .

Pits – areas excavated for gravel or sand (Pg) and bedrock quarries in Berea Sandstone (Pk).

Udipsamments – taxonomic group of soils with relatively little evidence of soil formation; found in areas where sand has been excavated for construction material.

Udorthents – soils in areas that have been excavated or where fill material has been deposited.

Water – lakes, ponds, and reservoirs sediments.

Map Symbol – consists of a 2-letter code (first letter capital and second letter lower case) designating the soil series to which the map unit belongs; can be followed by a single capital letter (A-G) indicating the amount of <u>slope</u>; can be followed by a single number (1-4) indicting the <u>erosion class</u> (see below):

Slope – inclination of and surface from horizontal; percentage of slope is the vertical distance divided by the horizontal distance times 100.

No letter – flat (0-1% slope)
A – nearly level (0-2% slope)
B – gently sloping (2-6% slope)
C – sloping (6-12% slope)
D – moderately steep (12-18% slope)
E – steep (18-25% slope)
F – very steep (25-40% slope)
G – very steep (40-70% slope)

Erosion Class – pertains to proportion of upper horizons that have been removed by accelerated water and wind erosion.

Class 1 – <25% loss of A and/or E horizons
Class 2 – 25-75% loss of A and/or E horizons
Class 3 – >75% loss of A and/or E horizons
Class 4 – 100% loss of A and/or E horizons

Texture – relative proportions of sand, silt, and clay particles in a soil; basic textural classes, in order of increasing proportion of fine particles progress from sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, to clay.

Hydric – soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part.

TABLE 3.2. CHARACTERISTICS OF OLD WOMAN CREEK WATERSHED SOILS (cont'd)

LEGEND: (cont'd)

Land Capability – degree of limitations on soil use

Class I – soils with slight limitations restricting their use
Class II – soils with severe limitations which reduce the choice of plants (require moderate conservation practices)
Class III – soils with severe limitations which reduce the choice of plants (require special conservation practices)
Class IV – soils with very severe limitations which reduce the choice of plants (require very special conservation practices)
Class V – soils which are not likely to erode but have other limitations (impractical to overcome) that limit their use
Class VI – soils with severe limitations that make them generally unsuitable for cultivation
Class VII – soils with very severe limitations that make them unsuitable for cultivation
Class VIII – soils with very severe limitations that nearly preclude their use for crop production
Modifiers – lower case letters indicate special limitations:
e – risk of erosion unless close growing plant cover is maintained
w – water on or in the soil interferes with plant growth or cultivation (artificial drainage may be required for cultivation)
s – shallow, droughty, or stony conditions

Prime Farmland – land that is best suited to food, feed, forage, fiber, and oilseed crops; produces the highest yields with minimal imputs of energy and economic resources; farming it results in the least damage to the environment; not urban and built-up land or water areas.
* – prime farmland where drained
** – prime farmland where drained and either protected from flooding or not frequently flooded during growing season

Relative Productivity – index number based on the most productive soils in the watershed (Cm and Mg) which have been assigned an index number of 100; index numbers for the other map units indicate the percentage of their corn yield compared to a yield of 15 cubic meters per hectare (165 bushels per acre) for Cm and Mg soil map units.

Hazard/Limitation – features of the soil or site that makes it hazardous or limits its use.
HWT – high water table

Data Source:
U.S. Dept. Agriculture, Soil Conservation Service and Ohio Dept. Natural Resources, Div. Soil & Water Conservation (Redmond et al. 1971, Ernst and Martin 1994, Martin and Prebonick 1994)

TABLE 3.3. PROPERTIES AND LIMITATIONS OF OLD WOMAN CREEK WATERSHED SOILS ERIE AND HURON COUNTIES, OHIO

Soil Series (Map Symbol)	Location/ Parent Material	Slope	Drain	Permeability	Water Capacity	Water Table High	Bedrock	Shrink/Swell	Homesite Limitation	Hazard
Adrian (Aa)	former bogs	0-2%	v poor	moderate	very high	surface (H)	>1,5 m	low	severe (B,St)	subsidence
Allis (Ak)	till or lake plains	0-2%	poor	very slow	low	surface (H)	0.5-1.0 m (C)	moderate	severe (St)	none
Amanda (Am)	till plain slopes	12-18%	well (E)	moderate slow	high	>1.2 m	>1.5 m	moderate	severe (St)	none
Amanda-Dekalb (An)	bedrock outcrops	40-70%	well	rapid	very low	>1.8 m	0.5-1.0 m	low	severe (B,St)	large stones
Bennington (Be,Bg)	till or lake plains	0-6%	s poor	slow	moderate	0.3-0.8 m	>1.5 m	moderate	severe (St)	none
Bixler (Bk)	lake plain/beach ridges	0-6%	s poor	rapid/moderate	moderate	0.5-1.0 m	>1.5 m	moderate	severe (B,St)	none
Brecksville (Bv)	bedrock slopes	40-70%	well	slow	low	>1.8 m	0.5-1.0 m (C)	moderate	severe (Sl,St)	slippage
Cardington (Ca,)	till plain	0-6%	moderate	slow	moderate	0.5-1.0 m	>1.5 m	moderate	severe (B,St)	none
Cardington (Cb)	till plain	6-12%	well (E)	moderate slow	moderate	0.5-1.0 m	>1.5 m	moderate	severe (B,St)	none
Chili (Ch)	beach ridges/outwash	2-6%	well	moderate rapid	moderate	>1.8 M	>1.5 m	low	slight	none
Colwood (Cm)	lake/outwash plains	0-2%	v poor	moderate slow	high	surface (H)	>1.0 m	moderate	severe (St)	none
Condit (Co)	till plain	0-2%	poor	slow	moderate	surface (H)	>1.5 m	moderate	severe (St)	none
Conotton (Ct,Cu)	beach ridges	2-12%	well	rapid	low	>1.8 m	>1.5 m	low	severe (St)	none
Dekalb (Db)	bedrock knolls	2-18%	well	rapid	very low	>1.8 m	0.5-1.0 m (C)	low	severe (St)	large stones
Del Rey (De)	lake plain	0-2%	s poor	slow	moderate	0.3-0.9 m	>1.5 m	moderate	severe (St)	none
Elnora (En,Eo)	lake plain or deltas	0-4%	moderate	rapid	low	0.4-0.6 m	>1.5; 1-1.5 m	low	severe (B,St)	none
Fries(Fr)	till or lake plains	0-2%	v poor	slow	low	surface (H)	0.5-1.0 m (C)	high	severe (St)	none
Gilford (Gd)	lake plain or deltas	0-2%	v poor	moderate rapid	low	surface (H)	>1.5 m	low	severe (St)	none
Haskins (Hk)	till plain/outwash	0-2%	s poor	moderate/slow	moderate	0.3-0.8 m	>1.5 m	moderate	severe (St)	none
Holly (Ho)	flood plains	0-2%	poor	moderate	very high	surface (H)	>1.5 m	low	severe (St)	flooding
Jimtown (Jt)	outwash/beach ridges	0-2%	s poor	moderate	moderate	0.3-0.8 m	>1.5 m	low	severe (St)	nonw
Kibbie (Kb)	lake plain or delta	0-2%	s poor	moderate	high	0.3-0.6 m	>1.5 m	low	severe (St)	none
Mermill (Me)	lake or till plains	0-2%	v poor	moderate/slow	moderate	surface (H)	>1.5 m	moderate	severe (St)	none
Milford (Mf)	lake plain	0-2%	v poor	moderate slow	high	surface (H)	>1.5 m	moderate	severe (St)	none
Millgrove (Mg)	outwash plains	0-2%	v poor	moderate	moderate	surface (H)	>1.5 m	moderate	severe (St)	none
Miner (Mr)	till or lake plains	0-2%	v poor	slow	moderate	surface (H)	>1.0 m	moderate	severe (St)	none
Mitiwanga (Mx)	till or lake plains	0-6%	s poor	moderate	low	0.3-0.8 m	0.5-1.0 m (C)	moderate	severe (St)	none
Nolin (No)	floor plains	0-2%	well	moderate	high	1.0-1.8 m	>1.5 m	low	severe (St)	flooding
Oakville (Oa)	lake plain/beach ridges	0-6%	well	rapid	low	>1.8 m	>1.5 m	low	severe (St)	none
Ogontz (Og,Oh)*	lake/outwash plains	0-6%	moderate	moderate	high	0.5-1.0 m	>1.5 m	moderate	severe (B,St)	none
Orrville (Op,Or)	flood plains	0-2%	s poor	moderate	high	0.3-0.8 m	>1.5 m	low	severe (St)	flooding
Oshtemo (Os)	outwash/beach ridges	0-6%	well	moderate rapid	low	>1.8 m	>1.5 m	low	slight	none
Pewamo (Pe)	till or lake plains	0-2%	v poor	moderate slow	high	surface (H)	>1.5 m	moderate	severe (St)	none
Plumbrook (Pm)	lake plain/outwash	0-2%	s poor	moderate rapid	moderate	0.3-0.8 m	>1.5 m	low	severe (St)	none

TABLE 3.3. PROPERTIES AND LIMITATIONS OF OLD WOMAN CREEK WATERSHED SOILS ERIE AND HURON COUNTIES, OHIO (cont'd)

Soil Series (Map Symbol)	Location/ Parent Material	Slope	Drain	Permeability	Water Capacity	Water Table High	Bedrock	Shrink/Swell	Homesite Limitation	Hazard
Rawson (Rc)	till or lake plains	0-6%	moderate	moderate/slow	moderate	0.6-1.0 m	>1.5 m	moderate	severe (B,St)	none
Rimer (Rg)	outwash/till plain	0-2%	s poor	moderate rapid	low	0.3-0.8 m	>1.5 m	high	severe (B,St)	none
Saylesville (Sb)	lake plain slopes	25-40%	well	moderate slow	high	>1.8 m	>1.5 m	moderate	severe (St)	none
Shinrock (Sh)	lake plain knolls	2-6%	moderate	moderate slow	moderate	0.6-1.0 m	>1.5 m	low	severe (B.St)	none
Shinrock (Sk)	lake plain slopes	6-12%	well (E)	moderate slow	moderate	0.6-1.0 m	>1.5 m	low	severe (B.St)	none
Spinks (Sp)	beach ridges/outwash	0-18%	well	moderate rapid	low	>1.8 m	>1.5 m	low	severe (St)	none
Tioga (Tg)	flood plains	0-2%	well	moderate/rapid	moderate	1.0-1.8 m	>1.5 m	low	severe (St)	flooding
Tuscola (Tu)	lake plain/outwash	0-6%	moderate	moderate	high	0.6-1.0 m	>1.5 m	moderate	severe (B,St)	none
Wakeman (Wa)	beach ridges/outwash	2-12%	well	moderate rapid	moderate	>1.8 m	0.5-1.0 m (C)	low	severe (B,St)	none
Zurich (Zu)	lake plain slopes	6-40%	well (E)	moderate	high	>1.8 m	>1.5 m	moderate	severe (St)	none

* former name Avery (Av,Ay)

LEGEND:

Soil Series – group of soils with similar subsurface profiles; soils of a particular series have horizons that are nearly consistant in composition, thickness, and arrangement.

Location/Parent Material – physiographic or geologic terrain; bedrock or unconsolidated mineral or organic material from which a soil formed.

Slope – inclination of the land surface from horizontal; percentage of slope is the vertical distance divided by the horizontal distance times 100.

Drain – drainage class; frequency and duration of periods of saturation during formation of soil (not saturation as a result of artifically altered drainage or irrigation):

- **well** – water is drained from soil readily, but not rapidly, and is available to plants throughout most of the growing season; wetness does not inhibit growth of roots
- **moderate** – water is drained from soil somewhat slowly and soils are wet for a short time during the growing season, but long enough that most crops are affected
- **s poor** – somewhat poorly drained soil that is wet for significant periods during the growing season; wetness restricts growth of crops unless artificially drained
- **poor** – water is drained so slowly that soil is saturated periodically during the growing season; free water is commonly at or near the surface so that most crops fail
- **v poor** – very poorly drained soil so that free water remains at or on the surface during most of the growing season; depressions are frequently ponded
- **(E)** – eroded; erosion has changed the soil to such an extent that different management practices are required for uses other than agriculture; 25-75% original topsoil lost

Permeability – quality of the soil that enables water to move downward through the profile; measured in centimeters per hour (cm/hr):

- **very slow** – <0.15 cm/hr
- **slow** – 0.15-0.5 cm/hr
- **moderate slow** – 0.5-1.5 cm/hr
- **moderate** – 1.5-5.0 cm/hr
- **moderate rapid** – 5.0-15 cm/hr
- **rapid** – 15-50 cm/hr
- **very rapid** – >50 cm/hr

TABLE 3.3. PROPERTIES AND LIMITATIONS OF OLD WOMAN CREEK WATERSHED SOILS ERIE AND HURON COUNTIES, OHIO (cont'd)

LEGEND: (cont'd)

Water Capacity – available capacty of the soil to hold water for use by most plants; commonly defined as the difference between the amount of soil water at field capacity and the amount of moisture at the wilt point of plants expressed as centimeters (cm) of water per 1 cm depth of soil:

- **very low** – 0 to 7.5 cm
- **low** 7.5 to 15 cm
- **moderate** – 15 to 22.5 cm
- **high** – 22.5 to 20 cm
- **very high** – >30 cm

Water Table High – highest level of a moisture saturated zone in the soil in most years; (H) – indicates a hydric soil, one that is typically saturated during the growing season.

Bedrock – depth under the soil surface to consolidated bedrock as expressed in meters (m); bedrock controlled areas (C) occur where the underlying bedrock is shallow (<1 m) and the rock determines or stongly influences the shape of the land even though a thin deposit of glacial till or lake sediment may be at the surface.

Shrink/Swell – potential for volume change in a soil with loss or gain in moisture content; commonly expressed in percentage change in length of an unconfined soil sample as moisture content is increased:

- **low** – <3% change in length
- **medium** – 3% to 6% change in length
- **high** – >6% change in length

Homesite Limitation – describe the impact of certain soil properties and site features on honmesites and septic tank absorption fields:

- **slight** – conditions are generally favorable for homesites and septic tank absorption fields with minor problems to overcome
- **moderate** – conditions are not favorable for homesites and septic tank absorption fields without special planning, design, or maintenance to overcome limitations
- **severe** – conditions so unfavorable or difficult to overcome that special design, significant increases in construction costs, and increased maintenance are required:
  - (B) – basement limitations; (Sl) – slippage limitations; (St) – septic tank absorption field limitations

Hazard – features of the soil or site that make its use hazardous, such as flooding, slippage, and large stones.

Data Source:

U.S. Dept. Agriculture, Soil Conservation Service and Ohio Dept. Natural Resources, Div. Soil & Water Conservation (Redmond et al. 1971, Ernst and Martin 1994, Martin and Prebonick 1994)

TABLE 3.4. ERODIBILITY OF OLD WOMAN CREEK WATERSHED SOILS

Map Symbol	Soil Series	Erosion Factor (K)	Erosion Factor (T)	Wind Erosion
Aa	Adrian	0.37	5	6
AkA	Allis	0.43	3	6
AmD2	Amanda	0.37	5	6
AnG	Amanda-Dekalb	0.37	5	6
AvA (OgA)	Avery (Ogontz)	0.43	5	3
AyB (OhB)	Avery (Ogontz)	0.37	5	6
Bc	Beaches	—	—	—
BeA	Bennington	0.43	3	6
BgA	Bennington	0.43	3	6
BgB	Bennington	0.43	3	6
BkA	Bixler	0.17	5	2
BkB	Bixler	0.17	5	2
BvG	Brecksville	0.43	4	6
CaB	Cardington	0.37	3	6
CbC2	Cardington	0.37	3	6
ChB	Chili	0.32	4	5
Cm	Colwood	0.28	5	5
Co	Condit	0.37	3	7
CtB	Conotton	0.24	3	5
CuC	Conotton	0.24	3	8
DbB	Dekalb	0.17	2	6
DbD	Dekalb	0.17	2	6
DeA	Del Rey	0.43	3	6
EnA	Elnora	0.17	4	2
EoA	Elnora	0.17	4	2
Fn	Fluvaquents	—	—	—
Fr	Fries	0.28	3	7
Gd	Gilford	0.10	4	2
HkA	Haskins	0.37	4	5
Ho	Holly	0.28	5	6
JtA	Jimtown	0.32	4	5
KbA	Kibbie	0.28	5	5
Me	Mermill	0.37	4	7
Mf	Milford	0.28	5	4
Mg	Millgrove	0.24	4	6
Mr	Miner	0.32	3	7
MxA	Mitiwanga	0.32	2	6
MxB	Mitiwanga	0.32	4	6
No	Nolin	0.43	5	5
OaB	Oakville	0.17	5	2
Op	Orrville	0.37	5	6
Or	Orrville	0.37	5	6
OsB	Oshtemo	0.24	5	3
Pc	Pewamo	0.28	5	7
Pg	Pits	—	—	—
Pk	Pits (quarry)	—	—	—
PmA	Plumbrook	0.20	5	3
RcA	Rawson	0.24	4	3
RcB	Rawson	0.24	4	3
RgA	Rimer	0.17	4	2
SbF	Saylesville	0.37	5	5

TABLE 3.4. ERODIBILITY OF OLD WOMAN CREEK WATERSHED SOILS (cont'd)

Map Symbol	Soil Series	Erosion Factor (K)	Erosion Factor (T)	Wind Erosion
ShB	Shinrock	0.37	5	6
SkC2	Shinrock	0.37	5	7
SpB	Spinks	0.17	5	2
SpD	Spinks	0.17	5	2
Tg	Tioga	0.37	5	5
TuA	Tuscola	0.24	5	3
TuB	Tuscola	0.24	5	3
Uc	Udipsamments-Spinks	—	—	—
Ud	Udorthents	—	—	—
WaB	Wakeman	0.28	2	3
WaC	Wakeman	0.28	2	3
W	Water body	—	—	—
ZuC2	Zurich	0.37	5	6
ZuD2	Zurich	0.37	5	6
ZuE2	Zurich	0.37	5	6
ZuF	Zurich	0.37	5	6

LEGEND:

Note: erosion factors and wind erosion group given for the upper 15 to 35 cm of soil.

Erosion Factor (K) – a relative index of the susceptibility of a bare, cultivated soil to particle detachment and transport by rainfall (sheet and rill erosion) adjusted to a standard 9% slope; values of K can range from 0.05 to 0.69, the higher the value the more susceptible the soil is to water erosion.

Erosion Factor (T) – an estimate of the maximum average annual rate of soil erosion by water or wind that can occur without affecting crop production of a sustained period; rate in tons per year; values of T can range from 1 to 5 tons per acre (0.4 ha) per year, with 1 ton for shallow and otherwise fragile soils and 5 tons for deep soils that are least subject to damage by erosion.

Wind Erosion Group – a set of classes (1 to 8) based on compositional properties of the surface soil that affect susceptibility to wind erosion; associated with each group is a wind erosion index in tons per acre (0.4 ha) per year based on an unsheltered, bare soil which lacks a surface crust; the higher the class (group) the more resistant the soil is to wind erosion:

- **Group 1** – coarse to very fine sands
- **Group 2** – loamy coarse to loamy very fine sands
- **Group 3** – coarse sandy loam to very fine sandy loam
- **Group 4** – clays, silty clays, clay loams, and silty clay loams; calcareous loams
- **Group 5** – non-calcareous loams and silt loams, <20% clay to sandy clay
- **Group 6** – non-calcareous loams and silt loams, >20% clay to sandy clay and <35% clay
- **Group 7** – silts and non-calcareous silty clay loams, <35% clay
- **Group 8** – soils not subject to wind erosion because of coarse fragments or surface wetness.

Data Source:

U.S. Dept. Agriculture, Soil Conservation Service and Ohio Dept. Natural Resources, Div. Soil & Water Conservation (Soil Survey Division Staff 1993, Ernst and Martin 1994, Martin and Prebonick 1994)