Minutes of NCERA-3: Soil Survey
New Mexico State University
Las Cruces, NM
May 9-14, 2009

Administrative Advisor:
Gerald Miller
Iowa State University
132 Curtiss Hall
Ames, IA 50011-1050

Chair:
Ken Olson
University of Illinois
Natural Resources and
Environmental Sciences
Urbana, IL 61801

Secretary:
Phillip Owens
Purdue University
Dept. of Agronomy
West Lafayette, IN 47907

Members in attendance:
Lee Burras – Iowa, James Crum - Michigan, Ken Olson - Illinois, Mickey Ransom - Kansas, Phillip Owens – Indiana, Brian Slater – Ohio State University, Larry West - NRCS Lincoln, Maxine Levin – NCSS Washington D.C.

Administrative Advisor - Gerald Miller

Guests: Randy Miles – University of Missouri

Members absent:
Gary Steinhardt, Indiana; A.D. Karathanasis, Kentucky; Mike Konen, Illinois; Terry Cooper, Minnesota; David Hopkins, North Dakota; Mark Kuzila, Nebraska; Douglas Malo, South Dakota

Saturday, May 9, 1:10 p.m., New Mexico State University, Corbett Center, Student Union
Ken Olson opened the meeting and welcomed representatives and guests present, and asked if there were any additions to the agenda.

1. Approval of minutes from the 2008 meeting

The minutes had been emailed previously, Mickey Ransom moved to approve the minutes. James Crum seconded. Unanimously approved.

2. Administrative Advisor Report – Gerald Miller

- Dr. Miller discussed reporting and suggested that the committee needed to revise and update impact statements.
- Dr. Miller discussed the impact of budget constraints, specifically decreases within the CSREES budget.

3. USDA-NRCS Report – Larry West and Maxine Levin

Dr West reported on activities at the National Soil Survey Center.

- As of the meeting date, the Director position had not been filled (following retirement of Bob Ahrens). (Jon Hempel since appointed).
- Dr West discussed major budget challenges, staffing changes.

- New Research Soil Scientist, Skye Wills appointed, providing expertise in statistics, sampling design.
- Dr West discussed current plans for training.
- Soil Geomorphology Institute – three-week field-based intensive, two sessions this year (Penn State and Alabama A&M). Davis CA planned for 2010. These should then alternate with Soil Science Institute.
- Kansas State is interested in hosting the Soil Science Institute in 2011
- Dr West discussed the project to incorporate characterization data from state university sources into the national system. The project should result in at least an additional 25,000 pedons to support data-driven interpretations.
- The renewed impetus for an international soil classification system, perhaps consistent with US Soil Taxonomy was raised.

Maxine Levin reported on activities at NRCS National Headquarters

- Headquarters restructuring was almost complete
- Current soil survey focus includes MLRA update work, research project interaction, and completion of the initial survey of US private lands. The 2011 goal may be optimistic, with 17 states incomplete, and major pending work in arid lands and rangelands.
- Increasing impetus for international work, though new authority and legislative support is needed.
- Maxine Levin discussed the Globalsoilmap.net, a project funded by the Gates Foundation. Major current funding is for developing a soil attribute spatial database for Africa, and some support for the development of project nodes elsewhere. NCSS has interest in cooperation and coordination. Further discussion to be lead by Alex McBratney, Jon Hempel and others at the following National Soil Survey Conference.
- Maxine Levin initiated discussion of the general format for soil survey spatial data. While the current polygon based system will dominate delivery of soil survey information for at least 15 years, increasing raster-based data will be generated as complementary products. A discussion of the pros and cons of polygon and raster based representations of soil geography followed.

4. Other information items

- The review of the project proposal by Ed Nater for the MSRC was discussed.
- A major comment form the review concerned the need to address issues related to larger and smaller scale soil survey investigations.
- The review had been addressed by the executive committee, and comments incorporated in the proposal.

5. Standing and National Board Committee reports were presented.

- Soil Research and Interpretations – Larry West to detail during the NSSC.
- Effect of Management on Soils – spearheaded by Neil Smeck, proposals published but no substantial change to ST was implemented. However, the remarks section of the official soil series description will include an erosion statement if a soil was previously a different soil prior to accelerated erosion.
- Education and Training – considerable efforts have been made at the state level in K-12 education. These are documented in some state reports, but should be a clearer focus.

Efforts need to be coordinated regionally, and collective effort reported as part of the NCERA project.

- High Intensity Soil Survey – SSSA meeting symposium organized by Dr Owens
- NCERA -3 and S9 sponsored Symposium on Soil C and Greenhouse Gas Emissions in AG Lands co-organized by Ken Olson for Pittsburg SSSA meetings; 20 oral and 40 posters.
- National Soil Taxonomy Committee – no activity reported
- National Soil Survey Database Committee – strong regional activity with incorporation of state data.
- National Soil Survey Conference Committee – Ransom, Slater, Miller and Olson contributed to teleconferences.

6. Accomplishments include:

- Active involvement of the steering committee for the 2009 national soil survey conference.
- K-12 activity, including FFA soil/land judging
- Symposium organized for the 2009 SSSA meeting titled "Soil Carbon and Green House Gas Dynamics in Agricultural Land"
- State data shared, incorporated in national database
- Information described in state reports regarding soil carbon work: focus on sampling strategies, directed sampling for soil properties, and stratification by land use among other activities.

7. Impact Statements

- Two benchmark catena trace element studies were initiated in Indiana and Illinois to provide baseline data related to soil processes. Conducted educational survey of regional universities related to training of soil scientist. This help focus attention on the declining soil student numbers, the loss of soil science curriculum, and reduced numbers of soil faculty teaching at regional universities.

- As a result of active NCERA-3 participation from 2004 to 2009 in Regional collegiate soil judging contests, NRCS views this activity as a critical recruiting event to encourage more students to participate in federal Soil Science and Soil Survey careers.

- As a result of active support by NCERA-3 members and NRCS cooperation, the Smithsonian Soils Exhibit in Washington DC opened July 18, 2008 for 18 months with specific information on the benefits of no-till and soil survey information. This exhibit will potentially introduce the field of Soil Science to over 1 million visitors a year.

- Co-sponsored and co-organized a High Intensity Soils symposium at 2006 SSSA meeting. National and regional soil survey conferences have addressed the need for high intensity soil surveys.

- NCERA-3 members suggested to NRCS that the state soil characterization data bases, which existed as paper files at many of the member institutions, be electronically stored and added to the National Soil Pedon data base. Previously some state university

laboratories had electronically stored soil property data but not soil descriptions or site locations. This effort had been delayed until the development of a software program to store soil descriptions using a pedon_pc software program. Another challenge had been to link the appropriate laboratory methods used at the time the laboratory measurements were made over the last 60 year time period. This project was initiated in 2006, with the support of Dave Hammer who was previously a member of NCERA-3. Electronics data storage site information, location, classification, soil descriptions, the laboratory methods used and the laboratory measured soil property data by horizon and depth. Illinois and Indiana were two of the first states to test pedon_pc software and have now stored the soil characterization data for approximately 3500 pedons. This characterization data is currently being checked and uploaded into NASIS by NRCS staff. The National Pedon Data Base original had 2100 pedons of laboratory data, measured at the National Soil Survey Laboratory, from sites in Illinois and Indiana so the soil characterization data provided by the University of Illinois and Purdue University will increase the number of pedons to approximately 5500. NRCS partially funded these two university laboratory electronic storage efforts as well as ones at 9 other state university laboratories throughout the USA. Later, with additional federal funding this project was then expanded to include a total of 28 university laboratories from around the country including others in the North Central region. The goal is to double the size of the National Pedon Data Base by adding approximately 30,000 pedons from the state university laboratories in the next few years. This National Pedon Data Base will provide the baseline data to support the soil and land use interpretations and recommendations being made in county soil survey reports and by cooperative soil survey scientists and mappers working on detailed or site specific soil surveys.

- The NCERA-3 committee is a sponsor and co-organizer of the upcoming Soil Carbon and Green House Gas Dynamics in Agricultural Land symposium at an upcoming ASA-SSSA meeting (in Pittsburgh, PA on November 3, 2009). A total of 60 abstracts, including some from NCERA-3 members, were submitted for the oral and topic poster sessions. The conference will help provide information that policy makers can use as they better understand soil carbon sequestration and/or soil carbon loss and green house gas emissions and/or storage as a result the use and management of agricultural land and as they attempt to develop a cap and trade soil carbon credit program.

8. Officers for FY10 are
   - Chair: David Hopkins
   - Chair Elect: Phillip Owens
   - Secretary: Doug Malo
   - Secretary Elect: Brian Slater
   - Moved Ransom, Seconded Crum, Approved.

Meeting adjourned 5 PM

Submitted by Phillip Owens, NCERA-3, 2009 Secretary

Approved: **Approved:**

Ken Olson, Chair **Gerald Miller, Administrative Advisor**

NCERA-3 State Reports 2009

Illinois - Kenneth R. Olson, University of Illinois

Summary of Report:

Illinois has published the soil survey reports for all 102 counties. More than sixty counties have a digital soil survey or one in progress. Research activity related to NCERA-3 includes: soil productivity-erosion relationships, evaluation of conservation tillage systems for restoration of productivity, crop yield prediction by soil type, and quantification of erosion rates. The effects of tillage on soil carbon sequestration is also being studied on sloping and eroding, low productivity soils in southern Illinois and on highly productive soils in west-central IL. Crop yields trends over time are also being monitored at these sites. An ongoing research project related to land degradation links teams of soil scientists from UIUC with Moscow State University (Russia) geographers. Documented the 2008 flooding impacts on agricultural lands in Illinois, Missouri, and Indiana. Co-organizer of the Symposium on Soil Carbon and Green House Gas Dynamics in Agricultural Lands to be held at 2009 SSSA meeting in Pittsburgh, PA

Research Activities:

- Productivity index ratings for new Illinois soils and crop yield updates for established soils
- Impacts of long term tillage on soil properties and crop yields
- Assessing soil erosion and deposition in Illinois landscapes
- NC-1017 Carbon Sequestration in Eroded Illinois Soils.
- Storing 2078 IL soil description, locations and laboratory data base storage using pedon-pc and lab pedon.

Outreach and Extension Development:

- North Central soil Survey Conference Soil Taxonomy and Standards Committee
- Illinois Farmland Assessment Technical Advisory Committee

Publications (*number of peer-reviewed (2), symposia (1), reports (0), and abstracts (2)*

Courses taught (*titles*):
Co-taught Introductory Soils (NRES 201) - 70 students
Soil and Water Conservation and Management (NRES 474) on campus -24 students

Indiana - Phillip Owens. Purdue University

Summary of Report:
All 92 Indiana counties have been initially surveyed and have published soil survey reports. Thirteen counties have been updated at a scale of 1:12,000 and updates have been updated for six additional counties. All thirteen of the updated published counties have hard copy books and soil maps available, and twelve have soil survey CD's. Twelve of the update surveys have manuscripts available online at the Web Soil Survey. All 92 counties have SSURGO completed and are released on CD as Soil Survey Interim Reports. 72 Historical Replica Soil Surveys have

publications online at the NRCS Indiana State Web Site http://www.in.nrcs.usda.gov/mlra11/manuscript_publications/Manuscripts.html. All 92 Counties have spatial and tabular data available online at the Soil Data Mart and Web Soil Survey. Maintenance to soil surveys in Indiana is now being done on a MLRA and landform basis. NRCS currently has 20 soil scientists working in Indiana as follows: 3 Area Resource Soil Scientists on board and 1 vacant position; 1 Student Trainee, 1 Soil Scientist on the Planning and Technology Staff at the Indiana State Office, 9 Soil Scientists working on update and maintenance Soil Surveys in two MLRA Soil Survey offices and 6 Soil Scientists in the MLRA Soil Survey Region 11 Office.

Research Activities:

- Characterizing the usefulness of soil landscape interface model (SoLIM) coupled with terrain attributes on low relief topography for digital mapping.
- Determining the relationship of seasonal water tables and hydraulic conductivity in benchmark soils within small watersheds to predict soil hydrology and related pedological features.
- Quantification of spatial variability of soil properties and trace elements within benchmark catenas using maps created by soil evaluations, digital elevation models, remote sensing and geostatistics.
- Landscape scale assessment of soil processes and pedochemical tracers across watersheds.
- Characterize the hydraulic conductivity variations between the concentric series of recessional moraines formed from the Erie-Ontario glacial lobe in northeastern Indiana.
- Characterize the spatial distribution of water limiting horizons across a watershed with geophysical methods.
- Collaborative regional loess covered benchmark catena study for MLRA 120 between Indiana, Illinois and Kentucky.

Outreach and Extension Development:

- National Soil Survey Advisory Committee, 2008-present
- Chair of Hydropedology Working Group 2007-2009 with SSSA Division S-05
- Co-editor of Special Issue of Catena Journal “Hydropedology”, Published in 2008.
- Chair of the Future Directions of the Soil Survey National Committee, 2006-present
- NCERA-3 Chair of the Future Directions of the Soil Survey Committee, 2005-present
- NCERA-3 Chair of High Intensity Soil Survey Working Committee, 2005-present

Publications: Research: 9, Book Chapter: 0, Abstracts: 9, Extension Bulletins: 3, Non-peer reviewed publications: 4

Classes**:** Introduction to Soil Morphology (AGRY 565), Soil Morphology Geography, Soils Genesis and Classification (AGRY 655)

Iowa

Academic Unit: Iowa State University

Name: C. Lee Burras, Thomas E. Fenton (*emeritus*), Gerald A. Miller, Andrew Manu, Jonathon Sandor

Summary of Report:
Four active faculty members from Iowa State University are involved in the Iowa Cooperative Soil Survey. These are: Jerry Miller, land use and extension, Andrew Manu, GIS and landscape analysis, Jon Sandor, pedology teaching and soil judging, and Lee Burras, experiment station coordinator for soil survey. In addition, Tom Fenton continues to play an important role as an *emeritus professor*. Collectively these individuals work through Mike Sucik, State Soil Scientist, NRCS, and his staff - as well as representatives from a variety of state and local agencies - to implement the program.

Program highlights include:

- As in 2008, 99 counties have modern soil surveys with 90 being available on line at the Iowa Cooperative Soil Survey website (http://icss.agron.iastate.edu/). These same surveys are available through Web Soil Survey and the Soil Data Mart. Hard copies are distributed on a limited basis by the NRCS Soils Staff.
- Seven surveys are being updated by NRCS soil scientists using a integrated county-MLRA approach. Surveys are in MLRA 103, 104, 107, 108 and 109.
- Integration of research with Thanos Papanicolaou and his group of engineers and hydrologists at the University of Iowa in order to quantify and better model.
- The ISU Soil Characterization Laboratory analyzed over 1000 samples in FY09, with the samples being split between ongoing soil survey updates and Experiment Station research..

Ongoing Research Activities:

- Quantifying the pedological impact of the past sixty years of cropping on major soil series mapped across Iowa (Jessica Veenstra, PhD student, expected completion lat 2009).
- Assessing the relationship between soil morphology, land use and water dynamics in the Clear Creek watershed (Brad Oneal, MS student, expected completion 2009).
- Evaluating mineralogy-genesis relationships in loess over bedrock soils such as Gosport (Mostafa Ibrahim, PhD student, expected completion 2011).

Outreach and Extension Development (2008):
Statewide FFA soils contest (G.A. Miller and J.A. Sandor)
Field days linking hydrology and soils (C.L. Burras)
Field "lessons" on soils and landscapes at Dordt College (C.L. Burras)

Publications (2008): Peer-reviewed: 3; chapters: 0, abstracts: 2;
Dissertations/theses: 0; research reports: 1.

Peer-reviewed

Lemus, R., E.C. Brummer, C.L. Burras, K.J. Moore, M.F. Barker and N.E. Molstad. 2008. Effects of nitrogen fertilization on biomass yield and quality in large fields of established switchgrass in southern Iowa, USA. Biomass & Bioenergy 32:1187-1195.

Miller, B.A., C.L. Burras and W.G. Crumpton. 2008. Using soil surveys to map Quaternary parent materials and landforms across the Des Moines Lobe of Iowa and Minnesota. Soil Surv. Hor. 49:91-95.

Papanicolaou, A.N., M. Elhakeem, C. Wilson, C.L. Burras and B. Oneal. 2008. Observations of soils at the hillslope scale in the Clear Creek Watershed in Iowa, USA. Soil Surv. Hor. 49:83-86.

Abstracts

Burras, L., T. Papanicolaou, J. Veenstra, B. Oneal and M. Sucik. 2008. Inventorying dynamic soil properties across Iowa's catenas and land uses. Agron Abstracts, 45475, Houston, TX. (invited)

Veenstra, J. and L. Burras. 2008. Soil changes after 60 years of land use in Iowa. Agron Abstracts 43436.

Research Reports

Papanicolaou, A.N., C. L. Burras, M. Elhakeem and C. Wilson. 2008. Field and laboratory investigations of infiltration on different geomorphic surfaces in a watershed under different land uses. Final Report, USDA-NRCS Nat'l. Soil Survey Center (USDA contract number 68-3H75-3-122). 69 p.

Other

Scientists hosted

Yury Chendev, Professor of Pedology at Belgorod State University, Russia, spent seven months at Iowa State University conducting original pedology research with the ISU Pedology group and NRCS, especially Mike Sucik.

Courses Taught:

- Fundamentals of Soil Science (Manu) - 2 sem., 1200 student credit hours (SCH)
- Soils & Environmental Quality (Burras) – 2 sem., 800 SCH
- Field Experience in Soil Descriptions (Sandor) – 2 sem., 30 SCH
- Soil Genesis & Landscape Relationships (Sandor) – 1 sem., 100 SCH

Kansas -Michel D. Ransom, Gerard Kluitenberg, DeAnn Presley

Summary of Report:

Updates of soil surveys are done on a multi-county (MLRA) or some other geographical basis. Updates are in progress in MLRA 72, 74, 79, 106, and 112. All updates will be on a 1:12,000 ortho-quad base. Most surveys in Kansas have been published at a scale of 1:20,000 and are not geo-referenced. The hard soil survey publication is not being disturbed to the public. The official soil survey information for Kansas is accessible from the Soil Data Warehouse through the NRCS electronic field office technical guide, Soil Data Mart, or the Web Soil Survey. The soil surveys for all counties in Kansas are digitized up to NRCS standards for SSURGO certification. This work was completed by the Agronomy Department, the Geography Department, and NRCS as part of an effort to develop a statewide GIS. The work was completed in the Geographic Information Systems/Spatial Analysis Laboratory of the Geography Department. The K-State Soil Characterization Laboratory analyzed about 500 grab samples in FY08 for the soil survey program. The Agronomy Department is assisting NRCS with data interpretation and analysis on a project that monitors water table levels and saturated hydraulic conductivity

Research Activities**:**

- Genesis and morphology of soils with vertic properties in southeast Kansas and western Missouri
- Clay translocation and carbonate accumulation in central and western Kansas using soil micromorphology
- Distribution and properties of clay minerals in Kansas soils with emphasis on fertility
- Soil genesis and parent material stratigraphy in the Bluestem Hills
- Carbon sequestration using benchmark sites to estimate soil organic C stocks
- Development of a Laser Induced Breakdown Spectroscopy (LIBS) procedure to determine the organic carbon content of soils in the field
- Development of improved procedures for determining soil physical properties, such as saturated hydraulic conductivity, for application to the soil survey program
- Effect of tillage on the hydrology of claypan soils in Kansas
- Cooperative work with NC-1018, Impact of Climate and Soils on Crop Selection and Management

Outreach and Extension Development:

- USDA-NRCS Advisory Panel to the Director of Soil Survey
- National Cooperative Soil Survey Conference Steering Committee
- Kansas Soil Survey Technology and Work Planning Conference
- Soil Science Society of America Soils Geomorphology Committee
- Soil Science Society of America Training and Continuing Education for Soil Scientists Committee

Publications (2008-09): Peer-reviewed journal articles: 1; Abstracts: 4

Courses taught**:** Soil Judging, Soil Genesis and Classification, Advanced Soil Genesis and Classification

Kentucky

Academic Unit: College of Agriculture, University of Kentucky

Name: A.D. Karathanasis

Summary of Report:
In Kentucky, the cooperative soil survey program involves representatives of the cooperating agencies NRCS, University of Kentucky, US Forest Service and the State Office. Soil surveys for all 120 counties representing 83 soil survey areas are SSURGO certified. Information for 17 soil survey areas is available on CD format. There are currently 15 NRCS soil scientists actively working on soil survey activities in the state. All soil survey activities in Kentucky are associated with the MLRA process except for the survey of Elliott County, which is awaiting publication. The Owensboro MLRA-SSO is focusing on soils occupying acid floodplains, deep loess deposit, and strip mined watersheds. The Frankfort MLRA-SSO is working on Lowell and Maury soils as well as on urban soils along the Ohio River in Northern Kentucky. The London MLRA-SSO is involved in studies with floodplain and terrace soils in southeastern Kentucky and the Big South Fork National Park. The Cookeville (TN) MLRA-SSO is studying fragipan soils in western Kentucky and soils developed on the Pennington formation. Sampling, characterization, classification, and correlation activities are on-going in all of the above projects. The UK soil characterization Laboratory is also involved in a project designed to convert site morphology and laboratory soil characterization data for about 1000 Kentucky pedons to a national survey database.

Research Activities:

- Soil site evaluation and design approaches for onsite wastewater treatment systems
- Hydrology and biogeochemistry gradients in mountain wetlands.
- Composition and transport behavior of soil nanocolloids in agricultural and coal mined watersheds
- Application of hyperspectral imagery to detect variability within and between soil map phases.
- Carbon sequestration processes in temperate soils with different properties and management histories.
- Interactions of organic and inorganic phosphate forms with soil hydroxyinterlayered minerals and waste management implications.

Outreach Activities:

Workshops training Health Department personnel on soil evaluations for onsite wastewater treatment systems

Publications:

Thompson, Y.L., B. C. Sandefur, A.D. Karathanasis and E.M. D'Angelo. 2008. Redox Potential and Seasonal Porewater Biogeochemistry of Three Mountain Wetlands in Southeastern, Kentucky, USA. Aquatic Geochem. (DOI 10.1007/s10498-008-9042-3).

Terzakis, S., M.S. Foundoulakis, I Georgaki, D. Albantakis, I. Sabathianakis, A.D. Karathanasis and T. Manios (2008). Constructed Wetlands Treating Highway Runoff in the Central Mediterranean Region. Chemosphere 72: 141-149.

D'Angelo, E., C. Kovzelove, and A.D. Karathanasis. 2008. Carbon Sequestration Processes in Temperate Soils with Different Chemical Properties and Management Histories. Soil Sci. 174: 45-55.

Miller, J.O., A.D. Karathanasis, O.O. Wendroth, C.J. Matocha, and C.D. Barton. 2008. In situ colloid mobilization within biosolid amended soils following coal mine reclamation. Proceedings of the NGWA/U.S. EPA Remediation of Abandoned Mine Lands Conference (#5019). Denver, CO.

Karathanasis, A. D., T. Mueller, B. Boone, and Y. Thompson. 2009. Nutrient removal from septic effluents as affected by soil thickness and texture. SCOPE, www.ceep-phosphates.org.

Courses Taught:

Soil Morphology (PLS 573) 15 students
Soil Judging (PLS 396 and 406) 10 students
Pedology-Mineralogy Methods (PLS 697) 10 students

Missouri - Randall J. Miles; University of Missouri

Summary of Report:

All counties in Missouri are mapped and published. Missouri soil surveys are available on the University of Missouri CARES web site at http://soils.missouri.edu/. The Missouri Soil Characterization Laboratory located at the University of Missouri ran approximately 3,200 soil samples in the 2008-2009 timeframe since our last meeting. Soil characterization data is also stored, maintained, and available through the CARES website. The Missouri Department of Natural Resources support of the Cooperative Soil

Survey has been cut. All fifteen of the MNDR soil scientist positions were eliminated by November 1. At this time, the level of support for the Characterization Laboratory and CARES website is not known for 2009-2010.

The Natural Resource Conservation Service (NRCS) level of support of the Cooperative Soil Survey has remained steady.

Many of the Cooperative Soil Survey activities have been project based. Some of the recently completed projects are:

- Completion of flooding frequency edits in the Bootheel.
- Completion of sand dune soils work in the Bootheel with development of 3 new data map units.
- Completion of Crowley's Ridge footslope project.
- Completion of Parent Material/Landscape/Landform information in NASIS with Ecological Site Description project.

Research at the University of Missouri:

- Influence of slope aspect and vegetative openness on soil development in the Chariton River Hills Ecological Land Type area of north-central Missouri.
- Genesis of soils and planar barrowing in a Mandan Plains Indian Village (Double Ditch) of North Dakota.
- Soil morphology and innovative time-dosed dispersal systems on effluent treatment and dispersal in claypan soils.
- Development of a new generation wastewater treatment system for a base camp.
- Development and application of new methods to indentify and quantify soil redoximorphic features.
- Use of proximal and penetrating conductivity sensors for high resolution soil mapping.
- Development or predictive tools and models for assessment of soil variability with landscape position.
- Collaboration with the development of an "Active Carbon" field kit (part of a national program with NRCS National Soil Survey Laboratory).
- Soil potential study for onsite wastewater applications to the Truman Lake area.

Extension and Outreach Activities

- Coordinated State FFA soil judging contest
- Served as scoring and grading coordinator at national collegiate soil judging contest at Missouri State University
- Numerous soils and onsite wastewater workshops in state.
- Four invited out of state soils and onsite wastewater workshops.

Publications: 2 book chapters, 1 research proceedings, 1 abstract, 1 bulletin

Courses Taught:

Soil Science 2100 (Introduction to Soil Science (2 semesters)); Soil Science 4320 and 7320 (Genesis of Soil Landscapes); Soil Science 9422 (Pedology); Soil Judging; Special Problems

Minnesota –Terence H. Cooper, Professor, University of Minnesota

Summary of Report

Minnesota Soil Survey Program**:** 87 counties - 91 soil survey areas (St. Louis County is divided into 5 sub-sets - of these 5, 3 are SSURGO)

83 soil survey areas are SSURGO (80 complete counties) All soil survey areas that are SSURGO are available via web soil survey- Minnesota no longer publishes books or CDs - the "official copy" is web based. This ensures that the user has access to the most up to date soil survey.

Soil surveys in Lake and Cook counties will begin this summer. Initial mapping is scheduled to be completed in Koochiching County by August. The 4th of 5 subsets of St. Louis County is complete; and depending on the number of out-of-state detailees, the 5th and final subset of St. Louis County may be completed this year (2010 for sure). Initial mapping continues in Pine County. Update mapping - Crow Wing County and the Red Lake Indian Reservation (parts in Lake of the Woods, Beltrami, and Clearwater Counties).

Minnesota NRCS has 4 MLRA Soil Survey Offices (there are 145 nationally); Minnesota NRCS soils staff consists of 7 Area Resource Soil Scientists (responsible for providing technical soil services; 11 staff based out of the St. Paul State Office/Regional MLRA office (6 soil scientists; 1 editor; 4 carto/GIS support staff); and 12 field staff (11 soil scientists; 1 GIS specialist). The St. Paul MLRA Regional Office staff also provides quality assurance and support to soil survey offices in 8 states. In addition, the are 5 GIS specialists located throughout the state that provide up to 50% of their time in support of soil survey operations.

MAES has 15 different projects in place to aid various segments of the soil survey program. Many of the projects deal with wet soils or spatial variability. New workshops for wetland delineators and ISTS personnel have been given during the year.

Publications**:** peer-reviewed 0, reports 0

Courses taught (titles):

Basic Soil Science, The Soil Resource, Field Study of Soils, Soil Judging, Soil Geography: Soil Variability on Planet Earth, Jr./Sr. Seminar, Environmental Impact Statements, Wetland Soils, Soil Genesis and Landscape Relations, Colloquium in Soil Science- Field Tour of Minn., Forest Soils, Soil Conservation.

Michigan - James R. Crum, Crop and Soil Science Department, Michigan State University

Summary of Report

As of December 31, 2008 Dr. Delbert Mokma retired from Michigan State University and I am, at least temporarily, representing MSU on this regional committee. A Soil Resources position has been proposed to our administration and with the current hiring-freeze and other faculty vacancies in our department it is unknown when the position might be filled.
Dr. Mokma's latest work dealt with loading rates of wastewaters from food processing facilities in Michigan. To soil columns simulated wastewaters were added at different temperatures, of different length, and to columns of different soil texture. BOD loading rates must be less than 75 pounds of BOD per acre per day. This is much less than the recommended 500 pounds of BOD per acre per day. Adding food processing waste waters on three days and resting for two days is not superior to adding on five days with no resting days.

Research Activities:

- Biomat formation in existing on-site wastewater treatment systems in Michigan.
- Carbon sequestration and distribution in soils of eroded landscapes.

Outreach and Extension Development:

- Michigan FFA Land Judging State Contest.

Publications:
Courses taught (*titles*):
CSS 210 Fundamentals of Soil Science - 290 students
CSS 470 Soil Resources -43 students

Nebraska - Mark Kuzila. Other collaborators at the University of Nebraska include Matt Joeckel and Paul Hanson

Summary of Report:
MLRA update and maintenance leadership positions in the Lincoln and Scottsbluff offices have been filled. The soil surveys for all counties in Nebraska are digitized to NRCS standards for SSURGO certification and available via the Web Soil Survey. A

soil survey update within a portion of MLRA 65 is partially completed. The implementation of the state-wide legend is complete. Work on the seamless digital coverage of the state is almost complete. The state-wide legend and seamless coverage will provide users a digital product that is consistently joined and documented between counties or survey areas. As soils information is updated and improved, the data is posted to a soils data mart, and then made available to the public through the Web Soil Survey.

Research Activities:

- The effect of a transition from prairie to forest ecosystems on soils in Nebraska.
- Geomorphology and ages of terrace landscapes along the Platte River in Central NE.
- Geochemical analysis of soils at 130 sites across Nebraska.
- Soil characteristics at Tern and Plover nesting sites.
- Genesis and morphology of lamella in glacial deposits in southeastern Nebraska.
- Grape production on soils formed in loess and glacial till in southeastern Nebraska

Courses taught (*titles*): Soil Evaluation (NRES 279), Great Plains Field Pedology (NRES 477/877), Surficial Processes (GEO 458).

Publications: Research: 3, Abstracts: 13, Maps 3

North Dakota

Academic Unit: Department of Soil Science; School of Natural Resource Sciences
North Dakota State University

Name: David G. Hopkins

Summary of Report:

The number of field soil scientists in North Dakota remains static at 11 with three vacancies. A handful of soil scientists went on detail to other states in the 2008 field season and these details will continue in the 2009 field season. The NRCS/ARS salinity study in the northern Red River Valley (MLRA 56) will continue for another two years. Two student interns have been hired for the summer, one from Stevens Point, WI and one from NDSU. Major project plans for the state NRCS staff include developing protocols for mapping strip mined coal lands that have been released from bond in the last few years, evaluating productivity indexes for soils on the northern till plain with a specific emphasis on eroded landscapes, and addressing data needs on sodium and salt affected landscapes in western North Dakota as a result of increased adoption of no-till and minimum tillage practices. The NRCS GIS

specialist from the State Office has organized a LIDAR/Landscape Review in Walsh County for late May, 2009. Walsh County is the only county in the state with full LIDAR coverage, and the western part of this county is located in the drift prairie. Improvements in soil landscape interpretation derived from digital soil mapping techniques could be easily extended to other parts of MLRA 55A when more accurate elevation data in made available. North Dakota State University is one of the Land Grant schools involved in the pedon capture program administered by the Soil Survey Laboratory. There are about 700 pedons that can be added to the national database once all the data has verified for accuracy.

Research Activities:

- Devils Lake Basin Joint Water Resource Board: "Devils Lake Water Utilization
  Test Project"
- USFS Dakota Prairie Grasslands: "Soil properties influencing restoration of oil
  access roads in western North Dakota."
- USFS Dakota Prairie Grasslands: "Soil microbiological assessment on reclaimed oil well roads in western North Dakota"
- North Dakota Agricultural Experiment Station/College of Science and Mathematics small grants program: "Origin of highly concentrated metals in northeastern North Dakota"

Outreach and Extension Development:

- "Overview of soil geography and soil organic matter inventory"; Glacial Ridge Conference: Seven Years of Prairie and Wetland restoration Progress. Rydell National Wildlife Refuge, MN; March 6, 2008.
- "Soil, landscape, and climatic interactions in the North Dakota Sandhills" presentation to the United States Forest Service National Grasslands Managers Meeting. Fargo, ND, June, 3, 2008
- Soil Salinity Field Workshop; Grand Forks Co., July 14, 2008. Overview of soil morphology in a large soil trench dug for the workshop; presentation on the formation and chemistry of salinity in Red River Valley soils.

Publications: (Abstracts 2)

- Franzen, D.W. and J.L. Boettinger. 2008. Terrain modeling to improve soil survey. In Proceedings of the 2008 Precision Ag Conference. R. Khosla, ed. July 20-23, 2008. Denver, CO.
- Matthees, H., D.G. Hopkins, and F.X.M. Casey. 2008. Soil Properties Influencing Restoration of Oil Access Roads in Western North Dakota. In Annual Meetings Abstracts [CD-ROM]. Joint Annual Meetings of Geol. Soc. Am. Agron. Soc. Am., Crop Sci. Soc. Am., and Soil Sci. Soc. Am., Houston, October 5-9, 2008.

Courses taught (titles):

Soils 444/644- Soil Genesis and Survey; Autumn, 2008

Geosciences 496 Colorado Plateau Field Course, March 14-22, 2009

Ohio - Brian K. Slater, School of Environment and Natural Resources, The Ohio State University

Summary of Report:

In Ohio, the Ohio Soil Inventory Board coordinates soil survey activities, involving representatives of the cooperative agencies (NRCS, OSU, ODNR-DSWC). Soil surveys for all 88 Ohio counties have been digitized to SSURGO standards, and are available via the Web Soil Survey and Soil Data Mart. Digitizing was completed in a series of projects involving the cooperative agencies, including 17 counties digitized at the Ohio State Digital Soil Information Lab. The Ohio Department of Natural Resources had also published CDs with soil survey information for all counties. There are currently 12 NRCS soil scientists and 5 soil scientists in the Ohio Department of Natural Resources actively working on soil survey related activities in Ohio. There are two MLRA Soil Survey offices in Ohio – Marietta and Findlay. (Ten MLRAs cover parts of the state). Soil survey updates on an MLRA basis are continuing in the four quadrants of the state. A project is underway to convert site morphology and laboratory analytical data for more than 5000 pedons analyzed at the Ohio State Soil Characterization Lab since the 1940s, to NASIS standards.

Research Activities**:**

- Developing Digital Soil Mapping Methods (DSM) for Soil Survey Updates – concentrating on MLRA 126 (Central Allegheny Plateau), specifically Monroe and Noble Counties
- DSM methods for soil carbon inventory
- Assessment methods for dynamic soil properties and soil change (condition and trend)
- Effects of land use and management on soil carbon stocks
- Site and soil evaluation methods and designs for onsite wastewater treatment
- Evaluation of soil moisture sensors for monitoring hydrology and controlling wastewater application within onsite systems
- Assessment of crop yield and productivity related to soils for taxation purposes
- Effects of waste products on soil properties, especially FGD-byproducts including gypsum

Outreach and Extension Development:
Workshops on soil and site evaluation for onsite wastewater treatment
Central States Forest Soils Conference (organizing committee, site selection and development, presentations)
Ohio Soil Inventory Board (Chair)

Publications: (Peer Reviewed 3, Abstracts 1)

Courses Taught:
Soil Science (ENR300.01) 220 students
Soil Science Laboratory (ENR300.02) 140 students
Soil Landscapes: Morphology, Genesis and Classification (ENR650) 12 students

Publications:

Armstrong, S.D., D.R. Smith, P.R. Owens, B.C. Joern and C. Williams. 2009. Manure spills in streams: current practices and remediation methods to minimize water quality degradation. Journal of Sustainable Agriculture. *In Press*.

Bowling, L.C., P.R. Owens, B.D. Lee and B.C. Joern. 2008. Watersheds and confined animal feeding operations. CAFO- ID 369.

Burkhart, P.A., Rawling, J.E. III, Livingston, J., Hanson, P.R., Mahan, S., Benton, R., Heffron, E., Jahn, M., Anderson, T., Page, B., 2008, Late Pleistocene through Holocene Landscape Evolution of the White River Badlands, South Dakota, in Raynolds, R.G., ed., Roaming the Rocky Mountains and Environs: Geological Field Trips: Geological Society of America Field Guide 10, 235-248.

Chen L., Ramsier, C., Bigham, J., Slater, B., Kost, D., Lee, Y., and. Dick, W. (2009) Oxidation of FGD-$CaSO_3$ and effect on soil chemical properties when applied to the soil surface. Fuel 88: 1167–1172.

Dillon, J.S., Hanson, P.R., Joeckel, R.M., Young, A.R., Kuzila, M.S., 2008, Surficial Geologic map of the Wynot 7.5-Minute Quadrangle, (http://snr.unl.edu/csd/information/statemap.asp)

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Hanson, P.R., Young, A.R., 2008, Surficial Geologic map of the Silver Creek SE 7.5-Minute Quadrangle, (http://snr.unl.edu/csd/information/statemap.asp)

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Hewitt, A., McKenzie, N..J., Grundy M.J., Slater B.K. (2008). Qualitative survey. In 'Guidelines for surveying soil and land resources. 2nd Edition' Australian Soil and Land Survey Handbook Volume 2. (Eds McKenzie N.J., Webster R., Grundy M.J., Ringrose-Voase A.J.) (CSIRO Publishing: Melbourne).

Korus, J.T., Kvale, E.P., Eriksson, K.A., and Joeckel, R.M., 2008, Compound paleovalley fills in the Lower Pennsylvanian New River Formation, West Virginia, USA. Sedimentary Geology, v. 20, p. 15-26.

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