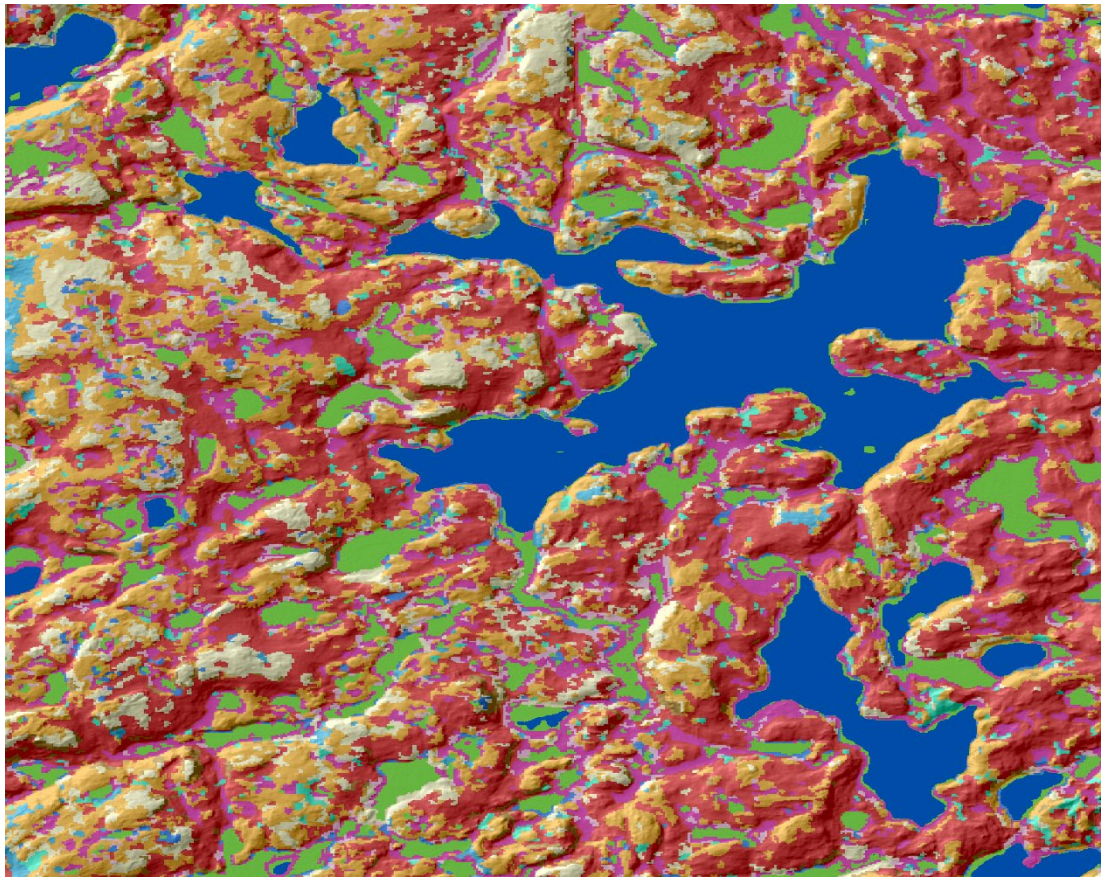
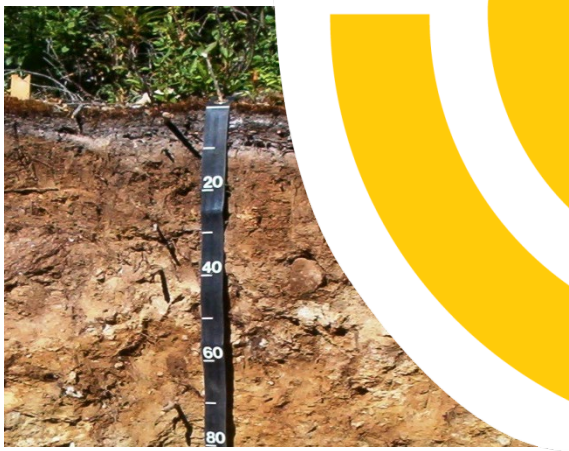
United States Department of Agriculture



Soil and Plant Science Division

Natural Resources Conservation Service



Digital Soil Mapping Focus Team

October 2020

Natural Resources Conservation Service

nrcs.usda.gov/

DSM Focus Team

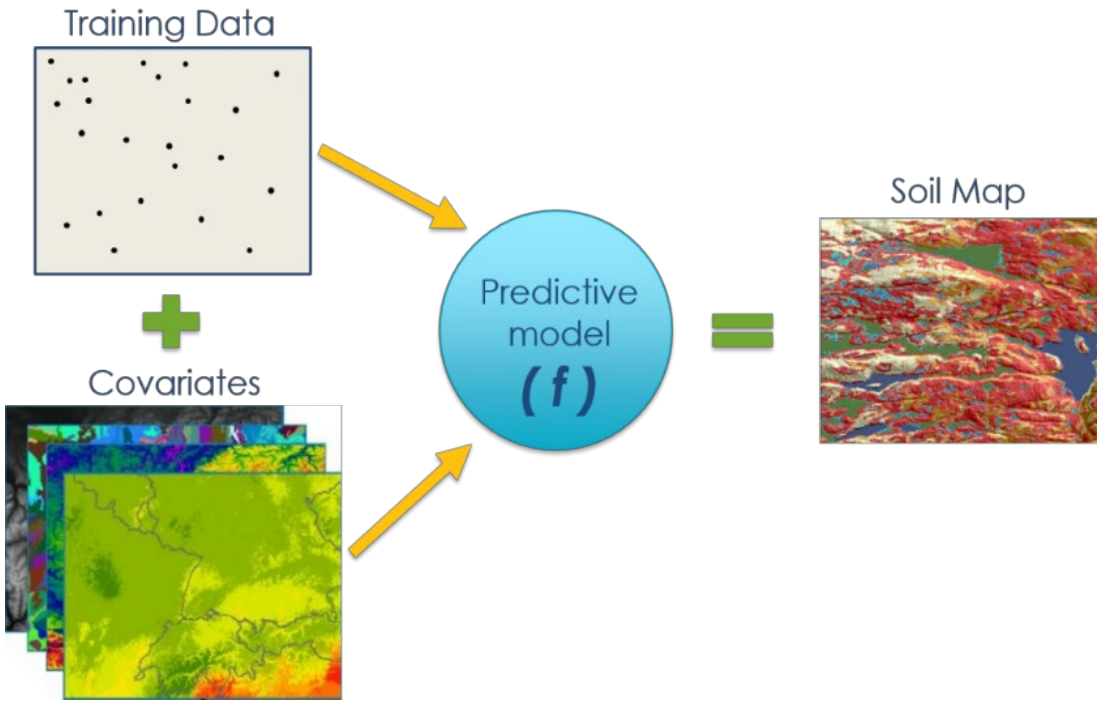
Team charges

- Coordinate DSM activities across the Division
- Identify training needs
- Identify needs to update standards and propose solutions
- Initiate annual field weeks to investigate soil-landscape relationships in selected project areas
- Assemble existing data
- Identify gaps
- Produce raster-based soil data and information

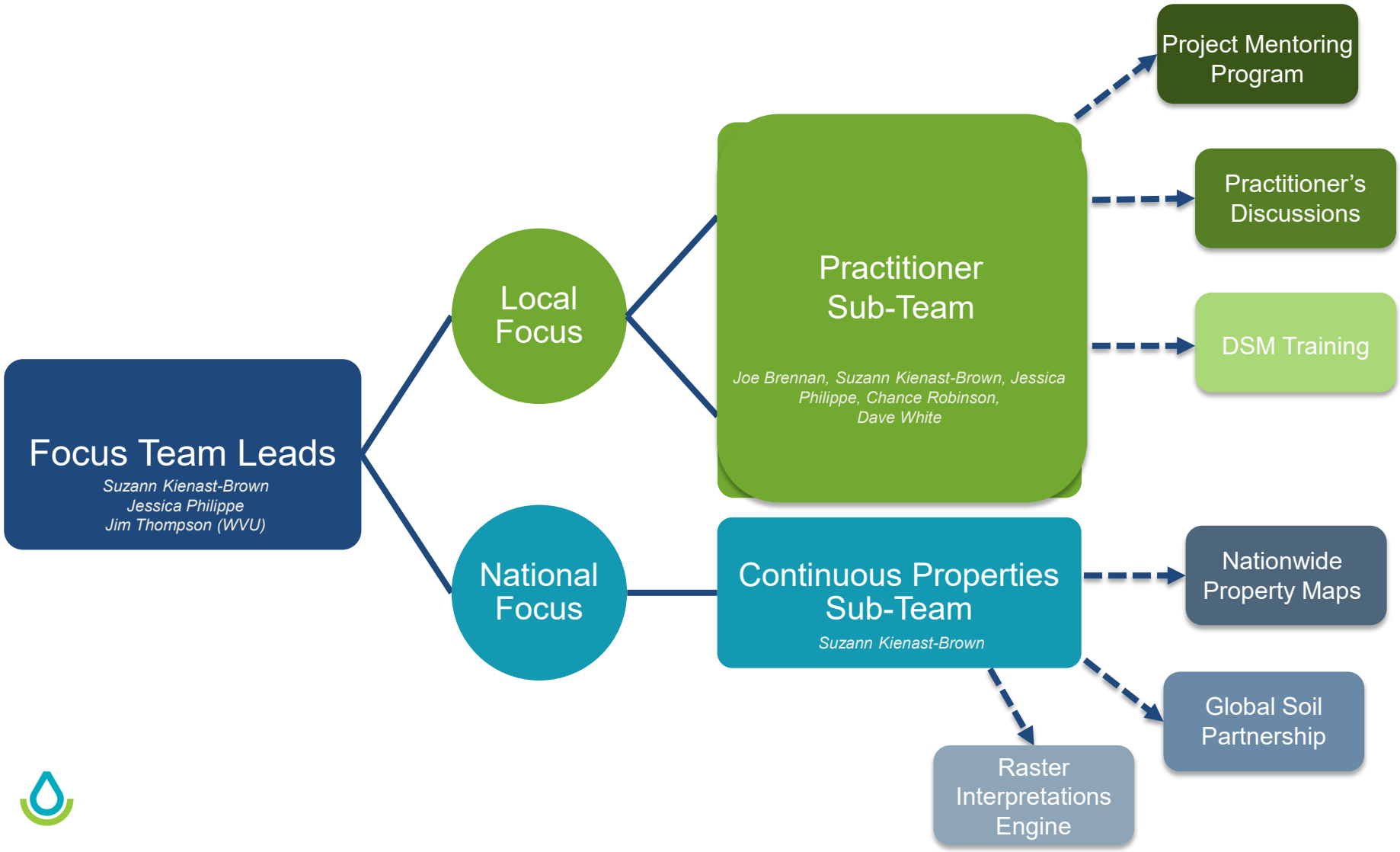
DSM Focus Team

Framework

- Standards
- Training
- Support
- Delivery



DSM Focus Team



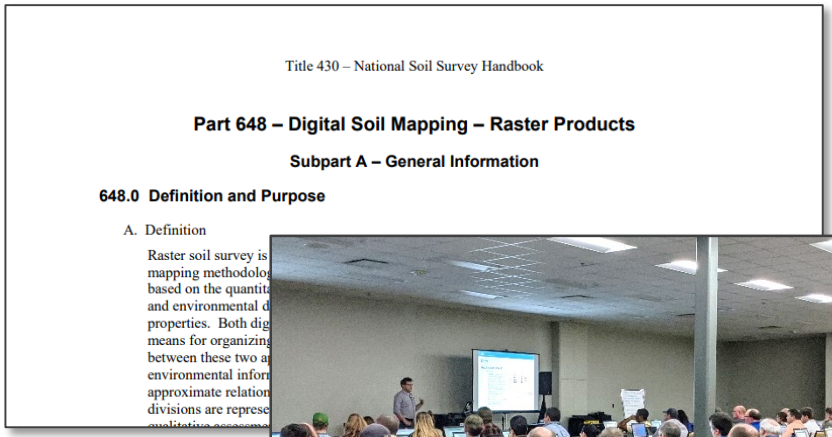
Framework

Standards
- NSSH Part 648

Training
- DSM curriculum

Support
- Sub-teams
- Field weeks
- Mentoring program

Delivery
- Raster Soil Surveys
- gNATSGO
- Global Soil Partnership


Title 430 – National Soil Survey Handbook

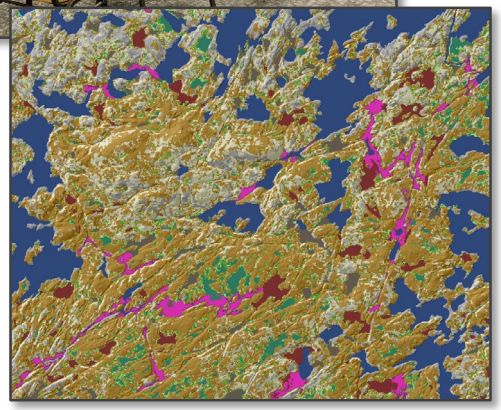
Part 648 – Digital Soil Mapping – Raster Products

Subpart A – General Information

648.0 Definition and Purpose

A. Definition

Raster soil survey is
mapping methodolog
based on the quantit
and environmental d
properties. Both dig
means for organizing
between these two a
environmental inform
approximate relation
divisions are represe



Practitioner Sub-Team

DSM Practitioner's monthly discussions

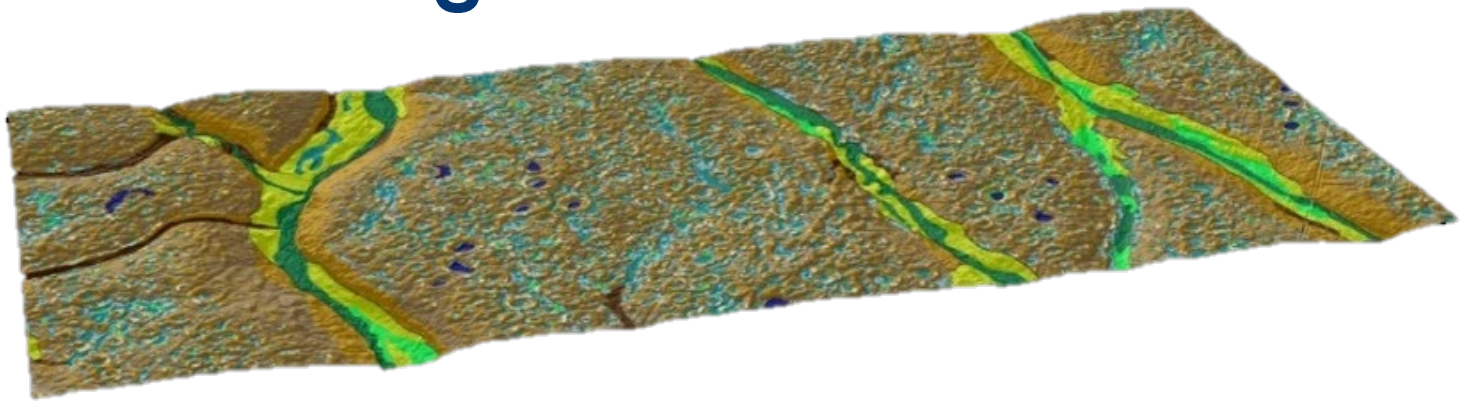
- *Informal training and sharing on a different topic each month*

Raster Mastery newsletter

- *Digital Soil Mapping and Raster Products - GovDelivery*

Job aids

Project mentoring



Raster Soil Survey defining variability in Ecological Sites across the landscape following an update soil survey project in the Northern Black Glaciated Plains of North Dakota

Update and Initial Mapping Sub-Teams

Project Mentoring Program

- Engagement and capacity building
- Soil Survey Office support
- Raster Soil Survey

1. Olympic National Park
2. Payette National Forest
3. Salmon-Challis National Forest
4. MLRA 94C/99
5. Lake Champlain Basin

USDA
United States Department of Agriculture

DSM Field Weeks combine modeling and training activities with field-based investigation

DSM Training Curriculum

Foundational Prerequisites (taken in the following order)

1. Spatial Analyst Workshop
2. Statistics for Soil Survey, Part 1
3. Intro to Digital Soil Mapping

DSM Field Week

- Prerequisites
  - All 3 foundational prerequisites
- Commitment from local soil survey office

Advanced Courses

Digital Soil Mapping with ArcSIE

- Prerequisites
  - All 3 foundational prerequisites

Statistics For Soil Survey, Part 2

- Prerequisites
  - Statistics for Soil Survey Part 1

Remote Sensing for Soil Survey Applications

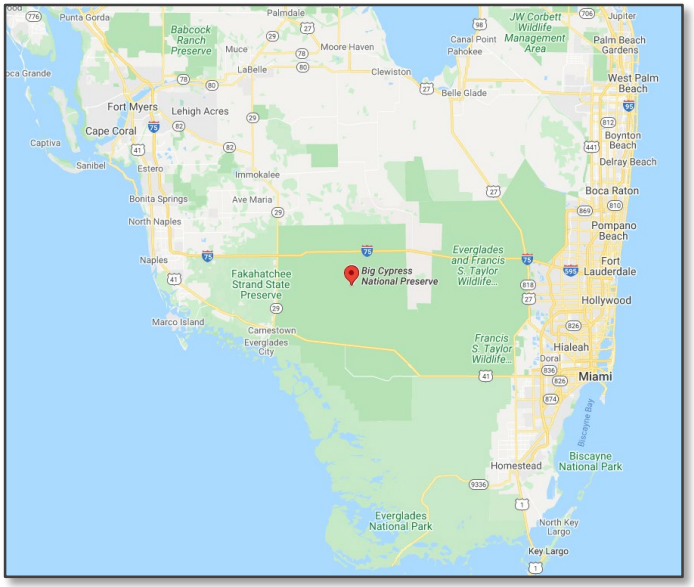
- Prerequisites
  - All 3 foundational prerequisites
- Intro to Digital Remote Sensing (available on-line from Michigan State University)

2021 Requests

1. Missouri
2. Idaho
3. Utah
4. Maine
5. Puerto Rico

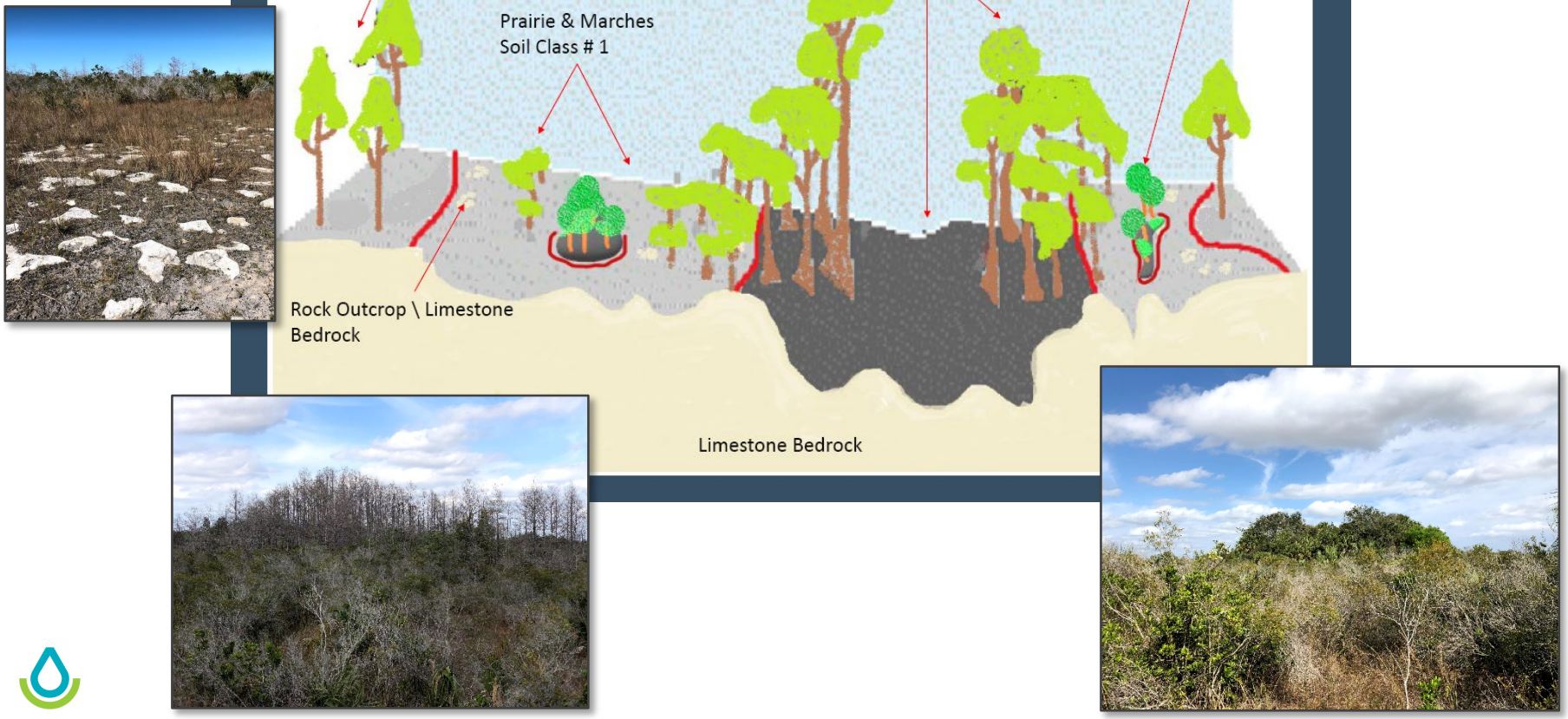
DSM Field Weeks

Big Cypress National Preserve



DSM Field Weeks

Big Cypress National Preserve

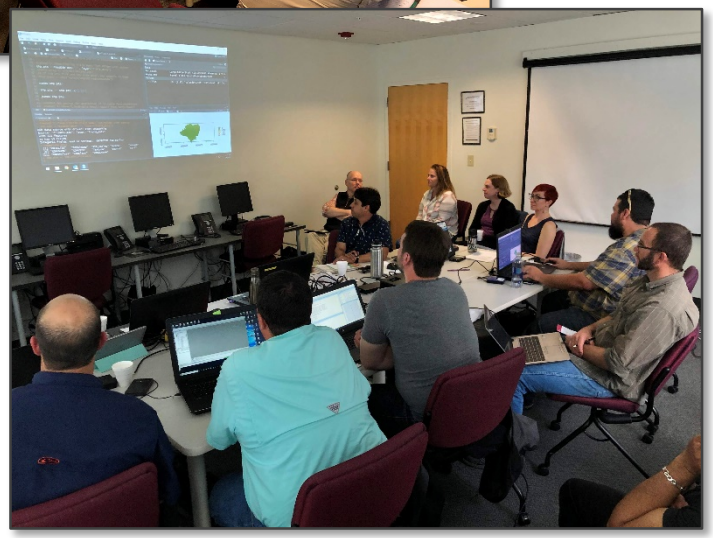


DSM Field Weeks

Big Cypress National Preserve

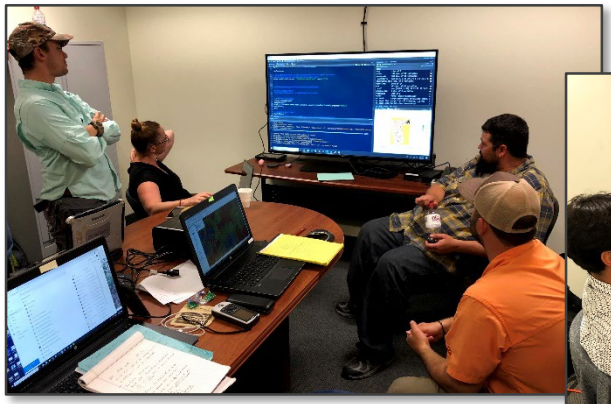
DSM Field Weeks

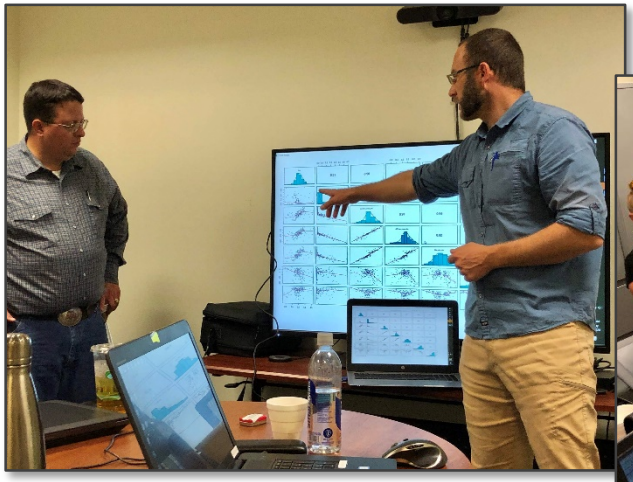
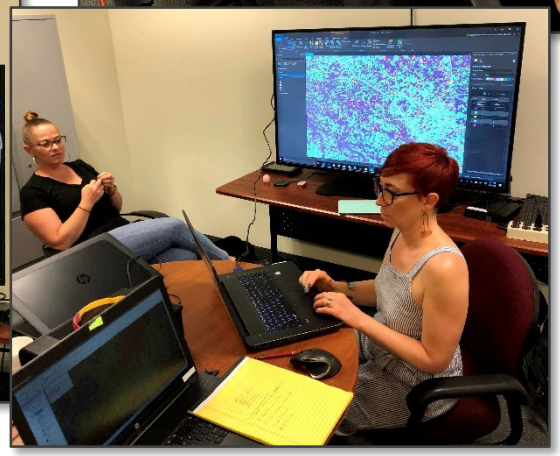
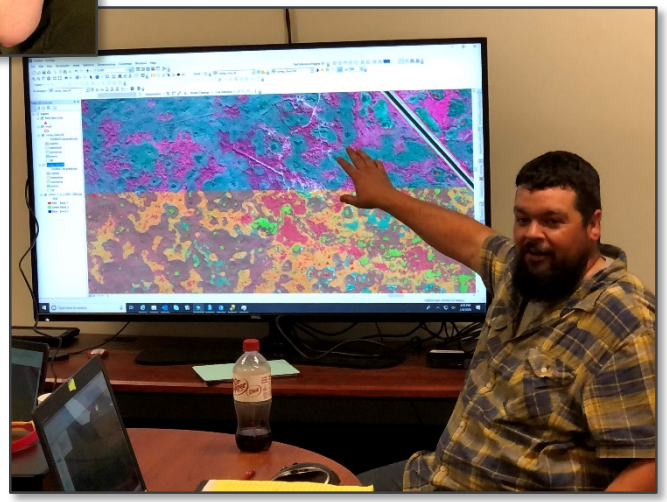
Big Cypress National Preserve



DSM Field Weeks

Big Cypress National Preserve



Continuous Properties Sub-Team

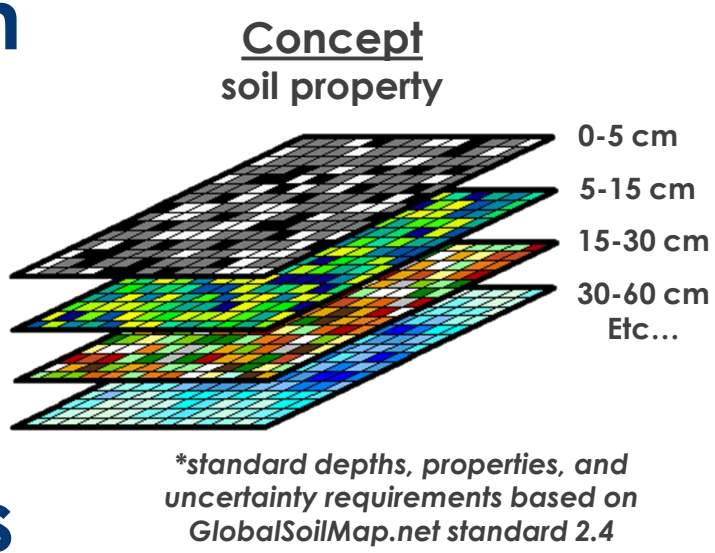
14 members from NCSS

Shared interest and vision

- Methodology
- Product
- Delivery

National coverage continuous soil properties

- 12 key soil properties
- 6 depths
- Prediction uncertainty



**standard depths, properties, and uncertainty requirements based on GlobalSoilMap.net standard 2.4*

Continuous Properties Sub-Team

Progress – complete

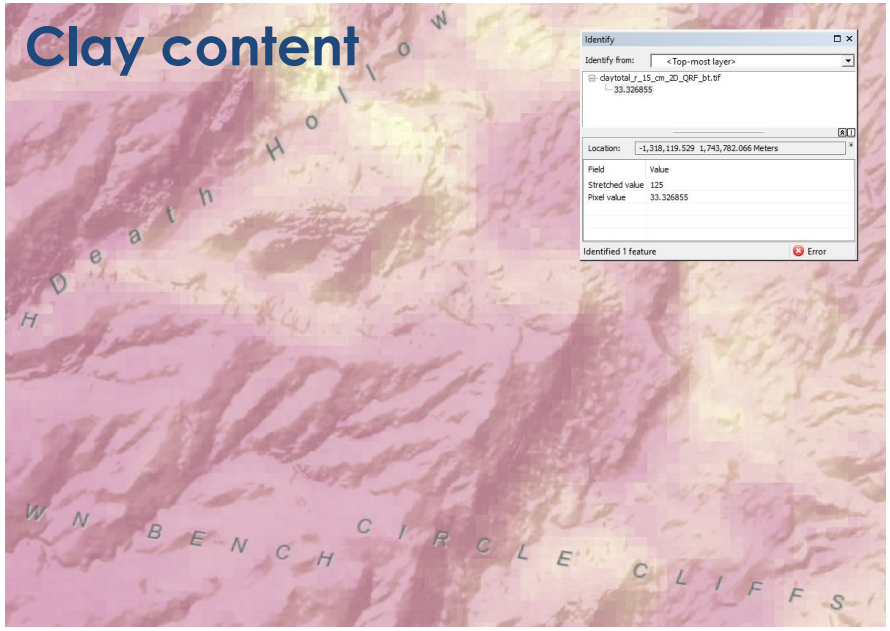
- Data (CONUS 30m covariates)
  - 20 spectral derivatives
  - Geomorphons (landform)
- Travis Nauman (USGS) completed continuous properties for Upper CO River Basin
- GSP Global Soil Salinity maps
  - pH, EC, ESP, salt severity class
  - Accuracy and uncertainty
- Methodology comparison
  - Point-depth vs. spline depth interval predictions
  - SSSA poster
  - Journal article

Continuous Properties Sub-Team

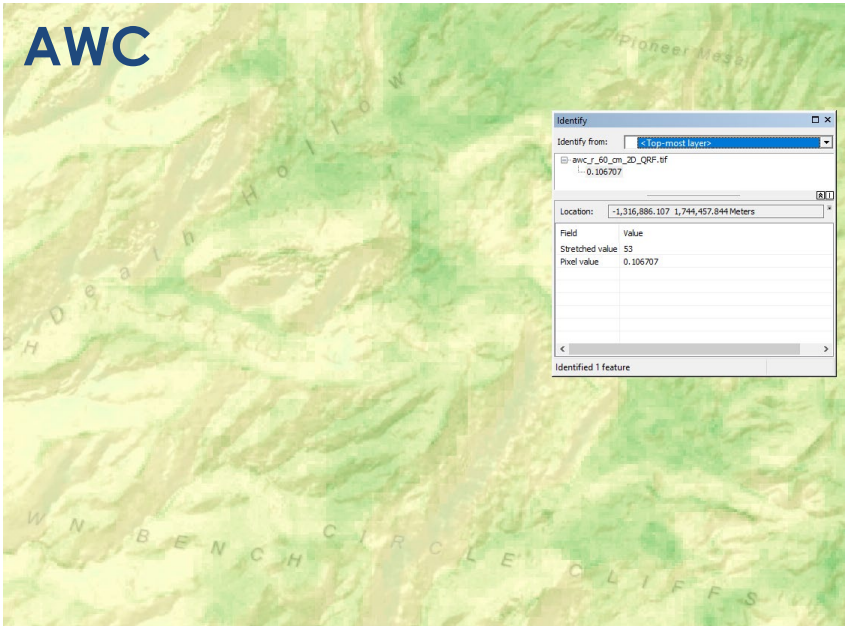
Progress – ongoing

- Data (CONUS 30m covariates)
  - 55 terrain derivatives
- 100m CONUS property maps
  - Combined methods from GSP and methodology study workflows
- R-based raster interpretations engine
- Computing solutions
  - Data Science Workbench (USDA)
  - Google Cloud

Upper CO River Basin Property Maps



claytotal_r_15_cm_2D_QRF_bt.tif
Value
High : 67.3018
Low : 0.413878



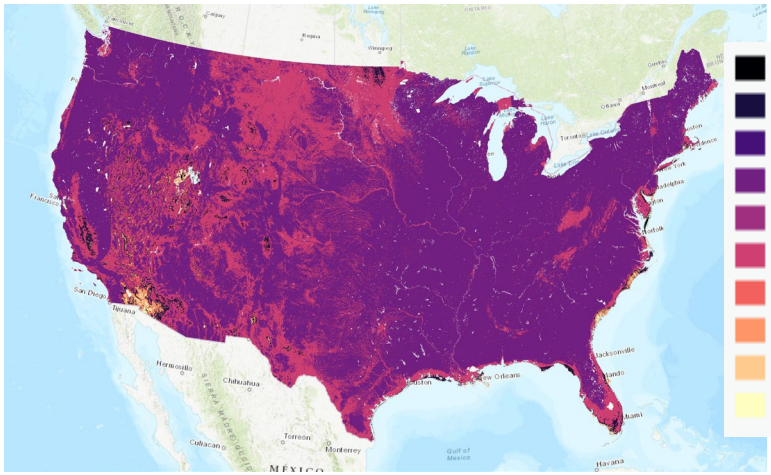
awc_r_60_cm_2D_QRF.tif
Value
High : 0.502631
Low : 0.0020278

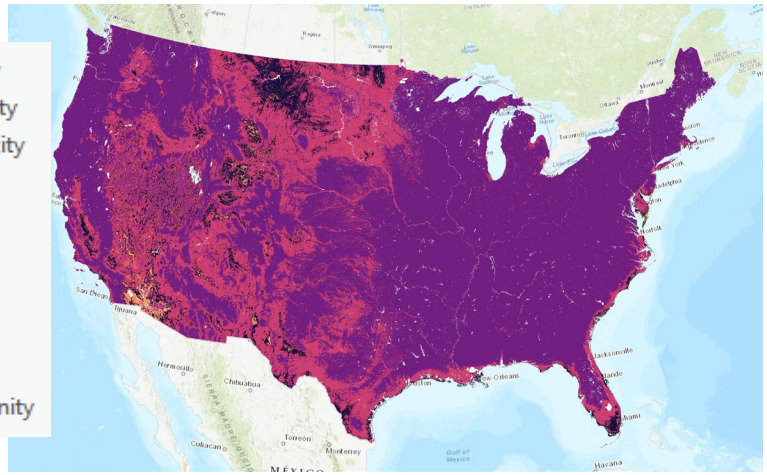
Travis Nauman, USGS (2019)

GSP Soil Salinity: Salt-Affectedness

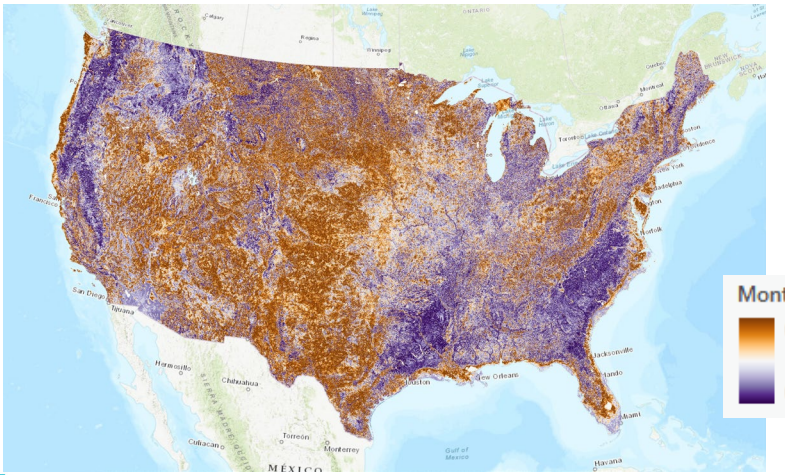
0–30cm

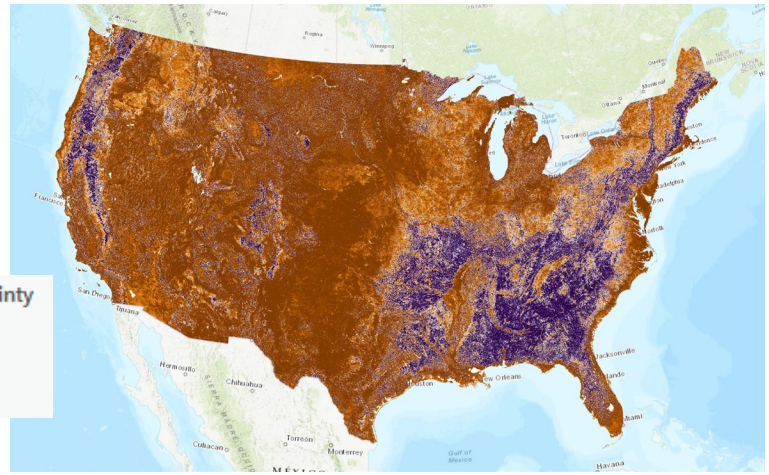
30–100cm





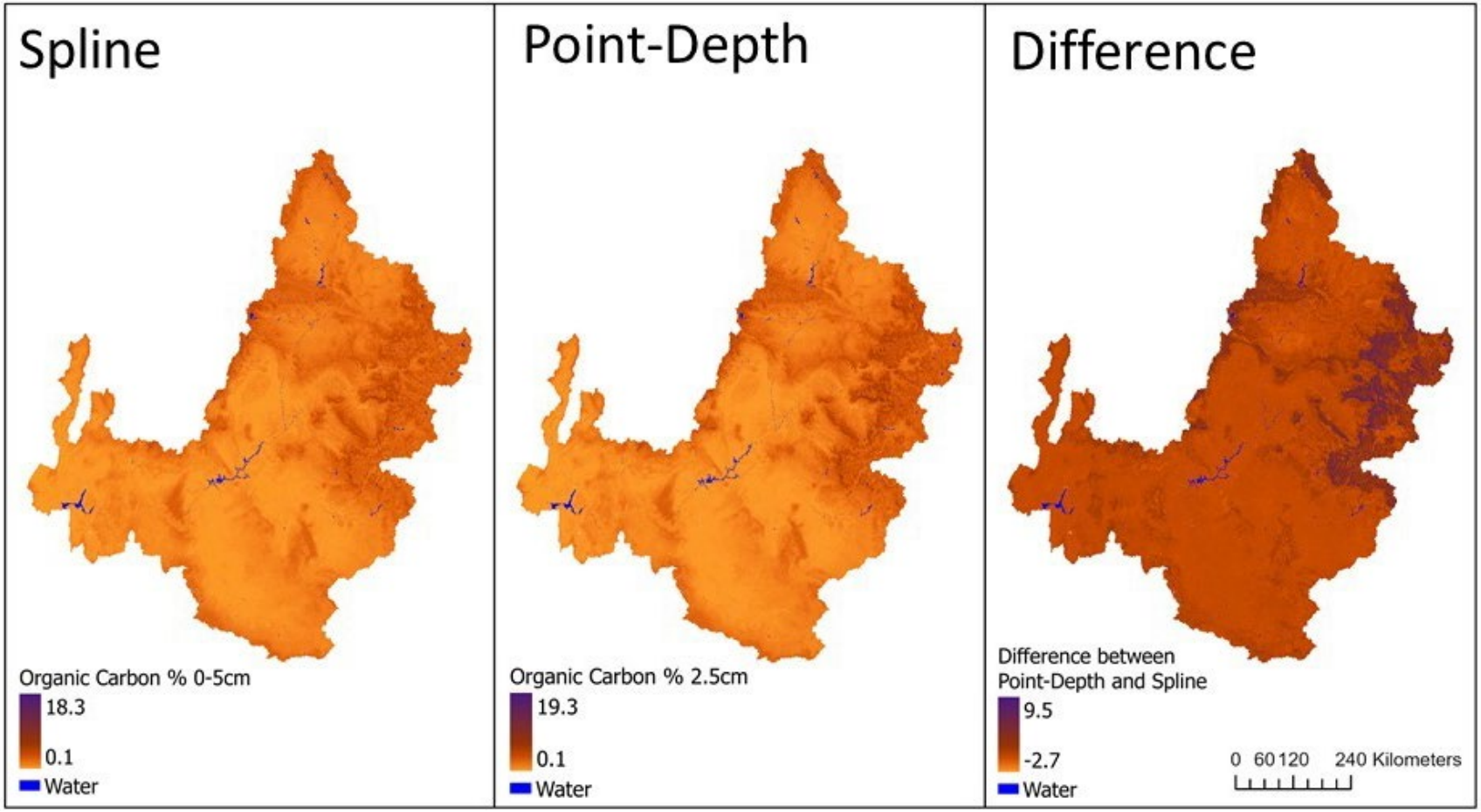
Extreme Salinity
Moderate Salinity
Moderate Sodicity
None
Saline Sodic
Slight Salinity
Slight Sodicity
Strong Salinity
Strong Sodicity
Very Strong Salinity



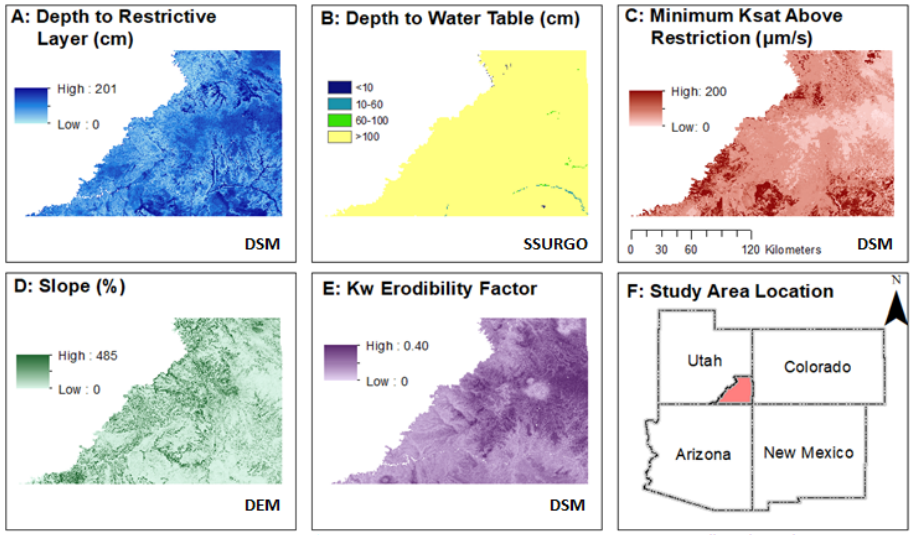


Monte Carlo Uncertainty
0.098
0

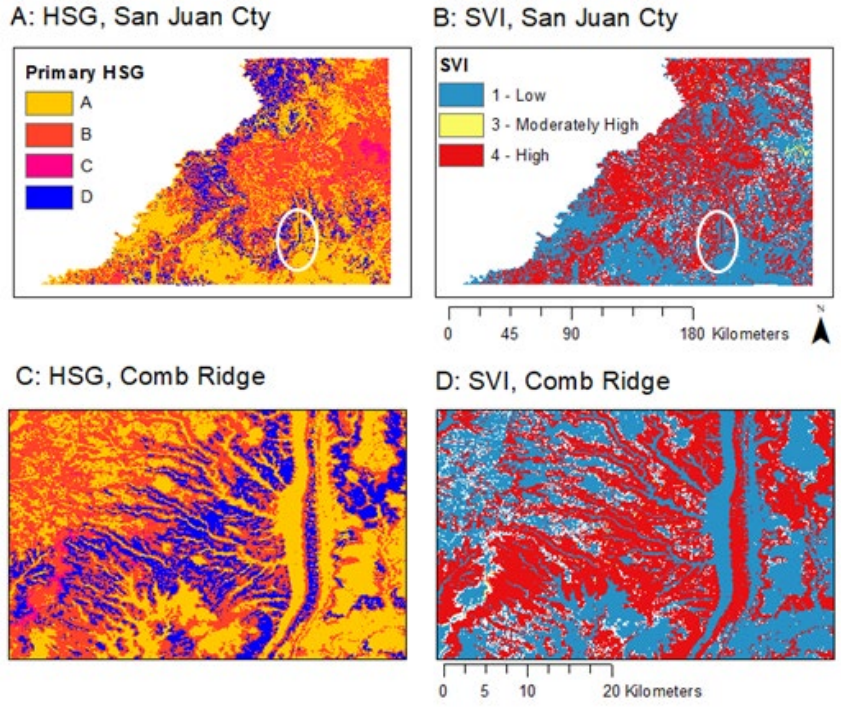
Methodology Comparison



Raster Interpretations Engine



Nauman, T., Duniway, M. 2020. A hybrid approach for predictive soil property mapping using conventional soil survey data, SSSAJ, https://doi.org/10.1002/saj2.20080



DSM Focus Team

Long range plan: 10-year goals

1. DSM operational in SPSD
2. Support system of staff at regional and national levels
3. National ecological site map built from continuous soil properties
4. DSM methods and products applied to dynamic soil property inventory and assessment within the framework of Dynamic Soil Survey

DSM Focus Team

Long range plan: 5-year goals

1. Products
   - Raster Soil Surveys (coastal zone and urban)
   - Continuous properties (refreshed annually)
   - Ecological site maps
   - Interpretations
   - Increased number of quality assured pedon observations
2. Delivery mechanism for raster-based products
3. Computing solution for development, storage, analysis, modeling, and sharing of nationwide datasets
4. Training
   - DSM in soil scientist/ecological site specialist training
   - Expand training
     - Advanced DSM course
     - Self-paced training (available to NCSS partners)
5. Continual review and update of standards
6. Integrate raster products into conservation planning

DSM – Foundation for the Future