

The
National Soil Survey Laboratory

Is Now The
Kellogg Soil Survey Laboratory

6/4/12 -- Naming of the Kellogg Soil Survey Laboratory



Research Projects at KSSL

- *Soil Systems* will be a focus of research at the KSSL.

Soil Systems

- Soil system: a recurring group of soils that occupies the landscape from the interstream divide to the stream (Daniels et al., 1999).
- A soil system will have similar soil parent materials, geomorphology, local relief, hydrology, and climate.

Soil Systems

- A few thousand hectares to many hundreds of km².
- A single MLRA, may contain multiple soil systems due to differences in stratigraphy; parent material, or other landscape characteristics that affect soil properties and distribution.

Goals of Soil System Research

- To improve accuracy and precision of soil maps and interpretations of soil behavior.
- Better understanding and representation of patterns of pedogenesis:
 - connectivity among soils and soil properties, topography, and geomorphology, and
 - soil, property response to disturbance including agricultural management and climate change.

Active Soil System Projects

- California Bay-Delta Watershed
- N. Great Plains salinity and sodicity

Bay Delta Active Projects

- **Sacramento-San Joaquin Rivers Delta (MLRA 16)** – Characterization of benchmark soil series (dominantly Histosols) in the fresh water and salt water marshes of the low-laying Delta.
- **Central California Coast Range (MLRA 15)** – Soil characterization and soil moisture & temperature studies of rangelands, degraded/eroded rangelands, and lands recently converted to vineyards and orchards on the east side of the Coast Range.
- **Sierra Nevada Mountains (MLRA 22B)** – Soil characterization and soil moisture & temperature studies of montane to alpine ecoregions.

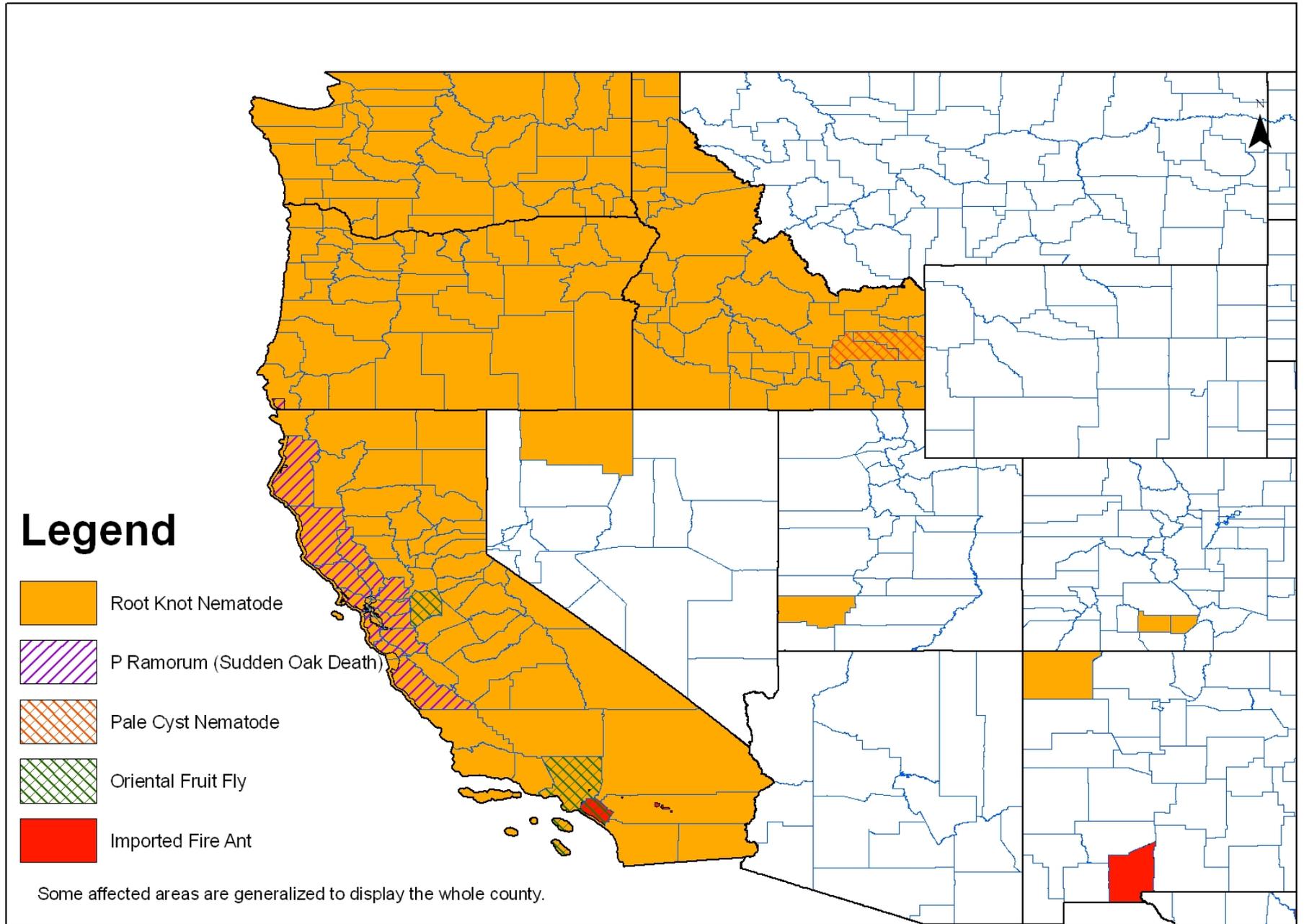
Long range plan: Bay Delta Watershed

- Central Valley Flood Plains and Basins (MLRA 17) – Characterization of selected benchmark soil series on the flood plains and basins of the Sacramento and San Joaquin Valleys.
- Merced/Tuolumne River Terraces (MLRA 17) – Native vs. disturbed cropland soils on terraces and fans with research focus on comparative study of soil hydrology, solute chemistry and reactions, and microbiology.
- Sierra Nevada Foothills (MLRA 18) – Hydropedologic processes and properties in rangeland soils in the foothills interface between agricultural and urban areas of the Valley & Delta and wildlands of the Sierra Nevada Mountains.

APHIS and NE Dept of Ag. Quarantines affecting western states

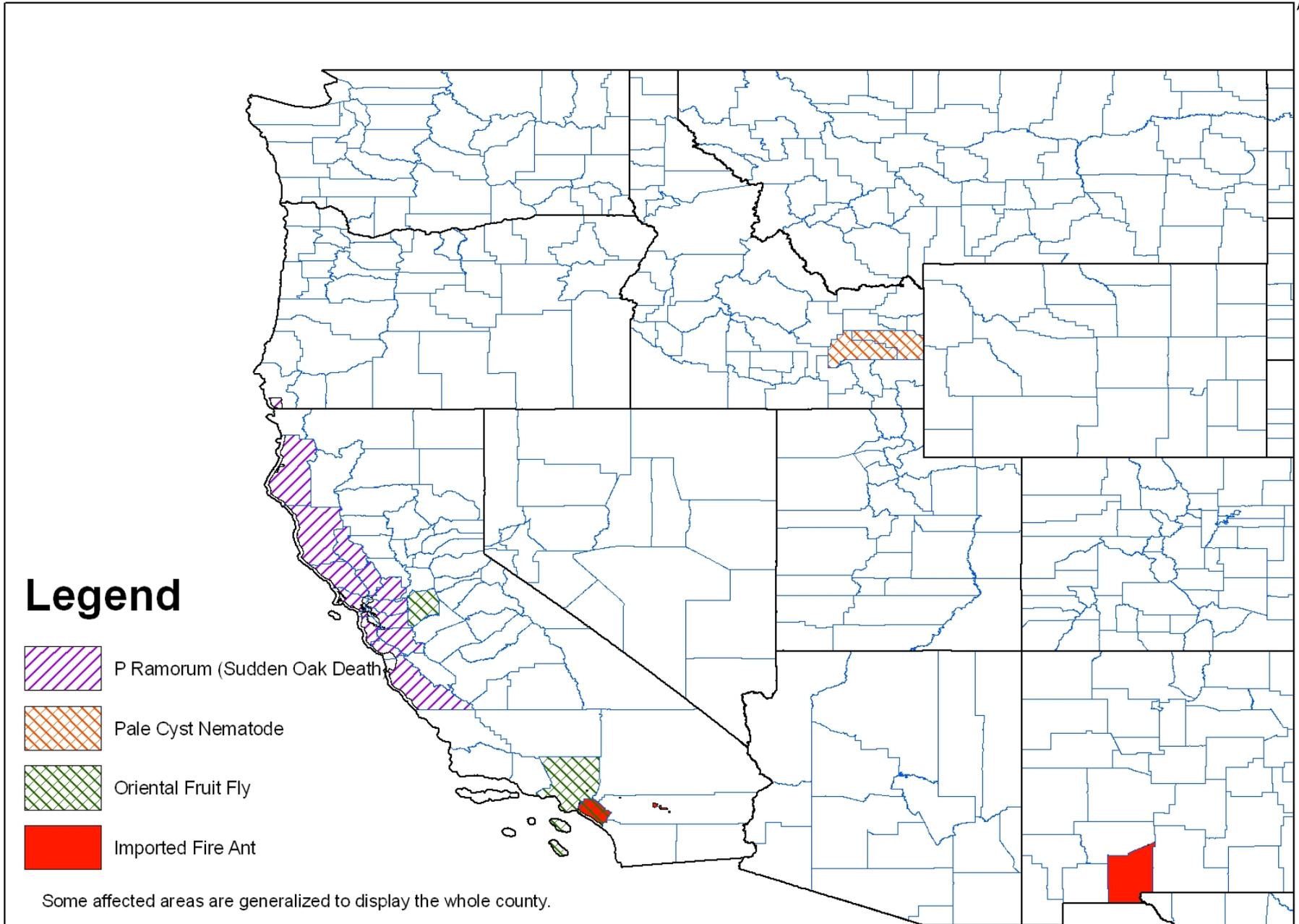
- APHIS:
 - *Phytophthora Ramorum* – sudden oak death
 - Pale Cyst Nematode
 - Oriental Fruit Fly
 - Imported Fire Ant
- Nebraska Department of Agriculture
 - Columbia root knot nematode

APHIS Quarantine Areas



APHIS Quarantine Areas

N



Legend



P Ramorum (Sudden Oak Death)



Pale Cyst Nematode



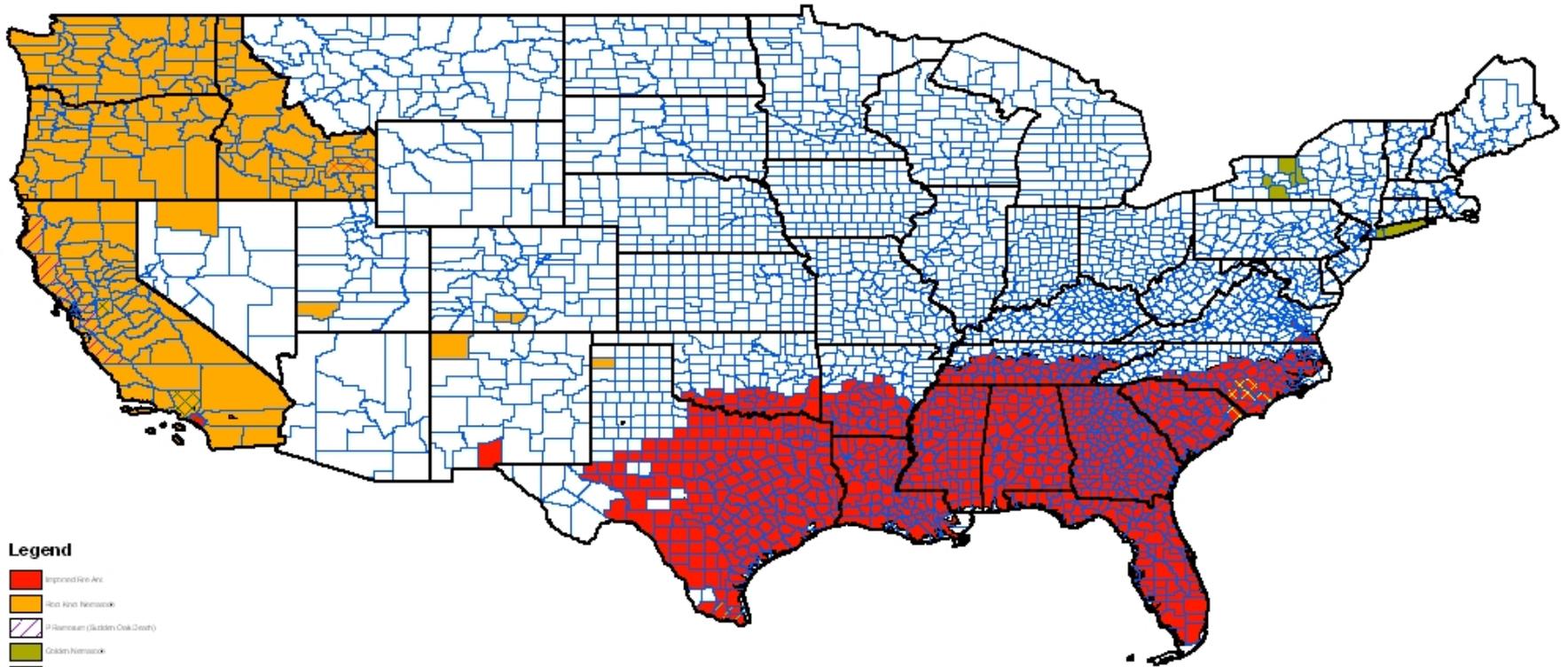
Oriental Fruit Fly



Imported Fire Ant

Some affected areas are generalized to display the whole county.

APHIS and NE Dept. of Ag. Quarantine Areas



- Legend**
- Impressed Scale Insect
 - Spotted Knives Nematode
 - Hemlock (Sudden Oak Death)
 - Golden Nematode
 - Star Cyst Nematode
 - Common Fruit Fly
 - Black Oak Bark Fly
 - Witchweed

1:24,714,513

Map data from various sources, including the U.S. Census Bureau.

Current KSSL Projects and Activities

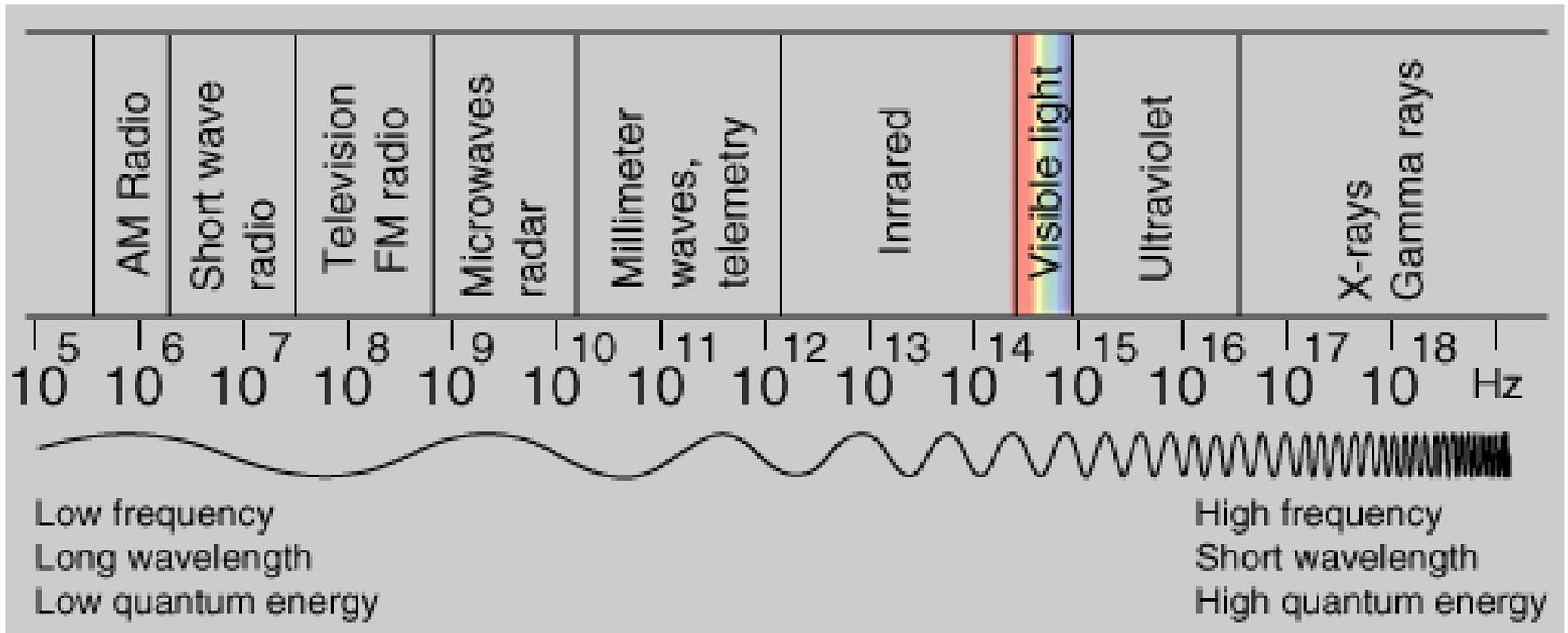
Rapid Carbon Assessment

- Field data collection complete.
- KSSL will analyze QC, organic samples and archive central pedons.
- Data aggregation and analysis is in progress.
- Models produced:
 - Predicting C from VNIR scans
 - Bulk density

VNIR and MIR Spectrometry

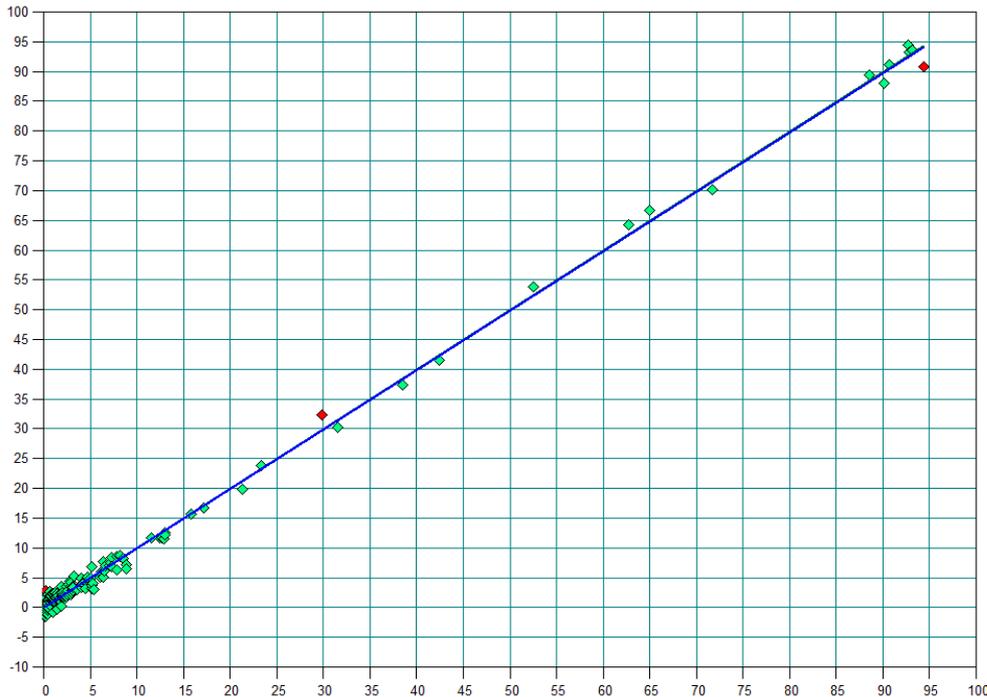
- VNIR Spectrometers used in RaCA will remain in MOs.
- Models will be developed for predicting C and other soil properties from VNIR and MIR spectra: calcium carbonate, gypsum, clay content, and other suitable properties.

Mid IR



Gypsum

Fit vs True / Gypsum / Calibration

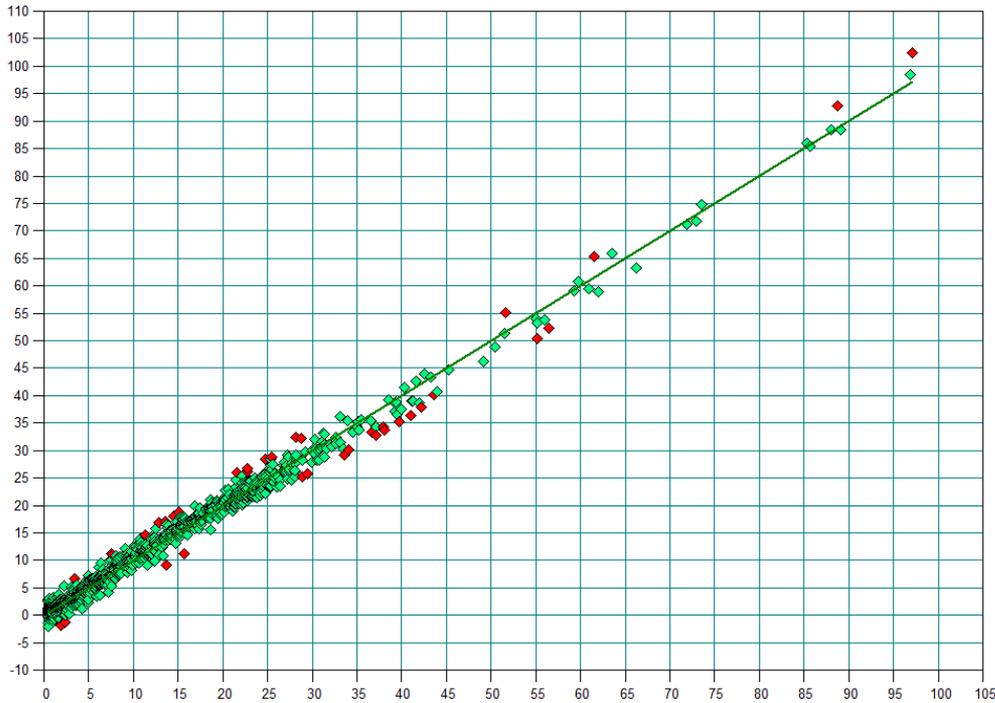


- ❑ One spectrum of each 204 samples were used as calibration set
- ❑ Partial least square (PLS) was used to develop calibration curve.
- ❑ IR spectra correlate well with gypsum with R^2 of 99.75, and the accuracy expressed in root mean square error of estimation (RMSEE) is about 0.956 while in root mean square of cross validation (RMSECV) is 1.11.

Offset: 0.018 Slope: 0.998 Corr. Coeff.: 0.9988
Rank: 7 $R^2 = 99.75$ RMSEE = 0.956 RPD: 20
Validation No 4 + Gypsum.q2

Calcium Carbonate Equivalent

Fit vs True / CaCO3 Equivalent / Calibration

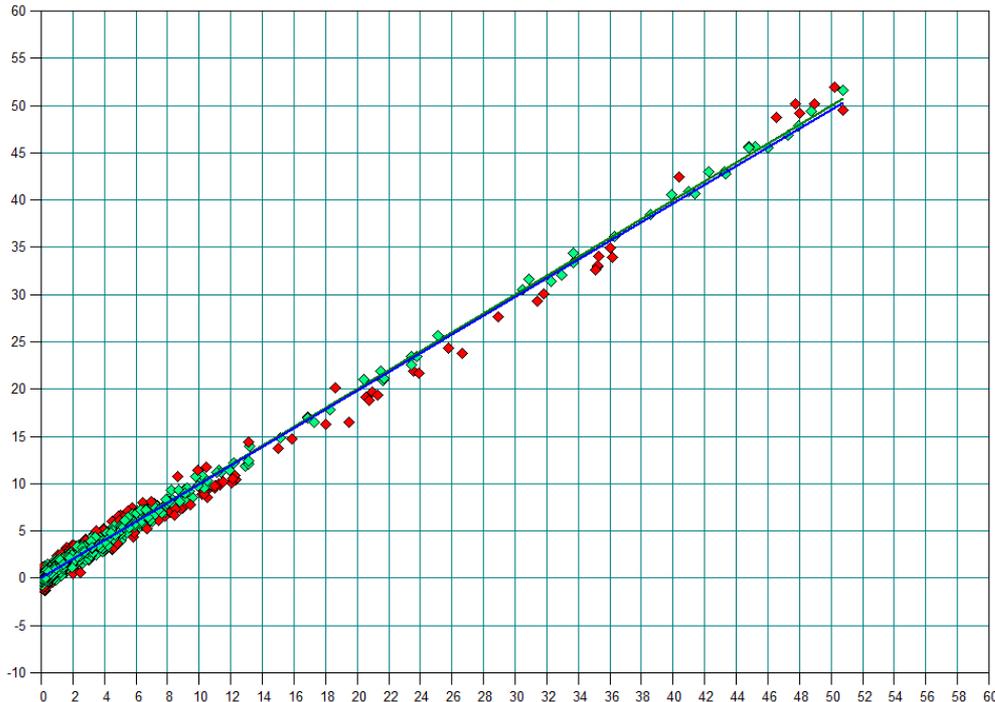


- ❑ One spectrum of each 1163 samples were used as calibration set
- ❑ Partial least square (PLS) was used to develop calibration curve.
- ❑ IR spectra correlate well with calcium carbonate equivalent with R^2 of 99.04, and the accuracy expressed in root mean square error of estimation (RMSEE) is about 1.29 while in root mean square of cross validation (RMSECV) is 1.37 .

Rank: 10 $R^2 = 99.04$ RMSEE = 1.29 RPD: 10.2
Validation No 1 CaCO3 Equivalent.q2

Total Carbon

Fit vs True / Total Carbon [%] / Calibration

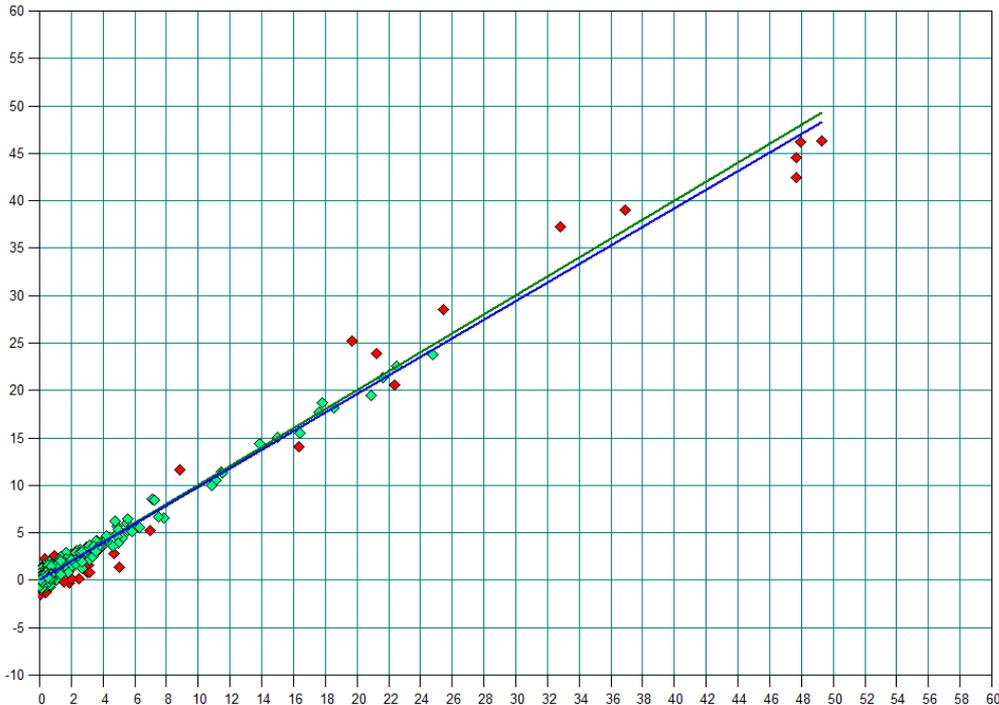


- ❑ One spectrum of each 4107 samples were used as calibration set
- ❑ Partial least square (PLS) was used to develop calibration curve.
- ❑ IR spectra correlate well with total carbon with R^2 of 99.06, and the accuracy expressed in root mean square error of estimation (RMSEE) is about 0.433 while in root mean square of cross validation (RMSECV) is 0.491 .

Offset: 0.019 Slope: 0.991 Corr. Coeff.: 0.9953
Rank: 15 $R^2 = 99.06$ RMSEE = 0.433 RPD: 10.3
Validation No 4 + total carbon all.q2

Estimated Organic Carbon

Fit vs True / Est. Organic Carbon [%] / Calibration



- ❑ One spectrum of each 1105 samples were used as calibration set
- ❑ Partial least square (PLS) was used to develop calibration curve.
- ❑ IR spectra correlate well with estimated organic carbon with R^2 of 97.93, and the accuracy expressed in root mean square error of estimation (RMSEE) is about 0.585 while in root mean square of cross validation (RMSECV) is 0.672 .

Offset: 0.028 Slope: 0.979 Corr. Coeff.: 0.9896
Rank: 10 $R^2 = 97.93$ RMSEE = 0.585 RPD: 6.94
Validation No 3 Est organic Carbon.q2

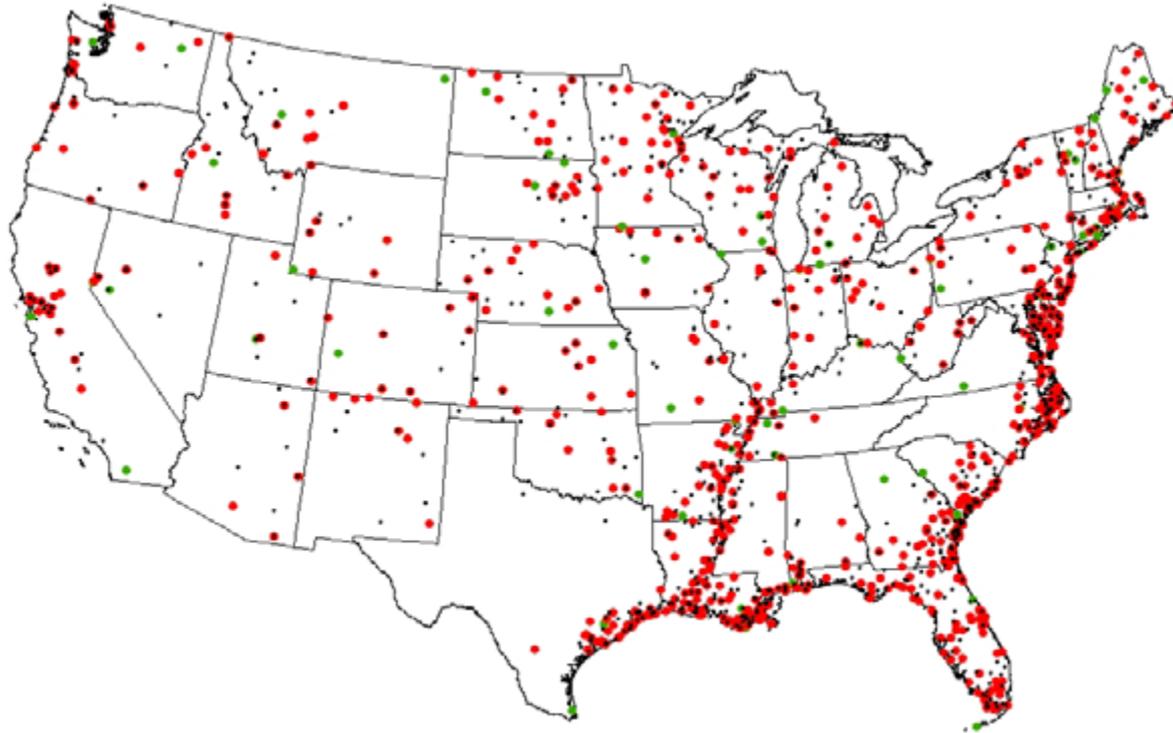
EPA National Wetland Condition Assessment

- The National Wetland Condition Assessment (NWCA) is a statistical survey of the quality of our Nation's wetlands.
- The NWCA is designed to:
 - Determine the ecological integrity of wetlands at regional and national scales.
 - Build state and tribal capacity for monitoring and analysis.
 - Promote collaboration across jurisdictional boundaries.
 - Achieve a robust, statistically-valid set of wetland data.
 - Develop baseline information to evaluate progress.

NWCA sampling and analysis

- ~ 1250 Sites Sampled by contractors - training by NRCS and State agencies.
- NWCA will analyze
 - Vegetation
 - Soils
 - Hydrology
 - Water quality
 - Algae

NWCA sample sites



Soil Analyses of NWCA samples

- PSDA
- Calcium carbonate equivalent
- Total Carbon, Nitrogen and Sulfur C N S
- pH 1:1 H₂O 1:2 .01M CaCl₂
- Cation exchange capacity CEC Ca²⁺ K⁺ Mg²⁺ Na⁺
- Ammonium Oxalate Extraction Al Fe Mn P Si
- Electrical Conductivity EC
- Dithionite-Citrate Extraction Al Fe Mn
- Olsen Phosphorus P
- Mehlich Phosphorus P
- Trace Elements Ag As Ba Be Cd Co Cr Cu Hg Mn Mo Ni P Pb Sb Se Sn Sr V W Zn
- Bulk Density Db_f

KSSL will interpret data.

Data will be added to soil characterization database.

Revised Procedure for Submitting Soil Samples, Site Data and Pedon Descriptions

Spreadsheets and instructions are available for
download at NRCS soils website.



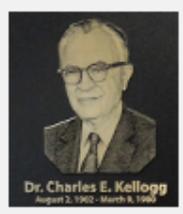
Search Soils Enter Keywords GO

- Quick Access**
- Citing Our Databases
 - Geospatial Research Unit
 - Hydric Soils
 - List of Published Soil Surveys
 - MLRA
 - MLRA Explorer
 - National Cooperative Soil Survey (NCSS)
 - Official Soil Series Descriptions (OSD)
 - Soil Classification
 - Soil Data Access
 - Soil Data Mart
 - Soil Data Viewer
 - Soil Geography
 - Soil Lab Data
 - Soil Quality
 - Soil Science Glossary
 - Soil Extent Mapping Tool (SEMT)
 - Soil Survey Office Laboratory References
 - State Soils
 - STATSGO2
 - SSURGO
 - Web Soil Survey

Welcome to the NRCS Soils Website.

Helping People Understand Soils

Soils is part of the National Cooperative Soil Survey, an effort of Federal and State agencies, universities, and professional societies to deliver science-based soil information.



Kellogg Soil Survey Laboratory Dedication

On June 4th, the National Soil Survey Laboratory was named after Dr. Charles E. Kellogg, an American pioneer of soil science who was instrumental in bringing a national focus on the value of soil data for the public good.

...More Info



2012 NCSS Regional Conference Information

The NCSS Regional Conferences will be held in Bowling Green, Kentucky on May 21-25; Lincoln, Nebraska on June 4-7; Orono, Maine on June 18-21; and Davis, California on June 25-28. Information has been posted for the [South \(Bowling Green\) Region](#), the [North Central \(Lincoln\) Region](#), the [West \(Davis\) Region](#), and the [Northeast \(Orono\) Region](#). These pages include registration forms, agendas, accommodations, and contacts.

...More Info



2011 Antarctica Data

There are currently eight Soil Climate Research Stations in Antarctica. Data collected in 2011 has been uploaded for each of these stations: Bull Pass, Don Juan Pond, Granite Harbour, Marble Point, Minna Bluff, Mt. Fleming, Scott Base, Victoria Valley. A ninth

Information For:

- Geographers
- Soil Scientists
- Land Use Managers
- Teachers and Students
- City and County Planners

Follow Us:



Soil Survey Office Laboratory References

- [Soil Survey Field and Laboratory Methods Manual](#), version 1.0 (2-3-11; PDF; 8.5 MB)
 - Addenda
 - [3.3 Bulk Density](#) (4-7-11; PDF; 114 KB)
 - [4.6 Electrical Conductivity and Soluble Salts](#) (4-7-11; PDF; 169 KB)
 - [Particle-size analysis by hydrometer data entry forms](#) (1-31-11; XLS; 386 KB)
- [Soil Survey Office Laboratory Safety Guide](#), version 1.0 (6-10-09; PDF; 453 KB)
 - [Material Safety Data Sheets \(MSDS\) and recommended chemical disposal procedure](#) (10-23-09; PDF; 3.2 MB)

Laboratory Methods and Information

- [Lab Methods Manual](#) - soil laboratory methodology and reference for the laboratory analyst.
- [Soil Survey Laboratory Information Manual](#) - Companion reference to the *Laboratory Methods Manual*, SSIR No. 42. Sampling methodology, descriptions of KSSL data sheets, and other information to help users of lab data.
- [Testing Methods for Phosphorus and Organic Matter](#)
- [KSSL Sample Submission](#) (ZIP; 664 KB) - Worksheets and documentation necessary for KSSL sample submission.

Geomorphic Description System

These documents provide a descriptive method and a technical guide for applying and understanding geomorphic and geologic concepts and terms for soil inventory in the USA National Cooperative Soil Survey (NCSS) Program.

- [Geomorphic Description System](#), version 4.11 (PDF; 606 KB)
- [Glossary of Landform and Geologic Terms](#) (Part 629 of the National Soil Survey Handbook) (DOC; 1.1 MB)

Installing Monitoring Wells in Soils

This document provides general guidance on how to install and use piezometers and water-table wells to investigate soil water

Soil Survey Office Laboratory References

- [Soil Survey Field and Laboratory Methods Manual, version 1.0 \(2-3-11\)](#) (PDF; 8.5 MB)

WinZip - NSSL_Sample_Submission[1].zip

File Actions View Jobs Options Help

| Name | Type | Modified | Size | Ratio | Packed | Path |
|--------------------------------|-----------------|--------------------|---------|-------|---------|------|
| NASSIS Sample Submission Gu... | Microsoft Of... | 3/13/2012 8:18 AM | 462,758 | 6% | 435,548 | |
| NSSL Project Sheet.xlsx | Microsoft Of... | 2/27/2012 2:07 PM | 16,769 | 20% | 13,424 | |
| NSSL Sample Submission.xlsm | Microsoft Of... | 2/27/2012 1:41 PM | 941,053 | 77% | 217,494 | |
| ReadmeFirst.docx | Microsoft Of... | 3/13/2012 10:52 AM | 15,663 | 18% | 12,775 | |

Selected 0 files, 0 bytes Total 4 files, 1,403KB

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Clipboard: Paste, Copy, Cut, Undo, Redo

Font: Arial, 14, Bold, Italic, Underline, Text Color, Background Color

Alignment: Left, Center, Right, Justify, Indent, Decrease Indent, Increase Indent, Merge Cells, Unmerge Cells

Number: General, Currency, Percentage, Decimals, Thousands Separator

Styles: Conditional Formatting, Format as Table, Cell Styles

Cells: Insert, Delete, Format

Editing: Sort & Filter, Find & Select

A B C D E F G H I J K L M N O

**SSL Soil Sampling Project - Information Sheet and
Instructions for Submitting Samples to the NSSL Lab**

Project Name:

Project Leader or Submitter Phone #

MO #

| | Name | Email |
|---|------|-------|
| NSSC Liaison/project coordinator | | |
| Project Leader or Submitter | | |
| SDQS | | |
| State Soil Scientist or MO Leader | | |
| Others who should receive lab data | | |
| | | |
| | | |
| | | |
| | | |

Home Insert Page Layout Formulas Data Review View Acrobat

Normal Page Layout Full Screen Workbook Views

Ruler Gridlines Message Bar Show/Hide

Formula Bar Headings

Zoom 100% Zoom to Selection

New Window Split Arrange All Hide Freeze Panes Unhide Window

Save Workspace Switch Windows

Macros

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z AA AB AC AD AE AF A

1 Enable macros: Click the Microsoft Office Button; Excel Options; Trust Center; Trust Center Settings; Macro Settings; Enable all macros

| | Field Label | Horizon | Top Depth cm | Bot. Depth cm | Analysis Groups | Acid (most humid region soils) | Salt (soluble salts) | Spodic (spodic properties) | Andic (volcanic ash influenced) | Organic (peaty & mucky) | Litter (undecomposed plant material) | DSP (Dynamic properties projects) | Calcium Carbonate Equivalent | Individual Analyses | Extractable Acidity, BaCl2-TEA | CEC and Cations | Total Nitrogen, Carbon, and Sulfur | KCl Extract | pH, Routine | pH, KCl | pH, NaF | Gypsum, <2mm | Acid Oxalate Extract | Dithionite-Citrate Extract | Na-Pyrophosphate Extract | Phosphate, Water Soluble | Phosphorus, Bray 1 | Phosphorus, Mehlich II | New Zealand | EC |
|----|---------------|---------|--------------|---------------|-----------------|--------------------------------|----------------------|----------------------------|---------------------------------|-------------------------|--------------------------------------|-----------------------------------|------------------------------|---------------------|--------------------------------|-----------------|------------------------------------|-------------|-------------|---------|---------|--------------|----------------------|----------------------------|--------------------------|--------------------------|--------------------|------------------------|-------------|----|
| 2 | | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | User pedon ID | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

- Lab pedon data will be entered and updated directly in NASIS.
- This will replace the SOI8 process.



Print Layout

Full Screen Reading

Web Layout

Outline

Draft

Document Views



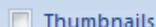
Ruler



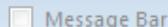
Document Map



Gridlines



Thumbnails



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Zoom



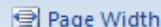
100%



One Page



Two Pages



Page Width

Zoom



New Window



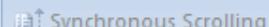
Arrange All



Split



View Side by Side



Synchronous Scrolling



Reset Window Position

Window



Switch Windows



Macros

Macros

The procedure for submitting NSSL characterization sites:

1. The Soil Survey Office staff will enter the pedon description into NASIS and verify that the "User Site ID" and the "User Pedon ID" conform to the national standards.

Improper nomenclature will be corrected:

| | | Site/Site Observation | | | | | |
|--|--|-----------------------|-----------|---------------|------------------------|------------|----------------|
| | | User Site ID | Site R... | Observatio... | Observation Dat... | Site Ob... | User Pedon ID |
| | | S2011MN075-010 | 562460 | 08/11/2011 | actual site observa... | 551319 | S2011MN075-010 |
| | | S2011MN075-040 | 562462 | 10/20/2011 | actual site observa... | 551321 | S2011MN075-040 |

To the proper nomenclature:

| | | Site/Site Observation | | | | | |
|---|--|-----------------------|-----------|---------------|------------------------|------------|---------------|
| | | User Site ID | Site R... | Observatio... | Observation Dat... | Site Ob... | User Pedon ID |
| M | | S2011MN075010 | 562460 | 08/11/2011 | actual site observa... | 551319 | S2011MN075010 |
| M | | S2011MN075040 | 562462 | 10/20/2011 | actual site observa... | 551321 | S2011MN075040 |
| | | S2005MN137512 | 179571 | 04/21/2005 | actual site observa... | 172228 | S2005MN137512 |

2. After the Site object has been fully populated, the Soil Survey Leader will change the ownership to the "NSSL" Site and the "NSSL_Sites" Group. The "NSSL_Sites" Group has a membership that includes the NSSL Liaisons and SDQS. This will be the one Site that controls the Quality Assurance editing for correlation updates for the sampled site and pedon.

| | | Site NASIS Site | NASIS Group |
|---|--|-----------------|-------------------------------|
| | | NASIS Site Name | NASIS Group Name |
| E | | MLRA10_Office | Pedons 10-4 Duluth, Minnesota |
| M | | MLRA10_Office | Pedons 10-4 Duluth, Minnesota |
| M | | | |
| M | | | |
| M | | | |
| M | | | |
| M | | | |
| M | | | |
| M | | | |
| M | | | |

Change Owner

Table: Site

Please select a new owner for the selected rows:

NASIS Site:

NASIS Group:

SearchSoils 

Enter Keywords

GO

Quick Access

- ▶ Citing Our Databases
- ▶ Geospatial Research Unit
- ▶ Hydric Soils
- ▶ List of Published Soil Surveys
- ▶ MLRA
- ▶ MLRA Explorer
- ▶ National Cooperative Soil Survey (NCSS)
- ▶ Official Soil Series Descriptions (OSD)
- ▶ Soil Classification
- ▶ Soil Data Access
- ▶ Soil Data Mart
- ▶ Soil Data Viewer
- ▶ Soil Geography
- ▶ Soil Lab Data
- ▶ Soil Quality
- ▶ Soil Science Glossary
- ▶ Soil Extent Mapping Tool

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Lincoln, NE

Orono, ME

Davis, CA

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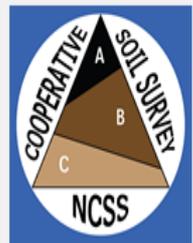
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National Cooperative Soil Survey
Universities, State Agencies, Federal Agencies,
and Private Soil Scientist Members

National Cooperative Soil Survey
Soil Characterization Data

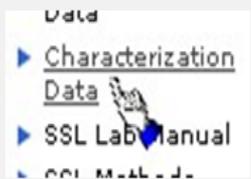
Home Data Usage User Manual Characterization Data FAQ's Links Contacts

- ▶ Application Home
- ▶ [How To: Report Generation](#)



Ten Easy Steps to Download Data

Step #1: Click on the 'Characterization Data' link on the menu located on the top of the page. This link loads the *NSSC SSL Characterization Data Query Interface* that can be used to search the available data using one or more of over fifty search criteria.



Step #2: Once the page is fully loaded, the user can both include or exclude criteria from a search using the check boxes located next to each item. If a box is checked, the item will be included in the query.

Note: Upon first entering or selecting data for an item, the check box will automatically be turned on.

Laboratory Project Name
 Project Type Fiscal Country

