National Cooperative Soil Survey

NCSS Newsletter

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In This Issue—

Editor's Note

Issues of this newsletter are available on the World Wide Web (http://soils.usda.gov/). Under Quick Access, click on NCSS, then on Newsletters, and then on the desired issue number.

You are invited to submit stories for this newsletter to Stanley Anderson, National Soil Survey Center, Lincoln, Nebraska. Phone—402-437-5357; FAX—402-437-5336; email—stan.anderson@lin.usda.gov.

NRCS Soil Scientists Receive National Awards

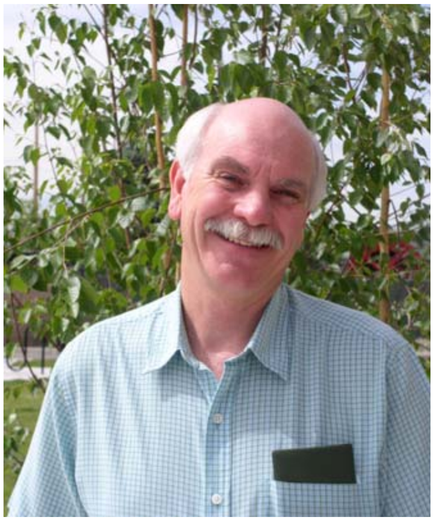
By Linda Greene, Public Affairs Specialist, Executive Communications Branch, NRCS, Washington, D.C.

WASHINGTON, DC—Two USDA Natural Resources Conservation Service (NRCS) soil scientists and a soil scientist from the National Park Service (NPS) recently received national recognition from the National Cooperative Soil Survey (NCSS) for their outstanding work in the field of soil survey.

Thomas McKay, soil data quality specialist in the NRCS office in Reno, Nevada, was named NCSS Soil Scientist of the Year, and James Doolittle, research soil scientist working in NRCS office in Newtown Square, Pennsylvania, was honored with the NCSS Soil Scientist Achievement Award. They joined Peter Biggam, soils program coordinator for the National Park Service, Boise, Idaho, who received the NCSS Cooperative Achievement Award.

"I cannot stress enough the importance of each person's work and the value of soil survey and all it does in relationship to sustaining our natural resources," said Bruce Knight, chief of the Natural Resources Conservation Service. "Where it not for these individuals and others like them in the profession of soil science, the quality of our lives would suffer," Knight added. "Whether it's the air we breathe, the water we drink, or the food we eat, the quality and quantity of these resources would be greatly compromised."

Jim Doolittle at work.



Tom McKay

McKay was honored for a career of excellence that demonstrated proficiency in all aspects of the soil survey program, including mapping, manuscripts, correlation, classification, investigation, interpretations, and database. Doolittle was recognized as one of the world's leading experts in the use of ground-penetrating radar techniques and applications in relationship to soil survey work. Biggam received recognition for his dedication to and support of soil survey mapping on National Park Service lands as well as advancing new technology in soils investigation.

The NCSS is a nationwide partnership of federal, regional, state, and local agencies and institutions. NRCS has the lead in this partnership, which works together to investigate, inventory, document, classify, and interpret soils and to distribute, publish, and promote the use of soils information. The work of the NCSS is carried out on national, regional, and state levels. The NCSS has partnered with the federal government in support of soil work since 1899. ■

West Virginia Soil Survey Staff Works to Confirm Forest Soil Fertility Differences

By Stephen G. Carpenter, State Soil Scientist/ MLRA Region 13 Staff Leader, USDA, Natural Resources Conservation Service, Morgantown, West Virginia ("In Solum Nos Fides").

For the tenth year, field soil scientists in West Virginia met to tackle a big job. This year, they sampled forest soils in unstudied areas in MLRA 127. During the week, they were able to sample eight benchmark soils in Fayette, Nicholas, Raleigh, and Webster Counties in MLRA 127. MLRA 127, which encompasses several million acres in West Virginia, includes some of the best hardwood forest in the world. The soil scientists also held their quarterly staff meeting, offered evening seminars as training sessions, and collected two soil monoliths.

The forest products industry is vital to the economy of West Virginia and Appalachia. Since 1995, NRCS soil scientists in West Virginia have been sampling some of the most extensive forest soil types as they occur by kind of parent material. The samples are evaluated by a system of total elemental analysis, which allows the staff to examine relationships of soil nutrient content to the forest type and growth rates. The soil scientists have found that there are marked fertility differences among the forest soils that they mapped and that these differences coincide with differences in the dominant forest types growing on those soils.

This is not a big surprise because we know that differences in forest site quality occur and that these differences are related to soils. In the past,

Soil Survey Staff prepares a sample of the Laidig series, an important forest soil in the region, for laboratory analysis.

however, we lacked the data to incorporate into soil survey reports. We hope that forest managers will now pay more attention to our information. We needed more data to verify the reliability of our information, and we got these data this week. We know that the development of these data will significantly improve the soil information available to managers in the forest products industry.

The staff used Camp Washington-Carver as their base of operations. This camp is listed on the National Register of Historic Places and serves as West Virginia's mountain cultural arts center. The facility nurtures the cultural heritage that has been embodied in the site since its dedication in 1942 as a 4-H Camp for West Virginia's African-American youth. The camp's Great Chestnut Lodge is the largest log structure of its kind in the world. It makes this site a favorite place for the soils staff to stay. It is affordable, and we love staying there. We work hard, and we have fun. We also get a lot of work done. ■

Writing About Soils

By Pattie West, Editor, NRCS, Region 10 MLRA Office, St. Paul, Minnesota.

When a group of soil scientists is standing around talking, chances are they'll be using a whole set of terminology I like to refer to as Soil Scientist Shorthand. "This is a silt loam surface soil with a 30-inch water table on bottoms," says one. "It's in trees with 3 percent surface stones."

All of the other soil scientists know exactly what he means.

These days, when much emphasis is placed on soils information that is generated automatically from a database, the ability to communicate about soils effectively in writing seems to have become a lost art.

In addition to Soil Scientist Shorthand, many have taken to speaking in a kind of Database Element Language. "Flood plain on valley" is an example.

There is an important difference between the language used among one's peers and language that clearly conveys information to the general reading public. ■

A Loss to Nevada Soil Survey

The following tribute was e-mailed to various soil scientists in the West. It was written by William E. Dollarhide, State Soil Scientist/MLRA Region 3 Staff Leader, USDA, Natural Resources Conservation Service, Reno, Nevada.

Over the weekend I received word Lou Langan had died, presumingly from lung cancer.

I believe Lou left Nevada in late 1968, when he went to the Soils Staff at the NTC in Portland, OR. It is unlikely any of you had the opportunity to work with him in the field, but several of you have had the opportunity to be in training sessions in which Lou was involved.

I believe Lou was a cornerstone to the development of Soil Survey in Nevada. He served as State Correlator from the mid-50s to 1968, during the development of the 7th Approximation and the New Classification System. If you did not know Lou, I ask that you pick up any of the surveys from Nevada published during the 60s or 70s, and you will see the impact Lou had on soil surveys in the state.

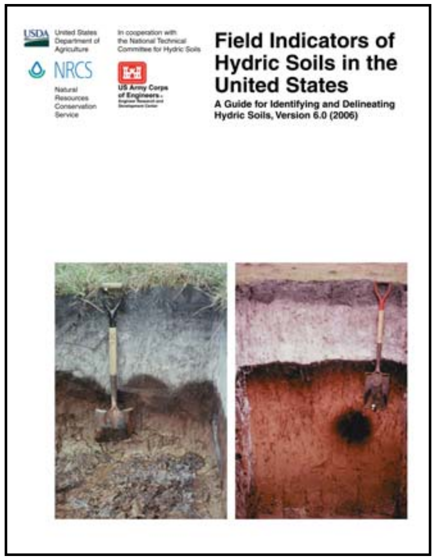
If you will bear with me, I'll share a couple of stories that molded my perception of Lou Langan. In 1968, when I was a soil scientist in California, I had the opportunity to go on a detail to the Lake Tahoe Basin, a survey that covered parts of California and Nevada. Early in the process, a coordination meeting was held. It included Dick Huff, Soil Correlator from California; Grant Kennedy, Area Soil Specialist, California; Lou Langan, Correlator, Nevada; and the crew. When I was introduced to Lou, there was a familiarity, but I could not place where I had seen him before. Sometime about midweek, it occurred to me that he had been a referee at one of my high school basketball games, had made what I believed to be a terrible call, and had quickly run over right in front of me, almost daring me to comment. That evening, after several drinks, I asked Lou if he was a referee. He confirmed that he was, so I told him he had made a bad (substituted word) call. He grinned and said, " I almost got you for a technical too." My first test.

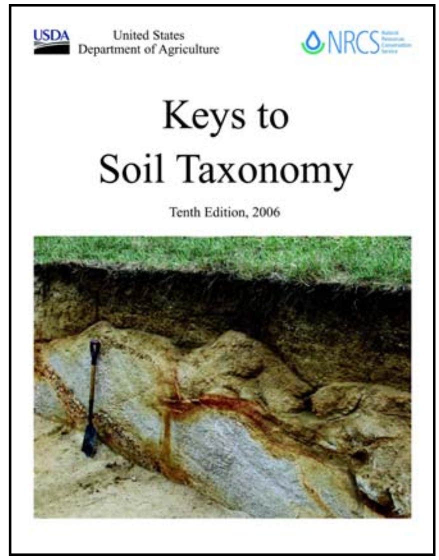
In 1969, when I came to Nevada as a project leader, the field work had been finished and Eddie Spencer was the new correlator. Lou come down from Portland to give Eddie and me a quick whirlwind tour of the soils and concepts in the survey. At one of the stops, Lou and I got into an extended debate about the classification of one of the pedons and the practicality of that classification. Later I said something to Eddie about it, and he said, "Oh, he knew you were right; he just wanted to find out how much you knew, and how far you would defend it." Second test.

Last story. A couple of years later, I went to Portland for a Soil Mechanic's class that Lou was teaching. I felt like I had a "pick-on-me" sign on my forehead. If I did not know the answer, Lou pointed out how critical that information was. If I did know the answer, he pointed out all the other possible concerns. Once again, he had got me to learn more than I had intended.

So when you are describing a soil

out on a landscape and the classification fits and it seems to fit ecologically, tip your cap and give a little thanks to Lou in whatever manner is comfortable for you. If you were at a training session and got picked on and learned a little more about soil behavior or about filling out a Soils 5 form, tip your cap and give a special thanks to Lou. He will be missed! ■





Three Key Documents in Press

By Stanley P. Anderson, Editor, NRCS, National Soil Survey Center, Lincoln, Nebraska.

The Soil Survey Division is printing three key documents this summer. These are *Field Indicators of Hydric Soils in the United States: A Guide for Identifying and Delineating Hydric Soils*, Version 6.0; *Keys to Soil Taxonomy*, 10th edition; and *Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin* (USDA Handbook 296).

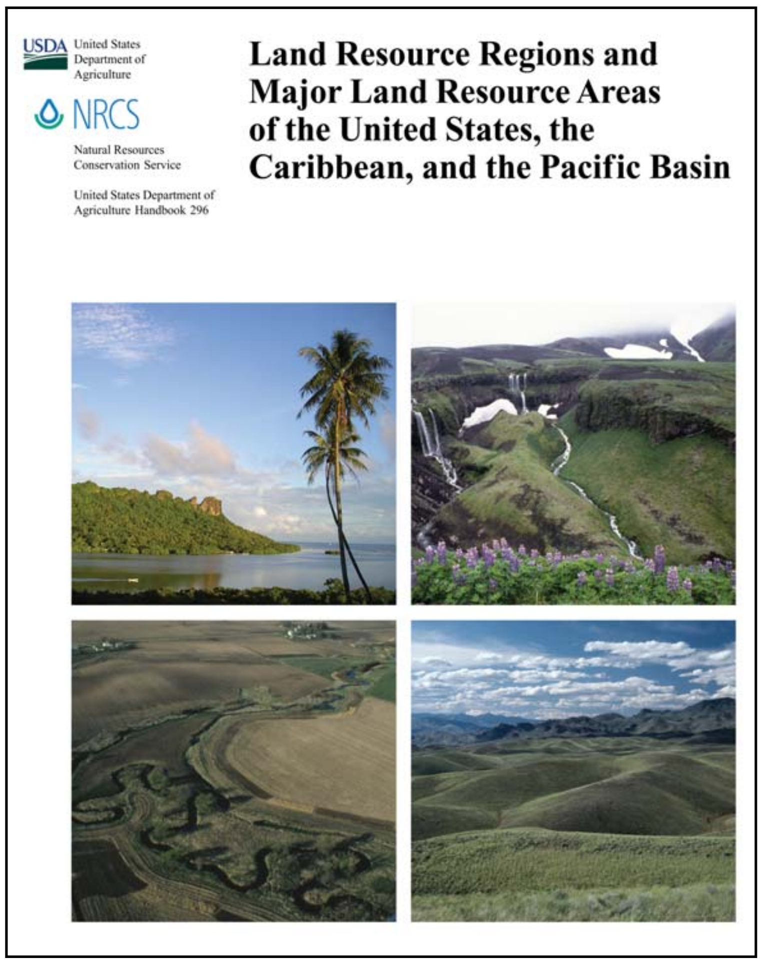
CD versions of these publications will be available at the 18th World Congress of Soil Science, July 9-15, 2006, Philadelphia, Pennsylvania. A limited number of hard copies of the *Keys to Soil Taxonomy* also will be available at the World Congress.

For Web versions, see—

Field Indicators of Hydric Soils in the United States (2.6 MB): http://soils.usda.gov/use/hydric/

Keys to Soil Taxonomy (3.9 MB): http://soils.usda.gov/technical/classification/tax_keys/keys.pdf

Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin (11.5 and 27.7 MB): http://soils.usda.gov/survey/geography/mlra/index.html ■



Russ Kelsea at his retirement party. Does this man look happy?

Russ' retirement cake.

Another view of the cake.

Russ Kelsea Retires

Russ Kelsea retired May 3, 2006, after more than 34 years of federal service. Russ began his career as an engineering student trainee in Sullivan County, New Hampshire. Following a change in academic major from engineering to soil science, Russ served 2 more years as a student trainee in the soil conservationist series before entering full-time service as a soil scientist in Hillsborough County, New Hampshire.

Russ worked in several counties throughout New Hampshire, participated in a soil mapping detail to Minnesota, and completed a Master of Science degree before moving to Fort Collins, Colorado, as principal business analyst for the National Soil Information System (NASIS) project.

During the reorganization in 1995, Russ accepted a position at the National Soil Survey Center, where he served as NASIS coordinator and national soil data steward. In 2001, Russ was selected as National Leader for Soil Survey Technical Services, the position from which he is retiring. Russ plans to return to New Hampshire to hike, canoe, and work on a family camp while looking for new challenges and opportunities.

On May 1, 2006, the National Soil Survey Center celebrated Russ' retirement with a coffee. The cake prepared for this occasion acknowledged one of Russ' hobbies—flying his own plane. ■

Carol Franks Retires

Carol Franks retired effective May 3, 2006. Carol began her career as a soil scientist in Utah. She came to Lincoln as part of the MNTC's soil and range team. She later joined the Quality Assurance Staff at the National Soil Survey Center. Carol served briefly as the State Soil Scientist in Arizona before returning to the Center as a research soil scientist. Before her retirement, she was on the Soil Survey Technical Services Staff. ■

IRIS Tubes—A New Technology for Documenting Saturation and Reduction in Soils

By Craig Ditzler, NRCS, National Leader for Soil Classification & Standards, National Soil Survey Center, Lincoln, Nebraska.

Documentation of saturation and reduction in soils with aquic conditions is necessary for soil classification and is critical for identifying hydric soils for wetland delineation or mitigation projects. Two features common to wet soils are saturation and development of anaerobic conditions. As microbes respire, they deplete the oxygen in the soil. With the loss of oxygen as an available electron acceptor in this biological process, other elements (especially iron, which is commonly abundant) perform this function. As iron is transformed from the oxidized (Fe^3) to the reduced (Fe^2) state, it becomes mobile and may be depleted from one location in the soil and moved to another. Where it comes in contact with oxygen again, it returns to the oxidized (immobile state) and will accumulate. The result is the familiar gray and red patterns of redox depletions and concentrations in the soil (fig. 1).

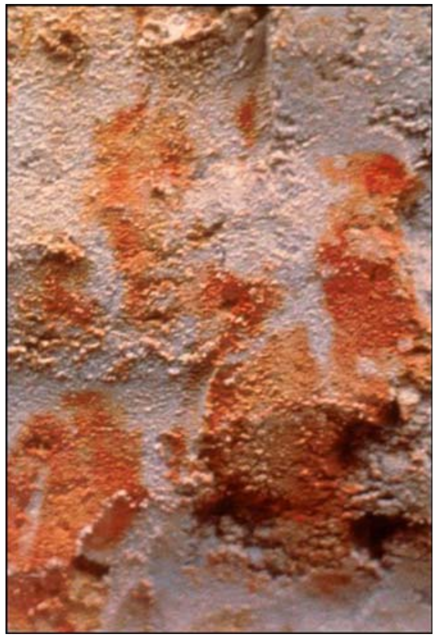


Figure 1.— Redox depletions (gray) and accumulations (red).

Soil scientists have generally had three main alternatives for documenting that a soil is periodically saturated and reduced. They can observe the morphology of the soil expressed in redoximorphic features, they can test for a reaction with alpha-alpha dipyridyl dye, or they can make measurements of water table depth and duration with a piezometer and redox potential with platinum electrodes. Each of these alternatives has advantages and disadvantages. Redox morphology is present throughout the year, so even if the water table is below the depth of observation on the day you observe the soil, the morphology attests to the fact that the soil has been saturated and reduced within the zone of observation. The morphology, however, is a reflection of the soil-forming processes over an extended time period (often hundreds to thousands of years), so there is always the possibility that the morphology was developed under wet conditions that are not contemporary (i.e., "relict features"). Alpha-alpha dipyridyl dye is quick and easy to use, but you must be present to perform the test when the soil is in the reduced state. Direct measurement of saturation and reduction with piezometers and platinum electrodes is relatively expensive and requires a high level of technical training. The equipment (but not necessarily the person) must be present during the time when the soil is saturated and reduced, so it may take a few months or a year or more to reach a conclusion about the site.

A relatively new alternative for documenting saturation and reduction in soil has been gaining attention. It is called "Indicator of Reduction in Soils" (IRIS). It was first described in a Ph.D. dissertation by Jenkinson (2002) and later was described in a publication by Jenkinson and Franzmeier (2006). The procedure is fairly simple. A PVC tube 1/2 inch in diameter is coated with ferrihydrite paint and inserted into the ground to a sufficient depth to be within the zone of anticipated saturation and reduction. If the soil is in fact saturated and reduced, the iron in the ferrihydrite paint will be reduced and stripped from the tube, leaving portions of the tube uncoated. This process mimics the natural process of iron reduction and redoximorphic feature formation in the soil. It still requires that the tubes be installed and remain in the ground during the period of expected saturation and reduction, but it has the distinct advantage of being fairly inexpensive and easy to perform. The resulting morphology confirms that the redox processes causing the removal of the ferrihydrite paint are contemporary.

A recent article describing a field study by Castenson and Rabenhorst

(2006) does a nice job of validating the procedure and providing information for reliably interpreting the results obtained with IRIS technology for their study area. Here is what they found.

The study was conducted at three sites within the Piedmont physiographic region of Maryland and Delaware. PVC tubes 1/2 inch in diameter and 24 inches in length were coated with a ferrihydrite paint. Two tubes were installed at each of 20 stations and left in the ground for 12 to 32 days. When the tubes were removed, they were replaced with new tubes. A total of 150 tubes were installed over the course of the 4-month study period. Instruments at each site recorded water table depth and soil temperature. Soil redox potential and pH were measured at depths of 4, 8, 12, 16, and 20 inches every 2 to 3 weeks. Upon removal of a tube, three digital photographs were taken. The tube was turned 120 degrees (one-third turn) after each of the first two pictures were taken. The three photos for each tube were cropped and joined, producing a two-dimensional photo of the tube's surface. The percent of the tubes surface with the paint removed could then be estimated by comparing the image to standard aerial percent charts. Estimates of paint removal were made for each 4-inch segment of each tube, corresponding to the depths of redox potential measurements described above. Because measurements of saturation and redox potential were made, the authors were able to determine whether each of the 4-inch tube segments was in a reducing or oxidizing environment in the soil. They could then compare the extent of paint removal with these known conditions. Their analysis showed that for the tube sections with an estimated paint removal of 10 percent, 81 percent were in a reducing environment and 19 percent were in an oxidizing environment. For those with an estimated paint removal of 20 percent, 87 percent were in a reducing environment and 13 percent were in an oxidizing environment. When 30 percent or more of the paint was removed, 100 percent of the tube sections were in a reducing environment. These results suggest that where about 25 percent of the paint is removed, one could say with a high level of confidence that the soil was recently saturated and reduced.

I suspect that as time goes on the use of this IRIS technology will become more popular as a way to monitor soils to confirm or refute the occurrence of saturation and reduction. The National Technical Committee for Hydric Soils is considering the inclusion of IRIS tubes as an acceptable method to document that a soil meets the criteria in the hydric soil standard. A Google search currently revealed just one commercial site where tubes can be purchased. The current cost of between $40 and $50 per IRIS tube may limit the routine use of the tubes in soil survey data-gathering operations, but this cost may be of little concern for hydric soil determinations and wetland delineation activities within the private sector.

References

Castenson, K.L., and M.C. Rabenhorst. 2006. Indicator of reduction in soils (IRIS): Evaluation of a new approach for assessing reduced conditions in soil. Soil Science Society of America Journal 70: 1222-1226.

Jenkinson, B. 2002. Indicators of reduction in soils (IRIS): A visual method for the identification of hydric soils. Ph.D. Dissertation (abstract # AAT 3104964) Purdue University, West Lafayette, IN.

Jenkinson, B.J., and D.P Franzmeier. 2006. Development and evaluation of iron-coated tubes that indicate reduction in soils. Soil Science Society of America Journal 70: 183-191.

Note: The two SSSAJ articles listed above can be accessed for free from any computer with a ".gov" address. Go to the National Agricultural Library (www.nal.usda.gov) and click on "Digitop." ■

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