A Help Guide for Using gSSURGO to Find Potential Wetland Soil Landscapes

Wetland Mapping Consortium Webinar

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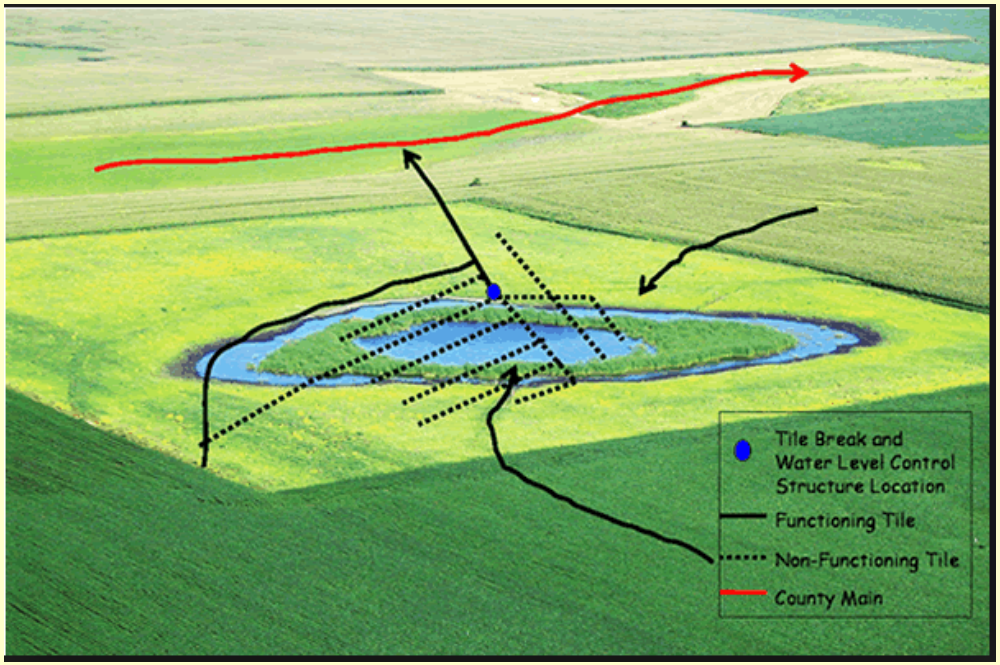
Wetland Restoration

- Regulatory agencies, and people who are regulated to restore or replace wetlands do not have a simple database to find suitable sites.
- Planners must compile the soils information from an area before they can conduct planning for wetland restoration.
- The premise is that if an area has hydric soil and is not mapped as a wetland, it bears investigation as a possible former wetland.

Drainage and Restoration



Wetlands and Soils Data

- Soils data for finding potential restoration sites is available in two spatial formats, vector and raster.
  - The vector data (SSURGO 2.0) is available through *Web Soil Survey* and up to 100,000 acres can be downloaded. *Web Soil Survey* has guides, information, and help built into the online tool.
  - The raster data (gSSURGO) is available for download for the county, state, bounding rectangle, or interactive map. Multiple data layers can be added to a GIS to overlay with the soils layer to get a complete landscape and ecosystem dataset.

Wetland Mapping with gSSURGO

Wetland Mapping and the Gridded Soil Survey Geographic (gSSURGO) Database

Soil geographic data provides important information for identifying jurisdictional wetlands under the Farm Bill and Clean Water Act, but also can contribute to better siting of potential wetland restoration projects. A new soil mapping database includes potential wetland soil landscapes among its attributes.

By Sharon W. Waltman and Lenore Vasilas

Reliable and readily accessible soil geographic information is critical for the estimation of many ecosystem services. For example, the amount of carbon that can be stored in soils impacts climate regulation and controls fertility. The ability of the soil to store precipitation and release water to plants

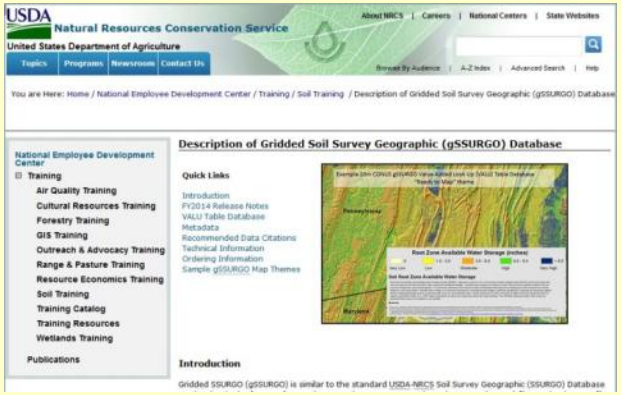
wetland determinations. These sources represent the most up-to-date information as well as the official soil survey information for each fiscal year (NTCHS (a) 2013).

Hydric soils reports provided in the Web Soil Survey identify hydric soils and can be used to identify areas likely to contain hydric

ftp://dnrftp.dnr.state.md.us/Public/Outgoing/CCWS/AdvisoryCommittee/Coastal_Restoration_Group/June2013%20Materials/Resources/gSSURGO_2013.pdf

gSSURGO Soils Data

- Get gSSURGO data at Geospatial Data Gateway http://datagateway.nrcs.usda.gov/ OR



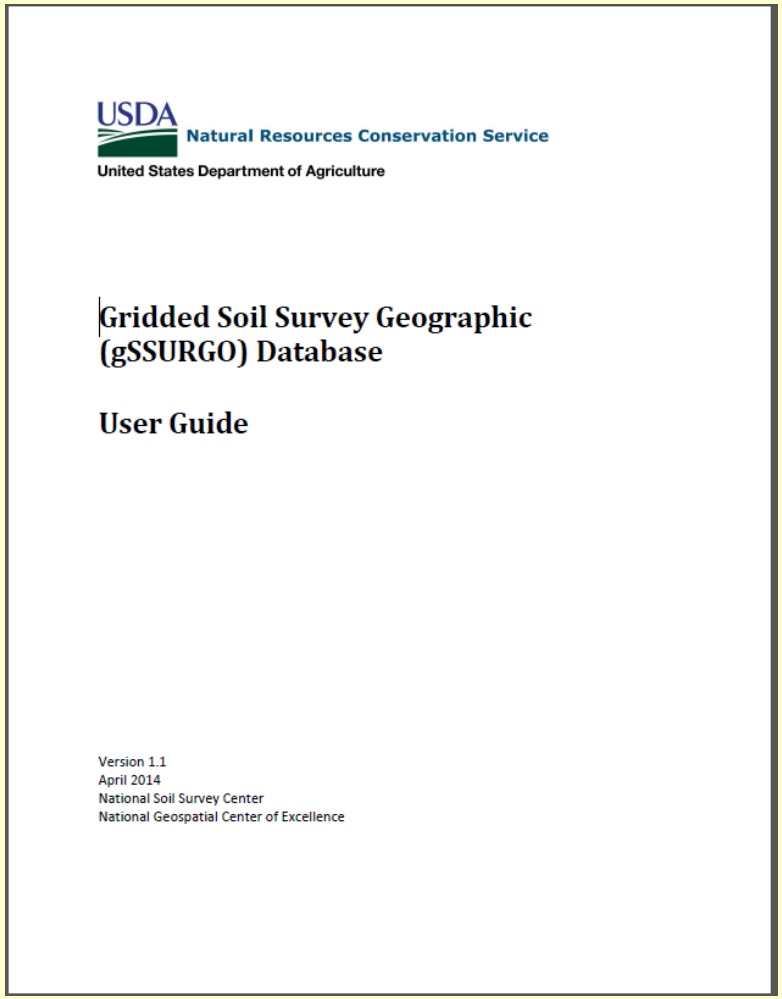
- http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/nedc/training/soil/?cid=nrcs142p2_053628

- The .zip file contains the data for the user defined area, along with a user's Guide and a database with VALU data tables.

gSSURGO User's Guide

Ver. 1.1 is included with the gSSURGO data as well as on the new gSSURGO web page.

It is an excellent guide with many illustrated examples of step-by-step use of the product.


USDA Natural Resources Conservation Service
United States Department of Agriculture

Gridded Soil Survey Geographic (gSSURGO) Database

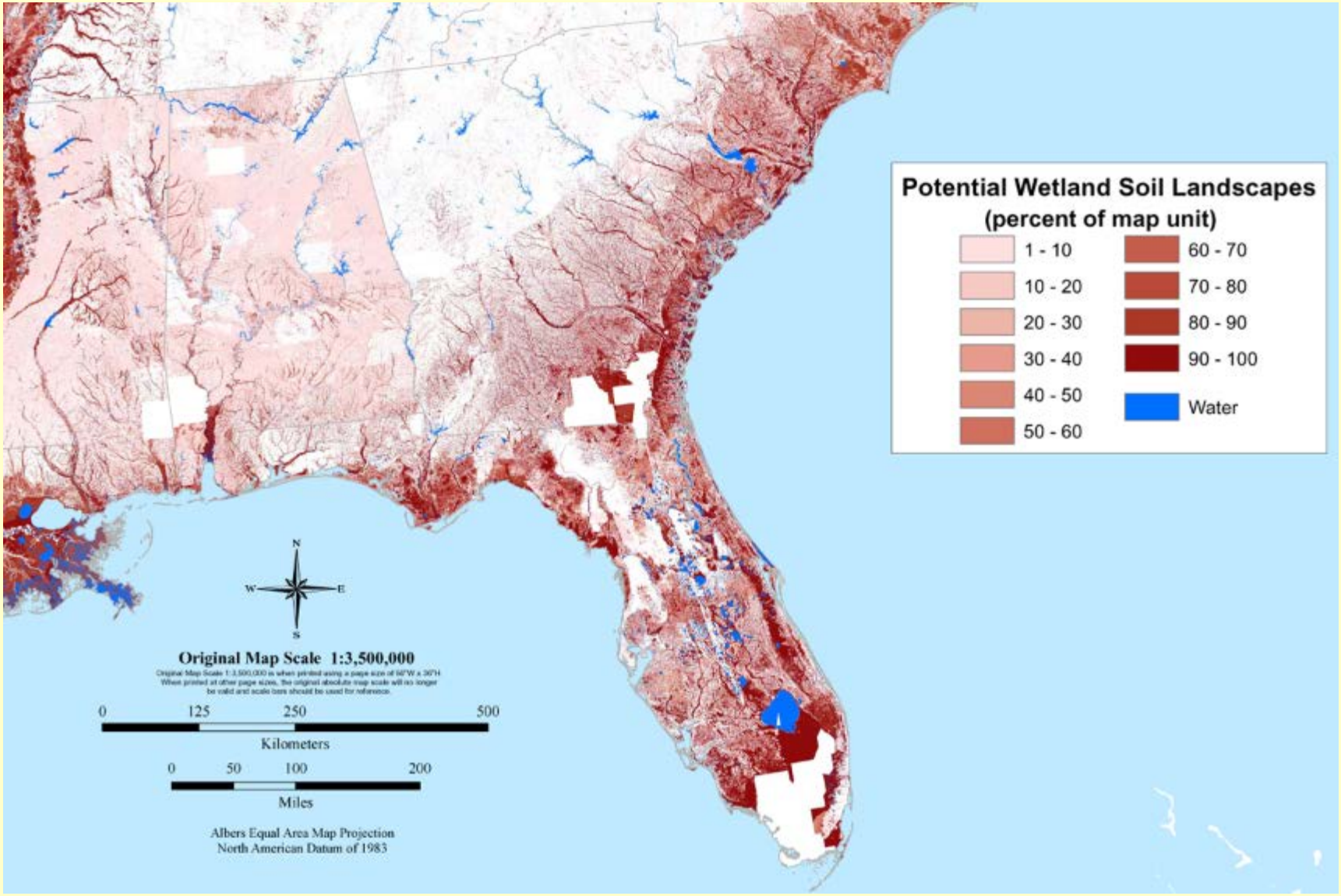
User Guide

Version 1.1
April 2014
National Soil Survey Center
National Geospatial Center of Excellence

Soil Survey Information in gSSURGO

- The download also contains VALU (value added lookup) tables.
- One of these - Potential Wetland Soil Landscapes, gives the sum of the hydric components for each map unit. (Saves many steps!)
- This is especially useful when looking for map units with a certain minimum composition of hydric soil components.

VALU Table converted to a GIS Layer



Potential Wetland Soil Landscapes – How the VALU data was created

Potential Wetland Soil Landscapes

The potential wetland soil landscapes (PWSL version 1) information is given as the percentage of the map unit (all components) that meet the criteria for a potential wetland soil landscape. If water was determined to account for 80 or greater percent of a map unit, a value of 999 was used to indicate a water body. This is not a perfect solution, but is helpful in identifying a general water body class for mapping.

Potential Wetland Soil Landscapes (PWSL) is expressed as the percentage of the map unit that meets the PWSL criteria. The hydric rating (soil component variable "hydricrating") is an indicator of wet soils. For version 1 (pwsl1), those soil components that meet the following criteria are tagged as PWSL and their comppct_r values are summed for each map unit. Soil components with hydricrating = 'YES' are considered PWSL. Soil components with hydricrating = "NO" are not PWSL. Soil components with hydricrating = 'UNRANKED' are tested using other attributes, and will be considered PWSL if any of the following conditions are met: drainagecl = 'Poorly drained' or 'Very poorly drained' or the localphase or the other data fields contain any of the phrases "drained" or "undrained" or "channeled" or "protected" or "ponded" or "flooded". If these criteria do not determine the PWSL for a component and hydricrating = 'UNRANKED', then the map unit will be classified as PWSL if the map unit name contains any of the phrases "drained" or "undrained" or "channeled" or "protected" or "ponded" or "flooded". For version 1 (pwsl1), waterbodies are identified as "999" when map unit names match a list of terms that identify water or intermittent water or map units have a sum of the comppct_r for "Water" that is 80% or greater. NULL values are presented where data are incomplete or not available.

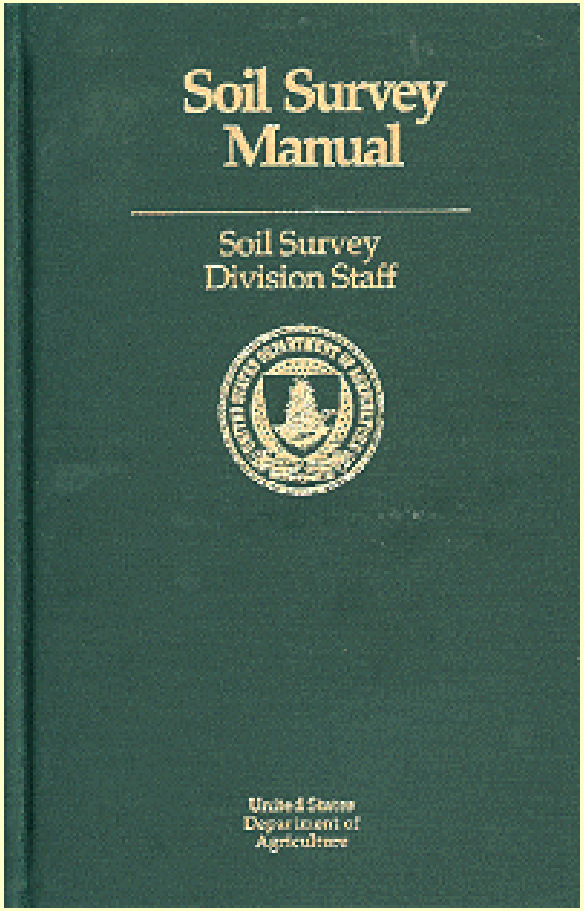
Soil Survey User's Guide

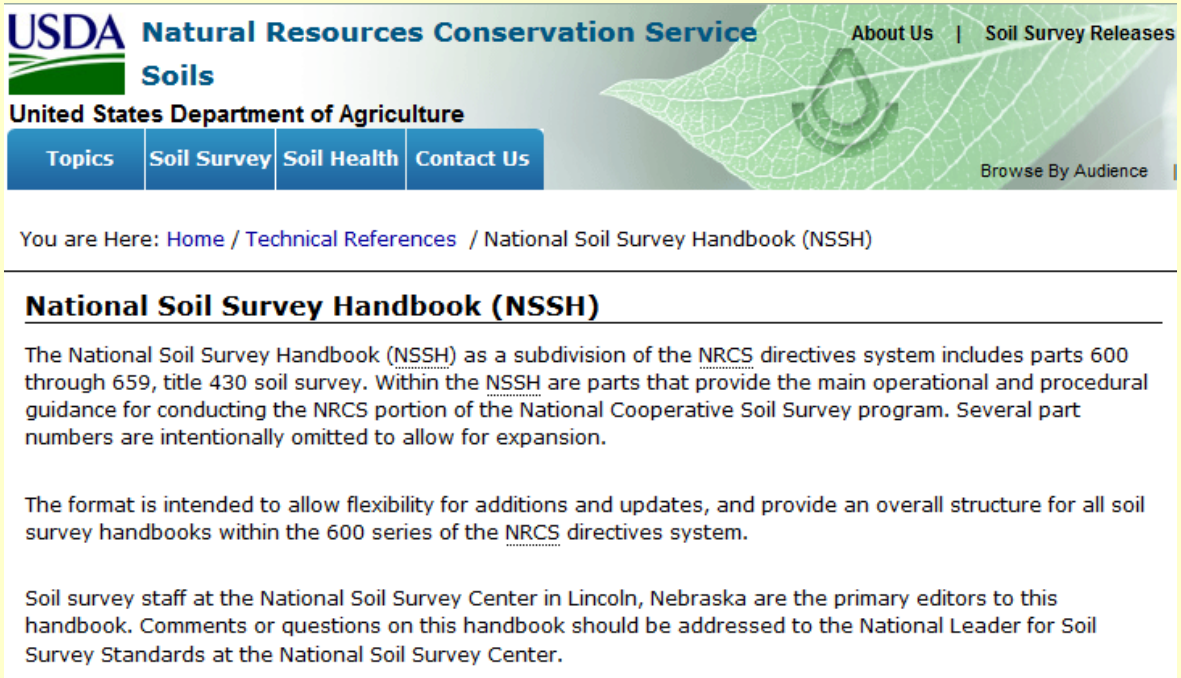
- However, understanding the origin, limitations, and appropriate use of soil survey map unit data is critical to holistic planning.
- A simple help guide can be composed to accompany the data to help users to better understand soil data.
- Example questions by users:
  - How is a soil survey made?
  - What are the limitations in making and using them?
  - How are map units designed? How variable are they?
  - What is the accuracy of the polygons?

Understanding the Soils Data

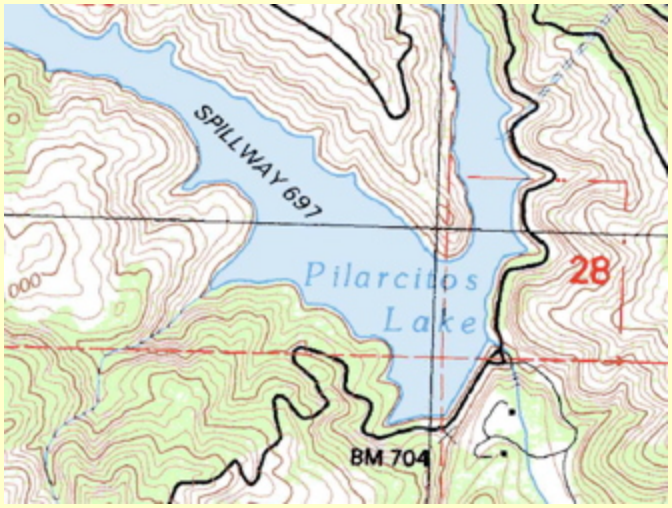
- Mappers dissect the landscape into landform segments, then dig in each proposed segment to confirm what soil(s) are inside.
- Landscape units with similar resources are represented by polygons on maps.
- Map units describe the typical soil components inside all polygons with the same legend symbol.
- The minimum size of the polygon (4-8 acres) is determined by the mapping scale, but they are large enough to be labeled, or can be long and narrow if important (floodplains).

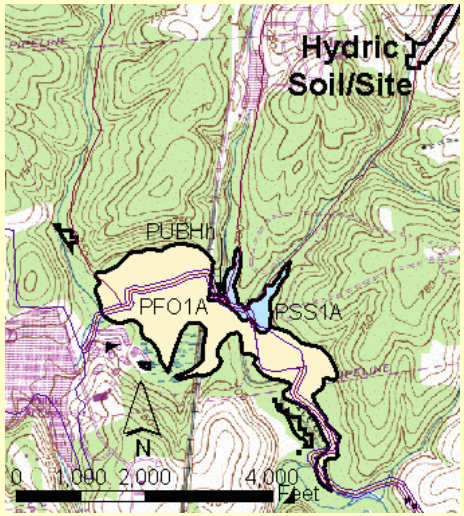
Guides for Making Soil Maps

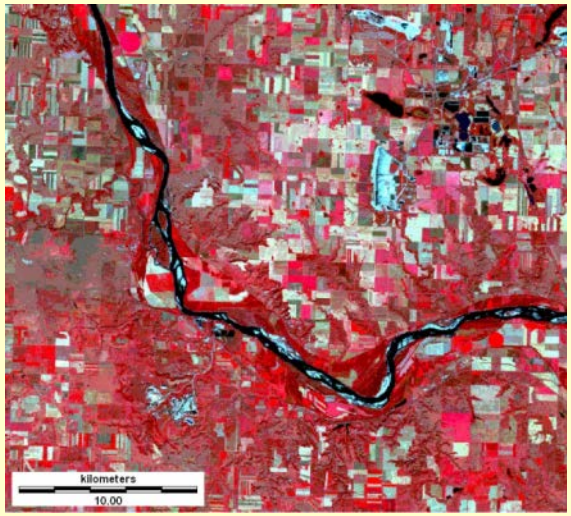




Tools


SPILLWAY 697
Pilarcitos Lake
28
BM 704


Hydric Soil/Site
PUBHh
PFO1A
PSS1A
N
0 1,000 2,000 4,000
Feet


kilometers
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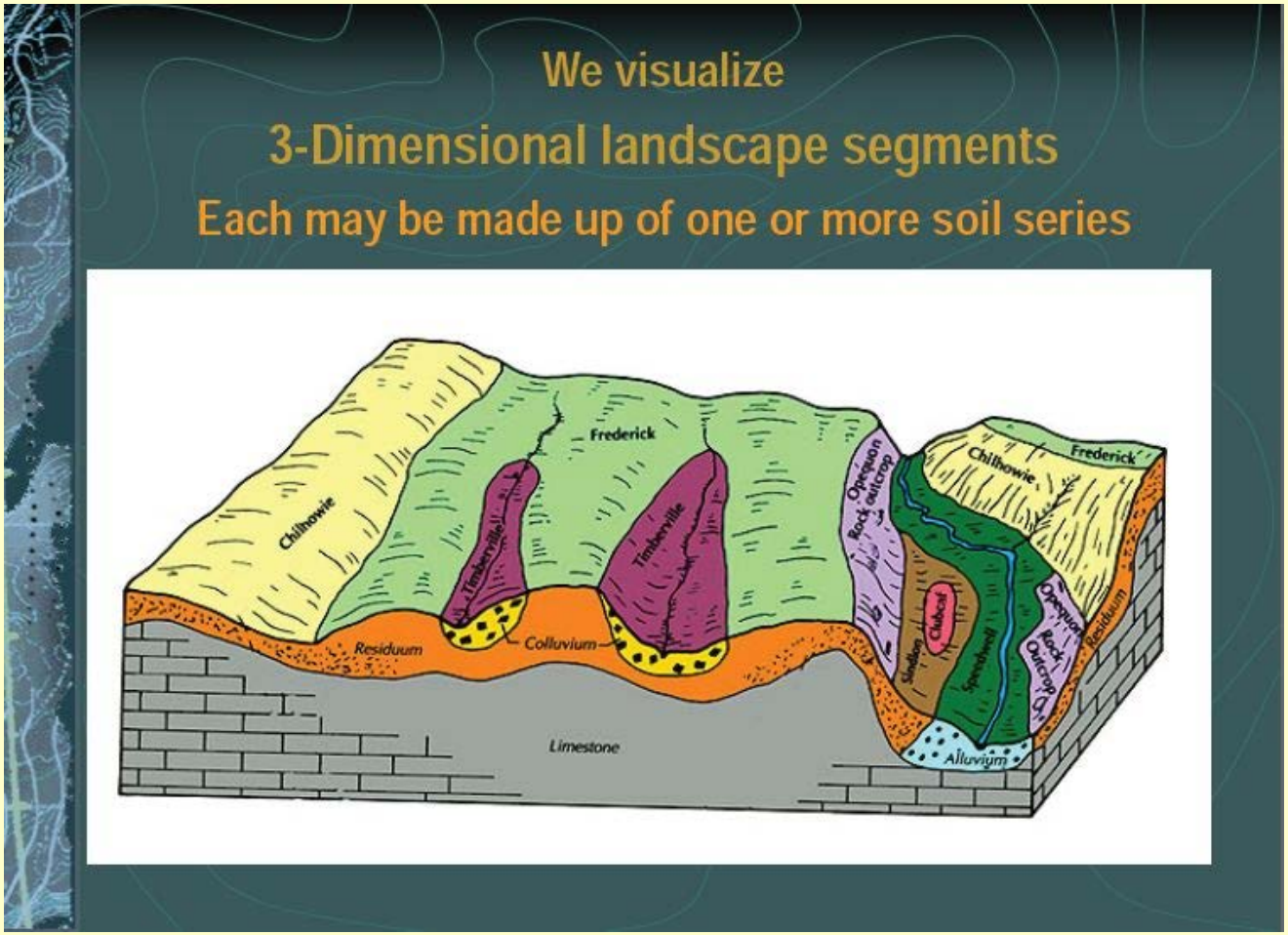
Soil Series

- Soils that differ from some other soil series by an important property or behavior (function). Series are the sixth level of Soil Taxonomy.
- They have ranges of properties, but the properties are constrained by the classification and by the properties of competing series.
  - Example 1: the colors of the topsoil may vary widely, but the subsoil clay content cannot range so broadly that it cause the soil to qualify for multiple higher-level classifications.
  - Example 2: the soil drainage class cannot be the same as another soil series mapped in the same area that has the same classification and major properties.

Phases

- Map unit legends give additional information about the soils.
  - Surface texture
  - Slope range (often 0-2% is left blank)
  - Frequency of flooding or ponding
  - Artificial drainage
  - Protection from flooding
  - More ….

Soil Series on the Landscape



Complexity

- Map units are made of soils, non-soils (beaches, rock), and hydrologic features (streams, small wet areas, springs).
- Water bodies and perennial rivers mapped as separate units.
- Composition is fully described in data tables.
  - The dominant soils and non-soils are part of the map unit name. They make up over 75% of the observations in the map unit.
  - The other components are called inclusions (<10% composition each).
  - Map units with some chance of having flat, wet areas usually have 3% inclusions of hydric soils.
  - Inclusion composition was not in the digital data tables, because their frequency was too variable and too small. They will be added in the future so that composition totals 100%.

Major Types of Map Units

- Consociations – one dominant component very extensive.
- Complexes – two or three major components named. The first named is always the most extensive (dominant).
- Higher Taxa – in older surveys, the soil could not be classified down to a series level (ex: Aquents). These are being replaced.

Consociations

- Soils that occur in relatively homogeneous landscapes often have 1 dominant soil and others are minor.

Complexes (2-3 major components)

- Soils occur in complex patterns and are too small or variable to map separately. They must differ in vegetation or texture…

Higher Taxa (dominant components are soils that are highly variable in properties)

- Soils do not occur in regular or repeating patterns, often due to human disturbance. Nature 504, 53–60.

Natural Disturbance

- Natural disturbances can cause soil maps to be innacurate.

Accuracy

- Not all polygons were visited or dug in.
- Most transects were conducted on important farm land units.
- Floodplains and wetlands were considered to have limited land use potential so were less frequently dug in.
- Floodplains have inherently complex soil patterns and are seldom consociations.
- Soils of small extent were combined with more common soils after mapping had ended.
- Microtopography in wetlands causes complex soil patterns.
- Wetlands capture sediment and water levels vary, so vertical complexity is common as well as lateral complexity.

Wetland Soils are Variable

Soil Series versus Hydric Soil Definition

- Many series were defined before hydric soils were.
- Many series had property ranges that crossed the boundaries between hydric and non-hydric soils.
- Criteria were set up to pull a subset of soil map units that contained series that had at least some properties of hydric soils.
- Soil maps made before hydric soil criteria were well defined may not reflect the more recent changes. Updates are being planned in some areas.
- Hydric soil lists are good tools to start with but understanding how and when map units were made is important to the end user of gSSURGO and Web Soil Survey data.

Where was the Original Wetland?

What Else Could the Help Guide Contain?

- Principals for Disaggregation of map unit components (separate complex map units into consociations).
- Examples of use of lidar and feature pattern recognition software to produce covariates for disaggregation.
- Information about using Saga® GIS software for topographic wetness index covariate generation.

Further

- Assistance may be needed to produce the help guide.
- Contact john.galbraith@vt.edu if you can assist.
- Thank you!