What is Soil Survey?

Soil Survey is “a systematic examination, description, classification, and mapping of the soils in a given area.”

Brady and Weil. 1996

Who Produces Soil Survey

Cooperative effort between the NRCS, Land Grant Universities and Counties where Survey is being conducted.

Where to get a Soil Survey
(those that are still in print or available)

1) USDA / NRCS
2)Cooperative Extension
3) Experiment Stations

What are the components of Soil Survey?

1. Mapping of the soils
2. Characterization of the Mapping Units
3. Classification of the Mapping Units
4. Correlation to other Soil Surveys
5. Interpretation of soil suitability for various land uses

What are Mapping Units? ~ colloquially called Map Units

Mapping Units are a collection of areas which have similar defined soil properties. Due to these similar soil properties, interpretations can be made for use and management of the soils in the Mapping Unit.

Map Units

Have a two letter code (Capital, then lower case), usually followed by a Slope Class code (a Capital letter from A to F)

Examples: Mardin channery silt loam, 2 to 8 percent slope = MaB

Arkport fine sandy loam, 2 to 6 percent slope = ArB


CeB
Rs
Rs
CeA
N
W
S
Rt. 48
CeB
Bp
Rt. 40
CeB
CeA
Bp
UNION
Rs

What information is provided by Soil Survey?

1. Properties of Soil Map Units

color	permeability	stoniness	depth to bedrock
pH	structure	salinity	texture
slope	H_2O availability	horizon thickness	engineering properties
erosion hazard			

and other physical and chemical properties

2. Position on the Landscape
3. Percent Area in the Landscape
4. Capacities

Yield for crop, pasture and vegetable

Suitability for silviculture, floriculture, recreation, wildlife and water infrastructure

Engineering potentials and hazards

MARDIN SERIES

The Mardin series consists of very deep, moderately well drained soils formed in loamy till. They are in glaciated uplands, mostly on broad hilltops, shoulder slopes and backslopes. The Mardin soils have a dense fragipan that starts at a depth of 14 to 26 inches below the soil surface. Slope ranges from 0 to 50 percent. Mean annual temperature is 48 degrees F., and mean annual precipitation is 38 inches.

TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Typic Fragiudepts

TYPICAL PEDON: Mardin channery silt loam, on a 5 percent slope in a meadow. (Colors are for moist soil.)

Ap-- 0 to 8 inches; dark brown (10YR 4/3) channery silt loam; moderate fine granular structure; friable; many fine roots; 20 percent channers; very strongly acid; clear, smooth boundary. (6 to 12 inches thick.)

Bw-- 8 to 13 inches; yellowish brown (10YR 5/6) channery silt loam; weak medium and fine subangular blocky structure; friable; many fine roots; 20 percent channers; strongly acid; clear wavy boundary. (4 to 18 inches thick.)

E-- 13 to 19 inches; pale brown (10YR 6/3) channery silt loam; weak medium subangular blocky structure; firm; common fine roots; 15 percent channers; many medium distinct light brownish gray (2.5Y 6/2) redoximorphic depletions; strongly acid; clear, wavy boundary. (0 to 8 inches thick.)

Bx1-- 19 to 26 inches; yellowish brown (10YR 5/4) channery silt loam, prism faces are pale brown (10YR 6/3) with yellowish brown (10YR 5/6) borders; strong very coarse prismatic structure parting to weak coarse subangular blocky, prism faces are wider at the top becoming narrower with increasing depth; very firm and brittle; few fine roots along prism faces; common fine pores with few faint clay films; 25 percent channers; common medium distinct dark grayish brown (10YR 4/2) redoximorphic depletions in the matrix and common fine prominent light gray (N 7/0) redoximorphic depletions along prism faces; strongly acid; diffuse, irregular boundary.

Bx2-- 26 to 42 inches; light olive brown (2.5Y 5/4) channery silt loam, prism faces are pale brown (10YR 6/3) with yellowish brown (10YR 5/6) borders; strong very coarse prismatic structure, 10 to 12 inches across, parting to weak coarse subangular blocky; very firm and brittle; few fine pores with few faint clay films; 30 percent channers; common medium distinct brown (10YR 4/3) redoximorphic depletions; moderately acid; diffuse irregular boundary. (Combined thickness of the Bx horizon is 15 to 56 inches.)

C-- 42 to 72 inches; light olive brown (2.5Y 5/4) very channery silt loam; massive; firm; 45 percent channers; moderately acid.

MARDIN SERIES (cont)

RANGE IN CHARACTERISTICS: Solum thickness ranges from 38 to 72 inches. Depth to the top of the fragipan ranges from 14 to 26 inches. Depth to bedrock ranges from 60 inches to 20 feet or more. There is 60 percent or more silt plus very fine sand in the fine-earth fraction above the fragipan. Rock fragments are dominantly channers, flagstones, or gravel, and range from 5 to 35 percent in the horizons above the fragipan, and commonly from 15 to 60 percent in the Bx and C horizons. Some pedons do not have rock fragments in layers below a depth of 40 inches.

The **Ap** horizon has hue of 7.5YR through 2.5Y, value of 3 or 4, and chroma of 2 through 4. Texture of the fine-earth fraction is silt loam. Structure is weak or moderate granular. Consistence is friable or very friable. Some pedons in uncultivated areas have a dark A horizon 1 to 5 inches thick. Reaction ranges from extremely acid through moderately acid, unless limed.

The **Bw** horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 3 through 8. Texture of the fine-earth fraction is loam or silt loam. Structure is very fine through medium subangular blocky or granular. Consistence is very friable through firm. Reaction ranges from extremely acid through moderately acid, unless limed.

The **E** horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 2 or 3. Texture of the fine-earth fraction is loam or silt loam. Structure is subangular blocky or platy. Consistence is friable or firm. Reaction ranges from extremely acid through moderately acid. The E or Bw horizons have redoximorphic features in some part above 20 inches, but are not distinct or prominent within 12 inches.

The **Bx** horizon has hue of 7.5YR through 5Y, value of 3 through 5, and chroma of 2 through 4 with faint to prominent redoximorphic features. Texture of the fine-earth fraction is loam or silt loam. The Bx horizon has weak through strong very coarse prismatic structure. Consistence is firm or very firm. Reaction ranges from very strongly acid through slightly acid. Some pedons have a BC or a CB horizon.

The **C** horizon has hue of 7.5YR through 5Y, value of 3 through 5, and chroma of 2 through 4. Textures are similar to the Bx horizon except silty layers that do not have rock fragments are in some pedons below a depth of 40 inches. The C horizon is massive, or has weak plate-like divisions. Consistence is firm or very firm. Reaction ranges from strongly acid through neutral in the upper part, but can range to slightly alkaline below a depth of 60 inches in some pedons. Some pedons lack C horizons.

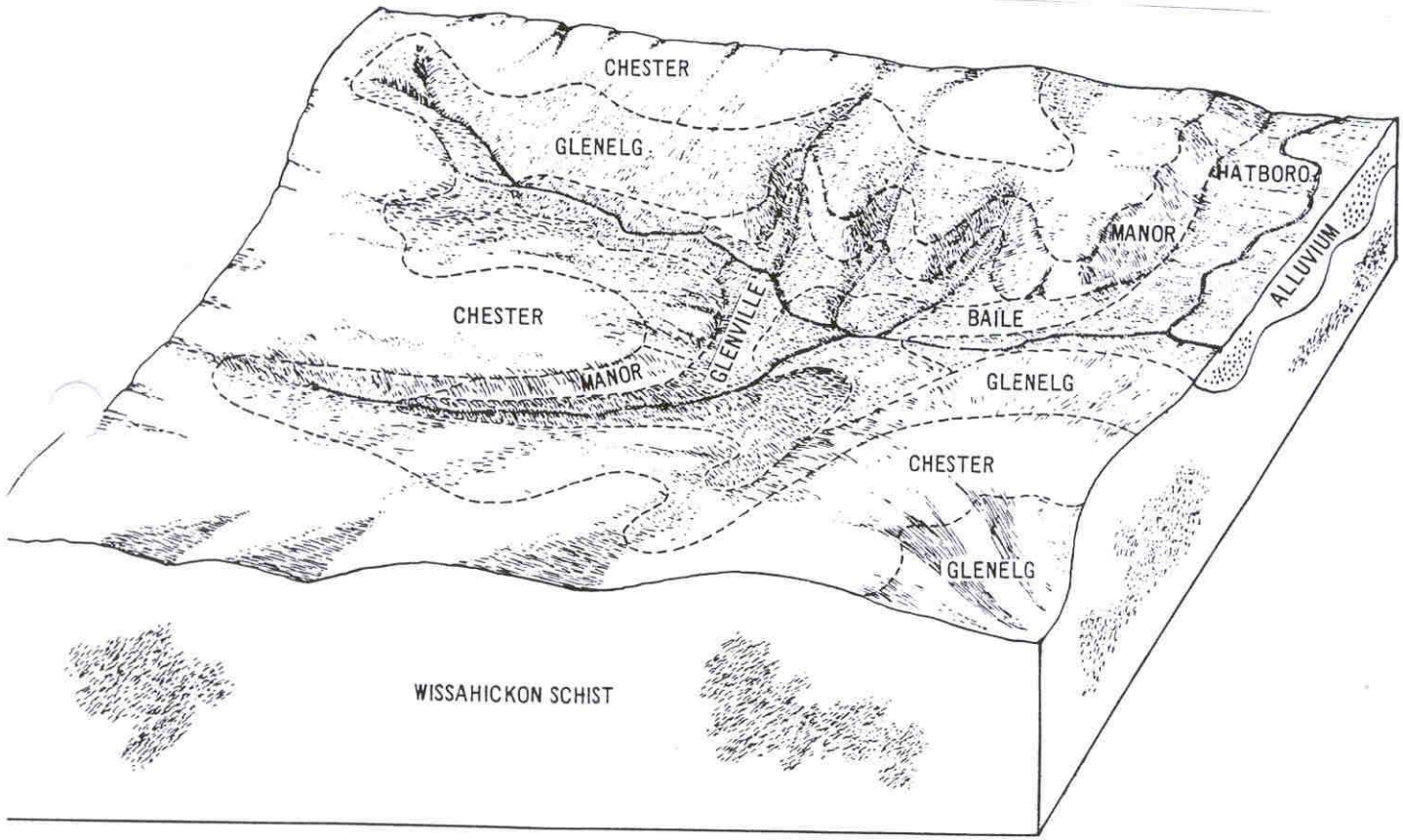


Figure 2.—Cross section showing typical soil pattern in the Chester-Glenelg association.

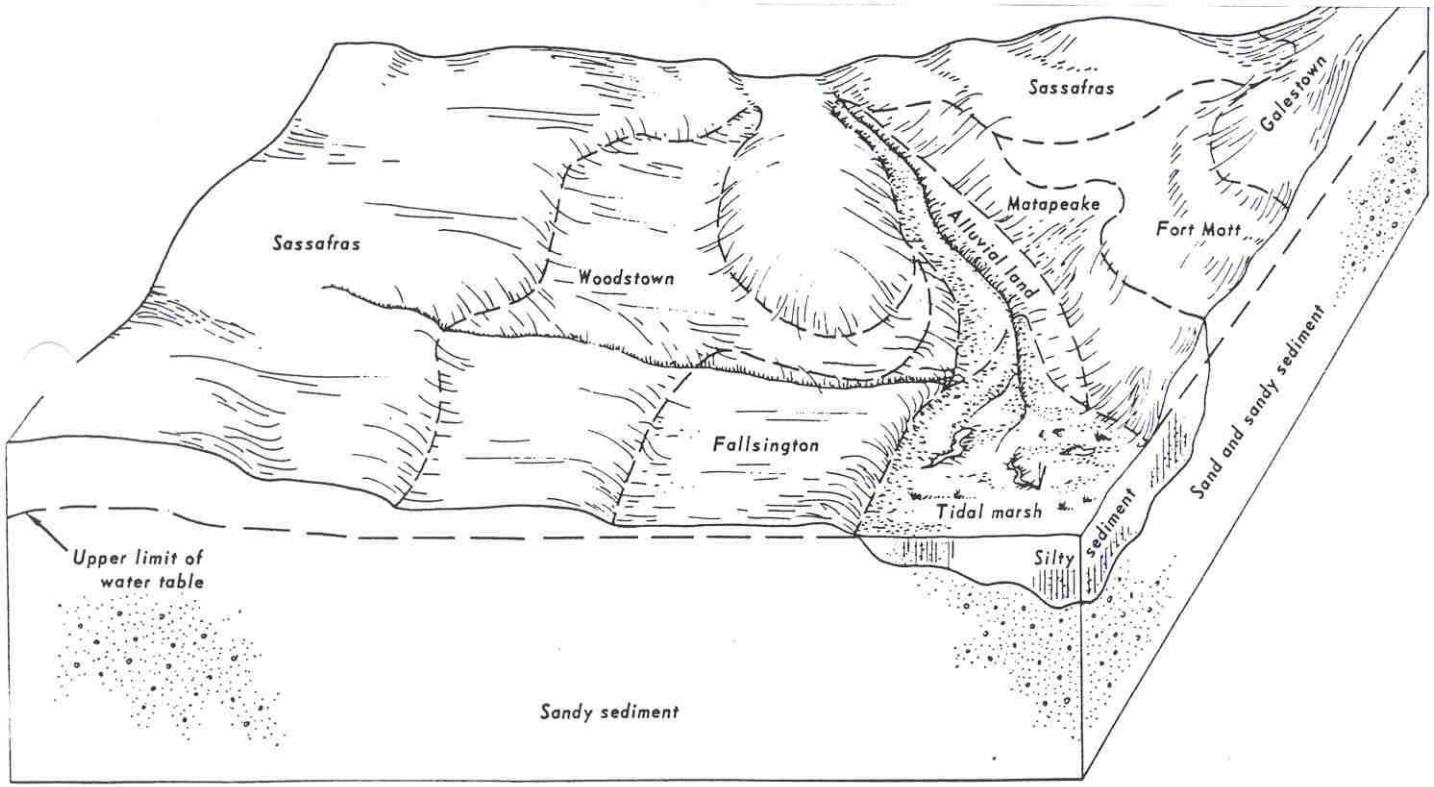
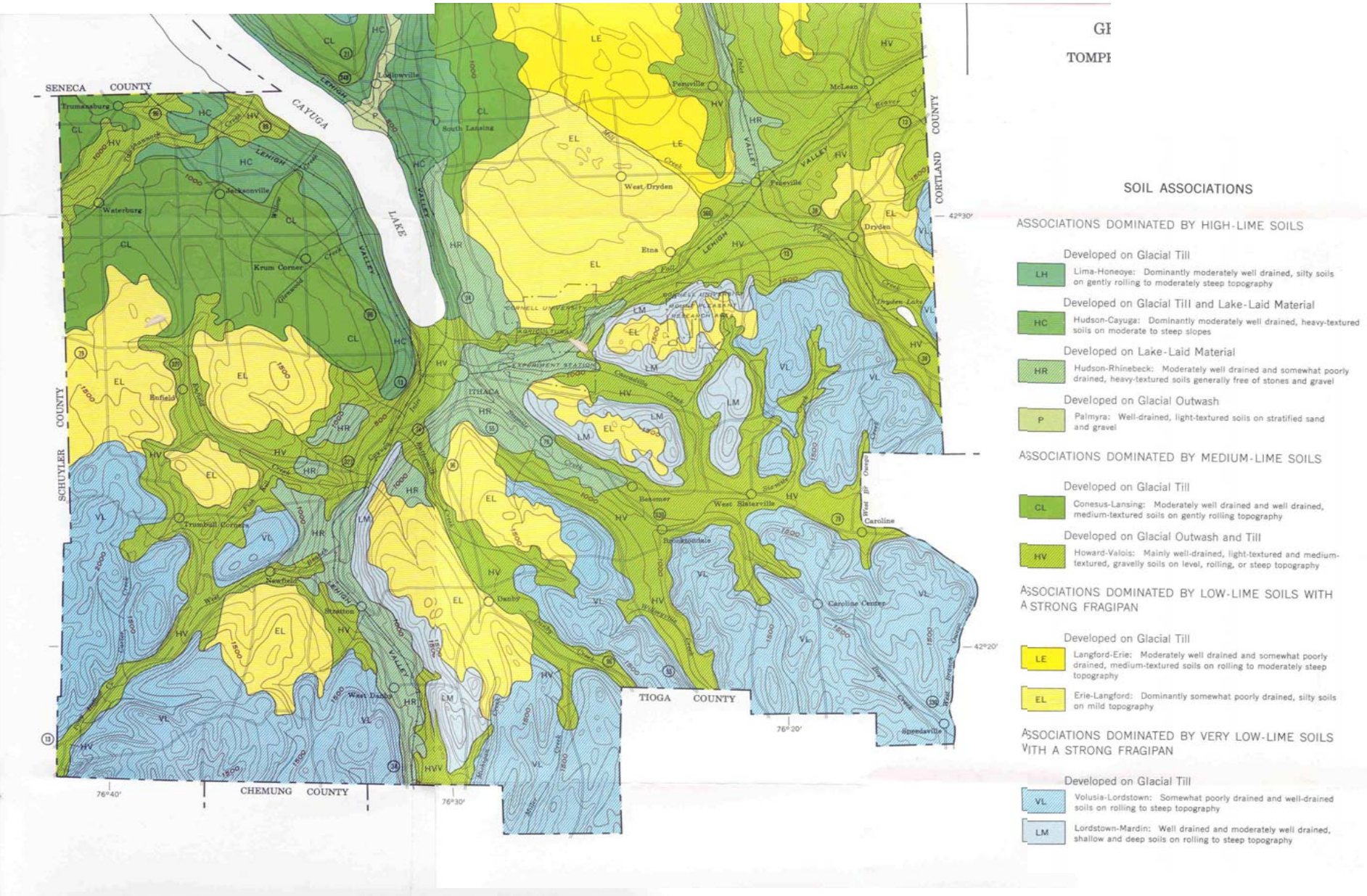


Figure 4.—Cross section showing typical pattern in the Sassafras-Woodstown-Fallsington association.

County General Soil Map presents Soil Associations



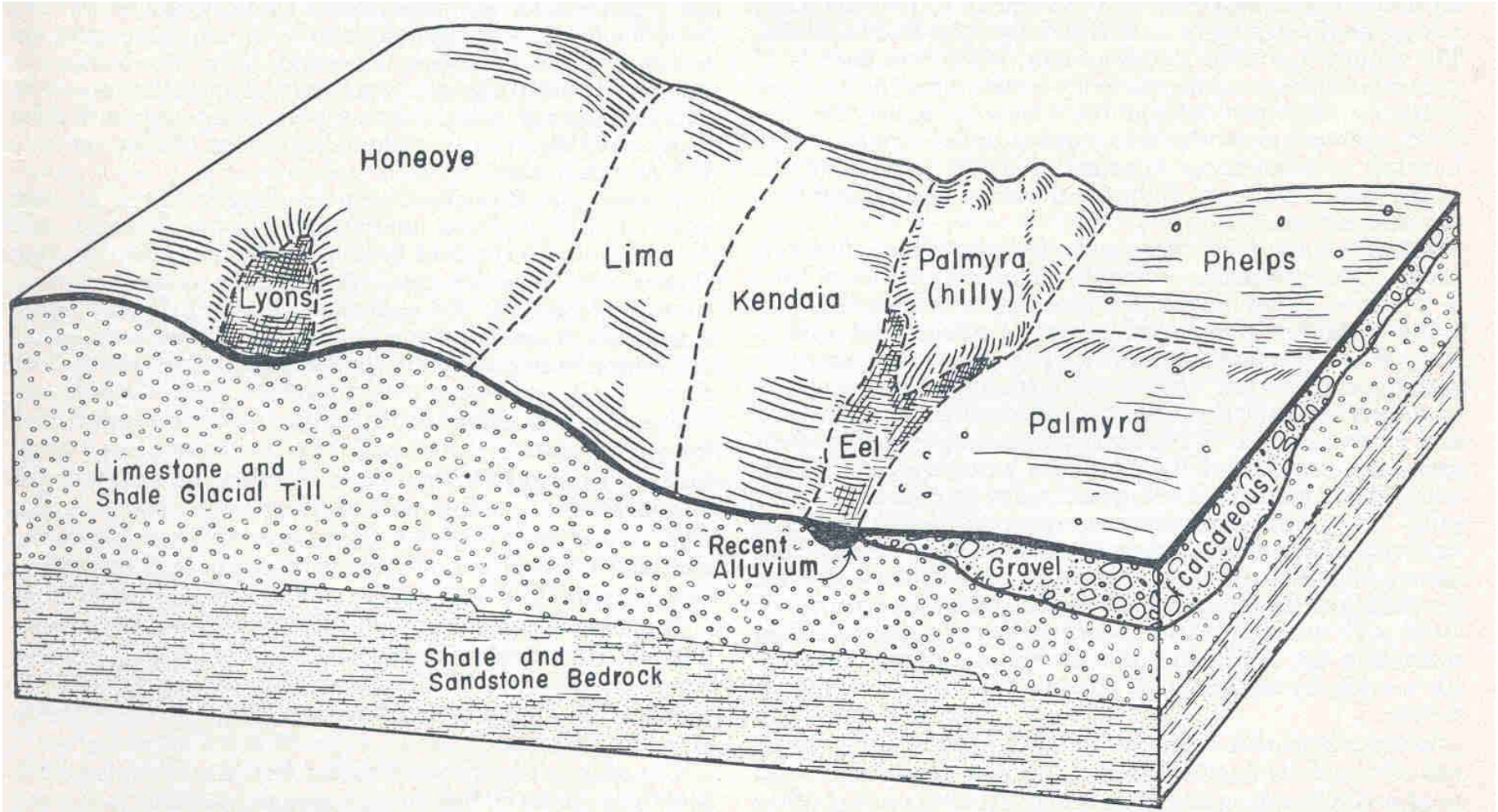


Figure 2.—Typical cross section of Lima-Honeoye association and Palmyra association in northwestern Tompkins County.

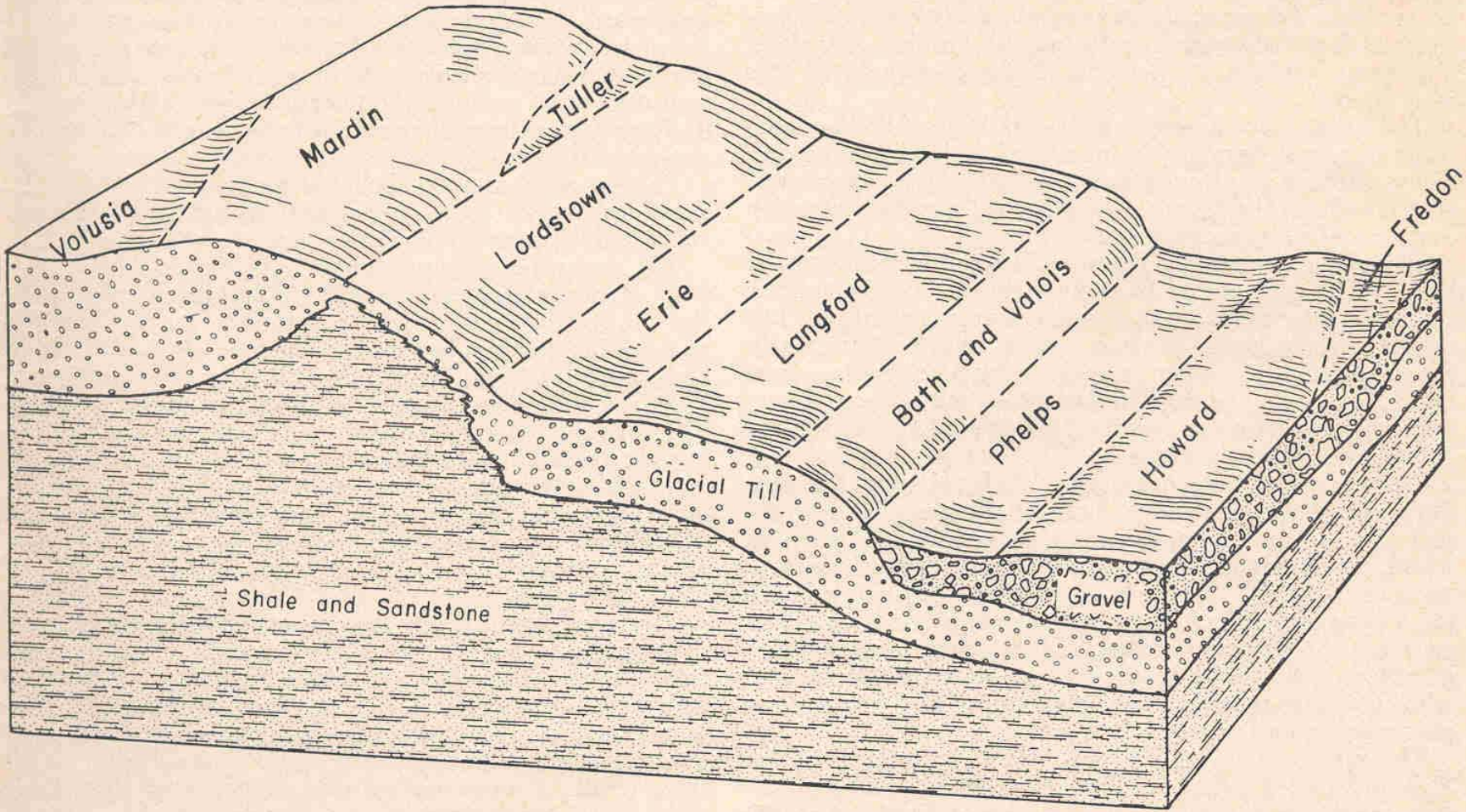


Figure 3.—**Typical cross section of southern Tompkins County soils, consisting mainly of low-lime and very low-lime soils with a fragipan.**

733–022—65——2

Generalized Landscape Positions

1: Summit

2 and 3: Shoulder Slope

4 and 5: Backslope

6: Footslope

7: Toeslope

Position helps understand relative Alluvial vs. Colluvial material deposition.

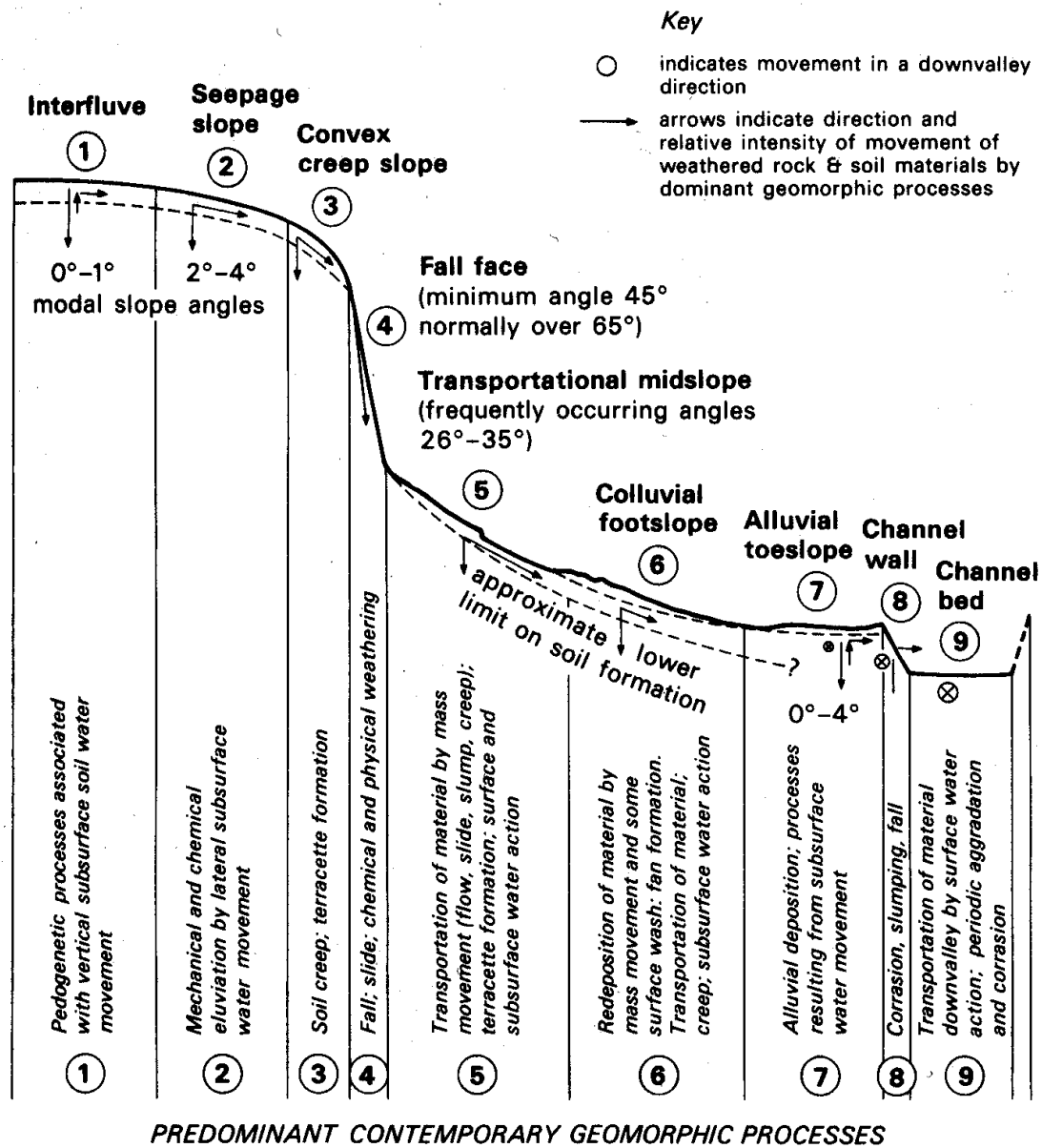


Figure 1.4 Hypothetical nine-unit landsurface model (from Dalrymple *et al.* 1968).

Slope Classes

• 0 – 2% or 0 – 3%	sometimes 0 – 6%	A
• 2 – 8% or 3 – 8%	sometimes 2 – 6%	B
• 8 – 15%		C
• 15 – 25%	sometimes 12 – 20%	D
• 25 – 35%	sometimes 20 – 45%	E
• 35 – 60%		F

Designated by a A, B, C, D, E or F at the end of the Map Unit Symbol

Drainage Classes

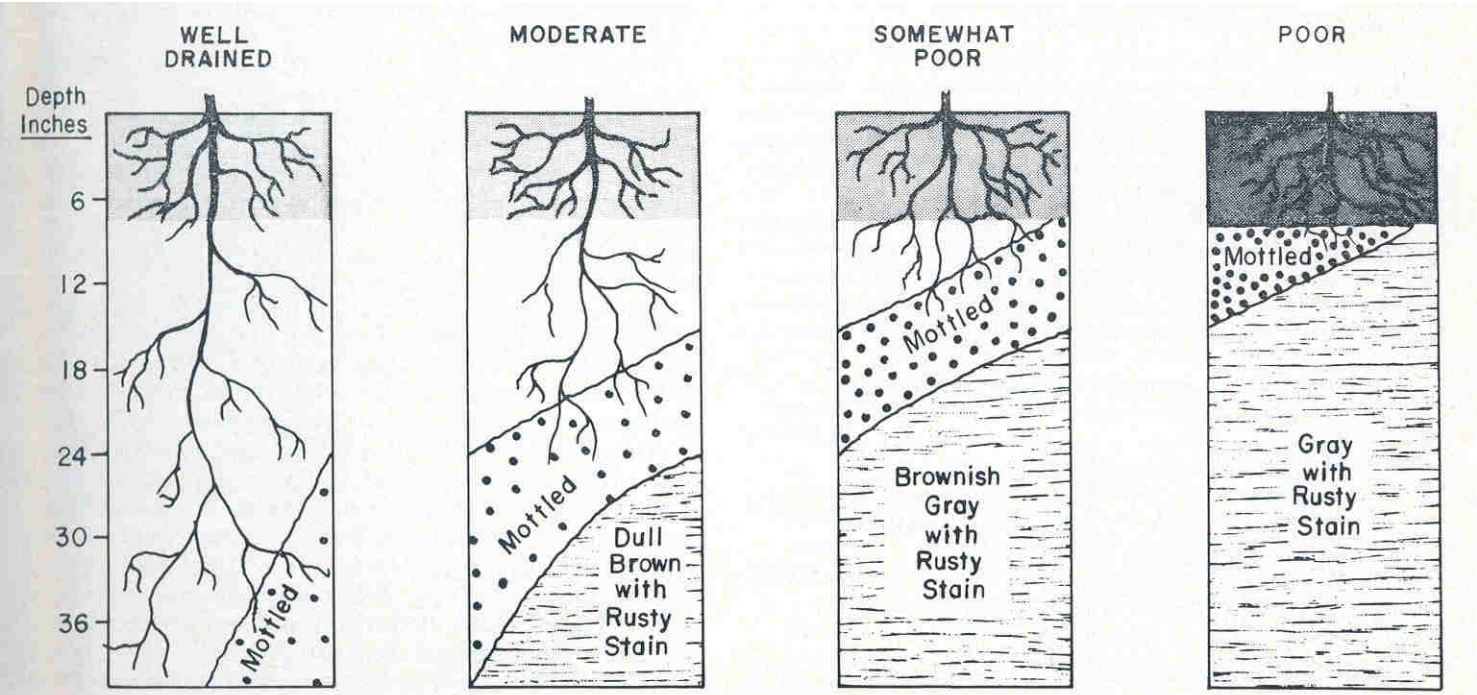


Figure 5.—Effect of soil drainage on root development.

Redox Features and Mottling in Relation to Drainage Classes

- 0 – 6 in. very poorly drained
- 6 – 12 in. poorly drained
- 12 – 20 in. somewhat poorly drained
- 20 – 32 in. moderately well drained
- 32 – 42 in. well drained
- 42 – 52 in. somewhat excessively well drained
- > 52 in. excessively well drained

Reduced (anaerobic) Soil Conditions

consequences

Carbon Accumulation	(addition)
Fe and Mn Reduction and Mobilization	(transformation and loss)
Sulfur – sulfate to sulfide	(transformation)

Redoximorphic (Redox) Features

causes

Fe and Mn reduction and re-oxidation pattern

Oxidized Fe = red & Mn = black

gleyed (grey)

indicator of long-term conditions AND reversable

Drainage classes = very poorly and poorly drained soils

~ Hydric Soils are soils…

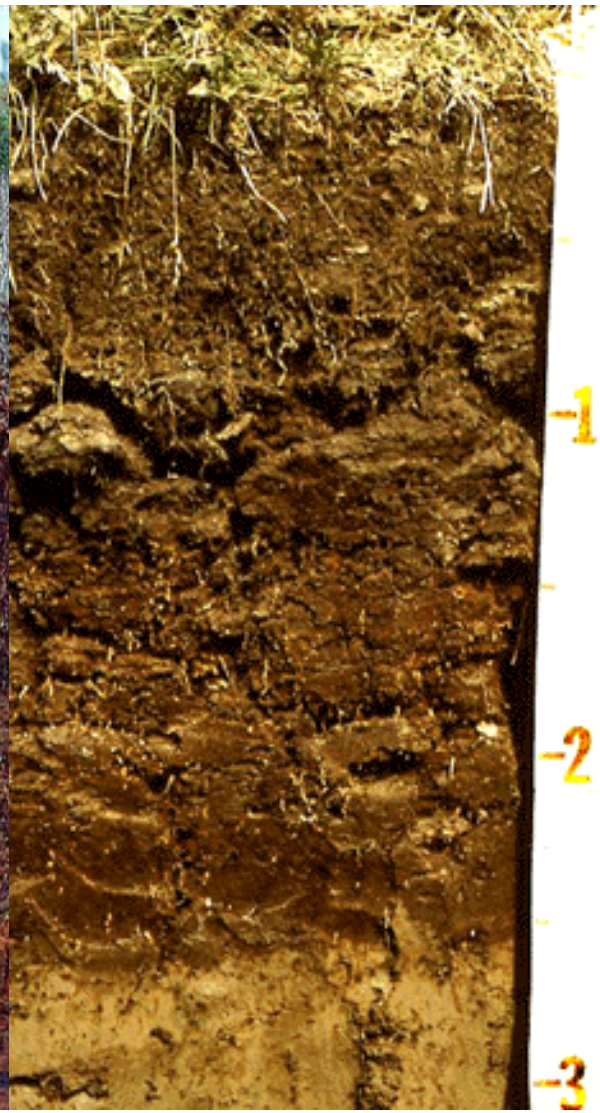
… soils saturated during growing season (soil temp > 5^{o}C)

sufficient to produce a reduced matric and

support hydrophilic plants

1) Organic Accumulation

Histosols and soils with histic epipedons – O horizons ≥ 8” thickness



sis.agr.gc.ca/.../ landscape/slc_bcnorth.html

www.ucalgary.ca/.../ SoilOrders/soilorders.html

3) Gleyed, low chroma (i.e. chroma ≤ 1 soil colors w/in 12” of soil surface

www.providence.edu/ bio/faculty/adams/LECTUREP...

4) Redox concentrations in the mineral matrix with chromas ≥ 2 close to the soil surface