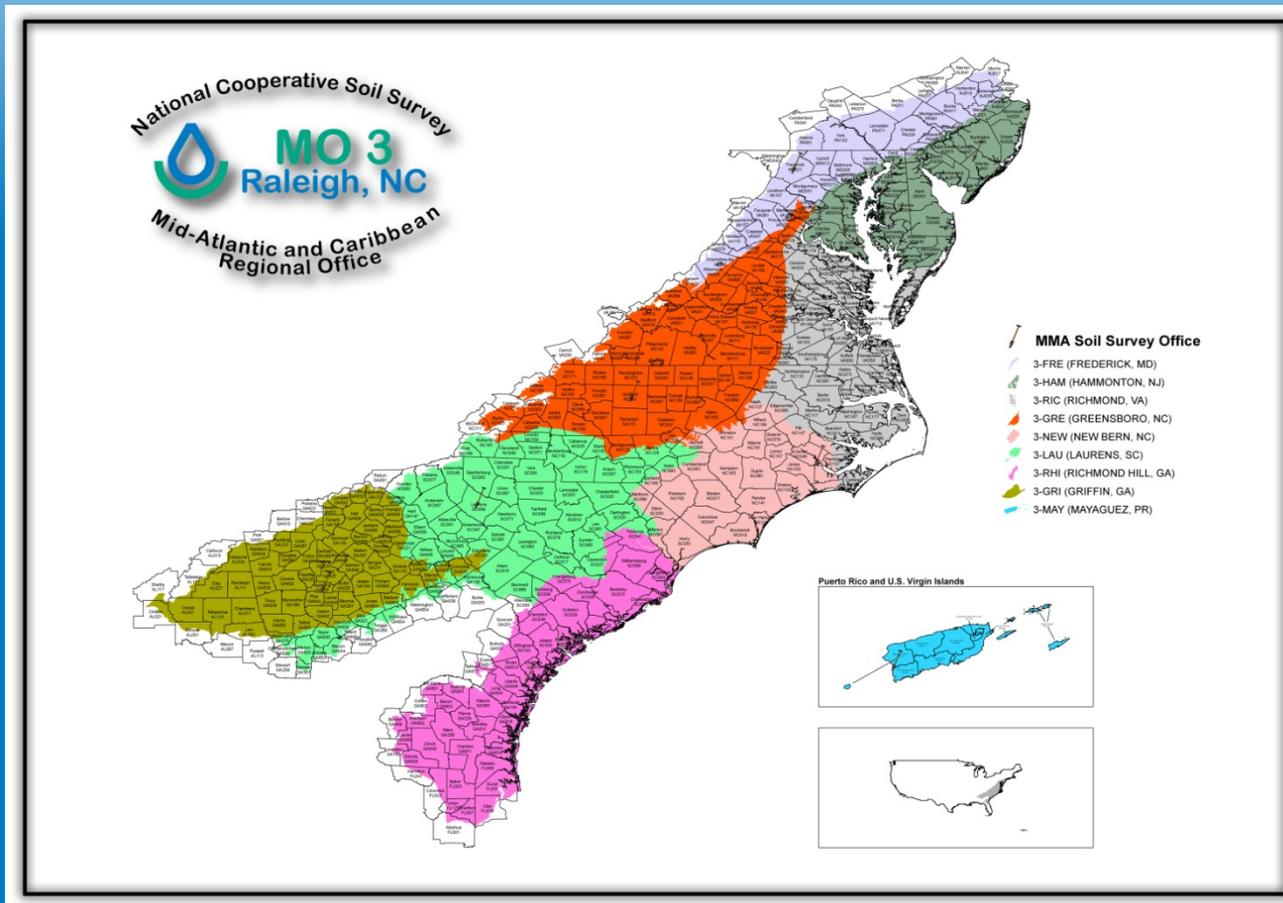
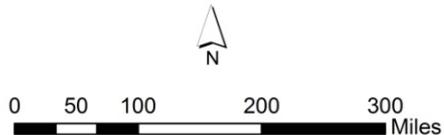
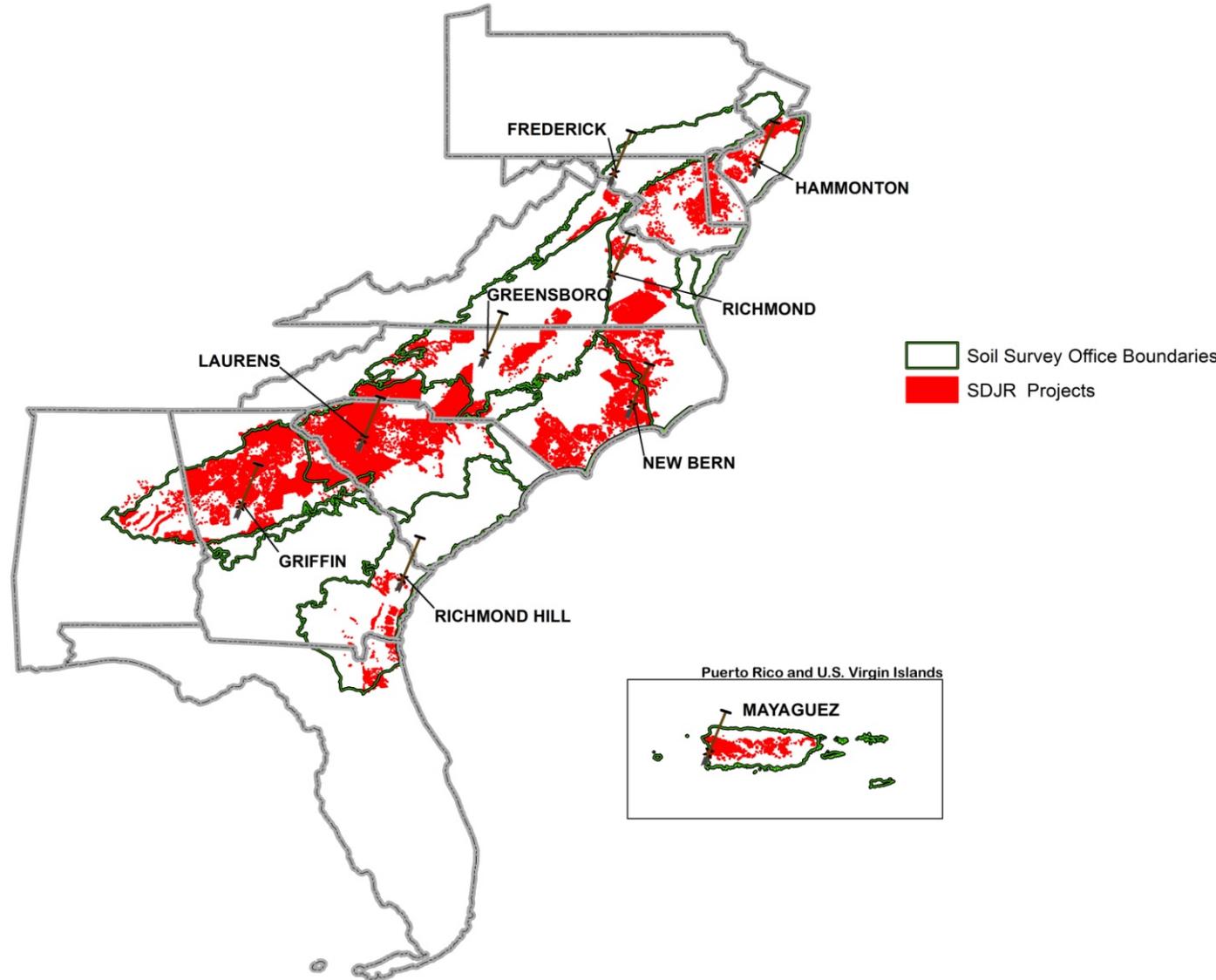


Mid-Atlantic and Caribbean Area Soil Survey Region 3



Soil Data Join & Recorrelation - FY 2013

Mid-Atlantic and Caribbean Area Regional Office





Carolina and Georgia Sand Hills Ecological Site Descriptions, NatureServe in partnership with the Natural Resources Conservation Service



Carl Nordman¹ and Michelle Clendenin²

¹NatureServe, 601-A Foster Street, Durham, NC 27701; carl_nordman@natureserve.org
²USDA/NRCS Mid-Atlantic and Caribbean Area Regional Office, 4407 Bland Road, Suite 117, Raleigh, NC 27609; Michelle.Clendenin@nc.usda.gov

Introduction

Ecological Site Descriptions including state and transition models have been developed for rangelands in the western United States. These have been valuable tools for incorporating ecological site information into rangeland management decisions. NatureServe and the USDA Natural Resources Conservation Service developed a partnership to develop Ecological Site Descriptions in the Carolina and Georgia Sand Hills, Major Land Resource Area 137 (MLRA 137). NatureServe is a network connecting science with conservation, and is a leading source of information about the rare species and vegetation of North America. NatureServe is also a conservation science network with partner agencies in each of the 50 states. The USDA Natural Resources Conservation Service has technical expertise in soil science, and the productive capabilities of the lands of the United States. In partnership, we have developed Ecological Site Descriptions (ESD) for the Carolina and Georgia Sand Hills, a special region which supports the imperiled longleaf pine ecosystem. For this effort, six sets of Ecological Site Descriptions (ESD) were developed, representing most of the lands of the Carolina and Georgia Sand Hills. Here we present the overall effort, and focus on one ESD, for Xeric Sandhill Scrub.

The Xeric Sandhill Scrub Ecological Site Description

The soils of the Xeric Sandhill Scrub include deep sandy soils of four series. These soil series are Candor (Sandy, kaolinitic, thermic Grossarenic Kandiodults), Lakeland (Thermic, coated Typic Quartzipsamments), Troup (Loamy, kaolinitic, thermic Grossarenic Kandiodults) and Wakulla (Siliceous, thermic Psammentic Hapludults). These are nutrient poor, acidic deep sands which are somewhat excessively drained to excessively drained and have slow runoff. These sands are nearly all eolian or marine in origin, and occur on gentle ridges, summits in broad upland areas, and on dry upper slopes.

These are the least productive sites within the Sand Hills region. The structure and composition of the vegetation is generally driven by fire, and by the characteristics of the excessively drained deep sandy soils. The Xeric Sandhill Scrub is naturally occurring woodland vegetation which is found on deep sands of dry uplands in the Carolina and Georgia Sand Hills (MLRA 137). These sites are prone to wildland fire and probably naturally burned as frequently as every few years. Fires are ignited by lightning or by humans. Prior to the construction of roads, wildland fires may have burned extensive areas (1000s of acres). Today prescribed fire is used by land managing agencies, to maintain and restore the Xeric Sandhill Scrub. There are two sources of fuel for the surface fires typical of the Xeric Sandhill Scrub, longleaf pine (*Pinus palustris*) needles and native grass such as wiregrass (*Aristida stricta*). Naturally functioning examples of Xeric Sandhill Scrub need both these sources of fuel. The loss of either the longleaf pine trees, or the native herbaceous ground cover can lead to less frequent surface fires, and transitions to other ecological states. Many areas that used to have longleaf pine have become dominated by loblolly pine (*Pinus taeda*) and hardwood trees after industrial logging and control of wildland fires began in the early 20th century. In recent decades land managers have become skilled at managing remnant longleaf pine woodlands and the value of longleaf pine forest products has gained more attention. The special qualities of the longleaf pine woodlands are now recognized for their beauty and high biological diversity. Numerous rare plants and animals persist in the Xeric Sandhill Scrub habitats, especially on the larger public lands, such as Fort Bragg and the Sandhills Game Lands.

State and Transition Model for Xeric Sandhill Scrub (see diagram lower right)

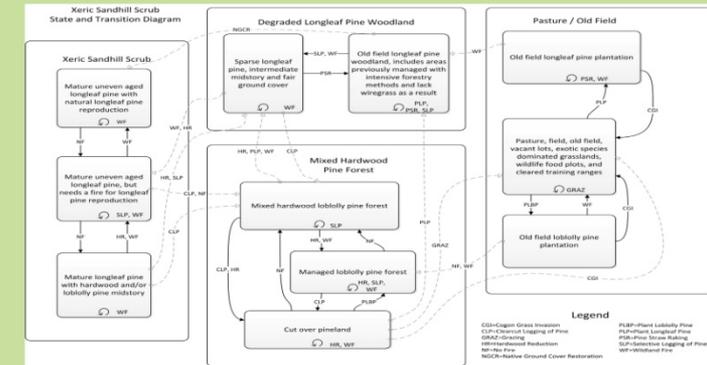
The state and transition model has the natural Xeric Sandhill Scrub on the very upper left, open longleaf pine forests generally along the top and left and closed hardwood and loblolly pine forests along the bottom. Pastures and old fields are on the right. The Sand Barren (Typic Subtype) is an unusual and very dry infertile community which naturally burns less frequently than other examples of the Xeric Sandhill Scrub. Because of the lack of fertility the buildup of grasses and longleaf pine needles is slower in the Sand Barren (Typic Subtype). In its natural condition it is in the middle box on the left side of the state and transition model, where there is more of a Turkey Oak (*Quercus laevis*) midstory. The transitions in the Xeric Sandhill Scrub state transition model can be either transitions between states, transitions within a particular state, or they can be factors which serve to maintain a site in a particular condition. If the factor maintains a site in a particular condition, it is indicated with a looped arrow in the state transition model diagram. Transitions within a state are indicated with solid line arrows and transitions between states are indicated with dashed line arrows. Because of the variety of natural disturbances and land management methods used in the Xeric Sandhill Scrub site, there are many transitions and paths between states as well as within the four states of the Xeric Sandhill Scrub site. Not all the possible transitions are indicated in the state and transition diagram. Multiple factors are indicated on many of the transition arrows. In some cases any of the factors are associated with the transition, but in other cases the several factors together lead to the transition.

Partnership between NatureServe and USDA Natural Resources Conservation Service

This partnership has started Ecological Site Description work in the eastern United States. NatureServe and NRCS have been able to apply their strengths to this effort, which has progressed quickly. Review of the Sand Hills region Ecological Site Descriptions were done with the help of the North Carolina Natural Heritage Program, USDA NRCS, and the Department of the Army (Lt. Bragg, DPW/Endangered Species Branch). We are thankful to these agencies.

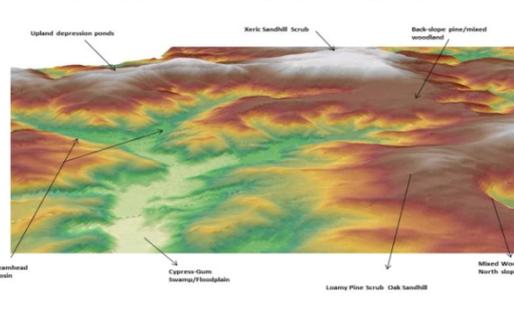
Conclusions

Ecological Site Descriptions and the state and transition models they include will be useful in the eastern United States to land managers. The soils expertise and ecological expertise of the project partners made this work time and cost efficient. This partnership could be continued to complete ESDs in the eastern United States.



Site	Landform	Surface Texture	Subsoil Texture	Depth to Seasonal High Water Table	Agricultural Drainage Class	Soil Series	Plant Community
1	Summit	Sandy	Sandy	>60 inches	Well to excessively	Candor, Wakulla, Lakeland, Troup	Dry LLP-Oak, xeric oak scrub
2	Summit	Sandy	Loamy	>60 inches	Well	Alley, Vaucluse, Blaney	LLP-Blackjack oak/hackberry/wiregrass woodland
3	Backslope	Sandy	Sandy	>60 inches	Well to excessively	Candor, Wakulla	No differences in vegetation as 1.
4	Backslope	Sandy	Loamy	>60 inches	Well	Alley, Vaucluse, Blaney	Mesic LLP woodland
5	Footslope & concave backslope, water-receiving positions	Sandy or loamy	Clayey	12 to 30 inches	Moderately well	Pellon	Hillside seep (Galberry/Isis)
6	Drainageway Floodplain	Mucky loam	Sandy or Loamy	Surface to 12 inches	Very poorly to poorly	Johnston, Bibb	Atlantic white cedar-pond pine- tulip tree forested seep

Landscape Position of Carolina and Georgia Sandhills Ecological Communities



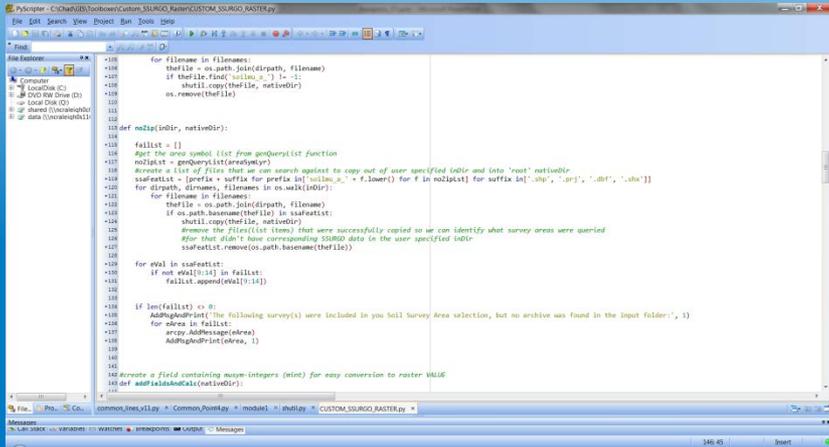
Methods

- Applied the methods for Ecological Site Descriptions used on western rangelands, but rarely applied in the eastern United States
- Used the U.S. National Vegetation Classification (U.S. NVC), which is the Federal Geographic Data Committee Standard
- Used soil description, classification, analysis, and mapping expertise of the USDA Natural Resources Conservation Service
- Incorporated information from NatureServe's Ecological Integrity Assessment (EIA) work, U.S. NVC development, NC NHP, and Landfire
- Developed six Ecological Site Descriptions including state and transition models for Xeric Sandhill Scrub, Pine Scrub Oak Sandhill, Mesic Pine Savanna, Sandhill Seep, Sandhill Streamhead Pocosin and Swamp, and Cypress-Gum Swamp with all states and transitions described
- Peer review by NatureServe Network partner, the North Carolina Natural Heritage Program, plus staff from NRCS, and Department of the Army

Landform	Surface texture	Subsurface Texture	Drainage Class	Hydrology	Soil Series*	Disturbance history**	Reference Community	proposed ESD name
summit	sandy	sandy	excessive		Candor, Wakulla, Lakeland, Troup		LLP-Turkey Oak /xeric scrub	upland sandy wood/ oak scrub
		loamy	well		Alley, Vaucluse, Blaney, Cowart		LLP-Blackjack Oak	loamy upland woodland
(Upland depressions/Seeps)	sandy	clayey, loam	poor	seasonally ponded	Dorran, Ogechee, Rambert, Partridge		Lynona shrubland/Pool meadow	carolina bay, depression wetland
						1-5 year intervals	LLP-Turkey oak	backslope sandy woodland
backslope/footslope	sandy	sandy	excessive		Candor, Wakulla, Troup	>100-200 year	Oak-Hickory	backslope mixed woodland
		loamy	well		Alley, Vaucluse, Blaney, Cowart	1-5 year intervals	LLP-Blackjack Oak	backslope pine woodland
drainageway	mucky loam	sandy or loamy	poor	seasonally ponded	Johnston, Bibb	>100-200 year	Mixed woods	backslope mixed forest woodland
		loamy	moderate		Pellon, Lumbee, Ramo		Galberry/Isis or herbaceous	side topographic or stream seepage
floodplain	mucky loam	sandy or loamy	poor	seasonally ponded	Johnston, Bibb		Atlantic white cedar-pond pine	streamhead
		loamy	moderate		Johnston, Bibb		Cypress-Tupelo gum	swamp

*Soil series include named components through MLRA137 from the Carolina and Georgia
 **Disturbance history here implies areas that may have been geographically excluded from fire, either from landscape position such as aspect or adjacency to water

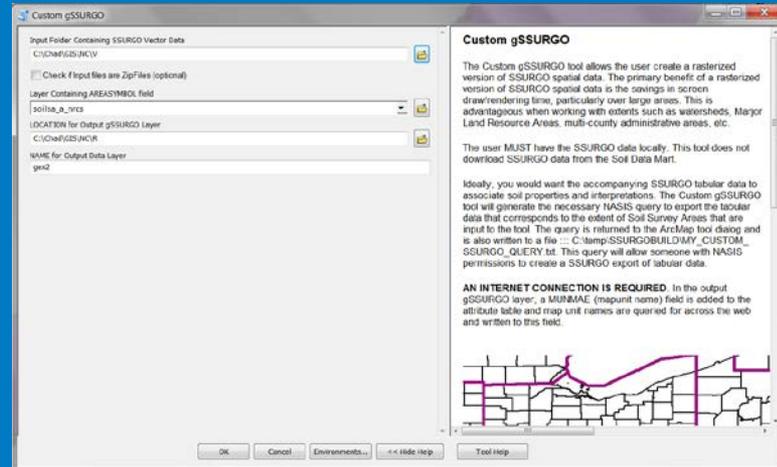
Custom GRIDDED SSURGO Tool



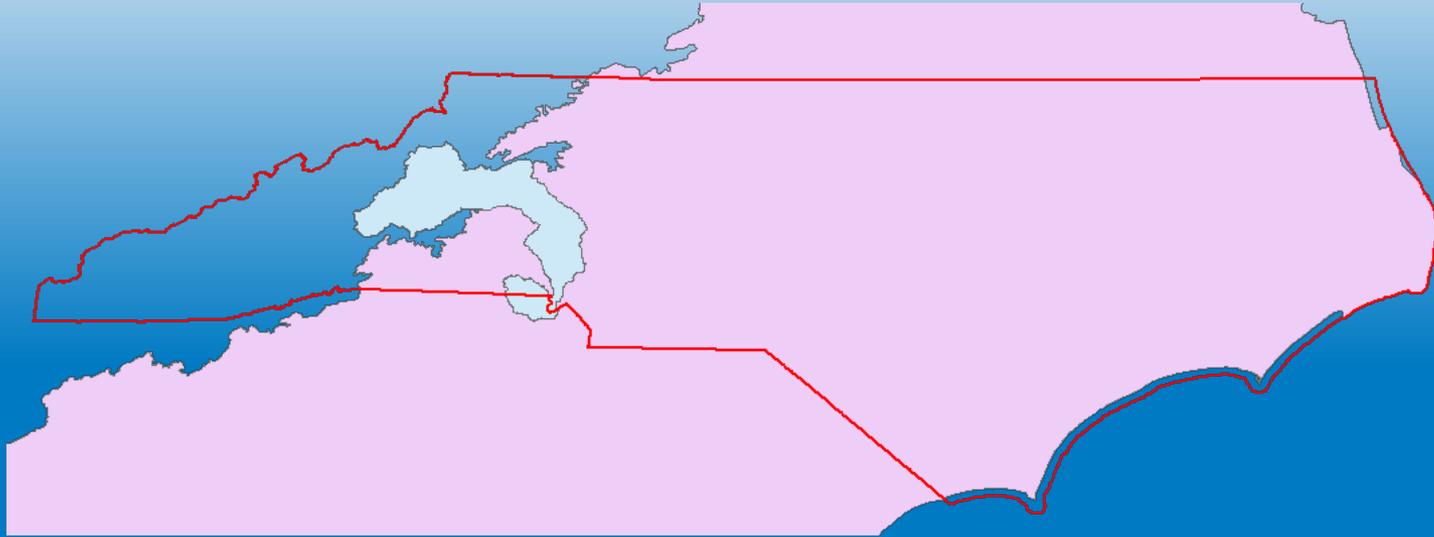
```
1183 for filename in filenames:
1184     thefile = os.path.join(dspath, filename)
1185     if thefile.find('solis_u_') != -1:
1186         shutil.copy(thefile, nativeDir)
1187         os.remove(thefile)
1188
1189
1190
1191 def nozip(inDir, nativeDir):
1192
1193     failList = []
1194     start the area symbol (set from geoqueryList function)
1195     nozipList = geoqueryList(areasymbol)
1196     iterate a list of files that we can search against to copy out of user specified inDir and into 'root' nativeDir
1197     safeFeatList = [prefix + suffix for prefix in ['solis_u_'] + f.lower() for f in nozipList for suffix in ['.shp', '.prj', '.dbf', '.shx']]
1198     for dspath, filenames, filenames in os.walk(inDir):
1199         for filename in filenames:
1200             thefile = os.path.join(dspath, filename)
1201             if os.path.basename(thefile) in safeFeatList:
1202                 shutil.copy(thefile, nativeDir)
1203                 #remove the file(s) if it was successfully copied so we can identify what survey areas were queried
1204                 #for that didn't have corresponding SSURGO data in the user specified inDir
1205                 safeFeatList.remove(os.path.basename(thefile))
1206
1207
1208 for pval in safeFeatList:
1209     if not pval[0:14] in failList:
1210         failList.append(pval[0:14])
1211
1212
1213
1214 if len(failList) > 0:
1215     AddMessagePrint('The following survey(s) were included in your Soil Survey Area selection, but no archive was found in the input folder(s).')
1216     for pval in failList:
1217         array.AddMessageToArea(
1218             AddMessagePrint(pval, 1)
1219         )
1220
1221
1222
1223 #Create a field containing mosaic integers (mint) for easy conversion to raster VALUE
1224 def addFieldAsMosaic(nativeDir):
```

A python script

Which runs in ArcGIS / ArcToolBox



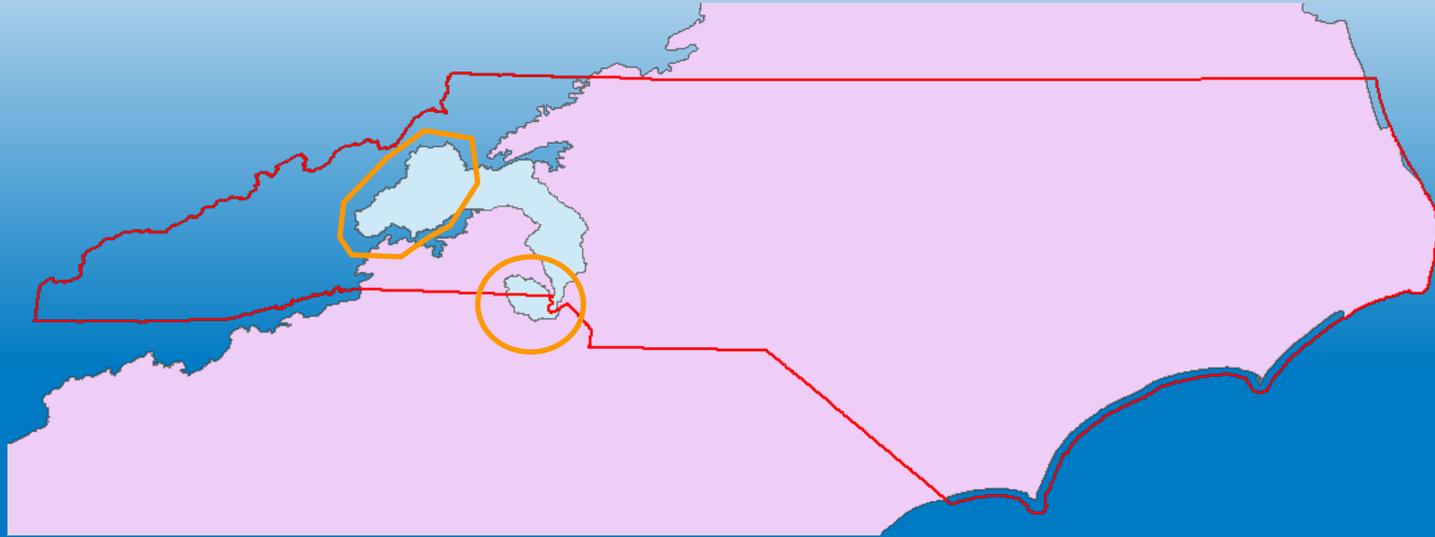
Custom GRIDDED SSURGO Tool



Alternative to currently distributed gSSURGO products (SSRO/State)

User Defines custom Area of Interest

Custom GRIDDED SSURGO Tool



Example – **Upper Catawba River Watershed**

Extends beyond **SSRO-3** and **North Carolina**

Custom GRIDDED SSURGO Tool



18 Soil Survey Areas mosaiced
Total time 7:50

Runs NASIS Web report and writes AREASYM and MUNAME to raster attribute table

Writes NASIS query for SSURGO export

```

Custom gSSURGO
Completed
Close
<< Details

Close this dialog when completed successfully

Executing: CUSTOMSSURGO C:\chad\GIS\NC\W # soils_a_ncca C:\chad\GIS\NC\W gex2
Start Time: Fri Jun 14 13:19:21 2013
Running script CUSTOMSSURGO...

***A processing folder (SSURGOBUILD and other subfolders) will be created in C:\temp
This processing folder will persist until the next time this tool is run or you manually delete it.***

The following query can be used (copy-paste) in NASIS by someone with database permissions
to generate a SSURGO tabular download corresponding to the GRIDDED SSURGO layer just created. A text file of
this query will also be written to C:\temp\SSURGOBUILD

FROM area, areatype, legend, inspanit, mapunit, correlation, datamapunit
WHERE area.area_symbol IN ('NC003', 'NC011', 'NC021', 'NC023', 'NC027', 'NC035', 'NC045', 'NC071', 'NC097', 'NC109', 'NC111',
'NC119', 'NC121', 'NC161', 'NC189', 'NC193', 'NC199', 'SC091') AND
areatype.name = 'non-nlra soil survey area' AND
legend.legend_suituse = 'current wherever mapped' AND
mustatus != 'Additional' AND
correlation.respbu = 'Yes' AND
JOIN area TO areatype AND
JOIN area TO legend AND
JOIN legend TO inspanit AND
JOIN inspanit TO mapunit AND
JOIN mapunit TO correlation AND
JOIN correlation TO datamapunit

Completed script CUSTOMSSURGO...
Succeeded at Fri Jun 14 13:26:33 2013 (Elapsed Time: 7 minutes 12 seconds)
    
```

Rowid	VALUE	COUNT	AREASYM	MUNAME
0	111316	14901	NC003	Asha-Cleveland complex, 8 to 25 percent slopes, stony
1	111318	65539	NC003	Asha-Cleveland complex, 25 to 60 percent slopes, stony
2	111340	125129	NC003	Cowe-Saluda complex, 8 to 25 percent slopes, stony
3	111341	430303	NC003	Cowe-Saluda complex, 25 to 60 percent slopes, stony
4	111350	130523	NC003	Evard-Cowe complex, 8 to 25 percent slopes, stony
5	111352	609605	NC003	Evard-Cowe complex, 25 to 60 percent slopes, stony
6	111354	16708	NC003	Hibriten very cobbly sandy loam, 8 to 15 percent slopes
7	111356	250111	NC003	Hibriten very cobbly sandy loam, 15 to 60 percent slopes
8	111382	29752	NC003	Usorthents-Urban land complex, 0 to 15 percent slopes
9	111383	83655	NC003	Water
10	111874	344631	NC036	Water
11	112633	14875	NC071	Alamance variant gravelly loam, 2 to 8 percent slopes
12	112634	16712	NC071	Alamance variant gravelly loam, 8 to 15 percent slopes
13	112635	386482	NC071	Applying sandy loam, 1 to 6 percent slopes
14	112638	926217	NC071	Cecil-Urban land complex, 2 to 8 percent slopes
15	112639	144307	NC071	Cecil-Urban land complex, 8 to 15 percent slopes
16	112645	98324	NC071	Helena sandy loam, 1 to 6 percent slopes
17	112646	22684	NC071	Helena-Urban land complex, 1 to 6 percent slopes
18	112647	8772	NC071	Lignum silt loam, 1 to 6 percent slopes
19	112650	143422	NC071	Madison sandy loam, 15 to 25 percent slopes
20	112652	624426	NC071	Pacolet sandy loam, 15 to 25 percent slopes
21	112653	24272	NC071	Pacolet sandy loam, 25 to 45 percent slopes
22	112655	4512	NC071	Rock outcrop
23	112656	521045	NC071	Tatum gravelly loam, 2 to 8 percent slopes
24	112657	420460	NC071	Tatum gravelly loam, 8 to 15 percent slopes
25	112658	352027	NC071	Tatum gravelly loam, 15 to 25 percent slopes
26	112659	63548	NC071	Usorthents, loamy
27	112660	186375	NC071	Urban land
28	112661	67616	NC071	Uwharrie stony loam, 25 to 45 percent slopes, very bouldery
29	112662	56588	NC071	Vance sandy loam, 2 to 8 percent slopes
30	112663	28123	NC071	Vance sandy loam, 8 to 15 percent slopes
31	112664	207045	NC071	Water