

# Downloading SSURGO Soil Data from Internet

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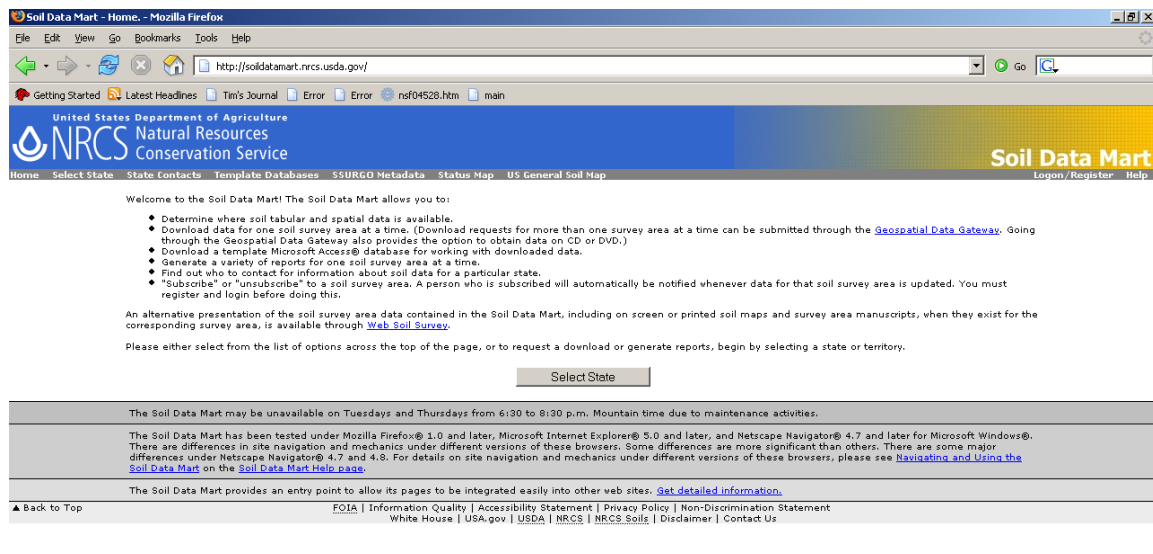
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## Purpose

The purpose of this exercise to demonstrate the steps involved in downloading SSURGO soil data from the internet and organizing it in a geotabase for future use in hydrologic modeling.

## Downloading SSURGO data

To download SSURGO soil data, **go to soil data mart** website at the following link:  
<http://soildatamart.nrcs.usda.gov/>



**Click** on *Select State*. In the next window, you will see a table with state abbreviations, names and number of survey areas. At least for the case of Indiana (I have not checked for other states), survey areas are basically counties. So there are 92 survey areas/counties in Indiana. Next **click** on *Select Survey Area* button:

ID	Idaho	43
IL	Illinois	102
IN	Indiana	92
IA	Iowa	99
KS	Kansas	105
KY	Kentucky	83
LA	Louisiana	64
ME	Maine	16
MD	Maryland	25
MA	Massachusetts	19
...	...	..

Note: Even if you click on Select County instead of Select Survey Area, eventually you will be asked to select the survey area in the individual county. So you can avoid one step by pressing the Select Survey Area button.

In the next window, you will see a table with Survey Area Symbol (two digit state abbreviation + three digit FIPS county code), Survey Area Name (county name), and the available data (spatial only / tabular only/ Tabular and Spatial). Both Tabular and Spatial data are available for all counties in Indiana. You can download data for only one survey area or county at a time. Since Cedar creek overlaps with three counties (Noble, De Kalb and Allen as shown in figure below), we will download data for these counties individually.



First **select** *Allen County, Indiana* (Survey Area Symbol = IN003), and **click** on *Download Data*.

Please select a soil survey area:

Survey Area Symbol	Survey Area Name	Available Data
IN001	Adams County, Indiana	Tabular and Spatial
IN003	Allen County, Indiana	Tabular and Spatial
IN005	Bartholomew County, Indiana	Tabular and Spatial
IN007	Benton County, Indiana	Tabular and Spatial
IN009	Blackford County, Indiana	Tabular and Spatial
IN011	Boone County, Indiana	Tabular and Spatial
IN013	Brown County, Indiana	Tabular and Spatial
IN015	Carroll County, Indiana	Tabular and Spatial
IN017	Cass County, Indiana	Tabular and Spatial
IN019	Clark County, Indiana	Tabular and Spatial
IN021	Clay County, Indiana	Tabular and Spatial
IN023	Clinton County, Indiana	Tabular and Spatial
IN025	Crawford County, Indiana	Tabular and Spatial
IN027	Daviess County, Indiana	Tabular and Spatial
IN029	Dearborn County, Indiana	Tabular and Spatial
IN031	Decatur County, Indiana	Tabular and Spatial
IN033	DeKalb County, Indiana	Tabular and Spatial
IN035	Delaware County, Indiana	Tabular and Spatial
IN037	Dubois County, Indiana	Tabular and Spatial
IN039	Elkhart County, Indiana	Tabular and Spatial
IN041	Fayette County, Indiana	Tabular and Spatial

In the next window, check the following download options

1. *Tabular and Spatial Data* option is selected
2. Spatial Format is *ArcView Shapefile* (you can choose other format if you wish)
3. Appropriate coordinate system is selected (leave the default *UTM zone 16 (NAD 83)* for these data)

Please select the class of data you wish to download: ( Survey Area Version 6 , Tabular Version 6 , Spatial Version 1 )

Tabular Data Only
  **Tabular and Spatial Data**
 Spatial Data Only
  Template Database Only

Please select a spatial format:

Please select a coordinate system:

Please select a template database (optional):

State	Access	Count	Database Name	Size
GA	Access 2002	31	soildb_GA_2002	1.5M
GA	Access 97	31	soildb_GA_97	1.3M
ID	Access 2002	32.9	soildb_ID_2002	2.0M
ID	Access 2000	32.9	soildb_ID_2000	2.0M
ID	Access 97	32.9	soildb_ID_97	1.7M
IN	Access 2002	32	soildb_IN_2002	1.7M

**Description:**

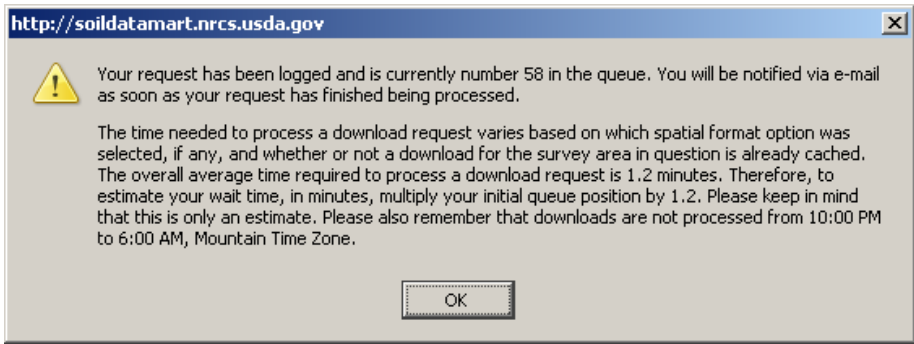
- Several reports not applicable to Indiana have been disabled in the template report list.
- This template contains a customized sand and gravel source interpretation for use in Indiana (Sand and Gravel Source report - Indiana).

Please enter your e-mail address:

If the e-mail account entered above is protected by spam blocking software, you will need to authorize e-mail from SoilDataMart@nrcc.usda.gov in order to receive e-mail notification once your request has been processed.

Also make sure the template database is selected (MS Access 2002, *soildb\_IN\_2002* - default option for Indiana). Enter you email address in the appropriate box, and **press** the *Submit Request* button.

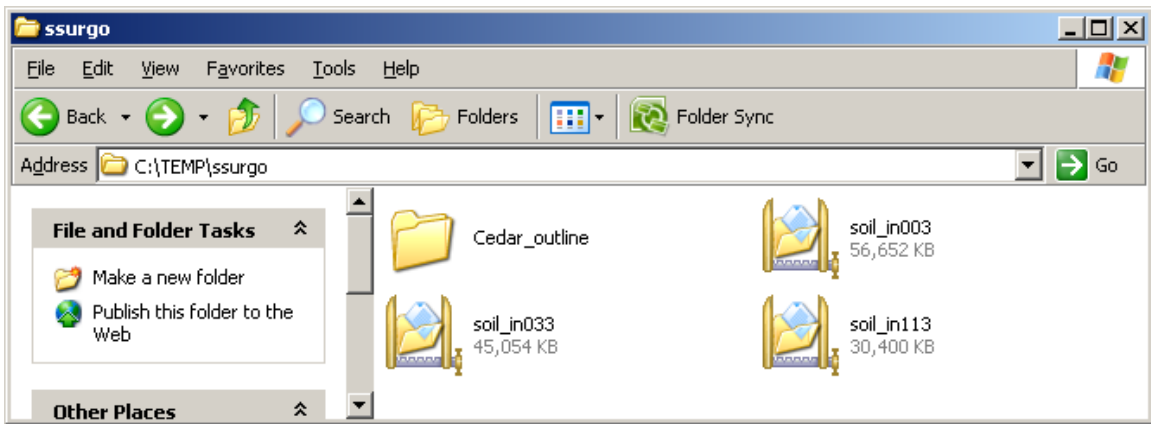
You will get a message similar to the one below saying you will be notified when the data is ready for download. **Press OK** on the message box.



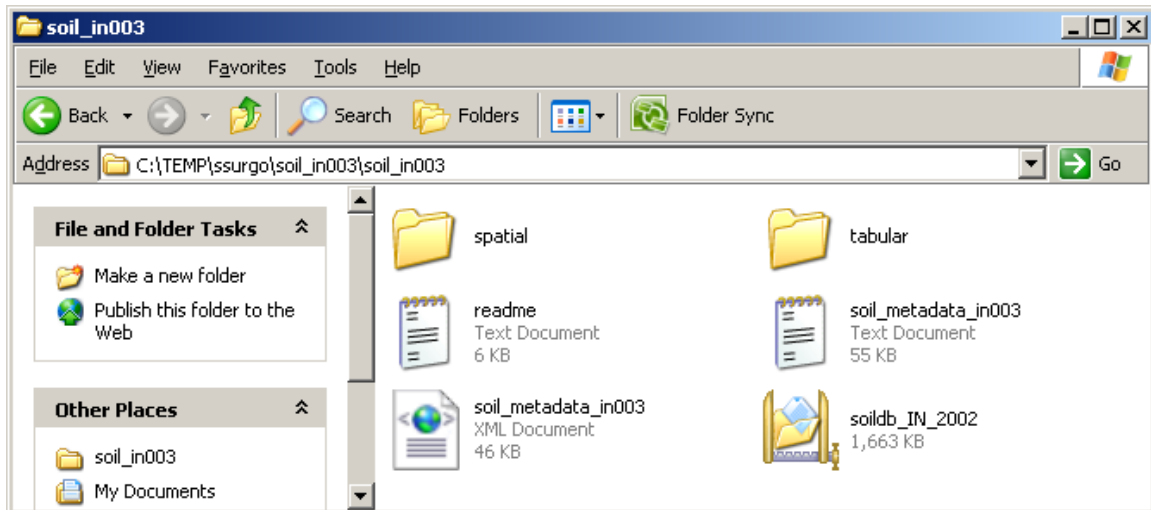
Next **press** the *Select Survey Area* button on the same window (bottom left corner). You will go back to the table with Survey Area Symbol, Survey Area Name and Available Data. **Select** the next survey area/county (De Kalb), **press** the *Download Data* button, and follow the same instructions as above to get the download message box. Similarly **download** data for *Noble county*.

Now you will wait until you get a message from NRCS saying the data are ready for download! Since you sent three requests, you will get three email notifications, one for each request. You will be sent a link to a zip file with the following name “soil\_SSxxx.zip”, where SSxxx is the survey area symbol (SS = state abbreviation and xxx = FIPS county code).

Instead of waiting on NRCS, let us continue this tutorial with the data already downloaded for this exercise. They are stored at <ftp://ftp.ecn.purdue.edu/vmerwade/download/data/ssurgo.zip> (130 MB file), which contains three zip files that were downloaded from soil data mart, and a folder named Cedar\_outline (containing a shapefile for the Cedar creek boundary) as shown below:



**Unzip** all these files. This will create three new folders inside the ssurgo folder (one for each dataset). Each folder will contain the following six items:

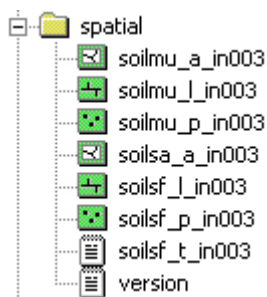


- Spatial folder: this contains spatial data (shapefiles)
- Tabular folder: this contains soil tables/properties associated with the spatial data (bunch of delimited text files)
- Readme file: instructions
- Soil\_metadata\_SSxxx.txt: text file with metadata
- Soild\_metadata\_SSxxx.xml: xml file with metadata
- Soildb\_IN\_2002.mdb: empty MS access template database that can be used to import data from the set of text files in tabular folder into an organized database.

Now that we have the spatial and temporal data, lets organize both by exporting these into a geodatabase.

### Organizing Spatial Data

**Open ArcCatalog**, and **browse** to one of the spatial folder from SSURGO. You should see the following view:



Each spatial folder has six shapefiles:

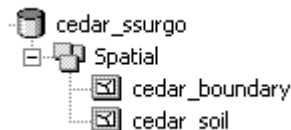
1. soilmu\_a\_ssxxx: map unit boundary polygons
2. soilsa\_a\_ssxxx: soil survey area boundary polygons
3. soilmu\_l\_ssxxx: line map units

4. soilmu\_p\_ssxxx: point map units
5. soilsf\_l\_ssxxx: line spot features
6. soilsf\_p\_ssxxx: point spot features
7. soilsf\_t\_ssxxx: spot feature descriptions

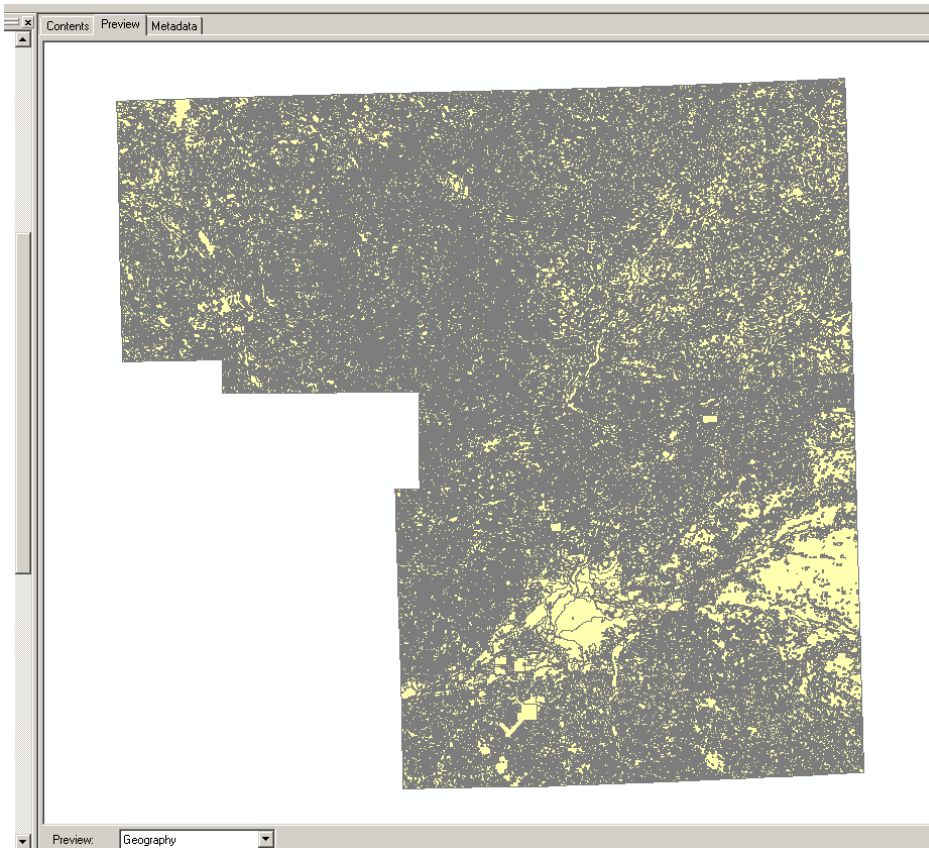
Spatial data always includes survey area and map unit boundary polygons, but all other feature classes are optional. Since each soil survey area is a county, *soilsa\_a\_ssxxx.shp* contains the boundary of the corresponding county. In hydrology we are mostly interested in map unit boundary polygons. So we will create a geodatabase feature class named *cedar\_soil* by following the below sequence (it is assumed that you are familiar with ArcGIS to follow these steps on your own):

- 1) **Create** a geodatabase inside the ssurgo folder named *cedar\_ssurgo.mdb*
- 2) **Create** a feature dataset (name *Spatial*) inside *cedar\_ssurgo* and **assign** the same coordinate system that is assigned to the soil spatial data (UTM zone 16 NAD 83 in this case). You can use the **import** spatial reference from one of the spatial folder shapefiles to the feature dataset.
- 3) In the Spatial feature dataset, **import** *soilmu\_a\_in003.shp* as *cedar\_soil* feature class
- 4) **Import** *soilmu\_a\_in033.shp* into *cedar\_soil* feature class (use the load data option this will append the new data to existing features). Since both files have same fields, accept all the default setting while loading the data.
- 5) Similarly **import** *soildmu\_a\_in113.shp* into *cedar\_soil* feature class.
- 6) Finally, import the *cedar\_boundary* shapefile from *cedar\_outline* folder as *cedar\_boundary* feature class inside spatial feature dataset

The ArcCatalog view of the cedar\_ssurgo geodatabase should look like the following figure:



The geography preview of the cedar\_soil feature class should look like the following figure:



Now we have the soil spatial data organized into one feature class. The next step is to organize the tabular data.

### Organizing Tabular Data

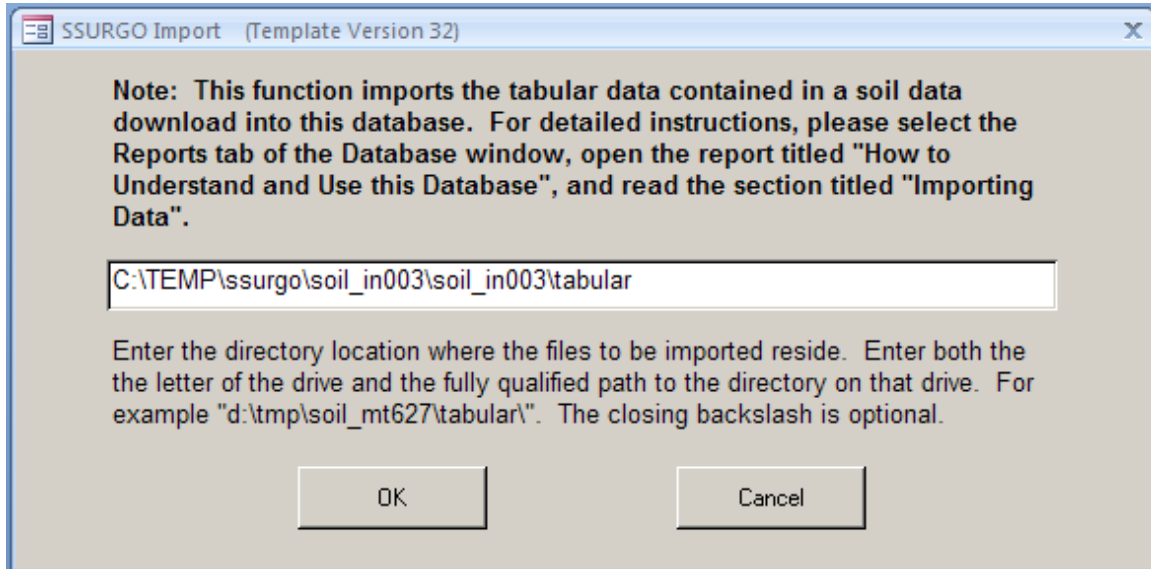
Tabular data is provided as a set of ASCII delimited files. Each file corresponds to table in the SSURGO 2.2 data model. To use the tabular data in GIS, it needs to be in a format that GIS can read. Also, these text files are not reader friendly (try opening one!). So the first step is to get these tables in a readable form by importing them in an MS Access SSURGO template database. **Unzip** *soildb\_IN\_2002* in *soil\_in003* folder to get the MS access database template.

(Note: Each download from SSURGO soil data mart comes with the MS Access template. If a template database was not included in the export file, you can download one from the following URL:

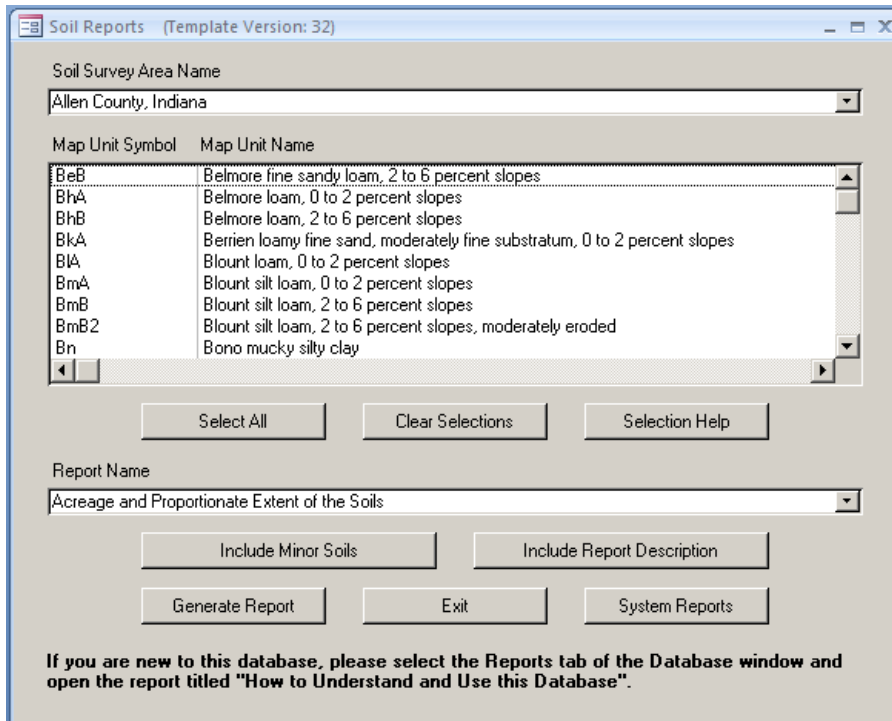
<http://soildatamart.nrcs.usda.gov/templates.aspx>)

**Open** the unzipped MS Access SSURGO template database in appropriate version of MS Access (or simply **double click** on *soildb\_IN\_2002.mdb* in windows explorer). If you get a *security warning*, just **ignore** it and **press** the *open* button. Depending on the version of MS Access you may get different warning messages, so make sure that you enable the

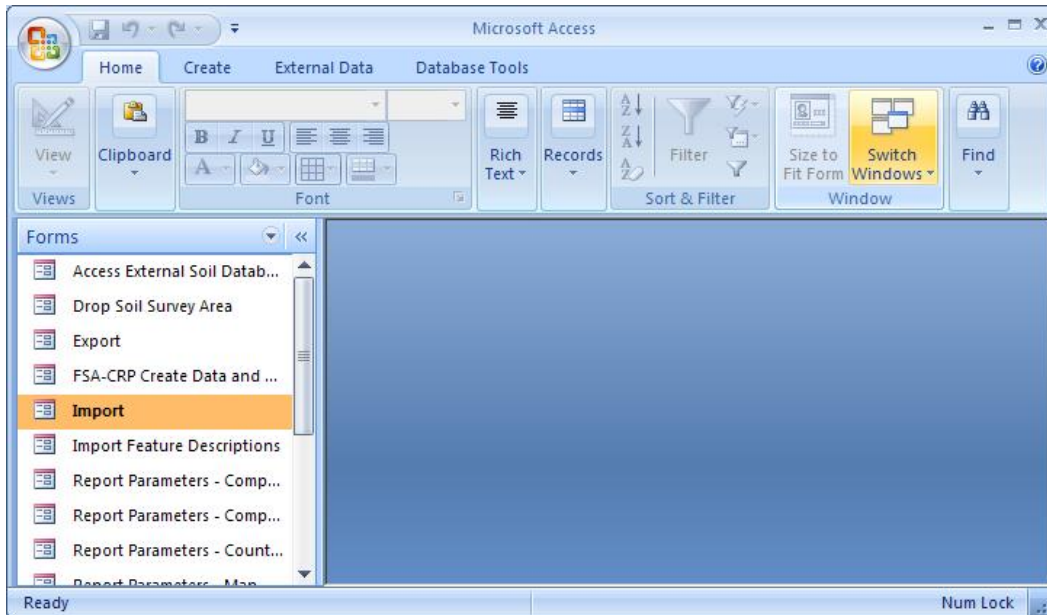
macros. If you do it right, you should get a *SSURGO Import form* asking for the path to the tabular SSURGO tabular folder as shown below (Note: if you do not get the import form, **click** the *Forms* tab in the database window and **double click** on a form named “Import”):



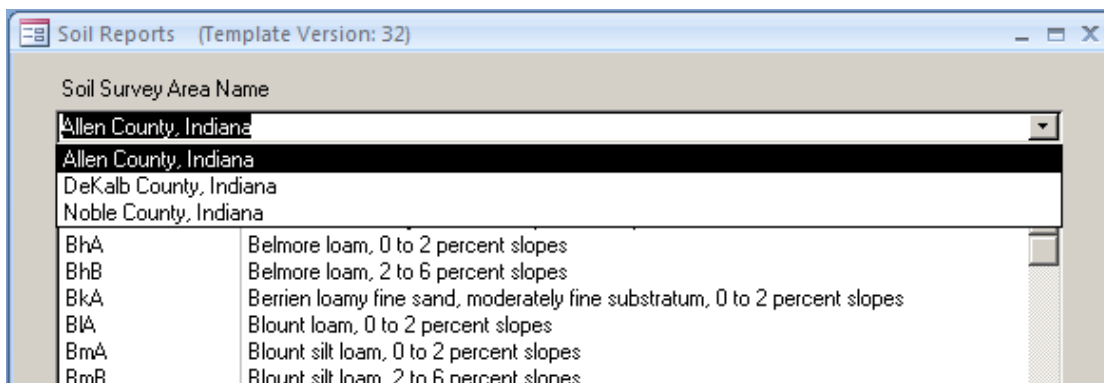
**Enter** the *path* for the tabular folder inside soil\_in\_003 (Allen county), and **click** *OK*. MS Access will then take all the text files from the tabular folder and populate the corresponding empty tables in the database. After the import the complete, the template will create a soil report for the soil survey area (Allen County, Indiana).



If you **click** on the *drop-down menu* for soil survey area name, you will see that we have report only for Allen County, Indiana since we have imported data only from soil\_in003. To import tabular data from other survey areas, **click Exit** on the soil report, and **go to Forms tab**, and **double click** on *Import* form as shown below:



This will invoke the same SSURGO import form as before (when you first opened the MS access database). Now **provide** the *path* for tabular folder in soil\_in033 to import tabular data from De Kalb county. Follow the same procedure to import the tabular data from soil\_in113 (Noble county). When you get the final soil report, you will see that now you have data for all three counties in the access database as shown below.

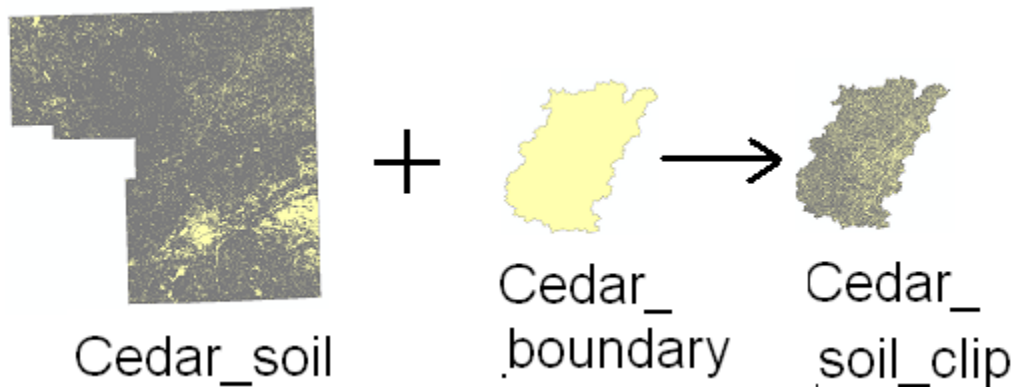


If you are an expert in MS Access database, you can browse different tabs, study the structure of the database, and see how the tabular data are stored.

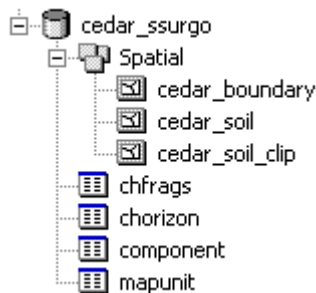
Now that we have the tabular data in an access database, we can export these tables into geodatabase.

**Open** *Arc Catalog* (if you closed it after organizing spatial data), and **import** the tables into *cedar\_ssurgo* geodatabase by using the import table (single or multiple) option. In hydrology, the commonly used tables are mapunit, component, chorizon and chfrags.

The final step (which is optional) is to clip the *cedar\_soil* polygons to the *cedar\_boundary*. Use *ArcToolbox* to accomplish the clipping task. Use the *Clip* tool in the *Analysis Tools* toolbox with *cedar\_soil* as *input features*, *cedar\_boundary* as *clip features*, and name the output as *cedar\_soil\_clip*.



The *ArcCatalog* view of the *cedar\_ssurgo* geodatabase with the spatial data and four tables (*chfrags*, *chorizon*, *component* and *mapunit*) is shown below:



The spatial (*cedar\_soil* or *cedar\_soil\_clip*) and tabular data can be joined/related by using common fields. For example, *cedar\_soil* and *component* can be linked by using *mukey* field. To understand the relationships you can refer to SSURGO data model diagram available the following link:

<http://soildatamart.nrcs.usda.gov/SSURGOMetadata.aspx>

We will explore these relationships and look at how to use the SSURGO data in another tutorial titled using SSURGO data.

OK, you are done for now!!