



Natural Resources Conservation Service

NCSS

National Cooperative Soil Survey

# USDA-NRCS SOIL DATA RESOURCES

PRESENTATION TO:

2018 MOISST AND NSMN WORKSHOP

USDA  
NATURAL  
RESOURCES  
CONSERVATION  
SERVICE

DAVID HOOVER, DIRECTOR  
National Soil Survey Center



# AIR



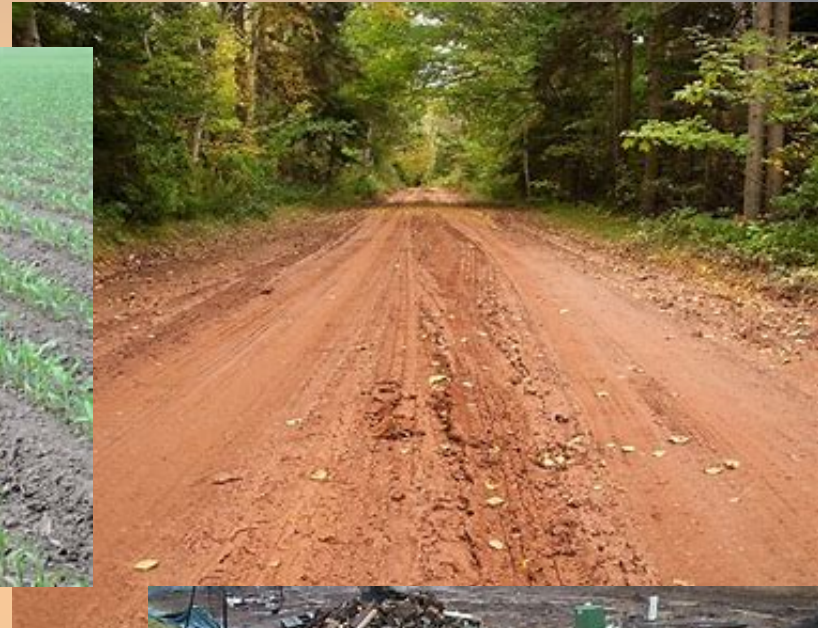
# WATER



# SUNLIGHT



# DIRT ???



# AIR



# WATER



# SUNLIGHT



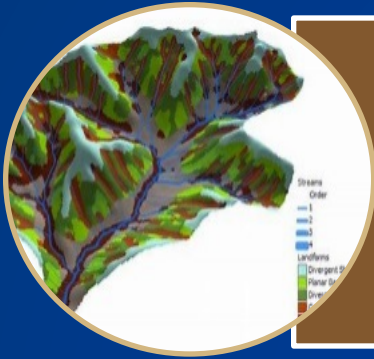


# DIRT



# SOIL





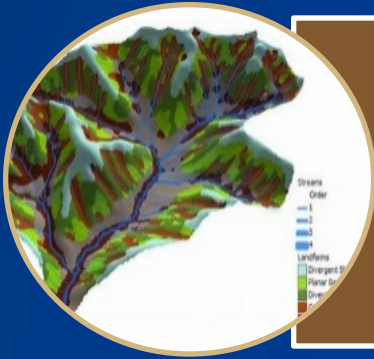
Use of national soil survey data with in situ or remotely sensed soil monitoring data



Development of the national soil survey database



Types and sources of soil survey data



## Use of national soil survey data with in situ or remotely sensed soil monitoring data

How to effectively combine 1:24000 scale polygonal data with site specific soil moisture monitoring sites?

# Uses of National Soil Survey Data

- Data validation
- Landscape knowledge
- Site selection
- Data extrapolation
- Paired studies
- Modeling



Natural Resources Conservation Service



National Cooperative Soil Survey



## Development of the national soil survey database



United States Department of Agriculture

# NATIONAL SOIL SURVEY CENTER

## DIRECTOR

**David Hoover**

National Soil Survey  
Center

## National Leader

**Curtis Monger**

Soil Survey Standards

## National Leader

**Doug Wysocki**

Research and Laboratory

## National Leader

**Drew Kinney**

Soil Business Systems

## National Leader

**Maxine Levin**

Soil Interpretations

## National Leader

**Joel Brown**

Ecological Sites

## Training Specialists

**Editors**

**Soil Scientists**

## Chemists

**Biologists**

**Soil Scientists**

**Technicians**

## Soil Scientists

**Programmers**

**IT Specialists**

**GIS Specialists**

**Soil Scientists**

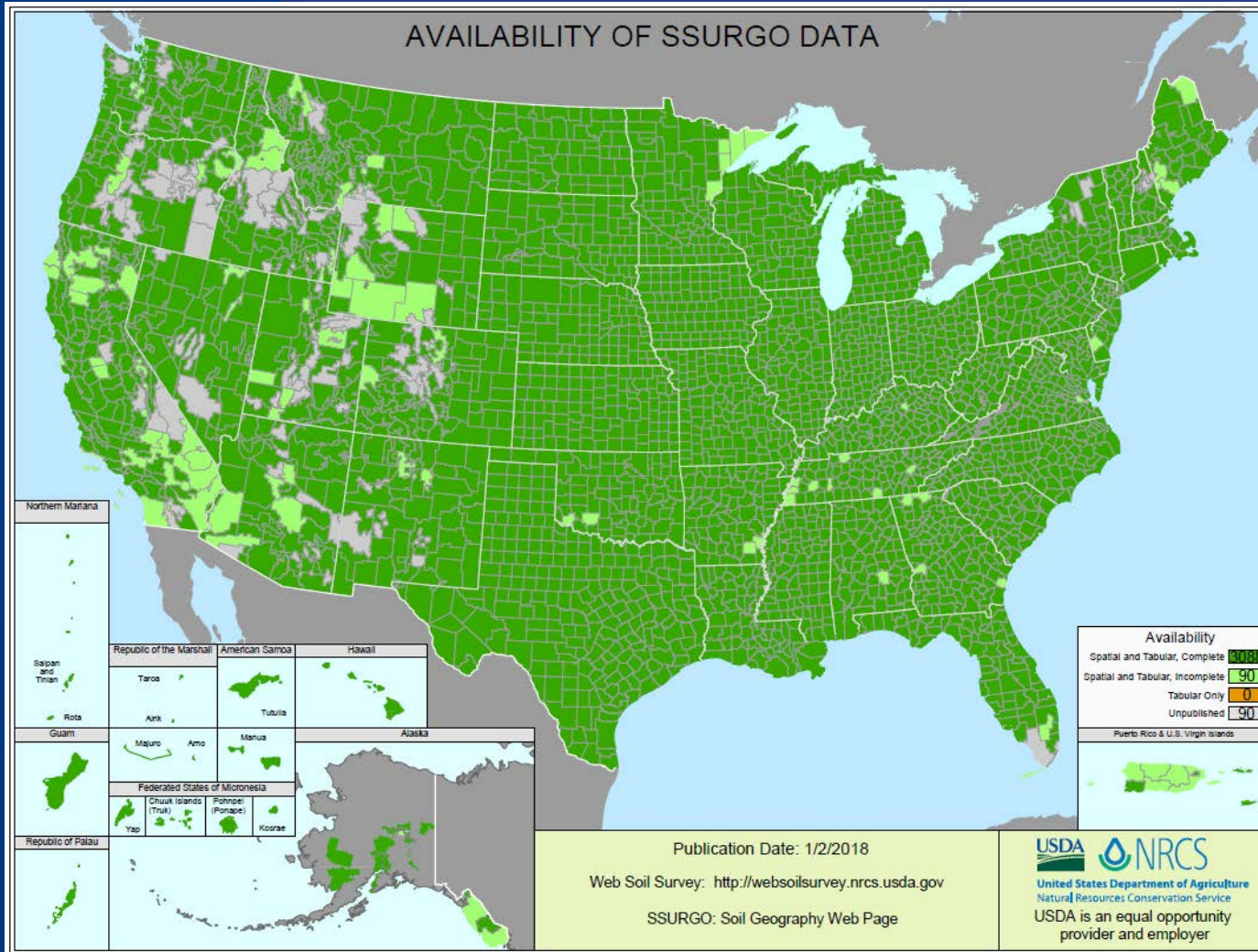
**GIS Specialists**

## Ecological Specialists

**Programmers**

**Agronomists**

# A National Investment



- A \$22 Billion investment
- An \$80 Million annual allocation





# From Truck to Data Delivery



The screenshot displays the Web Soil Survey (WSS) interface. On the left, there are various configuration options for the map unit, including 'Properties and Qualities Settings', 'View Options', and 'Advanced Options'. The 'View Options' section shows 'Map' set to 'S0', 'Table' set to 'S0', and 'Rating' set to 'S0'. The 'Advanced Options' section shows 'Aggregation Method' set to 'No Aggregation Necessary' and 'The Break Rule' set to 'Lower'.

On the right, a map shows a soil unit boundary. Below the map is a table titled 'Summary by Map Unit -- Hamilton County, Iowa'. The table lists map unit symbols, descriptions, ratings, areas in acres, and percentages of total area.

Map unit symbol	Map unit name	Rating	Area in acres	Percent of Area
0	SHARPER ULTY CLAY LOAM, 0 TO 1 PERCENT SLOPES	SHARPER ULTY CLAY LOAM, 0 TO 1 PERCENT SLOPES	2.0	1.0%
278	WARMS LOAM, 2 TO 5 PERCENT SLOPES	WARMS LOAM, 2 TO 5 PERCENT SLOPES	0.8	0.4%
85	MOULLET LOAM, 1 TO 3 PERCENT SLOPES	MOULLET LOAM, 1 TO 3 PERCENT SLOPES	9.4	4.7%
822	SPADON LOAM, 8 TO 24 PERCENT SLOPES, MODERATELY ERODED	SPADON LOAM, 8 TO 24 PERCENT SLOPES, MODERATELY ERODED	0.0	0.0%
95	WARPS CLAY LOAM, 0 TO 2 PERCENT SLOPES	WARPS CLAY LOAM, 0 TO 2 PERCENT SLOPES	9.9	4.9%
227	WABSTER ULTY CLAY LOAM, 0 TO 1 PERCENT SLOPES	WABSTER ULTY CLAY LOAM, 0 TO 1 PERCENT SLOPES	24.2	12.0%
238	CLARSON LOAM, 2 TO 5 PERCENT SLOPES	CLARSON LOAM, 2 TO 5 PERCENT SLOPES	38.4	19.0%

# Assessing the Landscape

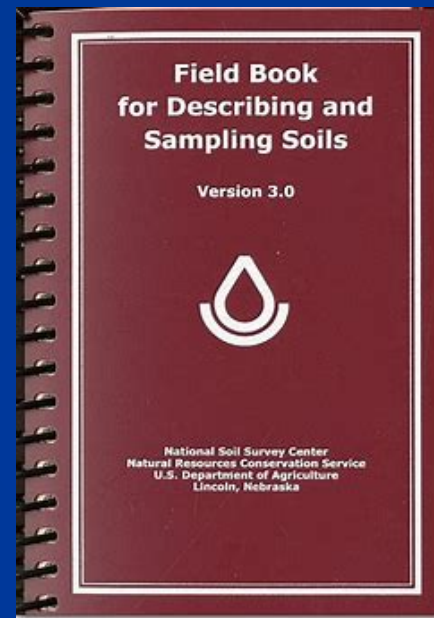
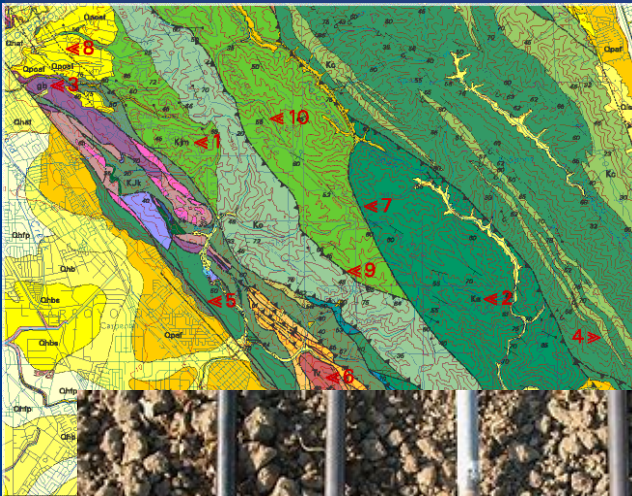


# Assessing the Landscape

<https://www.youtube.com/watch?v=uFhprCtrK2k>

1:44

# Selecting the Right Tools For the Day



# Databases

## NASIS National Soil Information System



**Tables**

- T Project
- T Technical Soil Service
- T Legend
- T Mapunit
- T Data Mapunit
- T Site
- T Pedon
- T Transect
- T Site Association
- T Area Type
- T Calculation
- T Distribution Metadata
- T Ecological Site
- T Evaluation
- T Geomorphic Feature Type
- T Local Plant
- T Milestone Type
- T NASIS Site
- T NASIS User
- T Other Vegetative Classification Type
- T Plant
- T Project Data Type
- T Property
- T Query
- T Report
- T Rule
- T Technical Soil Service Type
- T USFS Ecological Classification Type
- T USFS Interpretation Category
- T USFS Interpretation Restriction
- T System
- T Domain Group
- T Unit of Measure

Management tables

Map Unit tables

Point Data tables

System tables

**Pedon Table Structure**

Table Name	Table Label	Table Description
pedon	Pedon	The Pedon table contains information collected at the time a soil profile description is made. It has data that relates to the profile as a whole.
horizon	Pedon Horizon	The Pedon Horizon table lists the horizons for each pedon. If the horizon thickness is greater than zero (low=5, RW=6, high=12), the horizon thickness is stored in the horizon thickness field.
phloredur	Pedon Horizon Texture	The Horizon Texture table lists the texture, or terms in lieu of texture, for the texture modifier and class shown above in the Pedon Horizon table. Only the unmodified texture term is listed in the Pedon Horizon Texture table; modifiers are listed in the phloredurmod table.
phloredurmod	Pedon Horizon Texture Modifier	The Pedon Horizon Texture Modifier table lists the texture modifiers for the texture shown above in the Pedon Horizon and Pedon Horizon Texture tables. For example, a gravelly loamy sand is shown as "GR LS" in the phloredurmod table.

**Table Fields**

Domain ID	Column Name	Column Label	Column Description
	pedbsidref	Migrated Source Pedon Site	The internal ID (integer) of the NASIS Site that originally created a root owned object (data record).
	phloemodid	Rec ID	An internal ID (integer) that is part (or all) of a key that uniquely identifies a record. Also known as record ID.
	phloesidref	Migrated Texture Rec ID	An internal ID (integer) that is part (or all) of a key that uniquely identifies a record in another table.
	recordstatus	recordstatus	A string used to denote the status of a record (new, modified, deleted) in the midst of an editing session.
	seqnum	Seq	Sequential number of the feature being described.
	190 textmod	Modifier	A term used to denote the presence of a condition or component other than sand, silt, or clay.

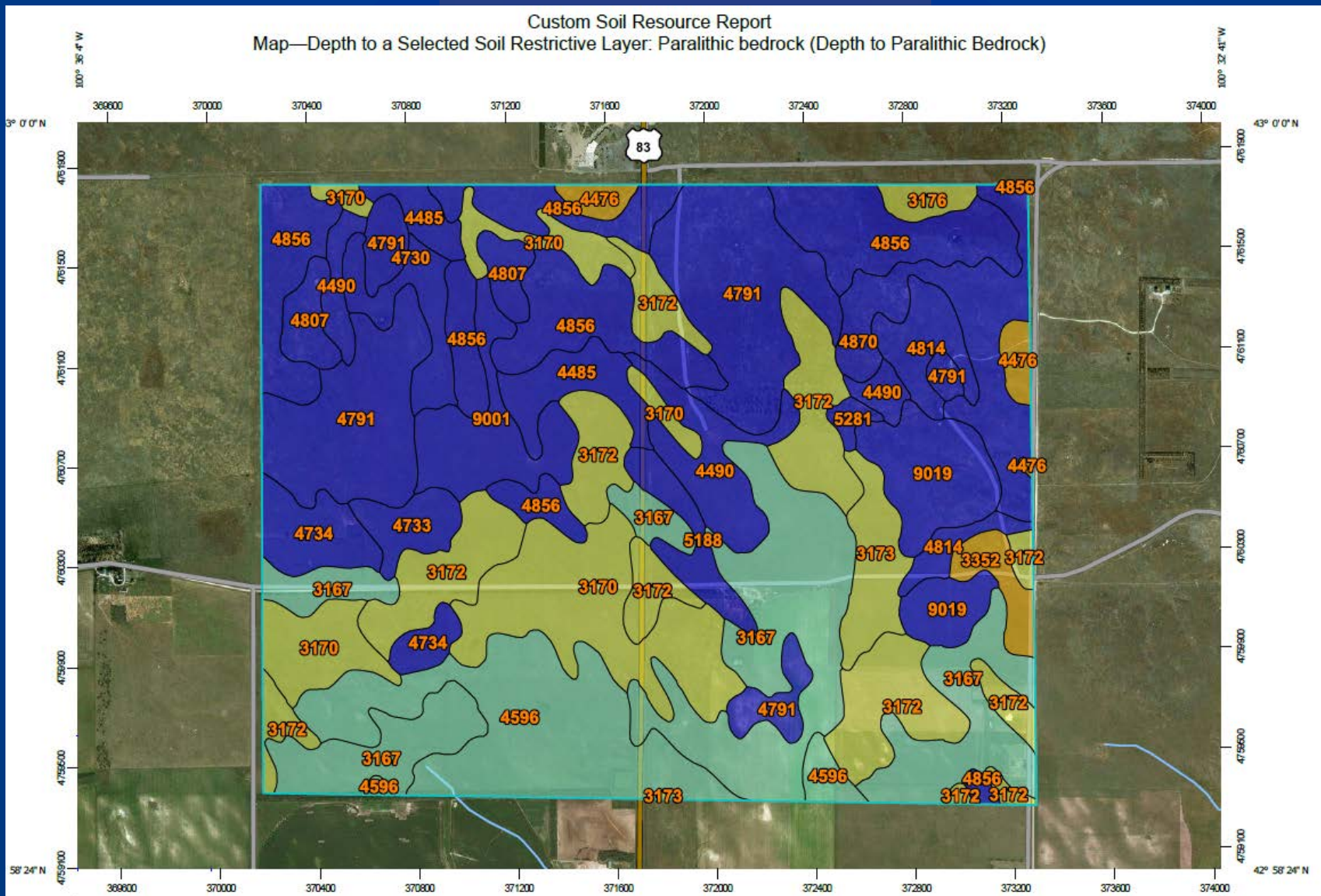
  

Show/Hide	Choice ID	Acronym	Choice Label	Choice	Choice Description
<input checked="" type="checkbox"/>	71	Artifactual	art		15 to 35 percent human artifacts, by volume
<input checked="" type="checkbox"/>	72	Very artifactual	artv		35 to 60 percent human artifacts, by volume
<input checked="" type="checkbox"/>	73	Extremely artifactual	artx		60 to 90 percent human artifacts, by volume
<input checked="" type="checkbox"/>	26	Ashy	ashy		Ashy
<input checked="" type="checkbox"/>	1	Bouldery	by		Bouldery
<input checked="" type="checkbox"/>	2	Very bouldery	byv		Very bouldery
<input checked="" type="checkbox"/>	3	Extremely bouldery	byx		Extremely bouldery
<input checked="" type="checkbox"/>	4	Cobbly	cb		Cobbly
<input checked="" type="checkbox"/>	55	Angular cobbly	cba*		Angular cobbly
<input checked="" type="checkbox"/>	5	Very cobbly	cbv		Very cobbly

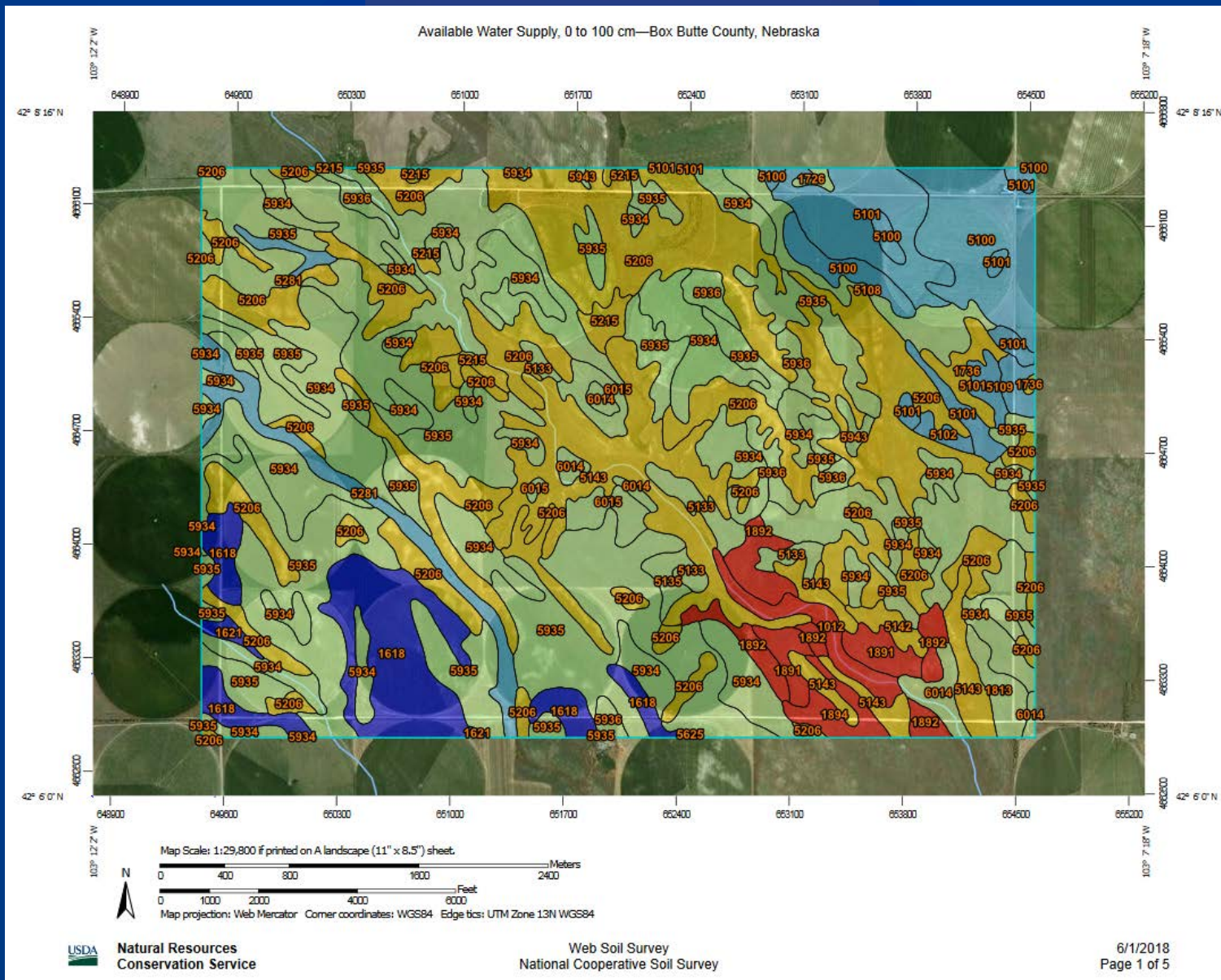


# Types and sources of soil survey data

# Delivering the Data Web Soil Survey



# Delivering the Data Web Soil Survey





# Delivering the Data Web Soil Survey

<b>Suitabilities and Limitations Ratings</b>	
<input type="button" value="Open All"/> <input type="button" value="Close All"/> <input <="" td="" type="button" value="?"/>	
Building Site Development	? ⌵
Construction Materials	? ⌵
Disaster Recovery Planning	? ⌵
Land Classifications	? ⌵
Land Management	? ⌵
Military Operations	? ⌵
Recreational Development	? ⌵
Sanitary Facilities	? ⌵
Soil Health	? ⌵
Vegetative Productivity	? ⌵
Waste Management	? ⌵
Water Management	? ⌵

<b>Properties and Qualities Ratings</b>	
<input type="button" value="Open All"/> <input type="button" value="Close All"/> <input <="" td="" type="button" value="?"/>	
Soil Chemical Properties	? ⌵
Soil Erosion Factors	? ⌵
Soil Health Properties	? ⌵
Soil Physical Properties	? ⌵
Soil Qualities and Features	? ⌵
Water Features	? ⌵

# Web Soil Survey

<b>Properties and Qualities Ratings</b>	
<input type="button" value="Open All"/> <input type="button" value="Close All"/> <span>?</span>	
<b>Soil Chemical Properties</b>	
Calcium Carbonate (CaCO <sub>3</sub> )	⌵
Cation-Exchange Capacity (CEC-7)	⌵
Effective Cation-Exchange Capacity (ECEC)	⌵
Electrical Conductivity (EC)	⌵
Gypsum	⌵
pH (1 to 1 Water)	⌵
Sodium Adsorption Ratio (SAR)	⌵
<b>Soil Erosion Factors</b>	
K Factor, Rock Free	⌵
K Factor, Whole Soil	⌵
T Factor	⌵
Wind Erodibility Group	⌵
Wind Erodibility Index	⌵
<b>Soil Health Properties</b>	
Soil Health - Organic Matter	⌵
Soil Physical Properties	⌵
Soil Qualities and Features	⌵
<b>Water Features</b>	
Depth to Water Table	⌵
Flooding Frequency Class	⌵
Ponding Frequency Class	⌵

<b>Soil Physical Properties</b>	
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	⌵

# Delivering the Data Web Soil Survey

Download either for smaller (<100,000 acres) AOI or for full Soil Survey Areas.

**Download Soils Data for...**  
**Your AOI (SSURGO)**

---

**General Information**

Link [Description of Soil Survey Geographic \(SSURGO\) Database](#)

Download Contents Tabular data, spatial data (if available), template database (if selected), and FGDC metadata

Spatial Data Format ESRI Shapefile, Geographic WGS84

**Soils Data Download Package for your AOI (SSURGO)**

**AOI Location**  
 Box Butte County, Nebraska

**Soil Survey Areas**  
**Box Butte County, Nebraska (NE013)**

**Area in AOI**  
 2,612 acres

**Data Availability**  
 Tabular and Spatial, complete

**Version**  
 Survey Area: Version 18, Oct 4, 2017  
 Tabular: Version 17, Oct 4, 2017  
 Spatial: Version 9, Oct 4, 2017

**Template Database**  
 State: NE  
 Microsoft Access Version: Access 2003  
 Template Database Version: 36  
 Template Database Name: soildb\_NE\_2003

**Download Size**  
 3.8 MB

**Download Link**  
[wss\\_aoi\\_2018-06-01\\_12-28-52.zip](#)

**Download Soils Data for...**  
**Your AOI (SSURGO)**

---

**Soil Survey Area (SSURGO)**

---

**General Information**

Link [Description of Soil Survey Geographic \(SSURGO\) Database](#)

Download Contents Tabular data, spatial data (if available), template database (if selected), and FGDC metadata

Spatial Data Format ESRI Shapefile, Geographic WGS84

**Options**

State: Colorado

County (optional):

Only show Soil Survey Areas updated since...

Sort by... Area Symbol

Include Template Database

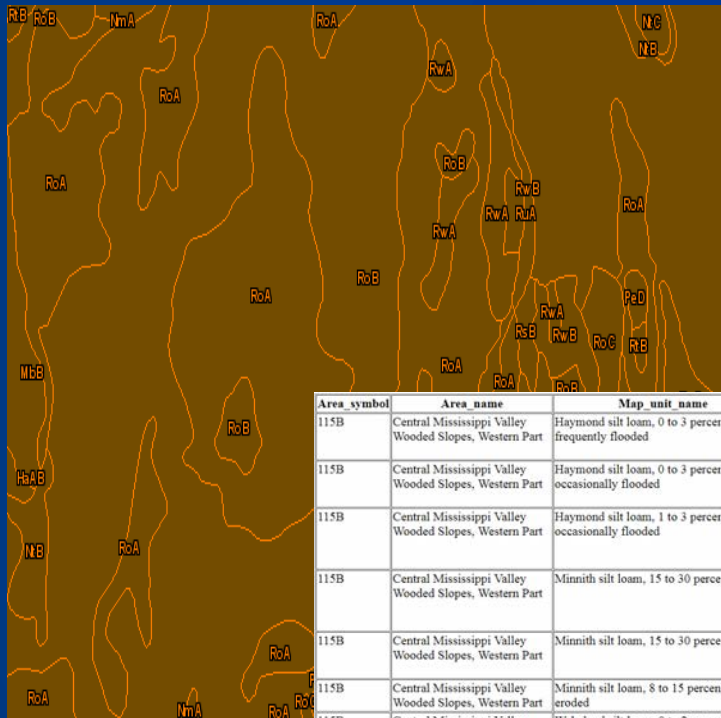
**Soil Survey Area (SSURGO) Download Links**

Name	Area Symbol	Data Availability	Version	Template Database	Download Size	Download Link
Adams County Area, Parts of Adams and Denver Counties, Colorado	CO001	Tabular and Spatial, complete	Survey Area: Version 14, Oct 5, 2017 Tabular: Version 14, Oct 5, 2017 Spatial: Version 4, Sep 22, 2015	soildb_US_2003 Access 2003 Version 36	19.2 MB	<a href="#">wss_SSA_CO001_soildb_US_2003_[2017-10-05].zip</a>

# Delivering the Data

## Soil Data Access Web Services

### SQL and URL Tools for Soils Data and Information



Area symbol	Area name	Map unit name	MLRA acres	Component name	Ecosite ID	Ecosite name
115B	Central Mississippi Valley Wooded Slopes, Western Part	Haymond silt loam, 0 to 3 percent slopes, frequently flooded	202	Haymond	F115BY031MO	Loamy Floodplain Forest
115B	Central Mississippi Valley Wooded Slopes, Western Part	Haymond silt loam, 0 to 3 percent slopes, occasionally flooded	3188	Haymond	F116AY039MO	Loamy Floodplain Step Forest
115B	Central Mississippi Valley Wooded Slopes, Western Part	Haymond silt loam, 1 to 3 percent slopes, occasionally flooded	203	Haymond	F115BY028MO	Loamy/Gravelly Upland Drainageway Forest
115B	Central Mississippi Valley Wooded Slopes, Western Part	Minnith silt loam, 15 to 30 percent slopes	835	Minnith	F115BY006MO	Loamy Protected Backslope Forest
115B	Central Mississippi Valley Wooded Slopes, Western Part	Minnith silt loam, 15 to 30 percent slopes	835	Minnith	F115BY044MO	Loamy Exposed Backslope Woodland
115B	Central Mississippi Valley Wooded Slopes, Western Part	Minnith silt loam, 8 to 15 percent slopes, eroded	2270	Minnith	F115BY005MO	Loamy Upland Woodland
115B	Central Mississippi Valley Wooded Slopes, Western Part	Wakeland silt loam, 0 to 2 percent slopes, frequently flooded	2434	Wakeland	F109XY030MO	Loamy Floodplain Forest
115B	Central Mississippi Valley Wooded Slopes, Western Part	Wilbur silt loam, 0 to 2 percent slopes, frequently flooded	739	Wilbur	F115BY031MO	Loamy Floodplain Forest
115B	Central Mississippi Valley Wooded Slopes, Western Part	Wilbur silt loam, 1 to 3 percent slopes, frequently flooded	50	Wilbur	F115BY031MO	Loamy Floodplain Forest
115B	Central Mississippi Valley Wooded Slopes, Western Part	Winfield silt loam, 2 to 5 percent slopes	110	Winfield	F115BY001MO	Deep Loess Upland Woodland

#### Hydric Soil List by State

This scripts retrieves by State a list of soils that have a hydric rating of "yes".

Text highlighted in yellow in the example script can be changed for a particular area, e.g. 'MO123' can be substituted for 'NE109'. Also, you can use wildcards to get the entire State e.g., 'MO%' will extract the state of Missouri. More examples can be found on the Tips page.

[Tips Page](#)

Copy the example script below and paste it into the query page on the Soil Data Access site.

[Soil Data Access Query Page](#)

#### Example Script

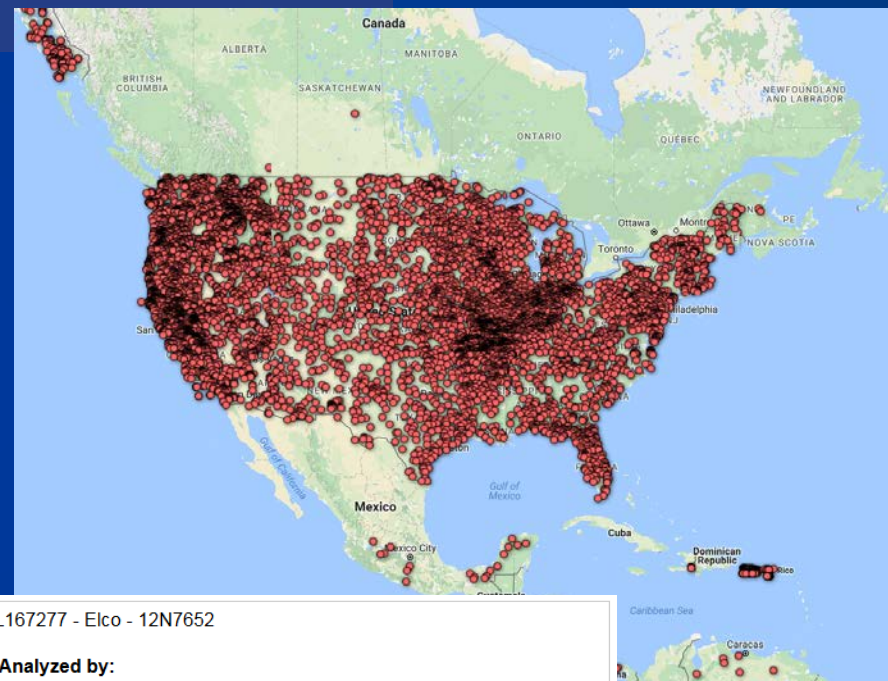
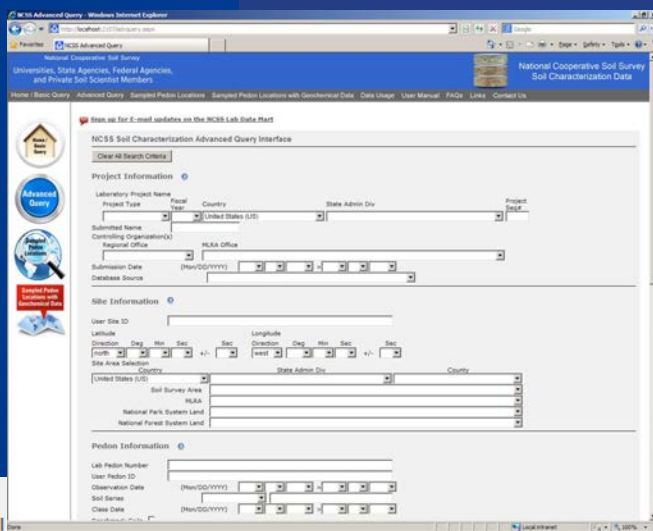
```
SELECT DISTINCT Compname AS Component_name
FROM legend AS l
INNER JOIN mapunit AS m ON l.lkey = m.lkey
LEFT OUTER JOIN component AS c ON m.mukey = c.mukey
WHERE hydricrating = 'yes' AND LEFT(l.areasymbol,2) LIKE 'WI'
```

#### Example Table Output

Description of tables and columns can be found on this link: [Table and Column Descriptions](#)

Component_name
Ackmore
Adder
Adrian

# Delivering the Data Soil Lab Data Mart



NCSS Soil

Return Last Data Interface

Check All

Bottom

<input type="checkbox"/>	Lab Pedon Number	User Pedon ID	Sampled as Series	Correlated Series	rc
<input type="checkbox"/>	40A2233	57NE057001	Bridgeport	Bridgeport	1
<input type="checkbox"/>	40A2234	57NE057002	Bridgeport	Bridgeport	2
<input type="checkbox"/>	40A2065	57NE057003	Bridgeport	(unnamed)	3
<input type="checkbox"/>	40A2235	57NE057004	Bridgeport	Bridgeport	4
<input type="checkbox"/>	89P0133	88NE057001	Colby	Sully	5
<input type="checkbox"/>	89P0134	88NE057002	Duroc	Duroc	6
<input type="checkbox"/>	89P0135	88NE057003	Duroc	Duroc	7
<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

2011IL167277 - Elco - 12N7652

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

**Sampled As Series Name:** Elco  
**Correlated Series Name:** Elco  
**Country:** United States  
**State:** Illinois  
**County:** Sangamon  
**MLRA:** 108B  
**Latitude:** 39.7185528  
**Longitude:** -89.6069861

[Lab Data Report](#)  
[Pedon Description Report](#)  
[Complete Pedon Index: 4](#)

# Delivering the Data

## GlobalSoilMap.net

### North American Node Data

#### ArcGIS REST Services Directory

[Home](#) > [services](#) > [GlobalSoilMap\\_v05](#)

[JSON](#) | [SOAP](#)

#### Folder: GlobalSoilMap\_v05

**Current Version:** 10.51

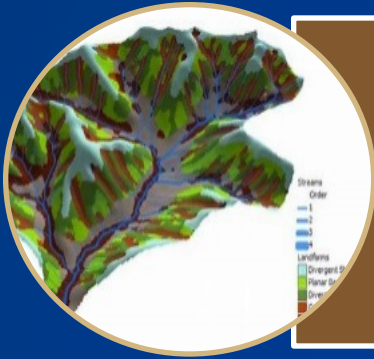
**View Footprints In:** [ArcGIS Online map viewer](#)

#### Services:

- [GlobalSoilMap\\_v05/available\\_water\\_supply](#) (MapServer)
- [GlobalSoilMap\\_v05/clay](#) (MapServer)
- [GlobalSoilMap\\_v05/dbthirdbar](#) (MapServer)
- [GlobalSoilMap\\_v05/electric\\_conductivity](#) (MapServer)
- [GlobalSoilMap\\_v05/gravel](#) (MapServer)
- [GlobalSoilMap\\_v05/pH](#) (MapServer)
- [GlobalSoilMap\\_v05/sand](#) (MapServer)
- [GlobalSoilMap\\_v05/silt](#) (MapServer)
- [GlobalSoilMap\\_v05/soil\\_depth](#) (MapServer)

**Supported Interfaces:** [REST](#) [SOAP](#) [Sitemap](#) [Geo Sitemap](#)

- [Total Sand, g kg \(0\)](#)
  - [Total Sand, g kg, 0-5 cm depth \(1\)](#)
  - [Total Sand, g kg, 5-15 cm depth \(2\)](#)
  - [Total Sand, g kg, 15-30 cm depth \(3\)](#)
  - [Total Sand, g kg, 30-60 cm depth \(4\)](#)
  - [Total Sand, g kg, 60-100 cm depth \(5\)](#)
  - [Total Sand, g kg, 100-200 cm depth \(6\)](#)
  - [Total Sand, g kg, total depth prior to spline \(7\)](#)
  - [Total Sand, g kg, depth available to root zone \(8\)](#)
  - [Percent of Map Unit used for Weighted Avg Calculation \(9\)](#)



**Use of national soil survey data with in situ or remotely sensed soil monitoring data**



**Development of the national soil survey database**



**Types and sources of soil survey data**

## Questions?

USDA-NRCS  
National Soil Survey Center  
March 2018

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Director

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402-437-4013

