United States Department of Agriculture
NRCS Natural Resources Conservation Service

SPRING 2006

The MO-16 Soils Newsletter

Message From The MO Leader's Desk

By Luis Hernandez,
MO-16 Team Leader

Greetings!

In this edition of MO-16 Newsletter I'm going to focus on two items:

1. MLRA Implementation Update
2. Upcoming Southern Cooperative Soil Survey Conference

MLRA Implementation Update

Last summer MO-16 State Soil Scientists (SSS's) and Soil Data Quality Specialists (SDQS's) met in Little Rock with the objective of developing a proposal to implement Major Land Resources Areas (MLRA) soil survey office structure in the region. The first step of the proposal development was an evaluation of the distribution of MLRA management areas and Soil Survey Project Offices. The process was completed utilizing "guiding principles" provided by the Soil Survey Division. Thanks to MO-16 State Soil Scientists and Soil Data Quality Specialists expertise the group was able to develop a strong science based proposal.

A joint meeting of MO-9 and MO-16 Board of Directors (BOD's) was held early this fiscal year. The meeting objectives were to present and discuss proposed MLRA management areas and Soil Survey Project Offices. The BOD's approved proposed MLRA management areas and Soil Survey Project Offices. The 14 MLRA's in Soil Survey Region 16 were reduced to nine management areas.

The proposal was submitted to the Soil Survey Division, early this calendar year, for consideration and to be included as part of the national implementation plan. The timeline established by the Soil Survey Division for MLRA implementation is as follows:

1. Second round Soil Survey Areas review/edit - September 23, 2005
2. Second draft National Map - October 21, 2005
3. Distribute Draft Plan and Maps to NLT - November 20, 2005
4. STC and Cooperators review and revise plan and office locations - January 1, 2006
5. Complete National Implementation Plan - April 30, 2006
6. STC/MO offices submit a 3 to 5 year migration plan - July 30, 2006
7. Begin National Implementation - October 1, 2006

Southern Cooperative Soil Survey Conference

The Southern Cooperative Soil Survey Conference is scheduled for the week of June 12-15, 2006 in Oklahoma City, Oklahoma. An article with additional information is included in this edition of MO-16 Newsletter. The registration deadline is May 19, 2006. Please contact Jimmy Ford, Oklahoma State Soil Scientist, for additional information or questions. His email is Jimmy.Ford@ok.usda.gov and telephone 405-742-1247.

NRCS Establishes MLRA Soil Survey Office at UAPB

By Leslie Glover,
Soil Data Quality Specialist, MO-16

A new cooperative effort between NRCS and the University of Arkansas at Pine

In This Issue:

Kalven L. Trice, State Conservationist, and Dr. Lawrence A. Davis Jr., UAPB Chancellor, shake hands after signing the Memorandum of Understanding.

Bluff (UAPB) to establish a Major Land Resource Area soil survey project office on the campus resulted in a Memorandum of Understanding being signed during a ceremony December 16, 2005 at the school.

UAPB is providing, at no costs to NRCS, office space, storage space for soil survey equipment, access to a GIS laboratory with more than 20 high-end GIS computers, printer, plotter, access to a soils laboratory with the latest technology for soil testing and analysis, and access to university telecommunications facilities to receive and transmit meetings to and from any part of the world using satellite technology.

NRCS presence on the UAPB campus will facilitate student and faculty exposure to NRCS and soil survey programs and activities, NRCS career opportunities, and technical assistance in curriculum development.

"UAPB students and faculty are already engaged in a statewide soil survey project on the evaluation of soils data for various Major Land Resource Areas in Arkansas" said Luis Hernandez, MLRA Leader and State Soil Scientist.

"This collaboration enables Arkansas NRCS to modernize existing digital soil data, to improve information contained in various soils databases, and to familiarize potential employees with technologies used in editing and digitizing soils data," he said.

The signing event was part of a conservation tour, sponsored by the National Organization of Professional Black NRCS Employees, to allow NRCS employees from all over the country to observe successful conservation projects around Arkansas.

"This new collaboration with UAPB is a good example of how we can engage new cooperators in a creative way that will fulfill the NRCS mission," Hernandez said.

The Maine Experience

By Marie Ross, Soil Scientist, Glenwood, AR, MLRA Soil Survey Project Office

During the spring and summer of 2005 I was given the opportunity to participate in a soil survey detail in Hancock County, Maine. The detail lasted from June 6 to September 8. I worked out of the Bangor Field Office along with another soil scientist, Alan Peer, from Carthage, Missouri.

The area that I surveyed was west of Nicatous Lake in a remote section of Hancock County. I mapped over 27,000 acres at a scale of 1:40,000, which was at the order 3 level. Most of the soils were spodosols in an area dominated by glacial till. I had to get accustomed to things not normally encountered when working in Arkansas, such as black flies, bogs, and moose. I enjoyed the bogs and seeing moose; the black flies I could live without.

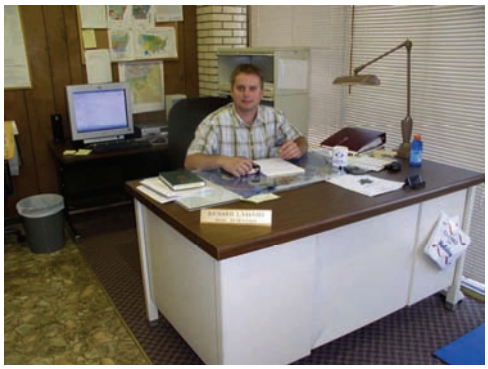
The 2005 Hancock County Mapping Detail. Shown left to right: Marie Ross, Soil Scientist, Glenwood, Arkansas; Larry Flewelling, Hancock County Soil Survey Project Leader, Dover-Foxcroft, Maine; and Alan Peer, Soil Scientist, Carthage, Missouri.

I would recommend detail work for anyone who has the opportunity. Working in a

different state will expose you to new concepts and will show not only how different we are across soil survey regions, but also how we are the same. The experience was extremely rewarding. I would also like to note that I had great support from my soils staff both at home in Arkansas and in Maine.

Welcome Aboard Richard!

By Jeff Olson,
Soil Survey Project Leader, Glenwood, AR



We want to extend a hearty welcome to our newest member of the NRCS and soil survey family here in Arkansas and in MO-16, Richard Vaught.

Richard came on board with the agency on October 3, 2005, at the MLRA Soil Survey Project Office in Glenwood. He is a native of Grove, Oklahoma, and holds both a Bachelor's Degree and a Master's Degree in Agriculture from the University of Arkansas at Fayetteville. His interest in soil science was sparked by childhood visits to his grandfather's farm. Richard enjoys a variety of outdoors activities, and has been spending much of his spare time enjoying the Ouachita National Forest.

Richard joins Jeff Olson and Marie Ross at the Glenwood office as they undertake soil mapping work on the Ouachita National Forest and soil survey evaluation and maintenance work on high priority areas of western Arkansas.

Arkansas County Soil Survey Public Meeting and Web Soil Survey Release

By Leslie Glover,
Soil Data Quality Specialist, MO-16

Soil Survey has been and continues to be the foundation for natural resource and conservation planning since the "Great Depression" and "Dust Bowl" era. Due to the tremendous loss of topsoil during that period, the United States Congress created the National Soil Survey Program to inventory the nation's soil resources and to develop ways to reduce soil erosion.

The first soil survey work in Arkansas County was completed for the area of Stuttgart in 1902. The soil map consisted of three soils: Miami clay loam, Almyra silt loam, and Guthrie clay. Since then soils information for Arkansas County has been improved three times, and includes a wide array of information from soil classifications to interpretations for wildlife, septic systems, recreation, forestry, and crop production.

Larry Kichler holds the attention of Web Soil Survey release meeting attendees.

The latest remapping of Arkansas County was completed in 1995. Because of the rapid change in technology, the NRCS has taken the opportunity to improve the way it delivers soil surveys; as well as, to increase the speed which soil surveys are updated.

The NRCS currently provides several different alternatives for customers to gather soils information including: compact discs, the national Soils Data Mart, and via the World Wide Web. The most current soils information is posted to the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/), which provides secure public access to the national soils information system. This website is a simple yet powerful way to access and analyze soils data that contributes to every aspect of public and private land use and development.

Arkansas NRCS celebrated the release of the most current soils information for Arkansas County on March 1, 2006, at the Phillips Community College in DeWitt, Arkansas; the public was encouraged to attend. Several topics were discussed including how soil surveys are used in estimating taxes and how soil surveys are used to develop conservation plans. Additional soil surveys can be requested from the local NRCS District Conservationist, Marshall Handcock, in DeWitt, Arkansas.

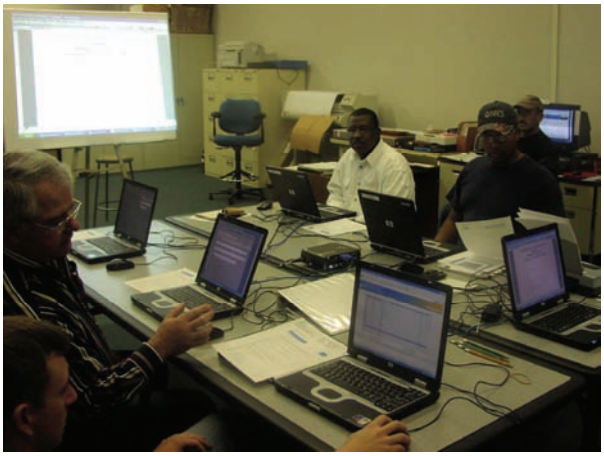
Larry Kichler, SDQS, removing laptops from portable carrying case. The laptops allow NRCS to provide training for personnel in the field.

On the Road with NASIS

By Larry Kichler,
Soil Data Quality Specialist, MO-16

Citrix, a web based access to the National Soil Information System, NASIS, is taking training to the field. In MO-16, laptops reserved for training have been made available to use in local field offices for small group training sessions.

The Carencro, Louisiana, Soil Survey Project office was the site for a NASIS Data Base Management training. We were able to bring in the Soil Survey team from Denham Springs-Burnell Muse, Project Leader, and Lyfon Morris and Darren Boudreaux, Soil Scientists, to join the Carencro Soil Survey Project office team of Gerald Trahan, Project Leader, and Michael Lindsey and Curt Riche, both Soil Scientists. Also joining was Charles Guillory, Assistant State Soil Scientist from Alexandria. This central location was chosen because it allowed travel without using per diem.



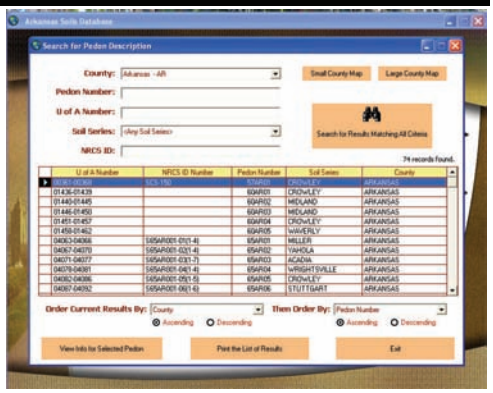
Carencro Soil Survey office, setup using 6 laptops and a power point projector connected to the Instructors laptop. Also available was a portable printer for onsite printing of training materials.

Arkansas Soil Characterization Database Project

By Edgar Mersiovsky,
Assistant State Soil Scientist, AR

The NRCS and the University of Arkansas have been long-term partners in the National Cooperative Soil Survey Program in Arkansas. Since 1956 this partnership has resulted in the sampling and characterization of more than 1,250 soil pedons and 10,500 soil horizons. This database contains data for all but two counties in the state.

The Arkansas Soil Characterization Database Project is a cooperative effort between the NRCS and University of Arkansas to bring this important database up to current database standards. A final product from this project will be data and pedon descriptions for more that 1250 soil pedons and 10,500 soil horizons that will be stored in a database on CD-ROM.



Example of Database search of Arkansas County.

The Arkansas Soil Characterization Database is the foundation database for the classification and interpretation of the soils in Arkansas. In the future this database will be used in the maintenance and updating of all the county soil surveys in the state. Considerable work is being done on the database to bring it up to current soil database standards to enable more effective presentation and use of the data.

Booneville Field Day

By Edgar Mersiovsky,
Assistant State Soil Scientist, AR

Late winter marks the time when across the country FFA Land Judging practice contests begin. In Arkansas, the Resource Soil Scientist have a key role in the education of local high school students in the area of soils and land use.

The Booneville Field Day is one of the first contests of the year in Arkansas. This contest began 15 years ago out of necessity for retired Resource Soil Scientist Bill

Glen Laurent, Resource Soil Scientist, instructing students on land judging.

Garner. For much of the late winter and early spring, Bill would go to many high schools in the Arkansas River Valley. One of the local Agriculture Teachers suggested that instead of Bill putting so many miles on the road that the schools come to him. The Booneville Field Day has grown to over 50 schools represented in the Land Contest alone. Add several other contests and the attendance is over 1,100 students.

Glen Laurent, Resource Soil Scientist in the Northwest Area of Arkansas, has taken the reigns of the contest for the past 12 years. Along with the contest, the field day is a time to teach students and agriculture teachers. Many of the agriculture teachers like to come to this contest since Glen is the lead for the state contest. Just as it is in other states, these type of activities are some of the most enjoyable that a Soil Scientist can take part in because we get to share our knowledge with the youth of today.

Transitioning to the Electronic Soil Survey

By Daniel Johnson, Soil Survey Project Leader, USDA-NRCS, Monroe, Louisiana

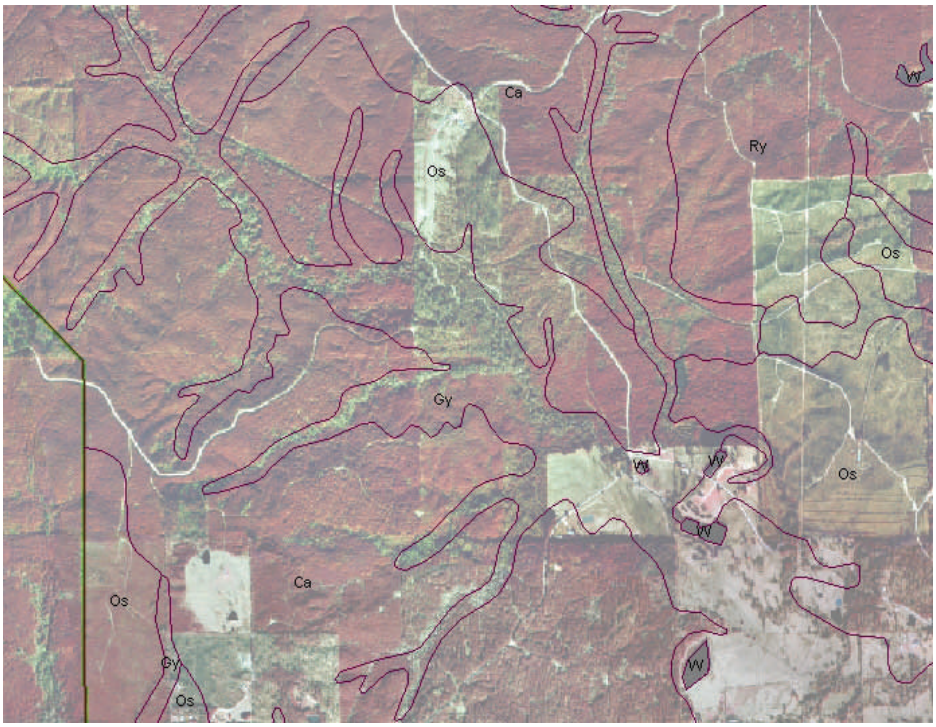


Figure 1: A portion of the Initial Soil Survey Maps of Ouachita Parish, which are currently being updated, plotted over DOQQ. This survey was produced during a time in the NCSS's history when association map units were encouraged for hilly terrain. Therefore, the only lines that consistently attempt to follow landform are those delineating alluvial flood plains.

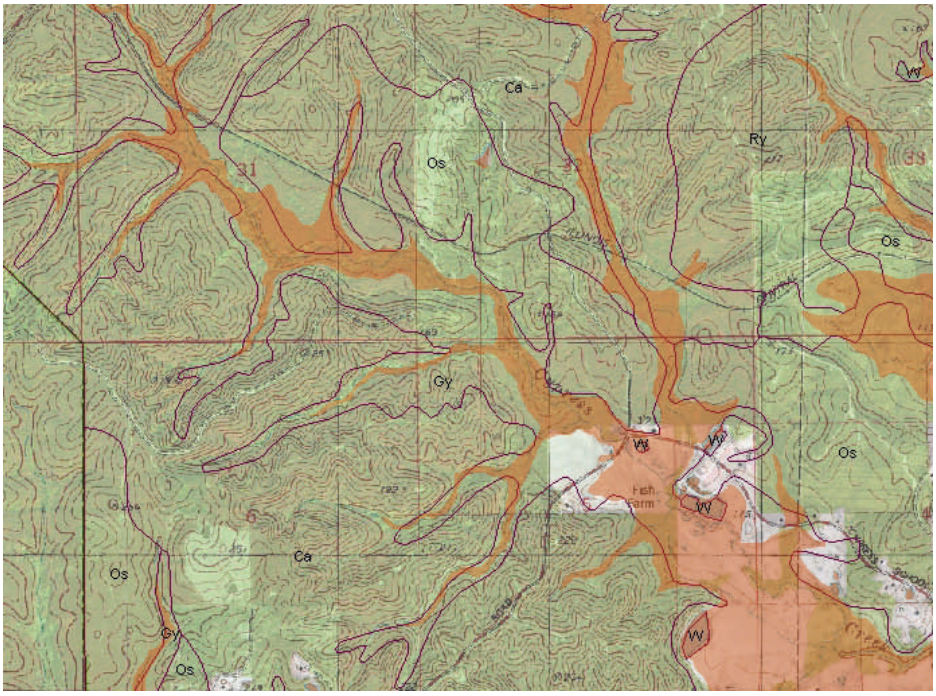


Figure 2: A portion of the Initial Soil Survey Maps of Ouachita Parish, which we are currently being updated, plotted over a USGS topographic quadrangle map.

A wide variety of exciting new technology has become available to Soil Scientists in certain parts of the country during the last couple of years, especially in the realm of spatial data. The availability of powerful and versatile GIS software, digital surveys and an assortment of other web-based spatial data, has opened up the opportunity for on-screen map development and editing utilizing a tremendous amount of supporting documentation. One of the more exciting products for Soil Survey is LIDAR.

LIDAR stands for Light Detection and Ranging. It applies the same principle as radar except a laser is used instead of radio waves. Its principle use in Soil Survey is for the measurement of elevation. Elevation data can be represented in different ways. In its raw form it is a series of points stored as x,y,z coordinates, where x and y represent latitude and longitude, and z is the elevation. Another representation of elevation data is as contour lines. In Louisiana, the contour data derived from LIDAR is in a shapefile format. A third representation of elevation data is as a DEM (Digital Elevation Model). The DEM is a raster, or grid format. Each cell of the grid holds the average elevation of that area (5 meter grid). ArcMap uses a 3D Analyst extension to read DEMs. The USGS DEM file format is derived from 1:24,000 7.5 minute topographic quadrangle maps. USGS DEMs are readily available but are not as high resolution, and so not as great a value in soil map unit delineation, as DEMs generated from LIDAR.

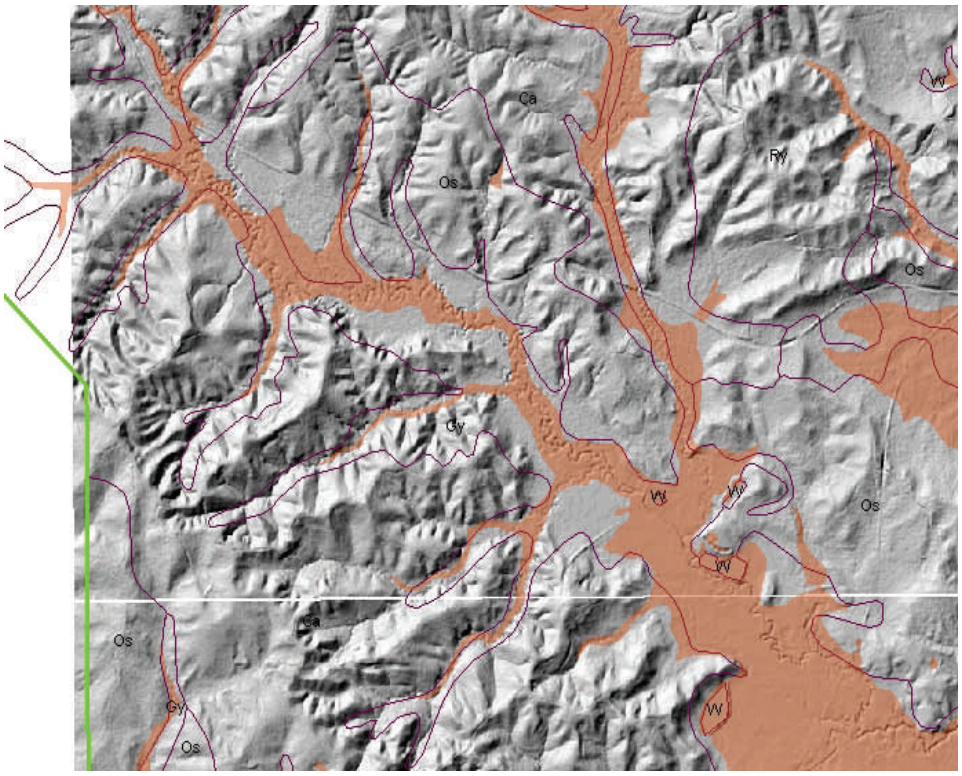


Figure 3: Initial soil survey map with the FEMA designated flood plain overlaying a LIDAR generated 3D hillshade.

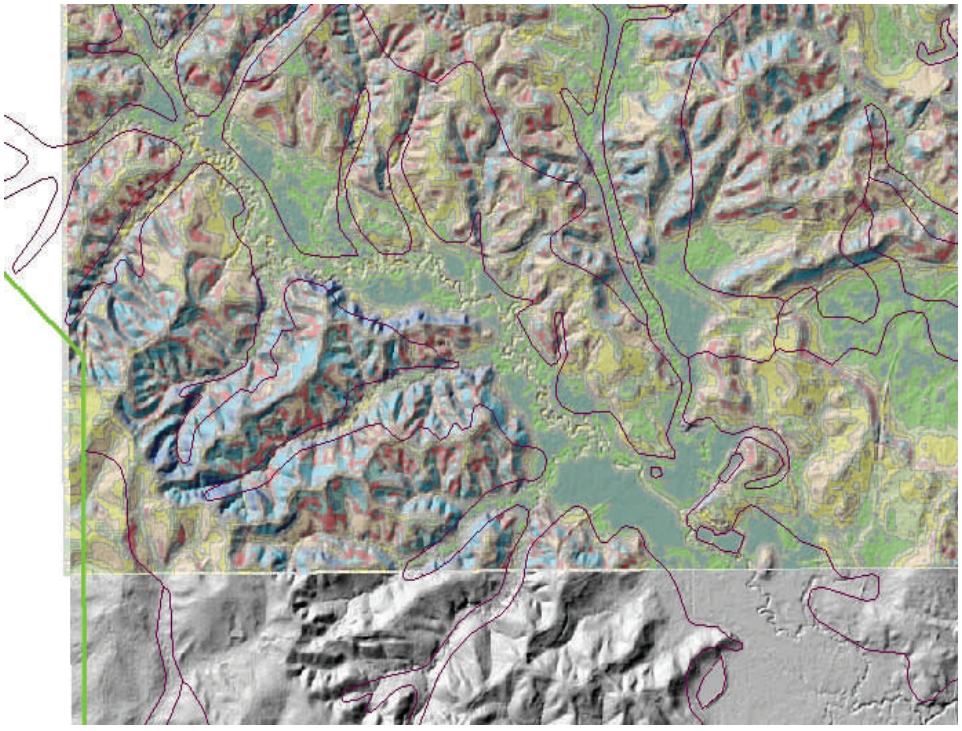


Figure 4: A colorized slope layer generated from the LIDAR data is added to the hillshade image.

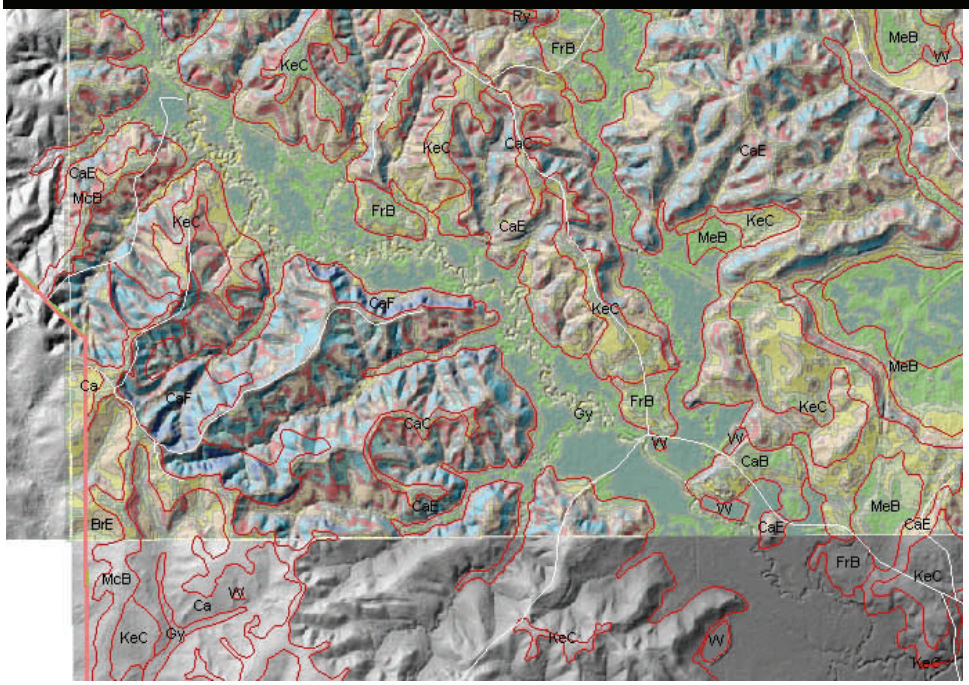


Figure 5: Example of soil line placement for the updated soil survey map.

The DEMs are readily converted to 3-dimensional hillshade layers using 3D Analyst. Slope-group layers can also be developed with the same technique. Of course, these kinds of tools will prove their greatest utility in areas of greatest relief.

Figures 1 and 2 show a portion of the Initial Soil Survey Maps of Ouachita Parish, which is currently being updated. This survey was produced during a time in the NCSS's history when association map units were encouraged for hilly terrain. Therefore, the only lines that consistently attempt to follow the landform are those delineating alluvial flood plains. The original lines were likely drawn using stereo paired imagery and following the hardwood signature of the photo. When the soil lines are placed over the 7.5 minute quadrangle and the FEMA flood map, it becomes apparent that some misplacement of the floodplain boundaries has occurred. The quality of this particular soils map could be dramatically improved by editing based on the data provided by overlaying the topo quad and the FEMA map.

Viewing the same area with the FEMA map overlaying a LIDAR generated 3D hillshade (Figure 3), brings into sharper contrast those places where the FEMA map is in error (the flood zone fails to capture the active channel of the stream in some instances). The LIDAR penetrates the vegetative canopy, producing an image of 'bare-ground' conditions. The changes in landform across the map are, therefore, much more pronounced than that depicted by the topo quad contour lines, or by aerial photography.

Adding a colorized slope layer generated from the LIDAR data (Figure 4) makes even the natural levee along the stream channel stand out from the slack-water areas, and can aid in establishing component percentages for the floodplain association. Of course, this layer will also aid in setting up slope phases for the upland map units. Figure 5 shows what the edited soil map would look like when developed using this new technology.

The LIDAR coverage in Louisiana is not a mosaic, so it must be downloaded one quarter quad at a time. This is easily evidenced by the seams between the different quarter quads that are very visible in Figures 3, 4 and 5. The Louisiana Geographical Information Working Group has plans to develop mosaics of the LIDAR data, but this effort will be dependent on the availability of adequate funds.

Landforms, Surfaces, and Parent Materials of Southwest Missouri (MLRA 116) A Proposed Project for Fiscal Year 2006

John D. Preston, MLRA Team Leader
&
Richard L. Tummons,
Soil Data Quality Specialist

This project was submitted to, and has been tentatively accepted by the National Soil Survey Center Investigations Staff. Initial contacts have been made by Doug Wysocki, Research Soil Scientist, NSSC. Project dates in August have been discussed. A summary of the proposed project follows.

Following the completion of the "Once over" Soil Survey of the state of Missouri and the establishment of MLRA Project Offices throughout the state, it has

become evident that there is a need for guidelines to develop consistency in soil terminology for landforms and parent materials, both within the state of Missouri and with adjoining states. Many series and/or map units have been mapped on multiple landforms, while other series have been split out based mostly on a landform.

Benchmark soils affected would include, but not be limited to: Clarksville, Creldon, Gasconade, Gatewood, Goss, Hoberg, Ocie, Pomme, Poynor, Scholten, Tonti, and Viraton series.

The Project will consist of a field trip throughout southwest Missouri and northwest Arkansas to observe landscapes, landforms and representative soils throughout the MLRA. Discussion will define names for landforms, surfaces, and parent materials. Questions for discussion at the field assist will include, but not be limited to:

Landscapes and landforms: Recommended and consistent use of terms such as plateau, hills, hill slope, upland, sideslope, backslope, ridge, interfluve, knobs, strath terrace, foot slope, toe slope, and structural bench.

Parent Materials: Occurrence or absence of loess in MLRA 116; recommended use of the terms "reworked" loess, silty sediments, colluvium, pedisediment, slope wash, and slope alluvium; recommended use of the term residuum versus clayey sediments; recommended parent materials for soils with fragipans and/or fragic properties.

Geomorphic Surfaces: Relevance to landscapes; relevance to parent materials; relevance to mapping in Southwest Missouri (MLRA 116); relevance in areas of "deep residuum".

This information is needed for the consistent population of NASIS data map units and for the revision of Official Series descriptions. Information of this nature is also critical as work begins in creating a "perfect join" between states. Information would also be vital to the exact exchange of data and concepts when working on future MLRA wide projects involving multiple states.

Ideally, participants would represent the NSSC, the Springfield MLRA Project Office, the Missouri Department of Natural Resources, MO-16 Soil Data Quality Specialist, representatives from the Missouri and Arkansas state soils staffs, and universities with interests in MLRA 116. The final products will include:

1) A "Glossary of Acceptable Landforms and Parent Materials for MLRA 116". The NSSC should author this document for use as a guide to the consistent development of NASIS data map units and revision of Official Series Descriptions within MLRA 116. The document will provide guidance to "approved" parent materials and their occurrence on "specific" landforms. This document could serve as a reference for update activities within MLRA 116.

2) A Soil Sampling Project Proposal Outline developed by involved the NSSC to answer questions arising from this field trip. This document will provide guidance for a comprehensive long range plan for soil sampling in the future. Objectives of the long range plan will be to resolve unanswered questions as to parent materials, etc.; validate glossary concepts; and help define the parent materials of "benchmark" soils.

This project hopes to answer questions about the parent material of Clarksville and other soils.

Soil Scientists Explore Electromagnetics to Assist with Soil Delineation

By Diana Rose Angelo, Cartographic Technician and Larry Kichler, Soil Data Quality Specialist, MO-16

On March 7-9 NRCS soil scientists, conservationists, archeologists, and technicians gathered to learn how to use an Electromagnetic Conductivity meter (EM-38) and process the data. Wes Tuttle, NRCS Geophysical Soil Scientist, arrived from North Carolina with a trailer load of equipment in tow. Wes led the group of Missouri and Arkansas individuals who had braved torrential downpours, high winds, and threatening tornados to get a chance to learn how to use the equipment.

The EM-38 is passed over the ground in a grid pattern as the operator walks back and forth. It releases an electronic signal that penetrates to a depth of about 1.5 meters. The signal passes through the ground on the forward end of the instrument and is recorded by a receiver on the other end. Changes to the signal due to differences in soil conductivity are recorded every second and GPS coordinates are assigned to each reading and logged into a handheld Allegro CX field PC recorder. The EM is so sensitive to magnetic changes that the operator must be metal free. That means no dangling keys and no metal shoe insole supports or metal eyelets. The meter can even be rigged to rest on a metal free cart pulled by a 4 wheeler for faster surveys. Wes carried just such a cart in his equipment trailer and even a gator to pull it. The processed data points can be downloaded and converted into Arc GIS shapefile format delineating areas based on conductivity patterns.

Rod Taylor, Soil Scientist from the Dexter, MO MLRA, SSA office, wired for data collection with the EM-38.

NRCS Archeologist, John Riggs, also tried his hand with collecting and processing the data to find magnetic anomalies that might indicate archeological features. The technology has the potential to reveal cultural sites without invasive methods, thus producing a large cost savings while not destroying nonrenewable archeological resources.

The processed data can reveal areas that need further traditional testing for greater accuracy of soil description. Large field areas can be surveyed in a shorter time period. Other potential uses soil scientist are looking into include water table depth variables, clay to sand contact points, saline concentrations, and locating

John Riggs, Archeologist, assessing processed data.

restrictive layers. The use of the Electromagnetic conductivity meter empowers us to make better determinations on site specific areas, aiding conservationist in land use decisions.

Conductivity mS/m (millisiemen/ meter)	
Sand, gravel	0.1 – 1
Silty sand	1-5
Loam	5-25
Silt	12.5-25
Clay	25-100
Saline soil	100-200

Soil conductivity meters measure differences in the conductivity of soils caused by their composition, formation, moisture, and salinity. The table shows the range of mS/m produced by typical soil types (Bruce Bevan, Geophysical Exploration for Archaeology: An Introduction to Geophysical Exploration. Midwest Archaeological Center Special Report 1., 1998).

Wes Tuttle, Geophysical Soil Scientist, pulling the EM-38 wagon with a Gator.

MO-16 Upcoming Soil Survey Activities

Southwest Missouri District FFA Soil Judging Contest, Springfield, MO April 9-11
National Soil Interpretation Advisory Group, Lincoln, NE, April 11-13
State Land Contest, Fayetteville, AR, April 14-15
NASIS Training, Greenville, MS, April 24-26
Tyler County TX Correlation, April 24-26
Caddo Parish LA Field Review, May 10-12
Field Assistance, Mayfield, KY June 5-9
South Region Soil Survey Work Planning Conference, Oklahoma City, June 12-15
North Central Region Soil Survey Work Planning Conference, Medora, ND, June 25-29
18th World Congress of Soil Science, Philadelphia, PA, July 9-15
MO-16 Staff Meeting, Little Rock, AR, August
Glenwood AR Progress Review, August
MO-16 staff meeting, Little Rock, AR, August
Central State Soil Scientist Meeting, August 2-4
Missouri Soil Survey Work Planning meeting, Columbia, MO, August 9
MO Leader's Meeting, August 28-Sept 1
San Augustine-Sabine TX, mid-September
Field Review, Paris, TN, September 18-21
Central States Forest/Soils Workshop, Poplar Bluff, Missouri, October 10-12

2006 Southern Cooperative Soil Survey Conference Planned for Oklahoma City, Oklahoma, in June 2006

The theme of the Conference will be "***Reconnecting and Enhancing the National Cooperative Soil Survey Partnership".***

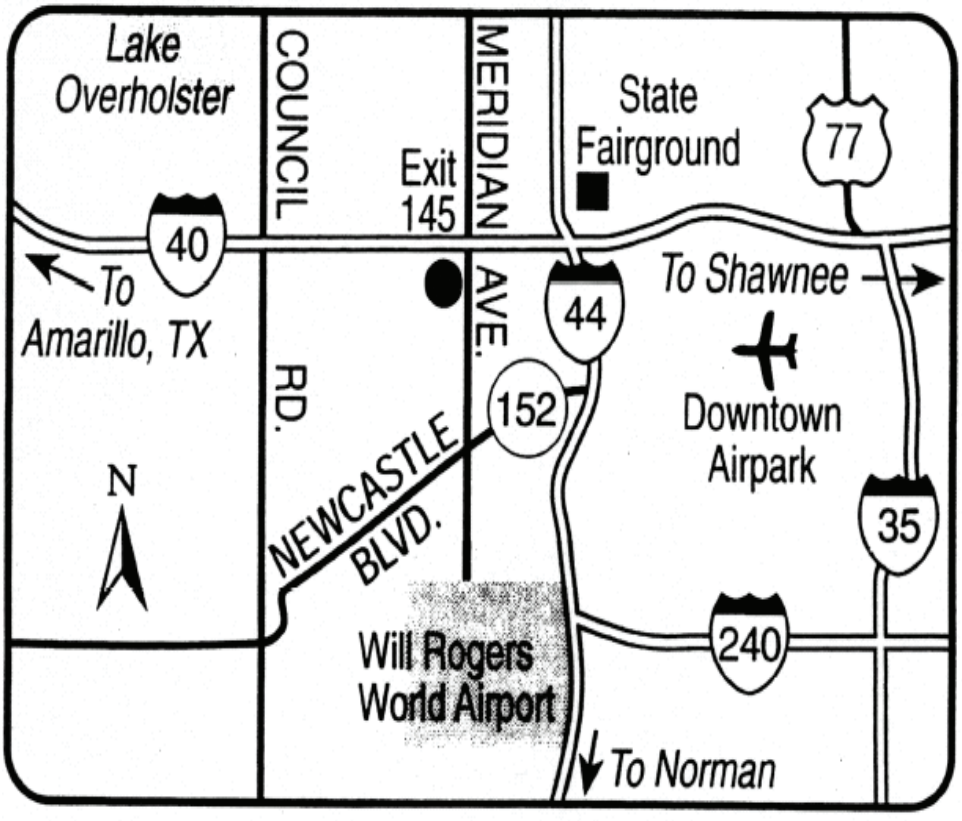
The 2006 Southern Regional Cooperative Soil Survey (NCSS) Conference is planned for June 12-15, 2006, in Oklahoma City, Oklahoma, at the Clarion Meridian Hotel and Convention Center. The Department of Plant and Soil Science, Oklahoma State University is the co-host of the conference.

A block of rooms has been reserved under the heading of **Southern Cooperative Soil Survey Conference**. The conference rate is $66.00 single/ double per night. You must make your own room reservations with the Clarion by **MAY 19, 2006**. Their phone number is (405) 942-8511.

Registration Fee is $125.00. Included in Registration Fee are the Monday social/refreshments, Wednesday banquet, and Thursday bus fees/food for tour. Registration tables will be set up from 3:00 to 5:00 p.m. for those arriving on Sunday, June 11, 2006. Late registration will be from 8:00 to 12:00 on Monday, June 12, 2006.

The field tour will be on Thursday June 15, 2006. The tour will involve looking at ecological sites, discussions on ecological site factors, and developing quality Ecological Site Descriptions. Part of the tour will be at Historic Fort Reno at El Reno, Oklahoma, which is now a Grazing Lands ARS research station.

The Steering Committee will meet after the conference on Friday, June 16.



Standing Committees

1. Soil Survey Standards Committee
Chair - Bill Craddoc

2. Research Priorites
Chair - Dr. Wayne Hudnell

3. New Technologies
Chair - Duane Daniels

4. Interpretations Criteria
Chair - Jerry Walker

5. MLRA Soil Survey Office Committee
Larry West - Co-chair (UGA)
Dennis Lytle - Co-chair (NRCS)

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Larry Kichler, Soil Data Quality Specialist, Little Rock, Arkansas

Leslie Glover, Soil Data Quality Specialist, Little Rock, Arkansas

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Vacant, Soil Data Quality Specialist, Alexandria, Louisiana

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Marcella Callahan, SSURGO/ Resources Inventory Specialist, Little Rock, Arkansas

Johnny Duke, GIS/Cartographic Technician, Little Rock, Arkansas

Kirby Griffith, MLRA Project Leader, Nacogdoches, Texas

Diana Angelo, Cartographic Technician, Little Rock, Arkansas

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Darrel Dominick State Conservationist Oklahoma

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James Ford State Conservationist Tennessee

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Dennis Potter State Soil Scientist Missouri

Jimmy Ford State Soil Scientist Oklahoma

Mike Risinger State Soil Scientist Texas

Jerry Daigle State Soil Scientist Louisiana

Mike Lilly State Soil Scientist Mississippi

Doug Slabugh State Soil Scientist Tennessee

Bill Craddock State Soil Scientist Kentucky

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