



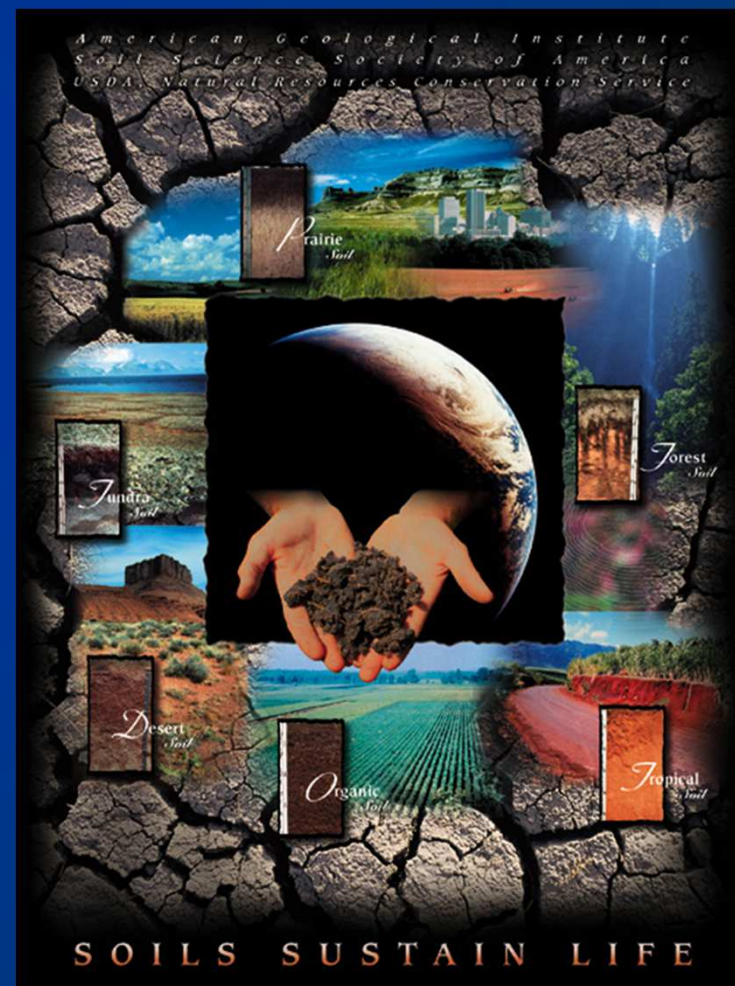
Natural Resources Conservation Service

NCSS

National Cooperative Soil Survey

Use of Soils Information for Land Management in the United States

Dr. Michael Robotham
National Leader –
Technical Soil Services
Soil Science Division
USDA-NRCS



Outline of Presentation

- Available soils data in the United States
- Soils information products
- Distribution mechanisms
- Examples of how soils data and information is used for land management
- New Initiatives

“No choice can be made between a utilitarian soil survey and a scientific soil survey. Of course, soil surveys made for predictions about land-use and management, and most of them are, must be practical. But they will not be practical unless they are also scientifically sound”

- Dr. Charles Kellogg

From: The Future of the Soil Survey. An address before the Soil Sci. Soc. Amer., Milwaukee, Wis., Oct., 1949.



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Soils Data for the United States available from the National Cooperative Soil Survey (NCSS)

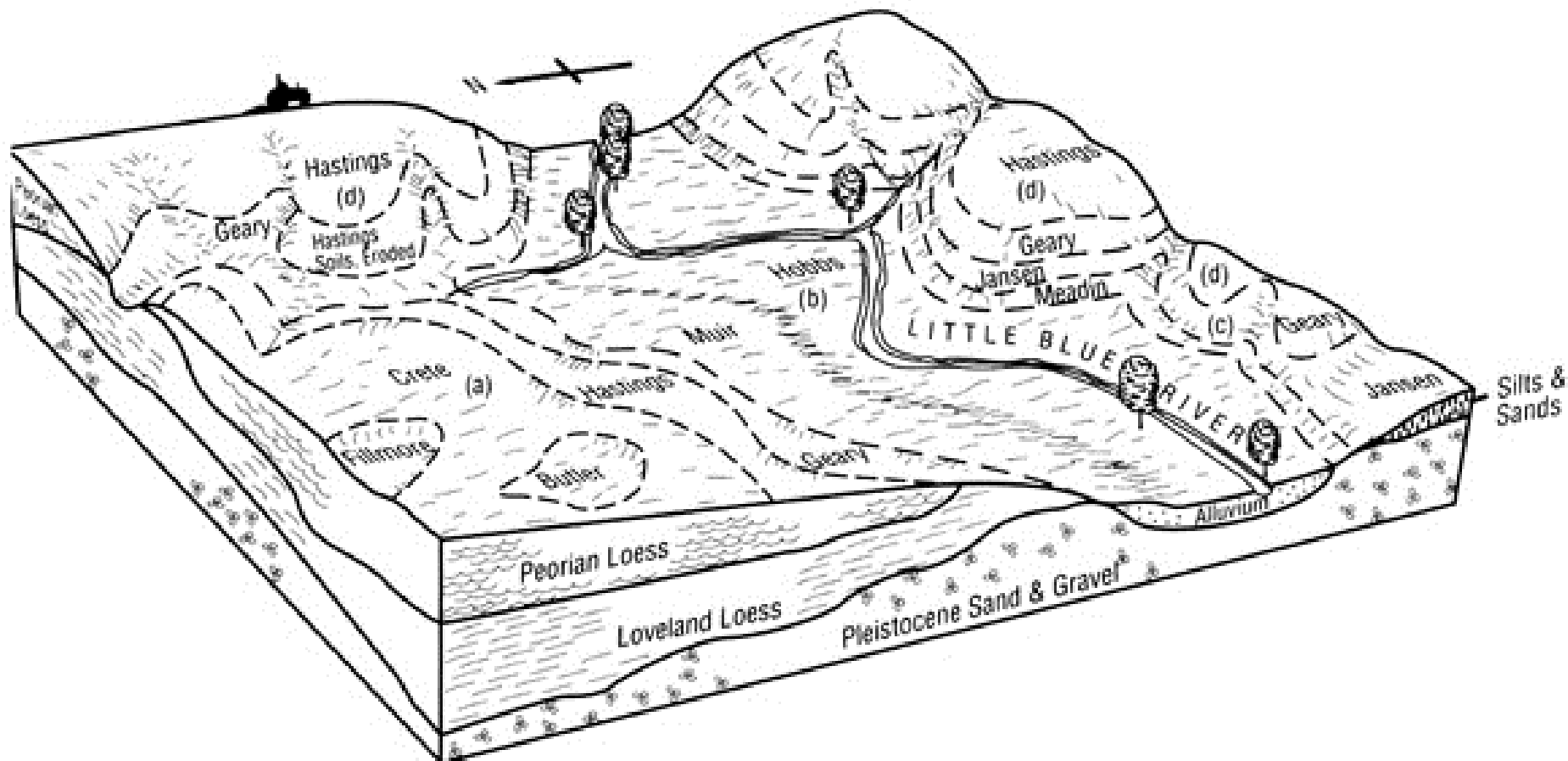
Soil Science Terms

- Soil surveyors delineated **map units** composed of one or more **components** on the landscape
- **Components** are divided and described as **pedons** which are divided in the vertical dimension by **horizons**
- Different types of data are collected and populated at the map unit, component and horizon level.

Definition of terms

- **Map unit:** a collection of areas defined and named the same in terms of their soil components or miscellaneous areas or both
- **Component:** a geographically associated group of soils that exist in a characteristic landscape and share a unique set of internal properties (usually synonymous with “soil series”)
- **Pedon:** A site specific vertical cross-section of soil
- **Horizon:** A distinct layer of soil, more or less parallel with the soil surface, having similar properties

FIGURE 2-3



Landscapes of Associations of Soil Series (Soil Survey Thayer Co., Nebraska).

Soils data products

- Pedon Characterization Database – KSSL (points)
- Soil Survey Geographic (SSURGO) database (polygons)
 - Recently released in 30m raster format as gSSURGO
- State Soil Geographic (STATSGO2) database (polygons)

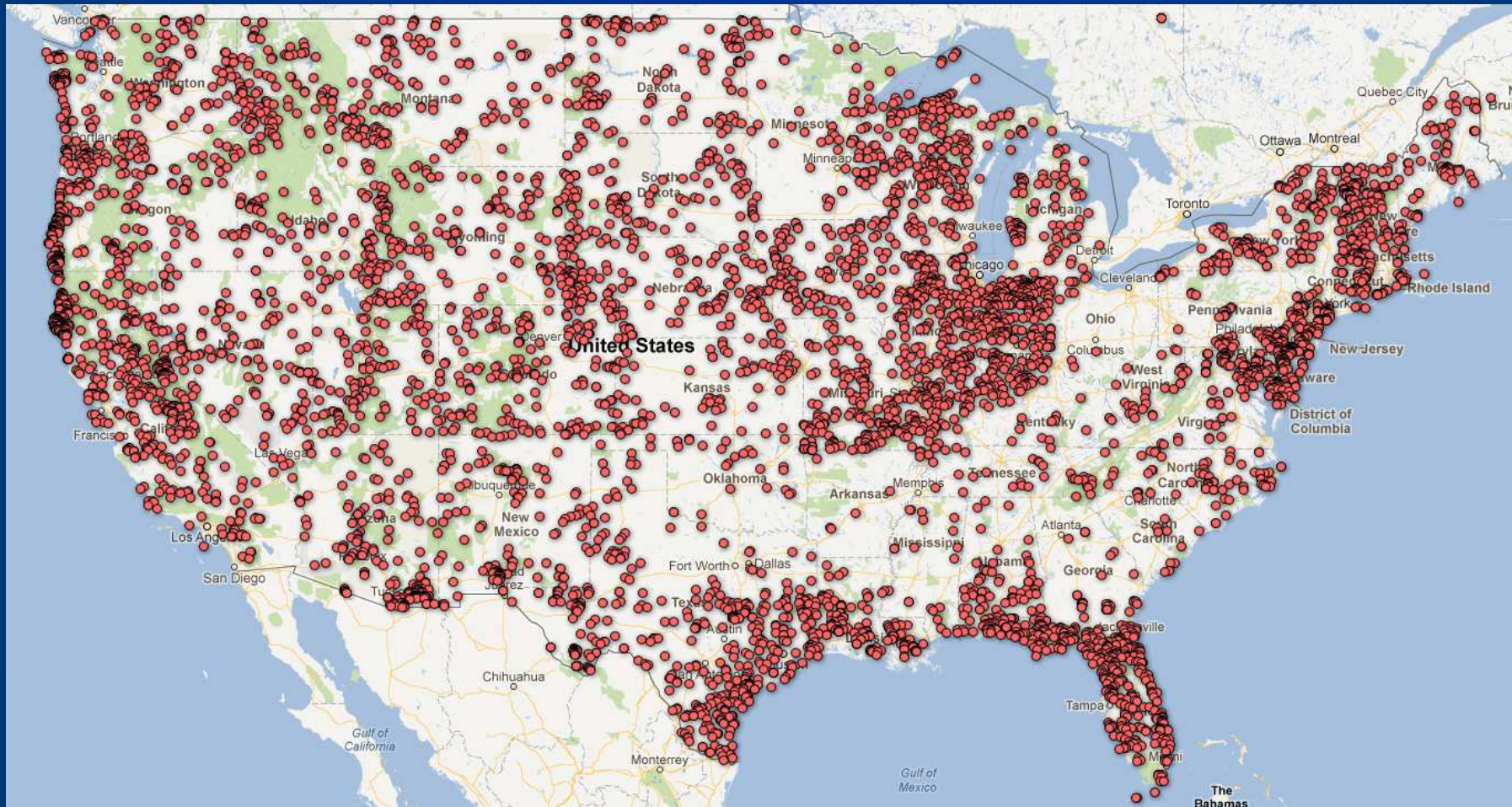


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Pedon Characterization Database (measured point data ~ 50,000 pedons)



Advantages

- It is measured data (not estimates)
- It is geo-referenced (vast majority)

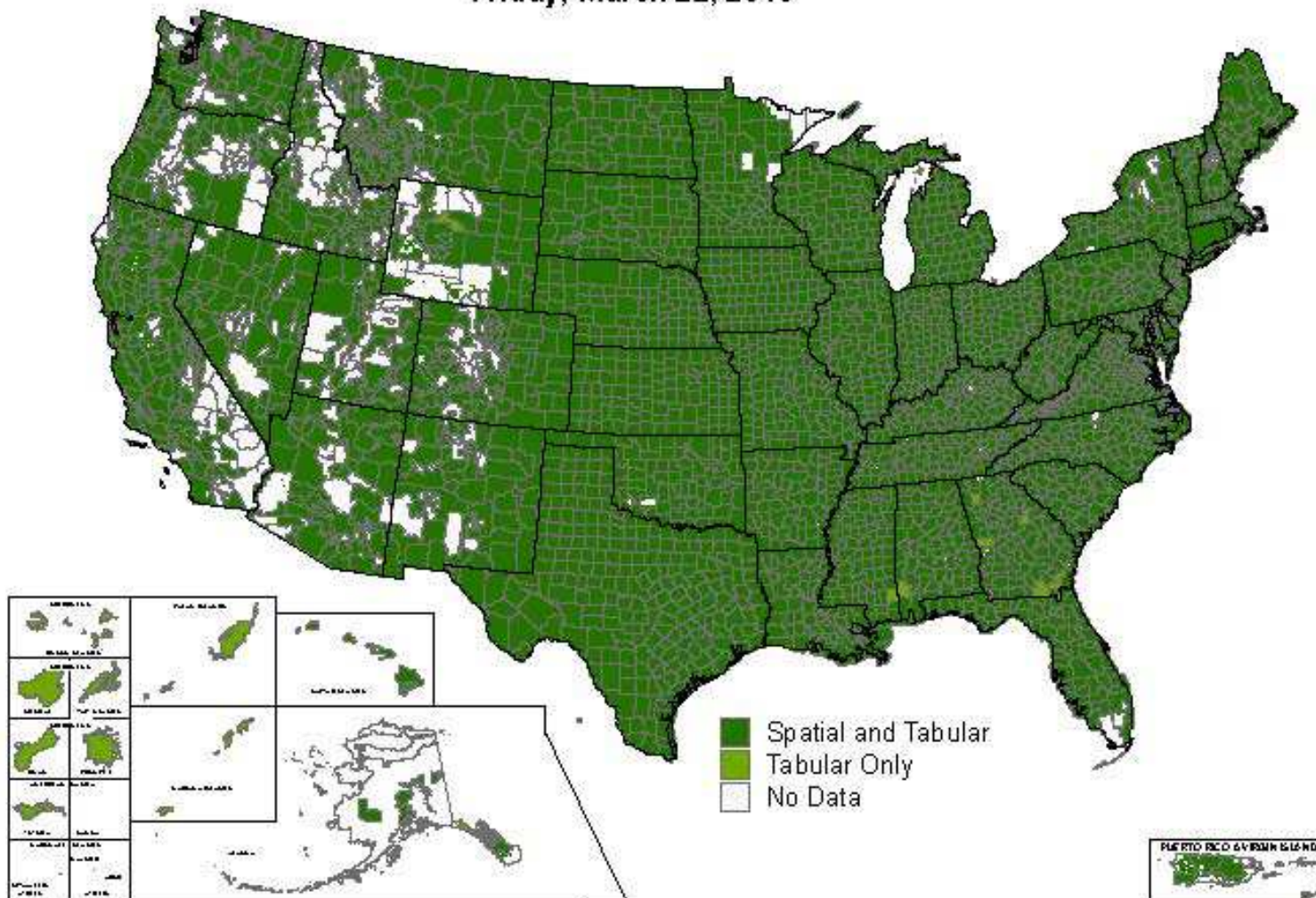
Disadvantages

- Sample points largely not systematically distributed
- Points may or may not “match” spatial delineations (components, map units)
- Not all pedons have all characterization data (many collected to answer specific questions)

U.S. DEPARTMENT OF AGRICULTURE

Available Soil Survey Data
Friday, March 22, 2013

NATURAL RESOURCES CONSERVATION SERVICE



produced 3/22/2013 9:57:07 AM Central Daylight Time

USDA Soil Data Portal <http://soildatamart.nrcs.usda.gov>

gSSURGO

- **Gridded** Soil Survey Geographic Database
- Identical data to SSURGO
- “Rasterization” of polygon level data
- Each raster cell retains all properties of the reference polygon
- Available in 10m x 10m and 30m x 30m resolution

➤ Advantages

- Nearly nationwide coverage (~80%)
 - Virtually all of the major agricultural land
- Wide range of data and information

➤ Disadvantages

- Data are estimates – “representative values”
- Data is assigned to components and horizons but georeferenced to mapunits

STATSGO2

- State Soil Geographic database
- Published: 2006
- Currency: 1984-1994
- Scale: 1:250,000 (minimum size delineation – 2,500 acres)
- Spatial data: ~78,000 polygons
- Tabular data: ~9,600 map units

Advantages

- Complete coverage for the US (including Alaska, Hawaii and US Territories)
- Contains “common” soils information used in DSS and simulation models
- “Pre-aggregated” to map units at 1:250,000

Disadvantages

- Course scale “simplifies” landscape
- Significantly less data / map unit than SSURGO



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Soil Information Products

Calculations and Interpretations

Calculations

- Information products developed by mathematically manipulating soils data (measured or estimated)
- Examples from SSURGO / gSSURGO
 - Available Water Capacity (AWC)
 - Total Organic Carbon



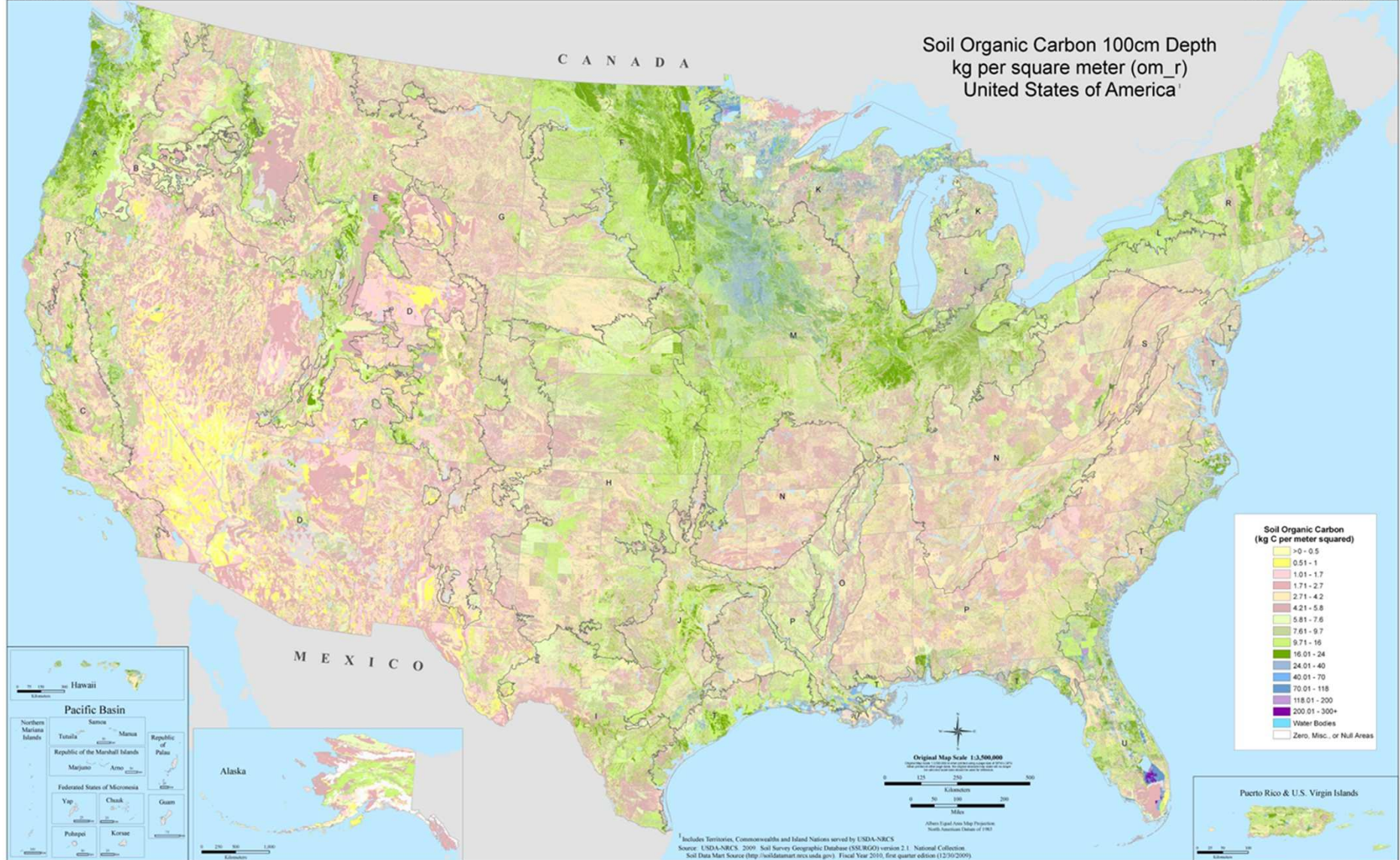
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Soil Survey Atlas United States of America

Soil Organic Carbon 100 cm Depth (kg per square meter)



Calculation and Map prepared by USDA-NRCS NCSS-Geospatial Research Unit, 3040 University Drive, Suite 3037 West Virginia University, Morgantown, WV 26505



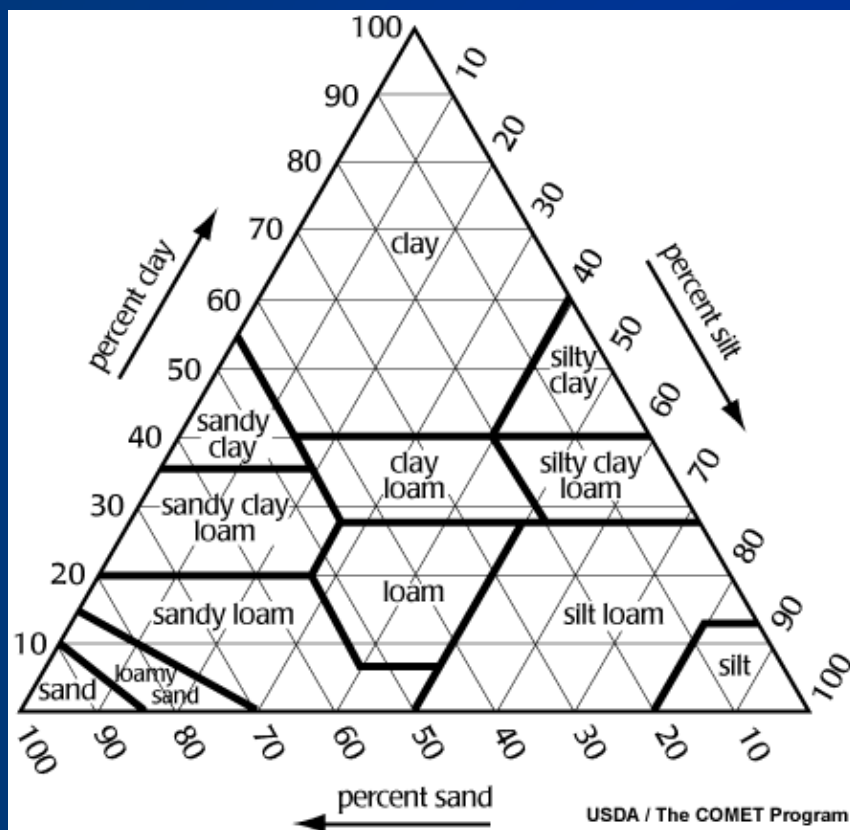
NCSS-GRU-0933-042011-1

Interpretations

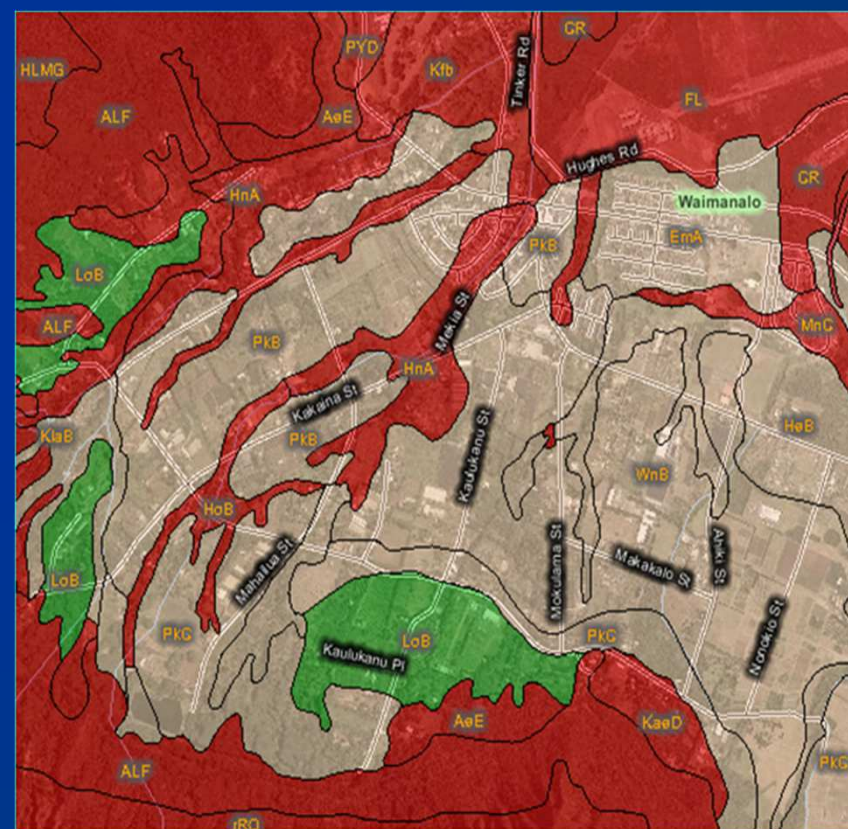
- Information products developed by using sets of rules combine and categorize the impact of soil properties
- Classes – broad categories
- Suitabilities – how “good” is the soil for a given use
- Limitations – what “problems” may limit the proposed use

Classes

Soil Texture

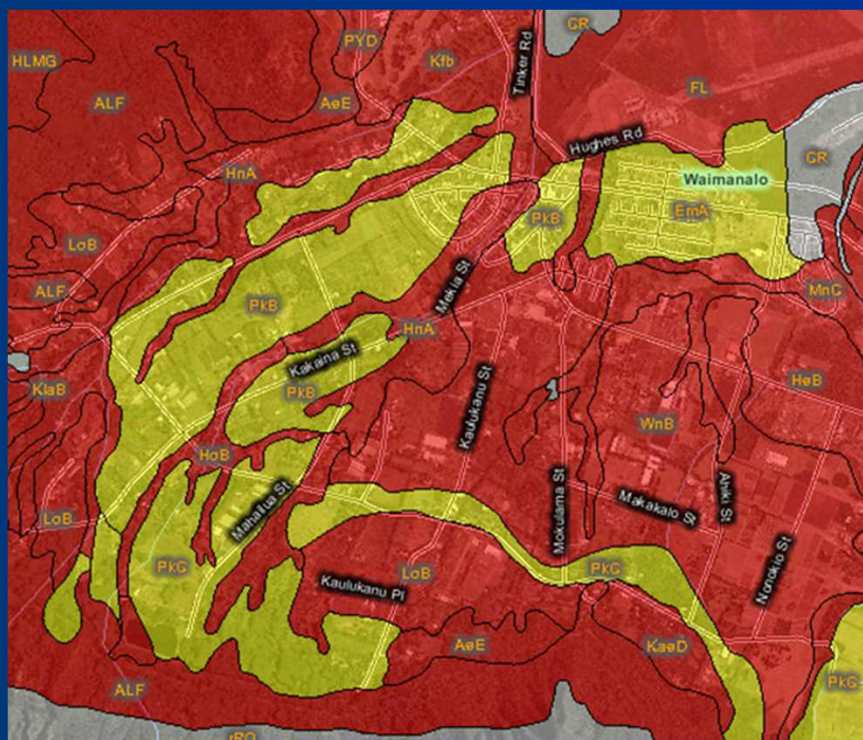


Prime Farmland



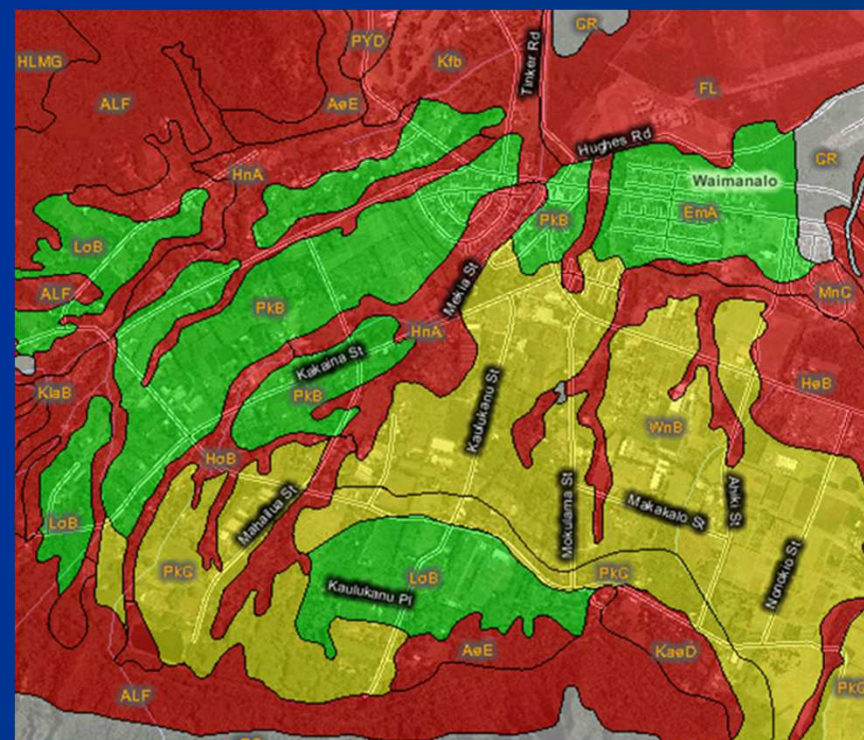
Suitability

Source of topsoil



Limitation

Dwellings w/o Basements





Natural Resources Conservation Service



National Cooperative Soil Survey

Soil Data Resources

Web and Database Outreach


**A Variety of Products for
Diverse Public Need**

Web Information Delivery

Web Soil Survey

- Most used USDA informational outreach site
- Over 152,000 unique users every month
- Over 493,000 customized soil reports developed every month
- Up to 100,000 acres (40,000 hectares) for a selected Area of Interest
- Tabular reports
- Thematic maps
- Professional customized reports



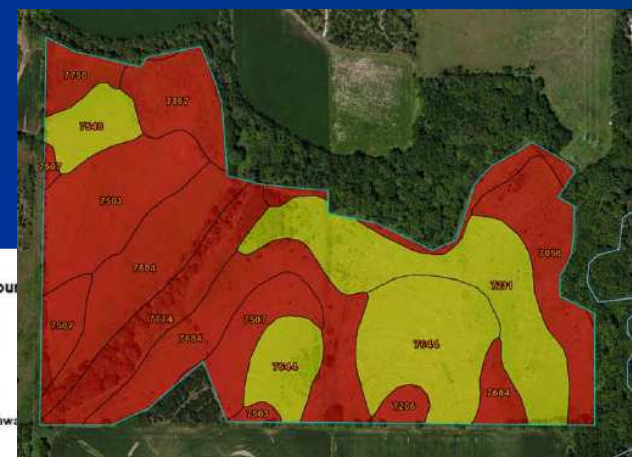


United States Department of Agriculture
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agriculture Department, and local participants.

Custom Soil Resource Report for Lancaster County, Nebraska

Joe's Weekend Hideaway



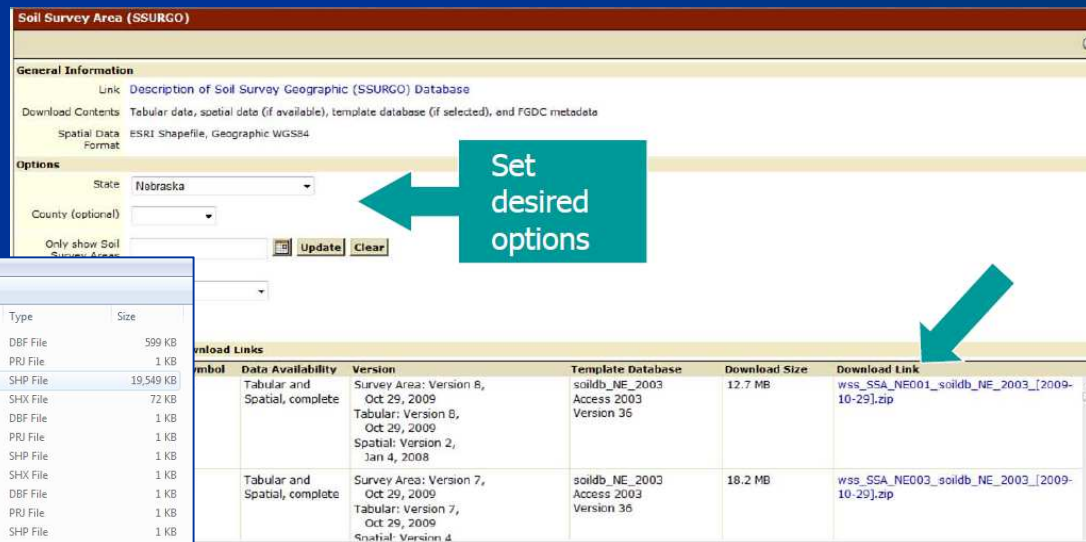
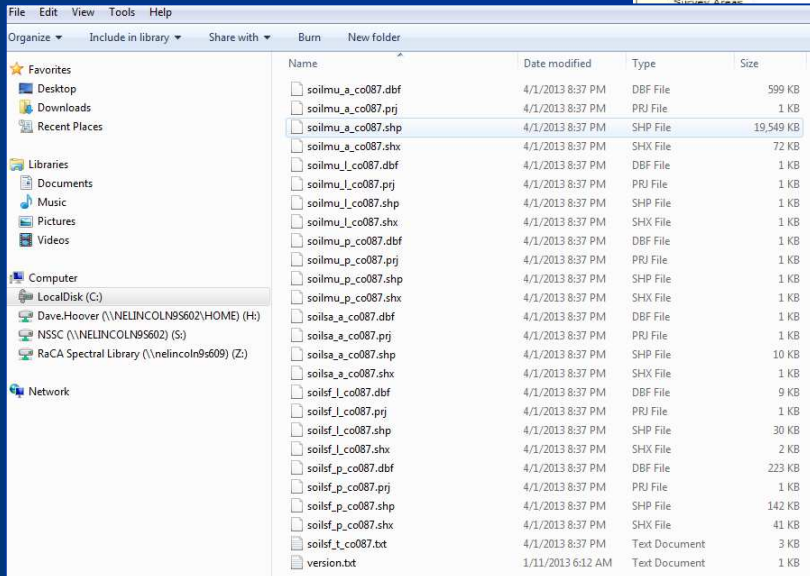
	values)	AOI	Percent of AOI
ed	Kennebec, occasionally flooded (95%)	Flooding (1.00)	5.5
		Depth to saturated zone (0.35)	7.8
	Colo, occasionally flooded (5%)	Flooding (1.00)	
		Depth to saturated zone (1.00)	
		Shrink-swell (0.50)	
ed	Aksarben (100%)	Shrink-swell (1.00)	0.8
ed	Judson (99%)	Shrink-swell (0.50)	10.3
			14.5
ed	Pawnee (100%)	Depth to saturated zone (1.00)	7.3
		Shrink-swell (1.00)	10.4
ed	Pawnee (100%)	Depth to saturated zone (1.00)	5.2
		Shrink-swell (1.00)	7.4
		Slope (0.04)	
ed	Shelby (100%)	Shrink-swell (0.50)	2.6
		Slope (0.04)	3.6



Web Soil Data Download

Web Soil Survey

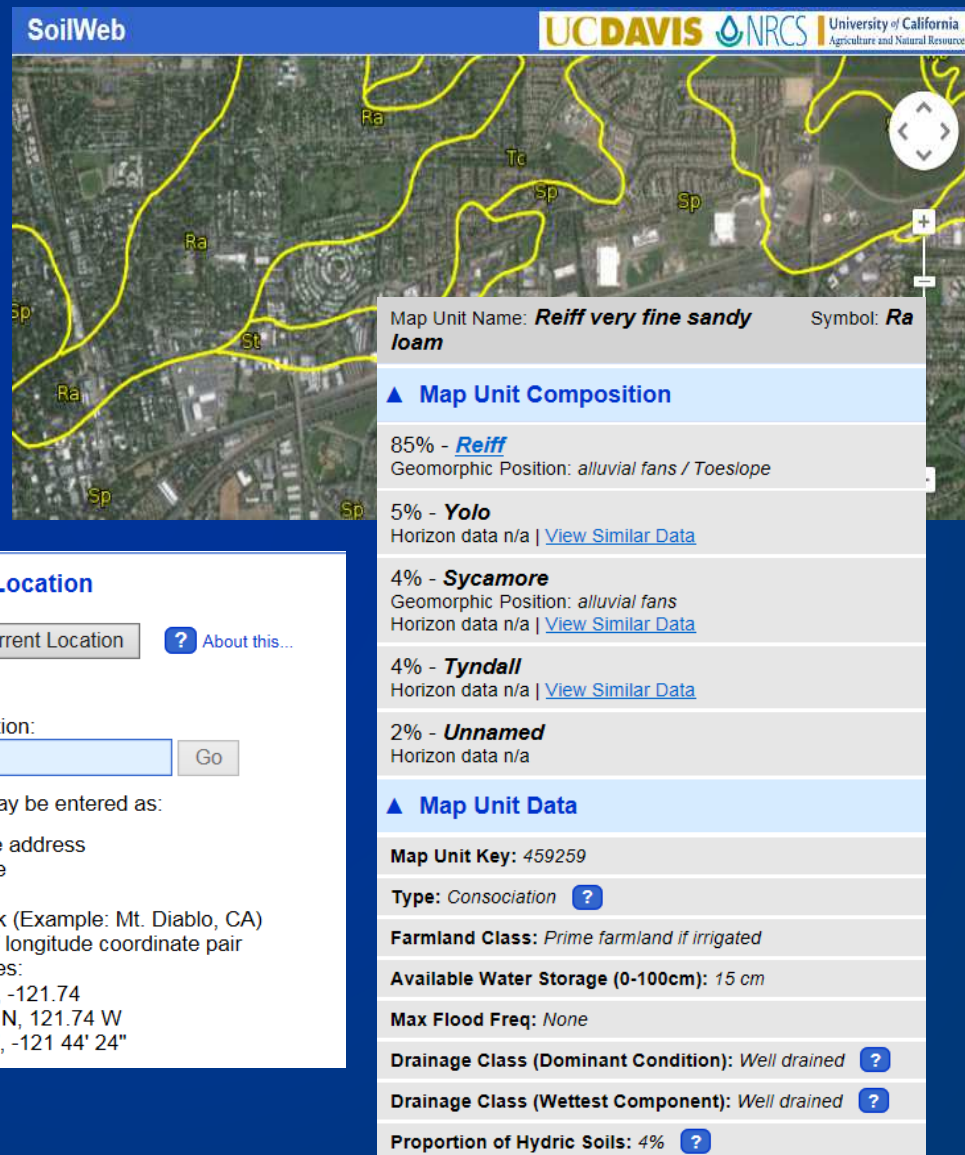
- Data portal
- Over 3200 soil surveys available
- Update notification processes



SoilWeb

(cooperative project with UC-Davis)

- Web access based on user defined location, or
- Uses device GPS system for map location
- Utilizes yearly download of authoritative data



SoilWeb UCDAVIS NRCS University of California Agriculture and Natural Resources

Map Unit Name: **Reiff very fine sandy loam** Symbol: **Ra**

Map Unit Composition

- 85% - **Reiff**
Geomorphic Position: *alluvial fans / Toeslope*
- 5% - **Yolo**
Horizon data n/a | [View Similar Data](#)
- 4% - **Sycamore**
Geomorphic Position: *alluvial fans*
Horizon data n/a | [View Similar Data](#)
- 4% - **Tyndall**
Horizon data n/a | [View Similar Data](#)
- 2% - **Unnamed**
Horizon data n/a

Map Unit Data

- Map Unit Key: 459259
- Type: *Consociation* ?
- Farmland Class: *Prime farmland if irrigated*
- Available Water Storage (0-100cm): 15 cm
- Max Flood Freq: *None*
- Drainage Class (Dominant Condition): *Well drained* ?
- Drainage Class (Wettest Component): *Well drained* ?
- Proportion of Hydric Soils: 4% ?

Zoom To Location

Use My Current Location ? About this...

- OR -

Enter a location: Go

Locations may be entered as:

- Complete address
- City, state
- Zip code
- Landmark (Example: Mt. Diablo, CA)
- Latitude / longitude coordinate pair

Examples:

- 38.55, -121.74
- 38.55 N, 121.74 W
- 38 33', -121 44' 24"

Web Data Services



Soil Data Access

- Web Map Services
- Web Feature Services
- Integration with other Web applications
- External access to current authoritative data

Please enter your SQL query:

```
SHAPE {
SELECT musym, muname, mukey
FROM legend l
INNER JOIN mapunit mu ON l.lkey = mu.lkey
WHERE areasymbol = 'NE079'
ORDER BY museq}
APPEND ({
SELECT mu.mukey, compct_r, compname
FROM legend l
INNER JOIN mapunit mu ON l.lkey = mu.lkey
LEFT OUTER JOIN component c ON mu.mukey = c.mukey
WHERE areasymbol = 'NE079'
ORDER BY compct_r DESC, compname}
AS component RELATE mukey TO mukey)
```

Please select the time frame and format:

Immediate / XML (same format as source)

 Immediate / HTML (results displayed in browser)

 Queued / XML

 Queued / Text

 First row contains column names

areasymbol	areaname	mukey	musym	muname	muacres	compct_r	compname	compctnd	texdesc	hzna
"AK612"	"Copper River Area, Alaska"	"51642"	"429"	"Gulkana silt loam, 0 to 2 percent slopes"	"11208 85"	"Gulkana				
"AK612"	"Copper River Area, Alaska"	"51643"	"430"	"Gulkana silt loam, 2 to 7 percent slopes"	"6189 85"	"Gulkana"				
"AK612"	"Copper River Area, Alaska"	"51644"	"431"	"Gulkana silt loam, 7 to 12 percent slopes"	"420 85"	"Gulkana"				
"AK612"	"Copper River Area, Alaska"	"51645"	"432"	"Gulkana silt loam, 12 to 20 percent slopes"	"277 85"	"Gulkana"				
"AK631"	"Yentna Area, Alaska"	"48423"	"244"	"Tyonek peat, 0 to 2 percent slopes"	"4430 90"	"Tyonek"				
"AK644"	"Ketchikan Area, Alaska"	"49655"	"244CD"	"Hydaburg-Grindall complex, 5 to 60 percent slopes"	"6804 40"	"Grindall"				
"AK644"	"Ketchikan Area, Alaska"	"49656"	"245CD"	"Hydaburg-Sunnyhay association, 5 to 60 percent slopes"	"36065"	"Sunnyhay"				
"AK644"	"Ketchikan Area, Alaska"	"49657"	"245CE"	"Hydaburg-Sunnyhay association, 5 to 75 percent slopes"	"56596"	"Sunnyhay"				
"AK644"	"Ketchikan Area, Alaska"	"49658"	"245E"	"Hydaburg-Sunnyhay association, 60 to 75 percent slopes"	"11192"	"Sunnyhay"				
"AK644"	"Ketchikan Area, Alaska"	"49659"	"246CD"	"Calamity-Hydaburg-Rock outcrop complex, 5 to 60 percent slopes"	"12106"	"Rock outcrop complex"				
"AK644"	"Ketchikan Area, Alaska"	"49660"	"246E"	"Calamity-Hydaburg-Rock outcrop complex, 60 to 75 percent slopes"	"44881"	"Rock outcrop complex"				
"AK644"	"Ketchikan Area, Alaska"	"49661"	"246F"	"Calamity-Hydaburg-Rock outcrop complex, 75 to 100 percent slopes"	"13212"	"Rock outcrop complex"				
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"AK644"	"Ketchikan Area, Alaska"	"49663"	"247E"	"Hydaburg-Rock outcrop complex, 60 to 75 percent slopes"	"44881"	"Rock outcrop complex"				
"AK644"	"Ketchikan Area, Alaska"	"49720"	"38AC"	"Magnetic-Golden complex, 0 to 35 percent slopes"	"14512 1"	"Grindall"				
"AK644"	"Ketchikan Area, Alaska"	"49721"	"38D"	"Magnetic-golden complex, 35 to 60 percent slopes"	"14512 1"	"Grindall"				
"AK644"	"Ketchikan Area, Alaska"	"49735"	"48C"	"Helm-Kitkun complex, 5 to 35 percent slopes"	"10252 2"	"Grindall"				
"AK644"	"Ketchikan Area, Alaska"	"49736"	"49C"	"Kina-Kitkun complex, 5 to 35 percent slopes"	"26715 1"	"Grindall"				
"AK644"	"Ketchikan Area, Alaska"	"49737"	"49D"	"Kina-Kitkun complex, 35 to 60 percent slopes"	"17623 85"	"Grindall"				
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"AK644"	"Ketchikan Area, Alaska"	"49822"	"84A"	"Grindall peat, 0 to 5 percent slopes"	"715 85"	"Grindall"				
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"AK644"	"Ketchikan Area, Alaska"	"49828"	"90C"	"Grindall-Kitkun complex, 5 to 35 percent slopes"	"3292 50"	"Grindall"				
"AK644"	"Ketchikan Area, Alaska"	"49829"	"90D"	"Grindall-Kitkun complex, 35 to 60 percent slopes"	"12828 50"	"Grindall"				
"AK645"	"Stikine Area, Alaska"	"49475"	"21"	"Niblack peat, 3 to 45 percent slopes"	"18029 85"	"Niblack"				
"AK645"	"Stikine Area, Alaska"	"49497"	"35"	"Kosman-Nayheso complex, 50 to 100 percent slopes"	"34215"	"Niblack"				
"AK649"	"Gulkana River Area, Alaska"	"50659"	"5T5"	"Haggard peat, 0 to 4 percent slopes"	"1160185"	"Haggard"				
"AK656"	"Delta River Area, Alaska"	"1483373"	"G03"	"Turbellina-Schleyer complex, 0 to 30 percent slopes"	"3020"	"Schleyer complex"				



Natural Resources Conservation Service



National Cooperative Soil Survey

National Cooperative Soil Survey Lab Web Data Mart



NCSS Soil Characterization Query Results

[Return Last Data Interface](#)

[Check All](#)

[Bottom](#)

	Lab Pedon Number	User Pedon ID	Sampled as Series		
<input type="checkbox"/>	40A2233	57NE057001	Bridgeport		
<input type="checkbox"/>	40A2234	57NE057002	Bridgeport		
<input type="checkbox"/>	40A2065	57NE057003	Bridgeport		
<input type="checkbox"/>	40A2235	57NE057004	Bridgeport		
<input type="checkbox"/>	89P0133	88NE057001	Colby		
<input type="checkbox"/>	89P0134	88NE057002	Duroc		
<input type="checkbox"/>	89P0135	88NE057003	Duroc		
<input type="checkbox"/>	89P0136	88NE057004	Keith	Ulysses	8
<input type="checkbox"/>	89P0137	88NE057005	Ulysses	Ulysses	9
<input type="checkbox"/>	89P0138	88NE057006	Keith	Ulysses	10
<input type="checkbox"/>	89P0139	88NE057007	Colby	Sully	11



Natural Resources Conservation Service



National Cooperative Soil Survey

National Cooperative Soil Survey Lab Web Data Mart



Soils Analyzed by:
NRCS Kellogg Soil Survey Laboratory &
Cooperating University Laboratories

Site Identifier: S10SP056002
Lab Pedon Number: 12N0035
Sampled As Series Name: Kiko
Correlated Series Name:
Country: Spain
State: Catalonia
County:
MLRA:
Latitude: 41.705
Longitude: -1.7930556

Cont. Site ID: S10SP05

[Lab Data Report](#)
[Pedon Description Report](#)

Pedon ID: S2010SP056002

Slope (%)	Elevation (meters)	Aspect (deg)	MAAT (C)	MSAT (C)	MWAT (C)	MAP (mm)	Frost-Free Days	Drainage Class	Slope Length (meters)	Upslope
5.0	320.0							well		

Ap1--0 to 12 centimeters (0.0 to 4.7 inches); silt loam, reddish brown (2.5YR 4/4), moist; moderate fine granular structure; friable; few very fine roots; 2 percent nonfat 2 to 75-millimeter unspecified fragments; strong effervescence; abrupt smooth boundary. Lab sample # 12N00171

Ap2--12 to 30 centimeters (4.7 to 11.8 inches); loam, reddish brown (2.5YR 4/4), moist; moderate medium subangular blocky structure; firm; few roots; few very fine tubular pores; 5 percent nonfat 2 to 75-millimeter unspecified fragments; strong effervescence; clear smooth boundary. Lab sample # 12N00172

Bknw1--30 to 51 centimeters (11.8 to 20.1 inches); loam, reddish brown (2.5YR 4/4), moist; moderate fine subangular blocky structure; friable; few roots; few very fine tubular pores; 5 percent carbonate nodules; 10 percent nonfat 2 to 75-millimeter unspecified fragments; violent effervescence; clear smooth boundary. Lab sample # 12N00173

Bknw2--51 to 91 centimeters (20.1 to 35.8 inches); silty clay loam, dusky red (10R 3/4), moist; strong medium subangular blocky structure; very firm; few very fine roots; few very fine tubular pores; 10 percent carbonate nodules; 15 percent nonfat 2 to 75-millimeter unspecified fragments; strong effervescence; clear smooth boundary. Lab sample # 12N00174

Bt--91 to 129 centimeters (35.8 to 50.8 inches); very gravelly loamy sand, reddish brown (2.5YR 4/4), moist; strong medium subangular blocky structure; firm; few very fine roots; common fine tubular pores; 3 percent carbonate nodules; 5 percent nonfat 2 to 75-millimeter unspecified fragments; strong effervescence; abrupt smooth boundary. Lab sample # 12N00175

2BC--129 to 150 centimeters (50.8 to 59.1 inches); dusky red (10R 3/4), moist; weak fine subangular blocky structure; friable; few very fine roots; 45 percent nonfat 2 to 75-millimeter unspecified fragments; strong effervescence.



Pedon ID: S10SP056002 *** Primary Characterization Data ***
(Cataluna, Spain)

Sampled as on Sep 08, 2010 : Kiko ; Coarse-silty, mixed, mesic
Revised to :

SSL - Project C2012SP56008 Spain 2012
- Site ID S10SP056002 Lat: 41° 42' 18.00" north Long: 1° 47' 35.00" west NAD83
- Pedon No. 12N0035
- General Methods 1B1A, 2A1, 2B

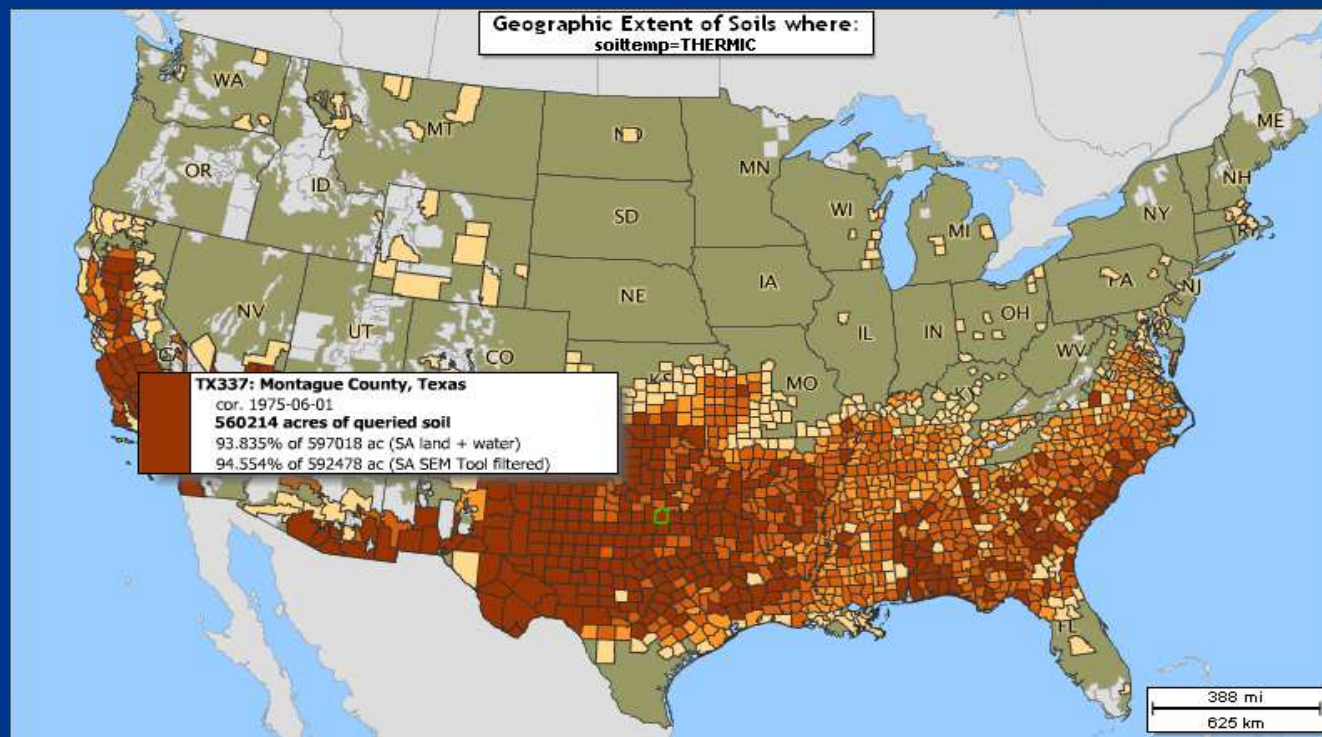
Layer	Horizon	Orig Hzn	Depth (cm)	Field Label 1	Field Label 2	Field Label 3
12N00171	Ap1	Ap1	0-12	S10SP056002-1		
12N00172	Ap2	Ap2	12-30	S10SP056002-2		
12N00173	Bknw1	Bknw1	30-51	S10SP056002-3		
12N00174	Bknw2	Bknw2	51-91	S10SP056002-4		
12N00175	Bt	Bt	91-129	S10SP056002-5		

Calculation Name		Result	Units of Measure
LE, Whole Soil, Summed to 1m		1	cm/m

PSDA & Rock Fragments		-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-		
		(---- Total ----) (- Clay ---) (--- Silt ---) (----- Clay Silt Sand Fine CO ₂ Fine Coarse VF F < .002 05 < < .002 02 .05 .10 .002 .05 .2 .0002 .002 .02 .05 .10 .25 (----- % of <2mm Mineral Soil ----- 3A1a1a 3A1a1a 3A1a1a 3A1a1a 3A1a1a 3A1a1a 3A1a1a 3A1a1a 3A1a1a 3A1a1a										
Layer	Depth (cm)	Horz	Prep									
12N00171	0-12	Ap1	S	12.5	39.7	47.8	--	20.1	19.6	18.9	17.5	
12N00172	12-30	Ap2	S	15.2	41.7	43.1		1.5	21.1	20.6	18.3	12.7
12N00173	30-51	Bknw1	S	17.6	42.2	40.2		2.3	23.9	18.3	17.1	12.7
12N00174	51-91	Bknw2	S	16.1	45.3	38.6		2.3	26.4	18.9	22.2	13.5
12N00175	91-129	Bt	S	16.1	41.0	42.9		2.1	25.5	15.5	20.6	17.0

Series Extent Mapper Web Tool

(cooperative project with Penn State)





SERIES NAME EXACT MATCH **SERIES NAME SEARCH** **TAXONOMIC LEVEL** **CLASSIFICATION SEARCH**

MAP SERIES

Hillshade layer visible
 MLRA layer visible
 Soil Series fill visible

data available data not available

acres per soil survey area (total = 10956490)

Acres not reported	7042 or less	7773 to 25333	26292 to 219809	224235 to 2814698
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Web Access to Archived Soil Surveys

- 4,154 soil surveys digitally archived
- 191,842 total digital manuscripts and maps
- Over 1 million downloads since archiving started

Soil survey name (Follow links for online surveys.)	Date
Ada County	Currer
Ada County Area	1980
Adams-Washington Area, Parts of Adams and Washington Counties	2000
Adams-Washington Area, Parts of Adams and Washington Counties	Currer
Bannock County Area	1987
Bannock County Area, Parts of Bannock and Power Counties	Currer
Bear Lake County Area	2010
Bear Lake County Area	Currer
Bear Lake Valley Area	1926
Benewah County	1930
Benewah County Area	1980
Benewah County Area	Currer
Bingham Area	1973

ADA COUNTY AREA, IDAHO

Soils on lacustrine foothills

The soils in the group are on the foothills above the Boise River. The elevation ranges from about 2,900 feet to about 3,400 feet. The soils are nearly level to very steep. The average annual precipitation is 12 inches, and the average annual temperature is 50 degrees F. The average frost-free season is about 120 days. These soils are very deep, and they are well drained to excessively drained. They are used mainly as rangeland and wildlife habitat and for recreation. In a few areas, the less sloping soils are used for farming. Slope and inaccessibility are the main limitations to building site development and other engineering uses. This group consists of two map units, which make up about 15 percent of the survey area.

2. Quincy-Lankbush-Brent, low rainfall

Nearly level to very steep, excessively drained and well drained, very deep soils, on alluvial fans and terraces in the foothills.

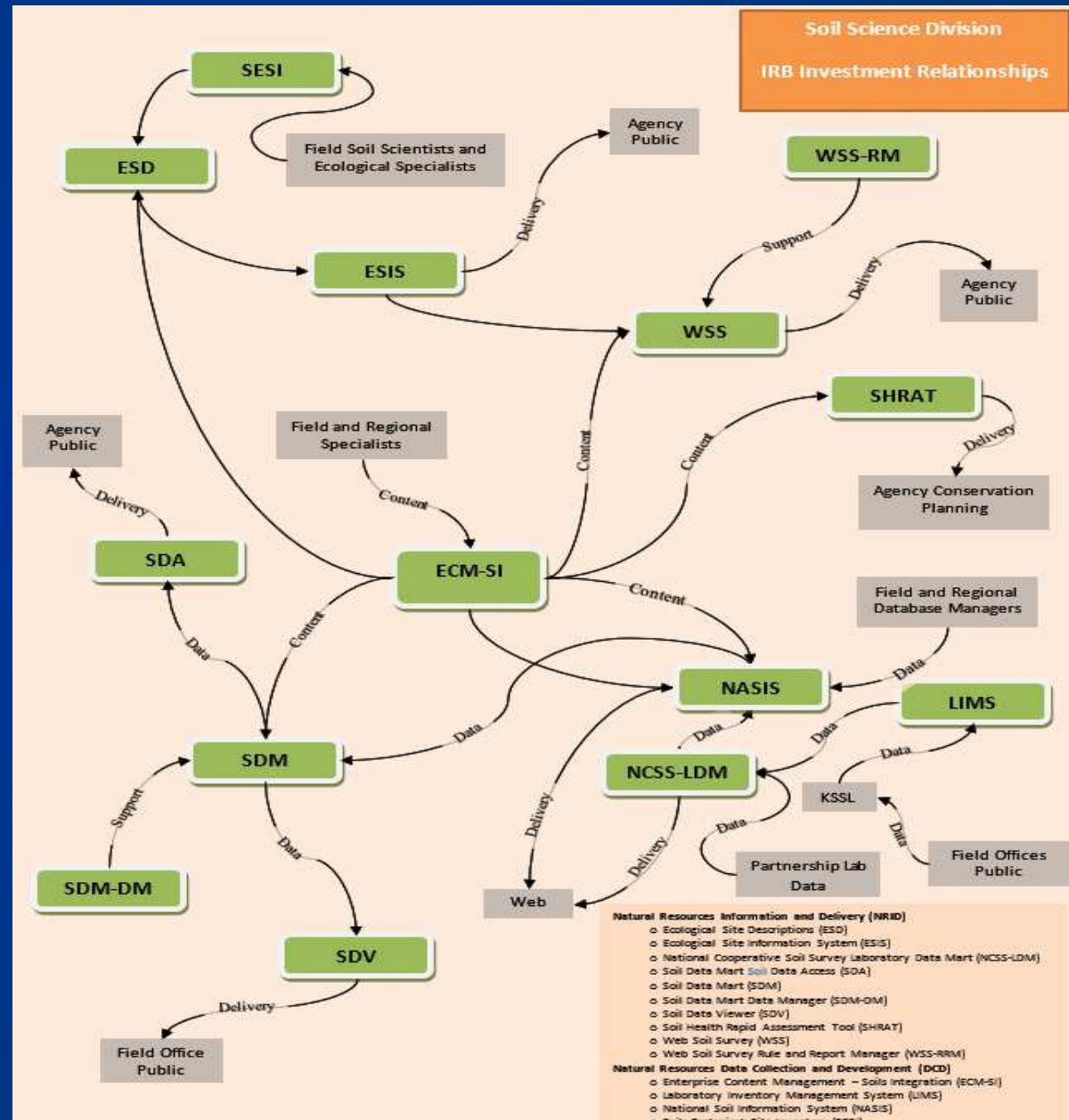
The soils in this map unit are on alluvial fans and terraces in the foothills (fig. 2). The foothills have a dominant aspect of northeast or southwest. The soils formed in siltan material, acid gneiss, silurian, and lacustrine sediments. They are drained primarily by small, intermittent streams. The slope ranges from 0 to 80 percent.

This map unit makes up about 13 percent of the survey area. It consists of about 20 percent Quincy soils; 20 percent Lankbush soils; 15 percent Brent, low rainfall, soils; and 45 percent minor soils.

Quincy soils formed mainly in siltan deposits on the south-facing side slopes of alluvial terraces in the foot-

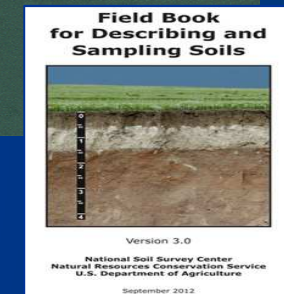
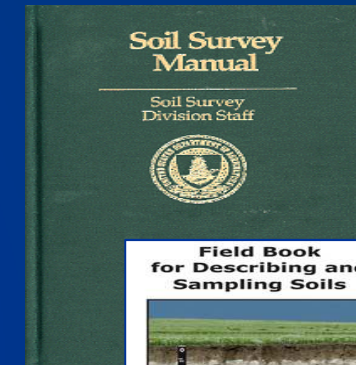
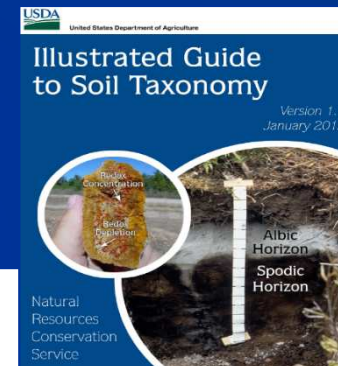
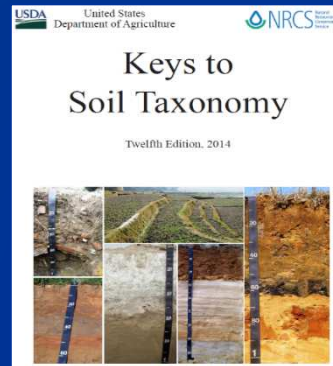
Soil Resource Relations and Dependencies

- Multiple services
- Complex relations and dependencies
- All supported by NRCS
- Relation processes enabled
 - Data Movement
 - Content Transfer
 - Support Services
 - Information Delivery

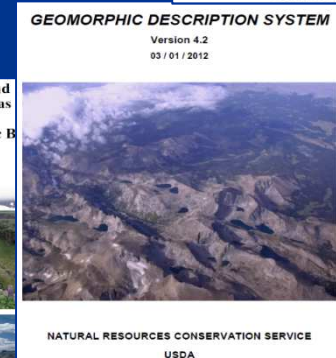
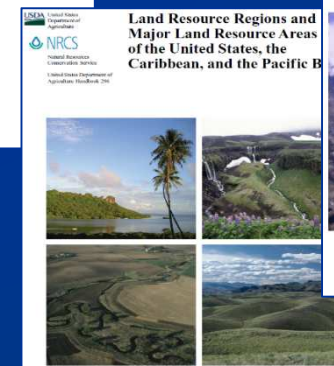
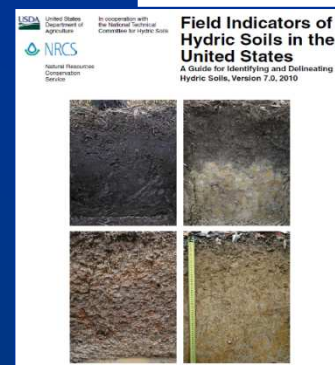


Web Soil Resources

Digital Versions of Technical References



Soil Taxonomy
A Basic System of Soil Classification for Making and Interpreting Soil Surveys





Natural Resources Conservation Service

NCSS

National Cooperative Soil Survey

Web Soil Resources

NRCS YouTube Channel

The screenshot shows the NRCS YouTube channel page. At the top, there is a banner with the NRCS logo and the text "NRCS NSSC". Below the banner, there are navigation tabs for Home, Videos, Playlists, Channels, Discussion, and About. The main content area displays a grid of video uploads, including:

- Webinar - History and Revision Recommendation... (20 views - 1 day ago)
- Webinar - Technical Soil Services: FY2015 Update... (85 views - 3 weeks ago)
- Webinar - NASIS and Provisional Ecological Site... (133 views - 1 month ago)
- Webinar - O Horizons in Forest Soils (2/2014) (107 views - 1 month ago)
- How To Sample Bulk Density In The Field (887 views - 1 month ago)
- Webinar - Haiti Pilot Soil Survey (1/2015) (87 views - 2 months ago)
- Webinar - Soil Health Nutrient Tool (1/2015) (342 views - 2 months ago)
- Webinar - Soil Carbon Stocks in Victoria, Austral... (29 views - 2 months ago)
- Webinar - Wetland ESD ArcMap Training (12/2014) (248 views - 3 months ago)
- Webinar - Valley Fever Habitat Model (11/2014) (25 views - 3 months ago)
- Webinar - dSSURGO: Spatial Disaggregation and... (199 views - 3 months ago)
- Webinar - Working with the New FY2015 SSURGO and... (278 views - 4 months ago)

The screenshot shows the Nasis UserGuide YouTube channel page. At the top, there is a banner with a landscape image and the text "Nasis UserGuide". Below the banner, there are navigation tabs for Home, Videos, Playlists, Channels, Discussion, and About. The main content area displays a list of video activities, including:

- Nasis UserGuide uploaded and posted 1 week ago
- SDA Video2 basicQuery joins by Nasis UserGuide (1 week ago - 04 views)
- SDA Video5 subquery FromConditions by Nasis UserGuide (1 week ago - 18 views)

NASIS and Soil Data Access Videos

Web Soil Resources

On-the-Job Training Modules

OJT for MLRA Soil Survey Offices

OJT module completion checklist for MLRA Soil Survey Offices

SF-182 Instructions for OJT Modules (PDF; 309 KB) — modules in their learning history in Aglearn. This requires a learning request. These instructions will help facilitate this process.

000 Map Unit Design and Mapping Soils

- > 001 Understand the MLRA concept for doing soil surveys
- > 002 Understand the relationship of the factors of soil formation
- > 003 Understand the concepts of landscape models and soil variability
- > 004 Understand soil variability within the landscape context
- > 005 How to differentiate between scales and orders of soil variability
- > 006 Understand what environmental issues exist in your area (PDF; 165 KB)
- > 007 Understanding the processes of mapping soils (PDF; 108 KB)
- > 008 How to identify native and nonnative plants and resources (PDF; 108 KB)
- > 009 How to plan traversing in your soil survey area based on terrain (PDF; 108 KB)
- > 010 How to design a map unit (PDF; 145 KB)
- > 011 How to recognize and use components in soil survey map units (PDF; 108 KB)
- > 012 How to recognize and distinguish map units in soil survey maps (PDF; 108 KB)
- > 013 How to name map units (PDF; 130 KB)
- > 014 How to establish and track a proposed new map unit (PDF; 73 KB)
- > 015 How to use a soils key for your soil survey area (PDF; 225 KB)
- > 016 How to develop a soils key for your soil survey area (PDF; 108 KB)
- > 017 How to effectively orient yourself on a photographic image while mapping or traveling in the field soil survey area (PDF; 34 KB)
- > 018 How to use a topographic map in your soil survey area (PDF; 75 KB)

100 Soil Describing

- > 101 How to use the Field Book for Describing and Sampling Soils (PDF; 67 KB)
- > 102 How to fill out a 232 soil description form (PDF; 37 KB)
- > 103 How to create sketches for a 232 soil description (PDF; 46 KB)
- > 104 Understand the differences between soil properties and qualities (PDF; 65 KB)
- > 105 How to differentiate and identify soil horizons in the field (PDF; 41 KB)
- > 106 Color — How to use the Munsell Soil Color Charts to describe soil colors (PDF; 67 KB)
- > 107 Color — How to describe soil matrix colors (PDF; 67 KB)
- > 108 How to describe mottles (PDF; 34 KB)
- > 109 How to describe redoximorphic features (PDF; 34 KB)
- > 110 How to describe concentrations (PDF; 34 KB)
- > 111 How to describe ped and void surfaces (PDF; 34 KB)
- > 112 Texture — How to describe sand, silt, and clay (PDF; 34 KB)
- > 113 Texture — How to distinguish sand, silt, and clay (PDF; 34 KB)
- > 114 Texture — How to estimate texture (PDF; 34 KB)
- > 115 Texture — How to describe texture (PDF; 34 KB)
- > 116 Fragments — How to describe concentrations (PDF; 34 KB)
- > 117 Fragments — How to describe size (PDF; 34 KB)
- > 118 Fragments — How to describe kind (PDF; 34 KB)
- > 119 How to describe soil structure (PDF; 34 KB)

OJT Module Lesson

Title: **107 How to describe soil matrix colors.**

WHAT	WHY, WHEN, WHERE, HOW, SAFETY, QUALITY
Cycle step 1	Trainee should access via the internet and read: <ul style="list-style-type: none"> • <i>Soil Survey Manual, Chapter 3</i> section on Soil Color-Dominant Color. • <i>Field Book for Describing and Sampling Soils</i> section on Soil Color-Matrix Color.
Cycle step 2	Do the following:
1. Review definition of dominant (matrix) color.	This was part of the reading assignment in the SSM. Point out that this is determined with broken samples in most situations.
2. Review conditions for measuring color.	This was part of the reading assignment in the SSM and prerequisite modules. Discuss light conditions and moisture content.
3. Use a "broken" sample to demonstrate how to locate hue, value, and chroma on the charts.	Do this in the field. Demonstrate how you "acquire" a broken sample for description.
4. Demonstrate how to add water to reach the appropriate moisture state	SSM reading assignment covers this. Discuss and demonstrate as needed.

On-the-Job Training Modules

Web Technical Soil Services

Assistance to Land Owners, Educators and Conservation Planners



USDA Natural Resources Conservation Service

Soil Quality Indicators

Physical, Chemical and Biological Indicators for Soil Quality Assessment and Management

A series of information sheets for physical, chemical and biological indicators is available to help conservationists and soil scientists with soil quality assessment. Use this guide to learn more about selecting appropriate soil quality indicators to assess specific soil functions. Visit <http://soils.usda.gov/soilassessment/> for more information and to download copies of the information sheets.

What is soil quality?

Concrete definitions for soil quality include "fitness for use" and "the capacity of a soil to function." Combining these, soil quality is the ability of a soil to perform the functions necessary for its intended use.

Soil functions include:

- sustaining biological diversity, activity, and productivity
- regulating water and solute flow
- filtering, buffering, degrading organic and inorganic materials
- storing and cycling nutrients and carbon
- providing physical stability and support

Tip: The function part of the top right corner of each information sheet (see D, W, K, N or S to show the function) that is most relevant to the subject indicator.

Tip: This indicator icon at the top right corner of each information sheet (see #, C or # to show the category in which the indicator best fits).

soil Quality Measure

soil Quality Kit - Guide for Educators

Soil quality integrates the physical, chemical, and biological. Therefore, to capture the holistic nature of soil quality or health, however, not all parameters have equal relevance to all soils. Soil quality may not be useful in the eastern part of the U.S. where water infiltration is a minimum data set of soil program components are selected based on their ability to indicate the land use, climate, and soil type. Indicators in the soil quality quality assessments. The kit should be used as a screening tool quality assessment. The kit should be used as a screening tool quality assessments. The kit should be used as a screening tool quality assessments.

There are **two fundamental ways** to assess soil quality:

1. Take measurements periodically over time to **monitor** soil
2. Compare **measured values** to a standard or reference soil

By making use of the two ways of assessing soil quality, the kit is:

- Make side-by-side comparisons of different soil management: soil quality.
- Take measurements on the same field over time to monitor to management;
- Compare problem areas in a field to the nonproblem areas; or
- Compare measured values to a reference soil condition or to 17

soil Organic Matter

soil Organic Matter Kit - Guide for Educators

Soil organic matter (SOM) is the organic component of soil, consisting of both living and dead organic matter. It is a key component of soil health and is essential for soil structure, nutrient cycling, and water retention. SOM is a dynamic pool of organic matter that is constantly being added to and decomposed. SOM is a key component of soil health and is essential for soil structure, nutrient cycling, and water retention. SOM is a dynamic pool of organic matter that is constantly being added to and decomposed.

Soil organic matter content can be estimated in the field and tested in a lab to determine soil health. SOM is a key component of soil health and is essential for soil structure, nutrient cycling, and water retention. SOM is a dynamic pool of organic matter that is constantly being added to and decomposed.

Soil organic matter impacts the rate of surface applied herbicides along with 1 control weeds. Soil organic matter impacts the potential for herbicide control of weeds necessary to manage.

Figure 1. Major soil organic matter components. The Soil Food Web (SFW) (Meyer)

Inherent Factors Affecting Soil Organic Matter

Inherent factors affecting soil organic matter such as climate and soil texture cannot be changed. Climate conditions, such as rainfall, temperature, and soil aeration (driven with wind) affect the rate of organic matter decomposition. Organic matter decomposes faster in climates that are warm and humid and slower in cold and dry climates. Phosphorus is released faster when soil is well aerated and slower when soil is waterlogged. Soils with high clay content and high organic matter content (SOM) are more resistant to erosion (Figure 2). SOM is a key component of soil health and is essential for soil structure, nutrient cycling, and water retention. SOM is a dynamic pool of organic matter that is constantly being added to and decomposed.

soil Phosphorus

soil Phosphorus Kit - Guide for Educators

Phosphorus (P) is a nutrient that is essential for plant growth and development. It is a key component of soil health and is essential for soil structure, nutrient cycling, and water retention. SOM is a dynamic pool of organic matter that is constantly being added to and decomposed.

Figure 1. Soil phosphorus cycle (Parslow et al., 2010)

Inherent Factors Affecting Soil Phosphorus

Inherent soil properties and climate affect soil phosphorus availability. Soil phosphorus is released faster when soil is well aerated and slower when soil is waterlogged. Soils with high clay content and high organic matter content (SOM) are more resistant to erosion (Figure 2). SOM is a key component of soil health and is essential for soil structure, nutrient cycling, and water retention. SOM is a dynamic pool of organic matter that is constantly being added to and decomposed.

INDICATOR	Excellent (8-10)
Surface cover	Year-round surface cover from living crop or dead mulch; cover 50-100% after planting
Soil structure (0-3 inches)	Soil aggregates crumb, don't disintegrate in water; soil tilth excellent; good weight-bearing capacity; no crusting and sealing
Organic matter (0-3 inches)	Soil dark color; visible organic matter at surface; organic matter content high (>4% in top 2 inches); approaching level under native vegetation
Soil erosion	No visual evidence of rills or soil movement and deposition in the field; few to no rock fragments visible at surface
Soil compaction	Soil not very resistant to penetration with soil compaction tester; no evidence of plow pan; low penetration resistance in subsoil
Water infiltration	Water drains well after heavy rain; ponding largely absent; low runoff
Soil biodiversity	Much evidence of earthworm activity; many nightcrawler mounds; spiders and ground beetles visible under residue
Plant and root growth	Seedling emergence even and fast; plant growth vigorous and even; plants resist drought stress; root growth vigorous; roots fibrous; roots explore soil profile

Uses of Soils Information for Land Management

Wide Variety of Customers

Wide Range of Scales

Many Information Needs

Landscape scale

- National, state, watershed (catchment)
- Dominated by class-based information
- Commonly used to inform land use planning and policy
 - Zoning / land use restrictions
 - Taxation / land valuation
 - Rating / ranking / eligibility criteria for government assistance programs

Specific Examples

- Prime Farmland
 - Mapunit level binary information
- Hydric rating
 - Component level binary information
 - Aggregated to 5 classes at mapunit level
- Hydrologic Soil Group
 - Component level, 4-class rating system

Support for modeling

- Watershed and larger landscape scale models are incorporating more detailed soils data and information
 - STASGO2 → SSURGO or gSSURGO
- Often use mix of mapunit, component and horizon-level data
- Expert assistance required to aggregate appropriately

Conservation Effects Assessment Project (CEAP)

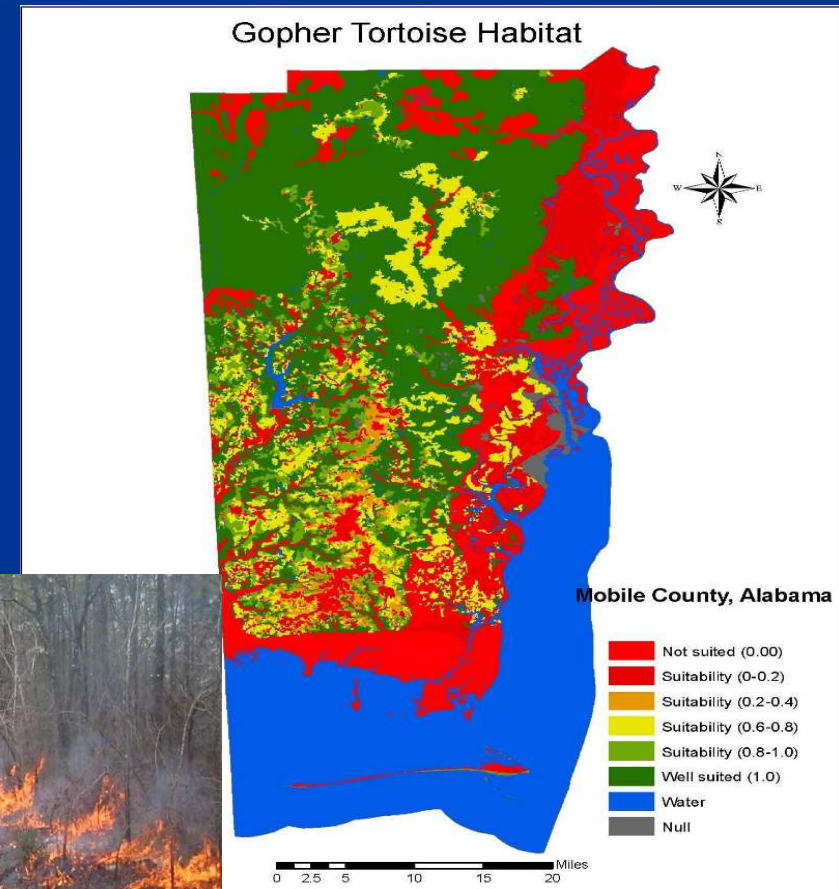
- Major USDA national priority
- Collaborative project between NRCS and the Agricultural Research Service (ARS)
- Detailed studies in ~ 20 specific watersheds (model calibration)
- Extrapolation to larger land use and physiographic regimes nationwide

Example model input variables

- Soil properties (measurable)
 - Organic matter (or carbon) content
 - Depth (to restrictive layer, to water table)
 - Permeability/kSAT
 - Sand/Silt/Clay percentage
- Soil “properties” (derived)
 - Available water capacity
 - Texture
- Interpreted/calculated values
 - Hydrologic soil group
 - USLE k factor

Soils as a Factor in Gopher Tortoise Habitat

- Gopher tortoise burrows provide shelter to many other species
- Suitable soils are sandy and dry
- Savannah vegetation must be maintained



Field and Farm Scale

- Primary scale of NRCS activities
 - NRCS is SSDs primary customer
- Scale most often used by individuals (Web Soil Survey users) for informal assessments
- Scale increasingly used by both private sector and other government agencies

Core NRCS Principles

- Collaborative and voluntary
- Integrated conservation planning process
- Identify and address resource concerns

SWAPAH

- **Soil**
- Water
- Air
- Plants
- Animals
- Humans

Soils Data and Information in Conservation Planning

- Data to support resource assessment models: RUSLE2, WEPS, Win-PST
- Data and information to inform conservation practice selection, location and design
 - Vegetative practices
 - Engineering practices

Other Users of Soils Data for Agricultural Land Management

- Agricultural consultants and consulting firms
- Private agribusiness entities
- Other government agencies
 - Risk Management Agency (crop insurance)
 - Farm Services Agency

Other Land Uses

- Increased NRCS interest in and support for management in urban areas – soil information plays a key role
 - Community gardens
 - Other land uses (parks, playgrounds)
- Private sector development professionals
 - Residential, commercial

Disaster Response

- Existing suite of disaster recovery planning interpretations
- Available via WSS or through other web services

Suitabilities and Limitations Ratings	
<input type="button" value="Open All"/> <input type="button" value="Close All"/> <input type="button" value="?"/>	
Building Site Development	? ⌵
Construction Materials	? ⌵
Disaster Recovery Planning	? ⌴
Catastrophic Mortality, Large Animal Disposal, Pit	
Catastrophic Mortality, Large Animal Disposal, Trench	
Clay Liner Material Source	
Composting Facility - Subsurface	
Composting Facility - Surface	
Composting Medium and Final Cover	
Rubble and Debris Disposal, Large-Scale Event	

Site Specific Management

- Current soils information not directly applicable at the site specific level
- Scientific, technical and practical issues – both historic and contemporary
- Private sector professionals -- Consulting Professional Soil Scientists – fill this role in the US



NRCS

Natural Resources Conservation Service

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National Cooperative Soil Survey

NRCS-SSD New Initiatives

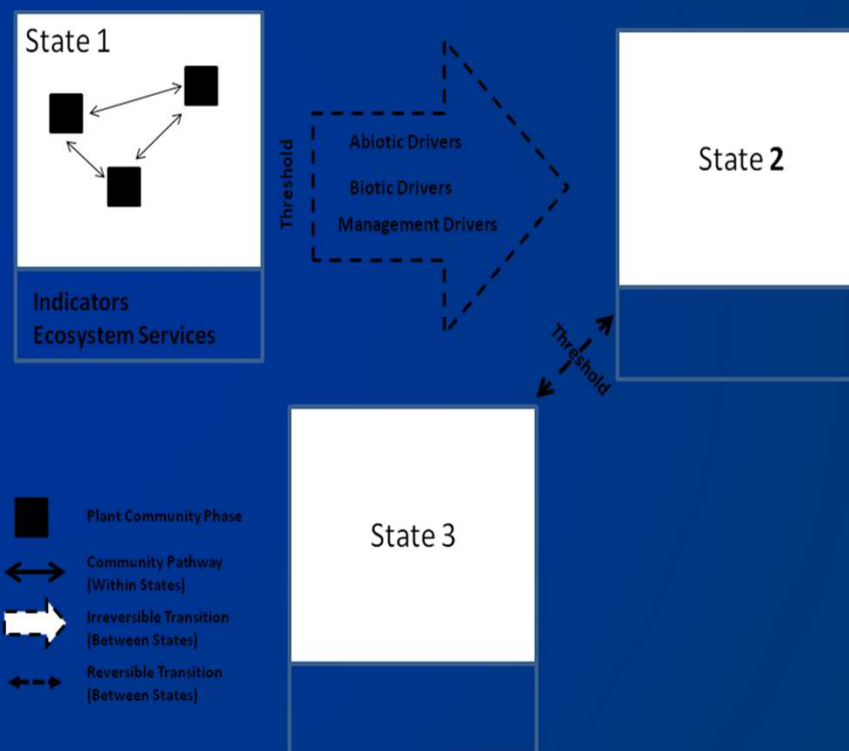
Collecting new data, creating new information and developing new products for our users

Site Specific Management

- Current soils information not directly applicable at the site specific level
- Scientific, technical and practical issues – both historic and contemporary
- Private sector professionals -- Consulting Professional Soil Scientists – fill this role in the US

Ecological Site Descriptions

- Directly referenced to soil components
- Ecological states represent range of possibilities
- Transitions represent ecosystem processes



Climate Change

- Priority USDA and wider US Government initiative
- NRCS and Soil Science Division roles still being discussed and defined
- Key questions:
 - How can existing soils data and information be used to inform activities?
 - Is new data / information needed?

GlobalSoilMap.net

- Collaborative international project to develop global spatial datasets of core soil properties at standard depths
- Attempts to assess uncertainty
- New approach – very different from “traditional” soil survey
- Additional information available at <http://www.globalsoilmap.net>

Useful web sites

- Web soil survey: <http://websoilsurvey.nrcs.usda.gov/app/>
 - Primary gateway to SSURGO data
- Soil characterization database:
 - <http://soils.usda.gov/survey/nscd/>
 - Pedon data (laboratory analysis)
- Soil Data Access: <http://sdmdataaccess.nrcs.usda.gov/>
 - Allows SQL-based queries to download soils data
- Geospatial Data Gateway:
 - <http://datagateway.nrcs.usda.gov/>
 - gSSURGO and much more

A tropical beach scene with a vibrant rainbow arching over lush green mountains and a sandy shore. The rainbow is the central focus, stretching from the left side of the frame towards the right. The mountains are covered in dense, dark green foliage. The sky is a mix of grey and white, suggesting a recent rain. The water in the foreground is a clear, light blue-green color. The overall mood is serene and beautiful.

Thank You

USDA is an equal opportunity provider and employer