What are Soil Map Units and Web Soil Survey

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Objectives

• Explain the concepts of scale and map unit design
• Identify the official source of soil survey information
• Describe Web Soil Survey and explain how it can be used to develop soil maps and reports
Soil Survey

• Soil surveys describe **kinds of soils** that exist in an area
• Soils are described in terms of their
  – location on the landscape
  – profile characteristics
  – relationships to one another
  – suitability for various uses
  – needs for particular types of management
• Soils are **grouped into map units** for display purposes
Soil Map Units

• A soil map unit is a collection of areas defined and named the same in terms of their soil components (e.g., series) or miscellaneous areas or both
  – Fallsington sandy loam, 0 to 2% slopes
  – Marr-Dodon complex, 2 to 5% slopes

• Soil map units are the basic unit of a soil map

• Each soil map unit differs in some respect from all others in a survey area
Soil Map Units

- Each map unit has a unique symbol (numbers or letters) on the soil map
  - FaA
  - MnB
- "Mono-taxa" units are dominated by a single soil type
- "Multi-taxa" units include two or more main soil types
Which is a “Map Unit”?  

A Delineation

A collection of delineations named the same, a.k.a. a Map Unit
Soil Delineations

- Each individual area of soil on a map is a **delineation**
- Soil delineation boundaries are drawn wherever there is a **significant change** in the type of soil.
- Soil delineations typically relate to the **underlying landform** (e.g., floodplain, backslope, terrace)
Types of Map Units

• Consociations
  – Delineated areas are dominated by a *single soil component and similar soils*

• FaA  Fallsington sandy loam, 0 to 2% slopes
• CrC  Croom gravelly sandy loam, 5 to 10% slopes
Types of Map Units

• Complexes and Associations
  – Delineated areas consist of *two or more dissimilar components that occur in a consistent, repeating pattern*
  – Major components in a complex CAN NOT be separated at mapping scale
  – Major components in an association CAN be separated at mapping scale

• MnA Marr-Dodon complex, 2 to 5% slopes
• GbB Galestown-Urban land complex, 0 to 5% slopes
Types of Map Units

• Undifferentiated Groups
  – Delineated areas consist of *two or more soil components that are not related in a consistent, repeating pattern*
  – The overriding factor is often some factor that limits use and management (e.g., steepness, stoniness, flooding)

  • ZS Zekiah and Issue soils, frequently flooded
  • HZE Howell and Dodon soils, 15 to 25% slopes
Working with Multi-Taxa Map Units

• In older soil surveys, interpretations were given for each map unit based on the ‘most limiting’ interpretation or the dominant component.

• NASIS now provides properties and interpretations for each component in a map unit, along with % composition.

• User may decide how to aggregate the data:
  – dominant condition, dominant component, most limiting, least limiting, weighted average.

• Web Soil Survey and Soil Data Viewer contain tools to help users analyze data.
Mapping Scale

- Scale depends on the intricacy of the soil pattern in relation to the expected intensity of land use
  - It may not be necessary to delineate complex soil patterns in areas of low intensity land use
- Most modern surveys are conducted at scales of 1:24,000 or 1:12,000
- The amount of detail displayed on a soil map is limited by the legibility of that map at publication scale
  - As map scale decreases, minimum delineation size increases
Mapping Scale

- Minimum delineation size for many MD surveys is ~1.4 acres
  - Areas smaller than this will not be delineated
  - Larger soil delineations may contain areas of soil that are quite different than the named soil map unit (dissimilar soils)

- Care must be taken when viewing or using these maps at scales larger than the mapping scale
  - Line placement may not be accurate at larger scales
  - Mapping concepts reflect the mapping scale; additional complexity visible at larger scales is not accounted for
Reporting Problems with Soil Survey Data

• Send an email to the State Soil Scientist
  – Include the location, a description of the problem, and if possible, a map

• The State Soil Scientist will forward problems to the appropriate MLRA Soil Survey Office
Official Soil Survey Data

• Digital soil data ("SSURGO") warehoused on NRCS’s Soil Data Mart is the official source of soil survey data

• Data stored on the Soil Data Mart *supersedes* all other sources of soil survey information

• Where digital soil survey data does not exist, the most recent hard copy publication contains the official soil survey data
Web Soil Survey

• Web Soil Survey is the National Cooperative Soil Survey’s principal data exploration and delivery tool.

• Web Soil Survey has replaced traditional hard copy publications as the primary means of distributing soil survey data.

http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm
Why Use Web Soil Survey?

• Immediate access to the most up-to-date soil data…**WSS is NEVER out of date!**

• Develop **custom reports** that address specific soil questions or concerns
  – for a soil survey area
  – for a specific property (< 10,000 acres) or “Area of Interest”

• Reduce publication and storage costs

• Reduce environmental impact
Requirements for Running WSS

- **Display Resolution**
  - 1024 x 768 or higher
  - Will work for resolutions as low as 800 x 600, but not optimal

- **JavaScript must be enabled**

- **Cookies**
  - Session Cookies required to maintain a WSS session
  - Persistent Cookies not required, but do allow you to save your WSS preferences

- **Popup Blocker should be configured to allow popups from this site**
Welcome to Web Soil Survey (WSS)

Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey (NCSS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation’s counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Three Basic Steps

1. Define.
   - Use the Area of Interest tab to define your area of interest.
   - Click to view larger image.

2. View/Explore.
   - Click the Soil Map tab to view or print a soil map, or click the Soil Data Explorer tab to access soil data for your area and determine the suitability of the soils for a particular use. The items you want saved in a report can be
Basic Steps

• Define your *Area of Interest* (AOI)
• View and/or print your *Soil Map*
• Explore your *Soils Information* (map, tables, reports)
• Add to *Free Shopping Cart and Check Out*
Web Soil Survey Functions

Quick Navigation

Navigate By...
- Address
- State and County
- Soil Survey Area
- Latitude and Longitude
- PLSS (Section, Township, Range)
- Bureau of Land Management
- Department of Defense
- Forest Service
- National Park Service
- Hydrologic Unit

Area of Interest Interactive Map

View Extent: Continental U.S.

Scale: (not to scale)
Navigate to an Area of Interest (AOI)

10 different ways to find a location
Zoom to a Location or Region
1. Define the Area of Interest (AOI)
Draw the AOI

Creating AOI...
View and Label the AOI

Area of Interest Interactive Map

View Extent: Contiguous U.S.

Legend:

- Use Soil Survey Area Map Unit Symbols
- Use National Map Unit Symbols

AOI Information

Name: Baden Fire House Area
Area (acres): 96.7

Map Unit Symbols:

Soil Data Available from Web Soil Survey

Prince George's County, Maryland (MD033)

- Soil Maps: Version 7, Dec 16, 2009
- Soil Data: Version 3, Dec 16, 2009
2. Create and View a Soil Map
Click on a map unit in the legend for a description.
3. **Print a Soil Map**
Explore and Analyze Soil Data with WSS Soil Data Explorer

– Learn the terminology and concepts associated with soils, soil interpretations, and land uses
– Create maps and reports of soil interpretations and properties
– Minimal learning curve and hardware requirements
4. Explore Soil Data
Introduction to Soils

Viewing Topics

A Table of Contents appears in the navigation panel to the left.

- Click an item in the Table of Contents to make it the active topic and view its content.
- To view an entire section, click the name of the section that contains the topics you want to view.

Saving or Printing Topics

Choose the topics you want to view, so they appear in the view panel, and then click Create Printable Document.
Determine Appropriate Uses for a Soil

Generate maps that show what kinds of soils are suitable for specific land uses.

• Approximately 80 interpretations
Land Capability Class Map

[Map Image]
Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects.

Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are included in this data set.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, or some other noncrop purposes.

Class 6 soils are those that are acceptable for agriculture but are too limited to be used extensively.

Class 7 soils are somewhat limited but can be used with a moderate amount of improvement or management.

Class 8 soils are those that are not suitable for any agricultural purposes.
• Approximately 46 reports
Soil Erosion Factors

- K Factor, Rock Free
- K Factor, Whole Soil
- T Factor
- Wind Erodibility Group
- Wind Erodibility Index

Soil Physical Properties
- Soil Qualities and Features
- Water Features
Soil Erosion Factors
Kw: Surface Horizon
Kw: Surface Horizon

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

**Rating Options — K Factor, Whole Soil**

- **Aggregation Method**: Dominant Component
- **Component Percent Cutoff**: None Specified
- **Tie-break Rule**: Higher
- **Layer Options**: Surface Layer

<table>
<thead>
<tr>
<th>Layer Options</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LQA</td>
<td>37</td>
<td>3.2</td>
<td>3.3%</td>
</tr>
<tr>
<td>Pk</td>
<td>26</td>
<td>0.1</td>
<td>0.1%</td>
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<tr>
<td>Totals for Area of Interest</td>
<td>96.7</td>
<td>100.0%</td>
<td></td>
</tr>
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</table>
Soil Properties and Qualities

Available Water Supply 0-100 cm
## Soil Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Water Capacity</td>
</tr>
<tr>
<td>Available Water Supply, 0 to 100 cm</td>
</tr>
<tr>
<td>Available Water Supply, 0 to 150 cm</td>
</tr>
<tr>
<td>Available Water Supply, 0 to 25 cm</td>
</tr>
<tr>
<td>Available Water Supply, 0 to 50 cm</td>
</tr>
<tr>
<td>Bulk Density, 15 Bar</td>
</tr>
<tr>
<td>Bulk Density, One-Tenth Bar</td>
</tr>
<tr>
<td>Bulk Density, One-Third Bar</td>
</tr>
<tr>
<td>Linear Extensibility</td>
</tr>
<tr>
<td>Liquid Limit</td>
</tr>
<tr>
<td>Organic Matter</td>
</tr>
<tr>
<td>Percent Clay</td>
</tr>
<tr>
<td>Percent Sand</td>
</tr>
<tr>
<td>Percent Silt</td>
</tr>
<tr>
<td>Plasticity Index</td>
</tr>
<tr>
<td>Saturated Hydraulic Conductivity (Ksat)</td>
</tr>
<tr>
<td>Saturated Hydraulic Conductivity (Ksat), Standard Classes</td>
</tr>
<tr>
<td>Surface Texture</td>
</tr>
<tr>
<td>Water Content, 15 Bar</td>
</tr>
<tr>
<td>Water Content, One-Third Bar</td>
</tr>
</tbody>
</table>
# Soil Qualities and Features

<table>
<thead>
<tr>
<th>Soil Qualities and Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO Group Classification (Surface)</td>
</tr>
<tr>
<td>Depth to a Selected Soil Restrictive Layer</td>
</tr>
<tr>
<td>Depth to Any Soil Restrictive Layer</td>
</tr>
<tr>
<td>Drainage Class</td>
</tr>
<tr>
<td>Frost Action</td>
</tr>
<tr>
<td>Frost-Free Days</td>
</tr>
<tr>
<td>Hydrologic Soil Group</td>
</tr>
<tr>
<td>Map Unit Name</td>
</tr>
<tr>
<td>Parent Material Name</td>
</tr>
<tr>
<td>Representative Slope</td>
</tr>
<tr>
<td>Unified Soil Classification (Surface)</td>
</tr>
</tbody>
</table>
View Soil Reports

Approximately 40 reports
Soil Erosion Reports

Prince George’s County, Maryland

<table>
<thead>
<tr>
<th>Map symbol and soil name</th>
<th>% of map unit</th>
<th>Hydrologic group</th>
<th>Kf</th>
<th>T factor</th>
<th>Representative value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ApA—Aquasco silt loam, 0 to 2 percent slopes, occasionally ponded</td>
<td>90</td>
<td>C</td>
<td>.37</td>
<td>4</td>
<td>15.9 60.7 15.4</td>
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<tr>
<td>Aquasco</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bsh—Beltsville silt loam, 0 to 2 percent slopes</td>
<td>75</td>
<td>C</td>
<td>.37</td>
<td>4</td>
<td>40.6 51.5 7.9</td>
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<tr>
<td>Beltsville</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bsb—Beltsville silt loam, 2 to 5 percent slopes</td>
<td>70</td>
<td>C</td>
<td>.37</td>
<td>4</td>
<td>40.6 51.5 7.9</td>
</tr>
<tr>
<td>Beltsville</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bsc—Beltsville silt loam, 5 to 10 percent slopes</td>
<td>70</td>
<td>C</td>
<td>.37</td>
<td>4</td>
<td>40.6 51.5 7.9</td>
</tr>
<tr>
<td>Beltsville</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GgA—Grovetown gravelly silt loam, 2 to 5 percent slopes</td>
<td>90</td>
<td>B</td>
<td>.37</td>
<td>4</td>
<td>23.7 64.2 12.1</td>
</tr>
<tr>
<td>Grovetown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GgC—Grovetown gravelly silt loam, 5 to 10 percent slopes</td>
<td>90</td>
<td>B</td>
<td>.37</td>
<td>4</td>
<td>23.7 64.2 12.1</td>
</tr>
<tr>
<td>Grovetown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LQA—Lenni and Quindesqua soils, 0 to 2 percent slopes</td>
<td>50</td>
<td>D</td>
<td>.37</td>
<td>3</td>
<td>24.0 60.6 15.4</td>
</tr>
<tr>
<td>Lenni, undrained</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quindesqua, undrained</td>
<td>30</td>
<td>C/D</td>
<td>.02</td>
<td>5</td>
<td>0.0 0.0 1.0</td>
</tr>
<tr>
<td>Po—Potomac-Essex complex, frequently flooded</td>
<td>70</td>
<td>D</td>
<td>.28</td>
<td>5</td>
<td>24.7 42.8 22.3</td>
</tr>
<tr>
<td>Potomac</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Issue</td>
<td>25</td>
<td>C</td>
<td>.37</td>
<td>5</td>
<td>24.0 60.6 15.4</td>
</tr>
</tbody>
</table>
Create a Printable Report

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factor K, for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the surface horizon.

Report—RUSLE2 Related Attributes

<table>
<thead>
<tr>
<th>Map UNIT symbol and soil name</th>
<th>Hydraulically active</th>
<th>Kf</th>
<th>T factor</th>
<th>Representative value %</th>
<th>% Sandy</th>
<th>% Silty</th>
<th>% Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>A—Agricultural, low, 3% to 12% percent slope, occasionally flooded</td>
<td>96 C</td>
<td>3F</td>
<td>5</td>
<td>15.5 90.7 15.9</td>
<td>79</td>
<td>15.6</td>
<td>79</td>
</tr>
<tr>
<td>B—B-2 field, low, 3% to 12% percent slope</td>
<td>75 C</td>
<td>3F</td>
<td>4</td>
<td>40.9 51.5 79</td>
<td>78</td>
<td>61.3</td>
<td>78</td>
</tr>
<tr>
<td>B—B-2 field, low, 3% to 12% percent slope</td>
<td>75 C</td>
<td>3F</td>
<td>4</td>
<td>40.9 51.5 79</td>
<td>78</td>
<td>61.3</td>
<td>78</td>
</tr>
<tr>
<td>D—D-2 field, low, 3% to 12% percent slope</td>
<td>75 C</td>
<td>3F</td>
<td>4</td>
<td>40.9 51.5 79</td>
<td>78</td>
<td>61.3</td>
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</tr>
<tr>
<td>D—D-2 field, low, 3% to 12% percent slope</td>
<td>75 C</td>
<td>3F</td>
<td>4</td>
<td>40.9 51.5 79</td>
<td>78</td>
<td>61.3</td>
<td>78</td>
</tr>
<tr>
<td>Gg—Grass/grass, low, 2% to 5% percent slope</td>
<td>03 D</td>
<td>3F</td>
<td>6</td>
<td>11.5 88.9 11.5</td>
<td>11.5</td>
<td>88.9</td>
<td>11.5</td>
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<tr>
<td>Gg—Grass/grass, low, 2% to 5% percent slope</td>
<td>03 D</td>
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<td>6</td>
<td>11.5 88.9 11.5</td>
<td>11.5</td>
<td>88.9</td>
<td>11.5</td>
</tr>
</tbody>
</table>

NRCS National Resources Conservation Service
Web Soil Survey National Cooperative Soil Survey
Page 1 of 2
5. Build Your Own Soil Survey
Add Content to Shopping Cart
Parts of a Custom Soil Survey

Title
- Custom Soil Resource Report for Prince George's County, Maryland

Subtitle
- Area of Interest Name: "Baden Fire House Area"
- Custom Subtitle: None

Size
- Total Size: 964 KB (0.9 MB)

Map Options
- Map Scale: Automatic
- Printed Sheet Size: A (8.5" x 11") — 1 sheet
- Show UTM Coordinate Ticks: Yes

Table of Contents
- Custom Soil Resource Report for Prince George's County, Maryland: Baden Fire House Area
  - Cover: 518 KB
  - Preface: 3 KB
  - Contents: 0 KB
  - How Soil Surveys Are Made: 5 KB
  - Soil Map: 427 KB
    - Soil Map: 374 KB
    - Map Unit Legend: 4 KB
    - Map Unit Description: 50 KB
  - Soil Data Explorer: 7 KB
    - All Uses: 7 KB
      - Soil Reports: 7 KB
        - Soil Erosion: 7 KB
          - RUSLE2 Related Attributes: 7 KB
    - References: 3 KB
    - Glossary: 113 KB
My Soil Survey...
6. Download SSURGO Soil Data

- Download SSURGO data just for your area of interest
Coming Soon…

- In the next release of WSS (sometime this spring), users will be able to save, export, and import Area of Interest boundaries in shapefile format
- In a subsequent release, the AOI size limit will be increased to 40,000 acres
Questions?