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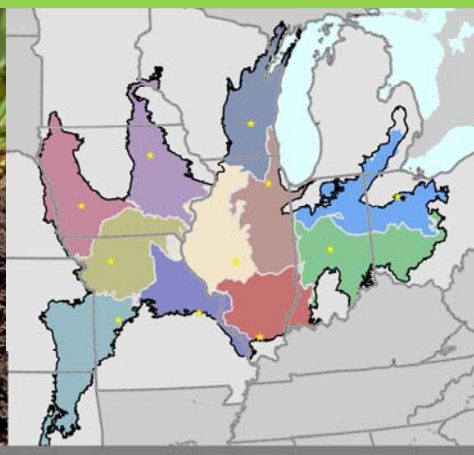

CUNEIFORM

REGION 11 MLRA SOIL SURVEY NEWSLETTER

November, 2016 Issue Number 3

Director's Corner by Kevin Norwood, Region 11 SSRD

Hello Everyone and Happy New Fiscal Year! *I am excited about things to come* in 2017 and about MLRA offices going to the field. I would like to first thank everyone for all their hard work and dedication for FY 2016. Region-11 completed over 2,850,000 acres in SDJR projects and completed four Provisional Ecological sites: MLRA 111A, MLRA 111D, MLRA 113 and MLRA 108D all totaling 15,000,000 acres. We also had offices working on the Soil Monitoring project for this year (Waverly/Springfield offices) and had all offices participate in the National Wetlands Conditioning Assessment project in conjunction with the EPA.

You will find in our newsletter that we held our very first Operations Meeting in Springfield, Illinois. This meeting gave staff the opportunity to meet each other face to face and also received training from Paul Finnell on National Soil Survey Handbook Part 610. This training helped prepare staff for creating MLRA projects. The training was beneficial for all staff for future work.

I would also like to take this time to thank Paul Finnell for all of his hard work and dedication to the Agency. I have always noticed his true passion and knowledge for soils in all of his trainings and work.

As you are aware all offices have held tech team meetings within their MLRA's and have prepared MLRA projects. In this edition of Cuneiform I am tailoring the newsletters to each state for you to see what projects are being worked on in your state for FY2017.

On October 24th - 27th the National Soil Survey Leadership Meeting was held in Lincoln, Nebraska. We are working on the Strategic Plan (2026) and also FY2017 National Priorities.

I am requesting an invite from all states that are in Region-11 to one of their Leadership Team meetings during FY17. I would like to discuss the direction that we are going with the Soil Survey Division and to address any questions or concerns that you may have about the region.

It is my goal to ensure that pertinent information is being effectively communicated with everyone and that ideas are taken into account to improve operations and delivery of soil information to everyone.

Thank You!

Soil Survey Region 11 Team Gathers in Springfield, Illinois for Regional Operations Meeting

by Tiffany Justus, Soil Scientist (Cont. on Pg. 3)

Employees from Region 11's Soil Survey Offices gathered for an operations meeting June 7-9 in Springfield, Illinois. The meeting started with a joint teleconference with Regions 5 and 10 with speakers David Lindbo, Roy Vick, Pam Thomas, and Dave Hoover. Topics discussed during the teleconference included the Soil Survey Division's and the National Soil Survey Center's vision for the future, workforce planning, and the budget. Paul Finnell then met with the Region 11 staff to review policies and procedures for updating soil surveys, focusing on the recently revised National Soil Survey Handbook, Part 610. Soil scientists also completed a hands-on exercise building an MLRA project in NASIS. The meeting was a great refresher of important materials and a wonderful opportunity for soil scientists within the region to get to know each other better.

Frank Heisner, John Hammerly, and Bob Tegeler enjoying the beautiful weather and fellowship.

Paul Finnell and Ryan Dermody contemplating the new MLRA update process!

Soil Survey Region 11 Team Gathers in Springfield, Illinois for Regional Operations Meeting

by Tiffany Justus, Soil Scientist

Front Row: Sheila Staton-Clifton, Paul Finnell (NSSC), Kim Worth, Jennifer Callaway, Tiffany Justus, Zach Choate, Karla Petges, Gene Campbell, Stephen Roecker, Norm Stephens.

Middle Row: Tyler Staggs, John Allen, Ralph Tucker, Frank Heisner, Tonie Endres, Bob Tegeler, Chris Miller, Cole Patton.

Back Row: Lee Camp, Dan Pulido, Larry Gray, John Hammerly, Kevin Norwood, Zach Weber, Ryan Dermody, Darnell Dunston.

Not Pictured: Linda Cox, Alena Stephens, Natalie Irizarry, Melvin Simmons, Neil Martin, Erik Gerhard, Dwayne Williams, Jon Bathgate, Randy Leeper, Rick Francen, Kristine Ryan, Sarah Smith.

Employee Spotlight: Kristine Ryan

Aurora, IL Soil Survey Project Leader

Congratulations and welcome as the new Aurora MLRA Project Office Leader! Help us get to know you better by telling us a little about yourself.

How long have you been working for the NRCS and what positions have you held?
I've been working for the NRCS since January 2004. I've done two soil survey details-one in Georgia and one in Wyoming.

When you aren't working as a soil scientist, what do you like to do in your spare time?
Cooking, spending time with my kids, gardening, exercising

Who has had the most influence on your career?
My college professor/advisory really helped steer me and focus on a path. But I have had a few friends that have helped me diversify my interests over the last 10 years.

What has been the most challenging part of your job?
SDJR for 4 years

What do you enjoy most about working for NRCS MLRA Soil Survey?
Being outside, learning something new every day.

Do you have any professional or personal goals for this FY?
Be the best supervisor I can be, teaching and training my employees in a way that makes sense for them.

Ecological Site Initiative Update

by Tyler Staggs, Ecological Site Inventory Specialist

This past year was year two of the Provisional Ecological Site Initiative. In FY15 provisional ecological sites (PESDs) were developed for MLRA 111C. This past year was a continuation of that effort in MLRAs 111A and 111D. The effort resulted in the creation of 22 and 27 PESDs for 111A and 111D respectively. The PESDs for both of those MLRAs have been created, reviewed, and have went through quality control. Once quality assurance has been completed they will be available for public "consumption" and use. Current fiscal year efforts will focus on developing PESDs for MLRAs 111B and 111E. Additional work for ecological sites is to start collecting higher level data for PESDs in 111C in an effort to start moving some of them towards the approved and correlated stage.

Likewise, planning will be conducted this winter and qualitative field work next spring on gathering information and data on agriculture ecological sites in 111C.

The Waverly Soil and Ecological Data Trailer is Finished!!!

After 4 years of planning and gathering equipment, the Waverly Soil Survey Office put the finishing touches on their Soil and Ecological Data Trailer, (SEDT or acronym of your choice, we will take suggestions). The ideas for this trailer, shamelessly was stolen from Soil Survey Region 5.

The addition of this trailer satisfies the following needs:

Storage and transport of 10 Amoozemeters

Water Storage for Ksat and infiltration measurement.

Place to process and transport Dynamic Soil Property Samples.

Storage of equipment, freeing up laboratory space.

Potential to expand water and or soil core storage under shelving.

Storage of Ecological equipment.

Processing of Ecological samples.

To save money the trailers interior was designed and built by the Waverly Soils staff. Cost for The trailer was $4,000, with an additional $1,000 for the storage containers, paint, and shelving.

With this trailer the Waverly Soil Staff will be able to collect more soil and ecological data, in a shorter amount of time.

We would like to thank the Past and current leadership of Region 11, for approving our many equipment requests over the past 4 years. We would also like to thank the staff of region 5 for letting us steal your Idea for this trailer.

If any Soil office wish more information on this trailer you can reach me at:

Ryan Dermody

Soil Scientist

Waverly Soil Survey Office

1510 3rd St. SW

Waverly, Iowa 50677

Phone: 319-352-4038 ext. 327

MLRA 112 Provisional Ecological Site Tech Team Meeting October 18th-20th

submitted by Gene Campbell, MLRA 112 Project Leader

A two-day Tech Team Meeting was held in Clinton, Missouri in an effort to address National Bulletin 430-306 on developing provisional ecological site descriptions for MLRA 112. In order for PESDs to be developed and eventually become approved ESD's, an ecological site legend must exist for the entire MLRA. To complete this task a soil sort was completed on the entire MLRA and sent out for review prior to the meeting so that team members would have the opportunity to make notes in order to speed the process of going over this information at the meeting. A draft ecological site key and legend, which was developed by the Missouri Ecological Team, was also sent out for review prior to the meeting. The meeting covered what was expected to meet the needs of National Bulletin 430-306, what each state had for ecological sites concepts, reviewing the soil sorts and assigning a provisional ecological site to each major component in the map unit, and creating a final provisional key that was composed by the end of the meeting. Everyone present thought the meeting went very well and we got a lot accomplished! Team members present were Gene Campbell, John Cole Patton and Sheila Staton-Clifton from the Clinton MLRA Soil Survey Office, Tonie Endres, Senior Regional Soil Scientist from Region 11 Regional Office, Jeff Hellerich, Kansas State Soil Scientist, David Kraft, Region 5 Regional Ecological Site Specialist and Chris Tecklenburg, Ecological Site Inventory Specialist from Kansas, Jorge Lugo-Camacho, Missouri State Soil Scientist, Mark Abney, Missouri Asst. State Soil Scientist, and Doug Wallace, Ecologist ACES program from Missouri, and Steve Alspach, Oklahoma State Soil Scientist and Brandon Reavis, State Rangeland Management Specialist from Oklahoma.

Aurora MLRA Assists with QA of NWCA Sites

by Tiffany Justus, Soil Scientist

On July 8, 2016, Aurora MLRA soil scientists Sarah Smith and Tiffany Justus assisted employees from the Illinois Natural History Survey Prairie Research Institute in the sampling and quality assurance of a National Wetlands Condition Assessment site at the Lake Carina recreational site at the Lake County Forest Preserve, in Gurnee, IL.

FFA Soil Judging and Envirothon Soil Training Highlighted

by Sheila Staton-Clifton, Soil Scientist

February 29th and March 4th, 2016 was the second year for the Sedalia Soil Judging and Envirothon Training Days. It is an informative soils training that is presented to area high school students by the Clinton Major Land Resourse Assessment Project Office Soil Scientists, Gene Campbell, Cole Patton and Sheila Staton-Clifton. It was in partnership with the Missouri Assistant State Soil Scientist, Mark Abney, and the local USDA Natural Resources Conservation Service Office Lead Resource Conservationist, Ryan Peck and Soil Conservationist, Kim Schroeder. The training is an effort to prepare students for the upcoming FFA Soil Judging and the Envirothon contests. It was held at the State Fair Community College Agriculture Department with the assistance of Agriculture Program Coordinator and Instructor Brad Driskill. Mr. Driskill lent the service of several students to serve as Earth Team volunteers for the day's activities. This is also the second year that the local area school FFA group from Knob Noster High School, acted as the host to provide refreshments for everyone in attendance.

This year's training was expanded to address the Envirothon and Soil Judging students separately due to the different content presented at each contests. The day's activities included classroom and outdoor training. The indoor training was tailored to Envirothon students where they were trained on the 'Use of the Soil Survey' and soil descriptions. They concentrated on soil development, parent material, horizon identification, color, structure, texture and redoximorphic features. Outside there were three soil pits at which Soil Judging students could take a 'mock exam' and review it with a Soil Scientist.

This type of training is very valuable to the instructors and students of the participating schools since it is a 'hands-on' soils environment. At the training, students are allowed to walk down into the soil pit and observe the physical properties of the soil as they occur naturally in the profile. They are able to discuss the many different properties that must be explored to compete on the soils exam for both the Soil Judging and Envirothon.

Trainings such as this bring together the soil judging communities where feedback about successes or concerns can be addressed for the future. There has been a high demand for this particular training so we will hopefully be able to make this an annual event to train several schools at the same time. We were lucky enough this year to have wonderful weather, the turnout of approximately 17 schools (89 students), 5 Earth Team volunteers and the participation of 7 professionals as trainers.

Mark Abney (in the pit) and Cole Patton (far left) get the mock contest started.

Sheila Staton-Clifton presents soils information to an Envirothon group.

Preparing Digital Elevation Models for use in Soil Survey Applications

By Tom D'Avello, GIS Specialist/Soil Scientist, NRCS, National Soil Survey Center, Geospatial Research Unit, Morgantown, West Virginia; Jon Bathgate, Resource Analyst, NRCS, Marion, Illinois

Background

We are living in a time of abundant data resources, especially with regard to digital elevation data. There was a day in the 1980s and 1990s when soil scientists could accurately proclaim the maps they created did a better job of representing terrain than the digital elevation models (DEMs) of the day. In this age of high resolution DEMs, the data has improved immensely, claims have tempered and information needs have inverted.

When DEM resolutions were 30 meter or coarser, the desire was for finer resolutions to capture smaller, subtler landscape features and generate more accurate terrain derivative like slope gradient. The 30 meter DEMs were not suitable for soil survey work for much of the USA. DEMs of 1 to 5 meter resolution are now readily available in many parts of the USA. Local and state agencies commonly have sub-meter resolution data available by special agreement. DEM users now have the challenge of handling and interpreting 100 to 900 times more data points. The good news is higher resolution data provides more options to the user. This article will provide a few examples for ways of dealing with a product often viewed as providing too much information without resorting to brutish methods.

Preprocessing Checklist

A quick workflow for working with any DEM should include:

- Verifying the projection parameters
- Verifying the horizontal units
- Verifying the vertical units
- Verifying the resolution
- Verifying the extent in terms of rows and columns
- Performing a qualitative check using a hillshade

The answers to these questions will determine if projecting to a common projection with common units is required. Although ArcGIS provides dynamic projection capabilities, it is a best practice to use one common projection for all of the raster data that will be used for GIS analyses. If reprojecting a DEM is required, a Job Aid is available that provides details related to that operation. If the raster data will also be utilized in applications like R, it is imperative that all layers share common projections, resolutions and extents.

Matching the horizontal and vertical units is preferred. This will make for assumption-free derivation of slope gradient, slope curvature and related terrain derivatives. Data provided in a geographic coordinate system, e.g. decimal degrees, must be converted to a projected coordinate system. Many users have been frustrated trying to interpret a slope gradient layer generated from input data with horizontal units in degrees or with the vertical units in centimeters or feet, while the horizontal units are in meters. There are situations where users maintain DEMs with vertical units different from horizontal, but those are best left to another discussion.

The last step in this review is the easiest. Create a Hillshade or painted relief using a reasonable vertical exaggeration and perform a qualitative review looking for anything that doesn't look correct. There is a tool to create painted reliefs in xTerrain Toolbox. The choice of vertical exaggeration factor is a personal preference, but a general guide would be 1x for mountainous terrain (> 150 meters of relief), 2x for rolling terrain (30-150 meters of relief) and 5x for low relief (< 30 meters of relief).

Noisy DEMs

One of the definitions of noise defined by Merriam-Webster is "irrelevant or meaningless data or output occurring along with desired information". High resolution DEMs derived from LiDAR are often noisy, providing elevation values for micro-features like cultivation furrows, seedbeds, seedlings in conifer plantations or sporadic dense, shrubby vegetation. This detail often remains undetected until terrain derivatives are developed and evaluated. For this reason, it is important to smooth the DEM before performing terrain analysis.

Using an area from the Midwestern USA that has 1 meter LiDAR data as an example, several options will be reviewed. Plowing ahead, as many of us are apt to do, a slope gradient layer, in percent, is produced using ArcGIS. It is apparent the output is quite noisy, as this is slope on the micro-topographic scale (Figure 1). Slopes range from 0 to 108 percent, which would only be practical and useful from the perspective of a toad or millipede.

Preparing Digital Elevation Models for use in Soil Survey Applications

By Tom D'Avello, GIS specialist/soil scientist, NRCS, National Soil Survey Center, Geospatial Research Unit, Morgantown, West Virginia; Jon Bathgate, Resource Analyst, NRCS, Marion, Illinois

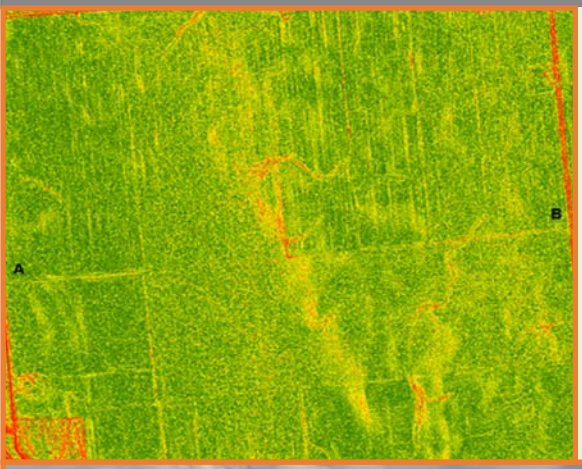

Figure 1. (left) Slope gradient from ArcGIS, original DEM

A quick look at the hillshade could have saved a step

before producing this unusable slope gradient layer.

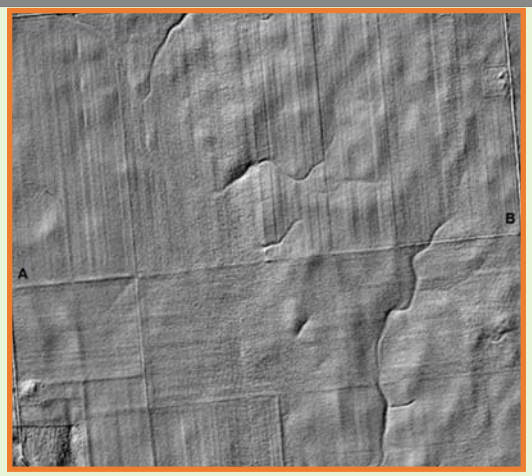

Figure 2. (left) shows the hillshade with 5x vertical exaggeration for this area. A qualitative view of the hillshade reveals the excess noise known as "corn rows" among LiDAR users. This area has roughly 3 meters of relief over a horizontal distance of 1,625 meters (10 feet/ mile).

A landscape photo looking from point A to point B on the hillshade Figure 3. (left) indicates what this area looks like. The slight rise on the left side of the photo occurs just off of the upper right corner of the hillshade. Flat, grading to very gently sloping, would be a good description of the terrain for this part of the world.

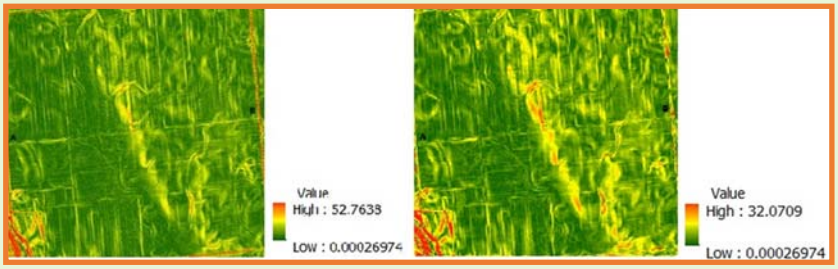

Figure 4. (above) Slope gradient from ArcGIS, Gaussian filtered DEM source on left and Focal smoothed DEM source on right. Each operation was performed 5 times. The focal smoothed DEM was based on a 3 cell radius neighborhood.

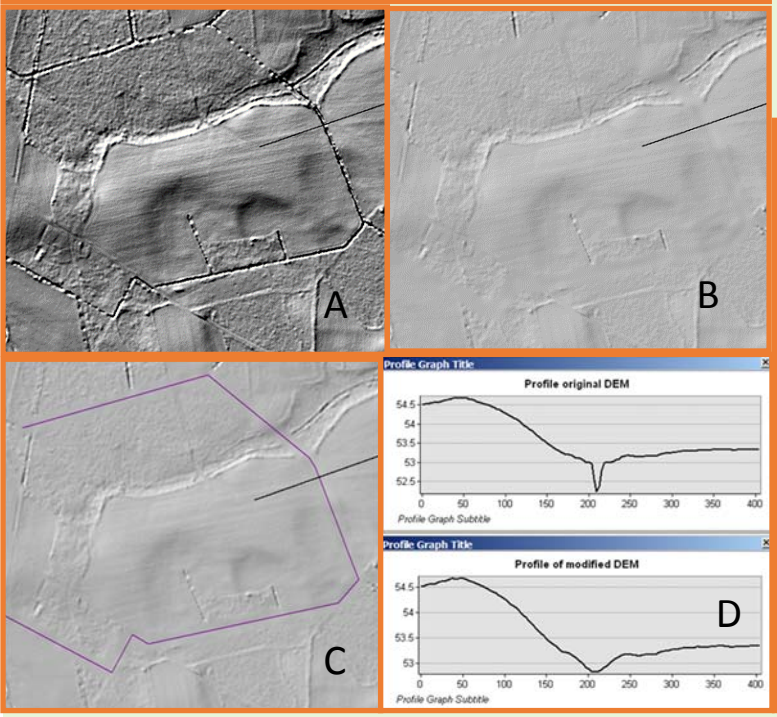

Figure 5. (above). Panel A shows the original 5x hillshade, panel B is the hillshade after linear artifact were "removed", panel C shows the linear artifacts applied to the "removal" and panel D shows the cross-sections for each DEM.

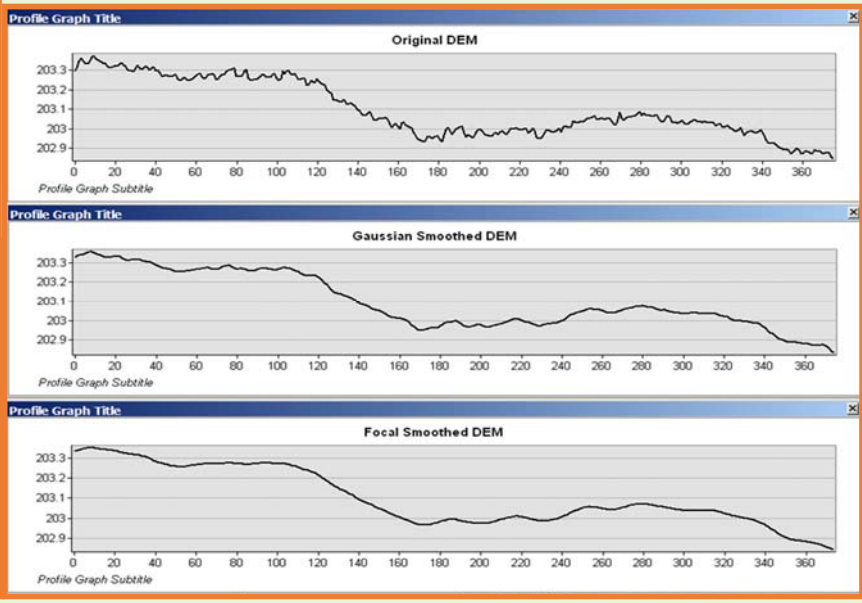

Figure 6. (above) Cross-sections from top to bottom reveal the elevations of the original, Gaussian Filetered and Focal Smoothed DEMs.

FY 2017 Project Activities

By Tonie Endres, Senior Regional Soil Scientist

Although the Soil Data Join Recorrelation (SDJR) Initiative is now over, work will continue towards completing an inventory and assessment of those map units not included in the SDJR Initiative. There are 373 SDJR projects planned for FY 2017.

Four Provisional Ecological Sites (PES) projects will be completed in FY 2017 for Land Resource Areas 107B, 111B, 111E, and 115B.

Future projects or update needs identified through the SDJR Initiative were prioritized over the summer by the Technical Teams and Management Teams. The highest priorities were then developed by the Soil Survey Offices into MLRA field projects. Field work has already begun on 39 MLRA field projects. Nineteen of these will be completed in FY 2017. The rest will be completed in FY 2018.

The list below provides a brief description of the MLRA field projects that will be started and completed in FY2017 within your state.

States Impacted	FY Start/End	Project Name	Project Description
Indiana	2017	MLRA 111B - Glynwood B-slope Erosion; Northeastern IN **(Findlay Soil Survey Office)**	In 2012 an MLRA project was initiated in portions of 9 Indiana counties in MLRA 111B to improve the consistency of erosion phase on Glynwood soils. Erosion plays a significant role in soil health. It disturbs the soil ecosystem by removing organic matter and altering the biological community. An analysis of map unit erosion phases can be used to evaluate key soil health parameters. To improve the use of the Glynwood map unit data for soil health initiatives, digital soil mapping techniques will be used to consistently delineate slope erosion phases. Landform analysis and modeling tools in ArcSIE developed in a previous MLRA project will be implemented in this project. The results will be tested to determine if the erosion classes consistently identify areas where degraded soils occur. Much of the field sampling and some of the lab analysis is completed. Acres: 192,124; Staff: soil scientist: 3/4 year; cartographer 1/2 year; data analysis 3 weeks.
Indiana	2017	MLRA 111A - Inactive series **(Indianapolis Soil Survey Office)**	The Bonpas, Cope, Delmar, and Manlove soils were correlated in 3 older soil surveys and have since become inactive series. These soils are correlated in both MLRA 111A and 111D. The descriptions and lab data on these series and associated map units are limited, and the Bonpas and Cope series are hydric soils. The benefits of this as an MLRA project are to update the spatial and tabular data, correlate to an active and existing series, improve land use information, provide minor component data that is currently lacking, and to improve consistency in mapping across political boundaries and landforms. This project encompasses 10,638 acres and with 2 soil scientists and 1 ARCGIS staff is expected to take a half year to complete. No anticipation of overnight lodging needed for this project, but some credit time accumulated could occur with travel times of 3 to 4 hours round trip to some areas during field season. This project was requested by NRCS area and field staff.
Indiana	2017	MLRA 111A - Fairmount mapunits **(Indianapolis Soil Survey Office)**	The Fairmount series is typically associated with soils that formed in limestone interbedded with shale in residual areas. However, they have been extended into areas that are surrounded by soils derived from glacial till material. In numerous soil survey updates, the Fairmount was converted to another series in till influenced areas, but it remains correlated in several of the older soil surveys. The benefits of this as an MLRA project are to update the spatial and tabular data, improve land use information, provide minor component data that is currently lacking, and to increase consistency across political boundaries. This project encompasses 8,902 acres and with 2 soil scientists and 1 ARCGIS staff is expected to take a half year to complete. Even though a portion of these map units are in eastern Indiana, it is anticipated that some overnight travel will be required as this map unit extends into some areas of southwest Ohio. This project was requested by NRCS area and field staff.
Indiana	2017	MLRA 115A - Swanwick variant silt loam, 1-15% **(Marion Soil Survey Office)**	"Swanwick variant silt loam, 1 to 15 percent slopes" (musym SvC) is mine land regolith. It is unevenly distributed in MLRA 115A as it is only mapped in Gibson County. This uneven distribution causes spatial discontinuity. Fieldwork along with terrain and spatial analysis is required to determine if this mapunit should be correlated to a different mapunit or mapped in other counties to achieve an even distribution. This project has the potential to affect 14,062 acres. Current mine reclaimed areas also need to be investigated to update the mapping of this mapunit. This project will take approximately 6 month to complete. This update was requested by Jeff Woodward, Resource Soil Scientist, Vincennes, IN.