

Creating Soil Maps and Rasters

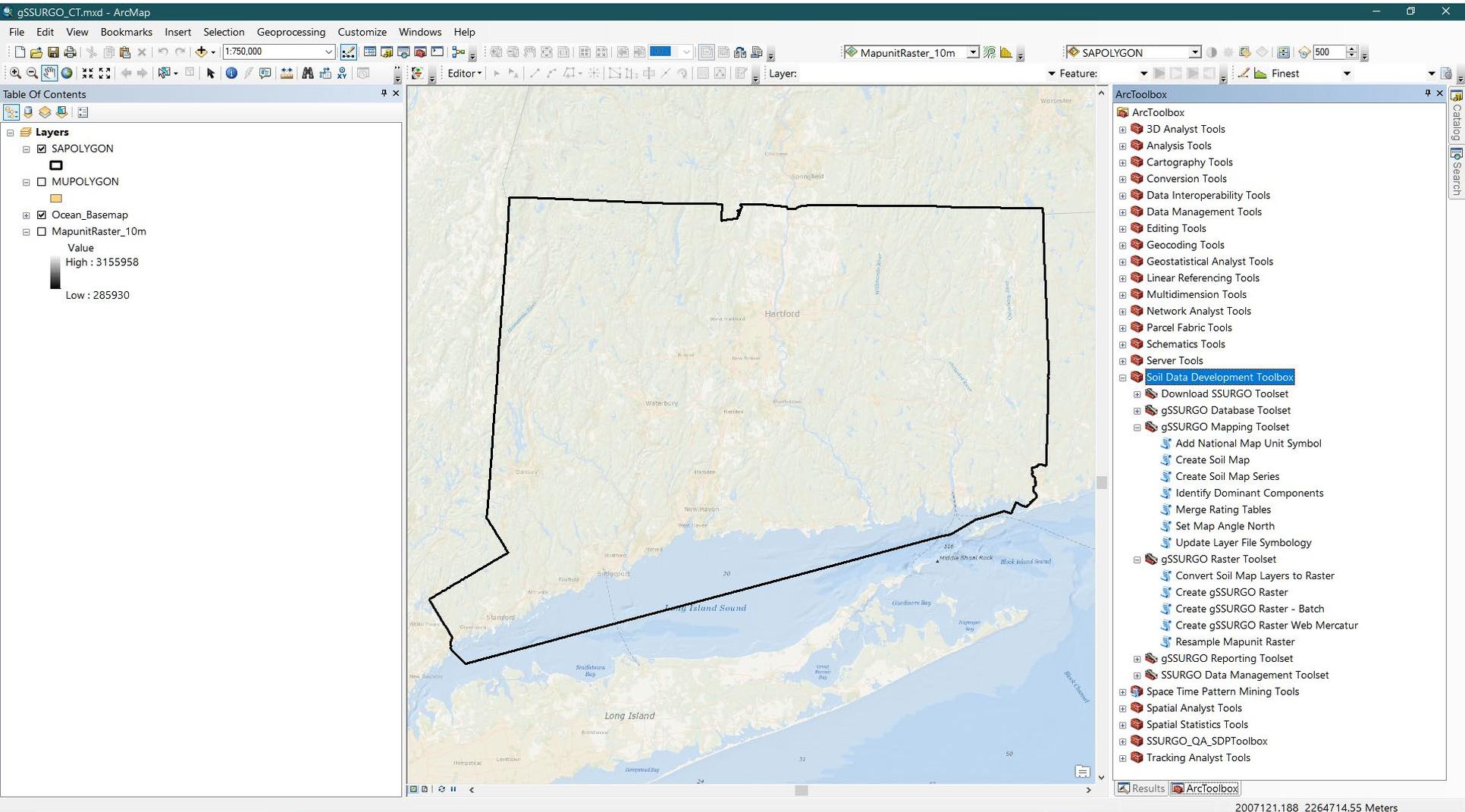
(Using the Soil Data Development Toolbox)

Individual Tools:

1. [Add National Map Unit Symbol](#)
2. [Create Soil Map](#)
3. [Create Soil Map Series](#)
4. [Identify Dominant Components](#)
5. [List Available Soil Maps](#)
6. [Merge Rating Tables](#)
7. [Update Layer File Symbology](#)
8. [Convert Soil Map Layers to Raster](#)

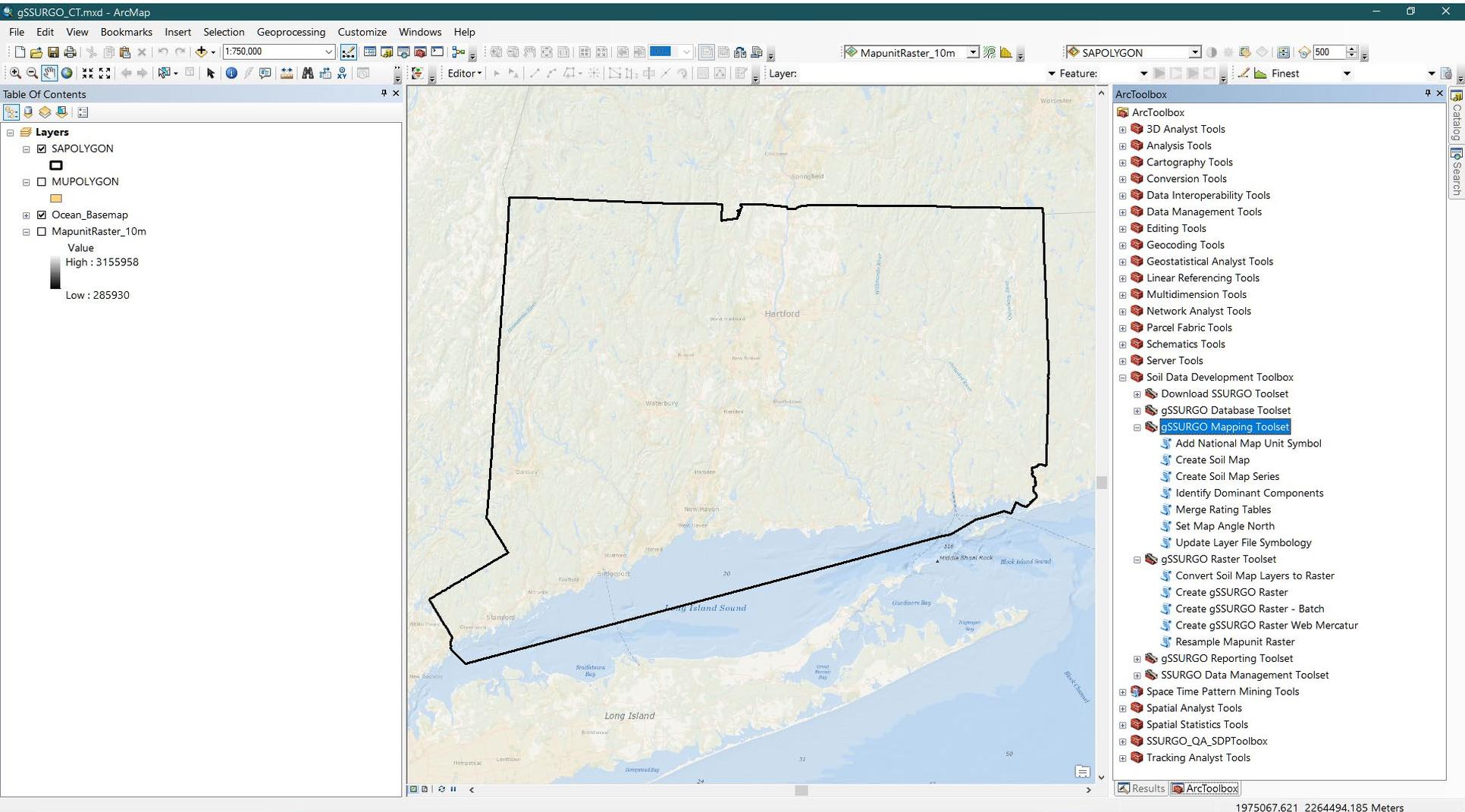
Note! All tools include Tool Help on the right side.

Soil Data Development Toolbox for ArcGIS Desktop



The following slides demonstrate the use of the **Soil Data Development Toolbox** in the creation of soil map layers and soil property rasters from the gSSURGO database for Connecticut.

gSSURGO Mapping Toolset



The **gSSURGO Mapping** toolset consists of several related tools, each with a specific function. These tools are described in the slides that follow. All of the tools described are members of this toolset with the exception of the **Convert Soil Map Layers to Raster** tool.

1. Add National Map Unit Symbol

The national map unit symbol is a label attribute that may be useful with large scale soil maps when the user is interested in seeing which soil map units continue across survey boundaries. Please be aware that a performance penalty will be incurred by adding this data to any of the spatial layers.

This attribute data is actually requested at runtime from the online Soil Data Access service, so input soils layer must have an attribute table containing MUSYM and MUKEY columns and they must be populated with the same vintage data that is hosted on Web Soil Survey. Older versions of data may not match the MUKEYs in Web Soil Survey and assign a NULL value for the national map unit symbol.

2. Create Soil Map

This is an ArcMap tool for creating soil maps using gSSURGO. The purpose is to create soil property or soil interpretation maps based on gSSURGO file geodatabases. The tool automatically handles all joins and table relationships and will create a complete soil map layer with all necessary map legend/symbology settings and metadata. Functionality is very similar to that of the Soil Data Viewer AddIn for use with SSURGO data (shapefiles and MS Access database).

There are two versions of this tool. The first tool creates a single map layer and allows the user full control over all settings. The second, batch-mode tool uses default settings to automatically create multiple maps.

Please note....

Layer files may be overwritten when multiple gSSURGO databases are stored and used in the same folder. To prevent this from happening it is recommended that each database be stored in a separate subfolder.

2. Create Soil Map...

The screenshot displays the ArcMap interface with the following components:

- Table Of Contents:** Lists layers including SAPOLYGON, MUPOLYGON, Ocean_Basemap, and MapunitRaster_10m. A vertical legend for MapunitRaster_10m shows a value range from 285930 (Low) to 3155958 (High).
- Main Map Area:** Shows a topographic map of the Hartford, Connecticut area with a black outline defining a specific geographic region.
- ArcToolbox:** The 'Soil Data Development Toolset' is expanded, and the 'Create Soil Map' tool is highlighted in blue.
- Status Bar:** Displays the text 'Soil Data Viewer type mapping tool for gSSURGO' and coordinates '1990311.677 2320650.232 Meters'.

The **Create Soil Map** tool creates soil maps in a similar manner as Soil Data Viewer or Web Soil Survey. Parameter choice lists can vary between gSSURGO databases, depending on what type of soil property or interpretation the user selects.

Map Unit Layer

MUPOLYGON

SDV Folder

Soil Chemical Properties

SDV Attribute

pH (1 to 1 Water)

Aggregation Method

Dominant Component

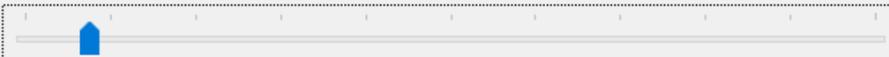
Primary Constraint (optional)

Secondary Constraint (optional)

Top Depth (cm)

 
0 200

Bottom Depth

 
0 200

Beginning Month (optional)

Ending Month (optional)

Tie Break Rule (optional)

Higher

 Interpret Nulls as Zero

Component Percent Cutoff (optional)

 Map Interp Fuzzy Values Include Null Values

Use Property Values

Representative

 Exclude State Interps

Message (optional)

Bottom Depth

Bottom depth (cm) for horizon calculations. Value must be set to 1 (one) or greater.

A red error flag will be displayed until the bottom depth is set properly.

OK

Cancel

Environments...

<< Hide Help

Tool Help

2. Create Soil Map...



The tool console messages include information that the user should make note of. The layer file (.lyr) can be used to add this map layer to other ArcMap documents. All symbology and the layer documentation including the soil property or interpretation narrative description and the aggregation settings are stored in the layer file. No actual data is stored in the .lyr file.

2. Create Soil Map...

The screenshot shows the ArcMap interface with the following components:

- Table of Contents:**
 - Layers
 - SAPOLYGON
 - pH (1 to 1 Water) DCP, 0 to 15cm
 - SDV_pHwater_DCP_0to15.pHwater_DCP
 - Ultra acid (pH < 3.5)
 - Extremely acid (pH 3.5 - 4.4)
 - Very strongly acid (pH 4.5 - 5.0)
 - Strongly acid (pH 5.1 - 5.5)
 - Moderately acid (pH 5.6 - 6.0)
 - Slightly acid (pH 6.1 - 6.5)
 - Neutral (pH 6.6 - 7.3)
 - Slightly alkaline (pH 7.4 - 7.8)
 - Moderately alkaline (pH 7.9 - 8.4)
 - Strongly alkaline (pH 8.5 - 9.0)
 - Very strongly alkaline (pH > 9.0)
 - MUPOLYGON
 - Ocean_Basemap
 - MapunitRaster_10m
 - Value
 - High : 3155958
 - Low : 285930

- ArcToolbox:**
- Soil Data Development Toolset
 - gSSURGO Database Toolset
 - Check gSSURGO
 - Check gSSURGO Attribute Data
 - Check gSSURGO Inventory
 - Clip Soils by Polygon
 - Create gSSURGO DB - Custom Tiled
 - Create gSSURGO DB - State Tiled
 - Create gSSURGO DB by Map
 - Create gSSURGO Valu Table
 - gSSURGO Mapping Toolset
 - Add National Map Unit Symbol
 - Create Soil Map
 - Create Soil Map Series
 - Identify Dominant Components
 - Merge Rating Tables
 - Set Map Angle North
 - Update Layer File Symbology
 - gSSURGO Raster Toolset
 - gSSURGO Reporting Toolset
 - SSURGO Data Management Toolset

This is the output map layer generated by the **Create Soil Map** tool. Each layer is created with a legend, description and credits that can be viewed on the layer properties dialog.

The 'Create Soil Map' tool has 16 parameters which is partly due to the complexity of the database. Many of these parameters may be enabled or disabled, depending upon choices made above. Disabled parameters will be grayed-out.

Parameters will have a default setting which normally does not be changed unless the user has a specific reason for doing so.

Create Soil Map

Soil Data Viewer-type mapping tool for gSSURGO. The purpose is to create soil property or soil interpretation maps using gSSURGO file geodatabases.

Warning. Creating several maps with the same parameters can result in map layers being overwritten.

Map Unit Layer
MUPOLYGON

SDV Folder

SDV Attribute

Aggregation Method

Primary Constraint (optional)

Secondary Constraint (optional)

Top Depth
0 0 200

Bottom Depth
0 0 200

Beginning Month (optional)

Ending Month (optional)

Tie Break Rule (optional)

Treat Null Values as Zero

Component Percent Cutoff (optional)

Map Interp Fuzzy Values

Include Null Values

Use Property Values
Representative

OK Cancel Environments... << Hide Help Tool Help



If a single soil polygon layer containing MUKEY is found in the ArcMap table of contents (TOC), that layer will be automatically selected in the first parameter.

If multiple soil polygon layers are present, the user will have to choose from the drop down menu.

Create Soil Map

Map Unit Layer
MUPOLYGON

SDV Folder

SDV Attribute

Aggregation Method

Primary Constraint (optional)

Secondary Constraint (optional)

Top Depth
0 0 200

Bottom Depth
0 0 200

Beginning Month (optional)

Ending Month (optional)

Tie Break Rule (optional)

Treat Null Values as Zero

Component Percent Cutoff (optional)

Map Interp Fuzzy Values

Include Null Values

Use Property Values
Representative

Create Soil Map

Soil Data Viewer-type mapping tool for gSSURGO. The purpose is to create soil property or soil interpretation maps using gSSURGO file geodatabases.

Warning. Creating several maps with the same parameters can result in map layers being overwritten.

OK Cancel Environments... << Hide Help Tool Help



The 'SDV Folder' parameter has at least 17 different choices. The 'Wildlife Management' choice may not be always be used.

Create Soil Map

Map Unit Layer
MUPOLYGON

SDV Folder
Soil Physical Properties

- Building Site Development
- Construction Materials
- Disaster Recovery Planning
- Land Classifications
- Land Management
- Military Operations
- Recreational Development
- Sanitary Facilities
- Soil Chemical Properties
- Soil Erosion Factors
- Soil Health
- Soil Physical Properties
- Soil Qualities and Features
- Vegetative Productivity
- Waste Management
- Water Features
- Water Management
- Wildlife Management
- Bottom Depur

0 0 200

Beginning Month (optional)

Ending Month (optional)

Tie Break Rule (optional)

Treat Null Values as Zero

Component Percent Cutoff (optional)

Map Interp Fuzzy Values

Include Null Values

Use Property Values
Representative

SDV Folder

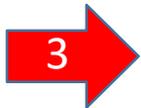
Top level category of soil properties or interpretations.

Examples:

- Building Site Development
- Land Management
- Soil Physical Properties

These choices are obtained from the gSSURGO database. They are not hard coded.

OK Cancel Environments... << Hide Help Tool Help



The 'SDV Attribute' parameter is dependent on the previous selection made for 'SDV Folder'.

In all, there can be over 150 possible selections for soil properties or interpretations, not including custom state versions.

Create Soil Map

Click error and warning icons for more information

Map Unit Layer: MUPOLYGON

SDV Folder: Soil Physical Properties

SDV Attribute: Percent Sand

- Available Water Capacity
- Available Water Storage
- Available Water Supply, 0 to 100 cm
- Available Water Supply, 0 to 150 cm
- Available Water Supply, 0 to 25 cm
- Available Water Supply, 0 to 50 cm
- Bulk Density, 15 Bar
- Bulk Density, One-Tenth Bar
- Bulk Density, One-Third Bar
- Linear Extensibility
- Liquid Limit
- Organic Matter
- Percent Clay
- Percent Sand
- Percent Silt
- Plasticity Index
- Saturated Hydraulic Conductivity (Ksat)
- Saturated Hydraulic Conductivity (Ksat), Standard Classes
- Surface Texture
- Water Content, 15 Bar
- Water Content, One-Third Bar

Beginning Month (optional):

Ending Month (optional):

Tie Break Rule (optional): Higher

Treat Null Values as Zero

Component Percent Cutoff (optional):

Map Interp Fuzzy Values

Include Null Values

Use Property Values

SDV Attribute

Specific soil property or interpretations to be mapped. Examples include "Corrosion of Concrete", "Available Water Capacity", "

These choices are obtained from the gSSURGO database at runtime.

OK Cancel Environments... << Hide Help Tool Help

As soon as the user chooses a horizon-level 'SDV Attribute' such as 'Percent Sand', the two parameters for horizon depth are automatically enabled.



A red 'X' is immediately displayed, letting the user know that they must set the top and bottom depths before the tool can be executed.

Create Soil Map

Click error and warning icons for more information

Map Unit Layer: MUPOLYGON

SDV Folder: Soil Physical Properties

SDV Attribute: Percent Sand

Aggregation Method: Dominant Component

Primary Constraint (optional):

Secondary Constraint (optional):

Top Depth: 0 (slider from 0 to 200)

Bottom Depth: 0 (slider from 0 to 200) [Red X icon]

Beginning Month (optional):

Ending Month (optional):

Tie Break Rule (optional): Higher

Treat Null Values as Zero

Component Percent Cutoff (optional):

Map Interp Fuzzy Values

Include Null Values

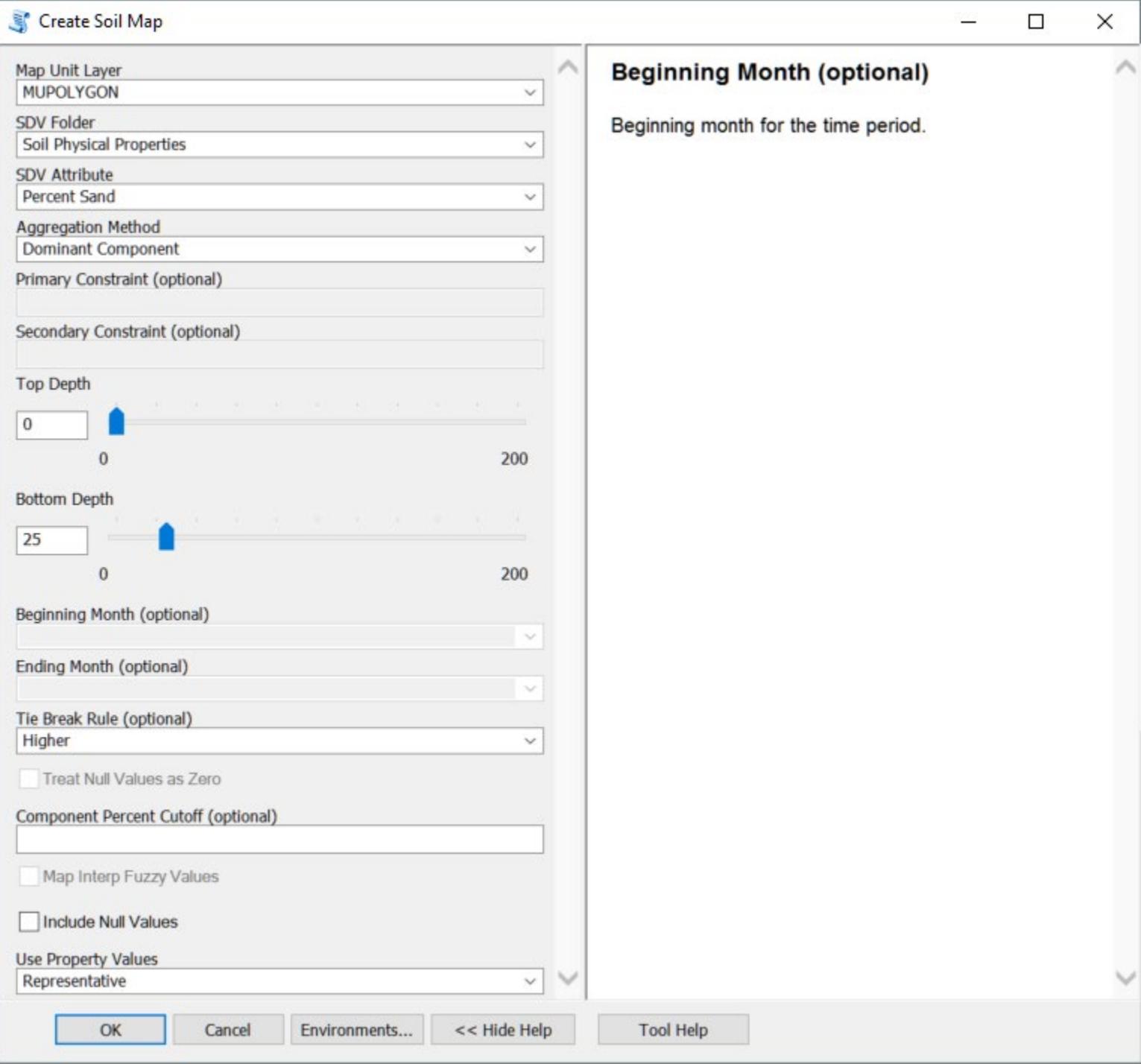
Use Property Values

SDV Attribute

Specific soil property or interpretations to be mapped. Examples include "Corrosion of Concrete", "Available Water Capacity", "

These choices are obtained from the gSSURGO database at runtime.

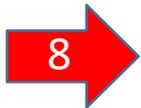
OK Cancel Environments... << Hide Help Tool Help



Top depth setting always defaults to the surface (0 centimeter). To only report properties for the surface horizon, set the top depth to 0 and bottom depth to 1 cm.



Inappropriate settings for top or bottom depth will result in an error. In this example, the top depth is set lower than the bottom depth.



Create Soil Map

Map Unit Layer: MUPOLYGON

SDV Folder: Soil Physical Properties

SDV Attribute: Percent Sand

Aggregation Method: Dominant Component

Primary Constraint (optional):

Secondary Constraint (optional):

Top Depth: 45 (range 0 to 200)

Bottom Depth: 1 (range 0 to 200)

Beginning Month (optional):

Ending Month (optional):

Tie Break Rule (optional): Higher

Treat Null Values as Zero

Component Percent Cutoff (optional):

Map Interp Fuzzy Values

Include Null Values

Use Property Values: Representative

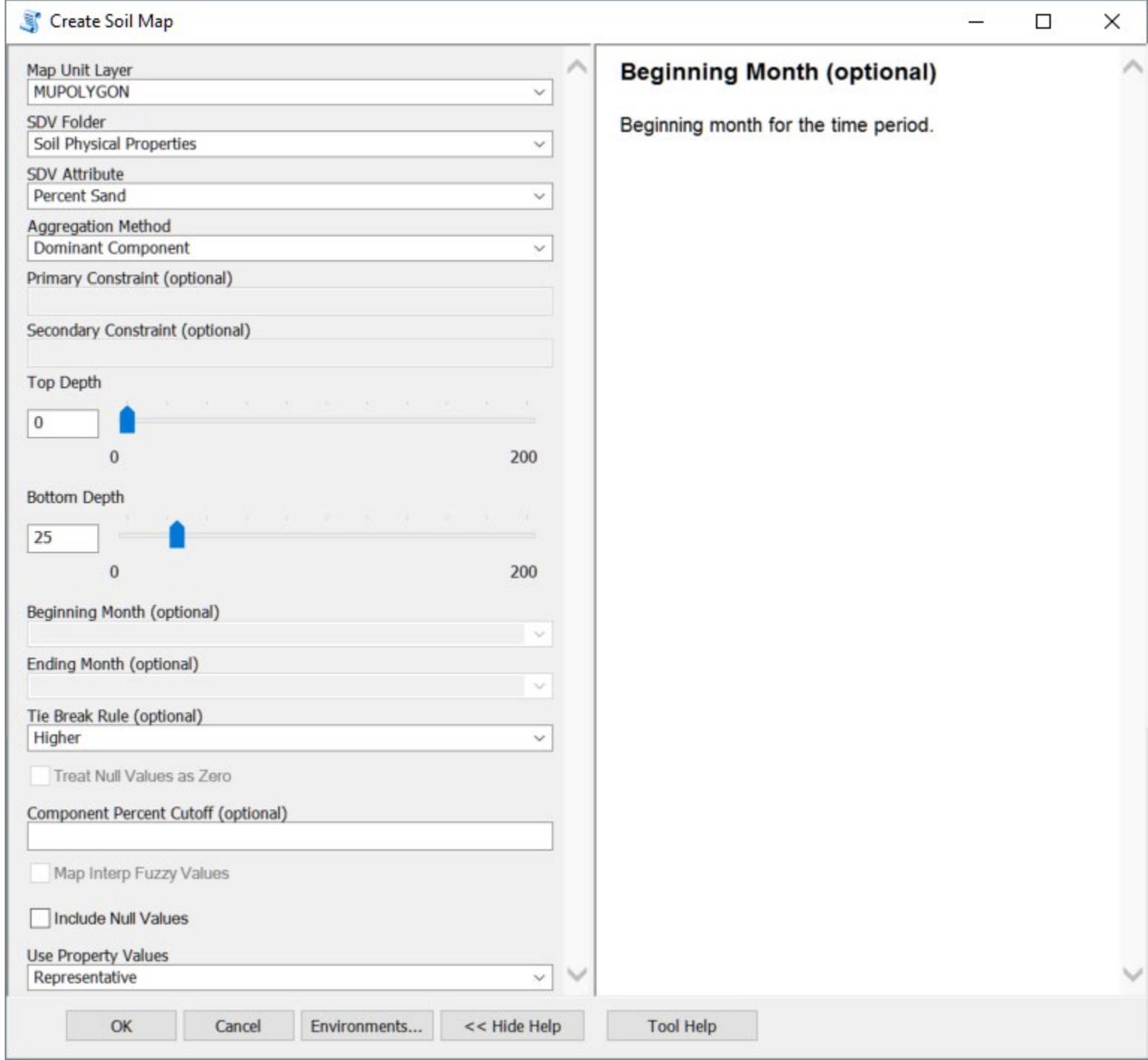
Create Soil Map

Soil Data Viewer-type mapping tool for gSSURGO. The purpose is to create soil property or soil interpretation maps using gSSURGO file geodatabases.

Warning. Creating several maps with the same parameters can result in map layers being overwritten.

ERROR .1
Top Depth cannot be greater than Bottom Depth

OK Cancel Environments... << Hide Help Tool Help



Map Unit Layer
MUPOLYGON

SDV Folder
Soil Physical Properties

SDV Attribute
Percent Sand

Aggregation Method
Dominant Component

Primary Constraint (optional)

Secondary Constraint (optional)

Top Depth
0 0 200

Bottom Depth
25 0 200

Beginning Month (optional)

Ending Month (optional)

Tie Break Rule (optional)
Higher

Treat Null Values as Zero

Component Percent Cutoff (optional)

Map Interp Fuzzy Values

Include Null Values

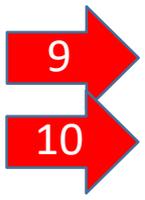
Use Property Values
Representative

Beginning Month (optional)

Beginning month for the time period.

OK Cancel Environments... << Hide Help Tool Help

For 'Percent Sand', the 'Beginning Month' and 'Ending Month' parameters have no application and are disabled.



Create Soil Map

Map Unit Layer
MUPOLYGON

SDV Folder
Soil Physical Properties

SDV Attribute
Percent Sand

Aggregation Method
Dominant Component

Primary Constraint (optional)

Secondary Constraint (optional)

Top Depth
0 0 200

Bottom Depth
25 0 200

Beginning Month (optional)

Ending Month (optional)

Tie Break Rule (optional)
Higher

Treat Null Values as Zero

Component Percent Cutoff (optional)

Map Interp Fuzzy Values

Include Null Values

Use Property Values
Representative

Tie Break Rule (optional)

Use to control which value or rating is selected when there is a tie in component percent for dominant component. Also used to control "Minimum or Maximum" aggregation method.

Currently, the final output table name does not incorporate the tiebreak method. This means that when the user creates a map based on the 'Lower' tiebreak method and then subsequently generates a map using the 'Higher' tiebreak method, the first table and map will be overwritten.

OK Cancel Environments... << Hide Help Tool Help

The Tie Break Rule controls which rating or property value is reported in case of a tie in component percent.



The Map Interp Fuzzy Values will create a soil map based upon fuzzy values rather than the rating class.



Create Soil Map

Map Unit Layer: MUPOLYGON

SDV Folder: Disaster Recovery Planning

SDV Attribute: Catastrophic Mortality, Large Animal Disposal, Pit

Aggregation Method: Weighted Average

Primary Constraint (optional):

Secondary Constraint (optional):

Top Depth: 0 to 200

Bottom Depth: 0 to 200

Beginning Month (optional):

Ending Month (optional):

Tie Break Rule (optional): Higher

Treat Null Values as Zero

Component Percent Cutoff (optional):

Map Interp Fuzzy Values

Include Null Values

Use Property Values: Representative

Map Interp Fuzzy Values

Map soil interpretations using the weighted average fuzzy value (0.00 -> 1.00) for the map unit rather than the rating class (No limitation, Somewhat limited, etc).

The 'Very limited' class would have a fuzzy value of 1.0

The 'Not limited' class would have a fuzzy value of 0

OK Cancel Environments... << Hide Help Tool Help

The 'Include Null Values' parameter controls how null values in certain numeric soil properties are handled. When checked, null values will be converted to zeros in the aggregation calculation.



Create Soil Map

Map Unit Layer
MUPOLYGON

SDV Folder
Soil Physical Properties

SDV Attribute
Percent Sand

Aggregation Method
Dominant Component

Primary Constraint (optional)

Secondary Constraint (optional)

Top Depth
0 0 200

Bottom Depth
25 0 200

Beginning Month (optional)

Ending Month (optional)

Tie Break Rule (optional)
Higher

Treat Null Values as Zero

Component Percent Cutoff (optional)

Map Interp Fuzzy Values

Include Null Values

Use Property Values
Representative

Include Null Values
Check this box to include NULL rating values

OK Cancel Environments... << Hide Help Tool Help

2. Create Soil Map...

The screenshot displays the ArcMap interface with the following components:

- Table of Contents:**
 - SAPOLYGON
 - pH (1 to 1 Water) DCP, 0 to 15cm
 - SDV_pHwater_DCP_0to15.pHwater_DCP
 - Ultra acid (pH < 3.5)
 - Extremely acid (pH 3.5 - 4.4)
 - Very strongly acid (pH 4.5 - 5.0)
 - Strongly acid (pH 5.1 - 5.5)
 - Moderately acid (pH 5.6 - 6.0)
 - Slightly acid (pH 6.1 - 6.5)
 - Neutral (pH 6.6 - 7.3)
 - Slightly alkaline (pH 7.4 - 7.8)
 - Moderately alkaline (pH 7.9 - 8.4)
 - Strongly alkaline (pH 8.5 - 9.0)
 - Very strongly alkaline (pH > 9.0)
 - MUPOLYGON
 - Ocean_Basemap
 - MapunitRaster_10m
 - Value
 - High : 3155958
 - Low : 285930

- ArcToolbox:**
- Convert Soil Map Layers to Raster (highlighted)
- Create gSSURGO Raster
- Create gSSURGO Raster - Batch
- Create gSSURGO Raster Web Mercatur
- Resample Mapunit Raster

At the bottom of the window, a status bar reads: 2002172.381 2278001.083 Meters

Allows user to generate individual soil property rasters from a group of soil maps. The group of soil maps should be generated using the 'Create Soil Map Set' tool.

Each map layer is based upon the original input soils layer. The spatial data is not duplicated because this would require a lot of disk storage.

3. Create Soil Map Series

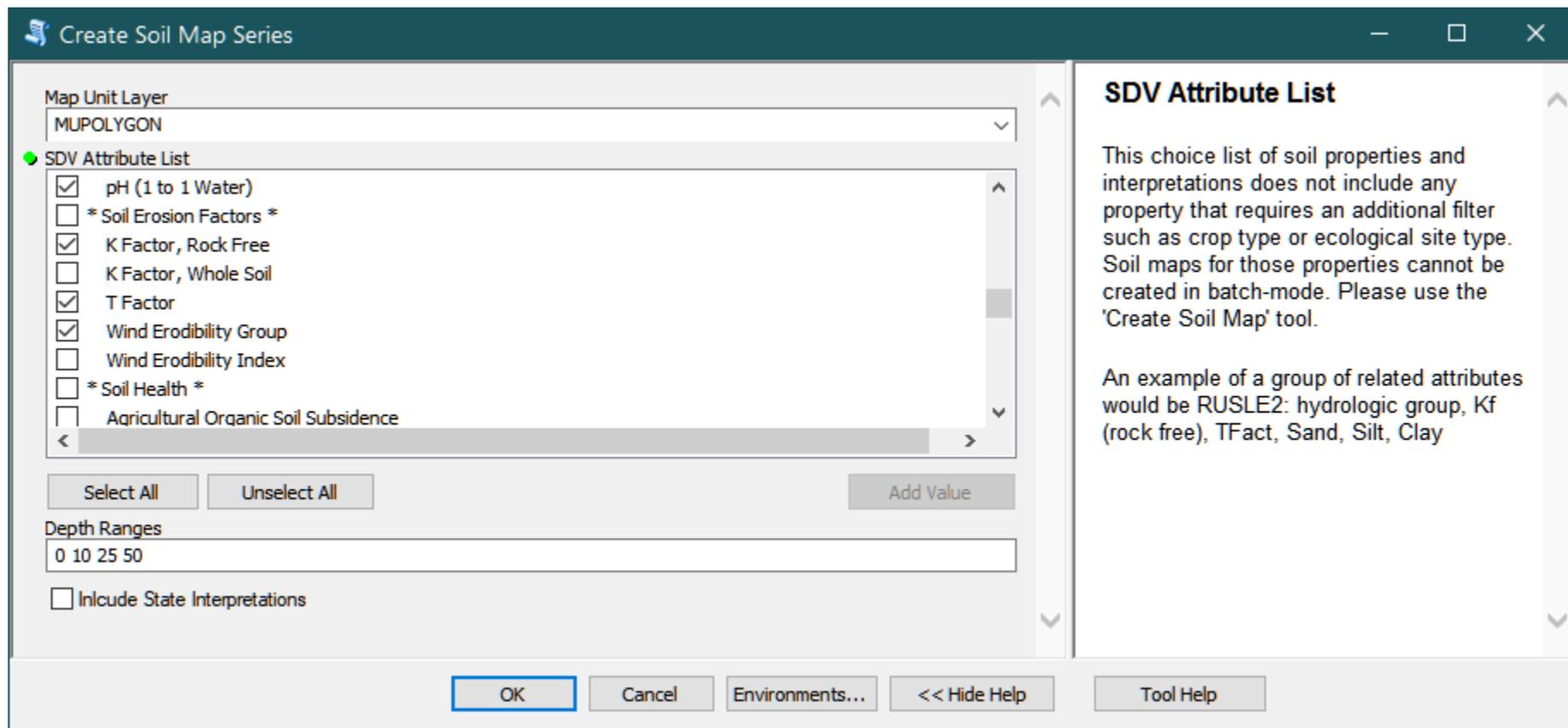
This version of the **Create Soil Map tool** can create multiple soil property or soil interpretation maps based on gSSURGO file geodatabases. Unlike the options available for the Create Soil Map tool, default settings will be used for each map in the series and will allow the user to specify a set of multiple horizon depths for certain properties.

Soil maps that require additional settings cannot be created using this tool because some of the parameters do not have default settings. Examples include 'Ecological Site Name', 'Yields of Irrigated Crops (Map Unit)'.

Please note....

Layer files may be overwritten when multiple gSSURGO databases are stored and used in the same folder. It is recommended that a separate subfolder be created for storing each database.

3. Create Soil Map Series...



The **Create Soil Map Series** tool allows the user to create a series of soil property or soil interpretation maps using a batch-mode process. Simply check the box next to each desired map layer. Multiple depth ranges can be specified for those properties based upon horizon-level data.

Aggregating rating information to the map unit level

Cancel

60%

<< Details

 Close this dialog when completed successfully

```
Executing: CreateSoilMapSeries MUPOLYGON ' Farmland Classification';' Hydric Rating by Map Unit';' National Commodity  
Crop Productivity Index';' Nonirrigated Capability Class';' pH (1 to 1 Water)';' K Factor, Rock Free';' T  
Factor';' Wind Erodibility Group' "0 10 25 50" false  
Start Time: Mon Oct 14 09:23:30 2019  
Running script CreateSoilMapSeries...
```

Creating a series of 10 soil maps (7 individual maps plus a series of 3 horizon-level property maps)

Creating map number 1: Farmland Classification

Preparing soil map layer...

Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\Farmland_Classification.lyr

Creating map number 2: Hydric Rating by Map Unit

Preparing soil map layer...

Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\Hydric_Rating_by_Map_Unit_PP.lyr

Creating map number 3: National Commodity Crop Productivity Index

Preparing soil map layer...

Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut

\National_Commodity_Crop_Productivity_Index_WTA.lyr

Creating map number 4: Nonirrigated Capability Class

Preparing soil map layer...

Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\Nonirrigated_Capability_Class_DCD.lyr

Creating map number 5: pH (1 to 1 Water) 25 to 50cm

Preparing soil map layer...

Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\pH_(1_to_1_Water)_DCP_25_to_50cm.lyr

Creating map number 6: pH (1 to 1 Water) 10 to 25cm

Preparing soil map layer...

Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\pH_(1_to_1_Water)_DCP_10_to_25cm.lyr

Creating map number 7: pH (1 to 1 Water) 0 to 10cm

Completed

Close

<< Details

 Close this dialog when completed successfully

```
Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut
\National_Commodity_Crop_Productivity_Index_WTA.lyr

Creating map number 4: Nonirrigated Capability Class
  Preparing soil map layer...
  Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\Nonirrigated_Capability_Class_DCD.lyr

Creating map number 5: pH (1 to 1 Water) 25 to 50cm
  Preparing soil map layer...
  Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\pH_(1_to_1_Water)_DCP_25_to_50cm.lyr

Creating map number 6: pH (1 to 1 Water) 10 to 25cm
  Preparing soil map layer...
  Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\pH_(1_to_1_Water)_DCP_10_to_25cm.lyr

Creating map number 7: pH (1 to 1 Water) 0 to 10cm
  Preparing soil map layer...
  Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\pH_(1_to_1_Water)_DCP_0_to_10cm.lyr

Creating map number 8: K Factor, Rock Free (surface)
  Preparing soil map layer...
  Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\K_Factor_Rock_Free_DCD_0_to_1cm.lyr

Creating map number 9: T Factor
  Preparing soil map layer...
  Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\T_Factor_DCD.lyr

Creating map number 10: Wind Erodibility Group
  Preparing soil map layer...
  Saved map to layer file: D:\Geodata\2020\SSURGO_2020\Test_gSSURGO\Connecticut\Wind_Erodibility_Group_DCD.lyr

CreateSoilMaps finished

Completed script CreateSoilMapSeries...
Succeeded at Mon Oct 14 09:27:23 2019 (Elapsed Time: 3 minutes 52 seconds)
```

3. Create Soil Map Series...

The screenshot shows the ArcMap interface with the following components:

- Table Of Contents:**
 - Wind Erodibility Group DCD
 - 1
 - 2
 - 3
 - 4
 - 4L
 - 5
 - 6
 - 7
 - 8
 - Null
 - T Factor DCD
 - 1
 - 2
 - 3
 - 4
 - 5
 - Null
 - K Factor, Rock Free DCD, 0 to 1cm
 - .02
 - .05
 - .10
 - .15
 - .17
 - .20
 - .24
 - .28
 - .32
 - .37
 - .43
 - .49
 - .55
 - .64
 - Null
 - pH (1 to 1 Water) DCP, 0 to 10cm
 - SDV_pHwater_DCP_0to10,pHwater_DCP
 - Ultra acid (pH < 3.5)
 - Extremely acid (pH 3.5 - 4.4)
 - Very strongly acid (pH 4.5 - 5.0)
 - Strongly acid (pH 5.1 - 5.5)
- ArcToolbox:**
 - Soil Data Development Toolset
 - Create Soil Map
 - Create Soil Map Series**
 - Identify Dominant Components
 - Merge Rating Tables
 - Set Map Angle North
 - Update Layer File Symbology
- Status Bar:** 1984397.565 2329605.831 Meters

[4. Convert Soil Map to Raster](#)

This is the only tool described in this document that is not a member of the **gSSURGO Mapping Toolset**. It is part of the **gSSURGO Raster Toolset**.

The MapunitRaster_10m or MapunitRaster_30m rasters that are part of the gSSURGO database are a very useful alternative to the MUPOLYGON (soil polygon) featureclass, especially when creating maps. The raster map layers display much more quickly than the polygon-based maps.

For analysis or raster modeling there are significant limitations with file geodatabase raster layers joined to attribute tables containing the soil property data. These rasters are still based upon the mapunit mukey value. Most raster tools won't recognize any attribute data contained within the joined table even though those data can be used to render the map.

This tool is designed to convert soil map layers to soil property rasters that can be more easily used in raster models. These rasters can be TIFF or file geodatabase rasters.

4. Convert Soil Map Layers to Raster...

Convert Soil Map Layers to Raster

Soil Map Layers

- pH (1 to 1 Water) DCP, 0 to 15cm

Select All Unselect All Add Value

Input gSSURGO Raster
MapunitRaster_10m

Output Folder (optional)
C:\Geodata\CT_Rasters

Cell Factor
3

Output Resolution
30

Build Pyramids

Input Resolution
10

Messages (optional)

Convert Soil Map Layers to Raster

Allows user to generate individual soil property rasters from a group of soil maps. The group of soil maps should be generated using one of the 'Create Soil Map' tools against the vector soil layer (MUPOLYGON)..

These rasters should be more suitable for use in modeling or analysis since the cell values are directly related to the soil property values. In the original gSSURGO raster, the cell value is actually the mukey (mapunit key) and most Spatial Analyst tools only work with the original cell value, not with data in a joined table.

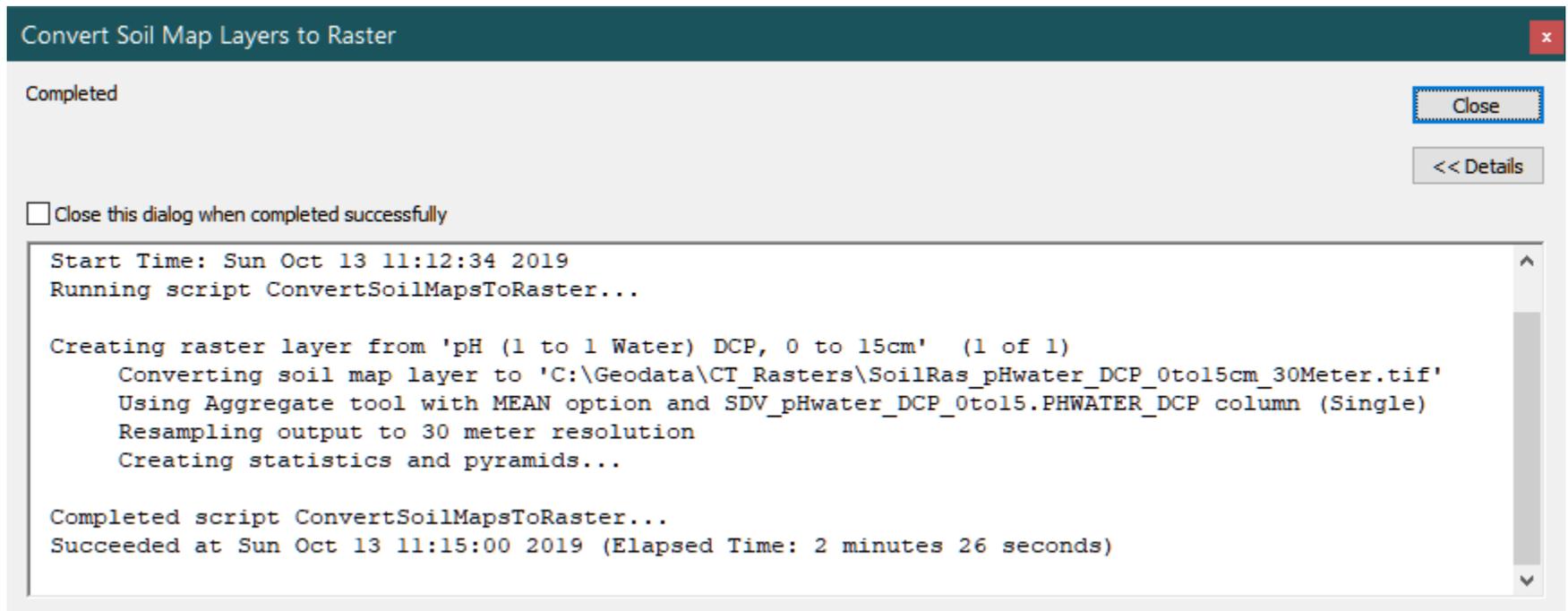
Please note that the process does not actually perform a polygon-to-raster conversion, it simply uses the attribute data from the selected soil map layer(s) and joins it to the existing gSSURGO raster to create a soil property raster.

2019-10-07

OK Cancel Environments... << Hide Help Tool Help

4. Convert Soil Map Layers to Raster...

Soil map layers are converted to either TIFF or file geodatabase rasters using different methods depending on what data types are being converted and whether resampling to a lower resolution is requested. Floating point data will be converted using MEAN and other data such as integer or text data will use MAJORITY.



4. Convert Soil Map Layers to Raster...

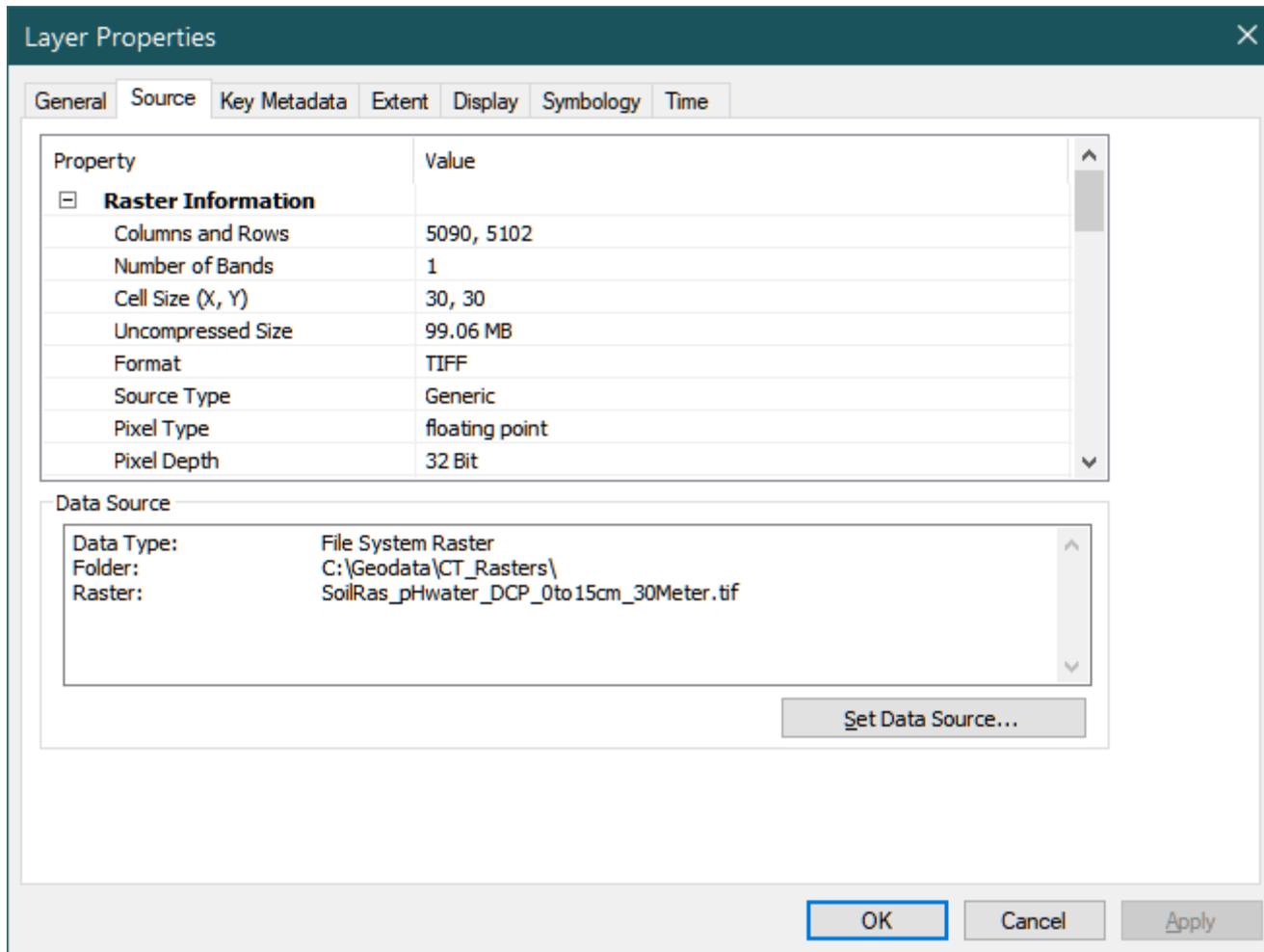
The screenshot displays the ArcMap interface with the following components:

- Table of Contents (Left):**
 - Layers
 - SAPOLYGON
 - RASTER SOIL MAP CONVERSIONS**
 - pH (1 to 1 Water) DCP, 0 to 15cm (30 meter raster) VALUE
 - Ultra acid (pH < 3.5)
 - Extremely acid (pH 3.5 - 4.4)
 - Very strongly acid (pH 4.5 - 5.0)
 - Strongly acid (pH 5.1 - 5.5)
 - Moderately acid (pH 5.6 - 6.0)
 - Slightly acid (pH 6.1 - 6.5)
 - Neutral (pH 6.6 - 7.3)
 - Slightly alkaline (pH 7.4 - 7.8)
 - Moderately alkaline (pH 7.9 - 8.4)
 - Strongly alkaline (pH 8.5 - 9.0)
 - Very strongly alkaline (pH > 9.0)
 - pH (1 to 1 Water) DCP, 0 to 15cm SDV_pHwater_DCP_0to15.pHwater_DCP
 - Ultra acid (pH < 3.5)
 - Extremely acid (pH 3.5 - 4.4)
 - Very strongly acid (pH 4.5 - 5.0)
 - Strongly acid (pH 5.1 - 5.5)
 - Moderately acid (pH 5.6 - 6.0)
 - Slightly acid (pH 6.1 - 6.5)
 - Neutral (pH 6.6 - 7.3)
 - Slightly alkaline (pH 7.4 - 7.8)
 - Moderately alkaline (pH 7.9 - 8.4)
 - Strongly alkaline (pH 8.5 - 9.0)
 - Very strongly alkaline (pH > 9.0)
 - MUPOLYGON
 - Ocean_Basemap
 - MapunitRaster_10m
 - Value
 - High : 3155958
 - Low : 285930

- ArcToolbox (Right):**
- ArcToolbox
 - 3D Analyst Tools
 - Analysis Tools
 - Cartography Tools
 - Conversion Tools
 - Data Interoperability Tools
 - Data Management Tools
 - Editing Tools
 - Geocoding Tools
 - Geostatistical Analyst Tools
 - Linear Referencing Tools
 - Multidimension Tools
 - Network Analyst Tools
 - Parcel Fabric Tools
 - Schematics Tools
 - Server Tools
 - Soil Data Development Toolset
 - Convert Soil Map Layers to Raster**
 - Create gSSURGO Raster
 - Create gSSURGO Raster - Batch
 - Create gSSURGO Raster Web Mercatur
 - Resample Mapunit Raster
 - gSSURGO Database Toolset
 - gSSURGO Mapping Toolset
 - gSSURGO Raster Toolset
 - gSSURGO Reporting Toolset
 - SSURGO Data Management Toolset
 - Space Time Pattern Mining Tools
 - Spatial Analyst Tools
 - Spatial Statistics Tools
 - SSURGO_QA_SDPTToolbox
 - Tracking Analyst Tools

At the bottom right, the status bar shows the coordinates: 1831746.199 2271707.829 Meters.

4. Convert Soil Map Layers to Raster...



4. Convert Soil Map Layers to Raster...

The screenshot displays the ArcMap interface with the following components:

- Table of Contents:**
 - SAPOLYGON
 - RASTER SOIL MAP CONVERSIONS
 - SoilRas_pHwater_DCP_0to15cm_30Meter.tif
 - Value
 - High : 8.3
 - Low : 4.2
 - pH (1 to 1 Water) DCP, 0 to 15cm
 - SDV_pHwater_DCP_0to15.pHwater_DCP
 - Ultra acid (pH < 3.5)
 - Extremely acid (pH 3.5 - 4.4)
 - Very strongly acid (pH 4.5 - 5.0)
 - Strongly acid (pH 5.1 - 5.5)
 - Moderately acid (pH 5.6 - 6.0)
 - Slightly acid (pH 6.1 - 6.5)
 - Neutral (pH 6.6 - 7.3)
 - Slightly alkaline (pH 7.4 - 7.8)
 - Moderately alkaline (pH 7.9 - 8.4)
 - Strongly alkaline (pH 8.5 - 9.0)
 - Very strongly alkaline (pH > 9.0)
 - MUPOLYGON
 - Ocean_Basemap
 - MapunitRaster_10m
 - Value
 - High : 3155958
 - Low : 285930
- ArcToolbox:**
 - Soil Data Development Toolset
 - Convert Soil Map Layers to Raster
 - Create gSSURGO Raster
 - Create gSSURGO Raster - Batch
 - Create gSSURGO Raster Web Mercator
 - Resample Mapunit Raster

4. Convert Soil Map Layers to Raster...

Layer Properties

General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates Time HTML Popup

Layer Name: pH (1 to 1 Water) DCP, 0 to 15cm Visible

Description: Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion. In general, soils that are either highly alkaline or highly acid are likely to be very corrosive to steel. The most common soil laboratory measurement of pH is the 1:1 water method. A crushed soil sample is

Credits: Created by Steve Peaslee on 2019-10-13 using script gSSURGO_CreateSoilMap.py

Scale Range

You can specify the range of scales at which this layer will be shown:

Show layer at all scales

Don't show layer when zoomed:

Out beyond: <None> (minimum scale) 

In beyond: <None> (maximum scale) 

OK Cancel Apply

4. Convert Soil Map Layers to Raster...

Layer Properties

General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates Time HTML Popup

Show:

- Features
- Categories
- Quantities
 - Graduated colors
 - Graduated symbols
 - Proportional symbols
 - Dot density
- Charts
- Multiple Attributes

Draw quantities using color to show values. Import...

Fields
Value: PHWATER_DCP

Normalization: none

Classification
Manual
Classes: 11 Classify...

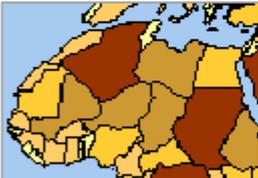
Color Ramp:

Symbol	Range	Label
	1.800000 - 3.400000	Ultra acid (pH < 3.5)
	3.400000 - 4.400000	Extremely acid (pH 3.5 - 4.4)
	4.400000 - 5.000000	Very strongly acid (pH 4.5 - 5.0)
	5.000000 - 5.500000	Strongly acid (pH 5.1 - 5.5)
	5.500000 - 6.000000	Moderately acid (pH 5.6 - 6.0)
	6.000000 - 6.500000	Slightly acid (pH 6.1 - 6.5)
	6.500000 - 7.300000	Neutral (pH 6.6 - 7.3)
	7.300000 - 7.800000	Strongly alkaline (pH 7.4 - 7.8)

Show class ranges using feature values

Advanced

OK Cancel Apply



Layer Descriptions

The 'Create Soil Map' tool automatically creates a layer description for each soil map layer (Layer Properties/General Tab). Below is an example of the description for 'Percent Sand WTA'. This information is also stored in the layer file (.lyr) for each map.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In the database, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Units of Measure: percent

Aggregation Method: Weighted Average; Tiebreak rule: Higher

Top horizon depth: 0; Bottom horizon depth: 25

GeoDatabase: C:\Geodata\Temp\gSSURGO_Rooks.gdb

Featureclass: MUPOLYGON

Rating Table: SDV_Sand_0to25WTA

Layer File: C:\Geodata\Temp\Percent_Sand_WTA_0_to_25cm.lyr

Created by Steve Peaslee on 2015-12-07

Layer Files (.lyr)

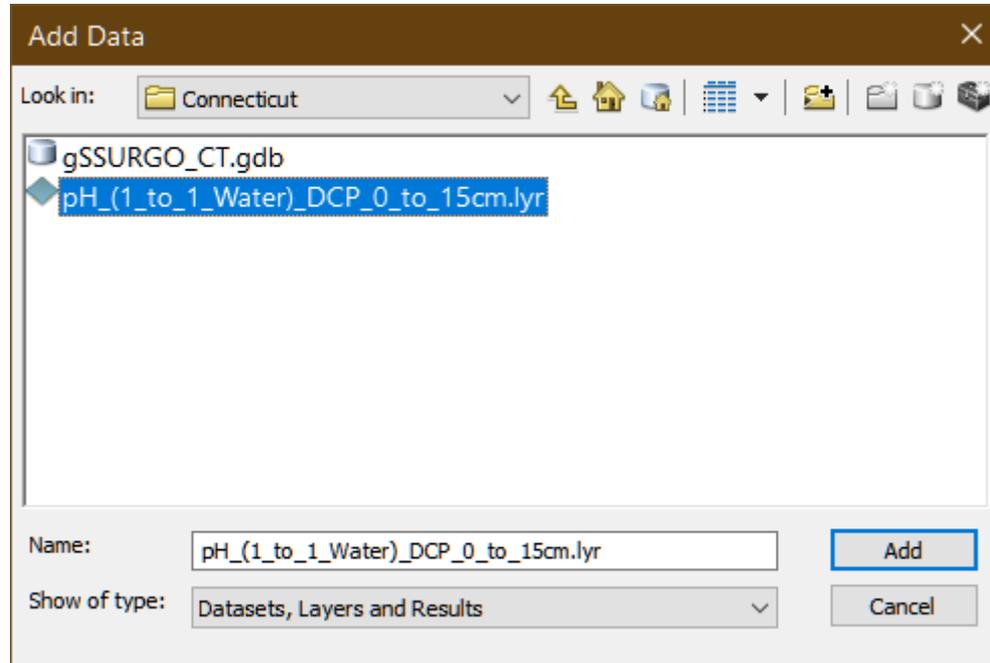
The 'Create Soil Map' tool automatically creates a layer file for each soil map and displays the name and location of this file in the console messages. The layer description information also includes the name and location of the layer file.

The tool creates layer symbology and temporarily joins the rating table to the soil polygon featureclass (MUPOLYGON). These settings are saved to the layer file and then the layer is added to the ArcMap table of contents (TOC). *Adding the MUPOLYGON featureclass to future ArcMap sessions will not automatically recreate the map legend.* This can only be accomplished by adding the layer file (.lyr) to ArcMap. The layer files are stored in the same folder as the geodatabase. An example might be something like: *C:\Geodata\Temp\Percent_Sand_WTA_0_to_25cm.lyr*. If the gSSURGO databases are moved or copied to a new location, always keep the layer files and databases together and do not change the names of the gSSURGO databases. Failure to follow these instructions will break the layer files.

Since the layer file names are not necessarily unique, it is a good idea to keep each gSSURGO database in its own, separate folder. Storing multiple gSSURGO databases in the same folder can result in layer files being accidentally overwritten.

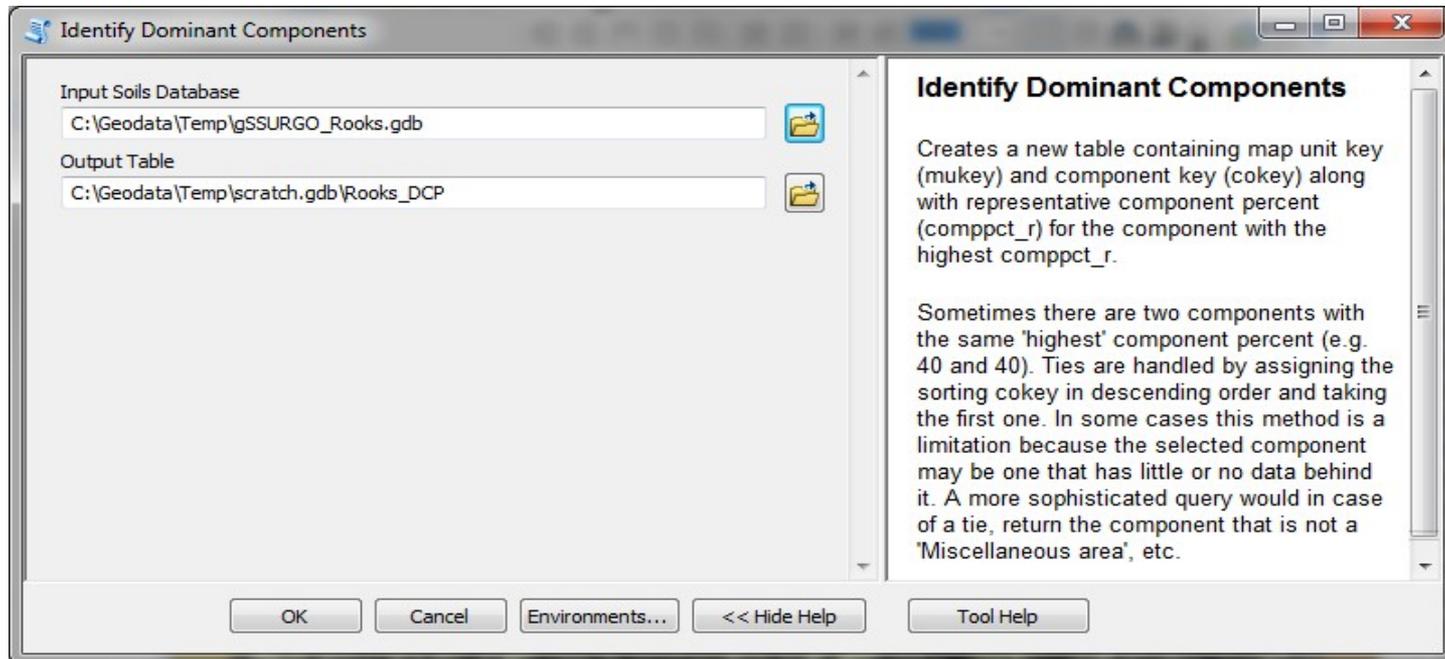
The output rating table names always begin with 'SDV_' and are created within the gSSURGO database. **These same rating tables can be joined to the MapunitRaster layer using the 'MUKEY' column.** Symbology will have to be manually created, but for large databases, drawing performance is greatly improved by using the raster.

4. Convert Soil Map Layers to Raster...



Identify Dominant Components

This tool creates a table containing the basic information for the dominant component for each map unit. The mukey, cokey and comp_pct_r values for each selected record are written to the specified table. This table can then be used to create a bridge between the soil polygon layer and the component table by joining on the MUKEY field.



Table

Rooks_DCP

OBJECTID *	mukey *	cokey	compct_r
1	2876217	11805065	80
2	1150273	11804906	50
3	1150242	11805154	45
4	1150271	11805026	95
5	1150270	11805051	87
6	1150277	11805110	45
7	1150276	11805082	90
8	1150275	11805076	90
9	1150243	11805150	55
10	1150255	11804949	100
11	1150279	11804952	100
12	1150278	11804950	100
13	2496154	11804996	100
14	1150257	11804897	100
15	1150253	11804948	100

(0 out of 68 Selected)

Rooks_DCP

Output table containing the cokey associated with each map unit's dominant component.

1. Join output table to soil map layer on MUKEY field.
2. Join COMPONENT table to soil map layer on COKEY field
3. Create dominant-component soil property map using data in component table.

Join Data

Join lets you append additional data to this layer's attribute table so you can, for example, symbolize the layer's features using this data.

What do you want to join to this layer?

Join attributes from a table

1. Choose the field in this layer that the join will be based on:
MUKEY
2. Choose the table to join to this layer, or load the table from disk:
Rooks_DCP
 Show the attribute tables of layers in this list
3. Choose the field in the table to base the join on:
mukey

Join Options

Keep all records
All records in the target table are shown in the resulting table. Unmatched records will contain null values for all fields being appended into the target table from the join table.

Keep only matching records
If a record in the target table doesn't have a match in the join table, that record is removed from the resulting target table.

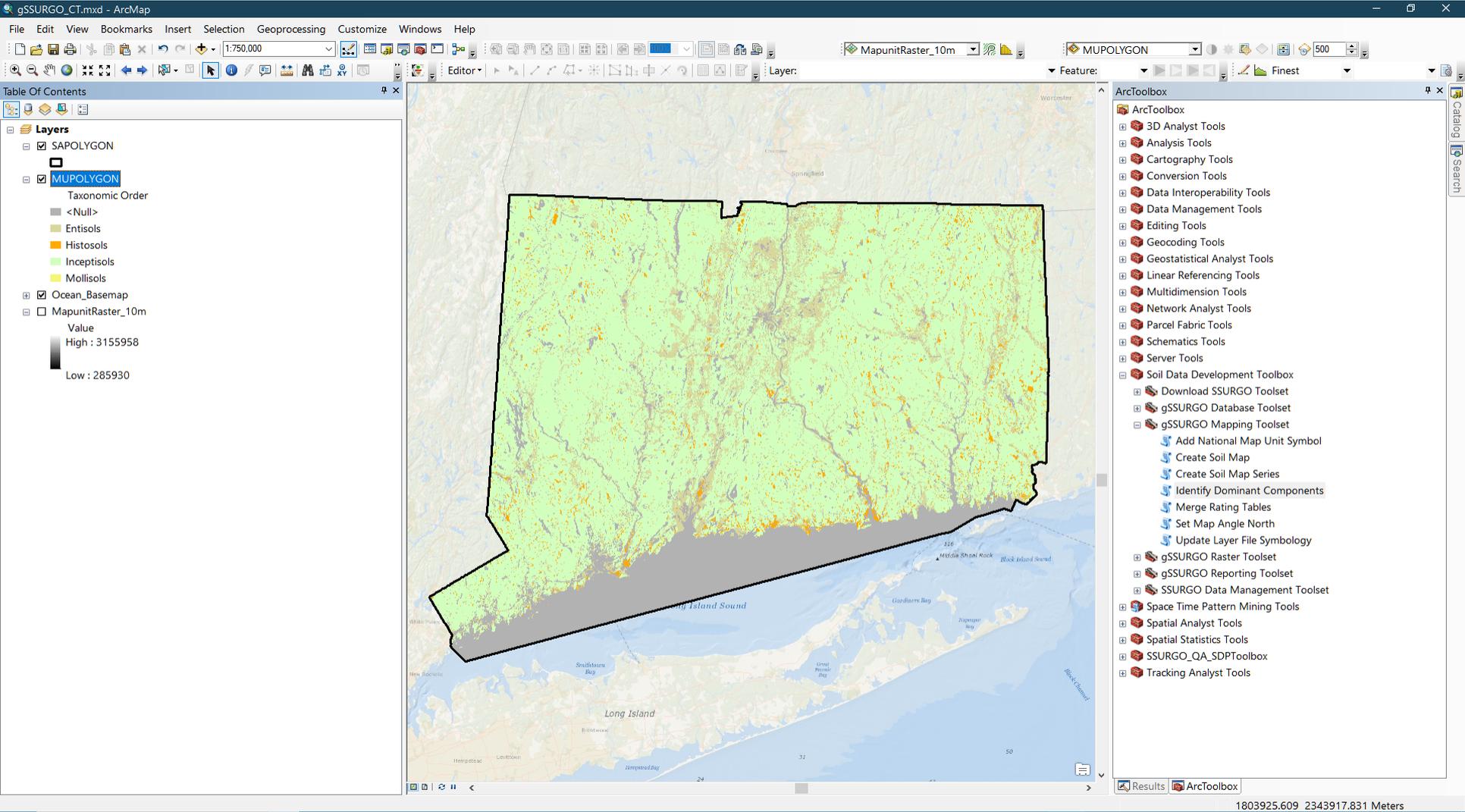
Validate Join

[About joining data](#)

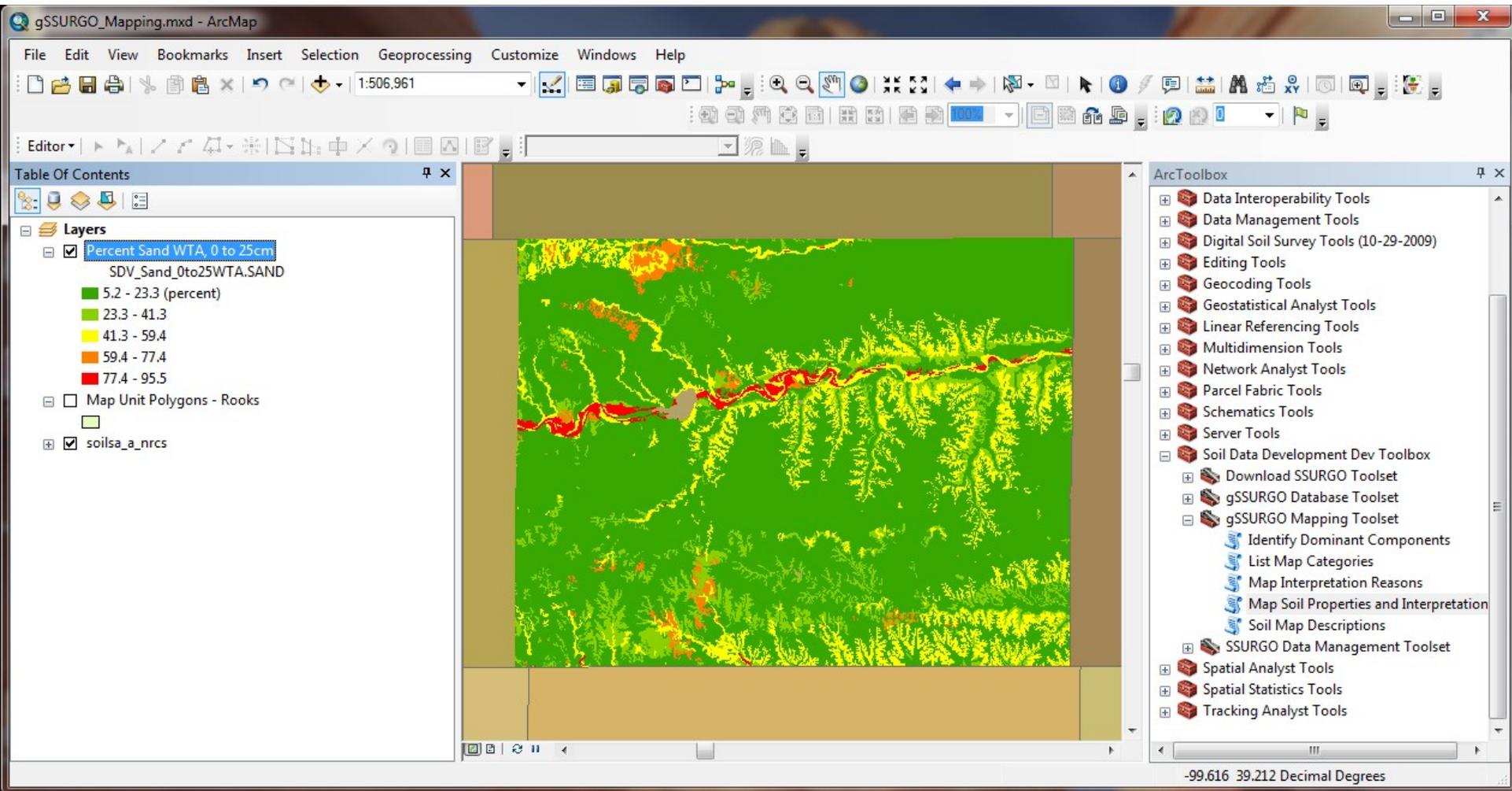
OK Cancel

The 'Add Join' tool located in Data Mgmt/Joins

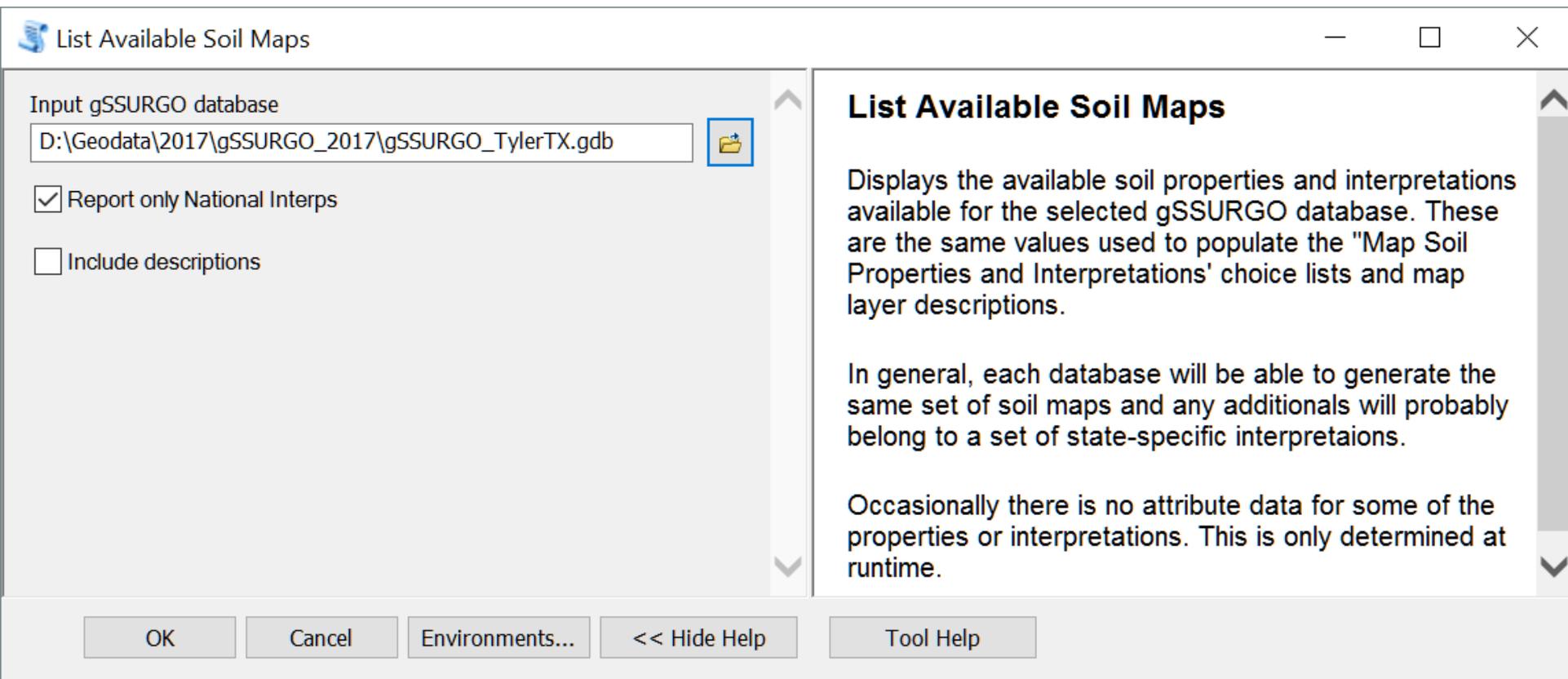
Simple component-level 'Taxonomic Class' map created with the assistance of the 'Identify Dominant Components' tool. Three tables were joined to create this map (Mupolygon, DominantComponent*, component).



Map created by the 'Create Soil Map' tool for 'Percent Sand'



List Available Soil Maps Tool



The 'List Map Categories' tool generates a tree-listing of all 'Soil Data Viewer' type maps that the 'Create Soil Maps' tool can produce with this database.

The default 'Report only National Interps' option will list only the national interpretations. Unchecking this option will add any custom state interpretations present in the selected database.

Including descriptions will add the narrative information for each property or interpretation.

Example of 'List Available Soil Maps' tool output to the console window. This text can be pasted to a Word document for future reference using the mouse to highlight and then Ctrl-C to copy.

