

**Minutes of NCERA-3: Soil Survey
Manhattan, KS
June 22- 25th, 2008**

Administrative Advisor: Gerald Miller Iowa State University 132 Curtiss Hall Ames, IA 50011-1050	Chair: Del Mokma Michigan State University. Dept. of Crop and Soil Sciences East Lansing, MI 48824	Secretary: David Hopkins North Dakota State University Dept. of Soil Science Fargo, ND 58105
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Members in attendance:

Terry Cooper - Minnesota, David Hopkins - North Dakota, Mark Kuzila - Nebraska, Doug Malo - South Dakota, Del Mokma - Michigan, Ken Olson - Illinois, Mickey Ransom - Kansas, Phillip Owens - Indiana, Bob Ahrens - NRCS Lincoln, Larry West - NRCS Lincoln, Maxine Levin - NCSS Washington D.C.

Administrative Advisor - Gerald Miller

Guests: Cleveland Watts - NRCS, Kansas, DeAnn Presley, Kansas State University, Brian Slater - Ohio State University, Randy Miles - University of Missouri

Members absent:

Lee Burras, Iowa; Gary Steinhardt, Indiana; A.D. Karathanasis, Kentucky; Mike Konen, Illinois; Neil Smeck, Ohio (retired); Cynthia Stiles, Wisconsin (resigned)

Sunday - June 22nd, 1:00 p.m. 2002 Throckmorton Hall

Del Mokma 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 2007 meeting

The minutes had been emailed previously, David Hopkins moved to approve the minutes. T. Cooper seconded. Unanimously approved.

2. Administrative Advisor Report - Jerry Miller

Dr. Miller discussed address corrections for the NIMSS website and also for the NCERA-3 listserve, which Mickey Ransom manages at KSU.

A major task is to edit and formalize the NCERA-3 Project renewal. The writing committee consists of Ken Olson, Del Mokma, Phillip Owens and David Hopkins; Dr. Mokma has been serving as chair of this subcommittee. When the Project Renewal is completed it will be uploaded to the NIMSS website. All members of the NCERA-3 Committee are required to file an Appendix E (Request to participate on committee) for the NIMSS site also. There was some discussion on methods for uploading and registering the Project Renewal on NIMSS. Dr. Miller stressed that the committee formalize a new name for NCERA-3 activity that reflects 21st Century concepts and our evolving scope as soil and landscape scientists.

The Farm Bill passed last week after 2 vetoes by the President. CSREES will be renamed National Institute of Food and Agriculture (NIFA). AFRI - Agriculture and Food Research Initiative will

contain the new NRI program. Dr. Miller shared additional information on the organizational structure resulting from the Farm Bill and passed out a handout of same for the committee.

3. USDA – NRCS Report – Bob Ahrens

The reorganization of the new MLRA offices will be completed by the end of 2010. These MLRA offices will prioritize a “laundry list” of the problems or deficiencies that exist within each of the MLRA’s. Examples: gypsum rich soils in the American SW region – subaqueous soils in the northeast. The new Deputy Chief of the NRCS, Mr. Wayne Maresh, was a former state conservationist and earlier a soil scientist and a supporter of the soil survey program.. Paul Benedict, former Leader of MO 10 in Bismarck, ND is now a Program Leader in Washington D.C. Dr. Larry West was appointed as research leader for the Soil Survey Laboratory in Lincoln, NE and Dr. Cindy Stiles was appointed as Laboratory Supervisor in the Chemistry Department. Rebecca Burt, who was on detail in Iraq, has safely returned to Lincoln. There have been several retirements including Bob Engel and Tom Reedy, both on the Standards Staff.. An additional Research Soil Scientist with statistical skills will be hired to address research needs on dynamic soil properties and help mine the characterization data

Mr. Ahrens stated that several Soil Survey outreach initiatives have occurred over the last few years including the popular Centennial exhibit showcased at the World Congress of Soil Science in Philadelphia. The national staff has addressed the Alliance of Independent Crop Scientists, as well as landscape planners and professional architects’ societies to stress the utility and scope of soil survey information for their respective applications.

The Soil Geomorphic Institute training schedule was discussed as well as the responsibilities of the NCSS partners in the host states- the sequence is Penn State, 2008 and possibly Lalabama or Texas A&M in 2009. The Soil Survey Characterization database conversion project was also discussed, i.e. geospatial requirements for the pedons, and novel optical scanning techniques to digitize lab data or pedon descriptions. Additional monies will likely be channeled into this effort in FY 2009.

4. USDA – NCSS Liaison Report – Maxine Levin

Summary and impressions of the National Soil Survey Conference (NSSC) in Madison, WI-2007: More than 40% of the attendees at the conference were non-federal, a significant occurrence, perhaps indicating growing awareness of soil survey information and its utility for multiple users. The Kansas Conference is the 3rd of the 4 regional conferences, each of which take on regional issues; i.e., the Northeast – subaqueous soils and hydopedology. The fact that NOAA is beginning to fund some of the soils research speaks to the wider audience alluded to earlier. The West region (Spokane, WA) met last week and featured presentations on ecological site descriptions as well as research on state and transition models. The Southern region Conference meets in mid-July and has adopted a pedometrics conference theme.

Toby O’Geen, UC-Davis, organized a group similar to NCERA-3 focused on climate change in the southwest and NRCS has committed to support this group’s research if they work with the state offices and the MLRA offices on benchmark soil landscapes. Participants are operating on a shoestring, trying to set up a LTER structure using their own grant money or CSREES funding.

In 2009, the National Work Planning Conference convenes in Las Cruces, NM from about May 15-20th. The Jornada Range Experiment Station will help host this Conference, and, as the Carlsbad National Park Soil Survey is in full swing, a post conference field trip may occur at that locale. The major emphasis will be desert landscapes and dynamic soil properties. There is a good possibility that NCERA-3 could schedule their yearly meeting for this conference.

There was a brief discussion on the National Ecological Observatory Network (NEON) initiative of the NSF in terms of consultation with the NRCS. Apparently, there has not been much collaboration. Mickey Ransom believed that the Konza Prairie location had been selected as a NEON site.

5. Revision of NCERA-3 Project Renewal

Del Mokma distributed the draft project renewal to the full committee to carefully review prior to the meeting and several members made comments. He suggested that the committee meet at 7:00 a.m. Monday morning to discuss and improve the renewal draft produced by the writing subcommittee. Dr. Miller commented on the specific accomplishments and impacts of the Committee over the past 5 years and suggested that Committee members be sure to include the various impacts in the final project renewal document.

Monday – June 23rd, 7:00-9:00 a.m.; 2002 Throckmorton Hall

This session of the NCERA-3 Committee was devoted to reviewing and revising the NCERA-3 Project Renewal document. Dr. Mokma asked the Committee to meet after the banquet at 8:00 p.m. in 2002 Throckmorton Hall to continue its business.

Monday – June 23rd, 8:00 p.m.; 2002 Throckmorton Hall

6. Committee Reports

1) Standing Committees

a) Soil Research and Interpretations Committee

This topic was covered in the Regional Conference – Randy Miles, Mickey Ransom and Brian Slater will continue to serve on this subcommittee.

b) Effects of Management on Soils Committee – Ken Olson

The Committee decided to drop this subcommittee because the Dr. Smeck's proposal for the anthropogenic deviant presented at the NC Regional Soil Survey Conference in 2006 and at the World Congress of Soil Science was not being adopted.

c) Education and Training Committee – Terry Cooper

Terry Cooper, Chair; members Doug Malo, Phillip Owens, Mickey Ransom, David Hopkins. Overall numbers of soil science majors are relatively low in the region, but the number of agronomy students is at an all time high in South Dakota. Some of the largest scholarships in that department are in soils.

d) High Intensity Soil Survey – Phillip Owens

Phillip Owens organized an SSSA symposia but has not had any recent activity in this area. The Committee still believes this in an important area for activity.

2) National Advisory Boards/Committees

a) National Soil Taxonomy Committee –

Brian Slater will participate in the national reviews of amendments to Soil Taxonomy.

b) National Soil Survey Database Committee

Ken Olson will continue to work on the database issues; his state is participating in the NRCS Data Conversion Project.

c) NCSS National Conference Steering Committee (2009)

Mickey Ransom, co-host for the 2008 conference and Brian Slater, co-host of the 2009 conference are automatically assigned as members of the steering committee for the next conference.

d) NCSS Advisory Group to Director of Soil Survey Operations

Mickey Ransom stated this committee has been inactive for about 9 months and that the NCERA-3 Committee does not control the timing or agenda for the NCSS Advisory Group. He anticipates a teleconference within the next few weeks.

7. Old Business

a) Chair of Soil Research and Interpretation Subcommittee

The Committee will keep the current subcommittee members, Miles, Ransom and Slater

b) State Reports

Individual State Reports were received by the Secretary electronically from the following states: Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota. Two states have vacant university pedology positions, Wisconsin and Ohio, and the Iowa representative has been in Africa since late May.

State reports will be attached to the minutes and may be accessed on the NIMMS website.

c) Other Items

David Hopkins, Ken Olson, and Phillip Owens will form a subcommittee to formulate a potential interaction with NCERA-59. Plans include a joint symposium on Soil Carbon Sequestration at the 2009 ASA meeting in Pittsburgh, PA.

Doug Malo suggested a subcommittee generate an outline/schematic for MLRA wide research projects since we are planning to emphasize landscape scale research in the Project Renewal; members will include Hopkins, Kuzila, and Malo

NCERA-3 plans to propose an invitation to a joint meeting with NCERA-3, NCERA-59, and NC 1017 to be held at the NC Regional Soil Survey Conference in Ohio in 2010. This item will be determined among the committee via email.

Phillip Owens was elected Secretary for the 2009 NCERA-3 meeting with Doug Malo acting as secretary at the 2009 meeting due to a schedule conflict. Officer rotations for future years will be maintained in accordance with the standing list.

d) Next meeting in Las Cruces, NM, May 15-20, 2009.

Wednesday - June 25, 4:15 p.m.; Flint Hills Room K-State Student Union

This session of the NCERA-3 Committee was devoted to reviewing and revising the NCERA-3 lists of accomplishments and impacts.

Accomplishments:

- Met jointly with NCERA-59 “Soil Organic Matter: Formation, Function and Management”
- Planned and hosted the 2008 North Central Soil Survey Conference to include chairing of selected technical committees.
- Participated in National Reviews of Amendments to Soil Taxonomy

- The IRIS Tubes technique was used to evaluate soil saturation in mollisols in Minnesota, North Dakota, and Wisconsin. This technique was developed by a NCERA-3 member in Indiana.
- NCERA-3 members served as coaches of Collegiate Soil Judging Teams and as judges of Regional Soil Judging contests. In addition, they have solicited participation of land grant and non-land grant institutions in soil judging activities. Teams from the North Central Region have won the National Championship in Soil Judging for the past two years.

Impact Statements:

- As a result of regional testing of the Iris Tubes, the NRCS is considering this technique to evaluate hydric/wetlands soil conditions.
- As a result of the NCERA-3 Committees persistent work on human impacted/eroded soils the NRCS has changed both the approach and the documentation of eroded soils for the National Cooperative Soil Survey.
- As a result of presentations and discussion at the 2006 NCSS Conference (Medora, ND), the NRCS has reopened negotiations with the USGS to cooperate in a national geochemical landscape initiative. Two benchmark catena trace element studies were initiated in Indiana and Illinois to provide baseline data related to soil processes.
- As a result of active NCERA-3 participation 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 will open 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.

The incoming FY09 Executive Committee members are:

- Del Mokma – Past Chair
- Ken Olson – Chair
- David Hopkins – Chair-Elect
- Phillip Owens – Secretary
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The individual state reports are attached

Submitted by David Hopkins, 2008

NCERA-3 Secretary

Approved:

Approved:

Delbert Mokma, Chair

Gerald Miller, Administrative Advisor

Joint meeting: NCERA-3, Soil Survey and NCERA-59: Technical Committee on soil organic matter; formation, function and management
Monday – June 23rd, 9:00 a.m.; 2002 Throckmorton Hall

Members in attendance:

The NCERA-59 Committee: Telmo Amado, Kansas State University; Larry Cihacek, North Dakota State University; Rhae Drijber, University of Nebraska; William Horwath, UC-Davis; Peter Motavalli, University of Missouri; Charles Rice, Kansas State University; Ronald Turco, Purdue University; Sieglinde Snapp, Michigan State University; Ann Marie Fortuna, Washington State University. The NCERA-3 Committee members were all present as was Dr. Gerald Miller, Administrative Advisor for both NCERA Committees.

Minutes:

A welcome to the Joint meeting was made by Dr. Gary Pierzynski, Chair of the Department of Agronomy, KSU who gave the group an overview of teaching and research programs at Kansas State University. This department has 35-38 faculty members, 85-90 undergrads, and 60-65 graduate students.

Dr. Chuck Rice from KSU provided an overview of the mission of NCERA-59 Technical Committee on soil organic matter: Formation, Function and Management. This group started with Drs. Fred Stevenson, Jack Bremner and M. Schnitzer, an illustrious group of scientists who forwarded research into soil organic matter. The mission of the NCERA-59 is to understand genesis and function. Dr. Rice discussed the important document, the UN-Millennium Ecosystem Assessment. Ecosystem and Human well being, and stressed how intimately soil organic matter is linked to ecosystem services. The website is:

<http://www.millenniumassessment.org/en/Synthesis.aspx>

An additional reference to ecosystem services of soil from an economic perspective is found in:

Boumans et al. 2002. Modeling the dynamics of the integrated earth system and the value of global ecosystem services using the GUMBO model. Ecological Economics. 41 (3) p.529-560.

This article presented a model calculating the ecosystem service of soil to be valued at 24 trillion dollars, over 2 times the total global GNP! Dr. Rice also mentioned the COMET-VR model for soil carbon crediting that was largely developed at Colorado State University. Apparently there will be a project on C sequestration validation done for the carbon crediting and it will be based upon MLRA boundaries. Some of the variability of soil response to management was discussed with respect to C crediting and land use change. The concept of “space for time” as a research strategy was brought up as well as the Kearney Soil Science Foundation which has a 5 year mission to investigate scaling up from point data to landscape scale in California (web site: <http://kearney.ucdavis.edu/Index.htm>) Del Mokma provided an overview of the NCERA-3 mission to joint meeting. The various committees were described and the objectives from the NCR-3 renewal draft were shared with the group.

Jerry Miller challenged both committees to work within their respective groups and determine a specific set of steps that could be addressed. His suggestions included hosting a symposium at the 2009 SSSA meetings or sending a subcommittee made comprised of members from both committees to participate at the North Central Regional Soil Survey Conference in Ohio in 2010.

Respectfully submitted by David G. Hopkins, July 1, 2008.

**NCERA-3
Kansas Report
2008**

Academic Unit: Kansas State University

Name: Michel D. Ransom; other collaborators at Kansas State University include DeAnn Presley, Gerard Kluitenberg, and Charles Rice.

Summary of Report: Updates of soil surveys will be done on a multi-county (MLRA) basis. Updates are in progress in MLRA 72, 73, 74, 77, 79, and 106. 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 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. A Soil Characterization Laboratory analyzed about 500 grab samples in FY07 for the soil survey program.

Research Activities:

- 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
- 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
- Kansas Soil Survey Technology and Work Planning Conference
- North Central Soil Survey Conference Steering Committee
- North Central Soil Survey Conference Soil Taxonomy and Standards Committee
- Board Representative for Division S-5, Pedology, of the Soil Science Society of America

Publications (2006-07): Peer-reviewed journal articles: 4; Abstracts: 4

Gehl, R.J. and C.W. Rice. 2007. Emerging technologies for in situ measurement of soil carbon. *Climatic Change* (In Press).

Gunal, H., and M.D. Ransom. 2006. Genesis and micromorphology of loess-derived soils from central Kansas. *Catena* 65:222-236.

Gunal, H., and M.D. Ransom. 2006. Clay illuviation and calcium carbonate accumulation along a precipitation gradient in Kansas. *Catena* 68:59-69.

Izaurrealde, R.C. and C.W. Rice, 2006: Methods and tools for designing pilot soil carbon sequestration projects. pp. 457-476. In R. Lal, C.C. Cerri, M. Bernoux, J. Etchvers, and E. Cerri. (eds.) *Carbon Sequestration in Soils of Latin America*. Food Products Press: The Haworth Press, Inc., Binghamton, NY.

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

**NCERA-3
Illinois Report
2008**

Academic Unit: NRES, ACES, UIUC, Illinois

Name: Kenneth R. Olson

Summary of: Continue to represent the UIUC at county soil survey field reviews and participate in Soil Survey conferences at the state, regional, and national levels. My 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. Co-authored a summarized the contributions of North Central Regional Committee 3 to Regional and National Cooperative Soil Survey Programs.

Research Activities:

- Productivity Index Ratings for New Illinois soils and Crop Yield Updates for Established Soils
- NC-1017 Carbon Sequestration in Eroded Illinois Soils.
- Described and sampled the Muscatune soils which have the highest soil productivity rating in Illinois.
- Storing 2078 IL Soil Descriptions 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 (3), symposia (0), reports (0), and abstracts (2)*)

- Olson, K.R. 2007. Soil organic carbon storage in southern Illinois woodland and cropland. *Soil Science* 172: 623-630.
- Olson, K.R. R.L. Jones, A.N. Gennadiyev, S. Chernyanskii, W.I. Woods, and J.M. Lang. 2006. Fly ash distribution to assess erosion and deposition in an Illinois landscape. *Soil and Tillage* 89:155-166.
- Gennadiyev, A.N., S.S. Chernyanskii, K.R. Olson, and R.G. Kovach. 2006 Use of magnetic spherules as indicators of mass-transfer process in soils. *Herald Journal of Moscow State University, Geography*. No. 3. 29-35.

Courses taught (*titles*):

First third of Introductory Soils (NRES 201) - 79 students

Soil and Water Conservation and Management (NRES 474) on campus -12 students

Soil and Water Conservation and Management (NRES 474) on-line -15 students

**NCERA-3
Indiana Report
2008**

Academic Unit: Purdue University

Names: Phillip Owens including Brad Lee, Darrell Schulze and Gary Steinhardt

Summary of Report:

All 92 Indiana counties have been initially surveyed, have published soil survey reports, and are now digitized and available online at the Soil Data Mart and Web Soil Survey. Twelve counties have been updated at a scale of 1:12,000 and updates are near completion in two additional counties. The 12 completed update surveys have been published with hard copy manuscripts, Soil Survey CD's, and hard copy soil maps available. All 92 counties are released on an interactive CD as Soil Survey Interim Reports. 54 Historical Replica Soil Survey publications covering 58 counties are online at the NRCS Indiana State Web Site:

http://www.in.nrcs.usda.gov/mlra11/manuscript_publications/Manuscripts.html.

Maintenance to soil surveys in Indiana is now being done on a MLRA and landform basis. Indiana is now serviced by 9 MLRA Soil Survey Offices in five states.

Additionally, Indiana NRCS soil scientists are collaborating with Purdue University testing the efficacy of using terrain attributes with SoLIM as a tool for updating soil surveys on a low relief till plain.

NRCS currently has 21 soil scientists working in Indiana as follows: 4 Resource Soil Scientists (1 to transfer as of July 7, 2008); 1 Soil Scientist on the Planning & Technology Staff at the Indiana State Office, 9 Soil Scientists and 1 part time graduate student working on project Soil Surveys in two MLRA Soil Survey Offices and 2 subset soil survey offices; and 6 Soil Scientists in the MLRA Soil Survey Region 11 Office.

Research Activities:

- Characterizing the usefulness of soil landscape interface models coupled with terrain attributes on low relief topography to predict soil properties.
- 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.
- Characterization and classification of reclaimed mine-soils and the relationship to soil survey interpretations for cropland yield estimations.
- Relationship of order 1 and order 2 soil surveys to measured geo-referenced yield monitors to compared with the predicted soil survey yield interpretations.

- Characterize the hydraulic conductivity variations between the concentric series of recessional moraines formed from the Erie-Ontario glacial lobe in northeastern Indiana.
- Identify the clay mineral properties of the illitic soils of MLRA 111.
- Explore the effect of hillslope position on the in situ saturated hydraulic conductivity patterns on a northeastern Indiana moraine.
- Characterize the spatial distribution of water limiting horizons across a watershed with geophysical methods.
- Evaluate the utility of geophysical methods to determine the location of septic systems.

Outreach and Extension Development:

- Chair of Hyrdopedology Working Group 2007-2009 with SSSA Division S-05
- Developed symposium and submitted a report on the Future Directions of the Soil Survey as the Committee Chair at the USDA-Soil Survey National Meetings in Madison, WI. June 2007
- Co-editor of Special Issue of Catena Journal “Hydropedology”, 2007.
- Chair of the Future Directions of the Soil Survey National Committee, 2006-present
- NCR-3 Chair of the Future Directions of the Soil Survey Committee, 2005-present
- NCR-3 Chair of High Intensity Soil Survey Working Committee, 2005-present

Classes: Introduction to Soil Morphology, Soil Morphology Geography, Soil Conservation & Management, Remote Sensing of Land Resources, Soil Classification & Survey, Forest Soils, Soils and Land Use, Soils Genesis and Classification, Soils and Septic Systems.

Publications: Research: 9, Book Chapter: 1, Abstracts: 8, Extension Bulletins: 3, Non-peer reviewed publications: 3

Peer Reviewed Publications:

1. Smith, D.R., P.R. Owens, A.B. Leytem and E.A. Warnemuende. 2007. Nutrient losses from manure and fertilizer applications as impacted by time to first runoff event. *Environmental Pollution*.147:131-137.
2. Armstrong, S.D., D.R. Smith, and P.R. Owens. 2007. Strategies to reduce nutrient losses from land applied animal manure. *Water Practice*. 1:4. Available On-Line at: <http://www.ingentaconnect.com/content/wef/wp> (5/21/2007).
3. Miles, D. M., D.E. Rowe and P.R. Owens. 2007. Winter Broiler Litter Gases and Nitrogen Compounds: Temporal and Spatial Trends. *Atmospheric Environment* (accepted 28 Nov 2006, Available online 15 February 2007) doi:10.1016/j.atmosenv.2006.11.056
4. Hart, K.S., B. D. Lee, P. S. Schoeneberger, D. P. Franzmeier, P. R. Owens and D.R. Smith. 2008. Comparison of field saturated hydraulic conductivity

- measurements to estimated morphological loading rates in Northeastern Indiana. *Journal of Hydrologic Engineering. In Press*
5. Lin, H.S., J. Bouma, P.R. Owens, and M. Vepraskas. 2008. *Hydropedology: Fundamental Issues and Practical Applications. Catena 73:151-152*
 6. Owens, P.R., L.P. Wilding, W.M. Miller and R.W. Griffin. 2008. Using Iron Metal Rods to Infer Oxygen Status In Seasonally Saturated Soils. *Catena 73:197-203*
 7. Winzeler, H.E., P.R. Owens, B.C. Joern, J.J. Camberato, B.D. Lee, D.E. Anderson and D.R. Smith. 2008. Potassium fertility and terrain attributes in a Fragiudalf drainage catena. *Soil Sci. Soc. Am. J. In Press*
 8. Miles, D.M., P.R. Owens, P.A. Moore, Jr. and D.E. Rowe. 2008. Instrumentation for evaluating differences in ammonia volatilization from broiler litter and cake. *Journal of Applied Poultry Research. (Accepted for publication: 11 May 2008)*
 9. Dungan, R.S., B.D. Lee, P. Shouse and J. de Koff. 2007. Saturated hydraulic conductivity of soils blended with waste foundry sands. *Soil Sci. In press.*

Book Chapter:

1. Schulze, D.G., R. R. Struthers, P.R. Owens and George E. Van Scoyoc. 2007. Teaching Soil-Landscape Interactions Using Rugged Tablet PCs in the Field. *In D.A. Berque, J. C. Prey, R. H. Reed, (eds.) The Impact of Tablet PCs and Pen-Based Technology on Education: Beyond the Tipping Point. Pp. 119-127. Purdue University Press. ISBN: 1557534616*

Abstracts:

1. Owens, P.R. and E. Kladivko. 2007. Influence of Tile Drainage on the Perched Seasonal Water Tables in a Clermont Silt Loam Soil. *In Annual Meetings Abstracts [CD-ROM]. ASA, CSSA, SSSA. Madison, WI*
2. Schulze, D.G. and P.R. Owens. 2007. Have Soils in Northwestern Indiana Been Influenced by Post-Glacial Acid Sulfate Weathering? *In Annual Meetings Abstracts [CD-ROM]. ASA, CSSA, SSSA. Madison, WI*
3. Schulze, D., P.R. Owens, G. Van Scoyoc and D. Eisert. 2007. Virtual Profiles-Generating diagrams of soils from written profile descriptions. *In Annual Meetings Abstracts [CD-ROM]. ASA, CSSA, SSSA. Madison, WI*
4. Winzeler, H.E., P.R. Owens, B.D. Lee, J. Camberato, and B.C. Joern. 2007. Lateral Clay Movement and Soil Wetness in a Fragiaqualf catena. *In Annual Meetings Abstracts [CD-ROM]. ASA, CSSA, SSSA. Madison, WI*

5. Miles, D.M., Rowe, D.E., Owens, P.R., Moore, P.A., Jr., and Smith, D.R. 2007. Cumulative ammonia quantification from litter with instantaneous flux estimates. Presented at the 2007 International Poultry Scientific Forum. Atlanta, GA. Jan. 22-23, 2007. Abstract In International Poultry Scientific Forum Abstracts, page 54. [CD-ROM]. U.S. Poultry & Egg Association. Tucker, GA.
6. Winzeler, H.E., B.C. Joern, P.R. Owens, B.D. Lee, and J. Camberato. 2007. Potassium Availability and Soil Wetness in a Fragiqualf catena. In Annual Meetings Abstracts [CD-ROM]. ASA, CSSA, SSSA. Madison, WI
7. Libohova, Z., L.C. Bowling, P.R. Owens, P. Schoeneberger, B.D. Lee, and H.E. Winzeler. 2008. The prediction of Soil Moisture Distribution for a small catchment by the Distributed Hydrology Soil Vegetation Model (DHSVM) based on SSURGO soil maps in southern Indiana. AGU Hydrology Days. Denver CO. March 26-28, 2008.
8. Sylvester, L., L.C. Bowling, P.R. Owens, B. Cooper and T. West. 2008. Characterization and Analysis of an Isolated Wetland Receiving Agricultural Runoff. Geological Society of America North-Central Meeting. Evansville, IN.

Extension Publications

1. Lee, B.D., P.R. Owens, L.C. Bowling and B.C. Joern. 2008. Considering soil properties when siting confined animal feeding operations. CAFO-ID 368.
2. Owens, P.R., B.C. Joern, B.D. Lee and L.C. Bowling. 2008. Using Web Soil Survey to investigate potential confined animal feeding operation locations. CAFO- ID 367.
3. Bowling, L.C., P.R. Owens, B.D. Lee and B.C. Joern. 2008. Watersheds and confined animal feeding operations. CAFO- ID 369.

Non-Peer Reviewed Publications

1. Porter, T., P.R. Owens, B.D. Lee and G. Van Scoyoc. 2008. How soil and landform characteristics relate to landslide activity - a review. Soil Survey Horizons. 49:14-18
2. Using Terrain Attributes to Develop Management Zones for Potassium Fertility. 2008. H.E. Winzeler, P.R. Owens, B.C. Joern, J.J. Camberato, B.D. Lee, D.R. Smith, and B.J. Erickson. Site Specific Management Center Newsletter. http://www.agriculture.purdue.edu/ssmc/Frames/SSMCNewsletter4_2008.pdf
3. Schulze, D.G., R.R. Struthers, P.R. Owens, and G.E. Van Scoyoc. 2007. Teaching soil – landscape interactions using rugged tablet PC's in the field. Teaching and Learning with Technology Conference. Purdue University. April 3-4, Purdue University, West Lafayette, IN.

**NCERA-3
Iowa Report
2008**

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:

- All 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 being distributed on a most limited basis, being printed and organized by the NRCS State Soils Staff.
- Seven surveys are being updated by NRCS soil scientists using a integrated county-MLRA approach in order to provide improved local and regional understanding of soils and supporting data. 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 about 500 samples in FY08.

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 2010).
- Assessing the relationship between soil morphology, land use and water dynamics in the Clear Creek watershed (Brad Oneal, MS student, expected completion 2009).
- Assessing the active carbon field kit in concert with the National Soil Survey Laboratory (Mostafa Ibrahim, PhD student).

Outreach and Extension Development (CY07):

- Veenstra, J.J. and C.L. Burras. January 15 2007. Human Impacts on Soil and Water. Sedimentation rates and water quality in small watersheds in Jefferson County. Iowa Watersheds Conference, Des Moines, IA. 50 attendees.
- Burras, C.L. January 30, 2007. Pedology's role in understanding plant nutrition and water quality. Sub-Committee of the Iowa Legislature Environmental Protection Committee, The Iowa Capitol, Des Moines. 40 attendees.
- Veenstra, J.J. and C.L. Burras. April 15 2007. Human Impacts on Soil and Water. Graduate Program in Sustainable Agriculture Research Symposium. Iowa State University. 70 attendees.
- Burras, C.L. July 28, 2007. The world around us – a pedologist's perspective. . North Central Institute Sustainable Agriculture Agroecosystems Analysis Field Course, Dordt, College. 35 students and faculty.
- Burras, C.L. August 02, 2007. Pedology & the environment. Agroecosystems Analysis Field Course, Ames. 25 students in field with handouts.
- Miller, G.A., J.A. Sandor and T.E. Fenton. October 12-13, 2007. Iowa FFA Soil Judging Contest, 150 attendees, 30 high schools, Ames.
- Fenton, T.E., G.A. Miller and J.A. Sandor. September 28-29. PSCI Southwest Iowa soils trip (CCA credits given). 40 attendees.
- Sandor, J.A. September 30- October 05, 2007. ASA Region 5 Collegiate Soil Judging Contest, Griswold, IA. Seven teams and 60 participants.
- Papanicolaou, T. and C.L. Burras. November 29, 2007. Opportunities for hydropedology using Clear Creek Watershed. Iowa Hydraulics and Hydrology Laboratory, University of Iowa, Iowa City. 10 attendees.

Publications (2007): Peer-reviewed: 1; chapters: 1, abstracts: 0; Dissertations/theses: 1; research reports: 1.

Peer-reviewed

Wills, S.A., C.L. Burras and J.A. Sandor. 2007. Prediction of soil organic carbon content using field and laboratory measurements of soil color. Soil Sci. Soc. Am. J. 71:380-388.

Book-chapters

McMichael, J., C.L. Burras and S.A. Wills. 2007. Understanding pasture quality, soil quality and soil carbon content relationships in south central Iowa. R. Drake

(Ed.). Proc. 3rd Nat'l. Conf. Grazing Lands. USDA-NRCS Grazing Lands Initiative, Davis, OK. p. 194-196.

Dissertations/Theses

Norton, Amy E. 2007. Dynamic soil properties across a suburban landscape, Ankeny, Iowa. (Major Professor: Andrew Manu).

Research Reports

Brummer, E.C. and C.L. Burras. 2007. Switchgrass production in Iowa: Soil suitability and varietal performance. Final Report, Bioenergy Feedstock Development Program Oak Ridge National Laboratory (DE-FC36-96GO10148). 23 pages.

Courses Taught:

- Fundamentals of Soil Science (Manu);
- Soils & Environmental Quality (Burras);
- Field Experience in Soil Descriptions (Sandor),
- Soil Genesis & Landscape Relationships (Sandor);
- Soil Morphology, Genesis & Classification (Sandor);
- Special Topics – Pedology of the Desert Project, New Mexico (Sandor).

**NCERA-3
Michigan Report
2008**

Academic Unit: Michigan State University

Name: Delbert L. Mokma

Summary of Report: Field work for the soil surveys in Michigan was completed in 2005. All soil surveys are digitized. Updates of soil surveys are being done on a Major Land Resource Area basis.

Research Activities:

- Soil assimilation of food processing wastewater at different temperatures
- Biomat presence in existing onsite wastewater systems

Outreach and Extension Development:

- Michigan Soil Survey Cooperators Meeting
- Michigan Phosphorous Index
- Two-day training courses for onsite wastewater treatment

Publications (2007):

None

Courses taught: Soil Resources

NCERA -3 Minnesota Report 2008

Academic Unit: University of Minnesota, Soil, Water & Climate, 1991 Upper Buford Circle, St. Paul, MN 55117

Name: Terence H. Cooper, Professor, tcooper@umn.edu

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.

Discussion starting for soil survey in Lake and Cook counties (still going on) . Initial mapping continues in Koochiching County, St. Louis County, and Pine County. Update mapping - (6 counties) Lincoln, Cottonwood, Crow Wing, and the Red Lake Indian Reservation in Lake of the Woods, Beltrami, and Clearwater Counties

Minnesota NRCS has 4 MLRA Soil Survey Offices (there are 144 nationally) 5 MLRA coordinators and 9 state staff in support of 25 field soil scientists.

MLRA Regional Office and the Minnesota State Office in St. Paul combined has 10 staff in support of 23 field staff in Minnesota (the MLRA Regional Office staff also provides quality assurance and support to soil survey offices in 8 states)

MAES has 13 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.

Research Activities:

- Anoka Sand Plain Practitioner Training
- GIS/RS Innovative Soil Mapping Update Project
- Historical analysis of soils
- Hydrology of Seasonal Ponds
- Minnesota Wetlands Web Page .
- Seasonal Saturation in Minnesota Landscapes
- Soil Survey Orthorectification and Digitization in Minnesota
- Spatial variability of pesticide degradation
- Wetland Delineation Training Workshops
- Wet Soil Monitoring Project
- Introduced legumes in grazed wet meadows: soil carbon effects
- Comparing soil quality and nematode communities in a long term (30 year) tillage study
- Relict Soil Mottling Study

Outreach and Extension :

- Interagency information session on soil survey – hosted by UM and NRCS in 2008 in St. Paul

Publications

peer-reviewed	0
reports	2

1) Jim Anderson, Jay Bell, Dan Wheeler, Greg Larson, Kim Steffen, Mike Whited, & Al Giencke, 2008. Seasonal Saturation and Landscapes - a compendium of NCSS, MAES and Wet Soil Monitoring data from the past 4 decades. This will become required text for all Wetland Delineators and SSTS professionals - Fall 2008.

2) Onsite Sewage Treatment Program, 2008. Regional Soils and Landscape Interpretation Guides for Recent Rule Revisions with the Minnesota Subsurface Sewage Treatment Systems Rules. (Based on MGS, SSURGO, Saturation publication, site investigations and a priori information).

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.

**NCERA-3
Missouri Report
2008**

Academic Unit: University of Missouri

Name: Randall J. Miles

Summary of Report: All counties are digitized with all counties on line through the Center for Agriculture, Resources, and Environmental Sciences (CARES) website (<http://soils.missouri.edu/>). The first phase of the update has been completed. The second phase has developed a process for prioritization of information for benchmark soil series. Research projects in phase II has provided an RFP for NRCS and MDNR soil scientists to develop the project. The state soil scientist, MNDR soil survey director, a faculty member from Civil and Environmental Engineering, and myself serve on the project selection and assessment team. Many of the Soil Survey updates are performed on an MLRA basis. The Missouri Soil Characterization Laboratory analyzed over 3,300 samples within the past reporting year.

Research Activities:

- Assessment of fecal coliform dieback in various soils around different pressure-dosed trenches.
- Development of soil potential rating for various onsite wastewater technologies within the four county Truman Lake area.
- Distribution of pressure dosed septic tank effluent with a new innovative distribution technology in claypan soils.
- Influence of slope steepness and aspect on soil development and forest site index for major soils within the Chariton River Hills of north-central Missouri.
- Use of soil morphology to assess planar burrowing activities in a Mandan Village, Double Ditch, Bismarck, North Dakota.
- Assessment of an active carbon field kit with Sanborn Field and Tucker Prairie surface soil samples in concert with the National Soil Survey Laboratory.
- A study on the estimation of claypan soil profile properties by combined proximal and penetrating sensors (D. Brent Myers, Ph.D. student) is being wrapped up by assessing near infrared (NIR), VNIR, and mid infrared (MIR) diffuse reflectance spectroscopy.

Outreach and Extension Development:

- Member of the Committee for Writing the Glossary of Decentralized Wastewater Term, Consortium of Institutes for Decentralized Wastewater Treatment (CIDWT).
- Member of the Committee for Onsite Wastewater Installers Curriculum and Training modules, Consortium of Institutes for Decentralized Wastewater Treatment (CIDWT).
- Technical Advisory Committee, Table Rock Water Quality Inc, Onsite Wastewater Demonstration Project.

- Consortium of Institutes for Decentralized Wastewater Treatment (CIDWT), Executive Board. Currently Chair of University Curriculum Committee.
- Director of the Missouri SmallFlows Wastewater Research and Training Center, developing and delivering training modules on soils and onsite wastewater treatment.
- Missouri Soil Survey Steering Committee
- American Society of Agronomy, Environmental Science Research Award (Chair).
- Missouri Association of Professional Soil Scientists, Education Chair

Publications (2007-2008): Peer-reviewed: 2; abstracts: 2; Dissertations: 1

Deal, N., J. Buchanan, K. Farrell-Poe, M. Gross, D. Gustafson, D. Kalen, B. Lesikar, D. Lindbo, G. Loomis, J. Mechell, R. Miles, and C. O'Neill. 2007. Speaking the Same Language: A Glossary for the Decentralized Wastewater Treatment Field. ASABE Eleventh National Symposium on Individual and Small Community Sewage Systems, ASABE Publication Number 701p1107.

Lesikar, B.J., N. Deal, J. Buchanan, K. Farrell-Poe, D. Gustafson, D. Kalen, D. Lindbo, G. Loomis, and R. Miles. 2007. Decentralized Wastewater Glossary. http://www.onsiteconsortium.org/files/GlossaryFinal_12-19-07pdf. 121 p.

Miles, Randall J., Robert Rubin, and Larry T. West. 2007. Fecal Coliform Numbers Around Pressure Dosed Septic Tank Effluent Soil Trenches in Missouri and North Carolina. ASABE Eleventh National Symposium on Individual and Small Community Sewage Systems, ASABE Publication Number 701p1107.

Motavalli, P.P., M.D. Patton, and R.J. Miles. 2007. Use of Web-Based Student Extension Publications to Improve Undergraduate Student Writing Skills. J. Nat. Resour. Life Sci. Educ. 36:95-102.

Myers, D. Brenton, Newell Kitchen, Kenneth J. Sudduth, Robert A. Sharp, and Randall J. Miles. 2007. Soybean Root Distribution Related to Claypan Soil Properties and Apparent Soil Conductivity. Crop Sci. 47:1498-1509.

Myers, David Brent. 2008. Methods of High-Resolution Soil Landscape Modeling in Midwest Upland Soils. Ph.D Dissertation.

Myers, D.B., Kitchen, N.R., Sudduth, K.A., Grunwald, S., Miles, R.J. Miles, Sadler, E.J., and Udawatta, R. 2008. Combining Proximal and Penetrating Conductivity Sensors for High Resolution Soil Mapping. Intl. Proceedings of the First Global Workshop on High Resolution Digital Soil Sensing and Mapping, February 5-8, Sydney, Australia, 2008 CDROM

Courses Taught: Introduction to Soil Science; Genesis of Soil Landscapes; Pedology; Soil Judging; Special Problems

**NCERA-3
Nebraska State Report
2008**

Academic Unit: School of Natural Resources, University of Nebraska

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

Summary of Report (*limited to no more than 5 sentences or 750 characters including spaces*):

We recently lost MLRA update and maintenance leadership in the Lincoln and Scottsbluff offices. The intent is to fill those positions by late summer 2008. 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. An ongoing priority activity is the implementation of a state-wide legend leading to seamless digital coverage of the state. The state-wide legend will provide to users a digital product that is consistently joined 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 (*bulleted titles of projects, no descriptive text*):

- Loess history of Central Nebraska and restoration strategies for rainwater basins.
- 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 as part of the USGS study.

Mason, J.A., **Joeckel, R.M.**, and Bettis, E.A., 2007, Middle to Late Pleistocene loess record in eastern Nebraska, USA, and implications for the unique record of Oxygen Isotope Stage 2. *Quaternary Science Reviews*, v. 26, p. 773-792.

Miao, X., Mason, J.A., Swinehart, J.B., Loope, D.B., **Hanson, P.R.**, Goble, R.J., Liu, X., 2007, A 10,000-year record of dune activity, dust storms, and drought in the central Great Plains, *Geology* 35, 119-122.

Rawling, J.E., **Hanson, P.R.**, Young, A., 2007, Preliminary optical luminescence ages from eolian sand in the Central Sand Plain of Wisconsin, *Midwest Friends of the Pleistocene Field Trip Guidebook Supplement*

Courses taught (*titles*): Soil Evaluation and Great Plains Field Pedology

**NCERA-3
North Dakota Report
2008**

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

Name: Dr. David G. Hopkins and collaborators at NDSU including Drs. Dean Steele, Frank Casey, and Larry Cihacek.

Summary of Report:

The reorganization of MLRA offices in North Dakota was accomplished in 2007. The four permanent office locations are Bismarck, Dickinson, Devils Lake and Fargo, with a staff of 11 field soil scientists (several are on detail currently). There are 3 open GS-11 positions that will be housed at Fargo, Devils Lake, and Dickinson MLRA offices. Mr. Jerome Shaar was selected as the new MO leader for MO7, his first day was May 25th. It is good to have Jerry back in North Dakota. Several special projects are underway in North Dakota related to soil salinity and digital soil mapping case studies. The USDA/ARS and NRCS salinity project in the northern Red River Valley of Minnesota and North Dakota is continuing with surveying and sampling excursions and a field tour scheduled for mid July this year in Grand Forks County. The Soils and Water Environmental Laboratory ran 676 saturated pastes for this project in the 2007 field season. Tile drainage is continuing to expand in both lacustrine and till parent materials in and adjacent to the Red River Valley. The Plant Sciences Department recently hired an Extension agronomist who is involved in tile drainage research. The ND State Water Commission (SWC) is funding a drainage/subirrigation field test on soils in the southern Red River Valley that involves faculty from the Agricultural and Biosystems Engineering Department and the Soil Science Department. The SWC is also collaborating in-kind by installing wells, piezometers, and sampling stations on the outflow drains. The ND Department of Health will be running all of the water analyses for this project. NRCS staff from the Devils Lake office are involved in a Lidar Digital Soil Mapping project in Walsh County; this is the only county in the state with complete Lidar coverage. The Bismarck office will also be collaborating on the Northern Glaciated Plains Case Study for the Global Soil Information services (GSIS) Initiative which is being directed by the National Geospatial Development Center in Morgantown, WV. The Department of Soil Science will contribute results from detailed catenary studies previously conducted in the Case Study overlap area in north central ND. The ND Geological Survey, the NRCS State Office, and the Department of Soil Science have initiated a cooperative agreement to participate in the North American Geochemical Landscapes project administered by the USGS in Denver. About 120 additional sites will be sampled in this study.

Research Activities:

- “Evaluation of soil factors affecting success of roadbed restoration on the Little Missouri National Grasslands”; Dr. D. Hopkins, Dr. F. Casey, Funding:

USDA/Forest Service-Dakota Prairie Grasslands; Start Date: July 21, 2006, End Date: June 30, 2009

- “Influence of geologic materials and pedogenic processes on trace elements and salinity in soil landscapes”; Dr. David Hopkins; CSREES project ND02356
- “Devils Lake Basin Water Utilization Test Project”; Dr. Dean Steele, Department of Agricultural and Biosystems Engineering, and Dr. David Hopkins, Department of Soil Science; Funding: Devils Lake Basin Joint Water Resource Board; End Date: May 31, 2009
- “Soil organic carbon investigations in Prairie Pothole Wetlands”; Dr. Larry Cihacek, Funding: Ducks Unlimited/PCO2R-USDOE, End Date Sept. 2009

Outreach and Extension Development:

- ND & SD SWCS, PSCAND, and South Dakota Professional Soil Scientists in meeting, October 4th, 2007, Bismarck - Soil Geochemical Initiatives
- National Soil Survey Conference, Madison WI, June 3-8, 2007; presented an overview of Highlights & Recommendations from the NSS-Regional Conference held in Medora, ND in 2006 on the first day of the Conference.

Publications (2006-07): Peer-reviewed journal articles: 1; Abstracts: 2; Thesis: 1

Doolittle J. A., B. Jenkinson, D. Hopkins, M. Ulmer, and W. Tuttle. 2006. Hydrogeological investigations with ground-penetrating radar (GPR): Estimating water-table depths and local ground water flow pattern in areas of coarse-textured soils. *Geoderma* 131:317-329.

Thomson, K. A., Hopkins, D. G., Steele, D. D. and M. E. Sharp. 2007. Soil Morphologic Investigations of the Devils Lake Water Utilization Test Project: GIS Applications. Electronic conference proceedings. Poster presentation at the Manitoba Soil Science Society Conference. Winnipeg. <http://www.gov.mb.ca/agriculture/news/msss/>

Sharp, M. 2007. Establishment of baseline soil salinity trends for the Devils Lake water utilization test project. MS thesis. North Dakota State University. Fargo

Hopkins, D., Manz, L., Ulmer, M., Benedict, P., Norvell, W., Grosz, A., and E. Jensen. 2007. Geochemical distribution of selected elements in north-central North Dakota generalized using soil survey SSURGO data. Poster for Minerals in Soil Landscapes symposium at the Soil Science Society of America Annual Meetings, New Orleans, LA.

Courses taught: Soil Genesis and Survey, Advanced Soil Genesis, Morphology, and Classification; GEOL 496/SOIL 496 Death Valley Field Course, March 10-17, 2007.

NCERA-3
South Dakota Report FY2008
July 2007- June 2008

Academic Unit: SD State University (SD Agricultural Experiment Station, Plant Science Dept.)

Name: Douglas D. Malo (0.75 FTE Teaching/0.25 FTE Research)
Douglas.Malo@sdstate.edu

Summary of Report:

SD has all been mapped and all counties have a published soil survey. Soil surveys updates (MLRAs 60A, 61, 62, 64, 65, and 102A) are being done by the SD Cooperative Soil Survey on a multi-county (MLRA) basis. The field work for Lawrence County is continuing. Working on a project to convert hardcopy soil lab and morphology data to digital format. Fact sheets (technical soil property information) for benchmark soils are being developed. Assisting SD agencies and the NRCS in improving the SD Soil Productivity Rating System. Soil formation and properties are being evaluated in gold mine reclamation area near Lead, SD.

Research Activities (bulleted titles of projects, no descriptive text):

- Mine reclamation and fire impacts on soil genesis and properties in Black Hills of SD.
- Characterized 300+ soil samples for research and NRCS soil survey use.
- Soil property and carbon sequestration changes due to grazing management practices in rangeland (42 pedons being characterized from Pennington County).
- Cooperative soil characterization and plant vegetation study (road salt damage impacts) with Department of Horticulture, Forestry, and Parks and SD Dept of Transportation in Black Hills area.
- Changes in surface soil test levels of P and K since 1950 (county and regional changes).
- Revising SD soil productivity index (PI) values (compare NASIS PI with Yield PI).
- Land management impacts on soil properties after 12+ years of cultivation (corn and soybeans), cool season grasses, and warm season grasses.
- Hawaii (Maui) wetland soils reclamation project for endangered bird species (200 soil samples taken)

Publications/Presentations (7/2007-6/2008): (List of publications available on request)

- 3 peer-reviewed journal articles and 2 other reports
- 4 published abstracts
- 1 lab manual and 1 text for Introductory Soils
- 3 CDs (soils teaching)

Outreach and Extension Development

- Work Planning Conference for the SD Cooperative Soil Survey
- Soils of NE SD USDA-ARS Field Day and NRCS Soil Quality Workshop

Grants (co-investigator/collaborator on all projects listed) received (7/2007-6/2008)

- Gilt Edge Mine Reclamation – US EPA
- Chloride Injury from De-Icing Salts in Trees and Soils in the Black Hills of SD – SDDOT
- Cropping Systems Evaluation for Enhanced Crop Production – SD Crop Improvement
- Biochar Mineralization Rates and Biochar Impacts on Soil Properties (project co-leader, tentative approval from USDOE)

Courses taught: Soils, Soil Judging, Integrated Natural Resource Management, Teaching Experience, Advanced Soil Genesis, Field Studies in Pedology, Undergraduate Research/Scholarship, Special Topics – Soils of Iowa and Texas, and Thesis

List of Selected Publications for South Dakota State University (D. Malo -7/2007 to 6/2008)

Peer-Reviewed

1. Werkmeister, C.E., Malo, D.D., Schumacher, T.E., Doolittle, J.J., and Miller, G.C. 2007. Testing Durability of Acid Rock Passivation to Root System Activity within Greenhouse Columns. Proceedings of the 2007 National Meeting of the American Society of Mining and Reclamation, Gillette, WY, 30 Years of SMCRA and Beyond June 2-7, 2007. R.I. Barnhisel (Ed.) publisher: ASMR, 3134 Montavesta Rd., Lexington, KY 40502.
2. Papiernik, S. K., Lindstrom, M. J., Schumacher, T. E., Schumacher, J. A., Malo, D. D., and Lobb, D. A. 2007. Characterization of Soil Profiles in a Landscape Affected by Long-Term Tillage. *Soil Tillage Research* 93:335-345.
3. Malo, D.D. 2008. Internet Sources of Basic Soils Information. *In* (Logsdon, S.D., D. Clay, D. Moore, and T. Tsegaye, Eds.) *Soil science: A step-by-step analysis*. SSSA, Madison, WI.

Published Abstracts

1. Werkmeister, C., Schumacher, T., Malo, D., and Doolittle, J. 2007. Aggregate Stability of Reclaimed Minesoils versus Native Soil. 2007 International ASA-CSSA-SSSA Annual Meeting. Published Abstracts. New Orleans, LA, November 4-8, 2007. (<http://a-c-s.confex.com/crops/2007am/techprogram/P37159.HTM>).
2. Kunze, B.O., Malo, D., and Werkmeister, C.E. 2007. Characterizing Soil Variability of a Research Farm Using Order 1 Soil Survey on Loess Covered Till Plain. 2007 International ASA-CSSA-SSSA Annual Meeting. Published Abstracts. New Orleans, LA, November 4-8, 2007. (<http://a-c-s.confex.com/crops/2007am/techprogram/P36135.HTM>).
3. Malo, D.D. 2007. [Web Soil Survey – A Search Engine for Modern Detailed Soil Survey Information](#). Plant Science/NCARL Seminar. Plant Science Department. South Dakota State University. http://media2.sdstate.edu/plantsci/Archive_20071116.wmv.
4. Gilmanov, T.G., Meyers, T.P., Wylie, B.K., Smart, A.J., Detwiler, A.G., Malo, D., Heuer, M.W., Johnson, P.S., Brehe, K., and Zhang, L. 2007. Carbon Dioxide Fluxes in Grassland Ecosystems of South Dakota: Flux Tower Measurements, Modeling, GIS, and Remote Sensing. SD Academy of Science Published Abstracts.

Teaching Publications/CDs

1. Malo, D.D., Clay, D.E., and Reese, C.L.. 2007. *Soils Laboratory Manual*. 36th Edition. Plant Sci. Dept. SDSU. Brookings 57007-2141.
2. Malo, D.D. 2007. *Soils*. 8th Edition. Plant Science Dept., SDSU, Brookings. 57007-2141.

3. Malo, D., and C. Werkmeister. 2007. National NACTA Collegiate Soil Judging Contest Photos. Hutchinson, KS (April). Pedology CD 07-1. Plant Science Department. South Dakota State University. Brookings. 57007 -2141.
4. Malo, D., and C. Werkmeister. 2007. Regional ASA Collegiate Soil Judging Contest Photos, Griswold, IA (October). Pedology CD 07-2. Plant Science Department. South Dakota State University. Brookings. 57007-2141.
5. Malo, D.D., Blodgett, S., and V. Owens. 2007. SDSU Foundation Opportunities Farm, Lennox, SD Final Reports (ABS 475 Class). Pedology CD 07-3. Plant Science Department. South Dakota State University. Brookings. 57007-2141.

Other Reports

1. Malo, D.D. 2007. Felt Farm Initial Information. Plant Science Department. South Dakota State University. Brookings. SD. 57007-2141. Cooperative report with NRCS.
2. Malo, D.D. 2007. Custom Soil Resource Report for Potential New Research Farm, Brookings, County, SD. Plant Science Department, South Dakota State University. Brookings. 57007-2141. Cooperative report with NRCS.